

*Proposal for*

# Region 4 Education Service Center (“ESC”)

HVAC Equipment, Installation, Service & Related Products



**TDIndustries**

*At the Heart of Your Building*

July 14, 2020

**COPY WITHOUT  
CONFIDENTIAL INFORMATION**



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# TAB 1 - DRAFT CONTRACT AND OFFER AND CONTRACT SIGNATURE FORM

## TAB 1 CONTENTS:

### APPENDIX A

#### A. TERMS AND CONDITIONS ACCEPTANCE FORM (APPENDIX B)

# APPENDIX A

## APPENDIX A

### DRAFT CONTRACT

This Contract ("Contract") is made as of \_\_\_\_\_, 201X by and between TDIndustries, Inc. ("Contractor") and Region 4 Education Service Center ("Region 4 ESC") for the purchase of HVAC Equipment, Installation, Service and Related Products ("the products and services").

### RECITALS

WHEREAS, Region 4 ESC issued Request for Proposals Number R\_\_\_\_\_ for \_\_\_\_\_ ("RFP"), to which Contractor provided a response ("Proposal"); and

WHEREAS, Region 4 ESC selected Contractor's Proposal and wishes to engage Contractor in providing the services/materials described in the RFP and Proposal;

WHEREAS, both parties agree and understand the following pages will constitute the Contract between the Contractor and Region 4 ESC, having its principal place of business at 7145 West Tidwell Road, Houston, TX 77092.

WHEREAS, Contractor included, in writing, any required exceptions or deviations from these terms, conditions, and specifications; and it is further understood that, if agreed to by Region 4 ESC, said exceptions or deviations are incorporated into the Contract.

WHEREAS, this Contract consists of the provisions set forth below, including provisions of all attachments referenced herein. In the event of a conflict between the provisions set forth below and those contained in any attachment, the provisions set forth below shall control.

WHEREAS, the Contract will provide that any state and local governmental entities, public and private primary, secondary and higher education entities, non-profit entities, and agencies for the public benefit ("Public Agencies") may purchase products and services at prices indicated in the Contract upon the Public Agency's registration with OMNIA Partners.

- 1) Term of agreement. The term of the Contract is for a period of three (3) years unless terminated, canceled or extended as otherwise provided herein. Region 4 ESC shall have the right to renew the Contract for two (2) additional one-year periods or portions thereof. Region 4 ESC shall review the Contract prior to the renewal date and notify the Contractor of Region 4 ESC's intent renew the Contract. Contractor may elect not to renew by providing three hundred sixty-five days' (365) notice to Region 4 ESC. Notwithstanding the expiration of the initial term or any subsequent term or all renewal options, Region 4 ESC and Contractor may mutually agree to extend the term of this Agreement. Contractor acknowledges and understands Region 4 ESC is under no obligation whatsoever to extend the term of this Agreement.
- 2) Scope: Contractor shall perform all duties, responsibilities and obligations, set forth in this agreement, and described in the RFP, incorporated herein by reference as though fully set forth herein.

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- 3) Form of Contract. The form of Contract shall be the RFP, the Offeror's proposal and Best and Final Offer(s).
- 4) Order of Precedence. In the event of a conflict in the provisions of the Contract as accepted by Region 4 ESC, the following order of precedence shall prevail:
  - i. This Contract
  - ii. Offeror's Best and Final Offer
  - iii. Offeror's proposal
  - iv. RFP and any addenda
- 5) Commencement of Work. The Contractor is cautioned not to commence any billable work or provide any material or service under this Contract until Contractor receives a purchase order for such work or is otherwise directed to do so in writing by Region 4 ESC.
- 6) Entire Agreement (Parol evidence). The Contract, as specified above, represents the final written expression of agreement. All agreements are contained herein and no other agreements or representations that materially alter it are acceptable.
- 7) Assignment of Contract. No assignment of Contract may be made without the prior written approval of Region 4 ESC. Contractor is required to notify Region 4 ESC when any material change in operations is made (i.e. bankruptcy, change of ownership, merger, etc.).
- 8) Novation. If Contractor sells or transfers all assets or the entire portion of the assets used to perform this Contract, a successor in interest must guarantee to perform all obligations under this Contract. Region 4 ESC reserves the right to accept or reject any new party. A change of name agreement will not change the contractual obligations of Contractor.
- 9) Contract Alterations. No alterations to the terms of this Contract shall be valid or binding unless authorized and signed by Region 4 ESC.
- 10) Adding Authorized Distributors/Dealers. Contractor is prohibited from authorizing additional distributors or dealers, other than those identified at the time of submitting their proposal, to sell under the Contract without notification and prior written approval from Region 4 ESC. Contractor must notify Region 4 ESC each time it wishes to add an authorized distributor or dealer. Purchase orders and payment can only be made to the Contractor unless otherwise approved by Region 4 ESC. Pricing provided to members by added distributors or dealers must also be less than or equal to the Contractor's pricing.

## 11) TERMINATION OF CONTRACT

- a) Cancellation for Non-Performance or Contractor Deficiency. Region 4 ESC may terminate the Contract if purchase volume is determined to be low volume in any 12-month period. Region 4 ESC reserves the right to cancel the whole or any part of this Contract due to failure by Contractor to carry out any obligation, term or condition of the contract. Region 4 ESC may issue a written deficiency notice to Contractor for acting or failing to act in any of the following:
  - i. Providing material that does not meet the specifications of the Contract;
  - ii. Providing work or material was not awarded under the Contract;
  - iii. Failing to adequately perform the services set forth in the Scope of Work and specifications;

# APPENDIX A

- iv. Failing to complete required work or furnish required materials within a reasonable amount of time;
- v. Failing to make progress in performance of the Contract or giving Region 4 ESC reason to believe Contractor will not or cannot perform the requirements of the Contract; or
- vi. Performing work or providing services under the Contract prior to receiving an authorized purchase order.

Upon receipt of a written deficiency notice, Contractor shall have ten (10) days to provide a satisfactory response to Region 4 ESC. Failure to adequately address all issues of concern may result in Contract cancellation. Upon cancellation under this paragraph, all goods, materials, work, documents, data and reports prepared by Contractor under the Contract shall immediately become the property of Region 4 ESC.

- b) Termination for Cause. If, for any reason, Contractor fails to fulfill its obligation in a timely manner, or Contractor violates any of the covenants, agreements, or stipulations of this Contract Region 4 ESC reserves the right to terminate the Contract immediately and pursue all other applicable remedies afforded by law. Such termination shall be effective by delivery of notice, to the Contractor, specifying the effective date of termination. In such event, all documents, data, studies, surveys, drawings, maps, models and reports prepared by Contractor will become the property of the Region 4 ESC. If such event does occur, Contractor will be entitled to receive just and equitable compensation for the satisfactory work completed on such documents.
- c) Delivery/Service Failures. Failure to deliver goods or services within the time specified, or within a reasonable time period as interpreted by the purchasing agent or failure to make replacements or corrections of rejected articles/services when so requested shall constitute grounds for the Contract to be terminated. In the event Region 4 ESC must purchase in an open market, Contractor agrees to reimburse Region 4 ESC, within a reasonable time period, for all expenses incurred.
- d) Force Majeure. If by reason of Force Majeure, either party hereto shall be rendered unable wholly or in part to carry out its obligations under this Agreement then such party shall give notice and full particulars of Force Majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied upon, and the obligation of the party giving such notice, so far as it is affected by such Force Majeure, shall be suspended during the continuance of the inability then claimed, except as hereinafter provided, but for no longer period, and such party shall endeavor to remove or overcome such inability with all reasonable dispatch.

The term Force Majeure as employed herein, shall mean acts of God, strikes, lockouts, or other industrial disturbances, act of public enemy, orders of any kind of government of the United States or the State of Texas or any civil or military authority; insurrections; riots; epidemics; landslides; lighting; earthquake; fires; hurricanes; storms; floods; washouts; droughts; arrests; restraint of government and people; civil disturbances; explosions, breakage or accidents to machinery, pipelines or canals, or other causes not reasonably within the control of the party claiming such inability. It is understood and agreed that the settlement of strikes and lockouts shall be entirely within the discretion of the party having the difficulty, and that the above requirement that any Force Majeure shall be remedied with all reasonable dispatch shall not require the settlement of strikes and lockouts by acceding to the demands of the opposing party or parties when such settlement is unfavorable in the judgment of the party having the difficulty.

- e) Standard Cancellation. Region 4 ESC may cancel this Contract in whole or in part by providing written notice. The cancellation will take effect 30 business days after the other party receives the notice of cancellation. After the 30th business day all work will cease following completion of final purchase order.



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- 12) Licenses. Contractor shall maintain in current status all federal, state and local licenses, bonds and permits required for the operation of the business conducted by Contractor. Contractor shall remain fully informed of and in compliance with all ordinances and regulations pertaining to the lawful provision of services under the Contract. Region 4 ESC reserves the right to stop work and/or cancel the Contract if Contractor's license(s) expire, lapse, are suspended or terminated.
- 13) Survival Clause. All applicable software license agreements, warranties or service agreements that are entered into between Contractor and Region 4 ESC under the terms and conditions of the Contract shall survive the expiration or termination of the Contract. All Purchase Orders issued and accepted by Contractor shall survive expiration or termination of the Contract.
- 14) Delivery. Conforming product shall be shipped within 7 days of receipt of Purchase Order. If delivery is not or cannot be made within this time period, the Contractor must receive authorization for the delayed delivery. The order may be canceled if the estimated shipping time is not acceptable. All deliveries shall be freight prepaid, F.O.B. Destination and shall be included in all pricing offered unless otherwise clearly stated in writing.
- 15) Inspection & Acceptance. If defective or incorrect material is delivered, Region 4 ESC may make the determination to return the material to the Contractor at no cost to Region 4 ESC. The Contractor agrees to pay all shipping costs for the return shipment. Contractor shall be responsible for arranging the return of the defective or incorrect material.
- 16) Payments. Payment shall be made after satisfactory performance, in accordance with all provisions thereof, and upon receipt of a properly completed invoice.
- 17) Price Adjustments. Should it become necessary or proper during the term of this Contract to make any change in design or any alterations that will increase price, Region 4 ESC must be notified immediately. Price increases must be approved by Region 4 ESC and no payment for additional materials or services, beyond the amount stipulated in the Contract shall be paid without prior approval. All price increases must be supported by manufacturer documentation, or a formal cost justification letter. Contractor must honor previous prices for thirty (30) days after approval and written notification from Region 4 ESC. It is the Contractor's responsibility to keep all pricing up to date and on file with Region 4 ESC. All price changes must be provided to Region 4 ESC, using the same format as was provided and accepted in the Contractor's proposal.

Price reductions may be offered at any time during Contract. Special, time-limited reductions are permissible under the following conditions: 1) reduction is available to all users equally; 2) reduction is for a specific period, normally not less than thirty (30) days; and 3) original price is not exceeded after the time-limit. Contractor shall offer Region 4 ESC any published price reduction during the Contract term.

- 18) Audit Rights. Contractor shall, at its sole expense, maintain appropriate due diligence of all purchases made by Region 4 ESC and any entity that utilizes this Contract. Region 4 ESC reserves the right to audit the accounting for a period of three (3) years from the time such purchases are made. This audit right shall survive termination of this Agreement for a period of one (1) year from the effective date of termination. Region 4 ESC shall have the authority to conduct random audits of Contractor's pricing at Region 4 ESC's sole cost and expense. Notwithstanding the foregoing, in the event that Region 4 ESC is made aware of any pricing

# APPENDIX A

being offered that is materially inconsistent with the pricing under this agreement, Region 4 ESC shall have the ability to conduct an extensive audit of Contractor's pricing at Contractor's sole cost and expense. Region 4 ESC may conduct the audit internally or may engage a third-party auditing firm. In the event of an audit, the requested materials shall be provided in the format and at the location designated by Region 4 ESC.

- 19) Discontinued Products. If a product or model is discontinued by the manufacturer, Contractor may substitute a new product or model if the replacement product meets or exceeds the specifications and performance of the discontinued model and if the discount is the same or greater than the discontinued model.
- 20) New Products/Services. New products and/or services that meet the Scope of Work may be added to the Contract. Pricing shall be equivalent to the percentage discount for other products. Contractor may replace or add product lines if the line is replacing or supplementing products, is equal or superior to the original products, is discounted similarly or greater than the original discount, and if the products meet the requirements of the Contract. No products and/or services may be added to avoid competitive procurement requirements. Region 4 ESC may require additions to be submitted with documentation from Members demonstrating an interest in, or a potential requirement for, the new product or service. Region 4 ESC may reject any additions without cause.
- 21) Options. Optional equipment for products under Contract may be added to the Contract at the time they become available under the following conditions: 1) the option is priced at a discount similar to other options; 2) the option is an enhancement to the unit that improves performance or reliability.
- 22) Warranty Conditions. All supplies, equipment and services shall include manufacturer's minimum standard warranty and one (1) year labor warranty unless otherwise agreed to in writing.
- 23) Site Cleanup. Contractor shall clean up and remove all debris and rubbish resulting from their work as required or directed. Upon completion of the work, the premises shall be left in good repair and an orderly, neat, clean, safe and unobstructed condition.
- 24) Site Preparation. Contractor shall not begin a project for which the site has not been prepared, unless Contractor does the preparation work at no cost, or until Region 4 ESC includes the cost of site preparation in a purchase order. Site preparation includes, but is not limited to: moving furniture, installing wiring for networks or power, and similar pre-installation requirements.
- 25) Registered Sex Offender Restrictions. For work to be performed at schools, Contractor agrees no employee or employee of a subcontractor who has been adjudicated to be a registered sex offender will perform work at any time when students are or are reasonably expected to be present. Contractor agrees a violation of this condition shall be considered a material breach and may result in the cancellation of the purchase order at Region 4 ESC's discretion. Contractor must identify any additional costs associated with compliance of this term. If no costs are specified, compliance with this term will be provided at no additional charge.
- 26) Safety measures. Contractor shall take all reasonable precautions for the safety of employees on the worksite and shall erect and properly maintain all necessary safeguards for protection of workers and the public. Contractor shall post warning signs against all hazards created by

# APPENDIX A

its operation and work in progress. Proper precautions shall be taken pursuant to state law and standard practices to protect workers, general public and existing structures from injury or damage.

- 27) Smoking. Persons working under the Contract shall adhere to local smoking policies. Smoking will only be permitted in posted areas or off premises.
- 28) Stored materials. Upon prior written agreement between the Contractor and Region 4 ESC, payment may be made for materials not incorporated in the work but delivered and suitably stored at the site or some other location, for installation at a later date. An inventory of the stored materials must be provided to Region 4 ESC prior to payment. Such materials must be stored and protected in a secure location and be insured for their full value by the Contractor against loss and damage. Contractor agrees to provide proof of coverage and additionally insured upon request. Additionally, if stored offsite, the materials must also be clearly identified as property of Region 4 ESC and be separated from other materials. Region 4 ESC must be allowed reasonable opportunity to inspect and take inventory of stored materials, on or offsite, as necessary. Until final acceptance by Region 4 ESC, it shall be the Contractor's responsibility to protect all materials and equipment. Contractor warrants and guarantees that title for all work, materials and equipment shall pass to Region 4 ESC upon final acceptance.
- 29) Funding Out Clause. A Contract for the acquisition, including lease, of real or personal property is a commitment of Region 4 ESC's current revenue only. Region 4 ESC retains the right to terminate the Contract at the expiration of each budget period during the term of the Contract and is conditioned on a best effort attempt by Region 4 ESC to obtain appropriate funds for payment of the contract.
- 30) Indemnity. Contractor shall protect, indemnify, and hold harmless both Region 4 ESC and its administrators, employees and agents against all claims, damages, losses and expenses arising out of or resulting from the actions of the Contractor, Contractor employees or subcontractors in the preparation of the solicitation and the later execution of the Contract. Any litigation involving either Region 4 ESC, its administrators and employees and agents will be in Harris County, Texas.
- 31) Marketing. Contractor agrees to allow Region 4 ESC to use their name and logo within website, marketing materials and advertisement. Any use of Region 4 ESC name and logo or any form of publicity, inclusive of press releases, regarding this Contract by Contractor must have prior approval from Region 4 ESC.
- 32) Certificates of Insurance. Certificates of insurance shall be delivered to the Region 4 ESC prior to commencement of work. The Contractor shall give Region 4 ESC a minimum of ten (10) days' notice prior to any modifications or cancellation of policies. The Contractor shall require all subcontractors performing any work to maintain coverage as specified.
- 33) Legal Obligations. It is Contractor's responsibility to be aware of and comply with all local, state, and federal laws governing the sale of products/services and shall comply with all laws while fulfilling the Contract. Applicable laws and regulation must be followed even if not specifically identified herein.

# APPENDIX A

## OFFER AND CONTRACT SIGNATURE FORM

The undersigned hereby offers and, if awarded, agrees to furnish goods and/or services in strict compliance with the terms, specifications and conditions at the prices proposed within response unless noted in writing.

Company Name TDIndustries, Inc.

Address 9525 Derrington Rd.

City/State/Zip Houston, TX 77064

Telephone No. 713-996-3121

Email Address crystal.seiler@tdindustries.com

Printed Name Crystal Seiler

Title PST Manager

Authorized signature 

**Accepted by Region 4 ESC:**

Contract No. \_\_\_\_\_

Initial Contract Term \_\_\_\_\_ to \_\_\_\_\_

\_\_\_\_\_  
Region 4 ESC Authorized Board Member

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Region 4 ESC Authorized Board Member

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name

# APPENDIX B

## Appendix B

### TERMS & CONDITIONS ACCEPTANCE FORM

Signature on the Offer and Contract Signature form certifies complete acceptance of the terms and conditions in this solicitation and draft Contract except as noted below with proposed substitute language (additional pages may be attached, if necessary). The provisions of the RFP cannot be modified without the express written approval of Region 4 ESC. If a proposal is returned with modifications to the draft Contract provisions that are not expressly approved in writing by Region 4 ESC, the Contract provisions contained in the RFP shall prevail.

**Check one of the following responses:**

- Offeror takes no exceptions to the terms and conditions of the RFP and draft Contract.

*(Note: If none are listed below, it is understood that no exceptions/deviations are taken.)*

- Offeror takes the following exceptions to the RFP and draft Contract. All exceptions must be clearly explained, reference the corresponding term to which Offeror is taking exception and clearly state any proposed modified language, proposed additional terms to the RFP and draft Contract must be included:

*(Note: Unacceptable exceptions may remove Offeror's proposal from consideration for award. Region 4 ESC shall be the sole judge on the acceptance of exceptions and modifications and the decision shall be final.)*

If an offer is made with modifications to the contract provisions that are not expressly approved in writing, the contract provisions contained in the RFP shall prevail.)

Section/Page	Term, Condition, or Specification	Exception/Proposed Modification	Accepted (For Region 4 ESC's use)
Section 1, 2 page 55	4% Administrative Fee	see the following page. <b>Letter is proprietary</b>	
		Please see TCPN CPN Letter to TCPN Members from last TCPN RFP as example given from TD's exception letter	
	Certified Proposal Number System	TD needs the CPN system to stay in place for tracking purposes to OMNIA members and to provide consistency, transparency, and compliance to our customers.	

## TAB 2 - PRODUCTS AND PRICING

### TAB 2 CONTENTS:

COMPLETE PRICING INFORMATION **Given upon request, Proprietary.**

ALL EQUIPMENT THAT TDINDUSTRIES WILL SERVICE AND REPAIR

# BONDING - SURETY LETTER



Ward & Moore | insurance services  
Commercial Insurance & Bonds

July 1, 2020

**RE: TDIndustries, Inc. - Bonding Confirmation**

To Whom It May Concern:

As the bonding agent for TDIndustries, Inc., we are pleased to present you with this letter of confirmation regarding the ongoing strength of TDIndustries' bonding relationship.

Bonds are provided to TDIndustries by the Zurich Surety Group, through its affiliated companies: Fidelity & Deposit Company of Maryland and Zurich American Insurance Company. The Zurich Surety Group and its affiliated companies maintain an AM Best Rating of A+ XV ("Superior"). On a combined basis, the Zurich Surety Group maintains a US Treasury listing in excess of \$638,000,000.

TDIndustries enjoys an extremely positive 28 year relationship with Zurich Surety. During this period of time TDIndustries has performed exceptionally well on all bonded projects.

The Zurich bonding facility comfortably supports TDIndustries on single projects up to the \$100,000,000 range, with a total backlog range of \$450,000,000. TDIndustries has on occasion exceeded these bonding parameters, and our agency has never failed to provide the surety credit required of their construction operations.

This letter is presented as a surety bond program confirmation. It is not a bid bond, nor is it an assumption of liability by any of the parties referenced herein. Should you award a contract to TDIndustries; then, based on contract documents satisfactory to both TDIndustries and the Surety, including but not limited to, reasonable terms and conditions as respects the completion date, penalties, bond forms and project financing, we are prepared to execute performance and payment bonds on their behalf - upon the request of TDIndustries, Inc.

TDIndustries, Inc. is an extremely well managed company, with an exceptional reputation, and we are pleased to highly recommend their quality construction services to your organization. Should you require additional information, please feel free to contact us at (214) 221-8300.

Very truly yours,

Douglas Moore, President  
Ward & Moore Insurance Services  
Attorney-in-fact: Fidelity & Deposit Company of Maryland  
Zurich American Insurance Company

# Air Handling

<b>Type (e.g., central station-manufactured or custom makeup air, fan filter, coil sections):</b>	Virtually unlimited  Mixed Air Single Path, Mixed Air Dual Path, 100% outside air Single Path, 100% outside air Duct Path, Variable-Speed, Drives, Heat Pipes, Heat Wheels, Fixed-plate Heat, Exchangers, High R-Value Insulation, High-Efficiency Motors, Preheat Coil, Heating Coil Cooling Coil, Supply Fan, Air Flow Station, Humidifier Discharge Static Pressure sensors, Exhaust, Mixed Air Damper, Airflow Stations
<b>Brand Name(s):</b>	Ex. Johnson Controls/York
<b>Fan Types (e.g., Backward incline, Forward curve, Airfoil):</b>	Fan Coil/Blower Coils, Package AHUs, Modular AHUs, Custom AHUs, Fan Wall, Backward incline, Forced, Pull Through, Airfoil
<b>Capacity Range (CFM):</b>	0 to 100,000 CFM
<b>Heating Medium (Electric, Gas, Steam, Hot Water):</b>	Electric, Gas, Steam, Hot Water, Re-Heat
<b>Cooling Medium (DX, Chilled Water):</b>	DX, Chilled Water
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Waynesboro, Pennsylvania
<b>Range of Efficiencies:</b>	Motors - 98% Efficiency
<b>Estimated Market Share (North America):</b>	30%
<b>Provide example data on each type of product provided:</b>	Please see Attachment A starting on page 49
<b>Detail Features and Benefits:</b>	<p><b>Mass Customization</b> - AHUs deliver custom-like performance and flexibility as well as being faster and more economical than was previously possible</p> <p><b>Design Flexibility</b> - Offers variable-aspect-ratio sizing, plus a wide range of component/material choices</p> <p><b>Faster Delivery</b> - Sophisticated computer engines speed-up the custom-manufacturing process of Johnson Controls AHUs</p> <p><b>Flexible Factory-Packaged Controls</b> - No more limited control configurations: designers can now customize them to meet application requirements</p>
<b>Other Manufacturers:</b>	Carrier, McQuay, Rheem, Ruud, Goodman, Lennox, Magic Aire, York, Johnson Controls, etc.



# *Air Terminal Devices and Heating Products*

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<b>Type (e.g., VAV, Fan coils, Unit ventilators, Unit heaters, Fin tube radiation/convectors):</b>	Virtually unlimited  Electronic Variable-Speed Drive, Fan Coil Units, Heating and Cooling Coils, FlexSys Underfloor Air Systems, Unit, Ventilators, Variable-Air-Volume Terminals, Airside Technical Services, Single Duct Terminal
<b>Brand Name(s):</b>	Ex. Johnson Controls/York
<b>Capacity Range (CFM):</b>	0-6,000
<b>Heating Medium (Electric, Gas, Steam, Hot Water):</b>	Electric, Gas, Steam, Hot Water
<b>Cooling Medium (DX, Chilled Water):</b>	DX, Chilled Water
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Waynesboro, Pennsylvania
<b>Estimated Market Share (North America):</b>	30%
<b>Provide example data on each type of product provided:</b>	Please see Attachment B starting on page 57
<b>Detail Features and Benefits:</b>	<p><b>Precise Zone Control</b></p> <p><b>Design Flexibility</b></p> <p><b>Lasting Components and Low Cost Operation</b></p> <p><b>A Variety of Controls</b></p> <p><b>Patented Flow Star Sensor Control</b></p> <p><b>Unique Electric Heat Design</b></p>
<b>Other Manufacturers:</b>	Carrier, McQuay, Rheem, Ruud, Goodman, Lennox, Magic Aire, Johnson Controls, Greenheck, Trane, etc.

# Boilers & Water Heaters

<b>Type (e.g., modulating, condensing, cast iron, water tube, packaged, other):</b>	Virtually unlimited
<b>Brand Name(s):</b>	Ex. AERCO, Condensing Unit
<b>Capacity Range (CFM):</b>	Boilers 750-Mb h to 6000 Mb h; Water Heaters - 600 Mb h - 1350 Mb h
<b>Heating Medium (Electric, Gas, Steam, Hot Water):</b>	Gas, Propane, Dual Fuel
<b>Standard Warranty (Parts and Labor):</b>	Parts only-pressure vessel/heat exchanger is 10 years non-prorated, Control panel is 2 years. 18 months all other components
<b>Optional Warranty (components covered and labor):</b>	As per customer needs. Can create a customized optional warranty.
<b>Estimated Lead/Delivery Time:</b>	4 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Vlauvelt, NY USA
<b>Range of Efficiencies:</b>	94-99%
<b>Estimated Market Share (North America):</b>	40%
<b>Provide example data on each type of product provided:</b>	Please see Attachment C starting on page 87 and Attachment D starting on page 97
<b>Detail Features and Benefits:</b>	<p>Reliability:</p> <ul style="list-style-type: none"> <li>» Superior Construction Materials</li> <li>» Advanced Design and Components</li> <li>» Warranty</li> </ul> <p>Installation Advantages:</p> <ul style="list-style-type: none"> <li>» Venting Versatility</li> <li>» Space-Saving Design</li> <li>» Zero Side Clearance</li> </ul> <p>Environmental Advantages</p> <ul style="list-style-type: none"> <li>» O2 Monitoring System</li> <li>» Low NOx burner</li> </ul> <p>Advanced Controls:</p> <ul style="list-style-type: none"> <li>» C-More</li> <li>» Remote Data Collection</li> <li>» Boiler Management System</li> </ul>
<b>Other Manufacturers:</b>	Hydro Therm, Precision Boilers, RBI Water Heaters, Superior Boilers, etc.

# Cooling Towers

<b>Type (e.g., open, closed, evaporative, other):</b>	Open, closed, evaporative, air cooled, hybrid
<b>Brand Name(s):</b>	Ex. Evapco
<b>Capacity Range (tons):</b>	Up to 5,000 Tons
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	10 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Taneytown, Maryland
<b>Range of Efficiencies:</b>	493 to 21,960 kw
<b>Estimated Market Share (North America):</b>	20%
<b>Provide example data on each type of product provided:</b>	Please see Attachment E starting on page 111
<b>Detail Features and Benefits:</b>	<ul style="list-style-type: none"> <li>Principle of operation</li> <li>IBC Compliant</li> <li>Easy Field Rigging</li> <li>Efficient Drift W/eliminators</li> <li>EVAPAK® Fill</li> <li>Superior Air Inlet Louver and Screen Design</li> <li>Reduced Piping Costs</li> <li>Pressurized Water Distribution System</li> <li>Optimum Design for Freezing Climates</li> <li>Fast, On-Time Shipments</li> </ul>
<b>Other Manufacturers:</b>	Delta cooling, Armstrong, Evaptech, Marley, Kemrock, Paltech

# DDC Controls

<b>Type (e.g., core components, end devices, lighting, panels):</b>	Tridium Niagara AX Web-based Multi-protocol Building Management Platform with Distech, Vykon or Siemens Talon equipment controllers
<b>Brand Name(s):</b>	Ex. Tridium
<b>System Protocol (BACnet, LonWorks, Proprietary or Combo):</b>	BACnet LonWorks
<b>LAN Communication Structure (Peer-to-peer, Polling):</b>	MSTP I/P Peer to peer
<b>Human Machine Interface (HMI) types (PC, Notebooks, Handheld terminals):</b>	All systems installed by TDIndustries are web accessible using most popular browsers  Access via mobile devices
<b>Third Party Interface (Drivers and Gateways):</b>	All building automation systems installed by TDIndustries utilizes open protocols  In retrofit applications, integration to existing proprietary automation systems is done using protocol drivers and hardware gateways
<b>Remote Alarm and Message Capabilities:</b>	Remote alarming available via email or text message
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 5 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Tridium primary manufacturing facility Richmond, VA, USA
<b>Estimated Market Share (North America):</b>	40%
<b>Provide example data on each type of product provided:</b>	Please see Attachment F starting on page 117
<b>Detail Features and Benefits:</b>	Full integration capability for BACnet, LonWorkds, Modbus and other widely used protocols  Distributed digital controls for HVAC, lighting and mechanical window shades  Energy management programs, utility metering, data management  UL864 rated smoke controls
<b>Other Manufacturers:</b>	Trane, Johnson Controls, ABB, BAC, Liebert, York, Distech, Siemens Talon

# Energy Services

<p><b>Type (e.g., Energy Tracking, Energy Analysis, Evaluation fo Potential Upgrades, Demand Response, Rebates and others):</b></p>	<p>Energy Savings Performance &amp; Management Solutions.</p> <ul style="list-style-type: none"> <li>» Energy auditing and facility assessment</li> <li>» In-house Design Engineering and Specification</li> <li>» Construction Project Management</li> <li>» Continuous Commissioning</li> <li>» Ongoing Maintenance and Support Services</li> <li>» Guaranteed Savings Performance Monitoring and Verification</li> <li>» Facility Staff and Occupant Training</li> <li>» Financing Procurement Support</li> <li>» Surge Protection</li> </ul>
<p><b>Define Processes for eachtype of energy services:</b></p>	<p>Energy Auditing and Facility Assessment</p> <ul style="list-style-type: none"> <li>» Preliminary Audit-Expert modeling and analysis of baseline energy usage and savings</li> <li>» Detailed Energy Audit-Project development and economic analysis</li> </ul> <ul style="list-style-type: none"> <li>• In-house Design Engineering and Specification</li> <li>• Construction Project Management <ul style="list-style-type: none"> <li>» Procurement of materials and trade labor</li> <li>» Safety coordination by our in-house Certified Safety Professional and OSHA-Authorized Trainer</li> </ul> </li> <li>• Continuous Commissioning</li> <li>• Ongoing Maintenance and support Services</li> <li>• Guaranteed Savings Performance Monitoring and Verification <ul style="list-style-type: none"> <li>» Performance guarantee backed by a history of financial strength, organizational longevity</li> </ul> </li> <li>• Facility Staff and Occupant Training</li> <li>• Financing Procurement Support</li> </ul> <p>Including Identifying and securing all available grants, rebates, and incentives available to offset Project costs.</p>
<p><b>Certifications of Personnel:</b></p>	<p>Certified Energy Manager - Association of Energy Engineers</p>
<p><b>List key personnel (factory, subcontract, others):</b></p>	<p>All work is performed internally</p> <p>Ken Scheepers - Project Manager III  Chuck Swallow - VP of National Accounts  Randy Heidrich - Sr. Manager Operations</p>
<p><b>References (public sector only):</b></p> <p><b>Additional References and details available upon request</b></p>	<p>University of Texas at Arlington  Guaranteed Savings: \$11,480,960 / 10 years  Bobby Kirby, Director of Energy and Mechanical Ops  817.272.9392</p> <p>Denton Independent School District  Actual Savings: \$3,928,625 / 3 years &amp; 38 M Gallons of Water  Paul Andress  Director of Operations  940.369.0230</p>
<p><b>Case Studies describing benefits of services:</b></p>	<p>Please see the following pages.</p>



## Growing energy footprint requires improved monitoring

Texas Tech University has big energy needs. The university has a growing student population exceeding 36,000 and a campus spanning 1,839 acres. To rein in its energy costs, Texas Tech turned to TDIndustries to tackle this challenge through smart data tracking technology.

In 2000, Texas Tech began tracking its energy consumption in an effort to understand how and where energy was being used. Throughout the years, the university has developed a broad energy management program, which is aligned with Texas Government Code, Chapter 447.

In 2013, Texas Tech contracted with TDIndustries and utiliVisor, an energy management firm, to analyze the real-time operating data gathered from the various university energy plants and provide recommendations for energy efficiency. In 2017, TD began campus utility metering services, providing meter installation, monitoring and reporting for a wide range of energy sources including electricity, steam, steam condensate, chilled water, irrigation and domestic water.

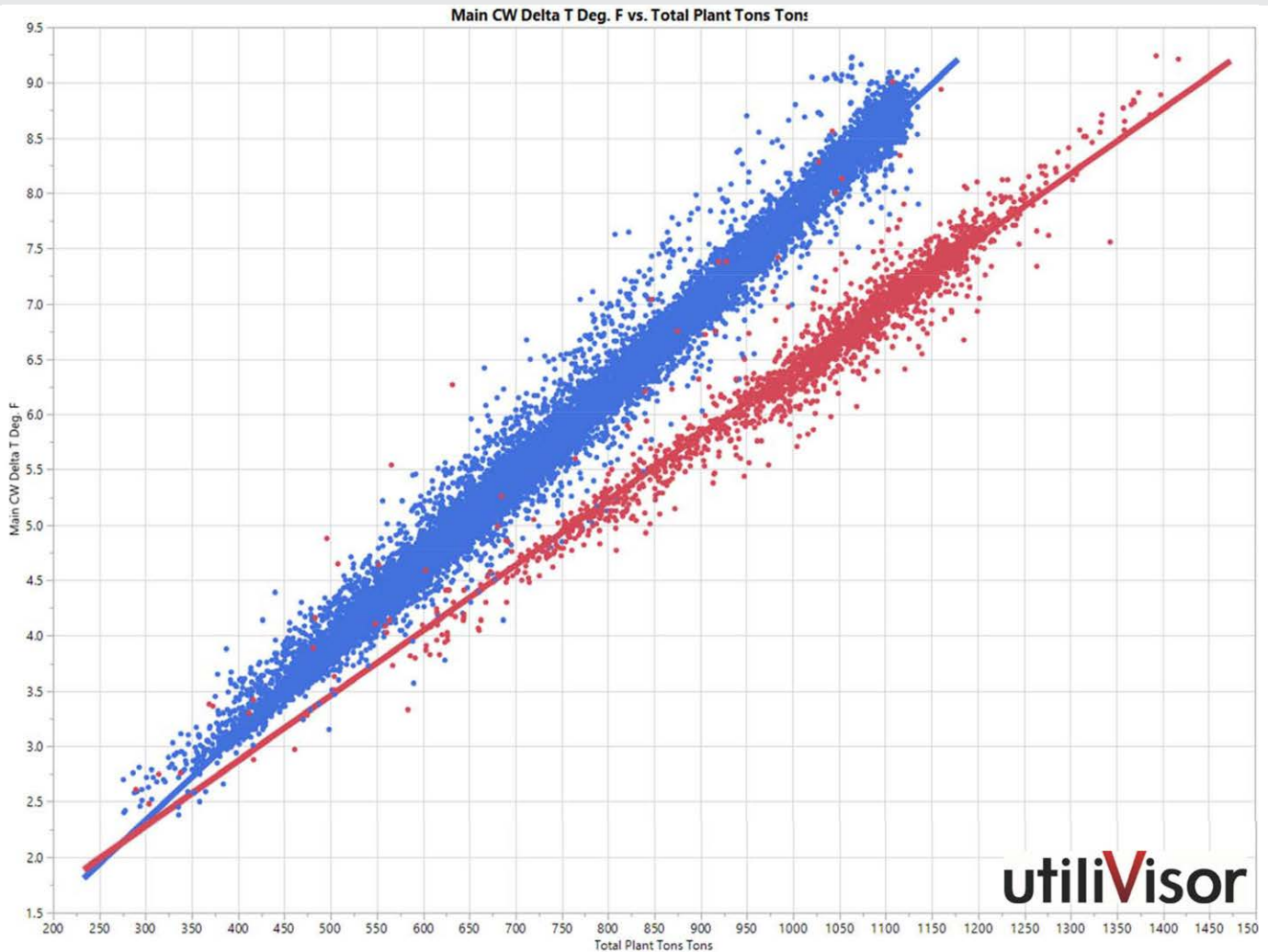
TD works in partnership with Texas Tech's Building & Construction Department, which oversees the metering program, to identify upgrades or new meters needed on a building-by-building basis. TD installs the meters and runs the electrical supply and energy source to the meter. The meters are tied into data drops provided by Texas Tech. During a meter installation, the energy supply must be completely shut down, which requires close coordination with all affected departments to minimize any impacts to campus operations.

[tdindustries.com](http://tdindustries.com)

### The TDIndustries Difference

- Metering installation, monitoring, and reporting for a wide variety of energy sources
- Smart data collection technology to understand and control energy consumption
- Dedicated Partners who take ownership of campus energy performance
- System troubleshooting to quickly identify issues with timely solutions
- Continuous quality service and access to specialty knowledge that would be too expensive to maintain internally





TD uses utiliVisor software to analyze real-time operating data from Texas Tech’s mechanical plants. Many of the reports are similar to this example, which compare the plant’s efficiency against industry benchmarks.

Once the meter is complete, the meter is integrated into the utiliVisor database for data collection. Using the different views of this versatile, state-of-the-art system, TD provides regular reports on:

- Consumption per meter
- Consumption per building
- Consumption throughout the campus

In addition, TD closely monitors campuswide energy systems to alert the university of any usage spikes or trends that may indicate a potential problem or risk.

Texas Tech uses the collected information to balance the energy plant loads and integrate the data into its eSight Energy Accounting System. This specially designed system is used for campuswide monitoring and billing for non-educational buildings and common spaces, such as the student union. The information helps the university understand its energy consumption and costs and aids in

the development of new energy saving initiatives.

Since 2000, Texas Tech’s overall Energy Use Index (EUI), which tracks all energy used on campus, has shown a 37 percent decrease in energy usage, and from 2008 through 2018, the university reported \$18 million in energy savings and an 18 percent reduction in the university’s overall carbon footprint. Through close monitoring and analysis of its energy consumption metrics, Texas Tech has significantly reduced its energy consumption while expanding campus facilities to meet the needs of the increasing student population. Today, Texas Tech is recognized as a leader in energy efficiency, providing mentorship and lessons learned for other universities.

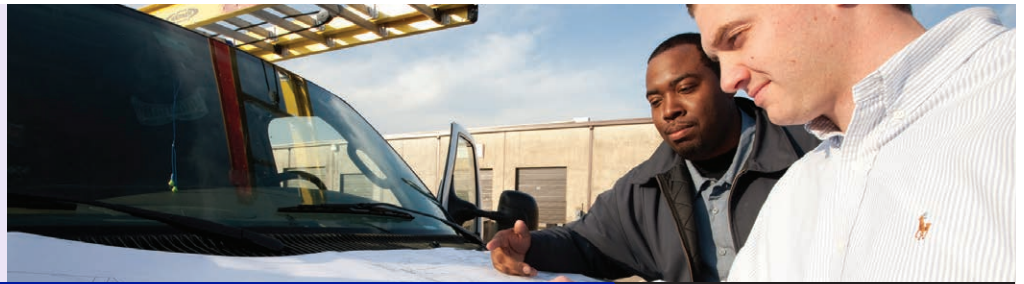
TDIndustries is proud to support Texas Tech and work in partnership to provide innovative solutions to help meet their energy performance goals.

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**TD Industries**  
Attachment B-6.1



## Energy Solutions

“Our commitment to innovation and sustainability in all aspects of energy-efficient planning and implementation ultimately means one thing for you: extended life for your plant and facilities with an optimal environment – and minimized environmental impact.”



### The TD Industries Difference

- Guaranteed reduced operating costs
- Tenant comfort and satisfaction grow exponentially
- TDLINKS Energy Audit pays back every cent+
- Extend the life of systems you already have
- Attain and retain your energy accreditation
- Empower highly accurate predictive budgeting

### The Face of Sustainability

TD Industries (TD) is able to offer the most energy-efficient and environmentally sound solutions in the industry today because we've been committed to learning, adapting and applying new technologies as they are developed for a long time. Innovation drives our company. And a commitment to increasing sustainability drives every project we undertake for you.

Combine our commitment to sustainability and expanding innovation with powerful new means of collecting and analyzing data in real time. That's what we've done over the past 10 years, and we've worked tirelessly to exponentially increase the extent of our customers' control over facilities – all to reduce energy consumption and operating costs.

TD offers a full arsenal of energy solutions that includes a powerful array of energy audits and assessments, energy engineering, retrofitting, continuous commissioning, measurement and verification, building management systems and controls, and even financing to help your facility run cost effectively. It is in the optimal integration of all these initiatives that the sustainability of any building is maximized.

### Energy Retrofits

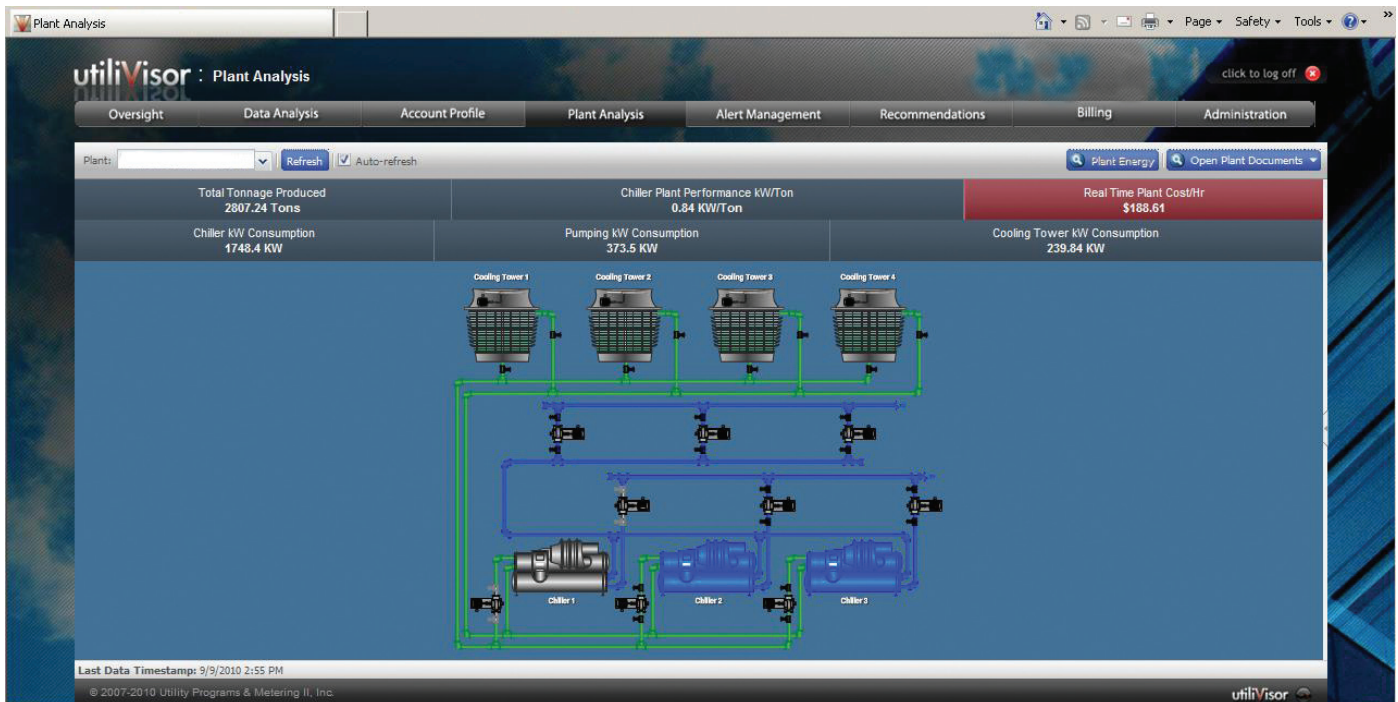
If you operate an older building, you know how they can waste energy and burn capital. TD offers excellent services to modernize older, inefficient equipment operations, reduce utility, maintenance and operating costs, improve comfort, safety and compliance, and redirect capital to other needs.



tdindustries.com







## New Buildings

Maximizing sustainability from the inception of a new building demands broad expertise and a singular focus on quantifiable ROI in all areas – cost, energy, time and more. Our goal is to offer our new building customers a no-risk business proposition with guaranteed savings, and verifiable results against worldwide standard protocols. Any shortfall can be made up by TD.

With our dedicated team of Certified Energy Managers, LEED-Accredited Professionals, Registered Professional Engineers and analysts, boasting memberships in EPA Green Light and Energy Star programs, we keep green objectives front and center when working on your project.

## Building Oversight

For large, mission-critical chiller plants and CHP (Combined Heating and Power) environments, our utiliVisor™ building oversight strategy yields exponential savings and performance benefits related to the most complex and critical components of a facilities infrastructure. An expert team of operating engineers works with your staff to coordinate and manage this web-based, continuous oversight tool that:

- Monitors, presents and analyzes key facility indicators – 24/7
- Leverages TD's extensive operations expertise
- Offers utility cost reductions of 5 to 25 percent
- Rescues and redeploys funds from inefficiencies back to your business

## Green Solutions That Mean Green Savings

For many customers, a determination to pursue green solutions begins with a routine maintenance or emergency service call that reveals a significant energy "challenge."

With precision metrics, and thorough data collection and analysis, we identify potential systemic and operational improvements to your sustainability. Better still, we have the depth of expertise necessary to ensure sensible, cost-effective implementation of those solutions.

Our commitment to innovation and sustainability in all aspects of energy-efficient planning and implementation ultimately means one thing for you: extended life for your plant and facilities with an optimal environment – and minimized environmental impact.

## TDLINKS "Clicks" for You

No matter how big, small, new or old your systems might be, odds are you just don't know exactly what is driving your energy usage. How could you? With TDLINKS Energy Audit, you'll find out and be given a choice of actions to improve your efficiency. Our audit can chart the exact performance of your current or planned facility and then spell out how to optimize.

We start with an ASHRAE Level II audit, where we assess all controls and intelligent integrated systems. We report our findings to you, along with good/better/best optimization recommendations. Then our service teams implement the energy-efficiency and cost-saving measures accordingly. And all can be realized at no or low cost as operating expense or self-funded capital expense enhancements. Because the optimizations pay for themselves in reduced energy costs!

Contact us today to explore just how green your operations can be with our full range of energy solutions.

Count on TD to give you the sustainable advantage for the good of your building – and the planet.

# TD SUPPORTS HIGH-IMPACT GROWTH AT DENTON ISD



## Background

Founded in 1882, Denton Independent School District sits roughly 30 miles north of Dallas. One of the fastest-growing school districts in the nation, Denton ISD has grown its campus space from 3.5 million sf to more than 6 million sf since 2007. With 45 K-12 schools and educational facilities, it has counted on TDIndustries to maintain and operate these facilities for 29 years.

## Challenges

Denton ISD's growth has been great for development, but also has come with growing pains. The school district has additional utility and energy costs, as well as increases in energy monitoring costs. With so many new buildings rising every year, the district quickly became overwhelmed with its manual monitoring method. One Denton ISD employee was calling every campus each month, then sending the bills to TD's engineering team to plug into a spreadsheet. Through this inefficient process, data was often 6-8 months behind.

## Solutions

TDIndustries provided two ways to combat these challenges:

**Growing its facility maintenance team:** As the district grew, TD's commitment did as well. TD flexed its labor and monitoring services to adequately fit the district's growing needs. With trained, onsite maintenance personnel, TD could control costs more efficiently than relying on service agreements. Currently, 25 Partners maintain and operate Denton ISD facilities.

**Provide energy monitoring services:** Using TD's energy tracking platform, TD automated the energy usage data and easily identified potential savings, problematic outliers, and improvements.

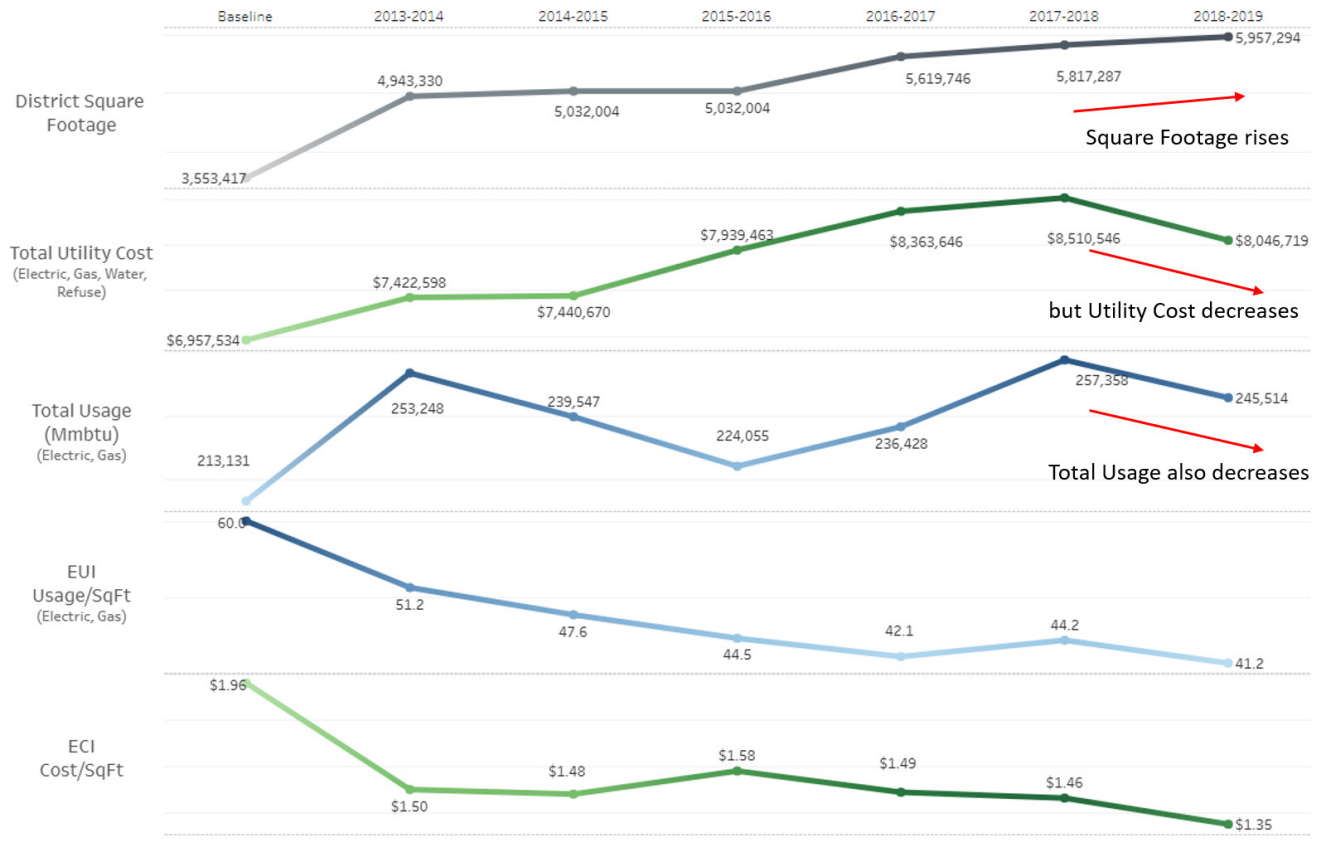
### Benefits of IFM for Denton ISD

- Cost reduction/mitigation
- Improved efficiency
- Right-sized support
- Utility monitoring
- Predictable cost structure
- Minimize backlog
- Single point of contact
- Growth options for employees

# TD PROVIDES SAVINGS OPPORTUNITIES FOR DENTON ISD



## Utility Performance Trends



Between 2018 and 2019, total square footage rose, but utility costs and total energy usage decreased.

## Results

In 2018, TDIndustries saved Denton ISD almost \$130,000 in utility bill savings – enough to hire two additional teachers, Superintendent Jamie Wilson said. These savings occurred while the total portfolio size increased from 5.8 million sf in 2018, to 5.95 in 2019. In that same time frame, total utility cost decreased from \$8.5 million to \$8 million, and total usage decreased from 257,358 million btu to 245,514. Additionally, TD’s energy monitoring service reduced natural gas costs by 25 percent. Beyond energy monitoring, TD’s energy tracking

program helped to identify a water usage spike. TD identified this data outlier as a water leak and promptly fixed it. Without the software, the utility company estimated that 10,000 gallons of water would have leaked before the problem would have been identified.

“We really work hard to find as many innovative ways as possible to get resources in the classroom,” Wilson said.

“One of the ways you do that is by having good partners who can help you do the different pieces that aren’t necessarily educating students, but they’re important for the work we do.”



# Equipment Parts and Supplies

<b>Type (e.g., Manufactured parts, emergency parts, miscellaneous material and supplies and other):</b>	Manufactured parts, emergency parts, miscellaneous material and supplies
<b>Brand Name(s) stocked:</b>	Virtually unlimited. As specified by Customer or Customer Preference
<b>Location of stocking parts:</b>	Various
<b>Standard Warranty (Parts and Labor):</b>	One year labor and parts
<b>Optional Warranty (Components covered and Labor):</b>	Up to 10 years labor and parts
<b>Estimated Lead/Delivery Time:</b>	Varies depending on equipment parts/supplies selected
<b>Percentage of locally stocked parts to delivered parts:</b>	TDIndustries does not keep on hand parts or supplies. We utilize JIT supply chain management and are able to utilize our purchasing power to obtain parts in a timely manner.
<b>Detail Features and Benefits:</b>	Varies depending on equipment parts/supplies selected.

# Financial Services

<b>Type (e.g., Leasing, prompt and pre-payment discounts, guaranteed savings and other):</b>	<ul style="list-style-type: none"> <li>» Pre-payment/prompt payment discounts</li> <li>» Guaranteed Savings as required by State Statutes</li> <li>» As required by Customers</li> </ul>
<b>Describe type of each funding and availability:</b>	TDIndustries offers pre-payment/prompt payment discounts as well as Guaranteed Savings as required by State Statutes (Energy Savings Performance Contracting) or as required by Customers.
<b>Funding Sources (internal and/or external):</b>	Internal and external
<b>List key personnel (internal and/or external):</b>	Evelyn Miller - CFO 13850 Diplomat Drive Dallas, TX 75234
<b>References (public sector only):</b>	<p>Bonding Agent: Ward &amp; Moore Insurance Services 12700 Park Central Drive Suite 1440 Dallas, TX 75251 Contact: Doug Moore 214-221-8300</p> <p>Bank (since 1989): JPMorgan Chase Bank N.A. 2200 Ross Avenue, 8th Floor TX 1-2939 Dallas, TX 75201 Contact: Credit Department Bank Officer: Andra Phillips Andra.S.Phillips@Chase.com 214-965-3959</p>
<b>Case studies describing benefits of services:</b>	Please see the Denton ISD case study starting on page 31.

# HVAC Refrigeration

<b>Type (e.g., rotary, centrifugal, scroll, reciprocating, absorption):</b>	Frick Compressors, Centrifugal, Scroll & Rotary Screw Compressor with 3 Step volume ration and continuous capacity control, Models 12-101
<b>Cooling medium (e.g., air, water):</b>	Air cooled & Water cooled
<b>Brand Name(s):</b>	Johnson Controls, Inc. / York
<b>Capacity Range (tons):</b>	210 to 6,000 Tons
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor on all components
<b>Estimated Lead/Delivery Time:</b>	Depends on sizes and configurations
<b>Location of Manufacturing (City, State, or Country):</b>	Waynesboro, Pennsylvania USA
<b>Range of Efficiencies (KW/Ton):</b>	(740-21, 100 KW)
<b>Estimated Market Share (North America):</b>	60%
<b>Provide example data on each type of product provided:</b>	Please see Attachment G starting on page 123.
<b>Detail Features and Benefits:</b>	Quality, Satisfaction, and Reliability Energy Efficiency Engineered Control Systems Feature Q-Net Technology Guaranteed overall plant efficiency for cooling/heating
<b>Other Manufacturers:</b>	York, Copeland, Drake, Johnson Controls-Frick, TECUMSEH

# HVAC Specialty Products

<b>Type (e.g., modular, outside/inside, S&amp;T heat recovery, humidity control, heat wheel, heat pipe, heat exchangers):</b>	Heat Exchangers, Humidity Control, Heat Wheel, *Energy Recovery Units, Geothermal Heat Pump System, Ductless Systems, Oil Furnaces, Boilers
<b>Brand Name(s):</b>	Ex. Carrier
<b>Heating Medium (electric, gas, steam, hot water):</b>	Electric, Gas, Steam, Hot Water
<b>Cooling Medium (e.g., DX Chilled Water):</b>	DX, Chilled Water
<b>Capacity Range (CFM and/or MBH):</b>	1.5 to 2.5 MBH per 100 square Feet of total Building Feet 45 CFM to 7100 CFM
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Collierville, Tennessee
<b>Range of Efficiencies (KW/Ton):</b>	9 SEER to 21 SEER
<b>Estimated Market Share (North America):</b>	35%
<b>Provide example data on each type of product provided:</b>	Please see Attachment G starting on page 123 and Attachment H starting on page 133.
<b>Detail Features and Benefits:</b>	Type: Wheel Nominal Airflow: 350 cfm Tilt Angle (Heating/Cooling): N/A Degrees Pressure Drop: 0.38 Inches
<b>Other Manufacturers:</b>	Mitsubishi, McQuay, Reem Ruud, Goodman, Lennox, Copeland, Magic Aire, TECUMSEH, Tecscoma, York, Johnson Controls

# *Installation and Turnkey Contracting*

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<b>Type (e.g., retrofit, new construction, energy retrofit, controls new - and upgrade and other):</b>	All types of Turnkey Contracting, Design/Build and Design Assist across all of TDIndustries specialties
<b>Define Processes for each type install of the system or the equipment:</b>	<p>We take a lifecycle view in planning, designing, specifying and installing our mechanical construction solutions. Whether it's a new design-build project, an expansion or retrofit, our long-range perspective, balanced with your priorities, creates the optimal solution.</p> <p>Through our experience, we have focused a great deal of effort in key areas of our mechanical construction to ensure safe, on-time, on-budget completion of systems that work, and work well. These advances include our deep resources, which enable us to self-perform all of our jobs; our pre-fabrication/manufacturing; our tools; and our startup process, which ensure successful commissioning.</p>
<b>Bonding and licensing capabilities:</b>	Virtually unlimited
<b>List key personnel (factory, sub-contract, other):</b>	Use Organizational Chart located on page 210-211.
<b>References (Public sector only):</b>	<p>Denton ISD Paul Andress Director of Operations 940.369.0230</p> <p>Texas State University Destiny Llamas HUB Specialist 512.245.6243.</p> <p>City of Maricopa Dan Leonard Facilities Manager 520.316.6949</p> <p>City of Houston Eric Alexander Senior Procurement Specialist 832.393.8704</p>
<b>Case studies describing benefits of services:</b>	Please see the following pages for a recent design-build project TD completed.



# RAYTHEON CONTINUES THRIVING WITH DESIGN-BUILD METHOD



Located in Richardson, TX at the upscale CityLine mixed-use development, Raytheon's new facility consists of three campus-style buildings designed to accommodate future expansion. With ideal security and privacy, a training room, full-service cafeteria, fitness center, an extensive data center, and a prime location near public transit and major freeways, Raytheon continues to thrive as a \$24 billion defense contractor in the LEED-certified facility.

## The Situation

When Raytheon was looking to relocate nearly 2,000 employees from its original campus built in the 1950s, they envisioned a state-of-the-art facility that would include high security, diverse workspace options, flexible meeting rooms, an abundance of windows, aesthetic designs, and satisfying dining options to attract and retain top-notch engineers. Raytheon needed to be out by the time their lease ended in 15 months.

The owner, KDC, sought to provide a new home impeccably tailored to Raytheon's culture, talent acquisition, and mission-critical needs. However, going from design to construction on a fast schedule wasn't feasible through the conventional plan-spec method. Due to Raytheon's nature of work, an expertise in working around sensitive compartmented information facilities (SCIFs) and other restricted areas was critical.

## The Solution

By collaborating early through the design-build method, KDC and TD were able to tackle the aggressive timeline and later alterations with reliability and ingenuity. Weekly meetings with decision-makers, trusting relationships, and transparency played a pivotal role in streamlining the process. Constructability engineering, adequate manpower, minimal RFIs, and a no change-order guarantee were essential to completing the project on time and within budget.

### Raytheon by the Numbers

- (2) three-story buildings
- (1) four-story building
- 500,000 sf approximate total
- (1) modular CUP
- Finished in six months

tdindustries.com

# TACKLING AGGRESSIVE TIMELINES WITH RELIABILITY AND INGENUITY



TD provided mechanical and plumbing engineering design and construction for the three buildings including two three-story buildings and one four-story building. The facility included a fully prefabricated modular central utility plant (CUP) measuring 45 feet by 20 feet. The plant was manufactured offsite and installed within one day of delivery. By utilizing modular construction of the CUP, critical savings included one month of labor, as well as, significantly reduced equipment costs. Additional work included chilled water serving building A with DX rooftops serving buildings B and C.

Some of the cost saving and value-added innovations provided by TD's constructability engineers included spiral duct instead of rectangular duct, plug and play reduced pressure zone (RPZ) device in wall connect manifolds in each breakroom, and therma-fusers with a grill for huddle rooms. TD's expertise in building data centers, healthcare facilities, offices, and government facilities provided the best in security throughout the project.

## The Success

The conventional plan-spec route would have taken at least a year to complete Raytheon's new home, but KDC's decision to pursue the design-build method with TD resulted in a 500,000 sf facility being finished in six months. TD's LEED-accredited professionals collaborated with KDC and Raytheon to meet necessary standards and criteria, and delivered a sustainable, innovative facility without compromising on quality and performance.

Raytheon is a prime example of TD's turnkey capabilities. Our Controls and Service Teams were awarded the contract to complete the full life-cycle of the building.

TD Controls' knowledge of the project from their early involvement, with budgeting and designing the building controls, was key to the project's success – bridging the gap between our construction group and service as they began their service agreement for HVAC, electrical, fire/life safety, and automation.

*"The performance of TD has not only met but surpassed our expectations for the Design-Build implementation. The D-B approach and the level of team work between TD and Walker Engineering has been key to the success of the project, allowing the team to be nimble, flexible and responsive to Raytheon's ever-evolving needs and still meet our contractual commitments."*

– Mike Rosamond, KDC Executive VP

# Invertors

<b>Brand Name(s):</b>	Ex. Carrier
<b>Capacity Range (HO):</b>	2.5 to 4Hz or 10 to 14HP on a 200HP Motor
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Location of Manufacturing (City, State, or Country):</b>	Collierville, Tennessee
<b>Estimated Lead/Delivery Time:</b>	Currently in stock for standard compressor needs and 3-5 days on specialty needs for invertors. The quantity of invertors could also result in a delay of lead time as well.
<b>Estimated Market Share (North America):</b>	35%
<b>Provide example data on each type of product provided:</b>	<p>Special Magnetic flux vector control VFDs Power Range: Single phase 1.5kw to 2.2kw 3 Phase Integrated RS485, Modbus-RTU communication Protocol 32 Bit high speed CPU special for ac motor controlling Built in braking unit the VFD Braking, 15kw Power to Lower</p> <p>Please see Attachment I starting on page 141 for more information.</p>
<b>Detail Features and Benefits:</b>	<p>High Performance Optimized voltage space Vector V/F algorithm and high efficiency VFD low Noise and low electromagnetic interference.</p> <p>Motor Speed monitor function allow smooth start for various loads such as centrifuges and de-watering machines anytime.</p>
<b>Other Manufacturers:</b>	ABB, Emerson, Liebert, Johnson Controls, York

# LED Lighting Products

<b>Type (e.g., LED area lights, Flexible LED Strips, Ceiling Lighting, Bulbs and Fixture Products, Other)</b>	LED area lights, Flexible LED Strips, Ceiling Lighting, Bulbs and Fixture Products, and more
<b>Brand Name(s):</b>	Ex. Lithonia Lighting, Aquity, Eaton, GE, Cooper Lighting, and others.
<b>Capacity Range (HO):</b>	Varies depending on the product
<b>Standard Warranty (Parts and Labor):</b>	Five year limited parts warranty
<b>Optional Warranty (components covered and labor):</b>	N/A
<b>Location of Manufacturing (City, State, or Country):</b>	Multiple Locations (varies depending on product)
<b>Estimated Market Share (North America):</b>	\$90.53
<b>Provide example data on each type of product provided:</b>	Please see Attachment J starting on page 152.
<b>Detail Features and Benefits:</b>	Energy savings and less maintenance cost
<b>Other Manufacturers:</b>	Countless others

# Professional Services

<b>Type (e.g., Engineering, Design, Drafting, Architectural, Project Management and other):</b>	Engineering, Design, Drafting, Architectural, Data Management
<b>Describe type of each professional service and availability:</b>	<p>In terms of our Design-Build capabilities, our theory is that your mechanical system is the engine-the-heart of your facility. When your system is running smoothly and seamlessly, your business hums along. That's why you can rely on TDIndustries to deliver superior results with anything you can hand us new systems, expansions or change-outs. We bring several innovations to the table including:</p> <p>Mechanical Engineering services for Design Build HVAC/ Plumbing and DDC Controls, Building Information Modeling for HVAC/Plumbing design/duct/pipe fitting/prefabrication. LEED certification for Design/Build &amp; Assist Projects.</p>
<b>Licensing and certification capabilities:</b>	TDIndustries has several licensed registered Engineers and LEED accredited professionals. Certified Energy Manager (CEM)
<b>List key personnel (internal and/or external):</b>	All work performed by TDIndustries Engineering Group
<b>References (public sector only):</b>	Lone Star: Greene's Point Campus - Houston, TX Wendy Hipes: 713-996-2799
<b>Case studies describing benefits of services:</b>	Please see the following pages.



**TDIndustries**

*At the Heart of Your Building*

# Lone Star College

### Situation

Lone Star College is a higher education system based in Texas that serves the local communities of Houston, Conroe and The Woodlands. TDIndustries (TD) provides Facility Management Services to five of Lone Star College’s campuses, encompassing more than 1 million square feet of campus space. Before TD began work, the Lone Star College System was managing the maintenance operations with their own employees. The operations at these North Harris campuses were outsourced to TDIndustries Facilities Partners to allow the Lone Star managers the ability to focus on their business of educating the 18,000 students that attend these campuses.

### Case Study

*Facilities Management & Energy Solutions*

**PARTNERS  
PROVIDE SOLID  
FACILITIES  
MANAGEMENT  
AND ENERGY  
SOLUTIONS AT  
THE NORTH  
HARRIS CAMPUS**



### Solution

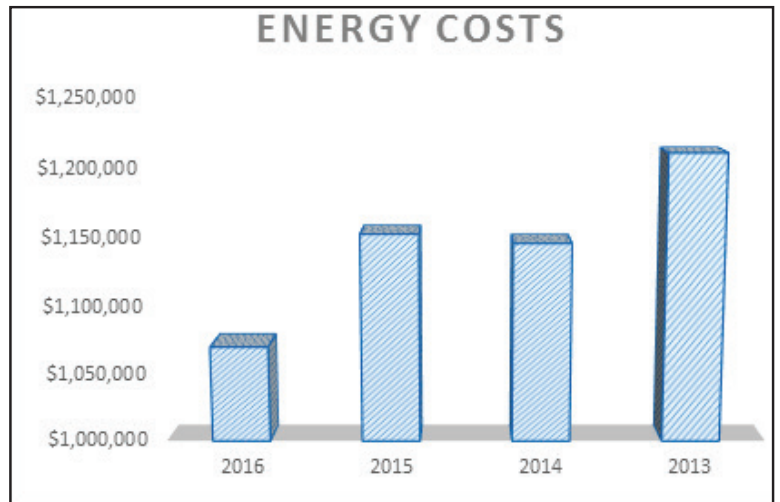
TD brought its industry-leading capabilities with critical systems and technician management. Using a hybrid staffing model, TD was able to bolster Lone Star College's existing facilities team. Through continued efforts with safety training, efficient scheduling in the equipment maintenance and work order system, TD's onsite team has been a renewed asset to the campus staff.

### Success

The total facilities management approach employed at the Lone Star College System, has allowed TD to do more with less. The existing Lone Star facilities personnel are key to the daily campuses deliverables. TD has provided ancillary management of this team to control daily operations, allowing the TD staff the ability to build additional value offerings for the customer.

An initial water savings project at the North Harris Campus was started within the first six months of the contract starting. TD invested an additional \$17,250 annually to upgrade the water treatment control, monitoring, and chemical feed equipment. Experienced TDPartners also saw an opportunity to reduce costs by correcting and metering the blowdown from the cooling tower. TD capitalized on water treatment recommendations to change the make-up water feed to the cooling tower and use less total water for cooling. All of these program changes and upgrades aided in removing mineral deposition from the equipment in the central plant. The efforts improved the efficiency of the campus HVAC equipment and uncovered a healthy operations cost savings for the Lone Star North Harris Campus. These gained efficiencies lead to a total utility cost reduction of \$59,643, in the 2016 fiscal year.

Savings aside, the customer is pleased with TD's ability to provide full facilities management with an impeccable safety record – 100% no incidents – and both parties look forward to a long and prosperous relationship.



*From maintaining aesthetics to management of Lone Star College's staff, the full range of services includes:*

**Mechanical, electrical and plumbing (MEP) services**

**Landscaping**

**Elevator maintenance**

**Housekeeping and related paper products**

**Pest control**

**Fire, life and security systems**

**Specialized roofing**

**Building automation systems**



[www.tdindustries.com](http://www.tdindustries.com)



## Health & Biomedical Sciences Center Case Study

### The University of Houston Accelerates Biomedical Center Construction

*TDIndustries Establishes Milestones and Meets Them*

**The University of Houston's (UH) Health and Biomedical Sciences Center Building is an approximate 172,000 square foot, six-story building with a mechanical penthouse connected to UH's College of Optometry. The \$68 million research and patient eye-care facility was designed using green/sustainable principles and includes an ambulatory surgical center, The Laser Center, specialized research laboratories, animal care facilities, offices, seminar spaces, a new conference facility, and classrooms. The project also includes the construction of a 16,000 square foot satellite central plant to support the new facility.**



tdindustries.com

#### The Situation

In its trek to achieve Tier One status, UH has embarked upon a major capital projects initiative. The Health and Biomedical Sciences Center (HBSC) Building represents a bold step toward becoming an integrated, cross-disciplinary research facility necessary for a Tier One university.

UH engaged Tellepsen Builders as the Construction Manager at Risk for the project. Tellepsen turned to TDIndustries to construct the central plant that will support the new facility.



UH set an aggressive construction schedule with a start date of November 2010 and an expected completion in late 2012. One of the major milestones was for the structure to be "air on" within six months of the start date.

#### The Solution

TD quickly focused on the schedule and developed its plans to meet milestones while working on a restricted jobsite connected to an occupied facility. Expectations were for an extremely fast schedule, beginning with 80% documents and having the majority of the rough-in completed with "air on" by the six month deadline.

TD's scope included:

- Building a completely independent 2, 250 ton central plant with cooling tower and associated pumps and pipe valve fittings, and
- Installing high pressure steam boilers that provide steam to water heat exchangers, steam to clean steam heat exchangers and clean steam to the Vivarium on Level 6.

Elements of TD's processes and technologies to meet scope deliverables included:

- Building Information Modeling (BIM) to provide 3-D coordination in the planning phase, and
- Prefabrication of central plant and skid mounted systems along with air handling unit hookups.

These tactics proved invaluable in accelerating the pace of work and TD's ability to meet the client's milestones.

#### The Success

TD met the "air on" date and the project is on schedule for its 2012 completion date. Tellepsen has been impressed with TD's ability to respond to changing situations in a timely and professional manner, its attention to precision work and its commitment to safety.





# Pumps

<b>Type (e.g., single stage, split case, end suction, inline, circulator, turbines):</b>	Single stage, Split Case, End Suction, Inline, Circulator, Turbines, Domestic Cold Water, Waste Water Dosing and Disinfection, Multi Stage*, Systems Chill Water, Systems Hot Water, Centrifugal Pumps, Screw Pump, Gear Pump, Vacuum Pump, Any Type pump for application needs
<b>Brand Name(s):</b>	Ex. Sulzer
<b>Capacity Range (GPM):</b>	Any GPM can be manufactured as required for Job/Project
<b>Standard Warranty (Parts and Labor):</b>	One year parts and labor
<b>Optional Warranty (components covered and labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 Weeks or unless pump is in stock
<b>Location of Manufacturing (City, State, or Country):</b>	Easley, South Carolina Portland, Oregon Houston, Texas
<b>Range of Efficiencies (KW/Ton):</b>	65% Minimum 85% for motors up to 15kw 90% for motors above 15kw
<b>Estimated Market Share (North America):</b>	20%
<b>Provide example data on each type of product provided:</b>	Please see Attachment K starting on page 182.
<b>Detail Features and Benefits:</b>	<p>Multiphase Pumps:</p> <ul style="list-style-type: none"> <li>» Helicoaxial stages axially compress the effluent to avoid separation and gas binding</li> <li>» Stage design changes to compensate for gas compression through the pump</li> <li>» Horizontal (onshore) or vertical (subsea) configurations to fit the application</li> <li>» Subsea qualification testing and JIP projects welcomed</li> <li>» Variety of sizes available from 1 to 10 MW to suit the field development, production and decline</li> </ul> <p>Main Applications</p> <ul style="list-style-type: none"> <li>» Remote or subsea multiphase pressure boosting</li> </ul> <p>Main Design Features</p> <ul style="list-style-type: none"> <li>» Helicoaxial stages</li> <li>» Cartridge construction for retrofitting ease as field conditions change</li> <li>» Sulzer pressure boundary design experience to 1000 bar</li> <li>» Variety of performances: single-phase, multiphase or hybrid</li> <li>» Variety of performances: Motor, GT, high-speed permanent magnet motor, etc.</li> </ul>
<b>Other Manufacturers:</b>	Myers, Gundfos, Sta-Rite, Hydroflo, Bell & Gossett, Pumps, Goulds

# *Refrigeration Products*

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<b>Type (e.g., display cases, refrigeration systems, glass doors and lids, walk-in products, others:</b>	Display Cases, Refrigeration Systems, Glass Doors and Lids, Walk-in Products
<b>Brand Name(s):</b>	Ex. Frick, Trenton, amcot
<b>Provide example data on each type of product provided:</b>	Please see Attachment G starting on page 119.
<b>Other Manufacturers:</b>	United Refrigeration, Barsco, ISI, and Baker

# Service & Maintenance

<p><b>Type (e.g., Preventative and full maintenance contracts, man-at attendance, remote monitoring, annuals, emergency services, regulatory compliance, cleaning) (e.g., duct, coils, and filters):</b></p>	<p>(Oil, refrigerant, vibration, chemical analysis, annuals, full maintenance, preventative maintenance)</p> <p>We offer complete HVAC, Plumbing, and Electrical scheduled maintenance services</p>
<p><b>Define Processes for each type of services and/or maintenance of the system or the equipment:</b></p>	<p>Service, Repair, Replacement and Maintenance of HVAC equipment (including but not limited to Air Cooled and Water Cooled Chilled Water Systems, Split Systems, Package Units, Computer Room Air Conditioners, Variable Frequency Drives, Fan Powered Boxes, and VAV boxes). Maintenance includes performing, at designated intervals, annual and routine planned maintenance inspections of HVAC equipment per manufacturer's specifications and requirements with the goal of extending the equipment's useful life through proper operating conditions. Inspections will include a combination of assessments and cleaning of condensers, evaporators, coils, condensate lines and drains, filters, belts, electrical connections and safeties, refrigerant systems, heaters, blowers, bearings, and motors. Equipment will also be inspected for proper airflow, pressures, temperatures, and operating issues such as short cycling, vibrations and noises.</p>
<p><b>List of key personnel (factory, sub-contract, other):</b></p>	<p>Please see Org Chart on pages 210 and 211.</p>
<p><b>References (public sector only):</b></p>	<p>Please refer to proposal references on page 278.</p>
<p><b>Case Studies describing benefits of services:</b></p>	<p>Please see below.</p>



## **Lake Dallas ISD – Lake Dallas, Texas**

TD services a variety of schools in Lake Dallas ISD to make sure that their HVAC and refrigeration equipment is highly functional and passes inspection. Our technicians are on call to help ensure that equipment is operating efficiently and reliably, especially during peak seasons. Scheduled maintenance includes HVAC preventative measures, commercial refrigeration, filters, building automation control systems support, rooftop units, ice machines, split systems, and air unit planned maintenance tasks.

# Site Surveys

<b>Type (e.g., equipment, system analysis, operational, architectural and other):</b>	(Equipment, system analysis, operational architectural)  Equipment, system analysis, lifecycle cost analysis, design-build/assist, preparation of as built diagrams, 3D modeling of plant, piping, ductwork, etc.
<b>Describe type of survey:</b>	In-house capabilities, complete building modeling for System Analysis/Energy use modeling, etc.
<b>Licensing and certification capabilities:</b>	Certified Energy Managers - Association of Energy Engineers. Licensed Engineers
<b>Advanced technology uses for each type of survey:</b>	With new, and existing facilities, generating ongoing energy savings can be achieved through a comprehensive monitoring-based commissioning (MBCx) process to ensure that all building systems remain “in tune”. It is common knowledge that buildings rarely perform as intended.
<b>List key personnel (internal and/or external):</b>	TDIndustries Engineering Group
<b>References:</b>	<ul style="list-style-type: none"> <li>» Texas Women's University, Denton Campus</li> <li>» George Bush Intercontinental Airport, Houston</li> <li>» University of Texas, Arlington</li> <li>» Fountain Place, Dallas</li> <li>» City Place, Dallas</li> </ul>
<b>Case studies describing benefits of services:</b>	<p><b>UT Arlington:</b></p> <ul style="list-style-type: none"> <li>» Chiller efficiency caused by evaporator approach which is never a part of the commissioning agents scope repaired by the Mfg. under warranty</li> <li>» Cooling Tower VFDs had issues repaired by the Mfg. representative under warranty</li> <li>» Cooling Tower performance issues and improper flow meter installation issues identified</li> </ul> <p><b>TWU Denton:</b></p> <ul style="list-style-type: none"> <li>» TWU Denton has 3 chillers, 115 data points with a service cost of \$27,400/year</li> <li>» The average plant operating cost avoidance is 15.5% or \$44K annually</li> </ul>

# Startup and Commissioning

<p><b>Define process for validation of system or equipment operation to design:</b></p>	<p>Commissioning is a systematic documented process to ensure that facilities, systems, and equipment meet established design requirements and operation design intent.</p> <p>The Commissioning process verifies the following:</p> <ul style="list-style-type: none"> <li>» The equipment that was specified for installation was properly installed per engineer design and the manufacturer's recommendation.</li> <li>» Functions within designed airflow, design pressures and performance and functions per purpose.</li> <li>» The operation and design criteria was meet and performance is demonstrated to the engineer and owner.</li> <li>» Demonstration to the owner on proper preventive maintenance requirements per the manufacturer's recommendation to maintain warranty requirements and are performed to train the owner of the equipment.</li> </ul>
<p><b>Type (e.g., equipment startups, system checkouts, control verification, retro commissioning, M&amp;V verifications, rebate auditing, other):</b></p>	<p>Start-up</p> <p>Prior to starting equipment or systems, obtain and review manufacturer's installation, starting and operating instructions</p> <p>Use manufacturer and supplier's trained personnel where necessary to maintain validity of manufacturer's warranty</p> <p>Compare actual installation with manufacturer's recommended installation. Correct deviations detrimental to equipment performance prior to starting equipment.</p> <p>Refer to the contract regarding the requirement of pre-existing and/or owner furnished equipment</p> <p>System Checkouts: Air Handling Units, Chilled Water Coils, Chiller(s), Cooling Tower(s), Boiler(s), Deaerator(s), Condensate Pumping Unit(s), VAV/CT Terminal Box(es), Chilled Water, Cold Water, Heating Hot Water Pump(s), Steam and Condensate piping, Heating Water Piping, Steam and Condensate Piping.</p> <p>Control Verification: The commissioning process starts with verifying the control inputs and outputs on a point-to-point basis. Calibration of each analog input and output using an independent and certified measurement device for temperature, pressure, and accurate readings on the graphics. The test will also include the sequences of operation in all normal modes and verify the points against the intended functionality of the system as a whole.</p> <p>Retro Commissioning: Retro commissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, retro commissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life.</p>

<b>List key personnel (factory, sub-contract, other):</b>	<p>Tasos Banos Sr. Vice President TDIndustries</p> <p>Peyton Hill Operations Manager</p>
<b>References (Public sector only):</b>	<p>Memorial Hermann Pavilion II 6411 Fannin Street Houston, Texas 77030 Chris Barrow - Project Manager 713.996.2459</p> <p>Memorial Hermann Katy 23900 Katy Freeway Katy, Texas 77494 Chris Barrow - Project Manager 713.996.2459</p> <p>University of St. Thomas Chase Morris - Project Manager 832-309-2646</p>
<b>Case studies describing benefits of services</b>	<p>Scott White Hospital Dollar value of the Agreement to date: \$27,168,746 Dollar value received relative to the Cx: \$1,245,000</p> <p>MD Anderson Cancer Hospital Dollar value of the agreement to date: \$350,000,000 Dollar value received relative to the Cx: \$2,500,000</p> <p>Performed commissioning tasks and acted at the commissioning agent, performing design document and submittals reviews, oversaw the development of the commissioning plan, start-up, and pre-functional, and functional test procedures. Witnessed the pre-functional and functional tests of the MEP systems, and developed a detailed corrective action log which the contractor was required to implement. Witnessed the retesting of deficient systems, and observed and verified owner training was successfully completed, no delays were on this project.</p>

# Unitary

<b>Type (e.g., rooftops, split systems, VRFs, heat pumps, PTACs, water-source, mini splits):</b>	Rooftops, *Split Systems, DX, VRFs, Heat Pumps, PTACs, Chill/Hot Water
<b>Brand Name(s):</b>	Johnson Controls / York
<b>Capacity Range:</b>	RTUs 25, 30, and 40 Tons RTUs 50 through 65 Tons Series 100 Single Package Units
<b>Heating Medium (Electric, Gas, Steam, Hot Water):</b>	Electric, Gas, Steam, Hot Water
<b>Cooling Medium (DX, Chilled Water):</b>	DX, Chilled Water
<b>Standard Warranty (parts &amp; labor):</b>	One year parts and labor
<b>Optional Warranty (components covered &amp; labor):</b>	Up to 10 years parts and labor
<b>Estimated Lead/Delivery Time:</b>	6-8 Weeks
<b>Location of Manufacturing (City, State, or Country):</b>	Collierville, Tennessee
<b>Range of Efficiencies (EER, SEER, COP):</b>	Up to 16 SEER, Energy Star Qualification
<b>Estimated Market Share (North America):</b>	40%
<b>Provide example data on each type of product provided:</b>	Please see Attachment L starting on page 186. 1.5 to 5 Ton 208-230 Volts Heavy Gauge Galvanized Steel Construction Single Stage Scroll Compressor
<b>Detail Features and Benefits:</b>	Models meets the Department of Energy's higher EER rating required to meet the region's minimum efficiency.
<b>Other Manufacturers:</b>	Carrier, Mitsubishi, Rudd, McQuay, Reem, Goodman, Lennox, Trane, Greenheck

# Warranty

<p><b>Type (e.g., Extended parts &amp; labor, define maximum number of years available, delayed start-up and other):</b></p>	<p>Extended parts &amp; labor up to 10 years, delayed start-up</p>
<p><b>Define processes for each type of warranty:</b></p>	<p>Priced as an option to Customer-lowest lifecycle cost at time of purchase.</p> <p>All equipment warranties on all products installed by TDIndustries are captured in a master database - New Construction/Retrofit, &amp; Service replacements. Should a warranty claim arise, the database provides the feedback loop to our Project Managers to initiate the warranty claim with the appropriate manufacturer, dealer or distributor. Turnaround time is dependent on the Supplier, but TDIndustries will leverage our size and buying power to help Suppliers prioritize our replacement delivery and if necessary, we will provide temporary heating/colling if the problem leaves our Customer without comfort in the meantime.</p>
<p><b>List key personnel (factory, subcontract, other):</b></p>	<p>Please refer to Org Chart on pages 210 and 211.</p>
<p><b>References (public sector only):</b></p>	<p>Denton Independent School District - 2 years parts and labor</p> <p>Richardson Independent School District - 2 years parts and labor</p> <p>Fr. Stockton Independent School District - 5 year parts and labor</p>
<p><b>Case studies describing benefits of services:</b></p>	<p>Lone Star College Woodlands, a customer on Facilities Preventive Maintenance agreement, found five IT rooms were not cooling. This caused the door to stay open and dependent on the building cooling system to remove the heat load from the equipment rooms. After investigating, it was found that the liquid line set was not installed per manufacturer's requirements and was missing a Freon trap system. This caused all the oil to relocate in the evaporator coil instead of the compressor, which is required for lubrication, causing the compressor to fail as well as several electrical safety devices in the system. TDIndustries acting as the warranty administrator for the project was able to order all five compressors which were no longer manufactured and locate several electrical safety devices for the system and install the trap system required fore proper colling to the IT areas in the building.</p>



# Design without limits



BY JOHNSON CONTROLS

# Solution<sup>®</sup> air-handling units experience and flexibility



We've built Solution units for all types of commercial, institutional, and industrial facilities.

## Names you know and trust

YORK<sup>®</sup> Solution<sup>®</sup> air-handling units (AHUs) by Johnson Controls – the only names you need to know for an AHU line that has no limits, ranging from basic indoor units up to penthouse mechanical-equipment rooms. And whatever the air-handling challenge – IAQ, acoustics, energy, controls, you name it – Johnson Controls has the experience to build a Solution AHU that will meet your needs.

In the air-handling business, the reputation and experience of the manufacturer is as important as the product. Johnson Controls has been manufacturing air-handling equipment since the 1950s. Then, in the 1990s, we acquired two of the most well-known and respected AHU companies in the business: the PACE Company and the Miller-Picking Corporation. Their 100-plus years of experience have now been joined with the worldwide engineering, manufacturing, service, and support of Johnson Controls, a Fortune 80 firm with a 125-year legacy in HVACR technology. The result is a company dedicated to providing uncompromising solutions for your air-handling needs.

For commercial and institutional facilities, for industrial manufacturing and process operations, and for critical hygienic applications in hospitals and cleanrooms, Solution AHUs can be built to handle any requirement – no limits.

## Design it your way, every time, every way

**Dimensional flexibility:** Space constraints are a reality on most construction projects. Why be constrained by fixed AHU sizes? Solution AHUs offer variable aspect-ratio, so you can design the unit to fit the application and the space. And if rectangular-shaped units can't fit the space, units can be configured to fit within just about any existing space or around any obstacle. L-shaped and T-shaped units, stacked units, notched units – we can do it.

**Material flexibility:** We offer a complete line of construction materials, including galvanized steel, pre-painted steel, stainless steel, and aluminum.

**Component flexibility:** To enable you to meet any AHU requirement, Solution units offer every available air-handling component. And as technology creates new capabilities, Johnson Controls will apply these to our Solution line.

### EXPERIENCE? WE'VE BUILT AHUs FOR ALL THESE

- Commercial space: office buildings, theaters, performance halls
- Institutional space: schools, universities, churches
- Industrial manufacturing: automotive, aerospace, chemical, petrochemical
- Hygienic systems: hospitals, life sciences, R&D facilities, food processing, cleanrooms
- Process manufacturing: pharmaceutical, electronics, semiconductor

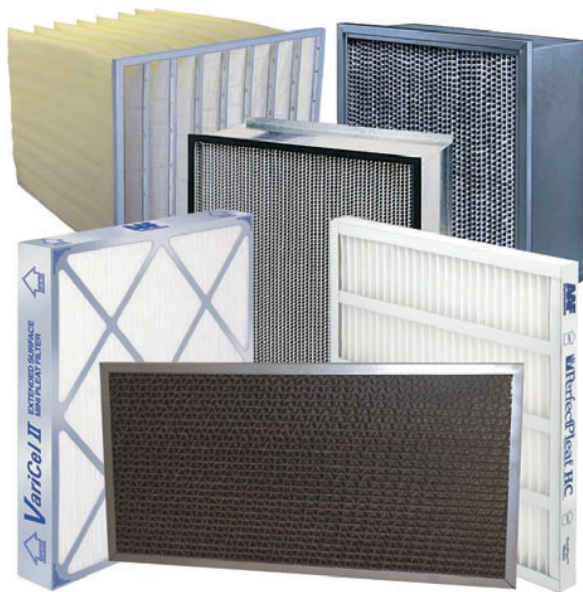
# The smart way to raise your IAQ

## Superior casing performance

Because indoor air quality (IAQ) is now vital to your project's success, your AHU's performance is absolutely critical. That's why Solution AHUs offer advanced features that can meet any IAQ challenge you face. It all begins with casing performance. Casing leakage can deteriorate the quality of the air supplied to the occupants by allowing dirty, unfiltered air to leak into the airstream downstream of the filters. To minimize leakage, all Solution AHUs employ superior casing construction. As a minimum, air leakage is limited to a miniscule 1% at  $\pm 8"$  w.g. If needed, the leakage can be limited to only 0.5% at as high a design pressure as required.

## Filter out impurities

A complete line of filters is available for all Solution AHUs. For light- or prefiltering duty, use our pleated and extended-surface filters. For more stringent requirements, 60% to 95% efficient rigid or bag filters can be specified. HEPA filters are available to trap particles as small as 0.3 microns with 99.97% effectiveness. Ultra-HEPA filters can remove particles as small as 0.1 microns. Activated-carbon filters are excellent at removing odors and volatile-organic compounds from the airstream.



A complete line of filters is available, including pleated, rigid, bag, HEPA and carbon.

## Hygienic drain-pan design

Micro-organisms can flourish in drain pans when cooling-coil condensate remains there during "off" or "heating" cycles. Solution AHUs move that condensate out of the unit with multi-sloped drain pans that ensure positive drainage. All pan designs also offer accessibility for periodic cleaning, now required by ASHRAE Standard 62-2001.



Multi-sloped drain pans ensure positive drainage.

## Ensure adequate ventilation

An adequate supply of ventilation air is critical for the health of facility occupants. However, having too much outside air can drive up energy costs. The solution is the AMS-60 damper, which incorporates an airflow-measuring station. The AMS-60 damper simultaneously measures and controls the volume of ventilation air, making sure it's neither too little nor too much.



The AMS-60 damper measures and controls ventilation-air volume.

## IAQ FEATURES TO HELP YOU CLEAR THE AIR

- Double-wall construction
- IAQ drain pans
- AMS-60 dampers
- Perforated liners
- Low-leak dampers
- P-cone fan monitoring
- All filter types (flat, angle, carbon, HEPA, etc)

# Put your AHUs on an energy diet



Heat-recovery wheels reduce the cost of conditioning ventilation air.

## Designed to save energy

Our industry has taken a leadership role by creating energy-performance guidelines, such as ASHRAE 90.1. Solution AHUs are designed with ASHRAE 90.1 in mind and can help you curb your energy intake.

## Stretch your dollars with energy recovery

The exhaust airstream represents an energy-saving opportunity. An energy-recovery wheel can economically transfer heat and moisture between the exhaust-air and fresh-air paths, reducing the cost of conditioning the fresh air.

Take advantage of “free” cooling with an economizer section. During spring and fall operation, cool/dry outside air cools and dehumidifies the facility, reducing the need for mechanical refrigeration.



Variable-speed drives offer dramatic fan-energy savings.

## Keep heat where it belongs

Superior casing performance affects more than just indoor air quality. In extreme ambient conditions, heat transfer through the casing must be controlled. All Solution casings offer a minimum of R-7 to R-14 insulation in the floors, walls and roof. Higher R-value insulations are also available. To prevent energy-robbing air leaks, units are designed for a maximum casing leakage of 1%, or even 0.5%.

## Reduce fan operating costs

In an AHU, the fan is the largest energy consumer. Solution fans offer a range of energy-saving options. High- or premium-efficiency motors can be specified. Direct-drive plenum fans eliminate belt-and-pulley energy losses.

If the air system is designed for variable-air volume (VAV), Solution AHUs offer the most efficient method of VAV fan control. Factory-mounting a Johnson Controls variable-speed drive reduces jobsite labor costs and provides single-source responsibility.

## Increase fans – decrease energy

Critical applications, such as life-science facilities or process operations, demand efficient and redundant air-handling operations. Solution AHUs meet this need by offering fan arrays ranging from 2 to 6 fans. When the fan array is optimized, the design can also increase efficiency by operating the fans at their most efficient points.

### FEATURES THAT SAVE DOLLARS AND MAKE SENSE

- Variable-speed drives
- Heat wheels
- Fixed-plate heat exchangers
- Heat pipes
- High R-value insulation
- High-efficiency motors

# Reduce noise complaints

## When noise matters

Applications such as theaters, performance halls and churches consider acoustics to be as critical as occupant comfort. That's why Solution AHUs ensure your success with a wide range of noise-reducing technologies that will quiet any complaint.

## Fans that whisper

Since the fan is the primary moving part in an air-handling system, it's the first place to look when reducing noise. Solution AHUs are available with a variety of low-noise fans. Plenum fans generate less ductwork noise than do standard DWDI fans. Varying the number of blades in a fan wheel can also improve its sound characteristics.

## Minimize vibration noise

Solution AHUs offer an array of construction and isolation techniques to help control vibration noise and its transmission. All fans are mounted on an isolated steel base. The entire fan assembly is dynamically balanced to ensure vibration-free operation. Direct-drive plenum fans can further reduce vibration by eliminating the belt-and-pulley mechanism.

## Attenuate remaining sounds

What little noise is left can be further reduced with direct methods of sound attenuation. Using sound-absorbing walls, and sound traps in the fan and discharge-plenum sections, Johnson Controls sales engineers can design a Solution AHU to meet your critical sound requirements.

## Tested sound levels

Being able to reliably predict the sound performance of an AHU is an engineering challenge. Our acousticians have created ARI-260-compliant, acoustical-calculation tools based on thousands of hours of real-world testing on hundreds of units.



Theatres, performance halls, and churches often consider acoustics as critical as occupant comfort.



Solution AHUs offer a variety of techniques to improve fan acoustics.

## SOUND TECHNIQUES TO IMPROVE ACOUSTICS

- Standard low-noise fans
- Direct-drive plenum fans
- Vane-axial fans
- Sound attenuators
- Sound-absorptive panels
- Inertia bases
- Special balancing and vibration-isolation options

# Take control of your application

## Factory-mounted controls increase reliability

When AHU controls are installed at the jobsite, costs can go up and reliability can go down. To eliminate these problems, Solution AHUs can be equipped with Metasys® controls which are engineered, installed, and tested in the factory.



Solution AHUs can be equipped with factory-packaged Metasys controls.

## Factory-testing ensures accurate operation

Factory-mounted Metasys controls undergo a detailed testing process at the factory. The testing ensures that all wiring is installed correctly, and that all control panels and end devices work appropriately before the AHU is shipped. It also means that Solution AHUs can be up-and-running faster when they arrive on-site.



Factory-testing ensures that all controls work appropriately.

## Factory-engineering speeds field connections

Solution AHUs are factory-engineered to simplify field connection of the controls. For example, coil valves are shipped uninstalled, but pre-wired with a flexible conduit with quick-connects. In some instances, the AHU is too large to ship in one piece, and must be split. To ensure fast and easy jobsite assembly of the Metasys controls, labeled quick-connects come standard on all shipping splits.



Labeled, quick-connect wiring makes split units easy to reassemble.

## Factory-installation improves quality, saves time

While a Solution AHU is being manufactured, Johnson Controls technicians can easily access all its segments. So, there are no accessibility problems to cramp the quality of the controls installation, which can occur on the jobsite. Also, all sensing probes have been pre-engineered to determine their best mounting location, ensuring accurate and reliable readings.

### YOU ARE IN COMMAND WITH METASYS® CONTROLS

- Field equipment controllers
- Input/Output modules
- Damper actuators
- Differential-pressure sensors
- Temperature sensors
- Valves and actuators
- Static-pressure transducers
- Differential-pressure switches
- Fan start/stop relays
- Humidity sensors
- Variable-speed controls
- Safety switches/resets

# Support when you need it

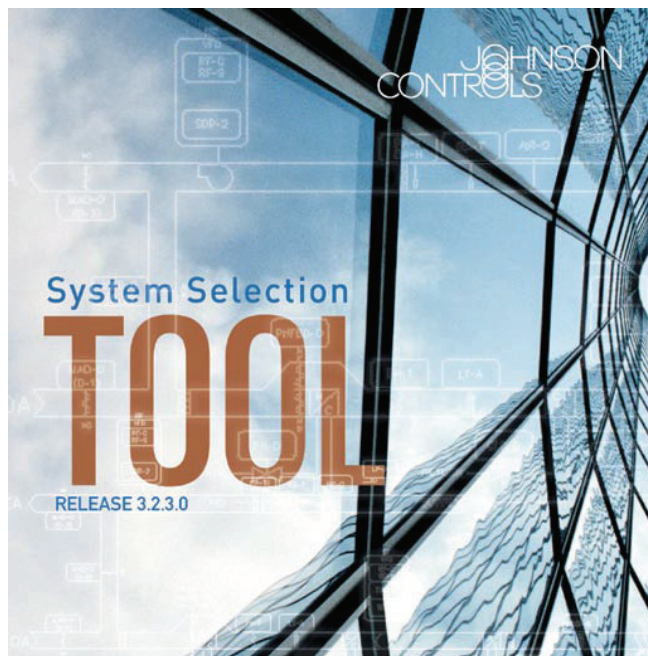
## Johnson Controls has the experience and support you demand

To unburden specifiers from the time-consuming task of system layout, we employ powerful design tools. The System Selection Tool is available to all qualified systems designers to assist in the development of plans and specifications for standard HVAC equipment and controls. Systems contained in the tool provide the user with flow diagrams, points lists and sequence of operations. Additionally, the software provides an output to the YORKworks™ program, the design tool that configures the Solution AHU and prepares the necessary specifications, schedules and drawings. For highly complex configurations or performance requirements, a team of factory engineers are available to support our sales professionals.

## Support after the sale

As assurance that your Solution AHUs will meet your performance expectations, Johnson Controls offers validation- and witness-testing at our factory for a variety of parameters: airflow, sound, vibration, and air-leakage, to name a few. We can provide certified technicians for jobsite installation and commissioning, drawing on a force of more than 5,000 technicians in over 500 locations worldwide. Project-management services are also available.

For air-handling units designed to meet your demanding requirements, call your nearby Johnson Controls representative.



Powerful design tools are available to aid system designers.

## SOLUTION AHUS ARE AN EASY CHOICE

- Worldwide support and resources
- Powerful design tools
- Backed by factory-engineering team
- Factory validation- and witness-testing
- Project-management services can be provided
- Maintenance and repair services are also available



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# TSS Single-Duct VAV Terminals



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## NOTES:

- All data is subject to change without notice. Drawings in this guide are not for installation purposes.
- Some drawings are not shown in this catalog. Construction drawings and performance data contained herein should not be used for submittal purposes.
- ETL Listing Number 492864.
- Visit [www.johnsoncontrols.com](http://www.johnsoncontrols.com) for current literature and submittal drawings or contact your local sales representative for more information.



## FEATURES AND BENEFITS

### PRECISE ZONE CONTROL

Model TSS terminals provide variable air volume (VAV) control beyond the typical single duct box. They are specifically designed for precise air delivery throughout the entire operating range, regardless of the installed inlet conditions. They also offer improved space comfort and flexibility for a wide variety of HVAC applications. TSS terminals take advantage of typical benefits provided by single duct units, while performing at extremely low sound levels. This is critical in today's buildings, where occupants are placing more emphasis on indoor acoustics.

The ability to provide comfort to the occupant is the measurement of quality for any VAV terminal. Comfort is achieved through quiet and precise control of airflow to the occupied space.

The TSS terminal provides the ultimate in airflow control with the patented FlowStar™ airflow sensor. No other sensor in the industry can match the FlowStar's ability to quietly and precisely measure airflow. Accurate airflow measurement is the basis for airflow control.

### DESIGN FLEXIBILITY

**Selection and Layout.** The TSS provides flexibility in system design. The compact cabinet design and quiet operation give the system designer the versatility to place units directly above occupied spaces. It is not necessary to locate the unit in the crowded space

above a hall or corridor. This will reduce lengthy and expensive discharge duct runs. The FlowStar sensor ensures accurate control, even when space constraints do not permit long straight inlet duct runs to the terminal.

**Sizes.** Model TSS terminals are available in ten unit sizes to handle airflow capacities between 45 and 8000 CFM.

A Windows® based Computer Selection Program is available on CD-ROM to facilitate the selection process. Contact your representative to obtain a copy of this powerful and time-saving program.

### CONVENIENT INSTALLATION

**Quality.** All TSS terminals are thoroughly inspected during each step of the manufacturing process, including a comprehensive "pre-ship" inspection, to maintain the highest quality product available. All TSS terminals are packaged to minimize damage during shipment.

**Quick Installation.** A standard single point electrical main power connection is provided with all electronic controls and electrical components located on the same side of the casing, for quick access, adjustment, and troubleshooting. Installation time is minimized with the availability of factory calibrated controls and a low profile compact design.

The FlowStar sensor ensures accurate airflow measurement, regardless of the field installation conditions. A calibration label and wiring diagram is located on the terminal for quick reference during start-up.

The terminal is constructed to allow installation with standard metal hanging straps. Optional hanger brackets for use with all-thread support rods or wire hangers are also available.

### LASTING COMPONENTS AND LOW COST OPERATION

**Quality.** All metal components are fabricated from galvanized steel. Unlike most manufacturers' terminals, the TSS is capable of withstanding a 125 hour salt spray test without showing any evidence of red rust.

**Energy Efficiency.** In addition to quiet and accurate temperature control, the building owner will benefit from lower operating costs. The highly amplified velocity pressure signal from the FlowStar inlet sensor allows precise airflow control at low air velocities.

The FlowStar sensor's airfoil shape provides minimal pressure drop across the terminal. This allows the central fan to run at a lower pressure and with less brake horsepower.

**Agency Certification.** Model TSS terminals with electronic controls and/or electric heat are listed with ETL as an assembly, and bear the ETL label.

TSS terminals and accessories are wired in compliance with all applicable NEC requirements and tested in accordance with AHRI Standard 880.

**Maintenance and Service.** TSS terminals require no periodic maintenance and provide trouble-free operation. Controls are located on the outside of the unit casing for easy access by maintenance personnel.

### A VARIETY OF CONTROLS

Model TSS terminals are available with analog electronic, consignment DDC, pneumatic controls and Johnson Controls DDC for BACnet, Lon or N2 specifically designed for use with TSS terminals. These controls are designed to accommodate a multitude of control schemes.



From the most basic to the most sophisticated sequence of operation, the controls are designed by experts in VAV single duct terminal operation. Refer to the Electronic Controls Selection Guide, and the Pneumatic Controls Selection Guide for a complete description of the sequences and schematic drawings that are available.

#### Available Control Types:

- Analog Electronic (shown above)
- Pneumatic
- Factory mounted consignment DDC
- Johnson Controls DDC for BACnet, Lon or N2

#### Standard Control Features:

- Patented FlowStar Airflow Sensor
- ETL Listing
- NEMA 1 Enclosure
- 24 Volt Control Transformer
- Floating Modulating Actuator
- Balancing Tees and Plenum Rated Tubing

## FEATURES AND BENEFITS

### PATENTED FLOWSTAR SENSOR CONTROL

The air valve features the FlowStar airflow sensor which has brought new meaning to airflow control accuracy. The multi-axis design utilizes between 12 and 20 sensing points that sample total pressure at center points within equal concentric cross-sectional areas, effectively traversing the air stream in two planes. Each distinct pressure reading is averaged within the center chamber before exiting the sensor to the controlling device.

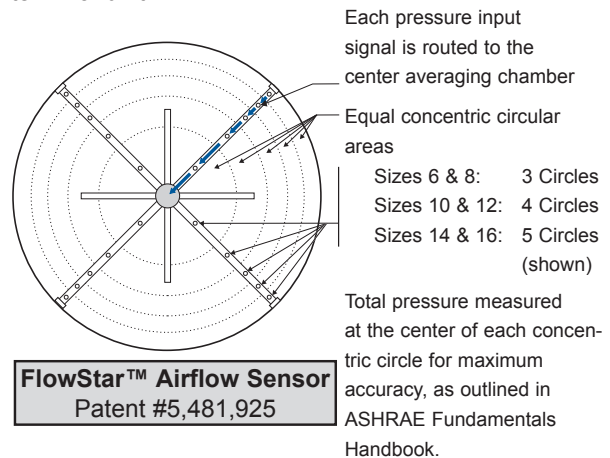
This sensor adds a new dimension to signal amplification. Most differential pressure sensors provide a signal equal to 1.5 times the equivalent velocity pressure signal. The FlowStar provides a differential pressure signal that is 2.5 to 3 times the equivalent velocity pressure signal. This amplified signal allows more accurate and stable airflow control at low airflow capacities. Low airflow control is critical for indoor air quality, reheat minimization, and preventing over cooling during light loads.

Unlike other sensors which use a large probe surface area to achieve signal amplification, the FlowStar utilizes an unprecedented streamline design which generates amplified signals unrivaled in the industry. The streamlined design also generates less pressure drop and noise.

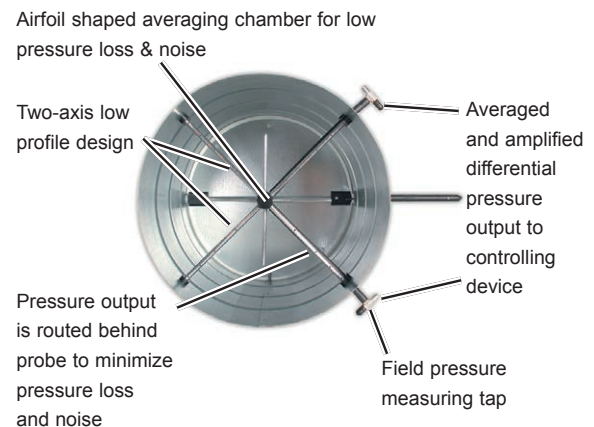
The VAV schedule should specify the minimum and maximum airflow setpoints, maximum sound power levels, and maximum air pressure loss for each terminal.

The specification for the VAV terminal must detail the required performance of the airflow sensor. For maximum building occupant satisfaction, the VAV system designer should specify the airflow sensor as suggested in the Guide Specifications of this catalog. Using FlowStar sensing to amplify the airflow signal allows you to use lower minimum airflow setpoints. Many VAV controllers require a minimum differential pressure signal of 0.03 inch W.G. The airflow sensor should be able to generate this signal with only 400 to 450 FPM air velocity through the inlet collar.

Conventional airflow sensors without amplification capabilities require approximately 700 FPM to generate a 0.03 inch W.G. signal. If 700 FPM represents a 20% minimum condition, the inlet velocity would be 3500 FPM at the maximum airflow setpoint. This results in extremely noisy conditions. In addition, the airflow sensor should generate a differential pressure range of at least one inch W.G. over the operating range of the terminal unit.



Sizes 6 & 8:	12 Sensing Points
Sizes 10 & 12:	16 Sensing Points
Sizes 14 & 16:	20 Sensing Points



## UNIQUE ELECTRIC HEAT DESIGN

Model TSS-EH models are unique in that they correct common industry heating problems. Historically, heater elements placed downstream of a VAV damper have experienced two major problems:

- Elements fail prematurely due to hot spots resulting from an uneven air velocity profile over the heater face
- Heaters suffer rapid nuisance cycling of the contactors and elements because the airflow switch probe is located on the low pressure (downstream side) of the VAV damper

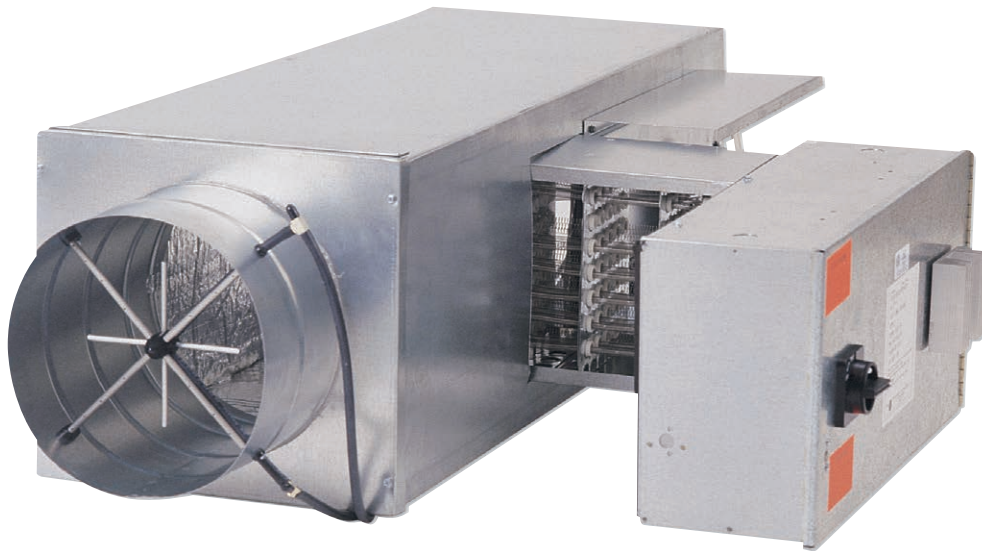
Our unique electric heat VAV terminal, the TSS-EH, solves these problems. The heater elements are

located midway between the air inlet and the damper. (See photo below.) This design provides uniform airflow over the face of the electric heater at all damper positions. Element life is extended, reducing repair cost and inconvenience.

With the heater elements located on the high pressure side of the VAV damper, the airflow pressure switch receives a reliable pressure signal even at minimum damper positions. This arrangement provides greater safety, as well as enhanced reliability.

The TSS-EH design permits tremendous flexibility when selecting KW, voltage, phase, balanced or unbalanced circuits and method of control.

The TSS-EH breaks new ground in single duct VAV electric heater design. The patented FlowStar sensor permits modulation to lower airflow levels than all other sensors in the industry. This minimizes the energy expended for heat in many applications.

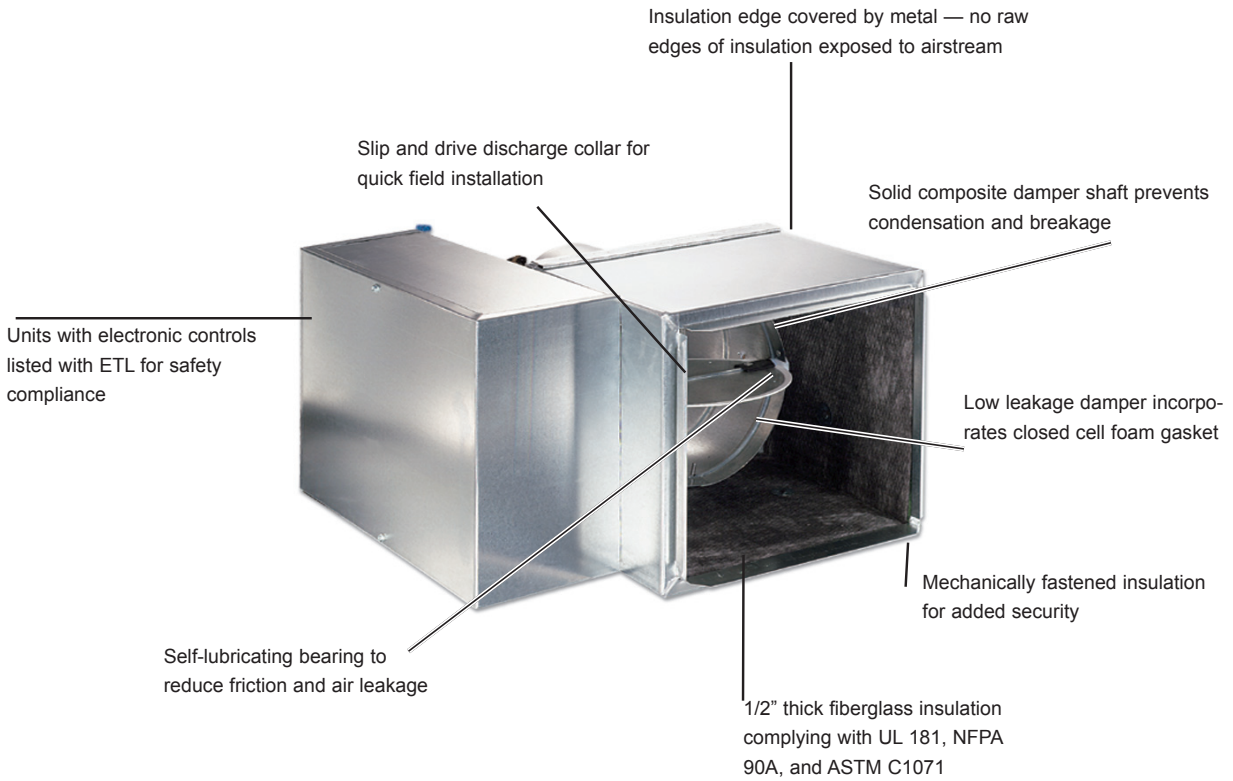
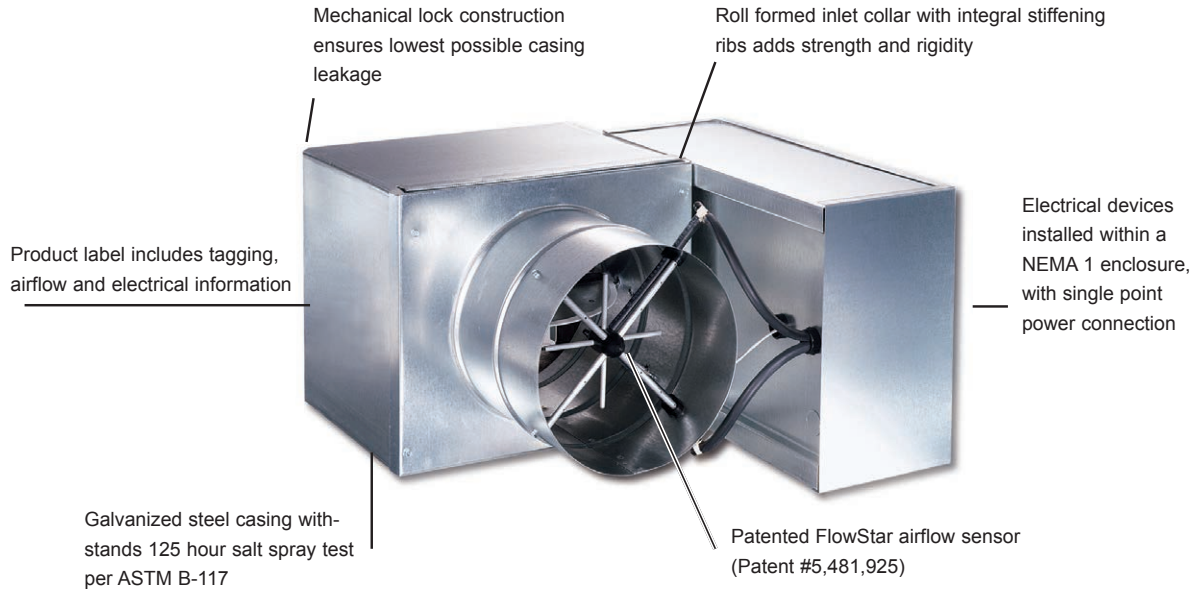


The FlowStar probe is visible in the inlet of the TSS-EH. The elements, partially removed for this photo, are midway between the inlet and the damper.

# STANDARD CONSTRUCTION

## MODEL TSS

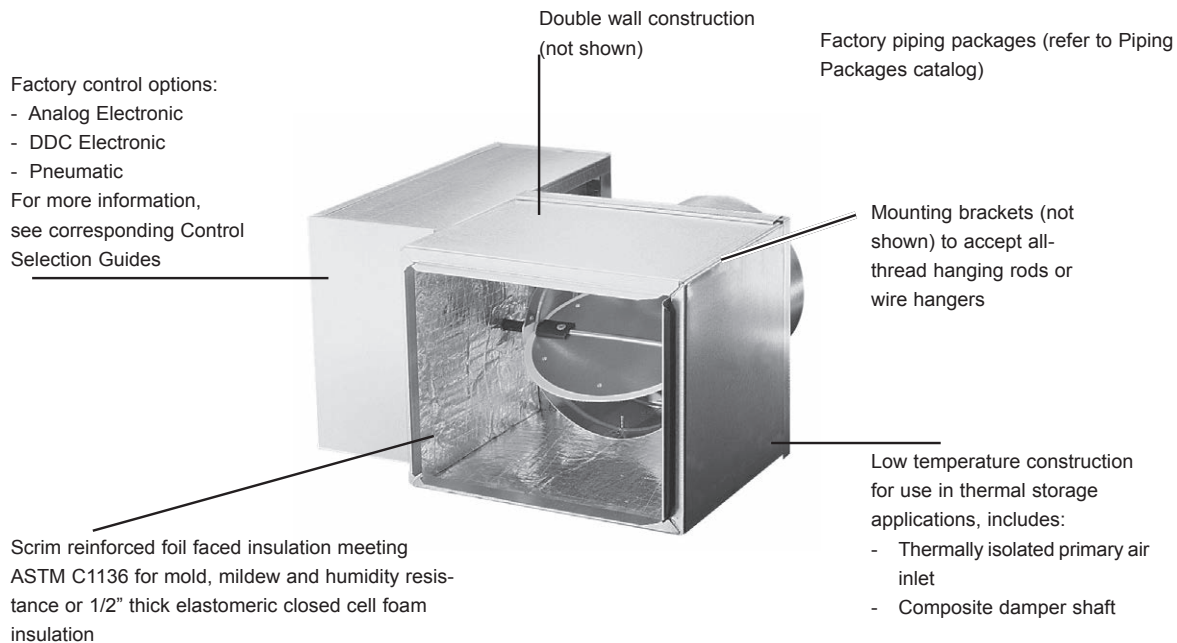
The TSS terminal incorporates many standard features that are expensive options for other manufacturers.



## OPTIONAL CONSTRUCTION

### MODEL TSS

The TSS single duct terminal is available with many optional features to meet any project requirement.



## STANDARD AND OPTIONAL FEATURES

---

### STANDARD FEATURES

#### Construction

- AHRI 880 certified and labeled
- 22 gauge galvanized steel casing and valve
- 1/2" thick fiberglass insulation, mechanically fastened for added security

#### Primary Air Valve

- Embossed rigidity rings
- Low thermal conductance damper shaft
- Position indicator on end of damper shaft
- Mechanical stops for open and closed position
- FlowStar™ center averaging airflow sensor
- Balancing tees
- Plenum-rated sensor tubing

#### Hot Water Coil

- Designed and manufactured by Johnson Controls
- AHRI 410 certified and labeled
- 1, 2, 3 or 4 rows
- Left or right hand connections
- Tested at a minimum of 450 PSIG under water and rated at 300 PSIG working pressure at 200°F

#### Electrical

- cETL listed for safety compliance with UL 1996
- NEMA 1 wiring enclosure

#### Electric Heat

- cETL listed as an assembly for safety compliance
- Automatic reset primary and back-up secondary thermal limits
- Airflow switch
- Single point power connection
- Hinged electrical enclosure door
- Fusing per NEC

### OPTIONAL FEATURES

#### Construction

- 20 gauge galvanized steel construction
- 3/4" and 1" insulation
- Foil faced scrim backed insulation
- 1/2" thick elastomeric closed cell foam insulation
- Double wall construction with 22 gauge liner

#### Hot Water Coil

- Coil access plate for cleaning coil

#### Electrical

- Toggle disconnect switch
- Primary and secondary transformer fusing

#### Electric Heat

- Proportional SSR heater control
- Mercury contactors
- Door interlocking disconnect switches

#### Controls

- Factory provided controls include:
  - Analog electronic
  - Pneumatic
- Factory mounted JCI DDC controls (factory mount and wire)

#### Piping Packages

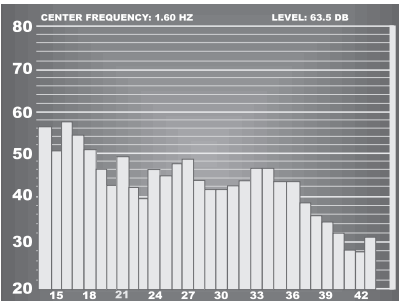
- Factory assembled – shipped loose for field installation
- 1/2" and 3/4", 2 way, normally closed, two position electric motorized valves
- Isolation ball valves with memory stop
- Fixed and adjustable flow control devices
- Unions and P/T ports
- Floating point modulating control valves
- High pressure close-off actuators



## APPLICATION AND SELECTION

### ACOUSTICAL CONCEPTS

The focus on indoor air quality is also having an effect on proper selection of air terminal equipment with respect to acoustics.



**Sound.** At the zone level, the terminal unit generates acoustical energy that can enter the zone along two primary paths. First, sound from the primary

air valve can propagate through the downstream duct and diffusers before entering the zone (referred to as Discharge or Airborne Sound). Acoustical energy is also radiated from the terminal casing and travels through the ceiling cavity and ceiling system before entering the zone (referred to as Radiated Sound).

To properly quantify the amount of acoustical energy emanating from a terminal unit at a specific operating condition (i.e. CFM and static pressure), manufacturers must measure and publish sound power levels.

The units of measurement, decibels, actually represent units of power (watts). The terminal equipment sound power ratings provide a consistent measure of the generated sound independent of the environment in which the unit is installed. This allows a straight forward comparison of sound performance between equipment manufacturers and unit models.

**Noise Criteria (NC).** The bottom line acoustical criteria for most projects is the NC (Noise Criteria) level. This NC level is derived from resulting sound pressure levels in the zone. These sound pressure levels are the effect of acoustical energy (sound power levels) entering the zone caused by the terminal unit and other sound generating sources (central fan system, office equipment, environment, etc.).

The units of measurement is once again decibels; however, in this case decibels represent units of pressure (Pascals), since the human ear and microphones react to pressure variations.

There is no direct relationship between sound power levels and sound pressure levels. Therefore, we must predict the resulting sound pressure levels (NC levels) in the zone based in part by the published sound power

levels of the terminal equipment. The NC levels are totally dependent on the project specific design, architecturally and mechanically. For a constant operating condition (fixed sound power levels), the resulting NC level in the zone will vary from one project to another.

**AHRI 885.** A useful tool to aid in predicting space sound pressure levels is an application standard referred to as AHRI Standard 885. This standard provides information (tables, formulas, etc.) required to calculate the attenuation of the ductwork, ceiling cavity, ceiling system, and conditioned space below a terminal unit. These attenuation values are referred to as the “transfer function” since they are used to transfer from the manufacturer’s sound power levels to the estimated sound pressure levels resulting in the space below, and/or served by the terminal unit. The standard does not provide all of the necessary information to accommodate every conceivable design; however, it does provide enough information to approximate the transfer function for most applications. Manufacturers use different assumptions with respect to a “typical” project design; therefore, it is impossible to compare product performance simply by looking at the published NC values.

### GENERAL DESIGN RECOMMENDATIONS FOR A QUIET SYSTEM

**The AHU.** Sound levels in the zone are frequently impacted by central fan discharge noise that either breaks out (radiates) from the ductwork or travels through the distribution ductwork and enters the zone as airborne (discharge) sound. Achieving acceptable sound levels in the zone begins with a properly designed central fan system which delivers relatively quiet air to each zone.

**Supply Duct Pressure.** The primary factor contributing to noisy systems (including single duct applications) is high static pressure in the primary air duct. This condition causes higher sound levels from the central fan and also higher sound levels from the terminal unit, as the primary air valve closes to reduce the pressure. This condition is compounded when flexible duct is utilized at the terminal inlet, which allows the central fan noise and air valve noise to break out into the ceiling cavity and then enter the zone located below the terminal. Ideally, the system static pressure should be reduced to the point where the terminal unit installed on the duct run associated with the highest pressure drop has the minimum required inlet pressure to deliver the design airflow to the zone. Many of today’s

## APPLICATION AND SELECTION

HVAC systems experience 0.5" w.g. pressure drop or less in the main trunk. For systems that will have substantially higher pressure variances from one zone to another, special attention should be paid to the proper selection of air terminal equipment.

To date, the most common approach has been to select (size) all of the terminals based on the worst case (highest inlet static pressure) condition. Typically, this results in 80% (or higher) of the terminal units being oversized for their application. This in turn results in much higher equipment costs, but more importantly, drastically reduced operating efficiency of each unit. This consequently decreases the ability to provide comfort control in the zone. In addition, the oversized terminals cannot adequately control the minimum ventilation capacity required in the heating mode.

A more prudent approach is to utilize a pressure reducing device upstream of the terminal unit on those few zones closest to the central fan. This device could simply be a manual quadrant type damper if located well upstream of the terminal inlet. In tight quarters, perforated metal can be utilized as a quiet means of reducing system pressure. This approach allows all of the terminal units to experience a similar (lower) inlet pressure. They can be selected in a consistent manner at lower inlet pressure conditions that will allow more optimally sized units.

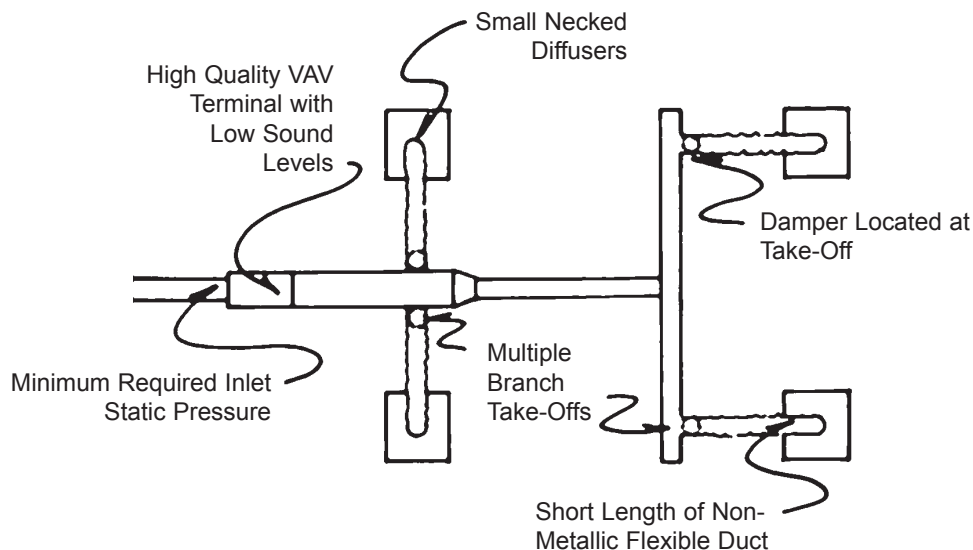
Inlet duct that is the same size as the inlet collar and as straight as possible will achieve the best acoustical performance. For critical applications, flexible duct should not be utilized at the terminal inlet.

**Zoning.** On projects where internal lining of the downstream duct is not permitted, special considerations should be made to obtain acceptable noise levels. In these cases, a greater number of smaller zones will help in reducing sound levels. Where possible, the first diffuser takeoff should be located after an elbow or tee and a greater number of small necked diffusers should be utilized, rather than fewer large necked diffusers.

The downstream ductwork should be carefully designed and installed to avoid noise regeneration. Bull head tee arrangements should be located sufficiently downstream of the terminal discharge to provide an established flow pattern downstream of the fan. Place diffusers downstream of the terminal after the airflow has completely developed.

Downstream splitter dampers can cause noise problems if placed too close to the terminal, or when excessive air velocities exist. If tee arrangements are employed, volume dampers should be used in each branch of the tee, and balancing dampers should be provided at each diffuser tap. This arrangement provides maximum flexibility in quiet balancing of the system.

### IDEAL DUCT DESIGN

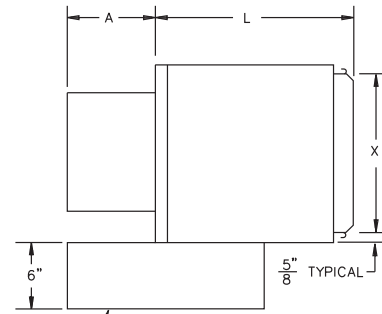


# DIMENSIONAL DATA

UNIT SIZE	DIMENSIONS						
	W	H	L	A	I	X	Y
4	10 [254]	10 [254]	11 [279]	10 1/2 [267]	3 7/8 [98]	8 3/4 [222]	8 3/4 [222]
5	10 [254]	10 [254]	11 [279]	10 1/2 [267]	4 7/8 [124]	8 3/4 [222]	8 3/4 [222]
6	10 [254]	10 [254]	11 [279]	6 1/2 [165]	5 7/8 [149]	8 3/4 [222]	8 3/4 [222]
8	12 [305]	10 [254]	11 [279]	6 1/2 [165]	7 7/8 [200]	10 3/4 [273]	8 3/4 [222]
10	14 [356]	12 1/2 [318]	13 [330]	6 1/2 [165]	9 7/8 [251]	12 3/4 [324]	11 1/4 [286]
12	16 [406]	15 [381]	13 [330]	6 1/2 [165]	11 7/8 [302]	14 3/4 [375]	13 3/4 [349]
14	20 [508]	17 1/2 [445]	17 1/2 [445]	6 1/2 [165]	13 7/8 [352]	18 3/4 [476]	16 1/4 [413]
16	24 [610]	17 1/2 [445]	17 1/2 [445]	6 1/2 [165]	15 7/8 [403]	22 3/4 [578]	16 1/4 [413]
19	30 [762]	17 1/2 [445]	11 [279]	8 [203]	28 1/4 [718] x 13 7/8 [352]	28 3/4 [730]	16 1/4 [413]
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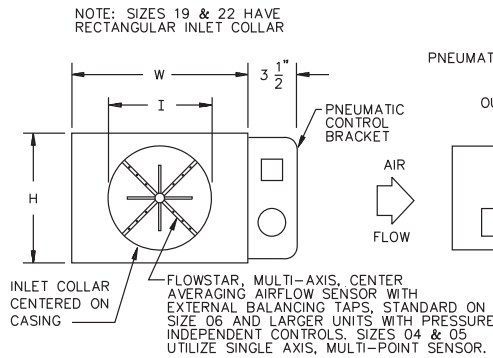
**NOTES:**

- All dimensions are in inches [mm] with a tolerance of  $\pm 1/8"$  [3mm].
- Sizes 19 and 22 have rectangular inlet collar.

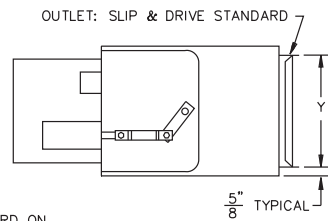


CONTROL ENCLOSURE STANDARD WITH ELECTRONIC CONTROLS (PROVIDE SUFFICIENT CLEARANCE TO PERMIT ACCESS TO CONTROLS)

PNEUMATIC CONTROLS NOT SHOWN THIS VIEW



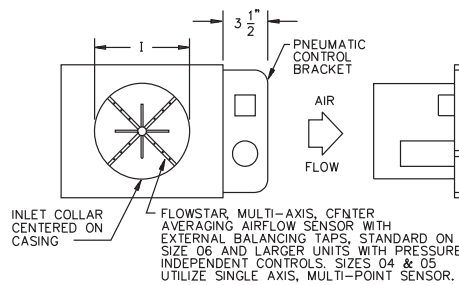
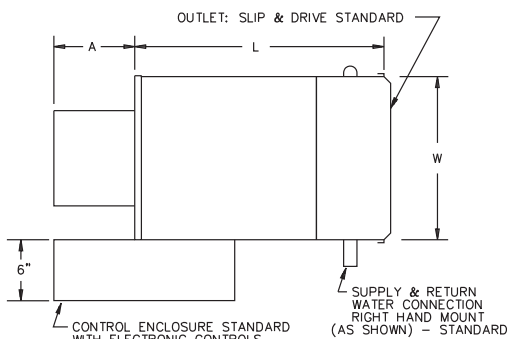
ELECTRONIC CONTROLS NOT SHOWN THESE VIEWS



UNIT SIZE	DIMENSIONS				
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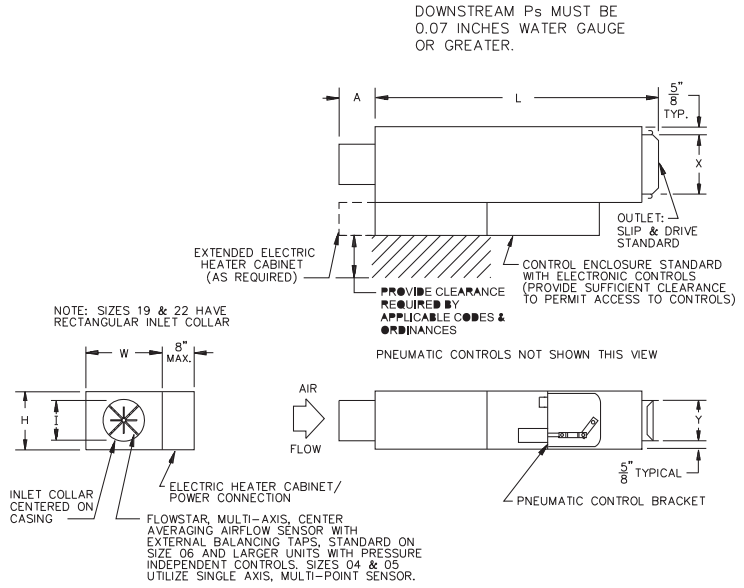
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# DIMENSIONAL DATA

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19	30 [762]	17 1/2 [445]	44 1/2 [1130]	28 1/4 [718] x 13 7/8 [352]	28 3/4 [730]	16 1/4 [413]	1 1/2 [38]
22	34 [864]	17 1/2 [445]	44 1/2 [1130]	32 1/4 [819] x 15 7/8 [403]	32 3/4 [832]	16 1/4 [413]	1 1/2 [38]

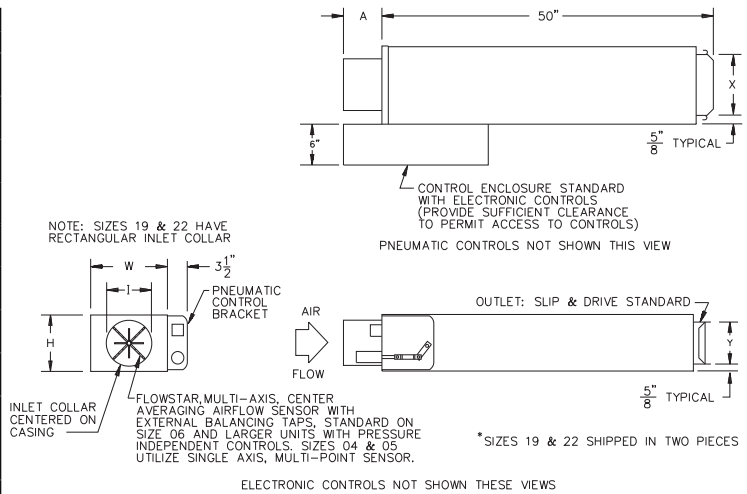
**NOTE:** All dimensions are in inches [mm] with a tolerance of ±1/8" [3mm].



## MODEL TSS - SA

UNIT SIZE	DIMENSIONS					
	W	H	A	I	X	Y
4	10 [254]	10 [254]	10 1/2 [267]	3 7/8 [98]	8 3/4 [222]	8 3/4 [222]
5	10 [254]	10 [254]	10 1/2 [267]	4 7/8 [124]	8 3/4 [222]	8 3/4 [222]
6	10 [254]	10 [254]	6 1/2 [165]	5 7/8 [149]	8 3/4 [222]	8 3/4 [222]
8	12 [305]	10 [254]	6 1/2 [165]	7 7/8 [200]	10 3/4 [273]	8 3/4 [222]
10	14 [356]	12 1/2 [318]	6 1/2 [165]	9 7/8 [251]	12 3/4 [324]	11 1/4 [286]
12	16 [406]	15 [381]	6 1/2 [165]	11 7/8 [302]	14 3/4 [375]	13 3/4 [349]
14	20 [508]	17 1/2 [445]	6 1/2 [165]	13 7/8 [352]	18 3/4 [476]	16 1/4 [413]
16	24 [610]	17 1/2 [445]	6 1/2 [165]	15 7/8 [403]	22 3/4 [578]	16 1/4 [413]
19*	30 [762]	17 1/2 [445]	8 [203]	28 1/4 [718] x 13 7/8 [352]	28 3/4 [730]	16 1/4 [413]
22*	34 [864]	17 1/2 [445]	8 [203]	32 1/4 [819] x 15 7/8 [403]	32 3/4 [832]	16 1/4 [413]

**NOTE:** All dimensions are in inches [mm] with a tolerance of ±1/8" [3mm].

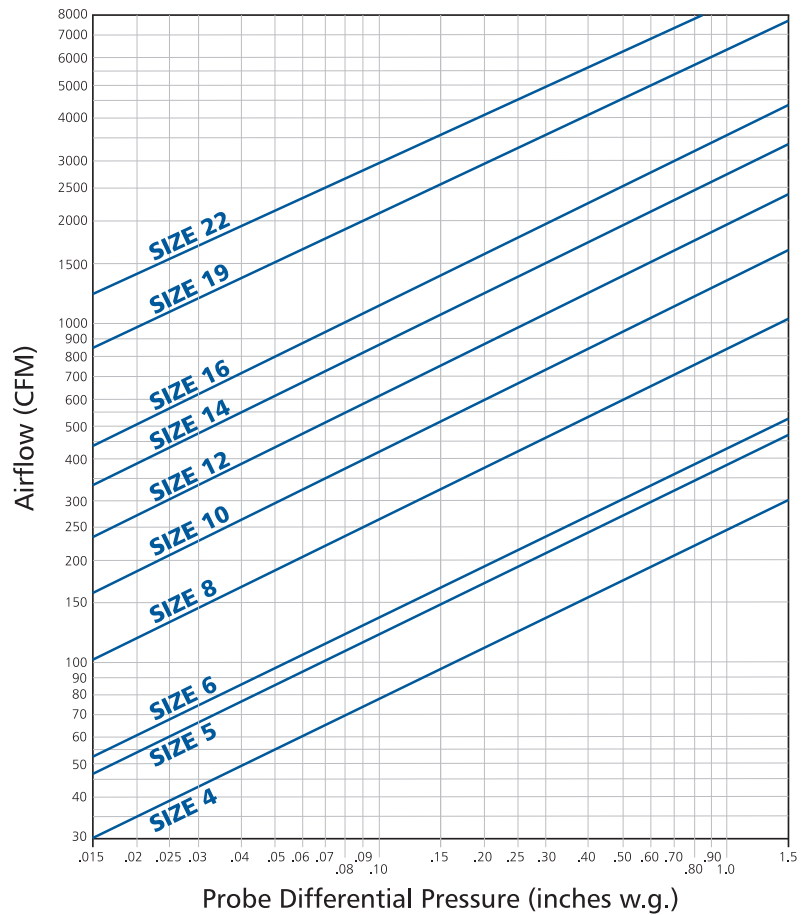


# AIRFLOW CALIBRATION

## FLOWSTAR CALIBRATION CHART

(For dead-end differential pressure transducers)

**NOTE:** Maximum and minimum CFM limits are dependent on the type of controls that are utilized. Refer to the table below for specific values. When DDC controls are furnished by others, the CFM limits are dependent on the specific control vendor that is employed. After obtaining the differential pressure range from the control vendor, the maximum and minimum CFM limits can be obtained from the chart above (many controllers are capable of controlling minimum setpoint down to .015" w.g.).



## AIRFLOW RANGES (CFM)

UNIT SIZE	400 SERIES (PNEUMATIC) STANDARD CONTROLLER		7000 SERIES ANALOG ELECTRONIC		DDC CONSIGNMENT CONTROLS (See Notes Below)				
	MIN.	MAX.	MIN.	MAX.	MIN.			MAX.	
					MIN. TRANSDUCER DIFFERENTIAL PRESSURE (IN. W.G.)			MAX. TRANSDUCER DIFFERENTIAL PRESSURE (IN. W.G.)	
					0.015	0.03	0.05	1.0	≤1.5
4	43	250	35	250	30	43	55	250	250
5	68	350	50	350	48	65	88	350	350
6	75	490	60	550	53	75	97	435	530
8	145	960	115	1000	105	145	190	840	1000
10	235	1545	185	1600	165	235	305	1355	1600
12	340	2250	285	2300	240	340	440	1975	2300
14	475	3100	390	3100	335	475	615	2750	3100
16	625	4100	520	4100	440	625	805	3595	4100
19	1180	6500	1025	6500	845	1180	1510	6375	6500
22	1730	8000	1450	8000	1260	1730	2200	8000	8000

**NOTES:**

1. Minimum and maximum airflow limits are dependent on the specific DDC controller supplied. Contact the control vendor to obtain the minimum and maximum differential pressure limits (inches W.G.) of the transducer utilized with the DDC controller.
2. Maximum CFM is limited to value shown in General Selection Data.



# SELECTION DATA

TERMINAL SIZE	CFM	MINIMUM ΔPs			DISCHARGE NOISE CRITERIA (NC)						RADIATED NOISE CRITERIA (NC)		
		Model SDR / SDR-SA	Model SDR-WC 1 Row	Model SDR-WC 2 Row	0.5" ΔPs		1.0" ΔPs		3.0" ΔPs		0.5" ΔPs	1.0" ΔPs	3.0" ΔPs
					Model SDR	Model SDR-SA	Model SDR	Model SDR-SA	Model SDR	Model SDR-SA			
4	100	0.01	0.02	0.03	--	--	--	--	20	--	--	--	20
	150	0.01	0.03	0.04	--	--	24	--	29	21	--	--	24
	200	0.01	0.04	0.07	23	--	29	23	34	28	--	22	29
	250	0.01	0.05	0.09	26	20	31	28	38	33	23	25	33
5	100	0.01	0.02	0.03	--	--	--	--	--	--	--	--	--
	200	0.01	0.04	0.07	--	--	24	--	28	--	--	--	24
	300	0.01	0.07	0.13	23	--	28	--	31	21	--	23	31
	350	0.01	0.09	0.16	24	--	30	21	33	24	21	25	33
6	200	0.02	0.05	0.08	--	--	--	--	25	--	--	--	29
	250	0.03	0.07	0.11	--	--	--	--	28	--	--	--	31
	300	0.04	0.10	0.16	--	--	--	--	28	20	--	20	33
	350	0.06	0.14	0.21	--	--	21	--	30	23	--	21	35
	450	0.10	0.22	0.33	--	--	24	--	33	25	--	24	36
	550	0.14	0.30	0.46	20	--	28	24	35	30	23	28	37
8	300	0.01	0.05	0.10	--	--	--	--	24	--	--	--	26
	400	0.01	0.08	0.15	--	--	--	--	26	--	--	--	29
	500	0.01	0.11	0.22	--	--	--	--	29	--	--	20	30
	600	0.01	0.15	0.30	--	--	--	--	30	20	--	21	32
	800	0.03	0.25	0.46	--	--	21	--	33	24	20	24	34
	1000	0.04	0.35	0.66	21	--	25	21	35	28	23	26	37
10	600	0.01	0.08	0.16	--	--	--	--	30	--	--	--	32
	800	0.01	0.13	0.26	--	--	--	--	30	20	--	--	32
	1000	0.02	0.20	0.39	--	--	20	--	31	24	--	21	32
	1200	0.02	0.25	0.47	--	--	23	--	34	28	--	23	34
	1400	0.03	0.32	0.61	--	--	25	20	35	29	20	24	35
	1600	0.04	0.40	0.76	20	--	28	24	36	31	24	26	37
12	800	0.01	0.08	0.15	--	--	--	--	26	--	--	21	33
	1100	0.01	0.13	0.26	--	--	--	--	28	--	--	22	34
	1400	0.02	0.21	0.40	--	--	20	--	30	24	--	24	35
	1700	0.02	0.26	0.50	--	--	21	--	33	28	--	25	36
	2000	0.03	0.34	0.65	--	--	23	--	35	30	20	26	37
	2300	0.04	0.43	0.82	20	--	25	20	36	31	22	28	38
14	1100	0.01	0.07	0.14	--	--	--	--	26	--	--	--	30
	1500	0.02	0.13	0.24	--	--	--	--	29	23	--	--	31
	1900	0.03	0.20	0.36	--	--	--	--	30	25	--	21	33
	2300	0.05	0.26	0.47	--	--	21	--	33	28	--	23	34
	2700	0.07	0.34	0.62	--	--	24	20	34	29	20	25	35
	3100	0.09	0.43	0.77	21	--	26	21	35	31	22	28	37
16	1600	0.01	0.10	0.19	--	--	--	--	24	--	--	--	33
	2100	0.02	0.17	0.31	--	--	--	--	29	23	--	20	35
	2600	0.03	0.24	0.45	--	--	20	--	34	29	--	21	35
	3100	0.04	0.29	0.55	--	--	23	20	35	30	--	24	36
	3600	0.05	0.37	0.70	20	--	25	21	37	34	21	26	37
	4100	0.06	0.46	0.86	23	--	28	23	39	36	24	29	38
19	2500	0.06	0.19	0.32	23	20	29	21	38	26	29	35	43
	3000	0.09	0.27	0.45	24	21	30	25	39	30	30	36	44
	3500	0.13	0.37	0.61	26	24	31	26	40	33	31	37	45
	4500	0.21	0.53	0.86	26	24	31	28	40	36	34	40	48
	5500	0.32	0.77	1.22	29	25	33	29	43	39	38	44	53
	6500	0.44	1.03	1.62	31	28	33	29	45	41	41	48	56
22	4000	0.06	0.30	0.55	28	24	33	26	41	33	31	37	48
	5000	0.09	0.46	0.83	28	24	34	29	41	36	34	39	50
	6000	0.14	0.56	0.99	29	26	34	31	43	38	36	41	53
	7000	0.18	0.72	1.27	30	28	36	33	44	40	39	45	56
8000	0.24	0.91	1.59	33	29	37	34	45	41	41	47	58	

NOTES:

- Min. ΔPs is the static pressure difference between the terminal inlet and discharge with the damper wide open.
- Performance data obtained from tests conducted in accordance with AHRI Standard 880.
- Dash (-) indicates NC level less than 20.
- NC values calculated based upon the 2002 Addendum to AHRI Standard 885 Appendix E Typical Sound Attenuation Values (shown at right) using Ceiling Type 2 for calculating Radiated NC.
- NC (sound pressure) levels predicted by subtracting appropriate values at right from published sound power levels (following pages).

DISCHARGE ATTENUATION VALUES	OCTAVE BAND					
	2	3	4	5	6	7
Small Box (< 300 CFM)	24	28	39	53	59	40
Medium Box (300-700 CFM)	27	29	40	51	53	39
Large Box (> 700 CFM)	29	30	41	51	52	39
RADIATED ATTENUATION VALUES	OCTAVE BAND					
	2	3	4	5	6	7
Type 2 - Mineral Fiber Ceiling	18	19	20	26	31	36









### DISCHARGE SOUND POWER DATA - MODEL TSS - SA

TERMINAL SIZE	OCTAVE BAND NUMBER																		
	CFM	0.5" ΔPs						1.0" ΔPs						3.0" ΔPs					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
4	100	52	47	35	29	21	22	55	51	42	34	24	24	55	54	48	41	30	28
	150	55	52	39	32	23	22	61	57	45	37	27	23	63	62	54	45	35	32
	200	60	56	43	35	24	25	66	61	48	40	29	26	68	67	58	48	37	34
	250	64	59	46	41	28	26	70	63	51	43	32	27	73	71	62	50	39	34
5	100	49	43	35	29	20	20	50	44	39	30	23	24	53	51	45	37	28	27
	200	53	49	39	30	20	21	56	51	44	35	24	23	60	60	54	44	34	31
	300	60	53	43	34	21	22	65	57	48	39	26	24	66	63	58	48	37	32
	350	62	55	45	36	24	21	68	60	50	42	29	25	68	65	60	51	39	32
6	200	49	45	35	28	19	22	54	50	43	32	22	23	59	58	51	43	32	29
	250	56	49	38	30	22	23	59	54	46	35	23	23	61	59	53	45	33	31
	300	59	52	41	32	22	23	61	57	48	37	25	23	64	62	57	46	35	31
	350	59	54	44	35	23	24	62	60	51	40	27	24	65	64	59	48	37	33
	450	60	55	46	37	23	24	65	61	54	42	28	24	69	66	61	50	38	36
550	64	59	50	42	26	26	67	65	57	46	32	29	73	70	65	52	39	38	
8	300	52	45	39	29	22	22	53	50	47	36	28	27	59	56	57	47	38	36
	400	55	46	40	30	23	23	57	51	46	37	28	28	60	57	58	47	38	36
	500	57	50	43	34	24	24	61	54	49	39	30	28	63	60	60	50	41	38
	600	58	52	45	36	26	24	63	56	49	42	30	28	65	62	62	52	41	38
	800	62	55	49	39	29	26	66	60	53	45	34	30	71	66	62	53	43	39
	1000	66	60	53	44	33	29	69	64	57	49	40	32	75	69	65	55	44	40
10	600	54	49	42	34	23	23	58	54	51	40	30	29	64	59	57	49	37	37
	800	56	51	43	35	25	24	61	57	52	42	31	30	66	63	60	53	40	39
	1000	59	54	47	38	28	26	63	59	54	44	34	32	70	66	62	55	43	40
	1200	60	57	49	40	29	27	65	61	56	45	37	33	72	69	64	56	44	42
	1400	62	59	51	43	32	29	67	63	58	48	40	35	74	70	66	58	46	44
	1600	65	61	56	47	35	32	71	66	62	51	43	37	77	72	68	61	48	46
12	800	52	49	44	35	28	26	55	55	54	45	36	33	61	59	58	51	42	40
	1100	54	52	47	37	29	28	59	58	56	46	38	38	65	62	61	55	47	43
	1400	56	54	50	40	32	28	62	60	57	47	40	38	66	66	66	58	49	45
	1700	58	55	52	42	34	31	64	61	58	49	42	38	70	69	67	60	52	48
	2000	61	59	54	45	37	33	66	62	60	51	45	40	74	71	69	61	53	51
	2300	65	61	57	48	40	37	69	63	61	52	47	42	76	72	70	61	55	52
14	1100	53	47	42	38	32	26	60	55	50	44	39	35	65	62	59	53	48	45
	1500	57	50	45	39	34	28	62	57	52	45	41	38	67	65	62	57	51	48
	1900	57	52	48	42	35	29	65	60	54	46	43	41	70	67	65	58	53	49
	2300	60	56	51	45	38	32	66	61	56	47	45	43	72	69	65	60	56	51
	2700	62	57	54	47	40	36	68	63	58	49	47	45	75	70	67	61	57	53
	3100	64	59	56	49	42	37	67	64	60	51	48	46	77	72	68	61	58	56
16	1600	54	48	43	36	32	27	58	54	50	47	39	34	64	59	53	51	48	43
	2100	58	52	47	40	34	29	63	58	52	48	42	37	66	65	59	57	52	47
	2600	59	53	50	43	36	30	66	61	54	49	43	41	70	70	63	62	56	51
	3100	61	57	52	46	39	33	67	63	57	49	45	43	74	71	66	61	57	53
	3600	62	59	56	47	41	36	68	64	60	50	47	44	77	74	68	62	58	55
	4100	64	61	59	50	42	38	68	65	63	52	49	45	79	76	70	62	59	57
19	2500	66	63	54	50	47	38	70	64	60	56	50	42	72	68	65	62	58	51
	3000	67	64	56	53	49	41	71	67	63	58	52	46	74	71	68	66	61	54
	3500	68	66	57	54	50	46	72	68	65	59	55	49	75	73	70	69	63	56
	4500	69	66	59	56	52	49	73	69	68	61	58	53	79	76	75	71	68	61
	5500	70	67	62	58	56	51	74	70	69	63	61	57	82	79	78	75	69	64
	6500	72	69	67	60	58	53	75	70	69	64	63	59	85	81	80	77	71	67
22	4000	68	66	60	53	46	41	73	68	66	58	50	46	78	73	74	69	63	57
	5000	68	66	62	57	49	45	75	70	70	61	53	50	80	76	77	73	65	59
	6000	71	68	65	60	53	49	77	72	73	63	57	54	82	78	79	73	67	62
	7000	74	69	68	62	55	53	78	73	74	65	60	57	84	80	81	74	68	63
	8000	76	70	71	64	57	55	78	74	74	67	63	59	85	81	82	75	70	65

- Performance data obtained from tests conducted in accordance with AHRI Standard 880.
- Sound levels are expressed in decibels, dB re:  $1 \times 10^{-12}$  watts
- Duct end corrections included in sound power levels per AHRI Standard 880.

# SOUND DATA

## RADIATED SOUND POWER DATA - MODEL TSS-SA

TERMINAL SIZE	OCTAVE BAND NUMBER																		
	CFM	0.5" ΔPs						1.0" ΔPs						3.0" ΔPs					
		2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
4	100	46	43	35	29	26	27	49	44	39	32	27	24	48	50	46	38	33	31
	150	49	47	40	33	29	28	52	48	44	36	31	28	53	55	50	43	37	34
	200	52	51	44	37	32	29	56	52	48	40	35	31	58	59	54	47	41	38
	250	54	54	47	40	36	32	58	55	51	43	38	34	61	62	58	50	45	41
5	100	42	36	33	27	23	20	45	40	37	29	25	22	47	47	44	36	32	30
	200	46	44	40	33	28	28	49	48	44	36	31	28	52	53	50	43	37	34
	300	51	49	45	38	34	30	54	53	49	41	36	32	56	57	56	48	42	39
	350	54	52	47	40	36	32	57	55	51	43	38	35	58	59	58	50	45	41
6	200	43	38	38	37	33	23	47	44	45	44	40	29	51	52	54	51	47	37
	250	46	41	39	36	32	23	48	46	45	44	41	30	53	54	56	55	51	40
	300	48	43	40	36	31	24	50	48	46	44	41	30	55	56	58	57	54	42
	350	50	46	42	37	31	26	53	50	47	43	40	30	57	58	60	58	55	43
	450	54	48	45	38	32	28	57	53	50	45	40	32	60	60	61	59	56	45
	550	60	53	49	43	36	30	64	58	53	46	41	34	63	63	62	57	55	46
8	300	46	37	38	33	28	24	49	46	42	38	33	29	53	53	52	47	43	35
	400	49	40	40	35	30	24	52	47	44	39	35	30	58	56	54	49	44	37
	500	50	42	41	36	32	25	53	48	46	41	37	31	57	57	55	51	46	40
	600	53	44	43	38	33	26	56	50	47	42	38	31	60	58	57	52	47	41
	800	58	47	45	40	35	28	60	53	50	45	40	33	64	61	59	54	50	43
	1000	60	52	48	42	37	30	62	56	52	46	42	35	67	63	62	56	51	45
10	600	49	40	38	32	27	28	53	47	43	37	31	29	58	58	57	49	42	36
	800	51	42	40	34	28	29	55	49	45	38	33	30	60	59	57	50	43	38
	1000	53	44	43	36	30	29	56	51	47	40	35	30	62	60	57	50	45	40
	1200	55	46	45	37	32	29	57	53	49	42	37	31	64	61	59	52	46	41
	1400	57	48	46	39	33	29	59	54	50	43	38	33	65	62	60	53	48	43
	1600	61	51	48	40	34	29	63	56	52	45	40	34	67	63	62	54	49	44
12	800	47	41	39	33	30	29	51	49	47	40	37	33	54	60	58	52	47	43
	1100	49	44	41	34	31	29	54	51	48	42	38	33	58	61	59	53	48	45
	1400	51	46	42	35	32	29	56	52	50	43	39	34	60	62	60	54	49	46
	1700	53	48	44	37	33	29	56	53	51	44	39	34	63	63	61	55	49	46
	2000	54	49	46	39	33	29	58	54	52	45	40	34	64	64	62	56	50	46
	2300	55	50	48	40	35	30	59	55	53	46	41	35	66	65	63	57	51	47
14	1100	47	42	36	34	34	30	53	49	42	39	40	36	60	60	54	50	47	45
	1500	49	44	39	36	34	30	54	51	45	40	41	36	62	61	55	52	48	47
	1900	51	46	42	37	34	30	56	53	47	43	43	37	63	62	56	53	51	48
	2300	53	48	44	38	34	30	57	54	48	43	43	37	65	63	58	54	53	50
	2700	55	50	46	40	35	31	59	56	50	45	43	37	66	64	60	55	54	50
	3100	56	53	48	42	37	32	61	58	52	46	43	38	67	65	62	57	55	50
16	1600	48	44	37	35	30	30	53	49	43	40	36	33	60	62	56	50	46	41
	2100	50	46	40	36	33	30	55	52	46	41	39	34	61	64	56	52	47	44
	2600	53	48	43	39	35	31	57	53	47	43	40	36	63	64	58	53	49	46
	3100	55	49	45	41	37	32	59	55	49	45	42	38	65	65	59	55	51	47
	3600	56	51	47	42	38	34	61	57	51	47	43	39	67	66	61	56	53	49
	4100	58	53	50	44	40	35	62	59	53	48	45	40	69	67	63	58	54	50
19	2500	59	57	54	47	41	33	65	60	60	52	46	39	70	67	67	63	57	50
	3000	59	58	55	47	41	34	65	61	61	52	46	39	70	68	68	64	58	50
	3500	60	59	56	48	42	35	66	62	62	53	47	40	71	68	69	64	59	51
	4500	60	61	59	50	45	37	66	64	65	55	50	43	72	70	72	67	61	54
	5500	62	63	63	53	48	40	67	66	68	58	53	46	73	72	76	70	64	57
	6500	66	65	66	56	51	44	67	68	72	61	56	49	75	75	79	73	67	60
22	4000	59	60	56	48	42	36	65	63	62	53	47	41	70	71	72	67	60	54
	5000	60	61	59	50	44	38	65	64	64	55	48	43	72	72	74	68	62	56
	6000	62	62	61	51	46	40	65	65	66	56	50	45	72	73	76	70	64	58
	7000	64	63	64	53	48	41	66	66	69	58	52	47	74	74	79	72	66	59
	8000	66	64	66	55	50	43	67	67	71	60	54	48	75	75	81	74	68	61

- Performance data obtained from tests conducted in accordance with AHRI Standard 880.
- Sound levels are expressed in decibels, dB re: 1 x 10<sup>-12</sup> watts



# AHRI RATINGS

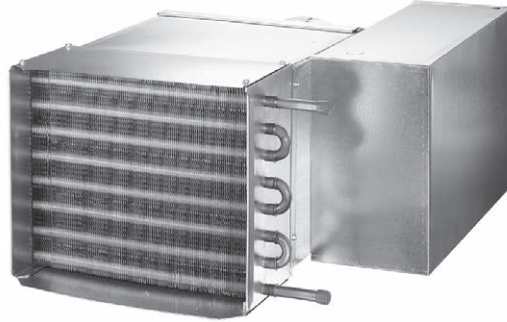
SIZE	RATED AIRFLOW CFM	MINIMUM OPERATING PRESSURE (IN. W.G.)	STANDARD RATINGS – SOUND POWER LEVEL, dB RE: 1 x 10 <sup>-12</sup> WATTS											
			1.5" WATER STATIC PRESSURE											
			RADIATED						DISCHARGE					
			Hz Octave Band Center Frequency						Hz Octave Band Center Frequency					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	150	0.01	53	53	46	38	33	30	68	67	58	54	49	48
5	250	0.02	53	52	49	41	35	32	70	68	59	55	51	50
6	400	0.10	56	54	52	49	46	36	69	67	60	57	52	52
8	700	0.03	58	56	52	47	42	35	69	67	62	60	57	55
10	1100	0.03	59	55	53	44	39	34	70	67	63	60	57	54
12	1600	0.04	59	56	53	44	40	35	71	67	64	61	59	57
14	2100	0.06	60	58	51	46	46	41	71	67	64	60	58	57
16	2800	0.04	60	59	52	47	44	40	74	68	65	60	58	57
19	5400	0.38	68	68	71	61	56	49	77	78	79	75	70	68
22	7100	0.20	69	69	73	63	57	51	82	80	82	76	71	69

- Rated in accordance with AHRI Standard 880
- Duct end corrections included in sound power levels per AHRI Standard 880.



# HOT WATER COIL DATA

## MODEL TSS-WC



### STANDARD FEATURES

- Designed, manufactured, and tested by Johnson Controls
- Aluminum fin construction with die-formed spacer collars for uniform spacing
- Mechanically expanded copper tubes leak tested to 450 PSIG air pressure and rated at 300 PSIG working pressure at 200°F
- Male sweat type water connections
- 1, 2, 3, and 4 row configurations

### OPTIONAL FEATURES

- Low pressure steam coils
- Multi-circuit coils for reduced water pressure drop
- Opposite hand water connections
- Bottom and top access plates for cleaning

### SELECTION PROCEDURE

TSS-WC Hot Water Coil Performance Tables are based upon a temperature difference of 125°F between the entering water and the entering air. If this ΔT is suitable, proceed directly to the tables for selection. All pertinent performance data is tabulated. **For Variable Air Volume Applications, the static pressure drop must be based on the maximum air volume.**

ENTERING WATER - AIR TEMPERATURE DIFFERENTIAL (DT) CORRECTION FACTORS															
ΔT	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
<b>FACTOR</b>	0.15	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.51	0.55	0.59	0.63	0.67	0.71
ΔT	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165
<b>FACTOR</b>	0.75	0.79	0.83	0.88	0.92	0.96	1.00	1.04	1.08	1.13	1.17	1.21	1.25	1.29	1.33

The table above gives correction factors for various entering ΔT's (difference between EWT and EAT). Multiply MBH values obtained from selection tables by the appropriate correction factor above to obtain the actual MBH value. Air and water pressure drop can be read directly from the selection tables. The LAT and LWT can be calculated from the following fundamental formulas:

$$LAT = EAT + \frac{BTUH}{1.085 \times CFM}$$

$$LWT = EWT - \frac{BTUH}{500 \times GPM}$$

### DEFINITION OF TERMS

- EAT Entering Air Temperature (°F)
- EWT Entering Water Temperature (°F)
- LWT Leaving Water Temperature (°F)
- LAT Leaving Air Temperature
- CFM Air Volume (Cubic Feet per Minute)

- GPM Water Capacity (Gallons per Minute)
- MBH 1,000 BTUH
- BTUH Coil Heating Capacity (British Thermal Units per Hour)

### MODEL TSS-WC - SIZES 4,5,6

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
50	1 Row	0.01	0.5	0.3	0.1	123.7	149.3	164.7	159.1	3.7	5.1
			1.0	1.0	0.3	128.4	155.8	171.8	168.8	4.0	5.5
	2 Row	0.01	2.0	3.4	0.9	131.2	159.3	175.8	174.2	4.1	5.7
			4.0	12.2	3.4	132.7	161.2	177.8	177.0	4.2	5.8
100	1 Row	0.01	0.5	0.3	0.1	105.7	127.4	157.5	147.9	5.5	7.8
			1.0	1.0	0.3	111.2	137.0	167.5	161.8	6.1	8.9
	2 Row	0.02	2.0	3.4	1.0	114.6	142.8	173.4	170.2	6.5	9.5
			4.0	12.2	3.4	116.5	146.2	176.6	174.9	6.7	9.9
150	1 Row	0.02	0.5	0.3	0.1	96.0	114.0	152.7	140.8	6.7	9.6
			1.0	1.0	0.3	101.7	124.7	164.4	156.8	7.6	11.3
	2 Row	0.03	2.0	3.4	1.0	105.3	131.7	171.6	167.2	8.2	12.5
			4.0	12.2	3.4	107.5	135.8	175.6	173.3	8.5	13.1
200	1 Row	0.03	0.5	0.3	0.1	89.8	104.9	149.1	135.8	7.5	10.8
			1.0	1.0	0.3	95.4	115.9	162.0	153.0	8.8	13.2
	2 Row	0.06	2.0	3.4	1.0	99.1	123.5	170.2	164.8	9.6	14.8
			4.0	12.2	3.4	101.4	128.1	174.8	171.9	10.0	15.8
250	1 Row	0.04	0.5	0.3	0.1	85.4	98.4	146.3	132.0	8.2	11.8
			1.0	1.0	0.3	90.9	109.3	160.1	149.9	9.7	14.7
	2 Row	0.08	2.0	3.4	1.0	94.6	117.1	169.0	162.7	10.7	16.8
			4.0	12.2	3.4	96.9	122.1	174.2	170.7	11.3	18.2
300	1 Row	0.06	0.5	0.3	0.1	82.1	93.4	144.0	129.0	8.8	12.5
			1.0	1.0	0.3	87.4	104.1	158.4	147.3	10.5	16.0
	2 Row	0.12	2.0	3.4	1.0	91.1	112.0	167.9	161.0	11.7	18.5
			4.0	12.2	3.4	93.4	117.2	173.6	169.6	12.5	20.2
350	1 Row	0.08	0.5	0.3	0.1	79.5	89.5	142.1	126.6	9.3	13.1
			1.0	1.0	0.3	84.6	99.9	157.0	145.2	11.2	17.0
	2 Row	0.15	2.0	3.4	1.0	88.3	107.8	167.0	159.5	12.6	20.0
			4.0	12.2	3.4	90.6	113.1	173.1	168.7	13.5	22.0
400	1 Row	0.10	0.5	0.3	0.1	77.4	86.4	140.4	124.6	9.7	13.6
			1.0	1.0	0.3	82.4	96.4	155.7	143.3	11.9	17.9
	2 Row	0.19	2.0	3.4	1.0	86.0	104.3	166.2	158.1	13.4	21.4
			4.0	12.2	3.4	88.3	109.6	172.6	167.8	14.4	23.7

### MODEL TSS-WC - SIZE 8

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
175	1 Row	0.02	0.5	0.3	0.1	95.7	113.1	148.4	135.0	7.7	11.0
			1.0	1.0	0.3	101.7	124.5	161.8	153.0	8.9	13.2
	2 Row	0.03	2.0	3.5	1.0	105.6	131.9	170.1	165.0	9.6	14.6
			4.0	12.7	3.5	107.9	136.2	174.8	172.1	10.0	15.4
250	1 Row	0.03	0.5	0.3	0.1	88.0	101.9	143.4	128.2	8.9	12.7
			1.0	1.0	0.3	94.0	113.5	158.4	147.6	10.6	15.8
	2 Row	0.06	2.0	3.6	1.0	97.9	121.6	168.1	161.5	11.6	18.0
			4.0	12.7	3.5	100.4	126.6	173.7	170.0	12.3	19.4
325	1 Row	0.05	0.5	0.3	0.1	83.0	94.4	139.7	123.5	9.9	13.9
			1.0	1.0	0.3	88.7	105.7	155.7	143.5	11.9	17.9
	2 Row	0.10	2.0	3.6	1.0	92.7	114.1	166.4	158.7	13.3	20.8
			4.0	12.7	3.6	95.2	119.5	172.7	168.3	14.1	22.7
400	1 Row	0.07	0.5	0.3	0.1	79.4	89.0	136.8	119.9	10.6	14.7
			1.0	1.0	0.3	84.9	99.9	153.4	140.2	13.0	19.5
	2 Row	0.14	2.0	3.6	1.0	88.8	108.3	165.0	156.3	14.7	23.1
			4.0	12.7	3.6	91.3	113.9	171.9	166.9	15.7	25.5
475	1 Row	0.09	0.5	0.3	0.1	76.7	85.0	134.4	117.1	11.2	15.4
			1.0	1.0	0.3	82.0	95.4	151.6	137.6	13.9	20.8
	2 Row	0.19	2.0	3.6	1.0	85.8	103.7	163.7	154.3	15.9	25.1
			4.0	12.7	3.6	88.3	109.4	171.2	165.6	17.1	28.0
550	1 Row	0.12	0.5	0.3	0.1	74.6	81.9	132.4	114.9	11.7	16.0
			1.0	1.0	0.3	79.6	91.7	149.9	135.3	14.7	21.9
	2 Row	0.25	2.0	3.6	1.0	83.4	100.0	162.6	152.6	16.9	26.8
			4.0	12.7	3.6	85.8	105.7	170.6	164.5	18.4	30.2
625	1 Row	0.15	0.5	0.3	0.1	72.9	79.3	130.6	113.0	12.1	16.5
			1.0	1.0	0.3	77.7	88.7	148.5	133.4	15.4	22.8
	2 Row	0.31	2.0	3.6	1.0	81.4	96.8	161.7	151.0	17.9	28.3
			4.0	12.7	3.6	83.8	102.5	170.0	163.5	19.5	32.2
700	1 Row	0.19	0.5	0.3	0.1	71.4	77.2	129.1	111.4	12.5	16.9
			1.0	1.0	0.3	76.1	86.2	147.3	131.7	16.0	23.7
	2 Row	0.38	2.0	3.6	1.0	79.7	94.1	160.8	149.7	18.7	29.6
			4.0	12.7	3.6	82.1	99.8	169.5	162.6	20.5	34.0

Data is based on 180°F entering water and 55°F entering air at sea level. See selection procedure for other conditions.

# HOT WATER COIL DATA

## MODEL TSS-WC - SIZE 10

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
300	1 Row	0.02	0.5	0.3	0.1	89.6	103.0	134.1	116.4	11.2	15.6
		0.04	1.0	1.2	0.3	96.5	116.2	152.4	139.4	13.5	19.9
	2 Row	0.04	2.0	4.2	1.2	101.1	125.3	164.6	156.6	15.0	22.9
		0.07	4.0	14.9	4.2	103.9	130.9	171.8	167.3	15.9	24.7
400	1 Row	0.04	0.5	0.3	0.1	83.8	94.5	129.1	110.4	12.5	17.1
		0.07	1.0	1.2	0.3	90.4	107.3	148.6	133.7	15.4	22.7
	2 Row	0.07	2.0	4.2	1.2	95.1	116.9	162.2	152.5	17.4	26.8
		0.11	4.0	14.9	4.2	98.0	123.0	170.4	164.9	18.6	29.5
500	1 Row	0.05	0.5	0.3	0.1	79.8	88.6	125.2	106.0	13.4	18.2
		0.11	1.0	1.2	0.3	86.1	100.8	145.5	129.4	16.9	24.8
	2 Row	0.11	2.0	4.2	1.2	90.7	110.5	160.2	149.3	19.3	30.0
		0.15	4.0	14.9	4.2	93.6	116.9	169.3	162.8	20.9	33.5
600	1 Row	0.07	0.5	0.3	0.1	76.8	84.2	122.2	102.8	14.2	19.0
		0.15	1.0	1.2	0.3	82.9	95.8	143.0	125.9	18.1	26.5
	2 Row	0.15	2.0	4.2	1.2	87.4	105.4	158.4	146.5	21.0	32.7
		0.19	4.0	14.9	4.2	90.3	111.9	168.2	161.0	22.9	37.0
700	1 Row	0.10	0.5	0.3	0.1	74.5	80.9	119.7	100.2	14.8	19.6
		0.19	1.0	1.2	0.3	80.3	91.8	140.8	123.1	19.2	27.9
	2 Row	0.19	2.0	4.2	1.2	84.7	101.2	156.9	144.1	22.5	35.1
		0.25	4.0	15.0	4.2	87.6	107.9	167.3	159.4	24.7	40.1
800	1 Row	0.12	0.5	0.3	0.1	72.7	78.3	117.6	98.1	15.3	20.2
		0.25	1.0	1.2	0.3	78.2	88.6	138.9	120.7	20.1	29.1
	2 Row	0.25	2.0	4.2	1.2	82.5	97.8	155.6	142.1	23.8	37.1
		0.30	4.0	15.0	4.2	85.3	104.4	166.5	158.0	26.3	42.8
900	1 Row	0.15	0.5	0.3	0.1	71.2	76.1	115.7	96.4	15.8	20.6
		0.30	1.0	1.2	0.3	76.5	85.9	137.3	118.6	20.9	30.1
	2 Row	0.30	2.0	4.2	1.2	80.6	94.9	154.4	140.3	25.0	38.9
		0.37	4.0	15.0	4.2	83.4	101.5	165.8	156.8	27.7	45.3
1000	1 Row	0.18	0.5	0.3	0.1	69.9	74.4	114.2	94.9	16.2	21.0
		0.37	1.0	1.2	0.3	75.0	83.6	135.8	116.8	21.6	31.0
	2 Row	0.37	2.0	4.2	1.2	79.1	92.4	153.3	138.7	26.1	40.5
		0.47	4.0	15.0	4.2	81.8	98.9	165.1	155.6	29.1	47.6

## MODEL TSS-WC - SIZE 12

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
400	1 Row	0.02	0.5	0.4	0.1	87.5	98.9	122.5	102.7	14.1	19.0
		0.04	1.0	1.4	0.4	95.3	113.5	144.3	128.3	17.4	25.3
	2 Row	0.04	2.0	4.9	1.4	100.6	124.0	159.7	149.4	19.8	29.9
		0.07	4.0	17.4	4.9	103.9	130.5	169.1	163.2	21.2	32.7
550	1 Row	0.04	0.5	0.4	0.1	81.3	89.8	116.2	95.8	15.7	20.7
		0.07	1.0	1.4	0.4	88.6	103.5	139.1	121.1	20.0	28.9
	2 Row	0.07	2.0	4.9	1.4	93.9	114.5	156.2	143.8	23.2	35.4
		0.11	4.0	17.4	4.9	97.3	121.6	167.1	159.7	25.2	39.7
700	1 Row	0.05	0.5	0.4	0.1	77.1	83.8	111.7	91.3	16.8	21.9
		0.11	1.0	1.4	0.4	84.0	96.6	135.1	115.8	22.0	31.5
	2 Row	0.11	2.0	5.0	1.4	89.2	107.4	153.4	139.4	25.9	39.7
		0.16	4.0	17.4	4.9	92.6	114.9	165.4	156.7	28.5	45.4
850	1 Row	0.08	0.5	0.4	0.1	74.2	79.6	108.2	88.1	17.7	22.7
		0.16	1.0	1.4	0.4	80.6	91.4	131.8	111.8	23.6	33.5
	2 Row	0.16	2.0	5.0	1.4	85.7	102.0	151.1	135.8	28.3	43.3
		0.21	4.0	17.5	5.0	89.0	109.6	163.9	154.3	31.3	50.3
1000	1 Row	0.10	0.5	0.4	0.1	71.9	76.5	105.4	85.6	18.4	23.3
		0.21	1.0	1.4	0.4	78.0	87.4	129.1	108.6	24.9	35.1
	2 Row	0.21	2.0	5.0	1.4	82.9	97.7	149.0	132.8	30.2	46.2
		0.27	4.0	17.5	5.0	86.2	105.3	162.6	152.1	33.8	54.5
1150	1 Row	0.13	0.5	0.4	0.1	70.2	74.1	103.1	83.7	18.9	23.8
		0.27	1.0	1.4	0.4	75.9	84.3	126.8	105.9	26.1	36.4
	2 Row	0.27	2.0	5.0	1.4	80.7	94.2	147.3	130.2	32.0	48.8
		0.33	4.0	17.5	5.0	83.9	101.7	161.5	150.2	36.1	58.2
1300	1 Row	0.17	0.5	0.4	0.1	68.8	72.2	101.1	82.1	19.4	24.2
		0.33	1.0	1.4	0.4	74.2	81.7	124.8	103.7	27.1	37.5
	2 Row	0.33	2.0	5.0	1.4	78.8	91.2	145.7	128.0	33.5	51.0
		0.40	4.0	17.5	5.0	82.0	98.7	160.5	148.5	38.1	61.5
1450	1 Row	0.20	0.5	0.4	0.1	67.6	70.6	99.5	80.8	19.8	24.5
		0.40	1.0	1.4	0.4	72.8	79.5	123.1	101.8	27.9	38.5
	2 Row	0.40	2.0	5.0	1.4	77.2	88.7	144.3	126.1	34.9	52.9
		0.47	4.0	17.5	5.0	80.4	96.1	159.6	147.0	39.9	64.5

Data is based on 180°F entering water and 55°F entering air at sea level. See selection procedure for other conditions.



**MODEL TSS-WC - SIZE 14**

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
700	1 Row	0.03	0.5	0.5	0.1	80.2	87.0	102.4	81.8	19.1	24.2
			1.0	1.7	0.5	88.6	102.1	128.1	107.4	25.5	35.7
	2 Row	0.06	2.0	6.0	1.7	94.9	114.8	149.0	133.7	30.3	45.4
			4.0	21.0	6.0	99.1	123.3	162.9	153.5	33.4	51.8
900	1 Row	0.04	0.5	0.5	0.1	75.9	81.0	97.3	77.5	20.4	25.3
			1.0	1.7	0.5	83.7	94.7	123.1	101.4	27.9	38.7
	2 Row	0.09	2.0	6.0	1.7	89.9	107.2	145.2	128.1	34.0	50.9
			4.0	21.1	6.0	94.0	116.1	160.5	149.5	38.0	59.6
1100	1 Row	0.06	0.5	0.5	0.1	72.9	76.9	93.5	74.6	21.3	26.0
			1.0	1.7	0.5	80.1	89.3	119.1	97.0	29.9	40.9
	2 Row	0.13	2.0	6.1	1.7	86.1	101.4	142.1	123.6	37.0	55.3
			4.0	21.1	6.0	90.2	110.5	158.5	146.2	41.9	66.1
1300	1 Row	0.08	0.5	0.5	0.1	70.6	73.9	90.6	72.5	22.0	26.6
			1.0	1.8	0.5	77.4	85.3	115.8	93.6	31.5	42.6
	2 Row	0.17	2.0	6.1	1.7	83.1	96.9	139.5	120.0	39.6	58.9
			4.0	21.1	6.0	87.2	105.9	156.8	143.4	45.3	71.7
1500	1 Row	0.11	0.5	0.5	0.1	68.9	71.6	88.3	70.9	22.6	27.0
			1.0	1.8	0.5	75.2	82.1	113.1	90.8	32.9	44.0
	2 Row	0.22	2.0	6.1	1.8	80.8	93.2	137.2	116.9	41.9	62.0
			4.0	21.2	6.1	84.7	102.1	155.2	140.9	48.3	76.5
1700	1 Row	0.14	0.5	0.5	0.1	67.5	69.8	86.3	69.6	23.1	27.3
			1.0	1.8	0.5	73.5	79.5	110.8	88.6	34.0	45.1
	2 Row	0.27	2.0	6.1	1.8	78.8	90.1	135.2	114.3	43.9	64.6
			4.0	21.2	6.1	82.7	98.9	153.9	138.7	51.0	80.8
1900	1 Row	0.17	0.5	0.5	0.1	66.4	68.4	84.7	68.6	23.5	27.5
			1.0	1.8	0.5	72.0	77.4	108.8	86.7	35.0	46.0
	2 Row	0.33	2.0	6.1	1.8	77.2	87.5	133.4	112.0	45.6	66.9
			4.0	21.2	6.1	81.0	96.1	152.6	136.8	53.5	84.7
2100	1 Row	0.20	0.5	0.5	0.1	65.5	67.2	83.3	67.8	23.9	27.8
			1.0	1.8	0.5	70.8	75.6	107.0	85.1	35.9	46.8
	2 Row	0.40	2.0	6.1	1.8	75.8	85.3	131.8	110.0	47.2	68.8
			4.0	21.2	6.1	79.5	93.7	151.5	135.0	55.7	88.1

**MODEL TSS-WC - SIZE 16**

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
1600	1 Row	0.09	0.5	0.6	0.1	68.9	71.2	82.5	66.6	24.1	28.1
			1.0	1.9	0.6	75.6	82.1	107.4	85.0	35.7	46.9
	2 Row	0.18	2.0	6.6	1.9	81.7	94.0	132.8	111.3	46.3	67.5
			4.0	22.9	6.6	86.1	103.7	152.4	136.9	53.9	84.4
1800	1 Row	0.11	0.5	0.6	0.1	67.6	69.5	80.7	65.5	24.5	28.3
			1.0	1.9	0.6	73.9	79.6	105.1	82.9	36.9	47.9
	2 Row	0.22	2.0	6.6	1.9	79.8	91.0	130.7	108.7	48.3	70.1
			4.0	22.9	6.6	84.1	100.6	150.9	134.6	56.8	88.9
2000	1 Row	0.13	0.5	0.6	0.1	66.5	68.2	79.2	64.7	24.9	28.5
			1.0	1.9	0.6	72.5	77.5	103.1	81.2	37.9	48.8
	2 Row	0.26	2.0	6.6	1.9	78.1	88.4	128.8	106.4	50.1	72.4
			4.0	23.0	6.6	82.4	97.9	149.6	132.6	59.4	92.9
2200	1 Row	0.16	0.5	0.6	0.1	65.6	67.0	78.0	64.0	25.2	28.7
			1.0	1.9	0.6	71.3	75.8	101.3	79.7	38.7	49.5
	2 Row	0.31	2.0	6.6	1.9	76.7	86.2	127.2	104.4	51.8	74.4
			4.0	23.0	6.6	80.9	95.5	148.4	130.7	61.8	96.6
2400	1 Row	0.18	0.5	0.6	0.1	64.8	66.1	76.8	63.4	25.5	28.8
			1.0	1.9	0.6	70.2	74.3	99.7	78.4	39.5	50.2
	2 Row	0.37	2.0	6.6	1.9	75.5	84.3	125.6	102.6	53.3	76.2
			4.0	23.0	6.6	79.6	93.4	147.3	129.1	64.0	99.9
2600	1 Row	0.21	0.5	0.6	0.1	64.1	65.3	75.9	62.9	25.7	29.0
			1.0	1.9	0.6	69.3	73.0	98.3	77.3	40.2	50.7
	2 Row	0.42	2.0	6.6	1.9	74.4	82.6	124.2	101.0	54.7	77.8
			4.0	23.0	6.6	78.4	91.5	146.2	127.5	66.0	102.9
2800	1 Row	0.24	0.5	0.6	0.1	63.6	64.6	75.0	62.5	25.9	29.1
			1.0	1.9	0.6	68.5	71.9	97.0	76.3	40.9	51.2
	2 Row	0.48	2.0	6.7	1.9	73.5	81.1	123.0	99.6	56.0	79.2
			4.0	23.0	6.6	77.4	89.9	145.2	126.1	67.9	105.7
3000	1 Row	0.27	0.5	0.6	0.1	63.0	64.0	74.2	62.1	26.1	29.2
			1.0	1.9	0.6	67.8	70.9	95.9	75.4	41.4	51.7
	2 Row	0.55	2.0	6.7	1.9	72.6	79.8	121.8	98.3	57.1	80.5
			4.0	23.1	6.6	76.5	88.3	144.3	124.8	69.7	108.3

Data is based on 180°F entering water and 55°F entering air at sea level. See selection procedure for other conditions.



# HOT WATER COIL DATA

## MODEL TSS-WC - SIZE 19

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
2300	1 Row	0.11	0.5	0.6	0.1	65.7	66.9	72.3	60.5	26.6	29.6
	2 Row	0.23	1.0	2.2	0.6	71.9	76.1	94.6	73.8	42.1	52.5
			2.0	7.4	2.2	78.1	87.5	121.5	97.9	57.4	80.9
			4.0	25.6	7.4	82.8	97.9	144.5	125.5	69.4	106.9
2600	1 Row	0.14	0.5	0.6	0.1	64.6	65.6	70.8	59.9	27.0	29.7
	2 Row	0.28	1.0	2.2	0.6	70.3	73.9	92.4	72.2	43.2	53.3
			2.0	7.4	2.2	76.2	84.6	119.1	95.3	59.8	83.5
			4.0	25.7	7.4	80.9	94.8	142.7	122.9	72.9	112.0
2900	1 Row	0.17	0.5	0.6	0.1	63.7	64.5	69.7	59.4	27.3	29.8
	2 Row	0.34	1.0	2.2	0.6	69.1	72.2	90.4	70.8	44.2	54.0
			2.0	7.5	2.2	74.7	82.3	117.0	93.0	61.8	85.7
			4.0	25.7	7.4	79.2	92.1	141.1	120.6	76.1	116.6
3200	1 Row	0.21	0.5	0.6	0.1	62.9	63.6	68.7	59.0	27.5	29.9
	2 Row	0.41	1.0	2.2	0.6	68.0	70.7	88.7	69.7	45.0	54.6
			2.0	7.5	2.2	73.4	80.3	115.2	91.1	63.7	87.6
			4.0	25.8	7.4	77.8	89.8	139.6	118.5	79.0	120.7
3500	1 Row	0.24	0.5	0.6	0.1	62.3	62.9	67.8	58.7	27.7	30.0
	2 Row	0.48	1.0	2.2	0.6	67.1	69.5	87.3	68.7	45.7	55.0
			2.0	7.5	2.2	72.2	78.6	113.5	89.5	65.3	89.3
			4.0	25.8	7.5	76.6	87.8	138.3	116.7	81.7	124.4
3800	1 Row	0.28	0.5	0.6	0.1	61.8	62.3	67.1	58.4	27.9	30.1
	2 Row	0.56	1.0	2.2	0.6	66.3	68.5	86.0	67.9	46.4	55.4
			2.0	7.5	2.2	71.2	77.1	112.0	88.0	66.8	90.8
			4.0	25.8	7.5	75.4	86.0	137.0	115.0	84.2	127.7
4100	1 Row	0.32	0.5	0.6	0.1	61.3	61.8	66.5	58.2	28.1	30.2
	2 Row	0.64	1.0	2.2	0.6	65.6	67.6	84.8	67.2	47.0	55.8
			2.0	7.5	2.2	70.4	75.7	110.6	86.7	68.2	92.1
			4.0	25.8	7.5	74.5	84.4	135.8	113.5	86.5	130.7
4400	1 Row	0.36	0.5	0.6	0.1	60.9	61.3	65.9	58.0	28.2	30.2
	2 Row	0.73	1.0	2.2	0.6	65.0	66.8	83.7	66.6	47.5	56.1
			2.0	7.5	2.2	69.6	74.6	109.4	85.5	69.5	93.3
			4.0	25.9	7.5	73.6	83.0	134.8	112.1	88.6	133.5

## MODEL TSS-WC - SIZE 22

AIRFLOW			WATER FLOW			LAT (°F)		LWT (°F)		CAPACITY (MBH)	
Rate (CFM)	Air PD (IN. W.G.)		Rate (GPM)	Water PD (FT. W.G.)		1 Row	2 Row	1 Row	2 Row	1 Row	2 Row
				1 Row	2 Row						
3100	1 Row	0.16	0.5	0.7	0.1	63.4	64.0	66.6	58.0	28.0	30.2
	2 Row	0.31	1.0	2.3	0.7	68.8	71.6	86.0	67.6	46.4	55.6
			2.0	8.0	2.3	74.7	81.9	112.8	88.6	66.1	90.2
			4.0	27.5	8.0	79.5	92.2	137.9	116.4	82.4	124.9
3500	1 Row	0.19	0.5	0.7	0.1	62.5	63.0	65.5	57.6	28.3	30.3
	2 Row	0.39	1.0	2.3	0.7	67.5	69.8	84.0	66.4	47.4	56.2
			2.0	8.0	2.3	73.1	79.4	110.4	86.3	68.4	92.5
			4.0	27.6	8.0	77.8	89.3	135.9	113.8	86.3	130.1
3900	1 Row	0.23	0.5	0.7	0.1	61.8	62.2	64.7	57.4	28.5	30.4
	2 Row	0.47	1.0	2.3	0.7	66.4	68.4	82.3	65.4	48.2	56.7
			2.0	8.0	2.3	71.7	77.4	108.3	84.3	70.5	94.5
			4.0	27.6	8.0	76.2	86.9	134.2	111.5	89.7	134.7
4300	1 Row	0.28	0.5	0.7	0.1	61.2	61.5	63.9	57.1	28.7	30.4
	2 Row	0.56	1.0	2.3	0.7	65.5	67.3	80.8	64.5	49.0	57.1
			2.0	8.0	2.3	70.5	75.6	106.5	82.6	72.3	96.1
			4.0	27.7	8.0	74.9	84.8	132.6	109.4	92.9	138.8
4700	1 Row	0.33	0.5	0.7	0.1	60.7	61.0	63.3	56.9	28.9	30.5
	2 Row	0.66	1.0	2.3	0.7	64.7	66.3	79.6	63.9	49.6	57.5
			2.0	8.1	2.3	69.5	74.2	104.8	81.2	74.0	97.6
			4.0	27.7	8.0	73.8	83.0	131.2	107.6	95.7	142.4
5100	1 Row	0.38	0.5	0.7	0.1	60.2	60.5	62.8	56.8	29.0	30.5
	2 Row	0.76	1.0	2.3	0.7	64.1	65.5	78.4	63.3	50.2	57.8
			2.0	8.1	2.3	68.7	72.9	103.4	79.9	75.4	98.8
			4.0	27.7	8.0	72.8	81.4	129.8	106.0	98.4	145.7
5500	1 Row	0.43	0.5	0.7	0.1	59.9	60.1	62.3	56.7	29.1	30.5
	2 Row	0.87	1.0	2.3	0.7	63.5	64.7	77.5	62.8	50.7	58.0
			2.0	8.1	2.3	67.9	71.8	102.0	78.8	76.8	100.0
			4.0	27.7	8.1	71.9	80.0	128.6	104.5	100.8	148.7
5900	1 Row	0.49	0.5	0.7	0.1	59.6	59.8	62.0	56.6	29.2	30.6
	2 Row	0.99	1.0	2.3	0.7	63.0	64.1	76.6	62.3	51.1	58.2
			2.0	8.1	2.3	67.2	70.8	100.8	77.8	78.0	101.0
			4.0	27.8	8.1	71.1	78.7	127.5	103.1	103.0	151.4

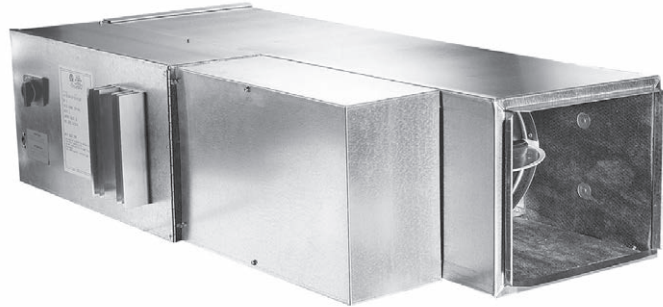
Data is based on 180°F entering water and 55°F entering air at sea level. See selection procedure for other conditions.





# ELECTRIC HEAT

## MODEL TSS-EH



### STANDARD FEATURES

- cETL listed as an assembly
- Single point power connection
- Primary auto-reset high limit
- Secondary high limit
- Airflow switch
- Hinged control panel
- Ni-Chrome elements
- Primary/secondary power terminations
- Fusing per NEC
- Wiring diagram and ETL label
- Available kW increments are as follows:  
0.5 to 8.0 kW - .50 kW; 8.0 to 16.0 kW - 1.0 kW  
Above 16 kW - 2.0 kW

### OPTIONAL FEATURES

- Disconnect (toggle or door interlocking)
- PE switches
- Mercury and magnetic contactors
- Manual reset secondary limit
- Proportional control (SSR)
- 24 V control transformer

### SELECTION PROCEDURE

With standard heater elements, the maximum capacity (kW) is obtained by dividing the heating (minimum) SCFM by 70. In other words, the terminal must have at least 70 SCFM per kW. In addition, each size terminal has a maximum allowable kW based upon the specific heater element configuration (i.e. voltage, phase, number of steps, etc.). Contact your Johnson Controls representative or refer to the VAV computer selection program for design assistance.

Heaters require a minimum of 0.07" w.g. downstream static pressure to ensure proper operation.

#### Selection Equations

$$kW = \frac{SCFM \times \Delta T \times 1.085^*}{3413}$$

$$SCFM = \frac{kW \times 3413}{\Delta T \times 1.085^*}$$

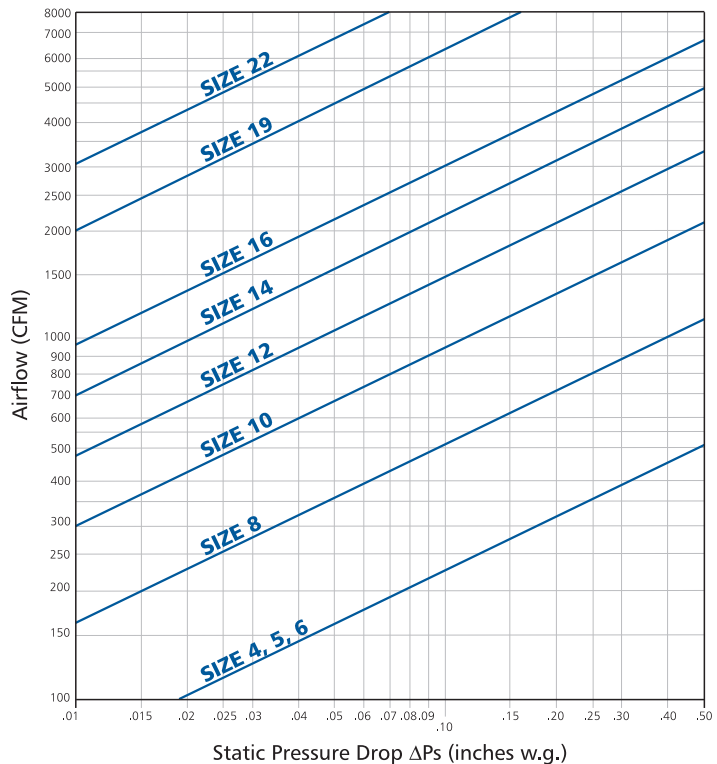
$$\Delta T = \frac{kW \times 3413}{SCFM \times 1.085^*}$$

\* Air density at sea level - reduce by 0.036 for each 1000 feet of altitude above sea level.

#### Calculating Line Amperage

$$\text{Single Phase Amps} = \frac{kW \times 1000}{\text{Volts}}$$

$$\text{Three Phase Amps} = \frac{kW \times 1000}{\text{Volts} \times 1.73}$$



## GUIDE SPECIFICATIONS

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### GENERAL

Furnish and install Johnson Controls Model TSS Single Duct Variable Air Volume Terminal Units of the sizes and capacities as scheduled. Terminals shall be certified by AHRI and bear the AHRI 880 seal.

### CONSTRUCTION

Terminals shall be constructed of not less than 22 gauge galvanized steel, able to withstand a 125 hour salt spray test per ASTM B-117. Stainless steel casings, or galvanized steel casings with a baked enamel paint finish, may be used as an alternative. The terminal casing shall be mechanically assembled (spot-welded casings are not acceptable).

Casing shall be internally lined with 1/2" thick fiberglass insulation, rated for a maximum air velocity of 5000 f.p.m. Maximum thermal conductivity shall be .24 (BTU • in) / (hr • ft<sup>2</sup> • °F). Insulation must meet all requirements of ASTM C1071 (including C665), UL 181 for erosion, and carry a 25/50 rating for flame spread/smoke developed per ASTM E-84, UL 723 and NFPA 90A. Raw insulation edges on the discharge of the unit must be covered with metal liner to eliminate flaking of insulation during field duct connections. Simple "buttering" of raw edges with an approved sealant is not acceptable.

All appurtenances including control assemblies, control enclosures, hot water heating coils, and electric heating coils shall not extend beyond the top and bottom of the unit casing. At an inlet velocity of 2000 f.p.m., the static pressure drop across the basic terminal or basic terminal with a sound attenuator shall not exceed .08" W.G. for all unit sizes.

### PRIMARY AIR VALVE

The primary air valve shall consist of a minimum 22 gauge cylindrical body that includes embossment rings for rigidity. The damper blade shall be connected to a solid shaft by means of an integral molded sleeve which does not require screw or bolt fasteners. The shaft shall be manufactured of a low thermal conducting composite material, and include a molded damper position indicator visible from the exterior of the unit. The damper shall pivot in self lubricating bearings. The damper actuator shall be mounted on the exterior of the terminal for ease of service. The valve assembly shall include internal mechanical stops for both full open and closed positions. The damper blade seal shall be secured without use of adhesives. The air valve leakage shall not exceed 1% of maximum inlet rated airflow at 3" W.G. inlet pressure.

### PRIMARY AIRFLOW SENSOR

For inlet diameters 6" or greater, the differential pressure airflow sensor shall traverse the duct along two perpendicular diameters. Cylindrically shaped inlets shall utilize the equal cross sectional area or log-linear traverse method. Single axis sensor shall not be acceptable for duct diameters 6" or larger. A minimum of 12 total pressure sensing points shall be utilized. The total pressure inputs shall be averaged using a pressure chamber located at the center of the sensor. A sensor that delivers the differential pressure signal from one end of the sensor is not acceptable. The sensor shall output an amplified differential pressure signal that is at least 2.5 times the equivalent velocity pressure signal obtained from a conventional pitot tube. The sensor shall develop a differential pressure of 0.03" w.g. at an air velocity of <450 FPM. Documentation shall be submitted which substantiates this requirement. Balancing taps and airflow calibration charts shall be provided for field airflow measurements.

### HOT WATER COIL

Single duct terminal shall include an integral hot water coil where indicated on the plans. The coil shall be manufactured by the terminal unit manufacturer and shall have a minimum 22 gauge galvanized sheet metal casing. Stainless steel casings, or galvanized steel casings with a baked enamel paint finish, may be used as an alternative. Coil to be constructed of pure aluminum fins with full fin collars maintaining accurate fin spacing and maximum tube contact. Fins shall be spaced with a minimum of 10 per inch and mechanically fixed to seamless copper tubes for maximum heat transfer.

Each coil shall be hydrostatically tested at a minimum of 450 PSIG under water, and rated for a maximum 300 PSIG working pressure at 200°F.

### ELECTRIC HEATERS

Terminal shall include an integral electric heater where indicated on the plans. Heater shall be cETL listed. The heater cabinet shall be constructed of not less than 20 gauge galvanized steel. Stainless steel cabinets, or galvanized steel casings with a baked enamel paint finish, may be used as an alternative. Heater shall have a hinged access panel for entry to the controls.

Electric heaters shall be factory mounted to the terminal with the heating elements located upstream of the airflow control damper to ensure uniform velocity profile

over the elements. Elements located downstream of the damper are not acceptable.

A power disconnect shall be furnished to render the heater non-operational. Heater shall be furnished with all controls necessary for safe operation and full compliance with UL 1996 and National Electric Code requirements.

Heater shall have a single point electrical connection. It shall include a primary disc-type automatic reset high temperature limit, secondary high limit(s), airflow switch, Ni-Chrome elements, and fusing per UL and NEC. Heater shall have complete wiring diagram with label indicating power requirement and kW output.

## SOUND ATTENUATOR

Sound attenuator shall be provided where scheduled to meet acoustical performance requirements. The attenuator and terminal unit shall be single piece construction at least 50" long. Attenuator casing shall be constructed as specified for the base terminal.

## MULTIPLE-OUTLET PLENUM

Multiple-outlet plenum (MOP) shall be provided where scheduled. The MOP shall have trim balancing dampers in each outlet. Damper shall have a locking quadrant to ensure that the damper position is maintained. Multiple-outlet casing shall be constructed as specified for the base terminal.

## OPTIONS

### Foil Faced Insulation

Insulation shall be covered with scrim backed foil facing. All insulation edges shall be covered with foil or metal nosing. Insulation shall meet ASTM C1136 for mold, mildew, and humidity resistance.

### Elastomeric Closed Cell Foam Insulation

Provide Elastomeric Closed Cell Foam Insulation in lieu of standard. Insulation shall conform to UL 181 for erosion and NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Polyethylene insulation is not acceptable.

### Double Wall Construction

The terminal casing shall be double wall construction using a 22 gauge galvanized metal liner covering all insulation.

## Low Temperature Construction

Terminals shall be designed for use with primary airflow temperatures as low as 46°F and maximum ceiling plenum conditions of 78°F and 60% R.H. In addition to other design criteria, the primary air valve shall be thermally isolated from the terminal casing. The damper shaft shall be made from non-conducting thermoplastic composite material. Metal shafts will not be acceptable.

## Piping Packages

Provide a standard factory assembled non-insulated valve piping package to consist of a 2 way, on/off, motorized electric control valve and two ball isolation valves. Control valves are piped normally closed to the coil. Maximum entering water temperature on the control valve shall be 200°F. The maximum close-off pressure is 40 PSIG (1/2") or 20 PSIG (3/4"). Maximum operating pressure shall be 300 PSIG.

**Option:** Provide 3-wire floating point modulating control valve (fail-in-place) in lieu of standard 2-position control valve with factory assembled valve piping package.

**Option:** Provide high pressure close-off actuators for 2-way, on/off control valves. Maximum close-off pressure is 50 PSIG (1/2") or 25 PSIG (3/4").

**Option:** Provide either a fixed or adjustable flow control device for each piping package.

**Option:** Provide unions and/or pressure-temperature ports for each piping package.

Piping package shall be completely factory assembled, including interconnecting pipe, and shipped separate from the unit for field installation on the coil, so as to minimize the risk of freight damage.

## CONTROLS

### Analog Electronic Controls

Furnish and install Series 7000 Pressure Independent Analog Electronic Control System where indicated on the plans and in the specifications. The complete system shall be fully operational and include the following:

- Single duct, dual duct, and/or fan powered terminal units
- Pressure independent Series 7000 analog electronic zone controllers with integral differential pressure transducer
- Analog electronic wall thermostat
- Electronic air valve actuator
- 24 VAC control transformers

## **GUIDE SPECIFICATIONS**

---

- Air pressure switches as required
- Electronic duct temperature sensors as required

### **Pneumatic Controls**

Units shall be controlled by a pneumatic differential pressure reset volume controller. Controller shall be capable of pressure independent operation down to 0.03 inches W.G. differential pressure and shall be factory set to the specified airflow (CFM). Controller shall not exceed 11.5 scim (Standard Cubic Inches per Minute) air consumption @ 20 PSIG.

Unit primary air valve shall modulate in response to the room mounted thermostat and shall maintain airflow in relation to thermostat pressure regardless of system static pressure changes. An airflow (CFM) curve shall be affixed to the terminal unit expressing differential pressure vs. CFM. Pressure taps shall be provided for field use and ease of balancing.

Terminal unit manufacturer shall supply and manufacture a 5 to 10 PSIG pneumatic actuator capable of a minimum of 45 in. lbs. of torque.

Actual sequence of operation is shown on the contract drawings. Terminal unit manufacturer shall coordinate, where necessary, with the Temperature Control Contractor.

### **JOHNSON CONTROLS DDC CONTROL**

#### **N2**

Each VAV terminal unit shall be bundled with a digital controller. The controller shall be compatible with a Johnson Controls N2 system network. A unique Johnson Controls N2 network address shall be assigned to each controller, and referenced to the tagging system used on the drawings and in the schedules provided by the Project Engineer. All controllers shall be factory mounted and wired, with the controller's hardware address set, and all of the individual terminal's data pre-loaded into the controller. The terminal's data shall include, but not be limited to the Max CFM, Min CFM, Heating CFM, and terminal K factor. Heating system operating data shall also be factory installed for all terminals with heat. Communication with the digital controller shall be accomplished through the Johnson Controls N2 network. The digital controller shall have hardware input and output connections to facilitate the specified sequence of operation in either the network

mode, or on a stand-alone basis. The terminal unit manufacturer shall coordinate, where necessary, with the temperature Control Contractor.

#### **MS/TP BACnet**

Each VAV terminal unit shall be bundled with a digital controller. The controller shall be compatible with a MS/TP BACnet system network. A unique network address and a BACnet site address shall be assigned to each controller, and referenced to the tagging system used on the drawings and in the schedules provided by the Project Engineer. All controllers shall be factory mounted and wired, with the controller's hardware address set, and all of the individual terminal's data pre-loaded into the controller. The terminal's data shall include, but not be limited to Max CFM, Min CFM, Heating CFM, and terminal K factor. Heating system operating data shall also be factory installed for all terminals with heat. Communications with the digital controller shall be accomplished through the MS/TP BACnet network or through a Bluetooth connector. The digital controller shall have hardware input and output connections to facilitate the specified sequence of operation in either the network mode, or on a stand-alone basis. The terminal unit manufacturer shall coordinate, where necessary, with the Temperature Control Contractor.

#### **LON**

Each VAV terminal unit shall be bundled with a digital controller. The controller shall be compatible with a LON system network. A unique network address shall be assigned to each controller and referenced to the tagging system used on the drawings and in the schedules provided by the Project Engineer. All controllers shall be factory mounted and wired, and all of the individual terminal's data pre-loaded into the LNS database for the project. The terminal's data shall include, but not be limited to Max CFM, Min CFM, Heating CFM, and terminal K factor. Heating system operating data shall also be factory installed for all terminals with heat. Communication with the digital controller shall be accomplished through the LON network. The digital controller shall have hardware input and output connections to facilitate the specified sequence of operation in either the network mode, or on a stand-alone basis. The terminal unit manufacturer shall coordinate, where necessary, with the Temperature Control Contractor.



Printed on recycled paper

Form:130.13-EG1 (1212) Supersedes:130.13-EG1 (608)

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# INNOVATION

## HIGH-PERFORMANCE WATER HEATER



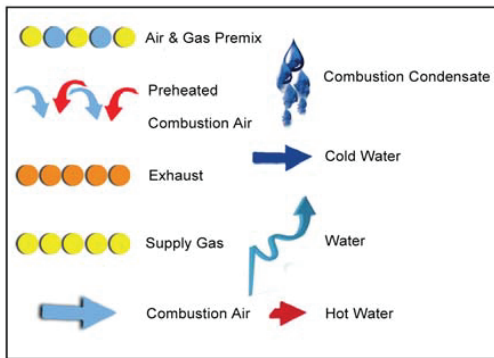
**25** YEARS  
1987 - 2012  
Condensing Firetube Designs

# INNOVATION

AERCO, the company that developed the first high-efficiency, commercial, condensing gas-fired, domestic water heater and hydronic boiler in the U.S. over two decades ago, continues to lead the way in commercial water-heating technology with the Innovation line of water heaters. Available in four sizes – 600, 800, 1060 and 1350 MBH – Innovation features advanced condensing/modulating technology and a thermal shock-proof, firetube heat exchanger that is highly resistant to scale buildup.

The Innovation design is based on AERCO's 25+ years of experience in the condensing domestic heater market. This gives AERCO an advantage over the competition with long history of success with:

- Real-world installation scenarios
- Real-world domestic heater water load profiles and changes
- Real-world operating efficiencies





# INDUSTRY LEADING EFFICIENCY—UP TO 99%

Innovation is the only commercial-size tankless water heater that provides hot water on demand without the need for any storage. Thanks to its unique tankless design, the Innovation is highly space efficient and cost-effective, as it eliminates the need for significant storage volume to buffer load change and provide stable hot water outlet temperatures, which tank-type heaters require.

### Key features of Innovation include:

- Up to 99% efficiency
- +/-4°F temperature control, thanks to dynamic feed-forward sensing and unmatched turndown (up to 30:1)
- All stainless steel helical firetube heat exchanger that is thermal shockproof and scale resistant
- Small footprint and high installation flexibility
- Reduced cycling losses due to unmatched turndown and onboard multiunit sequencing controls
- Low NOx and low CO emissions
- 1/3 standby losses compared to conventional tank-type heaters
- Designed and manufactured in the USA

AERCO Innovation water heaters utilize state-of-the-art technology to easily meet highly diverse, demanding commercial and industrial hot water requirements in a compact and reliable condensing design. Its durable, high-efficient, helical wound firetube heat exchanger is time-tested to be impervious to thermal stress for an extended life. Enhanced waterside flow distribution maintains constant minimum velocities above 4 ft/sec across the heat exchanger. This keeps solids in suspension and greatly reduces scale dropout to maintain high efficiency and long life.

Combine two benefits, reduced scaling and no (minimal) fireside cleaning, into lower maintenance requirements than other commercial water heaters.

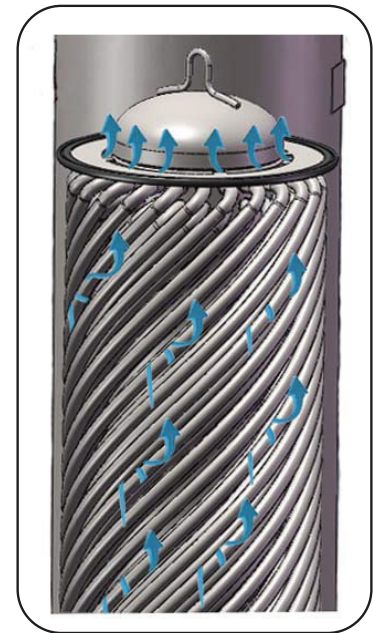
The all stainless steel construction maximizes longevity in the condensing application and will never need fireside cleaning. The corrugated tubes increase effective heat transfer surface area for optimal thermal efficiencies up to 99%.

### Precise Temperature Control and High Turndown Delivers Money-Saving Precision

**INN600 @ 14:1 Turndown    INN1060 @ 24:1 Turndown**

**INN800 @ 18:1 Turndown    INN1350 @ 30:1 Turndown**

### Enhanced Waterside Flow Distribution

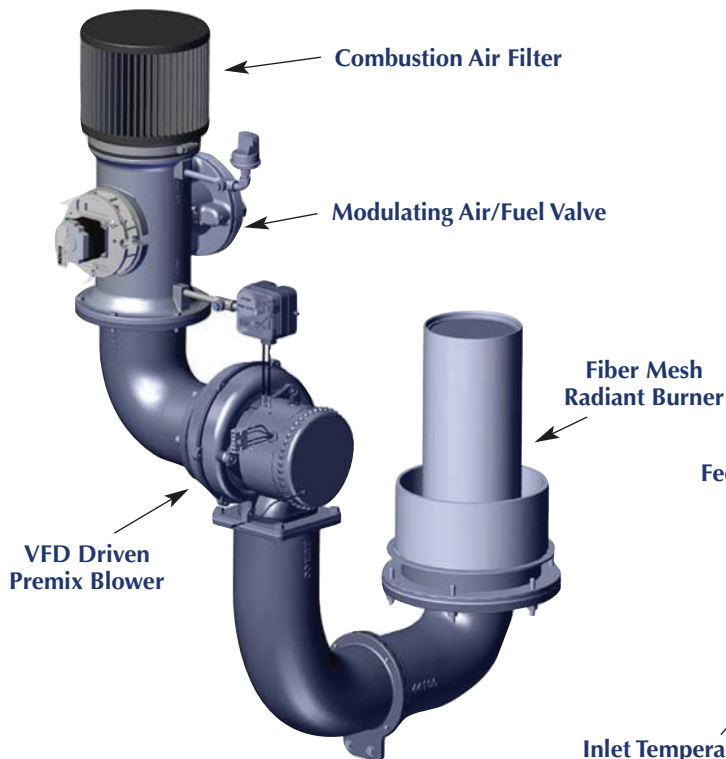


# ADVANCED DESIGN AND COMPONENTS

Further improving the efficiency of Innovation is AERCO's Dynamic Load Anticipator, an advanced control system that helps maintain precise modulation of the high turndown air/fuel delivery system. Field-proven for more than 60 years, dynamic feed-forward sensing uses feed-forward and feed-back sensors that monitor inlet flow via the proportional change in mixed temperature due to variations in the flow. The system controls fire the unit to accurately match load requirements and produce tight  $\pm 4^{\circ}\text{F}$  outlet temperature control.

The high turndown air/fuel delivery system of Innovation consists of AERCO's patented fully modulating air/fuel valve, VFD driven premix blower, and fiber mesh radiant burner. The system guarantees safe, stable, reliable and efficient combustion with the lowest NOx and CO emissions, as well as eliminates wasted fuel and reduces operating costs, making Innovation a smart choice for "green" designs.

## High Turndown Air/Fuel Valve Delivery System



## Dynamic Load Anticipator



# INSTALLATION ADVANTAGES

## Commercial Tankless Design

The unique tankless design of the Innovation water heaters allows the system to operate with set points of 120°F or below – saving energy and reducing the risk of scalding. Because water volume is kept to a minimum and continuous circulation is maintained through the Innovation unit, the risk of Legionella bacteria growth is virtually eliminated.

## Venting Versatility

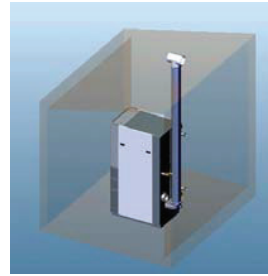
Innovation provides a number of venting options. Sidewall, through-the-roof, and sealed combustion capabilities (direct-vent), approved for venting with PVC, CPVC, Polypropylene, or AL29-4C materials, are all available and provide broad installation flexibility and savings.

## Space-Saving Design

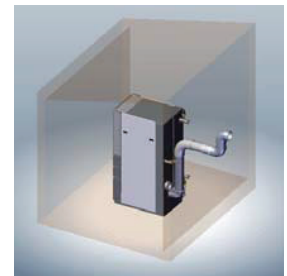
The AERCO Innovation is delivered as a single, fully assembled unit. Its small footprint, doorway size, and quiet operation make it ideal for both new construction and retrofit applications. The tankless design ensures the smallest possible footprint for a commercial size application, reducing standby losses to 1/3 of a comparable storage-type system.



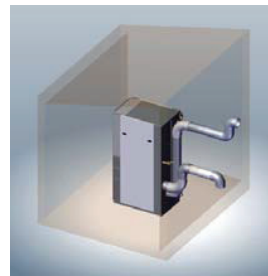
## Vent Configurations



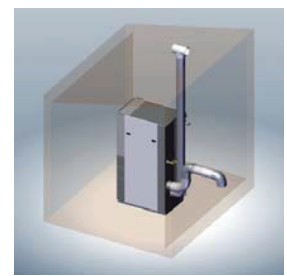
Vertical vent/room air



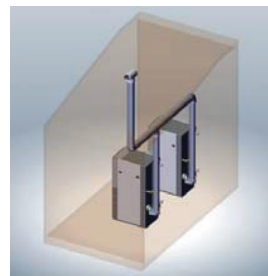
Sidewall vent/room air



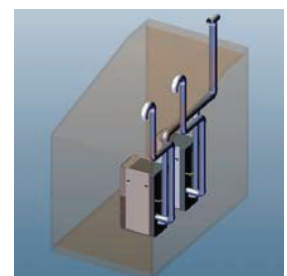
Direct-vent



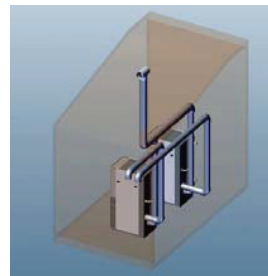
Vertical vent/sidewall air



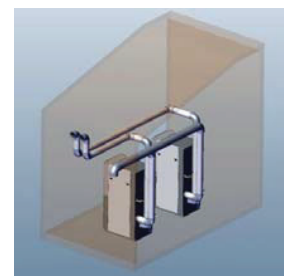
Common vertical vent/  
room air



Common vertical vent/  
individual vertical air



Common vertical vent/  
individual sidewall air



Individual sidewall vent/  
common sidewall air

## Advanced C-More Controls with Onboard Sequencing

Developed specifically to support the fully modulating operation of AERCO water heaters, the C-More Control System combines temperature and operating controls, combustion safeguards and fault enunciator functions in a single, state-of-the-art controller. In addition to basic water heater operation, C-More has many other beneficial features:

- **User-friendly interface with step-by-step diagnostics menus and status messages**
- **Ability to read system status during start-up sequence and operation**
- **One-touch access to operating parameters and recent fault history**
- **Flash-upgradeable platform**
- **Building Automation system integration via Modbus with optional support for LonWorks, BACnet, N2, etc.**
- **Supports tracking of more than 100 data points**
- **Ensures fail-safe heater operation if external building controls fail**

C-More also includes onboard multi-unit sequencing logic designed to efficiently sequence up to eight water heaters on the same system to meet load requirements. This minimizes cycles per unit to maximize system efficiency and turndown, and significantly reduces service and maintenance costs. With this unique feature, the operating systems turndown will equal the individual unit turndown multiplied by the number of units employed. Hence an application using eight INN1060s @ 24:1 will modulate to meet system load with a total turndown of 192:1.

The “Master C-More” operates one motorized valve per unit as an element of the load sequencing. The program logic also incorporates a unique master/slave backup feature that provides automatic bumpless transfer of master functions to the next unit on the chain, in case of designated master unit shutdown.

The result is the most energy-efficient and reliable water heating system design available. Only those units required to meet load are operating. Units in standby do not needlessly cycle to maintain set point – reducing system standby losses and unit wear to the bare minimum. Compared to a conventional storage system which requires 125 gallons of storage for every 500 MBTUH input, an Innovation system truly provides reliable domestic hot water on demand in the smallest possible energy footprint.



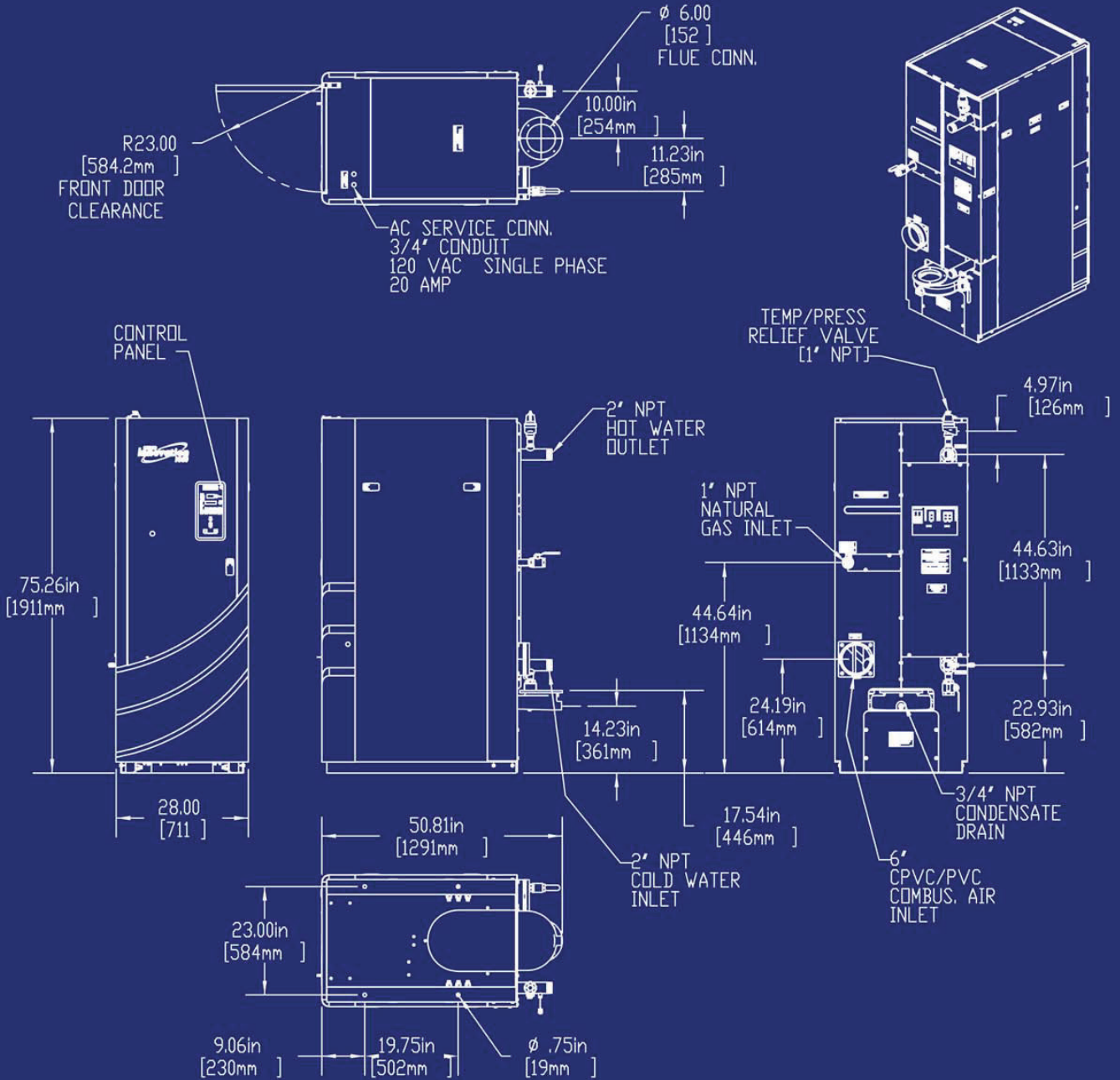
## SETTING A NEW STANDARD

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Innovation provides consulting specifying engineers, facilities management, and building owners with time-tested and trusted excellence that the industry has come to expect from AERCO. Innovation features the cutting-edge technology necessary to maximize forward-thinking designs – no matter the environment or conditions.



# ADVANCED DESIGN AND COMPONENTS



## INNOVATION SPECIFICATIONS

	600	800	1060	1350
Adjustable Temperature Control	50°F to 190°F	50°F to 190°F	50°F to 190°F	50°F to 190°F
Ambient Temperature	0°F to 130°F	0°F to 130°F	0°F to 130°F	0°F to 130°F
Accuracy	+/-4°F	+/-4°F	+/-4°F	+/-4°F
Input	600,000 BTUH (Natural Gas)	800,000 BTUH (Natural Gas)	1,060,000 BTUH (Natural Gas)	1,350,000 BTUH (Natural Gas)
Net Output	578,000 BTUH (Natural Gas)	771,000 BTUH (Natural Gas)	1,022,000 BTUH (Natural Gas)	1,310,000 BTUH (Natural Gas)
Turndown Ratio	14:1	18:1	24:1	30:1
Flue Size	6" Diameter	6" Diameter	6" Diameter	6" Diameter
Flue Material (per local code)	PVC, CPVC, PP or AL29-4C	PVC, CPVC, PP or AL29-4C	PVC, CPVC, PP or AL29-4C	PVC, CPVC, PP or AL29-4C
Water Inlet & Outlet	2" NPT Male	2" NPT Male	2" NPT Male	2" NPT Male
Gas Connection	1" NPT Male	1" NPT Male	1" NPT Male	1" NPT Male
Gas Pressure Requirements	14" WC Maximum, 4" WC Minimum @ Full Load (Nat. Gas)	14" WC Maximum, 4" WC Minimum @ Full Load (Nat. Gas)	14" WC Maximum, 4" WC Minimum @ Full Load (Nat. Gas)	14" WC Maximum, 4" WC Minimum @ Full Load (Nat. Gas)
Maximum Continuous Water Flow	50 GPM	50 GPM	50 GPM	50 GPM
Condensate Connection	3/4" NPT Female	3/4" NPT Female	3/4" NPT Female	3/4" NPT Female
Maximum Condensate Flow	4.5 GPH	6 GPH	8 GPH	11 GPH
Pressure Rating	160 PSIG @ 210°F	160 PSIG @ 210°F	160 PSIG @ 210°F	160 PSIG @ 210°F
NOx Emissions Certifications	SCAQMD, TCEQ	SCAQMD, TCEQ	SCAQMD, TCEQ	SCAQMD, TCEQ
Standard Listing & Approvals	UL, CUL, ASME (HLW)	UL, CUL, ASME (HLW)	UL, CUL, ASME (HLW)	UL, CUL, ASME (HLW)
Gas Train Options	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)
Electrical Requirements	120/1/60 20 AMP (9 Amp FLA)	120/1/60 20 AMP (9 Amp FLA)	120/1/60 20 AMP (9 Amp FLA)	120/1/60 20 AMP (15 Amp FLA)
Water Pressure Drop @ 15 gpm	.75 psi	.75 psi	.75 psi	.75 psi
Water Pressure Drop @ 30 gpm	1.5 psi	1.5 psi	1.5 psi	1.5 psi
Water Volume	26 gallons	24.5 gallons	23 gallons	20.6 gallons
Weight, Installed	960 lbs (dry), 1,177 lbs (wet)	980 lbs (dry), 1,202 lbs (wet)	1,000 lbs (dry), 1,190 lbs (wet)	1,050 lbs (dry), 1,222 lbs (wet)
Weight, Shipping	1,060 lbs	1,080 lbs	1,100 lbs	1,150 lbs



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# ATTACHMENT D



Business/Residential/Hotels



Education



Government

**BENCHMARK SERIES** High-Efficiency Boilers



Available in 7 sizes from 750,000 to 6 million BTU/hr.

# AERCO. The Benchmark of High-Efficiency for 25 Years.



The image features a central graphic with a green and blue wavy background. On the left is a compact AERCO boiler with a red top. In the center is a larger Benchmark boiler. On the right is a '2004 BEST PRACTICES AWARD' plaque from Frost & Sullivan. A UL logo is positioned in the top right corner. Dotted lines connect the text blocks to their respective images.

**1988**  
First high-efficiency, commercial, condensing, modulating domestic water heater and hydronic boiler (KC-1000 family) in the U.S.

**1997**  
Benchmark family of condensing, modulating boilers introduced setting a new standard in commercial boilers.

**2004**  
Benchmark Boiler Wins *ACHR NEWS* Dealer Design Award.

**2006**  
AERCO. First boiler manufacturer to achieve third-party confirmation of performance efficiency (UL).

AERCO introduced condensing firetube designs to the commercial marketplace over 25 years ago, raising the standard in hydronic heating. While other companies have attempted to develop similar designs, only AERCO has decades of experience, making its condensing, fully modulating boilers the standard by which all others are measured.

The Benchmark boiler family re-affirms AERCO's leadership. Having the longest proven performance record of any condensing, modulating boiler, Benchmark delivers unparalleled cost savings, efficiency benefits, and design advantages. With the introduction of re-designed 1.5 - 3 million BTU/hr and revolutionary 6 million BTU/hr models, AERCO once again raises the bar.



**2008**  
 Benchmark 1.5 Million BTU/hr. boiler introduced; Benchmark 1.5 Low NOx condensing boiler selected by *Buildings* as a Editors' Choice Top Product Pick; Benchmark 2.0 Low NOx boiler earns Readers' Choice Award from *ED+C* and *Sustainable Facility*.



**2011**  
 Benchmark 750 and 1000 with O<sub>2</sub> Monitoring introduced.

**2012**  
 Introduction of the Benchmark 3000 and 6000 with O<sub>2</sub> Monitoring, patent pending.



**2013**  
 AERCO wins Top Product Award from *Building Operating Management Magazine*



**At a Glance**

**Key Features**

- Available in seven models ranging from 750,000 BTU/hr to 6 million BTU/hr
- High Efficiency – up to 98%
- Stainless Steel Firetube Heat Exchanger
- Low NOx and CO Emissions
- Small Footprint
- Installation Flexibility
- Serviceability
- Designed and Manufactured in the USA

# Leader in High Efficiency

High efficiency has become a buzz term in recent years, but it is a philosophy at AERCO. Since the first Benchmark boiler was installed in 1997, it has set the gold standard for high efficiency.

## Reliability

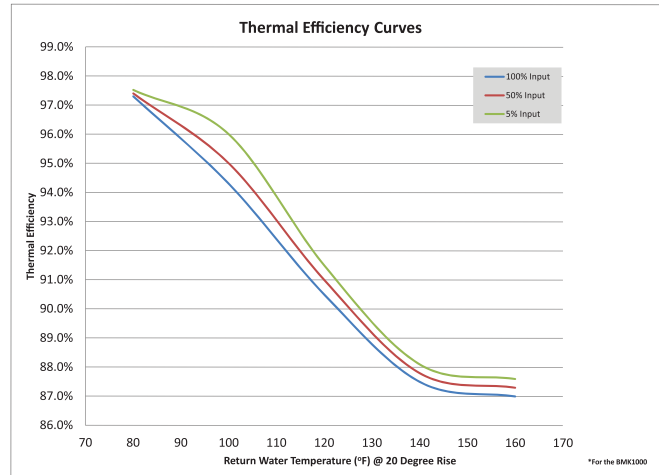
First introduced in 1997, the Benchmark boiler is among the oldest high-efficiency products available in the U.S. The market leader for the last decade, several thousand Benchmark units have been installed throughout North America and have continued to operate flawlessly season after season. Their performance proven reliability can be credited to:

**Superior Construction Materials** – A new 439 stainless steel heat exchanger offers even longer life and improves longevity with a simplified design that has only two moving parts.

**Advanced Design and Components** – AERCO's patented air/fuel delivery system and fully modulating burner reduces cycling losses, as well as wear and tear.

**Warranty** – AERCO stands behind its products. The heat exchanger in the Benchmark boilers has a 10-year full (non-prorated) warranty.

## Efficiency



Benchmark Model Numbers As Approved and Listed on the AHRI Directory	Thermal Efficiency, 100% Input • (High Fire) 100°F Temperature Differential • (80°F to 180°F)
BMK750	95.6%
BMK1000	96.8%
BMK1500	94.6%
BMK2000	94.6%
BMK2500	93.5%
BMK3000	93.5%
BMK6000	94.5%



The Greenspec® Listed Benchmark boilers are perfect for “green” designs. Their small footprint, flexible venting/piping options, high efficiency, and lower operating costs can help facilities earn LEED points. Benchmark has been designed with environmental advantages:

**O<sub>2</sub> monitoring system** – Benchmark units are available with AERCO’s proprietary O<sub>2</sub> monitoring system, which displays the oxygen level directly on the C-More controller in real time. It can be monitored via Modbus, so customers can measure emission levels and fuel combustion efficiency to maximize fuel economy.

**Low NOx burner** – Benchmark boilers are fitted with a low NOx burner whose emissions consistently meet the highest regulatory standards. Ultra low NOx (9 ppm or less) calibrations are available.\*

\*See tech data sheets for model specs.

### Advanced Controls

#### C-More

Efficiency and operation are further optimized via the C-More Control System. Intuitive, advanced, and simple to operate, C-More combines temperature and operating controls, combustion safeguards and fault enunciator functions – all at your fingertips! Benefits include:

- User-friendly intuitive control
- Simplifies diagnostic troubleshooting
- Full integration with BAS and EMS systems
- Supports remote monitoring and control
- Integrated Boiler Sequencing Technology (BST)

Ensures fail-safe boiler operation (if external building controls fail).

#### Remote Data Collection

AERCO’s remote data collection continually monitors the internal operations of your AERCO equipment, scanning performance parameters and potential fault risks. This information, transmitted via the Internet, is collected and evaluated at our data center. Our data center has the capability to monitor performance trends and fault occurrences. Future capabilities include early warnings before faults occur and email alerts to the user.\*

\*Consult AERCO if you are interested in the benefit of remote monitoring service.

# Installation Advantages

## Venting Versatility

Benchmark products provides a number of venting options; Sidewall, through-the-roof, and ducted combustion capabilities (direct-vent), approved for venting with PVC, CPVC, Polypropylene, or AL29-4C materials are all available and provide broad installation flexibility and savings.

## Space-saving Design

All Benchmark products are delivered as a single, fully assembled unit. Its small footprint, doorway size, and quiet operation make it ideal for both new construction and retrofit applications. Our new Benchmark 6000 model is the most compactly designed 6 million BTU/hr boiler in the market. No one is even close. A re-designed Benchmark 3000 model is 22% smaller than earlier generations.

## Zero Side Clearance

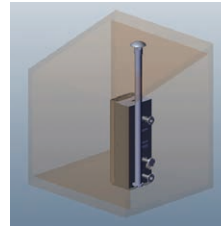
The redesigned Benchmark can be serviced via the front or top of the boiler, as well as the side. This flexibility allows units to be configured side by side.



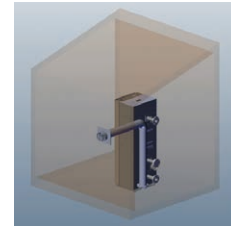
BMK 3000  
Shown

Consult an AERCO representative of factory for additional venting configuration inquiries.

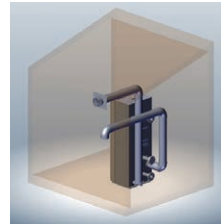
## Vent Configurations



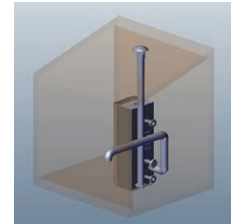
Vertical vent/room air



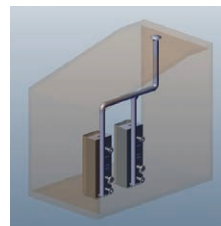
Sidewall vent/room air



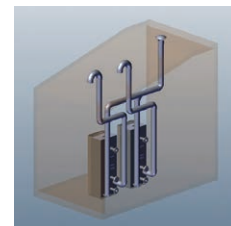
Direct-vent



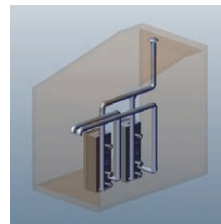
Vertical vent/sidewall air



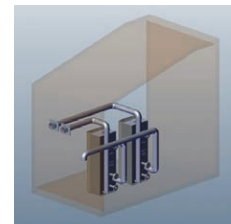
Common vertical vent/room air



Common vertical vent/  
individual vertical air



Common vertical vent/  
individual sidewall air



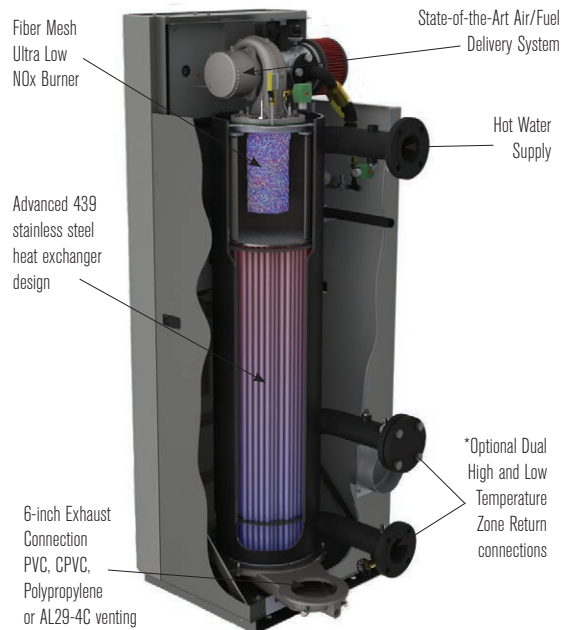
Individual sidewall vent/  
common sidewall air

# At a Glance

## Benchmark 750 (BMK750) and Benchmark 1000 (BMK1000)

### Features

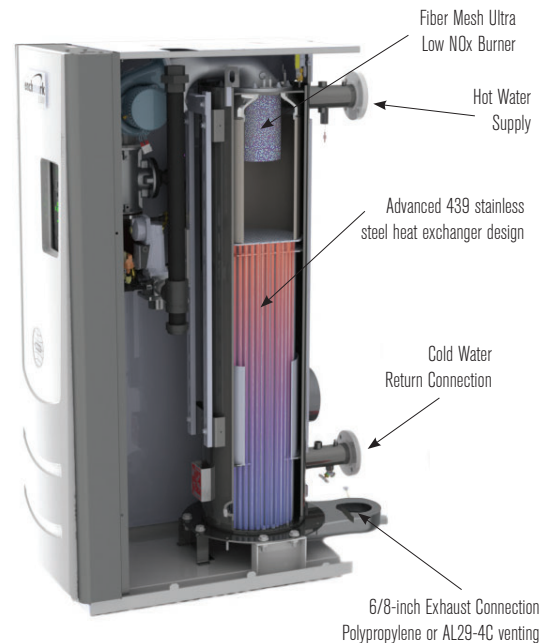
- BMK 750 – 15:1 Turndown Ratio (7%)
- BMK 1000 – 20:1 Turndown Ratio (5%)
- Oxygen Level (O<sub>2</sub>) Monitoring standard
- Stainless Steel Firetube Heat Exchanger
- Capable of variable primary flow installations
- NOx Emissions 20 ppm or less at all firing rates
- 9 ppm optional calibration
- Compact Footprint (25"D x 28"W x 78"H)
- High and Low Temperature System Return Connections\*
- Ducted Combustion Capable
- Acceptable vent materials AL29-4C, Polypropylene, CPVC, and PVC
- Available in Natural Gas and Propane



## Benchmark 1500 (BMK1500) and Benchmark 2000 (BMK2000)

### Features

- BMK 1500 – 20:1 Turndown Ratio (5%)
- BMK 2000 – 20:1 Turndown Ratio (5%)
- Oxygen Level (O<sub>2</sub>) Monitoring standard
- Stainless Steel Firetube Heat Exchanger
- Capable of variable flow installations
- NOx Emissions 20 ppm or less at all firing rates
- 9 ppm optional calibration
- Compact Footprint (41"D x 28"W x 79"H)
- Ducted Combustion Capable
- Available in Natural Gas, Propane, and Dual Fuel
- Acceptable vent materials AL29-4C, and Polypropylene



# At a Glance

## Benchmark 2500 (BMK2500) and Benchmark 3000 (BMK3000)

### Features

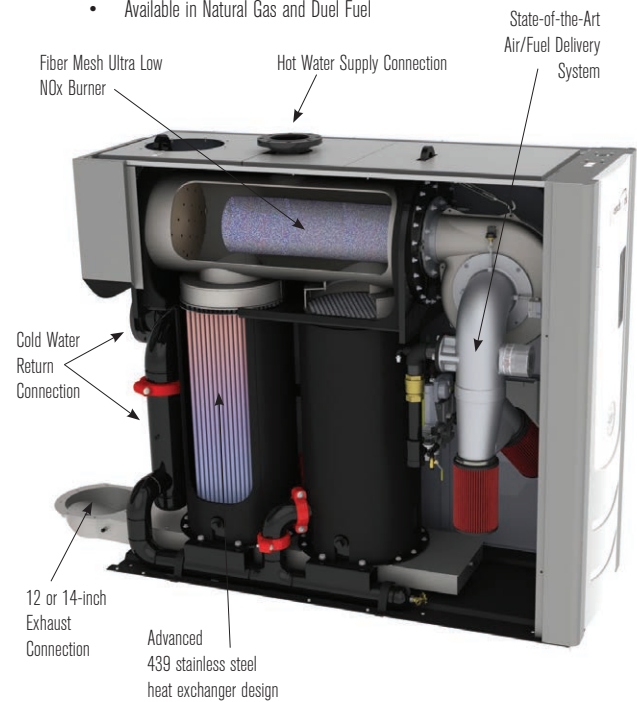
- Natural Gas
- 15:1 Turndown Ratio (7%)
- Oxygen Level (O<sub>2</sub>) Monitoring
- Stainless Steel Firetube Heat Exchanger
- Capable of variable primary flow installations
- NOx Emissions 20 ppm or less at all firing rates
- Compact Footprint (78"H x 28"W x 56"D)
- Ducted Combustion Capable
- Acceptable vent materials AL29-4C, Polypropylene
- Available in Natural Gas, Propane, and Duel Fuel



## Benchmark 6000 (BMK6000)

### Features

- Natural Gas
- 15:1 Turndown Ratio (7%)
- Oxygen Level (O<sub>2</sub>) Monitoring
- Stainless Steel Firetube Heat Exchanger
- Capable of variable primary flow installations
- NOx Emissions 20 ppm or less at all firing rates
- Compact Footprint (78"H x 34"W x 88"D)
- Ducted Combustion Capable
- Acceptable vent materials AL29-4C, Polypropylene
- 9 ppm optional calibration (requires 14" exhaust venting)
- Available in Natural Gas and Duel Fuel





# Venting

AERCO understands that every system design is different. To provide flexibility and meet any space configuration, venting options are available:

- Security Chimneys International SS and SSD/SSID venting systems are made from AL29-4C® super-ferritic stainless steel. The single- and double-wall SS and SSD/SSID install effortlessly, are highly reliable and meet industry specifications.
- DuraVent PolyPro® polypropylene vent pipe is for ANSI Category II and IV gas-burning appliances. The PolyPro vent system is suitable for exhaust temperatures up to 230°F/110°C and a maximum positive pressure of 15 in w.c. without the toxic risk associated with other plastic materials.

**Engineering support** - Customers can also leverage the vast experience of AERCO engineers who have devoted their careers to developing cost- and space-saving solutions. Standard services available include:

- Engineering – AERCO engineers work with manufacturers to verify vent sizing/design for enhanced reliability.
- AutoCAD drawings
- Submittal information
- Customer service
- Quotes within two business days
- Orders shipped within 10 days of receipt



DuraVent PolyPro®



Security Chimneys SS and SSD/SSID Venting Systems

# Accessories



## AERCO Control System (ACS)

The ACS is the best choice for maximizing heating plant efficiency if your heating plant has more than eight boilers or if your designing a combination control system as shown in the diagram on the next page. There is an ACS relay panel available to provide additional pump and valve control for several combination control configurations.



## Motorized Valves

The Belimo F6...HDU Series 2-way butterfly valves are designed to meet the needs of HVAC and commercial application requiring bubble tight shut-off for liquids. Typical applications include boiler isolation, chiller isolation, cooling tower isolation, change-over systems, air handler coil control, bypass and process control applications. Valves specifically designed for easy installation on BST configured boiler plants are available as well.



## BST Integration Panel

BST boiler plants have this option available to enable the BST Master to automatically switch a C-More Slave to the BST Master control if the currently designated master is not able to manage the boilers in the plant. The change is automatic so there is no need for a technician to intervene. The C-More may change from a slave to a master if a unit is taken down for service or if there is a fault that disables the C-More currently acting as the BST Master. The panel is the connection point for the Modbus sensors used by the BST Master Control. This allows the signal input of any sensors attached to the Integration Panel to be accessed at any node on the BST communication cables.



## AERCO Protonode/ Gateways

AERCO offers a multi-protocol, communications gateway to support integration with customers' building control and energy management systems. The plug-n-play package supports integration with BACnet/IP, BACnet MS/TP, LonWorks, and Johnson Controls Metasys N2 systems. AERCO's Communications Gateway is available for all AERCO boilers, water heaters and electronically controlled indirect systems.



## Condensate Neutralizer Kit

AERCO Condensate Neutralizers are ideal for neutralizing condensate from condensing boilers and furnaces operating on natural gas or propane. The condensate is acidic and has the potential to harm the environment and the sewer system. The AERCO Condensate Neutralizer will raise the pH of the condensate to a more neutral level before it is discharged to drain.



## Buffer Tanks

AERCO buffer tanks are ASME certified pressure vessels designed for use with high efficiency, low volume systems that incorporate low-mass condensing boilers. They add thermal mass, dampen fast transitions and minimize boiler cycling that occurs during zero or low domestic load conditions. The AERCO buffer tanks are available in two and four-port (Primary-Secondary) configurations.



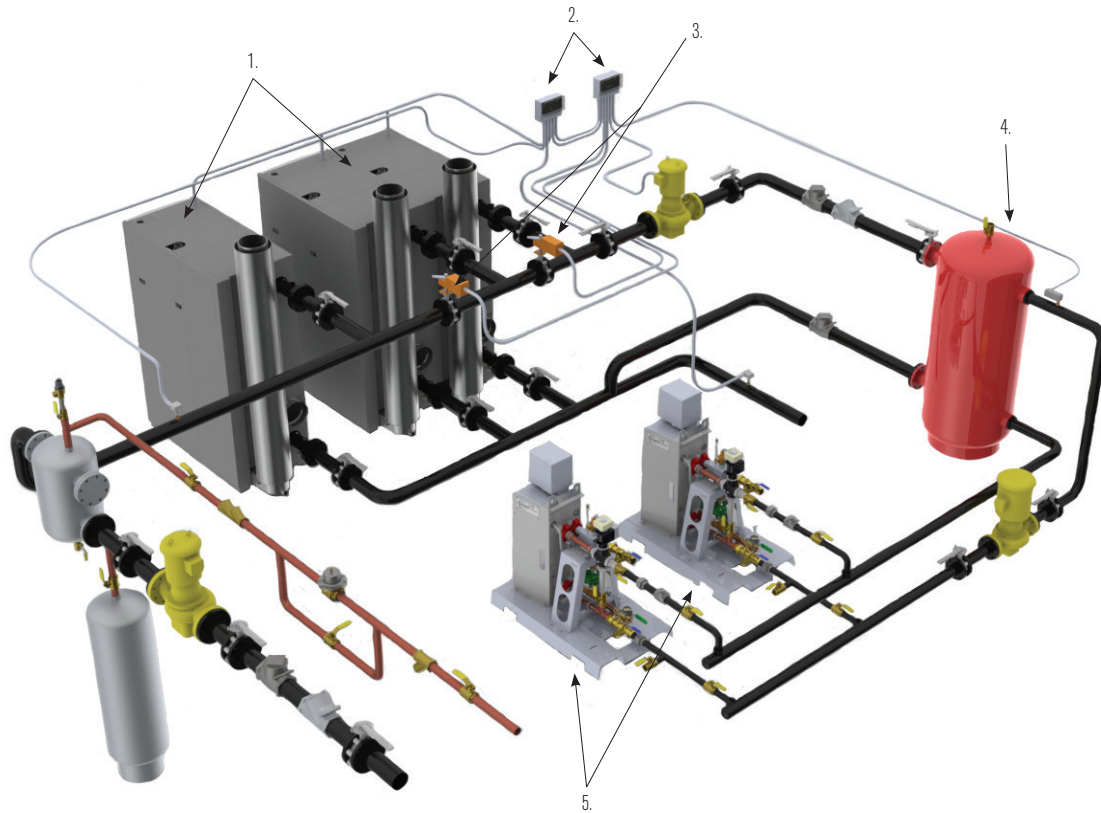
## Venting Mufflers

AERCO offers 6", 8", and 14" exhaust mufflers that are specifically designed with flanged ends to fit directly on the exhaust manifold of Benchmark boilers. The flanged-end design allows the muffler to be used with any venting system manufacturer – the only adapter required is an AERCO starter piece at one or both ends of the muffler.

# Installation

## Sample Installation

1. Benchmark 3000
2. AERCO Control System (ACS) and ACS Relay Panel
3. Motorized Valves
4. Buffer Tank
5. SmartPlate



# Benchmark Specifications

	750	1000	1500
Adjustable Temperature Control	50°F to 190°F	50°F to 190°F	50°F to 190°F
Ambient Temperature	0°F to 130°F	0°F to 130°F	0°F to 130°F
Accuracy	+/-4°F	+/-4°F	+/-4°F
Input	750,000 BTUH (Natural Gas)	1,000,000 BTUH (Natural Gas)	1,500,000 BTUH (Natural Gas)
Net Output	697,000 BTUH (Natural Gas)	930,000 BTUH (Natural Gas)	1,395,000 BTUH (Natural Gas)
Turndown Ratio	15:1	20:1	20:1
Flue Size	6" Diameter	6" Diameter	6" Diameter
Flue Material (per local code)	PVC, CPVC, PP or AL29-4C	PVC, CPVC, PP or AL29-4C	AL29-4C, PP
Water Inlet and Outlet	3" 150# Flange	3" 150# Flange	4" 150# Flange
Gas Connection	1" NPT Male	1" NPT Male	2" NPT Male
Gas Pressure Requirements*	14" WC Maximum, 4" WC Minimum at Full Load	14" WC Maximum, 4" WC Minimum at Full Load	14" WC Maximum, 4" WC Minimum at Full Load
Min/Max Water Flow	12-175 GPM	12-175 GPM	25-250 GPM
Condensate Connection	3/4" NPT Female	3/4" NPT Female	1.5" Tube
Maximum Condensate Flow	6 GPH	8 GPH	9 GPH
Pressure Rating	160 PSIG at 210°F	160 PSIG at 210°F	160 PSIG at 210°F
NOx Emissions Certifications	SCAQMD, TCEQ	SCAQMD, TCEQ	SCAQMD, TCEQ
Standard Listing and Approvals	UL, CUL, ASME	UL, CUL, ASME	UL, CUL, ASME
Gas Train Options	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)
Electrical Requirements	120/1/60 20 AMP (13 AMP FLA)	120/1/60 20 AMP (13 AMP FLA)	120/1/60 20 AMP (16 AMP FLA)
Water Pressure Drop at 20°ΔT	1.5 psi	3 psi	2.8 psi
Water Volume	16.25 gallons	14.25 gallons	44 gallons
Weight, Installed	669 lbs. (dry), 802 lbs. (wet)	700 lbs. (dry), 817 lbs. (wet)	1,406 lbs. (dry), 1,654 lbs. (wet)

\*Values are for Natural Gas FM Compliant gas trains only. See Benchmark Gas Components & Supply Design Guide GF-2030 for Propane, DBB & Dual Fuel gas train gas pressure requirements.

2000	2500	3000	6000
50°F to 190°F	50°F to 190°F	50°F to 190°F	50°F to 190°F
0°F to 130°F	0°F to 130°F	0°F to 130°F	0°F to 130°F
+/-4°F	+/-4°F	+/-4°F	+/-4°F
2,000,000 BTUH (Natural Gas)	2,500,000 BTUH (Natural Gas)	3,000,000 BTUH (Natural Gas)	6,000,000 BTUH (Natural Gas)
1,820,000 BTUH (Natural Gas)	2,325,000 BTUH (Natural Gas)	2,790,000 BTUH (Natural Gas)	5,580,000 BTUH (Natural Gas)
20:1	15:1	15:1	15:1
8" Diameter	8" Diameter	8" Diameter	12" or 14" Diameter
PP or AL29-4C	PP or AL29-4C	PP or AL29-4C	PP or AL29-4C
4" 150# Flange	4" 150# Flange	4" 150# Flange	6" 150# Flange
2" NPT Male	2" NPT Male	2" NPT Male	2" NPT Male
14" WC Maximum, 4" WC Minimum at Full Load	14" WC Maximum, 4" WC Minimum at Full Load	14" WC Maximum, 4" WC Minimum at Full Load	2" PSI Maximum, 14" WC Minimum at Full Load
25-350 GPM	25-350 GPM	25-350 GPM	75-600 GPM
1.5" Tube	1.5" Tube	1.5" Tube	1.5" Tube
10 GPH	17 GPH	20 GPH	40 GPH
160 PSIG at 210°F	160 PSIG at 210°F	160 PSIG at 210°F	80 PSIG at 210°F / 150 PSIG at 210°F
SCAQMD, TCEQ	SCAQMD, TCEQ	SCAQMD, TCEQ	SCAQMD, TCEQ
UL, CUL, ASME	UL, CUL, ASME	UL, CUL, ASME	UL, CUL, ASME
FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)	FM Compliant or Factory Installed, Double Block and Bleed (Formerly IRI)
120/1/60 20 AMP (16 AMP FLA)	208-230/3/60 20 AMP (10 AMP FLA) 460-230/3/60 15 AMP (5 AMP FLA)	208-230/3/60 20 AMP (10 AMP FLA) 460-230/3/60 15 AMP (5 AMP FLA)	208-230V/3/60 30 AMP (19 AMP FLA) 460/3/60 15 AMP (12 AMP FLA) 575/3/60 15 AMP (9 AMP FLA)
3.4 psi	2.9 psi	4 psi	6.2 psi
40 gallons	58 gallons	55 gallons	110 gallons
1,500 lbs. (dry), 1,760 lbs. (wet)	2,000 lbs. (dry), 2,332 lbs. (wet)	1,700 lbs. (dry), 2,364 lbs. (wet)	3,000 lbs. (dry), 3,920 lbs. (wet)

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BMK  
5K 1/15

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- Commercial HVAC
- District Energy
- Industrial Process
- Industrial Refrigeration
- Power

EVAPCO's powerful combination of financial strength and technical expertise has established the company as a recognized manufacturer of market-leading products on a worldwide basis. EVAPCO is also recognized for the superior technology of their environmentally friendly product innovations in sound reduction and water management.

EVAPCO is an employee owned company with a strong emphasis on research & development and modern manufacturing plants. EVAPCO has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:

- Higher System Efficiency
- Environmentally Friendly
- Lower Annual Operating Costs
- Reliable, Simple Operation and Maintenance

With an ongoing commitment to Research & Development programs, EVAPCO provides the most advanced products in the industry – **Technology for the Future, Available Today!**

EVAPCO products are manufactured in 19 locations in 9 countries around the world and supplied through a sales network consisting of over 170 offices.



## EXPERIENCE, INNOVATION, GUARANTEED PERFORMANCE

With over 45 U.S. Patents and their 92 foreign counterparts, EVAPCO's engineering expertise speaks for itself and provides an exceptional foundation for various product development projects. This foundation is the catalyst for providing customer driven features and benefits in an environmentally safe manner.

The state of the art Research & Development Center, located at EVAPCO's World Headquarters in Taneytown, Maryland USA, has over 60,000 square feet dedicated to thermal analysis and product development. Experienced R&D engineers perform product and application research year round in seven environmental test chambers.

The Research & Development Center features customized laboratories that are designed to conduct tests through a wide range of environmental conditions. The computerized data



acquisition system records the data and graphically displays continuous results, thereby providing the R&D engineers with valuable test information on a continuous basis.

The Research & Development Center also has the industry's

largest Low Temperature Environmental Test Chamber. This test chamber was converted from ammonia to CO<sub>2</sub> refrigerant in order to perform detailed thermal analysis on steel evaporators.

In addition, the R&D Center houses a modern Water Analytical Laboratory for advanced water chemistry analysis in support of the company's *Pulse~Pure*® Non-Chemical and Smart Shield® Solid, Time Released Water Treatment business and an AMCA Fan Test Chamber for evaporator fan performance verification. Product sound ratings are measured on a dedicated Sound Test Pad located on the property.

Most recently, EVAPCO has designed, built and commissioned a unique wind tunnel to investigate Air Cooled Condenser (ACC) heat exchangers. This one of a kind laboratory incorporates a full size heat exchanger test section. The heat exchanger is tested with steam under vacuum rather than hot water to allow EVAPCO to optimize the ACC design with unprecedented accuracy.

EVAPCO products are the result of extensive research and thermal testing. As a result, EVAPCO products deliver guaranteed performance in order to maximize system performance.



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USS

UT

cAT

Factory Assembled Induced Draft

## Field Erected



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LPT

PMTQ

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Evaporative Cooling Tower

Factory Assembled Forced Draft

Field Erected

## Closed Circuit Coolers



ATWB

ESWA

WDW

eco-ATW

eco-ATWE

Factory Assembled Induced Draft

## Thermal Energy Storage



PMWQ

LSWE

LRWB

Ice Coils

Factory Assembled Forced Draft

## Water Systems



Pulse-Pure®  
Non-Chemical Water Treatment



SMART SHIELD® – Solid, Controlled Release  
Chemical Water Treatment

# INDUSTRIAL REFRIGERATION SYSTEM PRODUCTS

## Evaporative Condensers



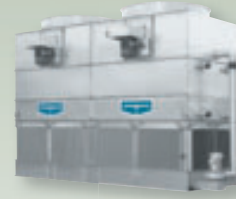
ATC-E



eco-ATC



WDC



cATC

Induced Draft Models

## Evaporative Condensers



eco-PMC/PMC-E



LSC-E/LRC

Forced Draft Models

## Rooftop Air Units



Critical Process Air Systems

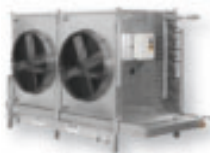


Penthouse Evaporators

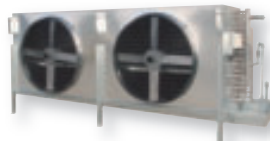


Make-Up Air Systems

## Evaporators — Stainless Steel • Aluminum • Galvanized Steel • Copper



SSTMC Unit Coolers



SSTL Product Coolers

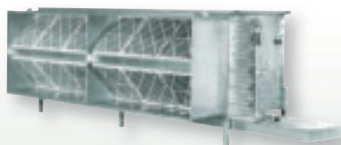


SSTWC Workroom Units

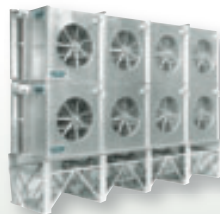


SSTD Low Profile Coolers

## Custom Freezing Capabilities



Draw Through Coils with Inlet Air Filters

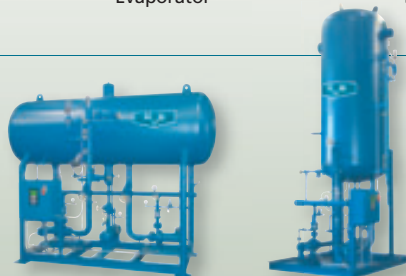


Stacked Blast Freezer Evaporator



Spiral Blast Freezer Evaporator

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MRP Recirculator Systems

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## EVAPCO...SPECIALISTS IN HEAT TRANSFER PRODUCTS AND SERVICES.

Visit EVAPCO's Website at: <http://www.evapco.com>

3M/0712/YGS

Bulletin 700L

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# Niagara Analytics Framework

Shrink big data and grow performance for your customers with the only analytics framework native to Niagara

The Niagara platform is the industry's first truly open framework, harnessing the power of the Internet of Things. Now, with the Niagara Analytics Framework, we're giving you the power to bring your customers the one thing they need most to optimize their operations—real-time intelligence that gives them actionable insights into their enterprise.

The Niagara Analytics Framework takes the big data generated by Niagara and shrinks it through a variety of analytic applications—from building automation to manufacturing to transportation and beyond. But unlike the vast majority of analytics tools, which provide business intelligence through historical data, the Niagara Analytics Framework captures historical patterns as well as real-time data on events as they unfold. No longer do your customers have to rely solely on data from last cycle to plan for the upcoming cycle—with our analytics platform they can respond proactively and make smarter, swifter decisions that drive their business forward.

BECAUSE THE NIAGARA ANALYTICS FRAMEWORK IS POWERED BY NIAGARA, YOU GET THE ADDED BENEFIT OF:

- The Niagara community to help expand your product
- Our global, end-user footprint to upsell a high-demand solution
- An open platform for support of multiple analytics applications
- Built-in analytics to enhance your enterprise solutions

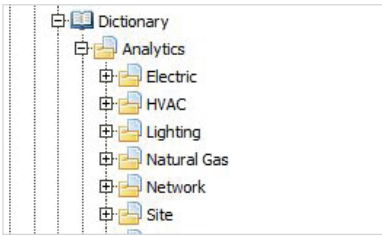
AND YOUR CUSTOMERS BENEFIT FROM AN ENTERPRISE SOLUTION THAT INCLUDES:

- Operational intelligence—real-time visibility for immediate remediation
- Single software certification for a complete solution



# Niagara Analytics Framework

Niagara Analytics Framework will run in Niagara<sup>AX</sup> Supervisor and is compatible with Niagara<sup>AX</sup> 3.7.106 or later.



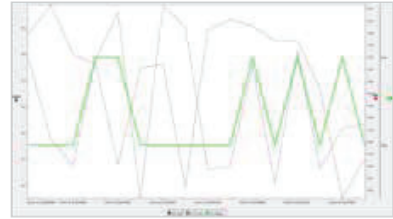
## DATA DEFINITIONS VIEW

Data definitions let the user define data and formulas in a specific way to make results clearer and more consistent when running analytics.



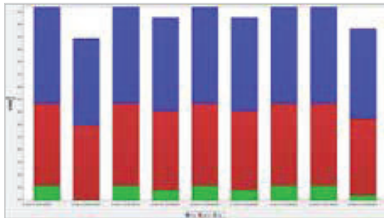
## FORMULA & RULE CREATIONS VIEW

Formulas and rules can be created on the Niagara Wiresheet without code, so no new programming or logic language needs to be learned.



## LINE CHART VIEW

Issues can be identified on a line chart—for example, when the belt drive speed increases while the belt tension decreases, resulting in belt slippage.



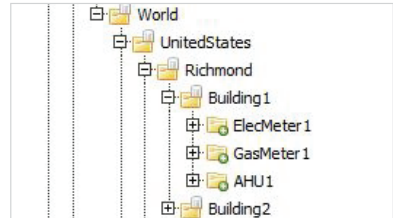
## BAR CHART VIEW

Data can be viewed in aggregate—for example, this bar chart shows the electrical load of the HVAC, lighting and plug circuits.



## INDIVIDUAL RESULTS VIEW

Individual results—such as this alarm record of a faulty water valve on an air handler—can be reviewed with hourly and total cost implications.



## DATA MODELING VIEW

Data is taken out of the “driver-based” modeling format in Niagara<sup>AX</sup> and set up in a geographically or system-typed model based on project requirements.

Integrate the Niagara Analytics Framework with your next application and give your customers the real-time intelligence they need to increase production, reduce costs and improve quality.

Contact your Niagara OEM to get started.

**TRIDIUM**

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REFRIGERATION EQUIPMENT

# For Food and Beverage

A complete line of  
Industrial Refrigeration products

## ATTACHMENT G



**Frick**<sup>®</sup>  
BY JOHNSON CONTROLS



## Why buy FRICK products?

FRICK HAS A REPUTATION FOR MAKING RELIABLE PRODUCTS



Frick began building quality products in Waynesboro, PA, USA in 1853. We built our first refrigeration compressor in 1883 and have been on the cutting edge of technology ever since. Each year, Frick continues to be stronger and strengthens its reputation for reliability, world-class engineering and application knowledge.

PART OF JOHNSON CONTROLS



As a part of Johnson Controls, Frick has access to the technical and financial resources of a Fortune 100 company. This allows us to share knowledge among our various sales and service organizations around the world.



FRICK FACTOR NETWORK

When you purchase a Frick industrial refrigeration system from your Frick Factor, you get the benefits of Frick product and service experience. Frick Factors have the skills to understand complex processes, product applications, and provide reliable, energy-wise installations, and service after the installation.

STATE-OF-THE-ART TECHNOLOGY IN BOTH DESIGN AND MANUFACTURING

We lead the industrial refrigeration industry with cutting edge controls technologies that allow for seamless system integration. Our product innovations continue to be a major focus as we strive to bring tomorrow's products to the marketplace today.

ENGINEERING EXCELLENCE

Frick engineers have provided reliable products for over 150 years. Frick engineers continually refine existing products, adding features and incorporating the newest technologies. This constant evolution of products ensures that Frick and

Frick Factors will deliver customer satisfaction by providing the most technologically advanced equipment in the industry. As we make changes to improve the performance of current products, Frick engineers ensure that these improvements can be applied to previous installations. This allows continual upgrades to existing equipment and allows you to keep your Frick equipment current.

QUALITY, SATISFACTION AND RELIABILITY

The Industrial refrigeration industry places high demands on the equipment it uses. Today's equipment must be easy to maintain and meet high standards for quality, reliability and energy efficiency. Unit designs must be both robust and easily installed. Frick products accomplish all of these goals. High quality materials, innovative design and modern manufacturing methods add up to a product that is unmatched in overall quality. JOHNSON CONTROLS QUALITY POLICY - We will deliver products and services that conform to our customer's requirements and strive to exceed their expectations.

ENERGY EFFICIENT

Facility owners and operators are focused on energy efficiency now more than ever. Energy efficiency investments must provide a reasonable payback. Frick's many years of experience in the industrial refrigeration industry provides for varied and innovative energy efficiency solutions for your system. As an example, our VSD drives with unique liquid cooling ensure that your compressor operates at the most energy efficient level. Our cutting edge designs, along with Frick Control Systems and the use of VSD's can dramatically reduce operating costs.

ENGINEERED CONTROL SYSTEMS FEATURE Q-NET TECHNOLOGY

Get optimum performance when you use Q-Net to take control of your refrigeration system. View, monitor and control your entire system by changing setpoints; react to system changes from one location because everything is linked. Our





constant evaluation of best practices regarding energy conservation and system performance keeps pace with current technologies and sets the standard by which competition is gauged. We offer nearly limitless expansion of your controls capability to keep pace with controls technology. Select from complete PLC based Engineered Control Systems to Q-Net Technology panels.



### SUPERIOR SYSTEM INTEGRATION

Our expertise in each product area means a better understanding of how to build a complete and superior refrigeration system with integrated controls. This complete system integration allows for a dependable, efficient and sustainable refrigeration system.

### COOLWARE

Coolware selection software enables the user to select the best system components for a refrigeration system. Coolware allows



products to be selected, priced, and placed directly into an order document, assuring that the correct equipment is ordered. It also provides flexibility in selection considerations to model a total system that is green, sustainable and efficient. Coolware is the most sophisticated and complete software found in industrial refrigeration today.

### WE ARE ENVIRONMENTALLY GREEN

Ammonia and CO2 are the primary refrigerants used for industrial refrigeration. Both are natural refrigerants that are environmentally friendly and have low Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

*NATURAL  
REFRIGERANTS  
DON'T LEAVE A  
FOOTPRINT!*

### AFTERMARKET SERVICE

If you have FRICK equipment, it is our policy to support it. Our technical support does not end with the warranty. The Baltimore Parts Center online ordering system is designed to help Frick® Factors obtain parts fast. Prompt and accurate service is our standard. We also offer a priority order service to expedite in-stock parts orders when same day shipment is required.

## A GLOBAL LEADER

The Frick Brand is produced by Johnson Controls, a global diversified technology and industrial leader serving customers in over 150 countries. Johnson Controls serves these markets through three business units; Building Efficiency, Automotive Experience, Power Solutions.

### Our Values

- Integrity
- Customer Satisfaction
- Employee Engagement
- Innovation
- Sustainability

Our commitment to sustainability includes our products, services, and operations. We believe in efficient use of resources around the world. We are committed to delivering value and making our customers successful.

Our 130,000 employees create quality products, services and solutions to optimize energy and operational efficiencies of buildings; lead-acid automotive batteries and advanced batteries for hybrid and electric vehicles; and interior systems for automobiles.



**Building Efficiency** is a leading provider of equipment and controls for heating, ventilating, air-conditioning and refrigeration, as well as security systems for buildings.

**Automotive Experience** is a global leader in automotive seating, overhead systems, door and instrument panels, and interior electronics.



**Power Solutions** is the global leader in lead-acid and advanced batteries for the automotive industry.





**RWF II and RXF Rotary Screw Compressors  
Quiet! Reliable! Efficient!**

Frick® RWF II and RXF Rotary Screw Compressors... leading the food and beverage industry with the most innovative and broadest product range available for industrial applications.

- **Variable volume ratio** for maximum efficiency
- **Infinite capacity control** to match changing loads... exactly!
- **Smart Series™ Motors** are NEMA premium efficient, low noise. Standard on Frick® compressor packages.
- **Flange mounting** eliminates troublesome field alignment between low-noise motor and compressor
- **Factory-mounted starter** simplifies electrical installation
- **Cold-start valve** provides oil pressure without the need for a pump
- **Lower leakage potential** because of fewer threads, less fittings and welded connections
- **Oil Cooling** by EZ-Cool™ Liquid Injection using a motorized expansion valve controlled by the Frick® Quantum™LX for optimum discharge temperature control; or by Thermosyphon which uses a plate and shell vessel to cool the oil with no compressor capacity lost or compressor power penalties incurred.

**QUANTUM™LX CONTROL Easy To Learn!  
Easy To Use!**

Our new LX display has contemporary graphics that are easy to read and navigate, just like the web. For today's personal computer user, the look and feel of Quantum™LX is second nature.

Our simple graphical interface is perfect for your newest users, while our advanced interface has detail to satisfy even your most experienced operator.

- Four user-defined capacity control modes for a wide application range
- Built-in diagnostic functions simplify troubleshooting
- Quantum™LX has on-screen calibrations and operator-friendly graphics
- Real-time and historical trending
- Smart safeties mean trouble-free operation
- Uses Ethernet for high-speed communications
- Backward compatible to Plus/Quantum™ micro with serial communication
- Industry standard serial communication protocols: Frick® ASCII • Allen-Bradley® DF1 Serial, Modbus ASCII • Modbus RTU
- Ethernet: Modbus TCP/IP • Web accessible





**Frick® PowerPac™ ...Your next refrigeration plant should be easy to buy, easy to install and easy to operate!**

Frick® PowerPac™ reduces the need for field labor. Frick® compressors, heat exchangers, evaporators, and condensers come in a compact package controlled by Frick® Quantum™LX controls and Frick® “turnkey” software.

Your Frick® PowerPac™ puts advanced heat exchanger technology to work for reduced refrigerant usage and maximum operating efficiency.

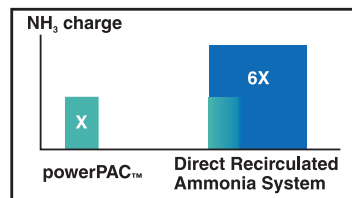
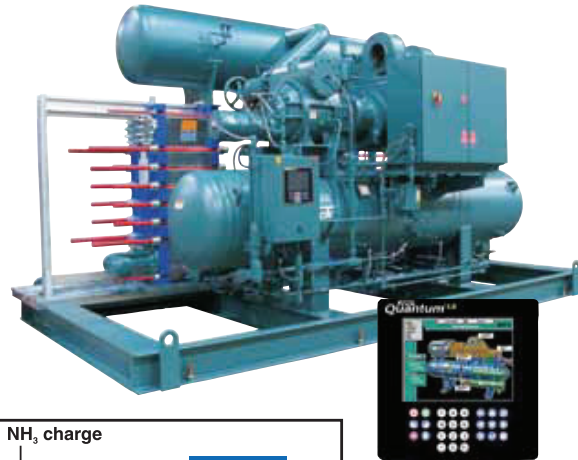
Reduces the requirement for a Process Safety Management (PSM) program.

**Frick® PowerPac™**

- Less jobsite labor means lower cost
- Optimized design means fewer welds
- “Factory Built” controlled environment; site delivered ready to operate
- Simplified electrical hookups
- Process side uses pumped glycol
- Freeze protection from 3-Directional expansion
- Plate and frame heat exchanger means less refrigerant charge

**Unit-Mounted Solid-State Starter or Variable Speed Drive...Why?**

- Lower installation costs
- Less mounting space
- Extended motor life and improved system integrity because it’s factory wired
- Superior motor overload protection
- Main circuit breaker disconnect provides immediate shutdown protection at the compressor.



**Vyper™ Variable Speed Drive gives you the kind of control you need, today, to respond to the unique load demands of your Process Cooling Requirements.**

There are many processes that could benefit from the use of the Vyper™ VSD. Some examples are:

- Carbonated Beverage • Cold Storage • Meat Processing • Dairy • Poultry Processing • Industrial Bakeries • Seafood • Fruits & Vegetables • Breweries • Ice Making

Contact your Frick® sales representative to better realize the potential of this technology when applied to your process.





***A smart, environmentally friendly way to upgrade your facility and reduce your carbon footprint!***

***Frick SmartPac™ Heat Pumps***

SmartPac™ Heat Pumps capture the heat from your ammonia refrigeration system that is normally rejected to the atmosphere. SmartPac™ then transforms this valuable resource into hot water that can then be utilized throughout your industrial facility.

SmartPac™ enables you to make more efficient use of your ammonia refrigeration system ... bottom line ... lower utility bills and a reduced carbon footprint.

***Frick® SmartPac™ –Easy to Install; Easy to Own***

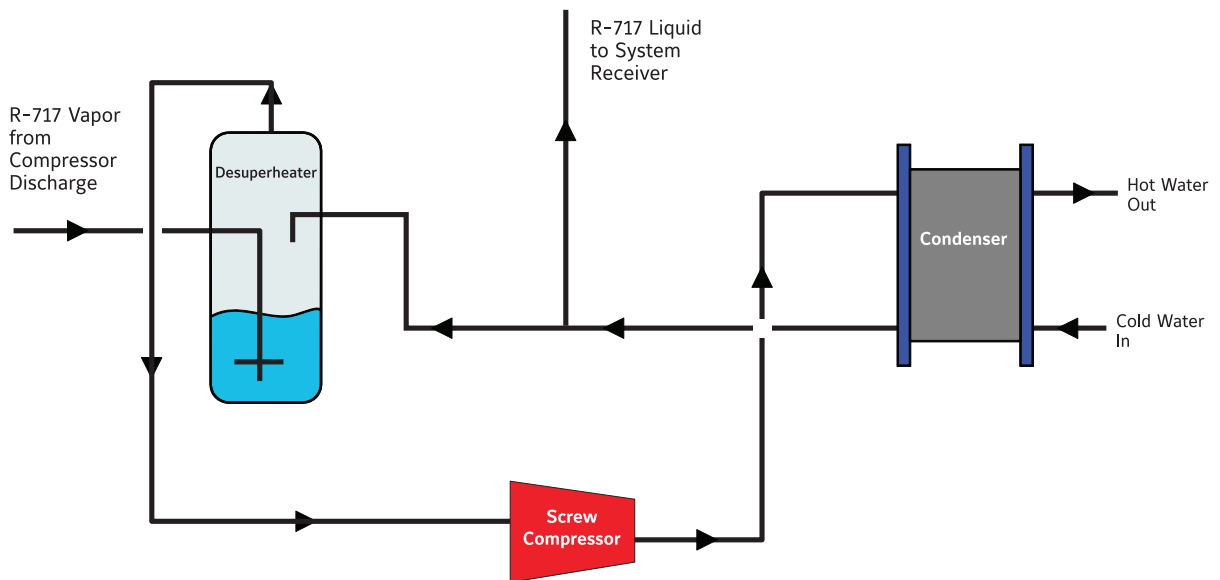
Frick screw compressors, heat exchangers, pressure vessels and controls all come together in a compact package ready to install.

Advanced heat exchanger technology increases operating efficiency with a reduced refrigerant charge.

When installed by a Frick Factor, get a 3-year warranty. No worries start saving \$\$ now.

**SmartPac™ Applications**

- Beef
- Poultry
- Dairy
- Brewery
- Prepared Foods
- Ice Rinks
- District Heating





*Sanitary conditions, compliance with regulations and the demand to deliver a quality product are all part of the success equation. Frick® AcuAir® systems are precision-engineered and painstakingly built to the high sanitary standards of food processors and help you meet the requirements of the United States Department of Agriculture.*



## ***Frick AcuAir® Hygienic Air-Handling Units*** ***Process Room Control of Temperature, Pressure, and Filtration, Creating a Safe, Sanitary Food Processing Environment***

- Hygienic air conditioning
- Rooftop installation
- Engineered to your specific sanitary requirements



### ***Makeup Air Handlers***

Whether your application requires simple fresh-filtered air with little temperature conditioning or specific volumes of tempered air, the AcuAir applications team knows just the questions to ask in order to provide you with your most economical solution.

***Frick AcuAir® products are the best solution for clean, conditioned air!***

### ***Custom Engineering***

The extensive experience of Frick AcuAir® and the array of unit options allows us to customize a unit for your specific application..



AcuAir products controlled by Quantum™LX technology provide access for monitoring and control, using the web browser of any connected network computer or a laptop at the unit. Simply type in the Unit's IP Address for easy access. The remote mounted System Interface Panel (optional & shown here) can also be used for quick easy access to monitor

and control your AcuAir units. The System Interface Panel will also provide access to any Quantum™LX control panel (compressor, evaporator, condenser/vessel) on the network from one convenient, central location.

### ***Designed for Internal Wash-Down***

Floor drains are provided throughout the unit that are piped to the exterior of the unit base. Under the cooling coil and downstream, the unit is provided with recessed stainless steel drain pans that are double-sloped for positive water drainage. Internal wiring and motors are also engineered for wash-down duty.





A Frick® heavy-duty evaporator means:

- Reliable heat transfer for continuous operation at all temperature levels
- Design flexibility in geometry, fan selection, and construction materials.

## RTF Rooftop Freezer Systems

### Penthouse Unit Features:

- 4" (R-32) or 5" (R-41) urethane foamed-in-place wall panels.
- Exterior painted, stucco-embossed steel panel.
- Large service doors with heated seals.
- OSHA guards at fan inlet.
- Fan motor service rail.
- Interior maintenance lighting.
- Refrigerant and drain lines extend through the insulated enclosure.
- Insulated drain pan – with or without hot gas pan coil. Interconnecting hot gas piping not included.
- External electrical control panel (Optional).

### The Evaporator System Includes:

- Coils constructed of stainless steel tube and aluminum fins or all hot dip galvanized steel.

### Innovative solutions driven by your application needs!

- CleanCoil™ hygienic fin design
- Fully welded hygienic drain pans
- Vari-Fin frost management design
- Full coverage drain pans

### Frick Quantum™LX controllers provide the right solution for efficient capacity control.

- Flexible defrost-sequencing control platform
- Control up to 32 evaporators from each Quantum™LX graphical interface
- Remote terminal boxes minimize wiring requirements and reduce installation expenses.

And ... for extremely large facilities, link several Frick® Quantum™LX control panels together to manage all of the evaporators at the same time.



- Direct-drive cast aluminum, non-overloading axial propeller fans. Standard motors are TEFC, 1160 or 1750 RPM.
- Air or hot gas defrost coil designs



## Easy Maintenance

- Internal Access – The interior of the unit is spacious and easily accessible via multiple large hinged access doors for adjusting the float valve, cleaning the strainer, or flushing the basin.
- Basin Sweeper System – The basin contains an optional piping system to sweep away sediment.
- Harmony™ Removal System – Water distribution branch removal system that requires no tools.



## Reliable Year-Round Operation

- Drive System – The fans, motor, and drive system are located to protect them from moisture, condensation and icing. Backed by a 5-year fan drive and motor warranty, these units are suitable for year-round operation.
- HDGAF Coil – The coil is hot dip galvanized after fabrication.

## Low Installed Cost

- Support – All models mount directly on two parallel I beams and ship complete with motors and drives factory installed and aligned.
- Modular Design– Large models ship in multiple sections to minimize the size and weight of the heaviest lift, allowing for the use of smaller, less costly cranes.

## Green (Energy Saving)

- PE VFD Motors – Fan motors are premium efficient inverter duty.
- VFD – Variable frequency fan motor drives are optional.
- Design – Evaporative condensers lower the condensing temperature saving up to 15% compared to a traditional condenser.

## The Frick Quantum™LX Condenser Control Panel

- Multi-step head pressure control
- Graphical operator interface (GOI) simplifies operator training
- Menu driven control-sequencing options
- Vessel level control to manage engine room needs





## Accumulators

Vertical accumulators with or without coils.

## Intercoolers

Vertical intercoolers with or without coils..

## Receivers

- Horizontal and vertical high-pressure receivers.
- Horizontal and vertical thermosyphon receivers.
- Vertical high-pressure thermosyphon receivers.

## Oil Pots

Horizontal oil pots.

## Economizers

Flash type and shell-and-coil type.

## Surge Drums

Horizontal surge drums with either single-flow or dual-flow.

## Surge Drum Packages

Horizontal vessel design with sufficient room for plate and frame heat exchangers mounted below vessel.

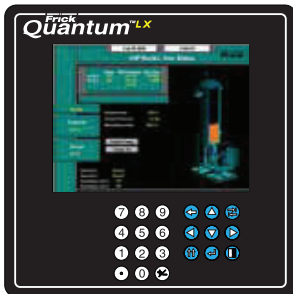
## Special Vessels and Packages

Frick® manufactures vessels and packages customized to specific application and design requirements.



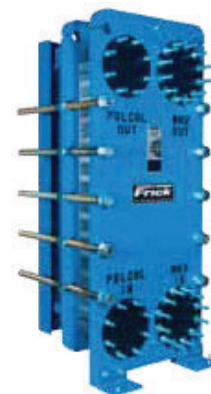
## Horizontal and Vertical Liquid Recirculator Vessels and Packages

Horizontal and vertical recirculator packages and vessels from 24 to 120 inch outside diameter. Offered with either mechanical seal or semihermetic style pumps, packages are completely factory piped and come standard with a 3-inch float column and 3 level eyes. Standard ammonia packages include an oil pot. Options include control panels, liquid-level control systems, oil pot heaters, variable speed drives, and liquid makeup assemblies (shipped loose).



# HEAT EXCHANGERS

A plate and frame heat exchanger mounted on a structural base, piped to a liquid separator and wired with a NEMA 4 liquid level control panel. Designed to cool water or brine utilizing liquid refrigerant from a central refrigeration system.







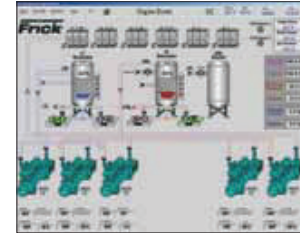
*Frick custom engineered control systems are tailored to your individual requirements and are used on all types of new and existing Industrial Refrigeration applications.*

- Custom solutions for any refrigeration application
- All setpoints password-protected with supervisor-assigned accessibility
- Open architecture
- Nonproprietary hardware and software

Opto 22 · Allen-Bradley®  
RSView®32™ · Wonderware® In-Touch®

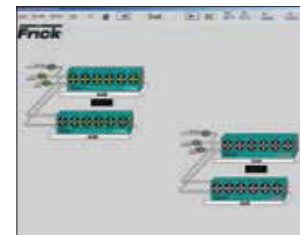


- All systems are protected by a NEMA 4 enclosure. NEMA 4x available as an option.



Engine room overview screen

- Remote monitoring
- Data logging and trending
- Report generation and printouts



Individual or group evaporator overview screen

- Unit-Mounted Starters and Controls for ease of installation and accessibility



# Single Source Industrial Refrigeration Solutions !

Heat Exchangers



Packaged Equipment



Air Handlers



Vessels



Controls



Evaporators



Compressors




Condensers



Johnson Controls Inc.  
100 CV Avenue • P.O. Box 997  
Waynesboro, PA 17268-0997 U.S.A.  
Tel: 717-762-2121 • Fax: 717-762-8624  
www.johnsoncontrols.com

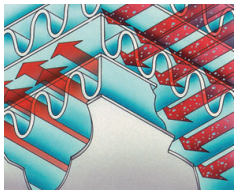
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CONTAINS 25% POST-CONSUMER WASTE 



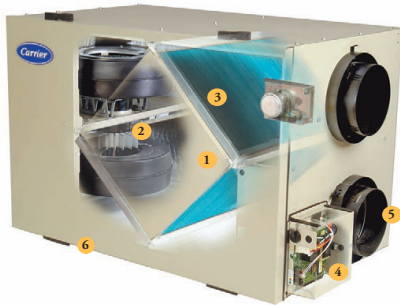
## BREATHE EASY WITH A CARRIER ENERGY RECOVERY VENTILATOR.

### TECHNOLOGY



This illustration shows how the central core doesn't mix the fresh air from outside with the stale polluted air from inside.

- Efficiency and comfort** is ensured by the high-efficiency energy recovery central core which recovers energy from the indoor air and transfers it to the fresh incoming air without mixing airstreams. The core also helps to remove unwanted humidity from air inside your home during winter, and removes the humidity from the outside air before it enters your home in the summer.
- Quiet comfort and energy savings** are provided by the motor which efficiently moves air through the system.
- Fresh, outdoor air is cleaned** by the filter prior to entering your living space.
- Better operating control and reliability** is provided by the electronic circuit board.
- Energy savings and added system reliability** is provided by the damper defrost. By periodically recirculating indoor air when temperatures drop below 23 degrees, the damper defrost helps prevent frost from forming, eliminating the need for energy-consuming supplementary electric defrost that can be found on competitive models.
- Easy access to internal components** comes from the briefcase-style latches. No tools are required for removing and cleaning filters.



### Energy Recovery Ventilators (ERVs)

Model #	ERVCLHU1150	ERVCLHU1200
Capacity (CFM) @ 0.5-0.3 ESP(in. wc)	117-152	182-214
Apparent Sensible Effectiveness @ 32 degrees F - percent	79	76
Net Moisture Transfer Efficiency 95 degrees F - percent	52	45
Cooling Season Total Recovery Efficiency 95 degrees - percent	45	41

This information is in the ERV Product Data - ERV-2PD.  
Units can be installed as independent systems for bathrooms or kitchens or integrated for whole house ventilation.

## CARRIER INDOOR COMFORT SYSTEMS OFFER UNMATCHED PERFORMANCE.

### CARRIER SYSTEMS

#### Humidifier

As part of a total indoor comfort system, a Carrier humidifier replenishes moisture to dry indoor air.

#### Zoning

Comfort zoning allows you to set different temperatures for different areas of your home. Enjoy dry indoor air.

#### Comfort Ventilator

A Carrier comfort ventilator adds a breath of fresh air to today's tightly constructed home. It combines fresh outdoor air with conditioned indoor air for improved air and energy exchanges.

#### Thermostat<sup>SM</sup> Control

A Carrier Thermostat<sup>SM</sup> Control is your command center. Precise temperature control and programmable features keep you in touch with your comfort.

#### Evaporator Coil

A Carrier evaporator coil is matched with the proper outdoor unit to provide top cooling efficiency and years of reliable service. If replacing your outdoor unit, Carrier recommends the replacement of the indoor section as well, to ensure peak performance and reliability.

#### Furnace

Carrier offers a complete line of top quality, high-efficiency gas and oil furnaces. Ask your Carrier dealer which one is right for you.

#### Air Cleaner

Carrier air cleaners can substantially improve your indoor comfort by removing harmful and irritating airborne pollutants from your home.

#### Air Conditioner

A complete line of Carrier air conditioners provides reliable, high-efficiency cooling for long-lasting comfort and energy savings. Ask your Carrier dealer about environmentally sound Carrier air conditioners with Puron<sup>SM</sup> refrigerant.



### MATCHING COMPONENTS PROVIDE OPTIMUM COMFORT, EFFICIENCY AND PERFORMANCE

- Forced-air systems are usually built around an indoor unit, such as a furnace or a fan coil.
- The outdoor unit will be an air conditioner or heat pump combined with a furnace for year-round comfort.
- Air quality is greatly improved with the addition of an air cleaner, humidifier and a ventilator.
- Precise temperature control comes from a Carrier thermostat matched to your indoor comfort system.
- Zoning provides the ultimate in control over your indoor comfort system.

### WARRANTY

Carrier extends your comfort by providing written product and component warranties. The Energy Recovery Ventilator (ERV) is covered by a **Five-year parts limited warranty** and a **lifetime limited warranty** on the core. Ask your Carrier dealer for details.



### EXPERTISE

Carrier has been on the leading edge of the indoor comfort industry since Willis Carrier invented what we now know as air conditioning in 1902. Since that time, Carrier scientists, engineers and dealers have been providing homeowners with the most advanced indoor comfort technology available. This technological

advantage has enabled Carrier to customize indoor comfort systems for millions of homeowners nationwide.

Today, you can rely on your local Carrier dealer to evaluate your indoor comfort needs and suggest a customized system that fits those precise requirements. By recommending the appropriate furnace,



www.carrier.com

A member of the United Technologies Corporation family.

Stock Symbol: UTX

© Carrier Corporation 2003

88VLS-3A3

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice or without incurring obligations.



Always look for these symbols. They are proof of optimal performance, efficiency and capacity.



## ENERGY RECOVERY VENTILATOR

Attachment B-10.1



THE CARRIER ERV REFRESHES YOUR INDOOR AIR

## A CARRIER ENERGY RECOVERY VENTILATOR ENHANCES YOUR OVERALL COMFORT.

### IAQ

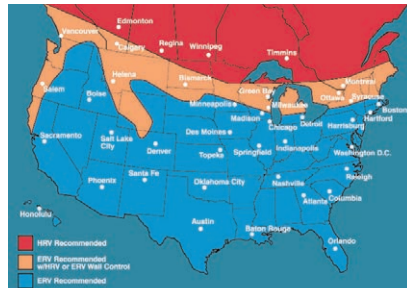
As the cold weather settles in, let a Carrier Energy Recovery Ventilator (ERV) provide the fresh comfort you deserve. Today's air-tight homes provide excellent energy efficiency. However, better insulation restricts the air exchange, trapping stale, polluted air inside your home. Without proper ventilation, dust, airborne particles, volatile organic compounds (VOCs), excessive humidity and other pollutants from building materials constantly recirculate throughout your home. That's why Carrier offers the ERV.

### EFFICIENCY

The Carrier ERV recovers energy from indoor air and transfers it to incoming outdoor air, so you can enjoy fresh air without sacrificing energy efficiency. The ERV draws fresh air into your home from outside as stale, polluted air is pulled out of your home and expelled outside. When the two air streams move through the central energy recovery core, energy is transferred from the stale outgoing air to the fresh incoming air without ever mixing airstreams. That means maximum comfort with fresh, clean air and efficient performance from your indoor comfort system.



Climate Map for Energy and Heat Recovery Ventilators



HRV or ERV? If you live in a colder climate with a longer heating season, your dealer will likely recommend the HRV. For most of the United States, ERV are recommended because of their year-round efficiency. Your local Carrier dealer can determine which is best for you.

## FOR UNEQUALLED PERFORMANCE AND DURABILITY, CHOOSE CARRIER.

### CUSTOM COMFORT

In addition to improving air quality, the ERV enhances your overall comfort. With the easy-to-use, wall-mounted control unit equipped with three different modes, you'll have fresh air at your fingertips. The recirculation mode provides air movement throughout your home without bringing in outside air. The continuous mode works 24 hours a day to provide a continuous flow of fresh outdoor air into your home. The intermittent mode operates when the indoor humidity exceeds your desired level, providing maximum fuel economy. The ERV will ensure your indoor comfort for years to come.

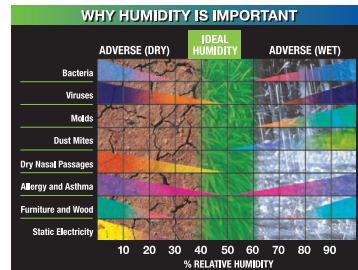
### AIRFLOW

A Carrier ERV expels stale polluted air outdoors and refreshes your home with clean outside air, while at the same time recovering energy. This helps prevent and dilute the build-up of radon gas, carbon monoxide and other volatile organic compounds (VOCs). It is much more economical than opening a window in the middle of winter or summer. It also reduces humidity levels during winter months to reduce condensation on windows and doors.



Simple wall control makes operating the ERV easy and convenient.

Integrated System



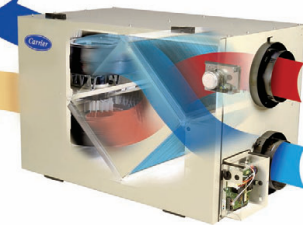
Maintaining ideal humidity in your home can be the key to relief from dry nasal passages, static electricity, and dry, itchy skin. Proper humidity control is also important for minimizing the growth of bacteria, molds, viruses and dust mites. When tighter built homes, too much humidity in the winter can be a problem. For example, excessive moisture in the winter can cause sweating/water drops to develop on windows and door jambs. This condition could prematurely deteriorate windows and door jambs, in corners, near floors or basements, and cause mold and mildew to develop.

## AN ENERGY RECOVERY VENTILATOR CAN BE THE SOLUTION TO IMPROVING YOUR INDOOR AIR QUALITY.

### ERV AIRFLOW

**STALE AIR TO OUTSIDE**  
Removes the stale air from your home after the energy transfer has taken place in the high-efficiency core and exhausts it outside.

**FRESH AIR TO BUILDING**  
Delivers fresh, filtered, conditioned air back into your home comfort system.



**FRESH AIR FROM OUTSIDE**  
Brings fresh, outside air into the unit. The fresh air filter removes large particles of dust and dirt from incoming fresh air.

**STALE AIR FROM BUILDING**  
Connects to the return air duct system in your home to draw stale, indoor air into the ventilator core.

### TODAY'S HOMES NEED PROPER VENTILATION

#### Ventilation Solutions

- Spot ventilation for kitchen, bath and other moisture or odor producing areas
- General ventilation to remove stale, polluted air and bring in outdoor air
- Vents and ventilators to protect the attic and crawlspace

Vent bathrooms to prevent mold, rot and mildew by using both fans or energy recovery ventilators.

Provide fresh outside air for good indoor air quality, especially to bedrooms during sleeping hours. Fresh air is provided through air filters or an energy recovery ventilator.

Moisture here can lead to rot and mold damage. Proper sized crawlspace vents or a ducted fan provides effective cross ventilation under the house.



An overheated attic means higher cooling bills and a poorly vented attic can also cause structural damage. Ventilate with vents, powered attic ventilators or a whole house fan for summer cooling.

Common pollutants from home, people and contents can create an unhealthy environment. Use an energy recovery ventilator or remove pollutants.

Vent smoke, heat, cooking vapors and moisture with range hoods, kitchen fans, deodorant fans or remote fans.

Moisture from basement floors, basement areas, furnaces from mobile and storage areas, radon and other gases can increase the pollutants in home. Ventilate these areas with energy recovery ventilators.

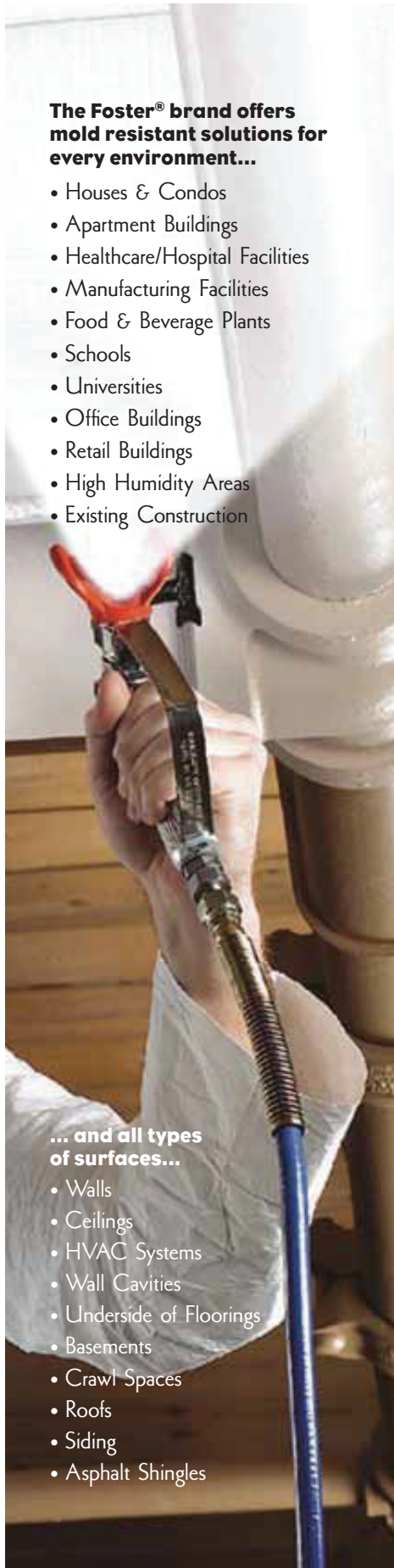
ATTACHMENT H



## Mold Remediation and Prevention Products

**The Foster® brand offers mold resistant solutions for every environment...**

- Houses & Condos
- Apartment Buildings
- Healthcare/Hospital Facilities
- Manufacturing Facilities
- Food & Beverage Plants
- Schools
- Universities
- Office Buildings
- Retail Buildings
- High Humidity Areas
- Existing Construction



**... and all types of surfaces...**

- Walls
- Ceilings
- HVAC Systems
- Wall Cavities
- Underside of Floorings
- Basements
- Crawl Spaces
- Roofs
- Siding
- Asphalt Shingles



## A World Leader

For over 60 years, the Foster® brand of products have been leading the way with its mastic, coating, sealant and adhesive products for the industrial, commercial and residential construction markets. Foster introduced the first EPA-registered antimicrobial coating, and still the only, for use in HVAC systems in 1992 and has continued to manufacture and sell water-based coatings, disinfectants and accessory products for mold remediation and prevention to the indoor air quality market. Our reputation has been built on the best technical expertise driving the best technology for superior performing products.

When tested against rigorous American Standards Testing Method (ASTM) D-5590, Foster products exhibit a "0" growth rate (see next page for more information). This means Foster products have proven performance and superior efficacy that truly work!

As a leader in the IAQ industry, the Foster brand product line includes:

- EPA-Registered Antimicrobial Products
- Mold Resistant Products
- Disinfectant/Sanitizer
- Accessory Products

For additional information, please visit [www.fosterproducts.com](http://www.fosterproducts.com).



# EPA-Registered Antimicrobial Products



Our customers come first, and our ability to meet their needs is the key to our success.

Foster® products are “Globally Specified, Proven, and Preferred” by IAQ professionals around the world. Specifically, our antimicrobial coatings are ideal for use in buildings and locations where mold already exists, or may potentially exist. These products have been successfully used in the field as the number one mold resistant coatings since 1992. Both of our EPA-Registered mold resistant coatings (Foster® 40-20™ and Foster® 40-30™) are the only coatings registered for use both in HVAC systems and on walls/ceilings.

## Solutions that Work!

The cost of remediating a mold-infested building can be staggering, especially when it may be repeated due to mold growth on an inferior coating. When applied to lined and unlined HVAC systems, walls, sub floors, and studs, Foster EPA-Registered fungicidal coatings provide long-term protection by preventing the growth and spread of odor causing bacteria and mold on the coating surface.

The samples at the right show standard untreated house paint (above) vs. Foster coating (below). The Foster 40-20 coating is free of mold!



*Mold covers the control sample completely*



*Mold growth is inhibited on the Foster® 40-20™ coating*

## Foster® Coatings Proven Effective 15 Years and Running . . .

Regardless of the job, Foster 40-20 offers the highest level of resistance to mold growth on its surface while protecting the substrate from deterioration. It is the first and only EPA-registered coating for application in HVAC duct work, as well as on walls, ceilings, pipes or wherever effective controls are essential. Foster 40-20 provides a flexible, tough film that remains clean while retarding fiber release and further erosion of the duct insulation. Over the past 15 years, Foster 40-20 has been extensively specified and used in numerous mold remediation projects. In one study, when used in the duct system of a prominent maximum security prison, Foster 40-20 has remained fully effective since 1992.

**Visit [www.fosterproducts.com](http://www.fosterproducts.com) for the full case study, and the use of Foster 40-20 in other remediation situations.**

## EPA-REGISTERED PRODUCTS

There are 3 antimicrobial products registered with the EPA: Foster® 40-20™ coating, Foster® 40-30™ coating, and Foster® 40-80™ disinfectant. These products have all gone through rigorous independent testing, required by the EPA. Both the Applicator and End User can be assured of:

### Low Toxicity

These products have been fully tested for toxicity and labeled with the lowest possible toxicity warning of “caution.”

### Accurate Claims

Fact based—there are no misleading claims to the consumers.

### Testing

These products have been tested by an independent lab for both efficacy and toxicity.

### Consistency

The formulation of EPA-Registered products is consistent with the original formula registered with the EPA.

# EPA-Registered Antimicrobial Products

All Foster® Indoor Air Quality products are water-based. Additional information and specifications can be found on the MSDS sheets and Product Data Sheets, available at [www.fosterproducts.com](http://www.fosterproducts.com).

Product Number/ General Description	Color	Substrate	Coverage	Dry Time	Application Method	Spray Tips
<b>Foster® Fungicidal Protective Coatings</b>						
<b>40-20™</b> Fungicidal Protective Coating <ul style="list-style-type: none"> <li>Industry leading antimicrobial coating</li> <li>Prevents the re-growth and spread of odor causing bacteria and mold on its surface.</li> <li>Provides a tough, elastic, water resistant coating</li> <li>Prevents air erosion and fiber release when applied to fibrous duct liner insulation.</li> </ul>	White	<ul style="list-style-type: none"> <li>Walls</li> <li>Ceilings</li> <li>Pipes</li> <li>Interior &amp; Exterior HVAC duct systems</li> </ul>	80 ft <sup>2</sup> /gal. (2.0 m <sup>2</sup> /L)	Set to touch: 4 hours Dry through: 16 hours	<ul style="list-style-type: none"> <li>Airless Sprayer</li> <li>Brush or Roller</li> </ul>	Tip Size*: 0.023 to 0.025", 8" to 10" fan width
<b>40-30™</b> Fungicidal Protective Coating <ul style="list-style-type: none"> <li>Prevents the re-growth and spread of odor causing bacteria and mold on its surface.</li> <li>Prevents air erosion and fiber release when applied to fibrous duct liner insulation.</li> </ul>	Black	<ul style="list-style-type: none"> <li>Fiberglass duct liners</li> <li>Duct board insulation</li> <li>Galvanized surfaces</li> </ul>	Galvanized Metal: 133 ft <sup>2</sup> /gal. (3.3 m <sup>2</sup> /L) New Duct Liner: 100 ft <sup>2</sup> /gal. (2.5 m <sup>2</sup> /L) Old Eroded Duct Liner: 67 ft <sup>2</sup> /gal. (1.6 m <sup>2</sup> /L)	Set to touch: 6 hours Dry through: 24 hours	<ul style="list-style-type: none"> <li>Airless Sprayer</li> <li>Brush or Roller</li> </ul>	Tip Size*: 0.019 to 0.025", 8" to 10" fan width
<b>Foster® Disinfectant/Sanitizer</b>						
<b>40-80™</b> Disinfectant/Sanitizer** <ul style="list-style-type: none"> <li>Use as a disinfectant, sanitizer, cleaner, fungicide, deodorizer, virucide and germicide.</li> <li>Kills a large variety of microbes within minutes.</li> <li>Contains surfactants to help clean and remove residue.</li> <li>Designed for use in water damage restoration situations.</li> </ul>	Clear	<ul style="list-style-type: none"> <li>All hard, non-porous surfaces</li> <li>Sanitizes porous and semi-porous materials</li> </ul>	Depends on application method and surface. Apply sufficient quantity to insure the surface remains wet continuously for at least ten (10) minutes.	Dry thoroughly before applying top coating	<ul style="list-style-type: none"> <li>Garden sprayer, spray bottle, cloth, mop or sponge</li> </ul>	Airless sprayers are NOT recommended.  Coarse spray only.

## Guide to Primer Use

Surface	Required Primer	Coating
Wood (structural studs, OSB, plywood)	None	All
Metal (galvanized, foil)	40-26 (recommended)	All
Drywall (unpainted)	None	All
Concrete, brick, plaster, masonry cement block (unpainted)	40-22 or 40-26	All
Painted surfaces (flat finish)	None	All
Painted surfaces (gloss finish)	40-26 or sanding	All
Wood (smooth, sanded, hardwoods)	40-26	All
Ductliner, duct board	None	40-20 or 40-30

## Airless Spray Equipment Guidelines

Foster Mold Resistant Coatings can be applied with most manufacturers commercial grade electric airless sprayers. Sprayers with the following minimum specifications are suggested:

Operating Pressure (psi):	3000
Motor Size (hp)	3/8
Volume (gpm):	0.45
Hose (inches i.d.):	1/4" up to 50', 5/16" over 50'
Spray Tips*:	Refer to Product Information Chart.

\* Tip sizes as small 0.017" may be used, however, application will be slower and may require multiple passes to achieve recommended coverage rate. Spray equipment manufacturers specifications should be reviewed for maximum tip size acceptable for the sprayer being used.

\*\* Not for use on the interior on HVAC systems. Refer to product label for use directions.



# Mold Resistant Products

## Resisting Mold in the Toughest Environments

Foster® brand coatings provide the highest level of performance even in the harshest conditions. Foster Mold Resistant Coatings specialize in resisting long-term mold growth on their surface. In addition to coatings, our accessory products improve the adhesion and aesthetic appeal when used.

## ASTM D-5590 Testing Provides Evidence

We demonstrate the efficacy of our mold resistant products with extensive ASTM D-5590 Testing. ASTM D-5590 is specifically designed to test paints and coatings in the most severe environment possible for promotion of fungal growth. This makes it an excellent method for evaluation of a mold resistant coating's performance under the harshest conditions.

## Foster® Brand Products Superior Performance and Highest Standards

Our products are constantly monitored for high quality through our ISO 9001 certification. This high level plant quality certification assures consistent, high quality Foster brand products. In addition, we test independently through a leading commercial IAQ laboratory (Aerotech Laboratories, Inc.) to maintain our position of leadership.

### ASTM D-5590 Test Method

ASTM D-5590 was purposefully developed to test paints and coatings in the "worst-case conditions" possible for promotion of mold, mildew, fungus and algae growth. This method is the best for evaluating a mold resistant coating's performance under ideal mold growth situations.

Mold requires three elements for growth: high humidity, proper temperatures and a food source. ASTM D-5590 provides these elements in an optimal environment for growth. To insure continual exposure, the sample is surrounded with active, continually re-generating mold spores, truly testing the product's resistance to growth. These conditions represent a worst-case scenario in a real world application where there is active mold spore generation on an adjacent substrate to the coated material at a temperature and humidity highly conducive to mold growth.

Other commonly cited tests do not provide this high standard of testing combining all three elements, and consequently do not reflect the product's performance under the most relentless mold growth conditions.

### WHAT CAUSES MOLD TO GROW?

Mold and mildew are naturally occurring, ever-present organisms found throughout indoor and outdoor environments. The organisms will grow with the right combination of moisture, temperatures and food sources. Indoor mold flourishes in dark, damp, warm environments and can grow in places not easily visible. Whenever moisture combines with a food source, mold and mildew can start to grow and spread within 24 to 48 hours - and will grow exponentially given the right conditions. Many building construction materials are excellent food sources for mold and mildew.

The key to mold prevention is moisture control.

- Keep the indoor humidity level low - if possible below 60 percent (ideally between 30 and 50 percent) relative humidity.
- Ensure rooms are properly ventilated and consistently cleaned.
- Ascertain there are no water leaks or areas of excessive water or moisture accumulation.
- Prevent condensation - reduce the potential for condensation by adding insulation.

If mold contamination does occur, addressing the source of water intrusion is a key factor in solving the problem. Once the source of water intrusion is fixed, remediation may need to be handled by a professional, depending on the type of mold growth and the size of mold problem. If a professional service provider is needed, make sure he/she has experience cleaning up mold.

# Mold Resistant Products

All Foster® Indoor Air Quality products are water-based. Additional information and specifications can be found on the MSDS Sheets and Product Data Sheets, available at [www.fosterproducts.com](http://www.fosterproducts.com).

Product Number/ General Description	Color	Substrate	Coverage	Dry Time	Application Method	Spray Tips
<b>Foster® Mold Resistant Coatings and Sealants</b>						
<b>40-10™</b> Duct Liner Adhesive Coating • Seals and reinforces the surface of new and aged duct liner. • Prevents air erosion and fiber release. • Resists mold, fungus, and discoloration from mildew and mold stains on its surface.	White	• Fibrous duct liner • Unfaced duct board insulation	80 to 200 ft <sup>2</sup> /gal. (2.0 to 4.9 m <sup>2</sup> /L)	Set to touch: 6 hours Dry through: 24 hours	• Airless Sprayer • Brush or Roller	Tip Size: 0.019 to 0.025", 8" to 10" fan width
<b>40-11™</b> Eclipse™ Coating • Matches the original surface color of most duct liner insulations. • Seals and reinforces the surface of new and aged duct liner. • Prevents air erosion and fiber release resists mold, fungus and discoloration.	Black	• Fibrous duct liner • Duct board insulation	50 to 150 ft <sup>2</sup> /gal. (1.2 to 3.7 m <sup>2</sup> /L)	Set to touch: 6 hours Dry through: 24 hours	• Airless Sprayer • Brush or Roller	Tip Size: 0.019 to 0.025", 8" to 10" fan width
<b>40-23™</b> Insulation Sealer • Penetrates deeply into existing HVAC duct liner insulations, forming a damage resistant surface that reduces particle release. • Resists fungus and mold growth on its surface.	White	• Fibrous duct liner • Duct board insulation	50 to 150 ft <sup>2</sup> /gal. (1.2 to 3.7 m <sup>2</sup> /L)	Dry through: 2-4 hours at ambient	• Airless Sprayer • Brush or Roller	Tip Size: 0.019 to 0.025", 8" to 10" fan width
<b>40-50™</b> Mold Resistant Coating • Formulated with EPA-registered antimicrobial agents which provide protection against odor causing bacteria, mildew and mold growth on the product surface. • For use in areas prone to the growth of mold.	White	• Wall cavities, floor joists, attic spaces • Wood and metal studs, drywall, OSB, furring strips, masonry	300 ft <sup>2</sup> /gal. (7.4 m <sup>2</sup> /L)	Dry through: 1-2 hours at ambient	• Airless Sprayer • Brush or Roller	Tip Size: 0.015 to 0.017", 8" to 10" fan width
<b>40-51™</b> Mold Resistant Coating • Provides a clear finish leaving the original surface visible after application. • Specially formulated with EPA-registered antimicrobial agents for long-term protection from mold growth on its surface.	Clear	• Wall cavities, floor joists, attic spaces • Wood and metal studs, drywall, OSB, furring strips, masonry	Wood: 250 to 450 ft <sup>2</sup> /gal. (6.1 to 11.0 m <sup>2</sup> /L) Non-Porous Surfaces: 500 to 600 ft <sup>2</sup> /gal. (12.3 to 14.7 m <sup>2</sup> /L)	Dry through: 1 hour at ambient	• Airless Sprayer • Brush or Roller	Tip Size: 0.015 to 0.017", 8" to 10" fan width
<b>40-55™</b> Clear Defense™ Mold Resistant Coating • Specifically designed to protect and maintain the aesthetics of residential, commercial and industrial surfaces. • Formulated with EPA-registered additives, providing long-term resistance to the growth of mold, mildew, fungus and algae on its surface without blushing or yellowing	Clear	• Masonry, stucco, concrete and clay roofing tiles • Asphalt shingles, vinyl, aluminum, painted wood	Non-Porous Surfaces: 300 ft <sup>2</sup> /gal. (7.4 m <sup>2</sup> /L) Porous will require more product.	Dry through: 40 minutes- 1 hour	• Airless Sprayer • Brush or Roller	Tip Size: 0.015 to 0.017", 8" to 10" fan width
<b>Foster® Accessory Products</b>						
<b>40-16™</b> Block Filler • Abrasion-resistant fill coat eliminates pores, depressions and crevices in a one-coat application.	Off White	• Unpainted masonry surfaces	40 to 70 ft <sup>2</sup> /gal. (1.0 to 1.7 m <sup>2</sup> /L)	Set to touch: 1-2 hours Dry through: 15 hours	• Airless Sprayer • Brush or Roller	30:1 Air Pump with Inductor Plate. Tip Size: 0.021 to 0.025", 8" to 10" fan width
<b>40-22™</b> Masonry Sealer & Primer • Penetrates into the surface, strengthening it and sealing it to help eliminate blistering and peeling	Off White (dries clear)	• Unpainted block plaster • Cement surface	50 to 200 ft <sup>2</sup> /gal. (1.2 to 4.9 m <sup>2</sup> /L)	Dry through: 2-4 hours at ambient	• Airless Sprayer • Garden Sprayer or Spray Bottle	Tip Size: 0.017 to 0.021", 8" to 10" fan width
<b>40-26™</b> Water-based Primer • Bonds and protects against stains and corrosion. • Increases the bondability of retrofit systems.	Off White (dries translucent)	• Metal, and rusty metal • Concrete • Masonry • Wood	Metal: 200 to 300 ft <sup>2</sup> /gal. (4.9 to 7.4 m <sup>2</sup> /L) for corrosion protection; 400 to 600 ft <sup>2</sup> /gal. (9.8 to 14.7 m <sup>2</sup> /L) for improving adhesion.	Dry through: 1 hour at ambient	• Airless Sprayer • Brush or Roller	Tip Size: 0.017 to 0.021", 8" to 10" fan width

\*See Airless Spray Equipment Guidelines for information.

**The Foster® Clean, Kill & Coat™ three-phased approach for mold remediation eliminates the chance for the return of mold.**

**Step 1. Clean**

- Remove any water-damaged and mold contaminated materials that cannot be salvaged such as carpeting, furniture and wallboard.
- Thoroughly dry all materials to be left in place by exposing them to circulated dry air.
- Follow with a thorough cleaning and removal of all contaminants.

**Step 2. Kill**

- Sanitize the affected porous and non-porous surfaces with the ready-to-use, EPA-registered Foster® 40-80™ Disinfectant/Sanitizer to clean, deodorize and remove any residual microbial contaminants.
- The surface should remain wet for 10 minutes.

**Step 3. Coat**

- Coat the surface with the appropriate Foster brand protective coating evenly and thoroughly. We recommend an airless sprayer for an even application.
- Ventilate well for proper drying. Continue ventilation using appropriate fans, negative air machines or air scrubbers until odors are reduced to acceptable levels.
- Always ensure the use of PPE (Proper Protective Equipment).



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# Foster ™

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Foster<sup>®</sup>, 40-10<sup>®</sup>, 40-11<sup>®</sup>, 40-16<sup>®</sup>, 40-20<sup>®</sup>, 40-22<sup>®</sup>, 40-23<sup>®</sup>, 40-26<sup>®</sup>, 40-30<sup>®</sup>, 40-50<sup>®</sup>, 40-51<sup>®</sup>, 40-55<sup>®</sup>, 40-80<sup>®</sup>, Clear Defense<sup>™</sup> and Eclipse<sup>™</sup> are trademarks of Specialty Construction Brands, Inc.

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Form #IAQBROCH0307

# VARIABLE FREQUENCY DRIVE

## OPERATION AND APPLICATION OF VARIABLE FREQUENCY DRIVE (VFD) TECHNOLOGY



**Carrier Corporation  
Syracuse, New York**

**October 2005**

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## INTRODUCTION

Variable frequency drive (VFD) usage has increased dramatically in HVAC applications. The VFDs are now commonly applied to air handlers, pumps, chillers and tower fans. A better understanding of VFDs will lead to improved application and selection of both equipment and HVAC systems. This paper is intended to provide a basic understanding of common VFD terms, VFD operation, and VFD benefits. In addition this paper will discuss some basic application guidelines regarding harmonic distortion with respect to industry standards.

### Common VFD Terms

There are several terms used to describe devices that control speed. While the acronyms are often used interchangeably, the terms have different meanings.

#### *Variable Frequency Drive (VFD)*

This device uses power electronics to vary the frequency of input power to the motor, thereby controlling motor speed.

#### *Variable Speed Drive (VSD)*

This more generic term applies to devices that control the speed of either the motor or the equipment driven by the motor (fan, pump, compressor, etc.). This device can be either electronic or mechanical.

#### *Adjustable Speed Drive (ASD)*

Again, a more generic term applying to both mechanical and electrical means of controlling speed.

This paper will discuss only VFDs.

## VFD OPERATION

Understanding the basic principles behind VFD operation requires understanding the three basic sections of the VFD: the rectifier, dc bus, and inverter.

The voltage on an alternating current (ac) power supply rises and falls in the pattern of a sine wave (see Figure 1). When the voltage is positive, current flows in one direction; when the voltage is negative, the current flows in the opposite direction. This type of power system enables large amounts of energy to be efficiently transmitted over great distances.

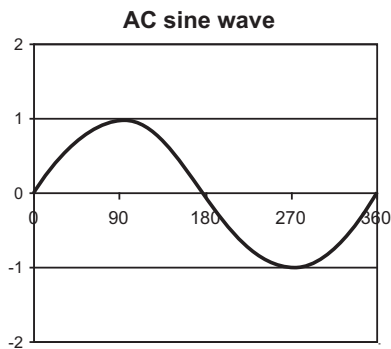


Fig. 1. AC sine wave

The **rectifier** in a VFD is used to convert incoming ac power into direct current (dc) power. One rectifier will allow power to pass through only when the voltage is positive. A second rectifier will allow power to pass through only when the voltage is negative. Two rectifiers are required for each phase of power. Since most large power supplies are three phase, there will be a minimum of 6 rectifiers used (see Figure 2). Appropriately, the term “**6 pulse**” is used to describe a drive with 6 rectifiers. A VFD may have multiple rectifier sections, with 6 rectifiers per section, enabling a VFD to be “**12 pulse**,” “**18 pulse**,” or “**24 pulse**.” The benefit of “*multi-pulse*” VFDs will be described later in the harmonics section.

Rectifiers may utilize diodes, silicon controlled rectifiers (SCR), or transistors to rectify power. Diodes are the simplest device and allow power to flow any time voltage is of the proper polarity. Silicon controlled rectifiers include a gate circuit that enables a

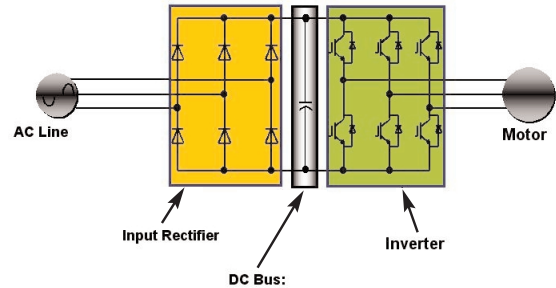


Fig. 2. VFD basics: Existing technology

microprocessor to control when the power may begin to flow, making this type of rectifier useful for solid-state starters as well. Transistors include a gate circuit that enables a microprocessor to open or close at any time, making the transistor the most useful device of the three. A VFD using transistors in the rectifier section is said to have an “**active front end**.”

After the power flows through the rectifiers it is stored on a **dc bus**. The dc bus contains capacitors to accept power from the rectifier, store it, and later deliver that power through the inverter section. The dc bus may also contain inductors, dc links, chokes, or similar items that add inductance, thereby smoothing the incoming power supply to the dc bus. The final section of the VFD is referred to as an “**inverter**.” The inverter contains transistors that deliver power to the motor. The “**Insulated Gate Bipolar Transistor**” (IGBT) is a common choice in modern VFDs. The IGBT can switch on and off several thousand times per second and precisely control the power delivered to the motor. The IGBT uses a method named “**pulse width modulation**” (PWM) to simulate a current sine wave at the desired frequency to the motor.

Motor speed (rpm) is dependent upon frequency. Varying the frequency output of the VFD controls motor speed:

$$\text{Speed (rpm)} = \text{frequency (hertz)} \times 120 / \text{no. of poles}$$

### Example:

2-pole motor at different frequencies

$$3600 \text{ rpm} = 60 \text{ hertz} \times 120 / 2 = 3600 \text{ rpm}$$

$$3000 \text{ rpm} = 50 \text{ hertz} \times 120 / 2 = 3000 \text{ rpm}$$

$$2400 \text{ rpm} = 40 \text{ hertz} \times 120 / 2 = 2400 \text{ rpm}$$

## BENEFITS OF VFD

As VFD usage in HVAC applications has increased, fans, pumps, air handlers, and chillers can benefit from speed control. Variable frequency drives provide the following advantages:

- energy savings
- low motor starting current
- reduction of thermal and mechanical stresses on motors and belts during starts
- simple installation
- high power factor
- lower KVA

Understanding the basis for these benefits will allow engineers and operators to apply VFDs with confidence and achieve the greatest operational savings.

### VFD Capacity Control Saves Energy

Most applications do not require a constant flow of a fluid. Equipment is sized for a peak load that may account for only 1% of the hours of operation. The remaining hours of operation need only a fraction of the flow. Traditionally, devices that throttle output have been employed to reduce the flow. However, when compared with speed control, these methods are significantly less efficient.

#### Mechanical Capacity Control

Throttling valves, vanes, or dampers may be employed to control capacity of a constant speed pump or fan. These devices increase the head, thereby forcing the fan or pump to ride the curve to a point where it produces less flow (Figure 3). Power consumption is the product of head and flow. Throttling the output increases head, but reduces flow, and provides some energy savings.

**Table A**  
Effects of Changes in Fan Speed

Flow changes linearly with speed	$\text{Flow Rate}_2 = \text{Flow Rate}_1 \times (\text{RPM}_2/\text{RPM}_1)$
Head varies as the speed squared	$\text{Lift}_2 = \text{Lift}_1 \times (\text{RPM}_2/\text{RPM}_1)^2$
Power varies as the speed cubed	$\text{Power}_2 = \text{Power}_1 \times (\text{RPM}_2/\text{RPM}_1)^3$

<sup>1</sup> Assumes fluid is fresh water, (specific gravity = 1).

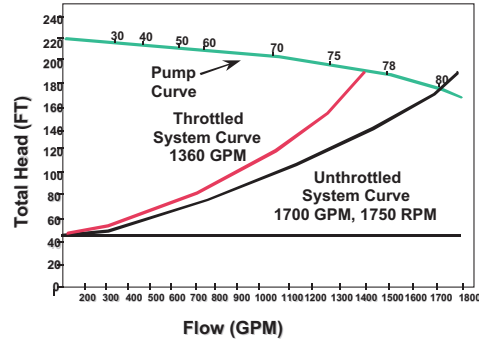


Fig. 3. Mechanical capacity control

Pump power  $\sim$  flow x head / 3960<sup>1</sup>

#### Variable Speed Capacity Control

For centrifugal pumps, fans and compressors, the ideal fan (affinity) laws describe how speed affects flow, head and power consumption (Table A).

When using speed to reduce capacity, both the head and flow are reduced, maximizing the energy savings. A comparison of mechanical and speed control for capacity reduction (Figure 4) shows that variable speed is the most efficient means of capacity control.

### Efficiency

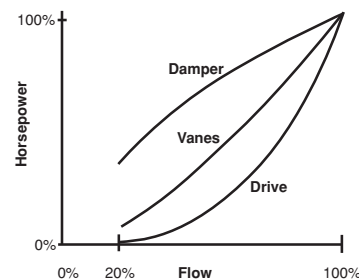


Fig. 4. Comparison of mechanical capacity control and speed capacity control



## Low Inrush Motor Starting

Motor manufacturers face difficult design choices. Designs optimized for low starting current often sacrifice efficiency, power factor, size, and cost. With these considerations in mind, it is common for AC induction motors to draw 6 to 8 times their full load amps when they are started across the line. When large amounts of current are drawn on the transformers, a voltage drop can occur<sup>2</sup>, adversely affecting other equipment on the same electrical system. Some voltage sensitive applications may even trip off line. For this reason, many engineers specify a means of reducing the starting current of large AC induction motors.

### *Soft Starters*

Wye-delta, part winding, autotransformer, and solid-state starters are often used to reduce inrush during motor starting. All of these starters deliver power to the motor at a constant frequency and therefore must limit the current by controlling the voltage supplied to the motor. Wye delta, part winding, and autotransformer starters use special electrical connections to reduce the voltage. Solid-state starters use SCRs to reduce the voltage. The amount of voltage reduction possible is limited because the motor needs enough voltage to generate torque to accelerate. With maximum allowable voltage reduction, the motor will still draw two to four times the full load amps (FLA) during starting. Additionally, rapid acceleration associated with wye-delta starters can wear belts and other power transmission components.

### *VFDs as Starters*

A VFD is the ideal soft starter since it provides the lowest inrush of any starter type as shown in Table B. Unlike all other types of starters, the VFD can use frequency to limit the power and current delivered to the motor. The VFD will start the motor by delivering power at a low frequency. At this low frequency, the motor does not require a high level of current. The VFD incrementally increases the frequency and motor speed until the desired speed is

met. The current level of the motor never exceeds the full load amp rating of the motor at any time during its start or operation. In addition to the benefit of low starting current, motor designs can now be optimized for high efficiency.

**Table B**  
**Comparison of Starter Types Based on Inrush**

Starter Type	Starting Current (% of FLA)
VFD	100%
Wye-Delta Starter	200-275%
Solid State Soft Starter	200%
Autotransformer Starter	400-500%
Part Winding Starter	400-500%
Across the Line Starter	600-800%

## Easy Installation

Many pieces of equipment are factory shipped with unit mounted VFDs that arrive pre-programmed and factory wired. Motor leads, control power for auxiliaries, and communication lines are all factory wired. The VFD cooling lines on unit-mounted chiller VFDs are also factory installed. The installing contractor needs only to connect the line power supply to the VFD.

## High Power Factor

Power converted to motion, heat, sound, etc. is called real power and is measured in kilowatts (kW). Power that charges capacitors or builds magnetic fields is called reactive power and is measured in Kilovolts Amps Reactive (kVAR). The vector sum of the kW and the kVAR is the Total Power (energy) and is measured in Kilovolt Amperes (KVA) (Figure 5). Power factor is the ratio of kW/KVA.

Motors draw reactive current to support their magnetic fields in order to cause rotation. Excessive reactive current is undesirable because it creates additional resistance losses and can require the use of larger transformers and wires. In addition, utilities often penalize owners for low power factor. Decreasing reactive current will increase power factor.

<sup>2</sup> This is a significant consideration for "soft" systems such as backup generators.

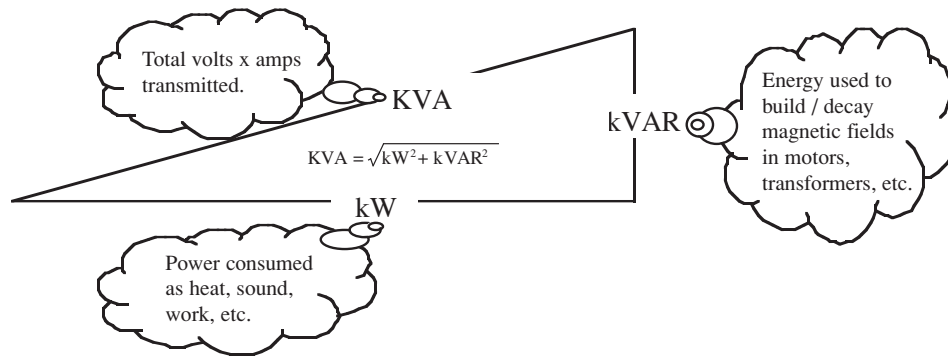


Fig. 5. Measuring power

Typical AC motors may have a full load power factor ranging from 0.84 to 0.88. As the motor load is reduced, the power factor becomes lower. Utilities may require site power factor values ranging from 0.85 to 0.95 and impose penalties to enforce this requirement. Power factor correction capacitors can be added to reduce the reactive current measured upstream of the capacitors and increase the measured power factor. To prevent damage to the motor, power factor correction capacitors should not exceed the motor manufacturer’s recommendations. In most cases, this results in maximum corrected values of 0.90 to 0.95.

The VFDs include capacitors in the DC Bus that perform the same function and maintain high power factor on the line side of the VFD. This eliminates the need to add power factor correction equipment to the motor or use expensive capacitor banks. In addition, VFDs often result in higher line side power factor values than constant speed motors equipped with correction capacitors.

### Low Full Load KVA

Total Power (KVA) is often the limiting factor in the amount of energy that can be transmitted through an electrical device or system. If the KVA required by equipment can be reduced during periods of peak demand, it will help alleviate voltage sags, brown outs, and power outages. The unit efficiency and power factor are equally weighted when calculating KVA. Therefore, equipment that may be equal or worse in efficiency, but higher in power factor has significantly lower KVA (Table C).

In this example, equipment with a higher power factor uses 15% less KVA while performing the same

job. This can lower electrical system cost on new projects and free up KVA capacity on existing systems.

**Table C**  
Power Factors and Energy Usage

Input kW	Power Factor	Amps	Volts	KVA
350.4	.84	502	Nominal 480	417
350.4	.99	426	Nominal 480	354

NOTE: KVA = Volts x Amps x 1.732

Backup generators are typically sized to closely match the load. Lowering KVA can reduce the size of the generator required. When VFDs with active front ends are used, the generator size can approach an ideal 1:1 ratio of kW/KVA because the power factor is near unity (1.0) and the harmonics produced by the VFD are extremely low.

Lower KVA also benefits utilities. When the power factor is higher, more power (kW) can be delivered through the same transmission equipment.

### HARMONIC DISTORTION AND INDUSTRY STANDARDS

A discussion of the benefits of VFDs often leads to a question regarding harmonics. When evaluating VFDs, it is important to understand how harmonics are provided and the circumstances under which harmonics are harmful.

#### Harmonic Definition

In the United States, three-phase AC power typically operates at 60 hertz (60 cycles in one second). This is called the **fundamental frequency**.

A **harmonic** is any current form at an integral multiple of the fundamental frequency. For example, for 60-hertz power supplies, harmonics would be at 120 hertz (2 x fundamental), 180 hertz, 240 hertz, 300 hertz, etc.

### What Causes Harmonics?

VFDs draw current from the line only when the line voltage is greater than the DC Bus voltage inside the drive. This occurs only near the peaks of the sine wave. As a result, all of the current is drawn in short intervals (i.e., at higher frequencies). Variation in VFD design affects the harmonics produced. For example, VFDs equipped with DC link inductors produce different levels of harmonics than similar VFDs without DC link inductors. The VFDs with active front ends utilizing transistors in the rectifier section have much lower harmonic levels than VFDs using diodes or silicon controlled rectifiers (SCRs).

Electronic lighting ballasts, uninterruptible power supplies, computers, office equipment, ozone generators, and other high intensity lighting are also sources of harmonics.

### Rocks and Ponds

Obviously, the magnitude of the contributing wave forms has an effect on the shape of the resultant wave form. If the fundamental wave form (60 Hz) has a very large magnitude (5,000 amps) and the harmonic wave forms are very low (10 amps), then the resultant wave form will not be very distorted and total harmonic distortion will be low. If the harmonic wave form current value is high relative to the fundamental, the effect will be more dramatic.

In nature, we see this effect with waves in water. If you continually throw baseball size rocks into the ocean, you would not expect to change the shape of the waves crashing onto the beach. However, if you threw those same size rocks into a bathtub, you would definitely observe the effects. It is similar with electrical waves and harmonics.

---

<sup>3</sup> The neutral wire sizing should account for 3<sup>rd</sup> order harmonic current.

When you calculate harmonics you are calculating the effect of the harmonics on the fundamental current wave form in a particular distribution system. There are several programs that can perform estimated calculations. All of them take into account the amount of linear loads (loads drawing power through out the entire sine wave) relative to non-linear loads (loads drawing power during only a fraction of the sine wave). The higher the ratio of linear loads to non-linear loads, the less effect the non-linear loads will have on the current wave form.

### Are Harmonics Harmful?

Harmonics that are multiples of 2 are not harmful because they cancel out. The same is true for 3<sup>rd</sup> order harmonics (3<sup>rd</sup>, 6<sup>th</sup>, 9<sup>th</sup> etc.). Because the power supply is 3 phase, the third order harmonics cancel each other out in each phase <sup>3</sup>. This leaves only the 5<sup>th</sup>, 7<sup>th</sup>, 11<sup>th</sup>, 13<sup>th</sup> etc. to discuss. The magnitude of the harmonics produced by a VFD is greatest for the lower order harmonics (5<sup>th</sup>, 7<sup>th</sup> and 11<sup>th</sup>) and drops quickly as you move into the higher order harmonics (13<sup>th</sup> and greater).

Harmonics can cause some disturbances in electrical systems. Higher order harmonics can interfere with sensitive electronics and communications systems, while lower order harmonics can cause overheating of motors, transformers, and conductors. The opportunity for harmonics to be harmful, however, is dependent upon the electrical system in which they are present and whether or not any harmonic sensitive equipment is located on that same electrical system.

### Understanding IEEE 519

IEEE (Institute of Electrical and Electronics Engineers) created a recommendation for evaluating harmonics. The IEEE-519 standard provides recommended limits for harmonic distortion measured at the point of common coupling. The point of common coupling is the point at which the customer's electrical system is connected to the utility.

Although the IEEE standard recommends limits for both voltage distortion and current distortion, specifications that reference a 5% harmonic limitation are generally referring to current distortion. In most cases, if the current distortion falls within IEEE-519 requirements, the voltage distortion will also be acceptable.

Determining compliance with IEEE-519 requires an actual measurement of the system during operation. Predicting compliance in advance often requires a system study that accounts for all electrical equipment (transformers, wires, motors, VFDs, etc.) in the system.

### Introduction To Harmonic Terms

#### *Total Harmonic Voltage Distortion - THD (V)*

As harmonic currents flow through devices with reactance or resistance, a voltage drop is developed. These harmonic voltages cause voltage distortion of the fundamental voltage wave form. The total magnitude of the voltage distortion is the THD (V). The IEEE-519 standard recommends less than 5% THD (V) at the point of common coupling for general systems 69 kV and under.

#### *Total Harmonic Current Distortion - THD (I)*

This value (sometimes written as THID) represents the total harmonic current distortion of the wave form at the particular moment when the measurement is taken. It is the ratio of the harmonic current to the fundamental (non-harmonic) current measured for that load point. Note that the denominator used in this ratio changes with load.

#### *Total Demand Distortion - TDD*

Total Demand Distortion (TDD) is the ratio of the measured harmonic current to the full load fundamental current. The full load fundamental current is the total amount of non-harmonic current consumed by all of the loads on the system when the system is at peak demand. The denominator used in this ratio does not change with load. Although TDD can be measured at any operating point (full or part load), the worst case TDD will occur at full load. If the full load TDD is acceptable, then the TDD measured at

part load values will also be acceptable. To use our rock analogy, the full load fundamental current is the size of our pond and the harmonic current is the size of our rock. (See Table D.)

**Table D**  
**Comparison of TDD and THD(I)**

Fundamental Current (rms)	Harmonic Current (rms )	THD(I)	TDD
1000	50	5%	5%
800	43.8	5.4%	4.4%
600	36.3	6.1%	3.6%
400	29.7	7.4%	3.0%
200	20.0	10%	2%
100	13.4	13.4%	1.3%

TDD - Total Demand Distortion

THD(I) - Total Harmonic Current Distortion

#### *Short Circuit Ratio*

Short circuit ratio is the short circuit current value of the electrical system divided by its maximum load current. Standard IEEE-519 Table 10.3 defines different acceptance levels of TDD depending on the short circuit ratio in the system. Systems with small short circuit ratios have lower TDD requirements than systems with larger short circuit ratios. This difference accounts for the fact that electrical systems with low short circuit ratios tend to have high impedances, creating larger voltage distortion for equivalent harmonic current levels. (See Table E.)

### Mitigating Harmonics

Some utilities now impose penalties for introducing harmonics onto their grid, providing incentives for owners to reduce harmonics. In addition, reducing harmonic levels can prevent potential damage to sensitive equipment residing on the same system. There are many approaches to mitigating harmonics. Several commonly used methods are discussed here.

#### *Line Reactors*

Line reactors add reactance and impedance to the circuit. Reactance and impedance act to lower the current magnitude of harmonics in the system and thereby lower the TDD. Line reactors also protect

**Table E**  
**Representation of IEEE Table 10.3**

$I_{SC}/I_L$	<11	11<7<17	17<h<23	23<h<35	35<h	TDD
<20	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

LEGEND: h = harmonic number

$I_{SC}$  = maximum short-circuit current at PCC

$I_L$  = maximum demand load current (fundamental) at PCC

devices from large current spikes with short rise times. A line reactor placed between the VFD and the motor would help protect the motor from current spikes. A line reactor placed between the supply and VFD would help protect the supply from current spikes. Line reactors are typically only used between the VFD and the motor when a freestanding VFD is mounted more than fifty feet from the motor. This is done to protect the motor windings from voltage peaks with extremely quick rise times.

#### *Passive Filters*

Trap Filters are devices that include an electrical circuit consisting of inductors, reactors, and capacitors designed to provide a low impedance path to ground at the targeted frequency. Since current will travel through the lowest impedance path, this prevents the harmonic current at the targeted frequency from propagating through the system. Filters can be mounted inside the drive cabinet or as free standing devices. Trap filters are typically quoted to meet a THD(I) value that would result in compliance with IEEE-519 requirements if the system were otherwise already in compliance.

#### *Active Filters*

Some devices measure harmonic currents and quickly create opposite current harmonic wave forms. The two wave forms then cancel out, preventing harmonic currents from being observed upstream of the filter. These types of filters generally have excellent harmonic mitigation characteristics. Active filters may reduce generator size requirements.

#### *VFDs Using Active Front End Technology (AFE)*

Some VFDs are manufactured with IGBT rectifiers. The unique attributes of IGBTs allow the VFD to actively control the power input, thereby lowering harmonics, increasing power factor and making the VFD far more tolerant of supply side disturbances. The AFE VFDs have ultra low harmonics capable of meeting IEEE-519 standards without any external filters or line reactors. This significantly reduces installation cost and generator size requirements. An AFE drive provides the best way to take advantage of VFD benefits and minimize harmonics.

#### *Multi-Pulse VFDs (Cancellation)*

There are a minimum of six rectifiers for a three-phase AC VFD. There can be more, however. Manufacturers offer 12, 18, 24, and 30 pulse drives. A standard six-pulse drive has six rectifiers, a 12-pulse drive has two sets of six rectifiers, an 18-pulse drive has three sets of six rectifiers and so on. If the power connected to each set of rectifiers is phase shifted, then some of the harmonics produced by one set of rectifiers will be opposite in polarity from the harmonics produced by the other set of rectifiers. The two wave forms effectively cancel each other out. In order to use phase shifting, a special transformer with multiple secondary windings must be used. For example, with a 12-pulse VFD, a Delta/Delta-Wye transformer with each of the secondary phases shifted by 30 degrees would be used.

## CONCLUSION

- **VFDs provide the most energy efficient means of capacity control.**
- **VFDs have the lowest starting current of any starter type.**
- **VFDs reduce thermal and mechanical stresses on motors and belts.**
- **VFD installation is as simple as connecting the power supply to the VFD.**
- **VFDs with AFE technology can meet even the most stringent harmonic standards and reduce backup generator sizing.**
- **VFDs provide high power factor, eliminating the need for external power factor correction capacitors.**
- **VFDs provide lower KVA, helping alleviate voltage sags and power outages.**

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TD INDUSTRIES

**BOEING LED LIGHTING RETROFIT**

PREPARED BY:  
SUMMIT ELECTRIC  
3551 W. ROYAL LN  
IRVING, TEXAS 75063






Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Type	Manufacturer/Brand	Catalog Number
2X4	ABL-Lithonia Lighting	2BLT4R 30L ADP GZ10 LP840
2X2	ABL-Lithonia Lighting	2BLT2R 20L ADP GZ10 LP840
4'	ABL-Lithonia Lighting	CDS L48 MVOLT DM 40K 80CRI WH
6"	ABL-Lithonia Lighting	LDN6RV 40/15 LR6AR LSS MVOLT GZ10
2X2	ABL-Lithonia Lighting	2BLT2R 20L ADP GZ10 LP840
UC	ABL-Lithonia Lighting	UCEL 36IN 30K 90CRI SWR WH M6
2X4P	ABL-Lithonia Lighting	2GTL4R 40L EZ1 LP840
8'	ABL-Lithonia Lighting	CDS L96 MVOLT DM 40K 80CRI WH
8"	ABL-Lithonia Lighting	LDN8RV 40/20 LR8AR LSS MVOLT GZ10

	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT4R 30L ADP GZ10 LP840	Type <b>2X4</b>
	Submitted By ALA LLC	Notes	



## FEATURES & SPECIFICATIONS

**INTENDED USE** — The BLTR Best-Value Low Profile LED Relight Assembly is a cost effective solution for renovating existing fluorescent troffer and parabolic fixtures while providing upgraded aesthetics and outstanding performance. The BLTR's popular center basket design offers a clean, versatile style, and volumetric distribution. The wide range of lumen packages and control and driver options make the BLTR a great choice for many applications including offices, schools, hospitals, retail spaces and other general lighting applications.

**CONSTRUCTION** — Universal end brackets are constructed of 22-gauge powder-painted steel and are secured to the host fixture with provided TEKS™ screws. The driver and light engine assembly is integrated in the BLTR door assembly making this an extremely "simple", time saving, relight solution. The door frame and reflector assembly is a made of cold-rolled steel and is painted after fabrication with a matte white powder paint for improved aesthetics and increased light diffusion. Diffuser trim rings provide an attractive mounting for integral sensors as well as adding a decorative element to the luminaire aesthetics.

LED boards and driver are accessible from below.

**OPTICS** — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces — rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

**ELECTRICAL** — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 80% LED lumen maintenance at 60,000 hours (L80/60,000).

**Non-Configurable BLTR Relight:** Generic 0-10 volt dimming driver. Dims to 10%

**Configurable BLTR Relight:** available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Step-level dimming option allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

Optional integrated nLight® controls make each luminaire addressable — allowing it to digitally communicate with other nLight enabled controls such as dimmers, switches, nLight AIR RIO, RES7 occupancy sensors and photo controls. Simply connect all the nLight enabled control devices and the BLTR Relight assembly using standard Cat-5 cabling. Unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting. Driver disconnect provided where required to comply with US and Canadian codes.

**SENSOR— Integrated sensor (individual control):** Sensor Switch MSD7ADXC ((Passive infrared (PIR)) or MSDPDTADXC ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

**Integrated Sensor (nLight Wired Networking):** This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

**Integrated Smart Sensor (nLight Air Wireless Platform):** The rES7 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CLAIRITY™, which allows for simple sensor adjustment. See page 4 for more details on the Integrated Smart Sensor.

**INSTALLATION** — After existing fluorescent components are removed from the host housing, universal end brackets are secured in place with TEKS™ screws. The BLTR's integrated driver and light engine door assembly can then be hinged to the universal end brackets and will hang in place for completion of assembly plug-in wiring. Rotate the doorframe assembly closed and pivot the cam latches to secure the doorframe in place. LED boards include plug-in connectors for easy replacement or servicing. Suitable for damp location installations. Damp location not available with sensor versions.

**LISTINGS** — UL/cUL Listed for use in fluorescent light fixtures. Installing Relight assemblies per instructions will not impact existing fixture UL listing. Tested to LM80 standards. DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at [www.designlights.org/OPL](http://www.designlights.org/OPL) to confirm which versions are qualified.

**WARRANTY** — 5-year limited warranty. Complete warranty terms located at: [www.acuitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**NOTE:** Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

## 2BLTR Series LED Relight

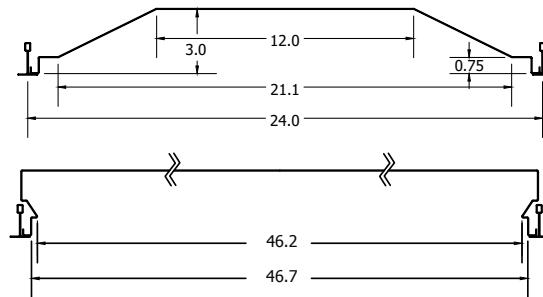
# 2BLTR

2' x 4' Relight  
LED



### Fit Compatibility:

The 2BLT4R Relight Assembly was designed to upgrade recessed 2x4 fixtures, including most parabolic and lensed troffers from all major manufacturers. Dimensional requirements are below, but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



SIDE SECTION


### A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.


- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a shaded background\*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a shaded background\*

To learn more about A+, visit [www.acuitybrands.com/aplus](http://www.acuitybrands.com/aplus).

\*See ordering tree for details

	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT4R 30L ADP GZ10 LP840	Type <b>2X4</b>
	Submitted By ALA LLC	Notes	

## 2BLT4R Volumetric Recessed Lighting 2'x4' Relight

 A+ Capable options indicated by this color background.

**ORDERING INFORMATION** Lead times will vary depending on options selected. Consult with your sales representative. **Example:** 2BLT4R 40L ADP EZ1 LP840

2BLT4R Series	Air Function	Lumens <sup>2</sup>	Diffuser	Voltage	Driver	Color temperature
2BLT4R 2X4 BLTR	(blank) Static (white end brackets for troffers)	<b>Standard efficiency (&gt;100 LPW)</b> 30L 3000 40L 4000 48L 4800 60L 6000 72L 7200	ADP Curved, linear prisms ADSM Curved, smooth SDP Square, linear prisms SDSM Square, smooth <b>Diffusers w/ trim rings</b> ADPT Curved, linear prisms ADSMT Curved, smooth SDPT Square, linear prisms SDSMT Square, smooth	(blank) MVOLT 120 120V 277 277V 347 347V <sup>4,5</sup>	EZ1 eldoLED dims to 1% (0-10 volt dimming) GZ1 Dims to 1% (0-10V dimming) <sup>6</sup> GZ10 Dims to 10% (0-10V dimming) <sup>6</sup> SLD Step-level dimming <sup>7</sup> EOHN On/Off (non-dim)	LP830 82CRI, 3000 K LP835 82CRI, 3500 K LP840 82CRI, 4000 K LP850 82CRI, 5000 K LP930 90CRI, 3000K LP935 90CRI, 3500K LP940 90CRI, 4000K LP950 90CRI, 5000K

nLight Interface	Control <sup>10</sup>	Individual Control	Standby Mode	Options
<b>nLight Wired</b>	<b>nLight Wired</b>	MSD7ADXC PIR integral occupancy sensor with automatic dimming control photocell <sup>12</sup> MSDPD7ADXC PDT integral occupancy sensor with automatic dimming control photocell <sup>12</sup>	NOC Occupancy sensor disabled <sup>13</sup>	EL7L 700 lumen battery pack (Noncompliant with CA T20) <sup>15</sup> EL14L 1400 lumen battery pack (Noncompliant with CA T20) <sup>15</sup> E10WLCP EM Self-Diagnostic battery pack, 10W Constant Power, (Certified in CA Title 20 MAEDBS) <sup>15</sup> BGTD Bodine Generator Transfer Device <sup>14</sup> GLR Fast-blowing fuse <sup>15</sup> GMF Slow-blowing fuse <sup>15</sup> NPLT Narrow pallet FAO Field adjustable output <sup>17</sup> USPOM US Point of Manufacture JP16 Job Pack
(blank) no nLight <sup>®</sup> interface	(blank) No sensor control			
N80 nLight with 80% lumen management	NES7 nLight™ nES 7 PIR integral occupancy sensor <sup>11</sup>			
N80EMG nLight with 80% lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7 nLight™ nES PDT 7 dual technology integral occupancy control <sup>11</sup>			
N100 nLight without lumen management	NES7ADXC nLight™ nES 7 ADCX PIR integral occupancy sensor with automatic dimming photocell <sup>11</sup>			
N100EMG nLight without lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7ADXC nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell <sup>11</sup>			
<b>nLight Wireless</b>	<b>nLight Wireless</b>			
(blank) no nLight <sup>®</sup> interface	RES7 nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control			
NLTAIR2 nLight AIR Generation 2 enabled <sup>9</sup>	RES7PDT nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell for Zone Control			
	RIO nLight AIR radio module without sensor			

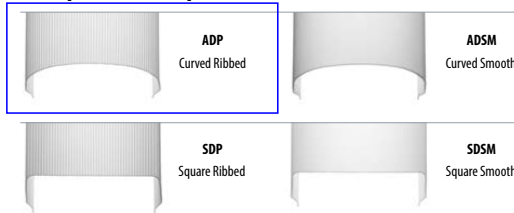
Non-Configurable BLT								
Stock	Catalog Description*	UPC	Lumens	Wattage	LPW	Color Temperature	Voltage	Pallet Qty
Stock	2BLT4R 40L ADP LP835	190887550948	3960	32	124	3500K/80 CRI	120-277	26
	2BLT4R 40L ADP LP840	190887550979	4023	32	127	4000K/80 CRI	120-277	26
	2BLT4R 46L ADP LP835	190887550993	4520	38	118	3500K/82 CRI	120-277	26
	2BLT4R 46L ADP LP840	190887551006	4620	38	121	4000K/82 CRI	120-277	26

\* Dims to 10%

**Notes**

- Consult factory for airflow data.
- Approximate lumen output.
- All versions may not achieve 130+ LPW. Refer to photometry on [www.acuitybrands.com](http://www.acuitybrands.com).
- Not available with EL7L or EL14L battery packs.
- 347 not available with SLD.
- GZ1, GZ10 not available with any Control or Sensor options.
- Not available with N80, N80EMG, N100, N100EMG, NLTAIR2, or occupancy control.
- nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
- Must order with RES7, RES7PDT, or RIO sensor. Only available with EZ1 driver. Not available with 72L, 72LHE, or 85LHE options.
- Must specify diffuser with trim rings. See sensor options on page 4.
- Requires N80, N80EMG, N100, or N100EMG.
- Only available with EZ1 driver option. 0-10v dimming wires not accessible via access plate. Not available with Controls options.
- Can only be ordered in conjunction with EZ1, NLTAIR2, RES7/RES7PDT. Occupancy sensor disabled at factory but can be re-enabled upon commissioning.
- Requires BSE labeling. Consult factory for options.
- Must specify voltage, 120 or 277 with GLR & GMF fusing.
- GZ1 driver not available with battery pack when specifying 72LHE or 85LHE lumen options. Must use EZ1 driver.
- Consult factory.

**Multiple Diffuser Options**



Accessories next page



2BLTR-2X4

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Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
2BLT4R 30L ADP GZ10 LP840

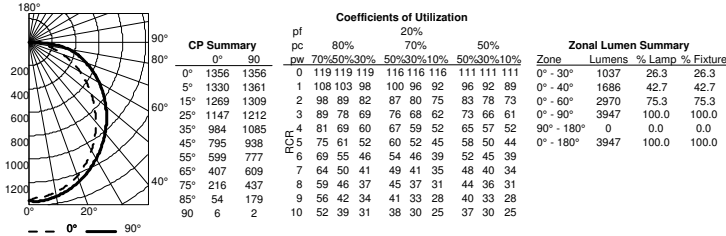
Type  
**2X4**

Notes

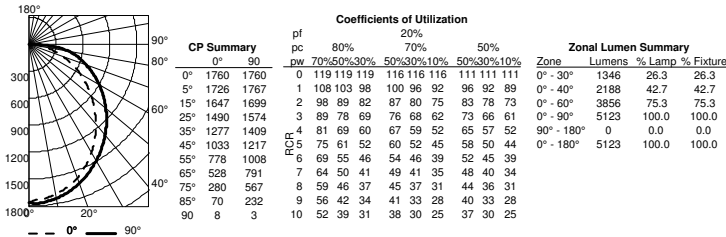
## 2BLT4R Volumetric Recessed Lighting 2'x4' Relight

### PHOTOMETRICS

**2BLT4R 40L ADP LP835**, 3945 delivered lumens, test no. LTL28918P417, tested in accordance to IESNA LM-79



**2BLT4R 48L ADP LP835**, 5121 delivered lumens, test no. LTL28918P421, tested in accordance to IESNA LM-79



Performance Data			
Lumen Package	Lumens	Input Watts	LPW
30L ADP LP830	2832	23	125
30L ADP LP835	2932	23	129
30L ADP LP840	2979	23	131
30L ADP LP850	3064	23	135
40L ADP LP830	3825	31	123
40L ADP LP835	3960	31	128
40L ADP LP840	4023	31	130
40L ADP LP850	4138	31	134
48L ADP LP830	4743	38	126
48L ADP LP835	4910	38	130
48L ADP LP840	4989	38	133
48L ADP LP850	5131	38	136
60L ADP LP830	5753	46	124
60L ADP LP835	5956	46	128
60L ADP LP840	6051	46	130
60L ADP LP850	6224	46	134
72L ADP LP830	6928	59	118
72L ADP LP835	7173	59	122
72L ADP LP840	7287	59	124
72L ADP LP850	7495	59	128

HE Performance Data			
Lumen Package	Lumens	Input Watts	LPW
30LHE ADP LP830	2971	22	133
30LHE ADP LP835	3076	22	138
30LHE ADP LP840	3125	22	140
30LHE ADP LP850	3214	22	144
40LHE ADP LP830	3906	29	134
40LHE ADP LP835	4044	29	138
40LHE ADP LP840	4109	29	141
40LHE ADP LP850	4226	29	145
48LHE ADP LP830	4561	34	135
48LHE ADP LP835	4722	34	139
48LHE ADP LP840	4798	34	142
48LHE ADP LP850	4935	34	146
60LHE ADP LP830	5636	43	132
60LHE ADP LP835	5835	43	137
60LHE ADP LP840	5928	43	139
60LHE ADP LP850	6098	43	143
72LHE ADP LP830	6836	52	132
72LHE ADP LP835	7078	52	137
72LHE ADP LP840	7191	52	139
72LHE ADP LP850	7396	52	143
85LHE ADP LP830	7801	61	127
85LHE ADP LP835	8076	61	131
85LHE ADP LP840	8205	61	133
85LHE ADP LP850	8440	61	137




2BLTR-2X4

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	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT2R 20L ADP GZ10 LP840	Type <b>2X2</b>
	Submitted By ALA LLC	Notes	



## FEATURES & SPECIFICATIONS

**INTENDED USE** — The BLTR Best-Value Low Profile LED Relight Assembly is a cost effective solution for renovating existing fluorescent troffer and parabolic fixtures while providing upgraded aesthetics and outstanding performance. The BLTR's popular center basket design offers a clean, versatile style, and volumetric distribution. The wide range of lumen packages and control and driver options make the BLTR a great choice for many applications including offices, schools, hospitals, retail spaces and other general lighting applications.

**CONSTRUCTION** — Universal end brackets are constructed of 22-gauge powder-painted steel and are secured to the host fixture with provided TEKS™ screws. The driver and light engine assembly is integrated in the BLTR door assembly making this an extremely "simple", time saving, relight solution. The door frame and reflector assembly is made of cold-rolled steel and is painted after fabrication with a matte white powder paint for improved aesthetics and increased light diffusion. Diffusers are extruded from impact modified acrylic for increased durability. Diffuser trim rings provide an attractive mounting for integral sensors as well as adding a decorative element to the luminaire aesthetics. LED boards and driver are accessible from below.

**OPTICS** — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces — rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

**ELECTRICAL** — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 70% LED lumen maintenance at 60,000 hours (L70/60,000).

**Non-Configurable BLTR Relight:** Generic 0-10 volt dimming driver. Dims to 10%

**Configurable BLTR Relight:** available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Step-level dimming option allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

Optional integrated nLight™ controls make each luminaire addressable – allowing it to digitally communicate with other nLight enabled controls such as dimmers, switches, nLight AIR RIO, RES7 occupancy sensors, and photo controls. Simply connect all the nLight enabled control devices and the BLTR Relight assembly using standard Cat-5 cabling. Unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting. Driver disconnect provided where required to comply with US and Canadian codes.

**SENSOR — Integrated sensor (individual control):** Sensor Switch MSD7ADXC ((Passive infrared (PIR) or MSDPDT7ADXC ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

**Integrated Sensor (nLight Wired Networking):** This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

**Integrated Smart Sensor (nLight Air Wireless Platform):** The rE57 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CLARITY™, which allows for simple sensor adjustment. See page 4 for more details on the Integrated Smart Sensor.

**INSTALLATION** — After existing fluorescent components are removed from the host housing, universal end brackets are secured in place with TEKS™ screws. The BLTR's integrated driver and light engine door assembly can then be hinged to the universal end brackets and will hang in place for completion of assembly plug-in wiring. Rotate the doorframe assembly closed and pivot the cam latches to secure the doorframe in place. LED boards include plug-in connectors for easy replacement or servicing. Suitable for damp location installations. Damp location not available with sensor versions.

**LISTINGS** — UL/cUL Listed for use in fluorescent light fixtures. Installing Relight assemblies per instructions will not impact existing fixture UL listing. Tested to LM80 standards. DesignLights Consortium™ (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

**WARRANTY** — 5-year limited warranty. Complete warranty terms located at: [www.acuitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**NOTE:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

## 2BLTR Series LED Relight

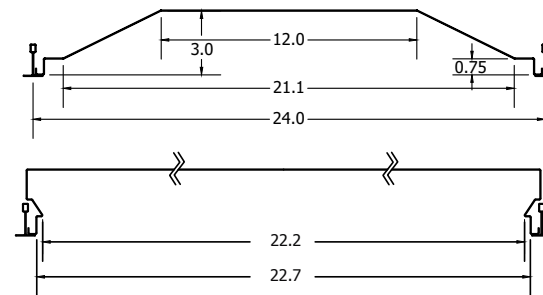
# 2BLTR

2' x 2' Relight  
LED



### Fit Compatibility:

The 2BLTR Relight Assembly was designed to upgrade recessed 2x2 fixtures, including most parabolic and lensed troffers from all major manufacturers. Dimensional requirements are below, but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



SIDE SECTION


### A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a **shaded background\***
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a **shaded background\***

To learn more about A+, visit [www.acuitybrands.com/aplus](http://www.acuitybrands.com/aplus).

\*See ordering tree for details

	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT2R 20L ADP GZ10 LP840	Type <b>2X2</b>
	Submitted By ALA LLC	Notes	

## 2BLT2R Volumetric Recessed Lighting 2'x2' Relight

A+ Capable options indicated by this color background.

**ORDERING INFORMATION** Lead times will vary depending on options selected. Consult with your sales representative. **Example:** 2BLT2R 33L ADP EZ1 LP835

2BLT2R	Air Function	Lumens <sup>2</sup>	Diffuser	Voltage	Driver	Color temperature
2BLT2R 2X2 BLTR	(blank) Static (white end brackets for troffers)	<b>Standard efficiency (&gt;100 LPW)</b> 20L 2000 33L 3300 40L 4000	ADP Curved, linear prisms ADSM Curved, smooth SDP Square, linear prisms SDSM Square, smooth <b>Diffusers w/ trim rings</b> ADPT Curved, linear prisms ADSMT Curved, smooth SDPT Square, linear prisms SDSMT Square, smooth	(blank) MVOLT 120 120V 277 277V 347 347V <sup>4,5</sup>	EZ1 eldoLED dims to 1% (0-10 volt dimming) GZ1 Dims to 1% (0-10V dimming) <sup>6</sup> GZ10 Dims to 10% (0-10V dimming) <sup>6</sup> SLD Step-level dimming <sup>7</sup> EOHN On/Off (non-dim)	LP830 82CRI, 3000 K LP835 82CRI, 3500 K LP840 82CRI, 4000 K LP850 82CRI, 5000 K LP930 90CRI, 3000K LP935 90CRI, 3500K LP940 90CRI, 4000K LP950 90CRI, 5000K
	A Air supply/return or to maintain black reveal (black end brackets for parabolics) <sup>3</sup>	20LHE 2000 33LHE 3300 40LHE 4000				
	F Flanged Brackets					

nLight Interface	Control <sup>10</sup>	Individual Control	Standby Mode	Options
<b>nLight Wired</b>	<b>nLight Wired</b>	<b>MSD7ADCX</b>	NOC Occupancy sensor disabled <sup>13</sup>	EL7L 700 lumen battery pack EL14L 1400 lumen battery pack E10WLCP EM Self-Diagnostic battery pack, 10W Constant Power, Certified in CA Title 20 MAEDBS
(blank) no nLight <sup>®</sup> interface	(blank) No sensor control	PIR integral occupancy sensor with automatic dimming control photocell <sup>12</sup>		BGTD Bodine Generator Transfer Device <sup>14</sup>
N80 nLight with 80% lumen management	NES7 nLight™ nES7 PIR integral occupancy sensor <sup>11</sup>	PDT integral occupancy sensor with automatic dimming control photocell <sup>12</sup>		GLR Fast-blowing fuse <sup>15</sup>
N80EMG nLight with 80% lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7 nLight™ nES PDT 7 dual technology integral occupancy control <sup>11</sup>			GMF Slow-blowing fuse <sup>15</sup>
N100 nLight without lumen management	NES7ADCX nLight™ nES7 ADCX PIR integral occupancy sensor with automatic dimming photocell <sup>11</sup>			NPLT Narrow pallet
N100EMG nLight without lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7ADCX nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell <sup>11</sup>			FAO Field adjustable output <sup>16</sup>
<b>nLight Wireless</b>	<b>nLight Wireless</b>			USPOM US Point of Manufacture
(blank) no nLight <sup>®</sup> interface	RES7 nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control			JP32 Job Pack
NLTAIR2 nLight AIR Generation 2 enabled <sup>9</sup>	RES7PDT nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell for Zone Control			
	RIO nLight AIR radio module without sensor			

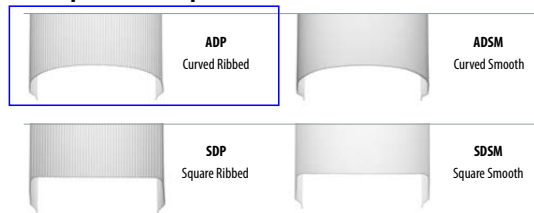
Non-Configurable BLT								
Stock	Catalog Description*	UPC	Lumens	Wattage	LPW	Color Temperature	Voltage	Pallet Qty
Stock	2BLT2R 33L ADP LP835	190887550900	3313	27	124	3500K/80 CRI	120-277	52
	2BLT2R 33L ADP LP840	190887550931	3404	27	127	4000K/80 CRI	120-277	52

\* Dims to 10%

### Notes

- Consult factory for airflow data.
- Approximate lumen output.
- All versions may not achieve 130+ LPW. Refer to photometry on [www.acuitybrands.com](http://www.acuitybrands.com).
- Not available with EL7L or EL14L battery packs.
- 347 not available with SLD
- GZ1, GZ10 not available with any Control or Sensor options.
- Not available with N80, N80EMG, N100, N100EMG, NLTAIR2, or occupancy control.
- nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
- Must order with RES7, RES7PDT, or RIO sensor. Only available with EZ1 driver.
- Must specify diffuser with trim rings. See sensor options on page 4.
- Requires N80, N80EMG, N100, or N100EMG.
- Only available with EZ1 driver option. 0-10V dimming wires not accessible via access plate. Not available with Controls options.
- Can only be ordered in conjunction with EZ1, NLTAIR2, RES7/RES7PDT. Occupancy sensor disabled at factory but can be re-enabled upon commissioning.
- Requires BSE labeling. Consult factory for options.
- Must specify voltage, 120 or 277 with GLR & GMF fusing.
- Consult factory.

### Multiple Diffuser Options



Accessories next page



2BLTR-2X2

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Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
2BLT2R 20L ADP GZ10 LP840

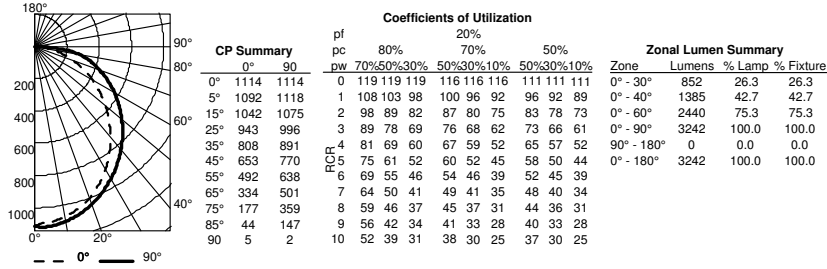
Notes

Type  
**2X2**

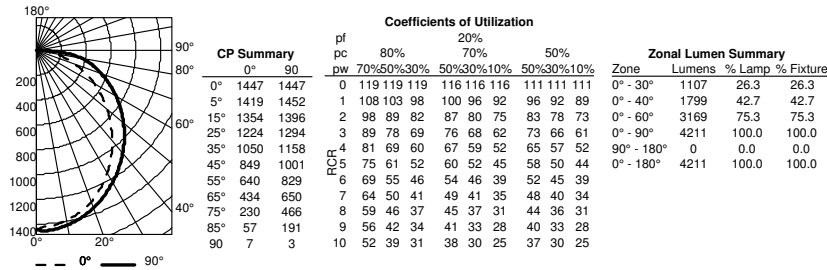
## 2BLT2R Volumetric Recessed Lighting 2'x2' Relight

### PHOTOMETRICS

2BLT2R 33L ADP LP835, 3241 delivered lumens, test no. LTL28918P404, tested in accordance to IESNA LM-79



2BLT2R 40L ADP LP835, 4210 delivered lumens, test no. LTL28918P405, tested in accordance to IESNA LM-79



Performance Data			
Lumen Package	Lumens	Input Watts	LPW
20L ADP LP830	1981	16	127
20L ADP LP835	2051	16	132
20L ADP LP840	2084	16	134
20L ADP LP850	2143	16	138
33L ADP LP830	3237	26	125
33L ADP LP835	3351	26	130
33L ADP LP840	3404	26	132
33L ADP LP850	3502	26	135
40L ADP LP830	3900	31	125
40L ADP LP835	4038	31	130
40L ADP LP840	4102	31	132
40L ADP LP850	4220	31	136

HE Performance Data			
Lumen Package	Lumens	Input Watts	LPW
20LHE ADP LP830	2008	16	129
20LHE ADP LP835	2079	16	134
20LHE ADP LP840	2112	16	136
20LHE ADP LP850	2173	16	140
33LHE ADP LP830	3068	24	128
33LHE ADP LP835	3176	24	133
33LHE ADP LP840	3227	24	135
33LHE ADP LP850	3319	24	139
40LHE ADP LP830	3797	29	129
40LHE ADP LP835	3931	29	133
40LHE ADP LP840	3994	29	135
40LHE ADP LP850	4108	29	139
48LHE ADP LP830	4532	36	126
48LHE ADP LP835	4692	36	130
48LHE ADP LP840	4767	36	132
48LHE ADP LP850	4903	36	136




2BLTR-2X2

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	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number CDS L48 MVOLT DM 40K 80CRI WH	Type <b>4'</b>
	Submitted By ALA LLC	Notes	



Contractor Select™  
**CDS**  
LED Striplight



The light-duty, dimmable, damp-location and DLC® listed CDS LED dual strip lights can easily mount individually to a ceiling, horizontal and vertical wall, or continuous row/daisy chaining. The size and versatility make them suitable for tight spaces and for task lighting, restrooms, under/over cabinet and storage closets.

**FEATURES:**

- Inspired by classic fluorescent strip channels, this LED fixture offers a traditional appearance that incorporates the latest technology
- Quick and simple to install with the snap-lock tool-less channel cover
- Features a low-glare diffuse lens for enhanced aesthetic




Catalog Number	UPC	Description	Lumens	Wattage	Voltage	Color Temperature	Color Rendering Index	Pallet Quantity
CDS L48 MVOLT DM 35K 80CRI WH	00190887837056	4' MVOLT LED Strip Light	4146	38	MVOLT (120-277)	3500K	80CRI	204
CDS L48 MVOLT DM 40K 80CRI WH	00191723192032	4' MVOLT LED Strip Light	4211	38	MVOLT (120-277)	4000K	80CRI	204
CDS L48 MVOLT DM 50K 80CRI WH	00191723036480	4' MVOLT LED Strip Light	4366	38	MVOLT (120-277)	5000K	80CRI	102
CDS L96 MVOLT DM 35K 80CRI WH	00191723192049	8' MVOLT LED Strip Light	8872	77	MVOLT (120-277)	3500K	80CRI	90
CDS L96 MVOLT DM 40K 80CRI WH	00191723192049	8' MVOLT LED Strip Light	9010	77	MVOLT (120-277)	4000K	80CRI	90
CDS L96 MVOLT DM 50K 80CRI WH	00191723036497	8' MVOLT LED Strip Light	9342	77	MVOLT (120-277)	5000K	80CRI	90

More configurations are available. [Click here](#) or visit [www.acuitybrands.com](http://www.acuitybrands.com) and search for CDS LED.

**Accessories:** Order as separate catalog number.

HC36	Chain hanger and jack chain, 36" (pair)
ZACVH	Aircraft cable 10' (one pair)
SQ	Swivel-stem hanger (specify length in 2" increments)
MNLK JBOXCVR M12	Junction box cover with hardware, white



	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number CDS L48 MVOLT DM 40K 80CRI WH</p> <p>Notes</p>	<p>Type <b>4'</b></p>
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## Specifications

### INTENDED USE:

Inspired by classic fluorescent strip channels, this LED fixture offers a traditional appearance that incorporates the latest technology. Available in several color temperatures, lumen packages and lengths. Ideal for use in commercial, retail, office, warehouse and display applications. **Certain airborne contaminants can diminish integrity of acrylic.** [Click here for Acrylic Environmental Compatibility table for suitable uses.](#)

Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. [Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.](#)

### CONSTRUCTION:

Compact-design channel and cover are formed from code-gauge, cold-rolled steel.

Easy to install row aligner bracket included for continuous row mounting.

Finish: High-gloss, baked white enamel (standard).

### OPTICS:

LEDs provide 80+ color rendering index (CRI) at 3500 K, 4000 K and 5000 K. Diffuse polycarbonate lens provides smooth, linear illumination which is designed to resemble the classic look of traditional fluorescent lamps. Lumen output exceeds 1,000 lumens per foot. Luminaire should be installed in applications where ambient temperatures do not exceed maximum ambient operating temperature of 95°F (35°C).

### ELECTRICAL:

Luminaire Surge Protection Level: Designed to withstand up to 2.5kV/0.75kA per ANSI C82.77-5-2015. For applications requiring higher level of protection additional surge protection must be provided.

### INSTALLATION:

Fixture may be surface or suspension mounted with appropriate mounting options (see accessories).

Aligner locks in place for easy continuous row mounting.

### LISTINGS:

CSA certified to US and Canadian safety standards and listed suitable for damp locations. Minimum starting temperature at -40°F (-40°C). Maximum ambient operating temperature of 95°F (35°C).

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

### WARRANTY:

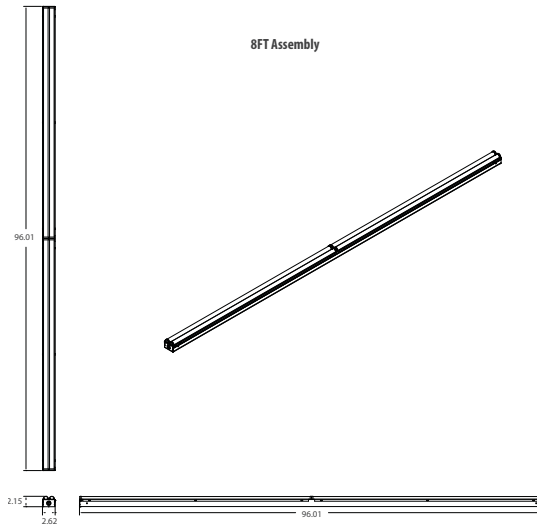
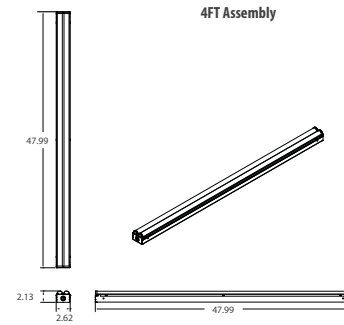
5-year limited warranty. Complete warranty terms located at:


[www.acuitybrands.com/resources/terms-and-conditions](http://www.acuitybrands.com/resources/terms-and-conditions)

**Note:** Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

## Dimensions

All dimensions are inches (centimeters) unless otherwise indicated.



	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number LDN6RV 40/15 LR6AR LSS MVOLT GZ10	Type <b>6"</b>
	Submitted By ALA LLC	Notes SUBMITTING 6" DOWNLIGHT, VERIFY DIAMETER	



## FEATURES & SPECIFICATIONS

**INTENDED USE** — LED downlight for retrofit of installed commercial mounting frames with incandescent, compact fluorescent (CFL), or high intensity discharge (HID) sources.

**CONSTRUCTION** — Innovative housing design that simultaneously retains and centers the fixture in the existing mounting frame.

See table for compatible ceiling opening and thickness ranges.

All installation can be performed from the room side without removing the existing mounting frame.

**OPTICS** — LEDs are binned to a 3-step SDCM; 80 CRI minimum. 90 CRI optional.

LED light source concealed with diffusing optical lens.

General illumination lighting with 1.0 S/MH and 55° cutoff to source and source image.

Multiple lumen packages to replace the installed base of CFL or HID sources with energy savings of 50%-80%. See Lumen Equivalency Chart.

Self-flanged anodized reflectors in specular, semi-specular, or matte diffuse finishes. Also available in white and black painted reflectors.

**ELECTRICAL** — Multi-volt (120-277V, 50/60Hz) eldoLED 0-10V dimming drivers available in 10% or 1% minimum dimming levels. Line voltage dimming driver available.

70% lumen maintenance at 60,000 hours.

**LISTINGS** — Certified to US and Canadian safety standards. Wet location standard (covered ceiling). IP55 rated. ENERGY STAR® certified product.

**WARRANTY** — 5-year limited warranty. Complete warranty terms located at:

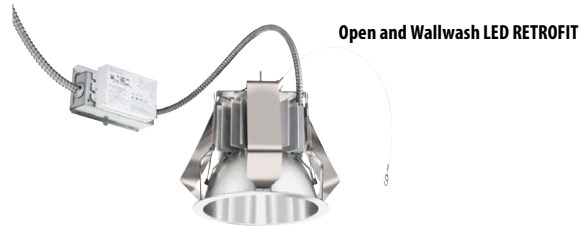
[www.acuitybrands.com/support/customer-support/terms-and-conditions](http://www.acuitybrands.com/support/customer-support/terms-and-conditions)

**Note:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

# LDNRV



A+ Capable options indicated by this color background.

### ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

**Example:** LDN6RV 35/30 LR6AR LSS MVOLT EZ10

Series	Color temperature		Lumens <sup>1</sup>			Aperture/Trim Color						
	27/	2700K	05	500 lumens	40	4000 lumens	LR	Downlight	4	4-5" aperture	AR	Clear
LDN6RV 6" retrofit	30/	3000K	10	1000 lumens	50	5000 lumens	LRW	Wallwash	6	6" aperture	WR <sup>2</sup>	White
LDN7RV 7" retrofit	35/	3500K	15	1500 lumens	60	6000 lumens			7	7" aperture	BR <sup>2</sup>	Black
LDN8RV 8" retrofit	40/	4000K	20	2000 lumens	80	8000 lumens			8	8" aperture		
LDN9RV 9" retrofit			25	2500 lumens	100	10000 lumens			9	9" aperture		
LDN10RV 10" retrofit			30	3000 lumens	120	12000 lumens			10	10" aperture		

Finish	Voltage		Driver	Options			
	MVOLT	Multi-volt		SF <sup>4</sup>	Single Fuse	LH <sup>6</sup>	Lower overall height
LSS Semi-specular	120	120V	GZ10 0-10V driver dims to 10%	TRW <sup>5</sup>	White painted flange	NLTAIR2 <sup>2,8,9</sup>	nLight® Air enabled
LD Matte diffuse	277	277V	EZ10 eldoLED 10% 0-10V	TRBL <sup>5</sup>	Black painted flange	NLTAIRER2 <sup>2,8,9</sup>	nLight® AIR Dimming Pack
LS Specular			EZ1 eldoLED 1% 0-10V				Wireless Controls. Controls fixtures on emergency circuit
			ELV <sup>3</sup> Electronic line voltage / Forward phase / Triac dimming, 120V Only			90CRI	High CRI (90+)

### Accessories: Order as separate catalog number.

PS1055CP FMC	Power Sentry battery pack, T20 compliant, field installable, 10w constant power
EAC ISSM 375	Compact interruptible emergency AC power system
EAC ISSM 125	Compact interruptible emergency AC power system
RK2 SDT 347/120 75VA U	347V step-down transformer mounted in box installed by others up to 5000lm
RK2 SDT 347277120 395VA AD U	347V step down transformer mounted in box installed by others 6000-12,000lm
LDN_RVRGIN	Rough-in frame. Fill in blank with appropriate aperture size (example: LDN6RV RGIN). Refer to pg. 6
nPP16 D EFP <sup>4</sup>	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1).
nPP16 D ER EFP <sup>4</sup>	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1). ER controls fixtures on emergency circuit.
NPS80EZ	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ10).
NPS80EZER	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ1). ER controls fixtures on emergency

### Notes

- Refer to Available Lumen Package Table for lumen range available per aperture size. 8"-10" trims utilize different trims based on lumen package selected. 5000lm and below supplied with low lumen ("LL") trim; 6000lm and above with high lumen ("HL") trim.
- Not available with finishes.
- 5000 lumen max. Must specify 120V.
- Must specify voltage 120V or 277V.
- Available with clear (AR) trim color only.
- Select LH option for lower overall height. Consult table on Page 2 and dimensional drawings.
- Not available with CP, NPS80EZ, NPS80EZER, NPP16D, NPP16DER or N80 options.
- NLTAIR2 and NLTAIRER2 not recommended for metal ceiling installations.
- NLTAIR2 and NLTAIRER2 refer to nLight AIR Max Lumens Table.



Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
LDN6RV 40/15 LR6AR LSS MVOLT GZ10

Notes  
SUBMITTING 6" DOWNLIGHT, VERIFY DIAMETER

Type  
**6"**

## LDNRV

Available Lumen Package Table

Series	500	1000	1500	2000	2500	3000	4000	5000	6000	8000	10000	12000
LDN4RV												
LDN6RV												
LDN7RV												
LDN8RV												
LDN9RV												
LDN10RV												
Approx. LED Wattage	8.5W	13W	20W	23W	30W	35W	44W	55W	68W	98W	117W	146W
Comparable Fluorescent	18W	26W	32W	1/42W 2/26W	2/32W 1/57W	>2/32W	2/42W	2/57W				
Comparable HID					50W	70W			100W	150W	>175W	250W
Comparable Incandescent	65W BR30	120W BR40	150W A21	200W A21		300W BR40						
Comparable Halogen PAR	50W	75W	90W	100W								

Dimensions\*

Series	Standard Height Max Lumens	Standard Height	LH Height Max Lumens	LH Height	Min Ceiling Opening	Ceiling Thickness at Min Opening	Max Ceiling Opening	Ceiling Thickness at Max Opening	Reflector Aperture	Reflector Flange Diameter
LDN4RV	2000LM	7-1/4"	N/A	N/A	4-7/8"	1/2"-1-1/2"	5-1/8"	1/2"-1-1/2"	4-5/8"	5-3/8"
LDN6RV	3000LM	8-1/4"	1500LM	6-1/2"	6"	1/2" - 2"	6-7/8"	1"-2"	5-1/4"	7-3/16"
LDN7RV	5000LM	8-7/8"	N/A	N/A	6-7/8"	1/2" - 2"	7-3/4"	1"-2"	6-1/4"	8-1/16"
LDN8RV	12,000LM	13 11/16"	5000LM	8-5/8" +	7-7/8"	1/2" - 2"	8-3/4"	3/4"-2"	7"	9-3/16"
LDN9RV	12,000LM	13 11/16"	4000LM	9-1/2"	8-7/8"	1/2" - 2"	9-7/8"	3/4"-2"	8-1/4"	11-7/16"
LDN10RV	12,000LM	13 11/16"	4000LM	9-1/2"	9-3/4"	3/4"-2"	10-3/4"	1"-2"	8-1/4"	11-7/16"

\* All dimensions are in inches + LH height 9-7/8" for 5000LM +Max ceiling thickness with NLTAIR2 option is 1.5"

ELV COMPATIBLE DIMMER LIST		
ELV Dimmer List		Light Dimming Range
Mfg.	Model	Min.
Lutron	S-603PG	4%
Leviton	IPI06-1LZ	0%
Leviton	6631-2	3%
Lutron	DVCL-153P	3%
Lutron	DV600P	5%
Lutron	TGCL-153P	5%
Lutron	S600P	2%
Leviton	VPE06	10%
Lutron	DVELV303P	7%
Lutron	SELV300P	7%
Leviton	6683-IW	0%
Leviton	6161	15%

ELV COMPATIBLE DIMMER LIST		
ELV Dimmer List		Light Dimming Range
Mfg.	Model	Min.
Leviton	6633-P	1%
Lutron	TG-600P	11%
Cooper	DLC03P	2%
Lutron	LG600P	5%
Lutron	CT103P	8%
Cooper	SLC03P	1%
Leviton	IPE04	6%
Lutron	MAELV600	12%
Lutron	FAELV500	12%
Lightolier	ZP260QEW	8%
Cooper	DAL06P	0%

NLIGHT AIR MAX LUMENS TABLE		
	Without LH Option	With LH Option
LDN4RV	2000lm	N/A
LDN6RV	3000lm	1500lm
LDN7RV	5000lm	N/A
LDN8RV	5000lm	5000lm
LDN9RV	5000lm	4000lm
LDN10RV	5000lm	4000lm



LDNRV

DOWNLIGHTING: One Lithonia Way Conyers, GA 30012 Phone: 800-705-SERV (7378) www.lithonia.com

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Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
LDN6RV 40/15 LR6AR LSS MVOLT GZ10

Notes  
SUBMITTING 6" DOWNLIGHT, VERIFY DIAMETER

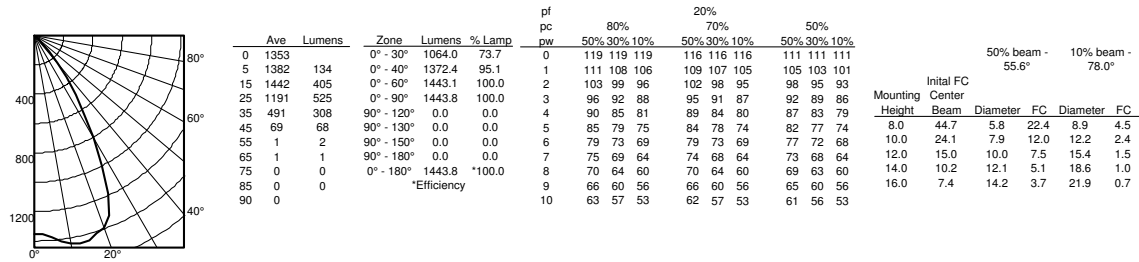
Type  
**6"**

## LDNRV

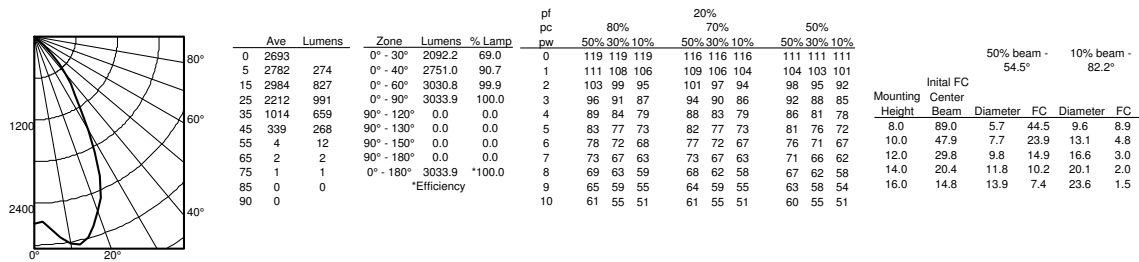
### PHOTOMETRY

Distribution Curve      Distribution Data      Output Data      Coefficient of Utilization      Illuminance Data at 30" Above Floor for a Single Luminaire

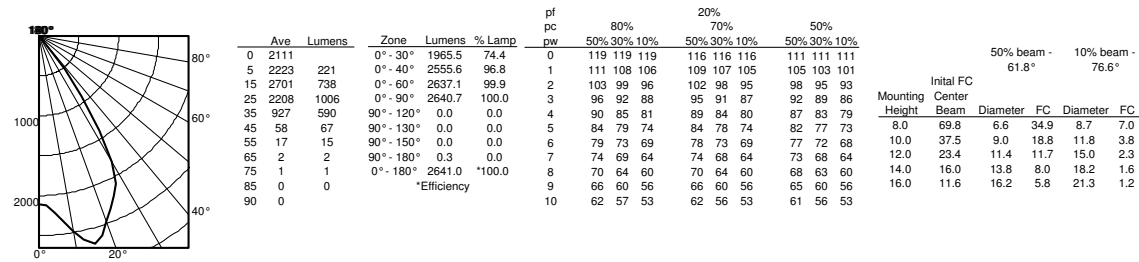
**LDN4RV 35/10 LR4AR LS**, input watts: 10.58, delivered lumens: 1085.2, LM/W=102.57, Spacing criterion at 0=1.04. ISF 30712P544



**LDN7RV 35/15 LR7AR LS**, input watts: 17.52, delivered lumens: 1521.9, LM/W=86.86, Spacing criterion at 0=0.96. ISF 33918P308




**LDN8RV 35/30 LR8AR LS**, input watts: 34.75, delivered lumens: 2641, LM/W=67.36, Spacing criterion at 0=1.18. ISF 192189P104



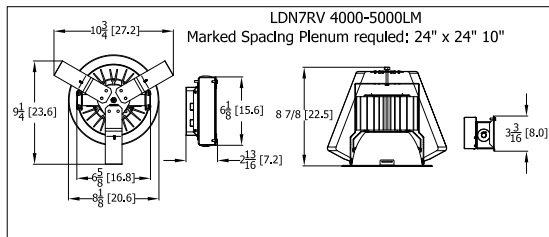
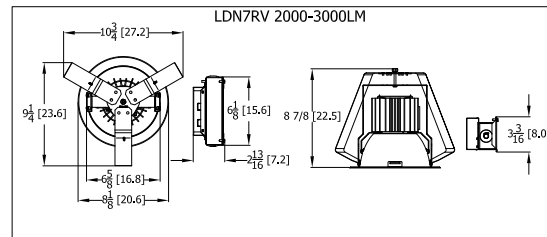
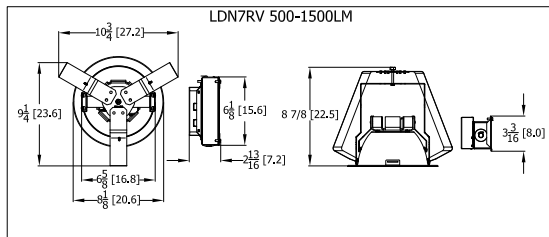
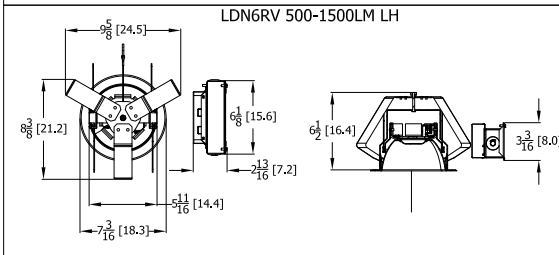
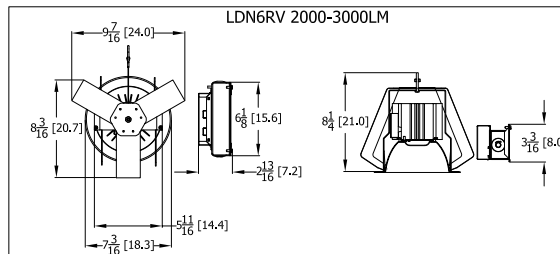
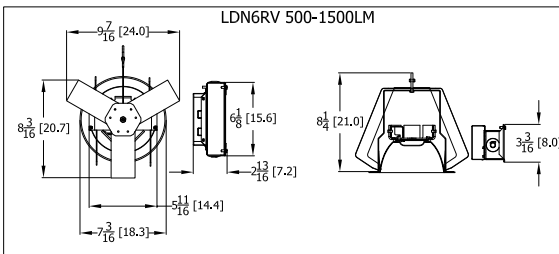
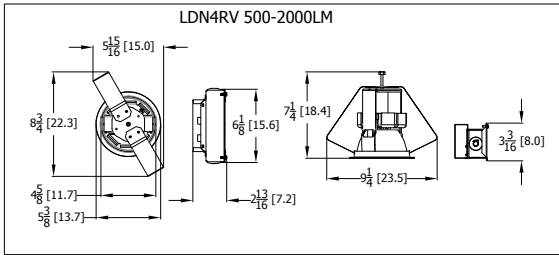
LUMEN OUTPUT MULTIPLIERS - FINISH			
	Clear (AR)	White (WR)	Black (BR)
Specular (LS)	1.0	N/A	N/A
Semi-specular (LSS)	0.950	N/A	N/A
Matte diffuse (LD)	0.85	N/A	N/A
Painted	N/A	0.87	0.73


LUMEN OUTPUT MULTIPLIERS - CCT				
	2700K	3000K	3500K	4000K
80CRI	0.950	0.966	1.000	1.025

	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number LDN6RV 40/15 LR6AR LSS MVOLT GZ10</p> <p>Notes SUBMITTING 6" DOWNLIGHT, VERIFY DIAMETER</p>	<p>Type <b>6"</b></p>
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## LDNRV

### LDN4RV



	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT2R 20L ADP GZ10 LP840	Type <b>2X2</b>
	Submitted By ALA LLC	Notes	



## FEATURES & SPECIFICATIONS

**INTENDED USE** — The BLTR Best-Value Low Profile LED Relight Assembly is a cost effective solution for renovating existing fluorescent troffer and parabolic fixtures while providing upgraded aesthetics and outstanding performance. The BLTR's popular center basket design offers a clean, versatile style, and volumetric distribution. The wide range of lumen packages and control and driver options make the BLTR a great choice for many applications including offices, schools, hospitals, retail spaces and other general lighting applications.

**CONSTRUCTION** — Universal end brackets are constructed of 22-gauge powder-painted steel and are secured to the host fixture with provided TEKS™ screws. The driver and light engine assembly is integrated in the BLTR door assembly making this an extremely "simple", time saving, relight solution. The door frame and reflector assembly is made of cold-rolled steel and is painted after fabrication with a matte white powder paint for improved aesthetics and increased light diffusion. Diffusers are extruded from impact modified acrylic for increased durability. Diffuser trim rings provide an attractive mounting for integral sensors as well as adding a decorative element to the luminaire aesthetics. LED boards and driver are accessible from below.

**OPTICS** — Volumetric illumination is achieved by creating an optimal mix of light to walls, partitions and vertical and horizontal work surfaces — rendering the interior space, objects and occupants in a more balanced, complimentary luminous environment. High performance extruded acrylic diffusers conceal LEDs and efficiently deliver light in a volumetric distribution. Four diffuser choices available - curved and square designs with linear prisms or a smooth frosted finish.

**ELECTRICAL** — Long-life LEDs, coupled with high-efficiency drivers, provide superior quantity and quality of illumination for extended service life. 70% LED lumen maintenance at 60,000 hours (L70/60,000).

**Non-Configurable BLTR Relight:** Generic 0-10 volt dimming driver. Dims to 10%

**Configurable BLTR Relight:** available in High Efficiency (HE) versions for applications where a lower wattage (over the standard product) is required. High Efficiency versions deliver >130 LPW and can be specified via the Lumen Package designations in the Ordering Information below.

eldoLED driver options deliver choice of dimming range, and choices for control, while assuring flicker-free, low-current inrush, 89% efficiency and low EMI.

Step-level dimming option allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

Optional integrated nLight™ controls make each luminaire addressable – allowing it to digitally communicate with other nLight enabled controls such as dimmers, switches, nLight AIR RIO, RES7 occupancy sensors, and photo controls. Simply connect all the nLight enabled control devices and the BLTR Relight assembly using standard Cat-5 cabling. Unique plug-and-play convenience as devices and luminaires automatically discover each other and self-commission. Lumen Management: Unique lumen management system (option N80) provides on board intelligence that actively manages the LED light source so that constant lumen output is maintained over the system life, preventing the energy waste created by the traditional practice of over-lighting. Driver disconnect provided where required to comply with US and Canadian codes.

**SENSOR — Integrated sensor (individual control):** Sensor Switch MSD7ADXC ((Passive infrared (PIR) or MSDPDT7ADXC ((PIR/Microphonics Dual Tech (PDT)) integrated occupancy sensor/automatic dimming photocell allows the luminaire to power off when the space is unoccupied or enough ambient light is entering the space. See page 4 for more details on the integrated sensor.

**Integrated Sensor (nLight Wired Networking):** This sensor is nLight-enabled, meaning it has the ability to communicate over an nLight network. When wired, using CAT-5 cabling, with other nLight-enabled sensors, power packs, or WallPods, an nLight control zone is created. Once linked to a Gateway, directly or via a Bridge, the zone becomes capable of remote status monitoring and control via SensorView software. See page 4 for the nLight sensor options.

**Integrated Smart Sensor (nLight Air Wireless Platform):** The rE57 sensor is nLight AIR enabled, meaning it has the ability to communicate over the wireless nLight control platform. It is available with an automatic dimming photocell, and either a digital PIR or microphonics (PDT) dual technology occupancy sensor. It pairs to other luminaires and wall switches through our mobile app, CLARITY™, which allows for simple sensor adjustment. See page 4 for more details on the Integrated Smart Sensor.

**INSTALLATION** — After existing fluorescent components are removed from the host housing, universal end brackets are secured in place with TEKS™ screws. The BLTR's integrated driver and light engine door assembly can then be hinged to the universal end brackets and will hang in place for completion of assembly plug-in wiring. Rotate the doorframe assembly closed and pivot the cam latches to secure the doorframe in place. LED boards include plug-in connectors for easy replacement or servicing. Suitable for damp location installations. Damp location not available with sensor versions.

**LISTINGS** — UL/cUL Listed for use in fluorescent light fixtures. Installing Relight assemblies per instructions will not impact existing fixture UL listing. Tested to LM80 standards. DesignLights Consortium™ (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

**WARRANTY** — 5-year limited warranty. Complete warranty terms located at: [www.acuitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**NOTE:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

## 2BLTR Series LED Relight

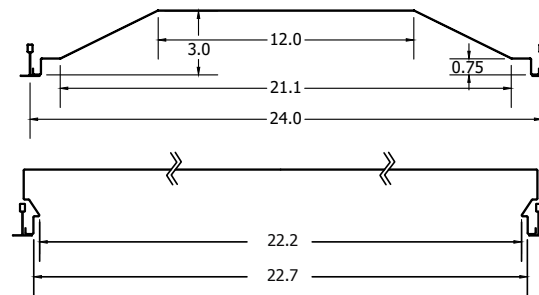
# 2BLTR

2' x 2' Relight  
LED



### Fit Compatibility:

The 2BLTR Relight Assembly was designed to upgrade recessed 2x2 fixtures, including most parabolic and lensed troffers from all major manufacturers. Dimensional requirements are below, but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



SIDE SECTION


### A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a **shaded background\***
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a **shaded background\***

To learn more about A+, visit [www.acuitybrands.com/aplus](http://www.acuitybrands.com/aplus).

\*See ordering tree for details

	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2BLT2R 20L ADP GZ10 LP840	Type <b>2X2</b>
	Submitted By ALA LLC	Notes	

## 2BLT2R Volumetric Recessed Lighting 2'x2' Relight

A+ Capable options indicated by this color background.

**ORDERING INFORMATION** Lead times will vary depending on options selected. Consult with your sales representative. **Example:** 2BLT2R 33L ADP EZ1 LP835

2BLT2R Series	Air Function	Lumens <sup>2</sup>		Diffuser	Voltage	Driver	Color temperature
2BLT2R 2X2 BLTR	(blank) Static (white end brackets for troffers)	<b>Standard efficiency (&gt;100 LPW)</b>	<b>High efficiency (&gt;130 LPW)</b>	ADP Curved, linear prisms	(blank) MVOLT	EZ1 eldoLED dims to 1% (0-10 volt dimming)	LP830 82CRI, 3000 K LP835 82CRI, 3500 K
	A Air supply/return or to maintain black reveal (black end brackets for parabolics) <sup>3</sup>	20L 2000 33L 3300 40L 4000	20LHE 2000 33LHE 3300 40LHE 4000	SDP Square, linear prisms SDSM Square, smooth <b>Diffusers w/ trim rings</b> ADPT Curved, linear prisms ADSMT Curved, smooth SDPT Square, linear prisms SDSMT Square, smooth	120 120V 277 277V 347 347V <sup>4,5</sup>	GZ1 Dims to 1% (0-10V dimming) <sup>6</sup> GZ10 Dims to 10% (0-10V dimming) <sup>6</sup>	LP840 82CRI, 4000 K LP850 82CRI, 5000 K LP930 90CRI, 3000K LP935 90CRI, 3500K LP940 90CRI, 4000K LP950 90CRI, 5000K
	F Flanged Brackets					SLD Step-level dimming <sup>7</sup> EOHN On/Off (non-dim)	

nLight Interface	Control <sup>10</sup>	Individual Control	Standby Mode	Options
<b>nLight Wired</b>	<b>nLight Wired</b>	<b>MSD7ADXCX</b>	NOC Occupancy sensor disabled <sup>13</sup>	EL7L 700 lumen battery pack EL14L 1400 lumen battery pack E10WLCP EM Self-Diagnostic battery pack, 10W Constant Power, Certified in CA Title 20 MAEDBS
(blank) no nLight <sup>®</sup> interface	(blank) No sensor control	PIR integral occupancy sensor with automatic dimming control photocell <sup>12</sup>		BGTD Bodine Generator Transfer Device <sup>14</sup>
N80 nLight with 80% lumen management	NES7 nLight™ nES7 PIR integral occupancy sensor <sup>11</sup>	PDT integral occupancy sensor with automatic dimming control photocell <sup>12</sup>		GLR Fast-blowing fuse <sup>15</sup>
N80EMG nLight with 80% lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7 nLight™ nES PDT 7 dual technology integral occupancy control <sup>11</sup>			GMF Slow-blowing fuse <sup>15</sup>
N100 nLight without lumen management	NES7ADXCX nLight™ nES7 ADCX PIR integral occupancy sensor with automatic dimming photocell <sup>11</sup>			NPLT Narrow pallet
N100EMG nLight without lumen management. For use with generator supply EM power <sup>8</sup>	NESPDT7ADXCX nLight™ nES PDT 7 dual technology integral occupancy sensor with automatic dimming photocell <sup>11</sup>			FAO Field adjustable output <sup>16</sup>
<b>nLight Wireless</b>	<b>nLight Wireless</b>			USPOM US Point of Manufacture
(blank) no nLight <sup>®</sup> interface	RES7 nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control			JP32 Job Pack
NLTAIR2 nLight AIR Generation 2 enabled <sup>9</sup>	RES7PDT nLight AIR microphonics dual technology occupancy sensor with automatic dimming photocell for Zone Control			
	RIO nLight AIR radio module without sensor			

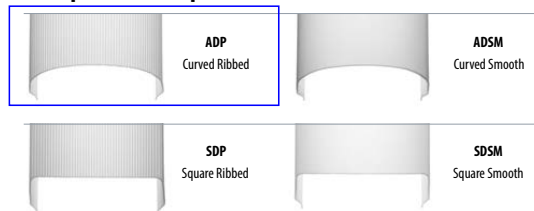
Non-Configurable BLT							
Stock	Catalog Description*	UPC	Lumens	Wattage	LPW	Color Temperature	Pallet Qty
Stock	2BLT2R 33L ADP LP835	190887550900	3313	27	124	3500K/80 CRI	52
	2BLT2R 33L ADP LP840	190887550931	3404	27	127	4000K/80 CRI	52

\* Dims to 10%

### Notes

- Consult factory for airflow data.
- Approximate lumen output.
- All versions may not achieve 130+ LPW. Refer to photometry on [www.acuitybrands.com](http://www.acuitybrands.com).
- Not available with EL7L or EL14L battery packs.
- 347 not available with SLD
- GZ1, GZ10 not available with any Control or Sensor options.
- Not available with N80, N80EMG, N100, N100EMG, NLTAIR2, or occupancy control.
- nLight EMG option requires a connection to existing nLight network. Power is provided from a separate N80 or N100 enabled fixture.
- Must order with RES7, RES7PDT, or RIO sensor. Only available with EZ1 driver.
- Must specify diffuser with trim rings. See sensor options on page 4.
- Requires N80, N80EMG, N100, or N100EMG.
- Only available with EZ1 driver option. 0-10V dimming wires not accessible via access plate. Not available with Controls options.
- Can only be ordered in conjunction with EZ1, NLTAIR2, RES7/RES7PDT. Occupancy sensor disabled at factory but can be re-enabled upon commissioning.
- Requires BSE labeling. Consult factory for options.
- Must specify voltage, 120 or 277 with GLR & GMF fusing.
- Consult factory.

### Multiple Diffuser Options



Accessories next page



2BLTR-2X2

COMMERCIAL INDOOR: One Lithonia Way Conyers, GA 30012 Phone: 800-705-SERV (7378) [www.lithonia.com](http://www.lithonia.com)

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Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
2BLT2R 20L ADP GZ10 LP840

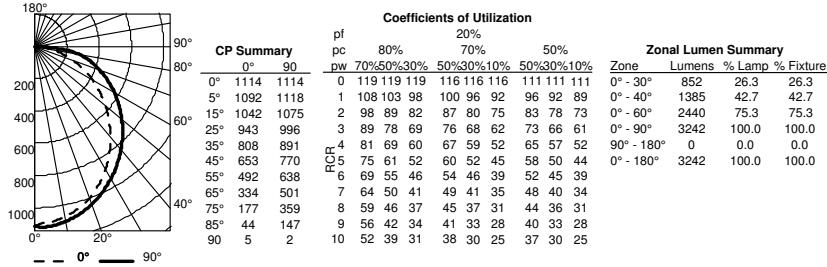
Notes

Type  
**2X2**

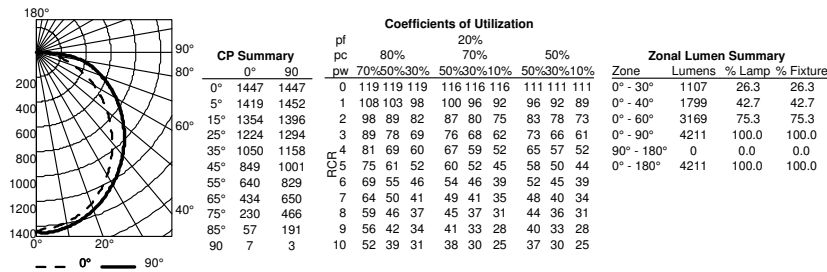
## 2BLT2R Volumetric Recessed Lighting 2'x2' Relight

### PHOTOMETRICS

2BLT2R 33L ADP LP835, 3241 delivered lumens, test no. LTL28918P404, tested in accordance to IESNA LM-79



2BLT2R 40L ADP LP835, 4210 delivered lumens, test no. LTL28918P405, tested in accordance to IESNA LM-79



Performance Data			
Lumen Package	Lumens	Input Watts	LPW
20L ADP LP830	1981	16	127
20L ADP LP835	2051	16	132
20L ADP LP840	2084	16	134
20L ADP LP850	2143	16	138
33L ADP LP830	3237	26	125
33L ADP LP835	3351	26	130
33L ADP LP840	3404	26	132
33L ADP LP850	3502	26	135
40L ADP LP830	3900	31	125
40L ADP LP835	4038	31	130
40L ADP LP840	4102	31	132
40L ADP LP850	4220	31	136

HE Performance Data			
Lumen Package	Lumens	Input Watts	LPW
20LHE ADP LP830	2008	16	129
20LHE ADP LP835	2079	16	134
20LHE ADP LP840	2112	16	136
20LHE ADP LP850	2173	16	140
33LHE ADP LP830	3068	24	128
33LHE ADP LP835	3176	24	133
33LHE ADP LP840	3227	24	135
33LHE ADP LP850	3319	24	139
40LHE ADP LP830	3797	29	129
40LHE ADP LP835	3931	29	133
40LHE ADP LP840	3994	29	135
40LHE ADP LP850	4108	29	139
48LHE ADP LP830	4532	36	126
48LHE ADP LP835	4692	36	130
48LHE ADP LP840	4767	36	132
48LHE ADP LP850	4903	36	136




2BLTR-2X2

COMMERCIAL INDOOR: One Lithonia Way Conyers, GA 30012 Phone: 800-705-SERV (7378) www.lithonia.com

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	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number UCEL 36IN 30K 90CRI SWR WH M6	Type <b>UC</b>
	Submitted By ALA LLC	Notes SUBMITTING 3' LED UNDERCABINET	



## FEATURES & SPECIFICATIONS

### INTENDED USE

Provides task or accent lighting in commercial, retail, hospitality and residential applications. Ideal for use under and over cabinets, display cases, task lighting, office lighting, coves and utility/work areas.

### CONSTRUCTION

Low profile design, with on/off rocker switch. Can be direct wired or powered by 5' cord-and-plug (not included, see accessories). Connect up to 354 watts of fixtures with 13" connector cord or 7/8" end row connector (Included).

Rugged post-painted low-profile steel housing with white finish. Acrylic white diffuser provides soft widespread illumination with zip-lock design for easy installation, cleaning, and superior retention.

### ELECTRICAL

Long-life LEDs, coupled with a high-efficiency driver, provide extended service life. Fixture is rated to deliver L70 performance at 50,000 hours and operates at 120 volts, 60Hz. Minimum starting temp -20F. Can direct-wire through rear access plate/knockout by utilizing the included Romex connector or by utilizing the optional UCD JB Junction/Splice box (sold separately).

Works with most standard incandescent dimmers (see list of approved dimmers).

### INSTALLATION

All mounting hardware included.

### LISTINGS

UL listed to US and Canadian safety standards. ENERGY STAR® certified product (3000K and 4000K only) and Title 24 qualified. Listed for damp locations.

### WARRANTY

5-year limited warranty. Complete warranty terms located at:

[www.aucitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.aucitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**NOTE:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

Indoor General Purpose

# UCEL LED Linkable Cabinet Light

Linkable



SPECIFICATIONS	1'	2'	3'	4'
Lumens (3000K):	388	742	1162	1603
Watts (3000K):	5.8	10.2	14.8	19.5
Lumens per watt:	67	73	79	82
Length:	12 (30.5)	24 (61)	36 (91.4)	48 (121.9)
Width:	2.83 (7.2)	2.83 (7.2)	2.83 (7.2)	2.83 (7.2)
Height:	1.03 (2.6)	1.03 (2.6)	1.03 (2.6)	1.03 (2.6)
Weight:	1 (.45)	1.5 (.7)	2.3 (1)	3 (1.4)

All dimensions are inches (millimeters) unless otherwise indicated. Weights are pounds (kilograms).

### ORDERING INFORMATION

For shortest lead times, configure products using **bolded options**.

Example: UCEL 12IN 30K 90CRI SWR WH

Series	Length	Color temperature	CRI	Options	Finish
<b>UCEL</b> Economy LED Undercabinet	<b>12IN</b> 1' Nominal <b>24IN</b> 2' Nominal <b>36IN</b> 3' Nominal <b>48IN</b> 4' Nominal	<b>30K</b> 3000K	<b>90CRI</b> >90	<b>SWR</b> On/off Rocker Switch	<b>WH</b> White


### Accessories: Order as separate catalog number.

UC 5FT POWERCORD WH	White 5' cord and plug
UCD JB	White Junction/Splice box - allows for quick and easy direct wiring (UC ERC24 also required for splice box to first fixture)
UC ERC	White 7/8" row connector for end-to-end connections (1 included with each fixture)
UC ERC24	White 24" connector cord for longer length connections between fixtures or splice box (required for splice box to first fixture)

DECORATIVE INDOOR

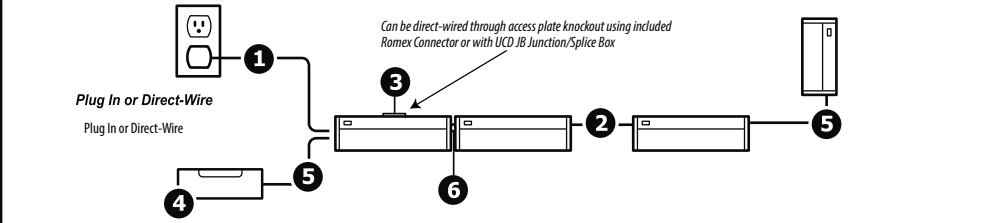
UCEL



	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number UCCEL 36IN 30K 90CRI SWR WH M6	Type UC
	Submitted By ALA LLC	Notes SUBMITTING 3' LED UNDERCABINET	





## UCCEL LED Cabinet Light

**Installation**






*Can be direct-wired through access plate knockout using included Romex Connector or with UC JB Junction/Splice Box*

**Included**

-  13' Connector Cord
-  Romex® Connector (accepts MC Cable up to 5/8")
-  Mounting Screws  
Model # UC ERC BL
-  Row Connector (fixture to fixture - 7/8" spacing)

**Accessories**  
*sold separately*

-  5' Cord/Plug  
Model # UC SFT POWERCORD WH UC SFT POWERCORD BL
-  Junction/Splice Box (for direct-wiring to first fixture with included 13' Connector cord or optional 24" Connector cord) \*all ci codes\*
-  24" Connector Cord (splice box to fixture or fixture to fixture) (splice box to first fixture or for extended lengths between fixtures) \*all ci codes\*

COMPATIBLE DIMMERS	
<p>The UCCEL is designed to operate with most standard Triac Based dimmers and is not compatible with 0-10v dimming systems. The following is a list of dimmers tested and does not imply any guarantee or warranty of compatibility with a particular application. Unlisted dimmers do not imply non-compatibility.</p>	
Manufacturer	Part number(s)
Lutron	Diva DVELV-300P (ELV) Skylark SELV-300P (ELV) Diva DV-600P (Triac) Nova NTELV-300V (ELV)
Leviton	SureSlide 6633-PA (Triac) SureSlide 6615-P (ELV)
Pass & Seymour	HCL453PTCCCV6 (triac)
Synergy	ISD 600 I 120
SensorSwitch	nLight1 nSP5 PCD 2W nLight3 nSP5 PCD ELV 120




UCCEL

DECORATIVE INDOOR: One Lithonia Way Conyers, GA 30012 Phone: 800-705-SERV (7378) www.lithonia.com

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	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number 2GTL4R 40L EZ1 LP840	Type <b>2X4P</b>
	Submitted By ALA LLC	Notes	



## FEATURES & SPECIFICATIONS

**INTENDED USE** — The 2GTL\_R LED Relight assembly is the ideal solution for renovating existing fluorescent lensed troffers, delivering improved quality of light and refreshing the space. 2GTLR delivers high efficiency and energy savings vs. existing fluorescent systems. The 2GTL\_R Relight assembly is recommended for offices, restaurants, schools, hospitals, and other general lighting applications where existing 2x2 or 2x4 lensed troffers are currently in use.

**CONSTRUCTION** — Universal end brackets/driver assembly are constructed of aluminum for optimal thermal performance and are secured to the host fixture with provided tek screws. End brackets are painted white to match existing lensed troffer finish. The LED light engine panel is highly reflective white aluminum with plug-in connection to driver. A steel wiring connection cover is provided for use if required. Standard kit requires use of existing door frame/lens assembly.

**OPTICS** — LED light panel is designed to provide consistent, uniform lighting.

Mounting brackets optimize source-to-aperture distance.

**ELECTRICAL** — Long-life LEDs, coupled with high-efficiency drivers, provide extended service life. 2GTLR is rated to deliver L90 performance at 60,000 hours. eldoLED driver options deliver choice of dimming range, and choice of control, while assuring flicker-free, low current inrush, 89% efficiency and low EMI. Ballast disconnect is provided for quick installation.

**INSTALLATION** — After existing fluorescent components are removed from housing, universal end brackets with integral driver assembly are fastened in place with provided tek screws. Supply wiring connection is made with plug-in ballast disconnect. The LED panel plugs into the driver assembly and snaps into place between end brackets for consistent source-to-aperture positioning. LED boards include plug-in connectors for easy replacement or servicing. UL Classified as suitable for damp location and air-handling installations.

**LISTINGS** — UL/cUL classified for use in recessed fluorescent light fixtures. Installation per instructions will not impact existing fixture UL listing or air-handling capabilities. Tested to LM80 standards. DesignLights Consortium® (DLC) Premium qualified product. Not all versions of this product may be DLC Premium qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

**WARRANTY** — 5-year limited warranty. Complete warranty terms located at [www.acuitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx)

**Note:** Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.



# 2GTL2R 2GTL4R

2' x 2' and 2' x 4' Relight  
LED Retrofit Assembly

Specifications

Intended for installation in most existing 2x2 or 2x4 lensed troffers; 1x4 configurations are available



eldoLED®

### ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

Example: 2GTL4R 40L EZ1 LP835

Series	Lumens <sup>1</sup>	Driver	Voltage	Color temperature
2GTL2R 2' x 2' retrofit	20L 2000 lumens	EZ1 eldoLED Dims to 1% (0-10 volt dimming)	(blank) MVOLT (120-277V)	LP835 82 CRI, 3500 K
	30L 3000 lumens			LP840 82 CRI, 4000 K
	40L 4000 lumens			
2GTL4R 2' x 4' retrofit	20L 2000 lumens			
	30L 3000 lumens			
	40L 4000 lumens			
	48L 4800 lumens			
	60L 6000 lumens			

**Notes**

1 Approximate lumen output.



Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
2GTL4R 40L EZ1 LP840

Notes

Type  
**2X4P**

## 2GTL4R Recessed LED Lighting, 2x4

**Energy Comparison - 2x4 LED vs. T12 & T8**

System	Lamp type	Ballast factor	Input watts	Watts saved by using LED
LED - nominal 4000 lm	LED	1.0	39	---
4-lamp T12	F40T12	0.88	144	105
4-lamp T8	F32T8	0.88	110	71
3-lamp T12	F40T12	0.88	108	69
3-lamp T8	F32T8	0.88	90	51
2-lamp T12	F40T12	0.88	72	33

**2 x 2 Performance Data**

Lumen package	Lumens	Input watts	LPW
20L LP835	1,944	19.7	99
20L LP840	1,990	19.7	101
30L LP835	2,541	27.8	91
30L LP840	2,603	27.8	94

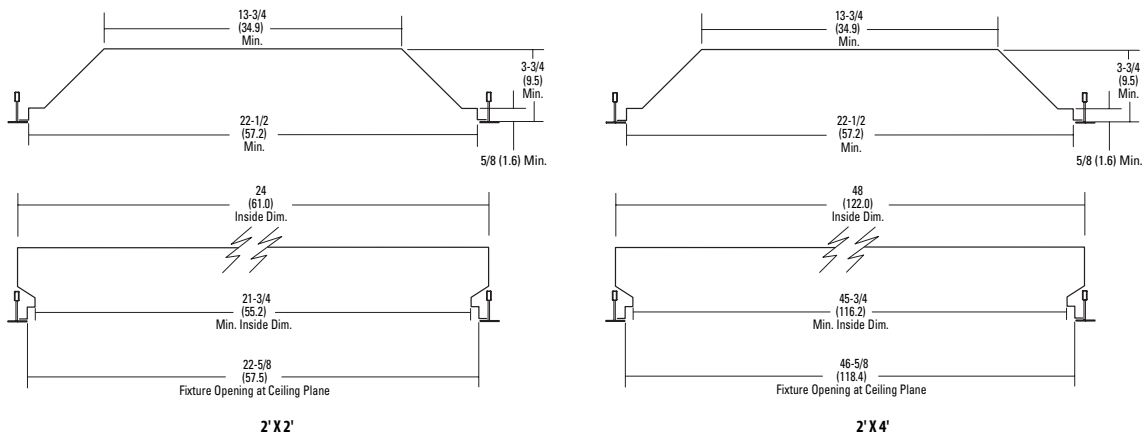
**2 x 4 Performance Data**

Lumen package	Lumens	Input watts	LPW
30L LP835	2,995	25.8	116
30L LP840	3,072	25.8	119
40L LP835	4,278	38.6	111
40L LP840	4,402	38.5	114
48L LP835	5,027	46.9	107
48L LP840	5,143	49.7	103
60L LP835	5,887	52.7	112
60L LP840	6,135	53.8	114

## FIT COMPATIBILITY

The 2GTL\_RT Relight assembly was engineered to upgrade recessed 2X2 or 2X4 lensed troffers from all major manufacturers. Dimensional requirements are below but Lithonia Lighting recommends a trial installation prior to purchasing project quantities.

Relight assemblies are designed to fit most recessed fixtures mounted in T-grid installations.



Dimensions are inches (centimeters) unless otherwise noted.




2GTLR

LED: One Lithonia Way Conyers, GA 30012 Phone: 800-858-7763 Fax: 770-929-8789 www.lithonia.com

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	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number CDS L96 MVOLT DM 40K 80CRI WH	Type <b>8'</b>
	Submitted By ALA LLC	Notes	



Contractor Select™  
**CDS**  
LED Striplight



The light-duty, dimmable, damp-location and DLC® listed CDS LED dual strip lights can easily mount individually to a ceiling, horizontal and vertical wall, or continuous row/daisy chaining. The size and versatility make them suitable for tight spaces and for task lighting, restrooms, under/over cabinet and storage closets.

**FEATURES:**


- Inspired by classic fluorescent strip channels, this LED fixture offers a traditional appearance that incorporates the latest technology
- Quick and simple to install with the snap-lock tool-less channel cover
- Features a low-glare diffuse lens for enhanced aesthetic



Catalog Number	UPC	Description	Lumens	Wattage	Voltage	Color Temperature	Color Rendering Index	Pallet Quantity
CDS L48 MVOLT DM 35K 80CRI WH	00190887837056	4' MVOLT LED Strip Light	4146	38	MVOLT (120-277)	3500K	80CRI	204
CDS L48 MVOLT DM 40K 80CRI WH	00191723192032	4' MVOLT LED Strip Light	4211	38	MVOLT (120-277)	4000K	80CRI	204
CDS L48 MVOLT DM 50K 80CRI WH	00191723036480	4' MVOLT LED Strip Light	4366	38	MVOLT (120-277)	5000K	80CRI	102
CDS L96 MVOLT DM 35K 80CRI WH	00191723192049	8' MVOLT LED Strip Light	8872	77	MVOLT (120-277)	3500K	80CRI	90
CDS L96 MVOLT DM 40K 80CRI WH	00191723192049	8' MVOLT LED Strip Light	9010	77	MVOLT (120-277)	4000K	80CRI	90
CDS L96 MVOLT DM 50K 80CRI WH	00191723036497	8' MVOLT LED Strip Light	9342	77	MVOLT (120-277)	5000K	80CRI	90

More configurations are available. [Click here](#) or visit [www.acuitybrands.com](http://www.acuitybrands.com) and search for CDS LED.

<b>Accessories:</b> Order as separate catalog number.	
HC36	Chain hanger and jack chain, 36" (pair)
ZACVH	Aircraft cable 10' (one pair)
SQ	Swivel-stem hanger (specify length in 2" increments)
MNLK JBOXCVR M12	Junction box cover with hardware, white

	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number CDS L96 MVOLT DM 40K 80CRI WH</p> <p>Notes</p>	<p>Type <b>8'</b></p>
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## Specifications

### INTENDED USE:

Inspired by classic fluorescent strip channels, this LED fixture offers a traditional appearance that incorporates the latest technology. Available in several color temperatures, lumen packages and lengths. Ideal for use in commercial, retail, office, warehouse and display applications. **Certain airborne contaminants can diminish integrity of acrylic.** [Click here for Acrylic Environmental Compatibility table for suitable uses.](#)

Certain airborne contaminants may adversely affect the functioning of LEDs and other electronic components, depending on various factors such as concentrations of the contaminants, ventilation, and temperature at the end-user location. [Click here for a list of substances that may not be suitable for interaction with LEDs and other electronic components.](#)

### CONSTRUCTION:

Compact-design channel and cover are formed from code-gauge, cold-rolled steel.

Easy to install row aligner bracket included for continuous row mounting.

Finish: High-gloss, baked white enamel (standard).

### OPTICS:

LEDs provide 80+ color rendering index (CRI) at 3500 K, 4000 K and 5000 K. Diffuse polycarbonate lens provides smooth, linear illumination which is designed to resemble the classic look of traditional fluorescent lamps. Lumen output exceeds 1,000 lumens per foot. Luminaire should be installed in applications where ambient temperatures do not exceed maximum ambient operating temperature of 95°F (35°C).

### ELECTRICAL:

Luminaire Surge Protection Level: Designed to withstand up to 2.5kV/0.75kA per ANSI C82.77-5-2015. For applications requiring higher level of protection additional surge protection must be provided.

### INSTALLATION:

Fixture may be surface or suspension mounted with appropriate mounting options (see accessories).

Aligner locks in place for easy continuous row mounting.

### LISTINGS:

CSA certified to US and Canadian safety standards and listed suitable for damp locations. Minimum starting temperature at -40°F (-40°C). Maximum ambient operating temperature of 95°F (35°C).

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

### WARRANTY:

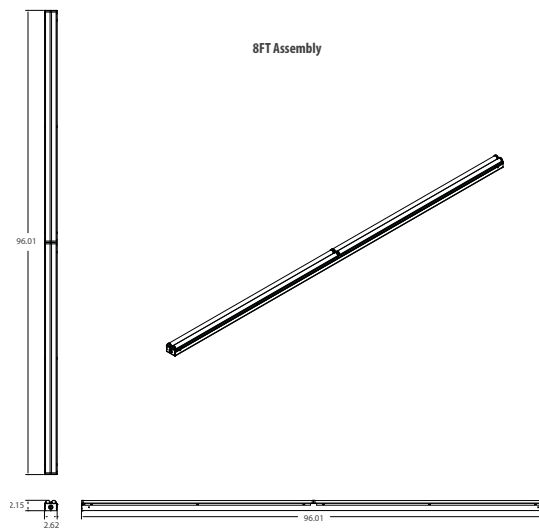
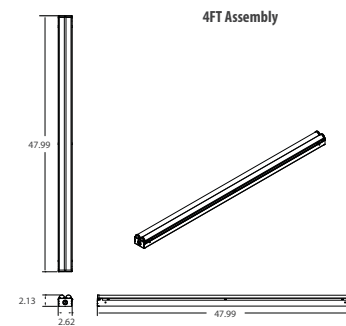
5-year limited warranty. Complete warranty terms located at:

[www.acuitybrands.com/resources/terms-and-conditions](http://www.acuitybrands.com/resources/terms-and-conditions)

**Note:** Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

## Dimensions

All dimensions are inches (centimeters) unless otherwise indicated.



	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number LDN8RV 40/20 LR8AR LSS MVOLT GZ10	Type <b>8"</b>
	Submitted By ALA LLC	Notes	



### FEATURES & SPECIFICATIONS

**INTENDED USE** — LED downlight for retrofit of installed commercial mounting frames with incandescent, compact fluorescent (CFL), or high intensity discharge (HID) sources.

**CONSTRUCTION** — Innovative housing design that simultaneously retains and centers the fixture in the existing mounting frame.

See table for compatible ceiling opening and thickness ranges.

All installation can be performed from the room side without removing the existing mounting frame.

**OPTICS** — LEDs are binned to a 3-step SDCM; 80 CRI minimum. 90 CRI optional.

LED light source concealed with diffusing optical lens.

General illumination lighting with 1.0 S/MH and 55° cutoff to source and source image.

Multiple lumen packages to replace the installed base of CFL or HID sources with energy savings of 50%-80%. See Lumen Equivalency Chart.

Self-flanged anodized reflectors in specular, semi-specular, or matte diffuse finishes. Also available in white and black painted reflectors.

**ELECTRICAL** — Multi-volt (120-277V, 50/60Hz) eldoLED 0-10V dimming drivers available in 10% or 1% minimum dimming levels. Line voltage dimming driver available.

70% lumen maintenance at 60,000 hours.

**LISTINGS** — Certified to US and Canadian safety standards. Wet location standard (covered ceiling). IP55 rated. ENERGY STAR® certified product.

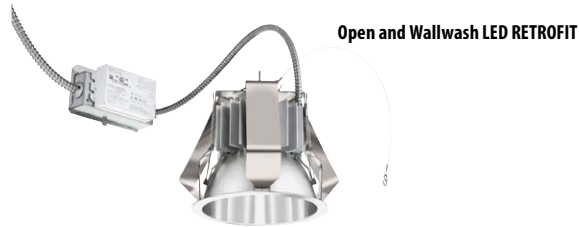
**WARRANTY** — 5-year limited warranty. Complete warranty terms located at:

[www.acuitybrands.com/support/customer-support/terms-and-conditions](http://www.acuitybrands.com/support/customer-support/terms-and-conditions)

**Note:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.



Open and Wallwash LED RETROFIT



A+ Capable options indicated by this color background.

#### ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

**Example:** LDN6RV 35/30 LR6AR LSS MVOLT EZ10

Series	Color temperature	Lumens <sup>1</sup>		Aperture/Trim Color		
LDN4RV 4-5" retrofit	27/ 2700K	05 500 lumens	40 4000 lumens	LR Downlight	4 4-5" aperture	AR Clear
LDN6RV 6" retrofit	30/ 3000K	10 1000 lumens	50 5000 lumens	LRW Wallwash	6 6" aperture	WR <sup>2</sup> White
LDN7RV 7" retrofit	35/ 3500K	15 1500 lumens	60 6000 lumens		7 7" aperture	BR <sup>2</sup> Black
LDN8RV 8" retrofit	40/ 4000K	20 2000 lumens	80 8000 lumens		8 8" aperture	
LDN9RV 9" retrofit		25 2500 lumens	100 10000 lumens		9 9" aperture	
LDN10RV 10" retrofit		30 3000 lumens	120 12000 lumens		10 10" aperture	


Finish	Voltage	Driver	Options
LSS Semi-specular	MVOLT Multi-volt	GZ10 0-10V driver dims to 10%	SF <sup>4</sup> Single Fuse
LD Matte diffuse	120 120V	GZ1 0-10V driver dims to 1%	TRW <sup>5</sup> White painted flange
LS Specular	277 277V	EZ10 eldoLED 10% 0-10V	TRBL <sup>5</sup> Black painted flange
		EZ1 eldoLED 1% 0-10V	
		ELV <sup>3</sup> Electronic line voltage / Forward phase / Triac dimming, 120V Only	
			LH <sup>6</sup> Lower overall height
			NLTAIR2 <sup>7,8,9</sup> nLight® Air enabled
			NLTAIRER2 <sup>7,8,9</sup> nLight® AIR Dimming Pack
			Wireless Controls. Controls fixtures on emergency circuit
			90CRI High CRI (90+)

#### Accessories: Order as separate catalog number.

PS1055CP FMC	Power Sentry battery pack, T20 compliant, field installable, 10w constant power
EAC ISSM 375	Compact interruptible emergency AC power system
EAC ISSM 125	Compact interruptible emergency AC power system
RK2 SDT 347/120 75VA U	347V step-down transformer mounted in box installed by others up to 5000lm
RK2 SDT 347277120 395VA AD U	347V step down transformer mounted in box installed by others 6000-12,000lm
LDN_RVRGIN	Rough-in frame. Fill in blank with appropriate aperture size (example: LDN6RVRGIN). Refer to pg. 6
nPP16 D EFP <sup>4</sup>	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1).
nPP16 D ER EFP <sup>4</sup>	nLight network power/relay pack with 0-10V dimming for non-eldoLED drivers (GZ10, GZ1). ER controls fixtures on emergency circuit.
NPS80EZ	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ10).
NPS80EZER	nLight® dimming pack controls 0-10V eldoLED drivers (EZ10, EZ1). ER controls fixtures on emergency

#### Notes

- 1 Refer to Available Lumen Package Table for lumen range available per aperture size. 8"-10" trims utilize different trims based on lumen package selected. 5000lm and below supplied with low lumen ("LL") trim; 6000lm and above with high lumen ("HL") trim.
- 2 Not available with finishes.
- 3 5000 lumen max. Must specify 120V.
- 4 Must specify voltage 120V or 277V.
- 5 Available with clear (AR) trim color only.
- 6 Select LH option for lower overall height. Consult table on Page 2 and dimensional drawings.
- 7 Not available with CP, NPS80EZ, NPS80EZER, NPP16D, NPP16DER or N80 options.
- 8 NLTAIR2 and NLTAIRER2 not recommended for metal ceiling installations.
- 9 NLTAIR2 and NLTAIRER2 refer to nLight AIR Max Lumens Table.

	Project 19-29918-2 Boeing LED Lighting Retrofit	Catalog Number LDN8RV 40/20 LR8AR LSS MVOLT GZ10	Type <b>8"</b>
	Submitted By ALA LLC	Notes	

## LDNRV

Available Lumen Package Table												
Series	500	1000	1500	2000	2500	3000	4000	5000	6000	8000	10000	12000
LDN4RV												
LDN6RV												
LDN7RV												
LDN8RV												
LDN9RV												
LDN10RV												
Approx. LED Wattage	8.5W	13W	20W	23W	30W	35W	44W	55W	68W	98W	117W	146W
Comparable Fluorescent	18W	26W	32W	1/42W 2/26W	2/32W 1/57W	>2/32W	2/42W	2/57W				
Comparable HID					50W	70W			100W	150W	>175W	250W
Comparable Incandescent	65W BR30	120W BR40	150W A21	200W A21		300W BR40						
Comparable Halogen PAR	50W	75W	90W	100W								

Dimensions*										
Series	Standard Height Max Lumens	Standard Height	LH Height Max Lumens	LH Height	Min Ceiling Opening	Ceiling Thickness at Min Opening	Max Ceiling Opening	Ceiling Thickness at Max Opening	Reflector Aperture	Reflector Flange Diameter
LDN4RV	2000LM	7-1/4"	N/A	N/A	4-7/8"	1/2"-1-1/2"	5-1/8"	1/2"-1-1/2"	4-5/8"	5-3/8"
LDN6RV	3000LM	8-1/4"	1500LM	6-1/2"	6"	1/2" - 2"	6-7/8"	1"-2"	5-1/4"	7-3/16"
LDN7RV	5000LM	8-7/8"	N/A	N/A	6-7/8"	1/2" - 2"	7-3/4"	1"-2"	6-1/4"	8-1/16"
LDN8RV	12,000LM	13 11/16"	5000LM	8-5/8" +	7-7/8"	1/2" - 2"	8-3/4"	3/4"-2"	7"	9-3/16"
LDN9RV	12,000LM	13 11/16"	4000LM	9-1/2"	8-7/8"	1/2" - 2"	9-7/8"	3/4"-2"	8-1/4"	11-7/16"
LDN10RV	12,000LM	13 11/16"	4000LM	9-1/2"	9-3/4"	3/4"-2"	10-3/4"	1"-2"	8-1/4"	11-7/16"

\* All dimensions are in inches + LH height 9-7/8" for 5000LM +Max ceiling thickness with NLTAIR2 option is 1.5"

ELV COMPATIBLE DIMMER LIST		
ELV Dimmer List		Light Dimming Range
Mfg.	Model	Min.
Lutron	S-603PG	4%
Leviton	IPI06-1LZ	0%
Leviton	6631-2	3%
Lutron	DVCL-153P	3%
Lutron	DV600P	5%
Lutron	TGCL-153P	5%
Lutron	S600P	2%
Leviton	VPE06	10%
Lutron	DVELV303P	7%
Lutron	SELV300P	7%
Leviton	6683-1W	0%
Leviton	6161	15%

ELV COMPATIBLE DIMMER LIST		
ELV Dimmer List		Light Dimming Range
Mfg.	Model	Min.
Leviton	6633-P	1%
Lutron	TG-600P	11%
Cooper	DLC03P	2%
Lutron	LG600P	5%
Lutron	CT103P	8%
Cooper	SLC03P	1%
Leviton	IPE04	6%
Lutron	MAELV600	12%
Lutron	FAELV500	12%
Lightolier	ZP260QEW	8%
Cooper	DAL06P	0%

NLIGHT AIR MAX LUMENS TABLE		
	Without LH Option	With LH Option
LDN4RV	2000lm	N/A
LDN6RV	3000lm	1500lm
LDN7RV	5000lm	N/A
LDN8RV	5000lm	5000lm
LDN9RV	5000lm	4000lm
LDN10RV	5000lm	4000lm





Project 19-29918-2  
Boeing LED Lighting Retrofit

Submitted By  
ALA LLC

Catalog Number  
LDN8RV 40/20 LR8AR LSS MVOLT GZ10

Notes

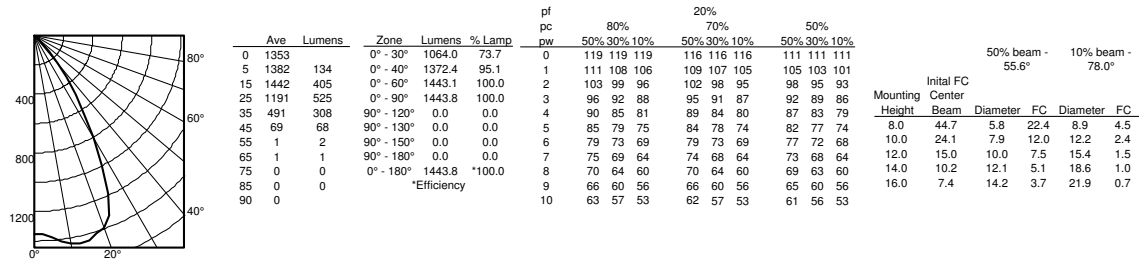
Type  
8"

## LDNRV

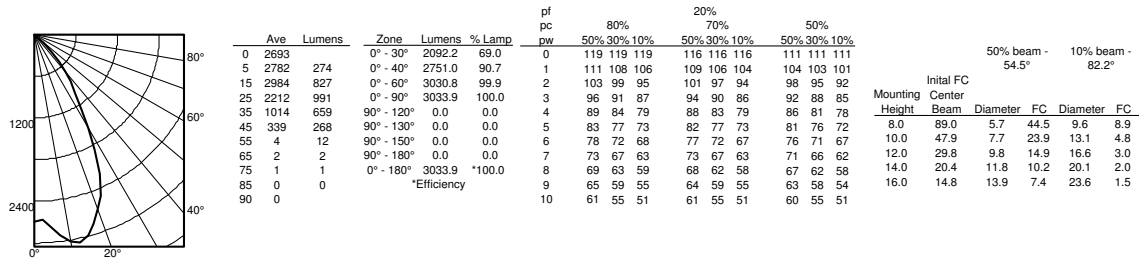
### PHOTOMETRY

Distribution Curve      Distribution Data      Output Data      Coefficient of Utilization      Illuminance Data at 30" Above Floor for a Single Luminaire

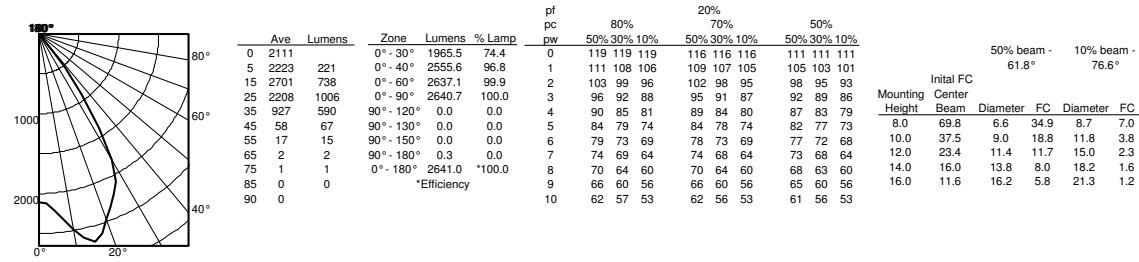
**LDN4RV 35/10 LR4AR LS**, input watts: 10.58, delivered lumens: 1085.2, LM/W=102.57, Spacing criterion at 0=1.04. ISF 30712P544



**LDN7RV 35/15 LR7AR LS**, input watts: 17.52, delivered lumens: 1521.9, LM/W=86.86, Spacing criterion at 0=0.96. ISF 33918P308



**LDN8RV 35/30 LR8AR LS**, input watts: 34.75, delivered lumens: 2641, LM/W=67.36, Spacing criterion at 0=1.18. ISF 192189P104




LUMEN OUTPUT MULTIPLIERS - FINISH			
	Clear (AR)	White (WR)	Black (BR)
Specular (LS)	1.0	N/A	N/A
Semi-specular (LSS)	0.950	N/A	N/A
Matte diffuse (LD)	0.85	N/A	N/A
Painted	N/A	0.87	0.73

LUMEN OUTPUT MULTIPLIERS - CCT				
	2700K	3000K	3500K	4000K
80CRI	0.950	0.966	1.000	1.025



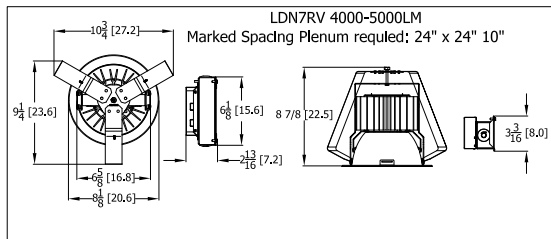
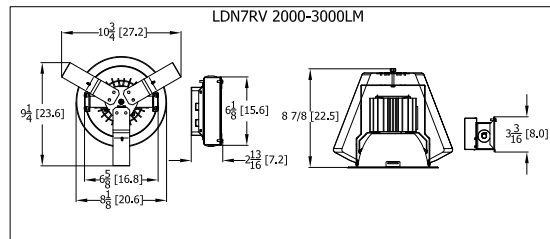
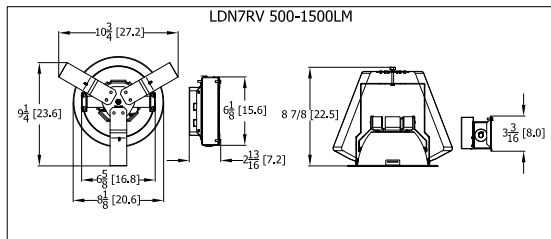
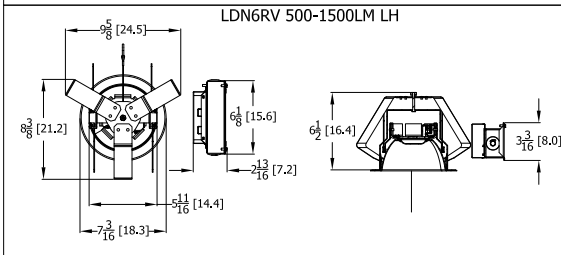
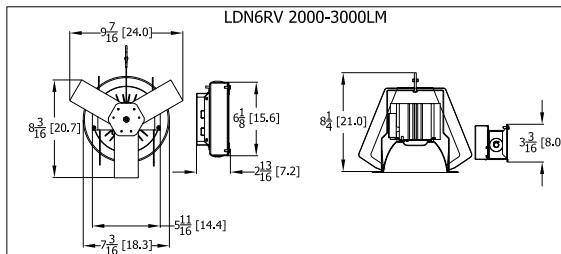
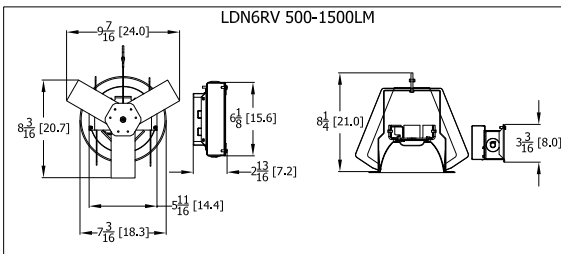
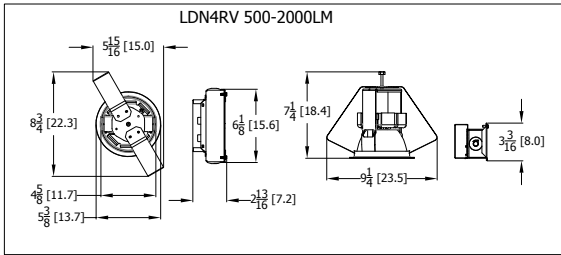
LDNRV




	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number LDN8RV 40/20 LR8AR LSS MVOLT GZ10</p> <p>Notes</p>	<p>Type <b>8"</b></p>
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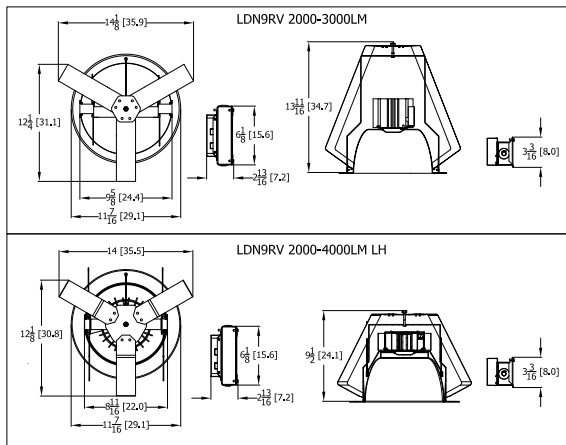
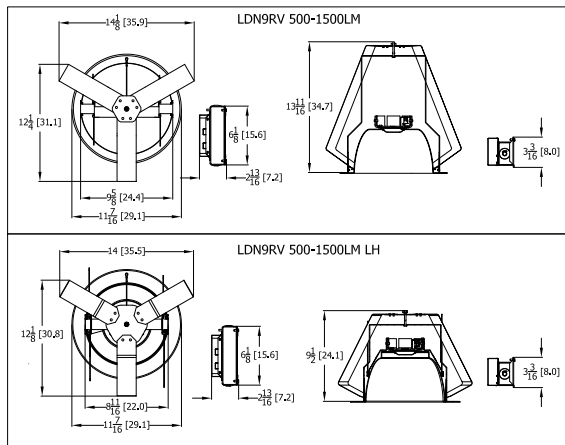
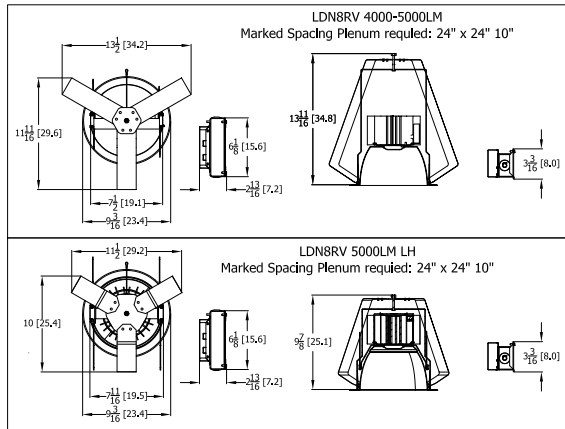
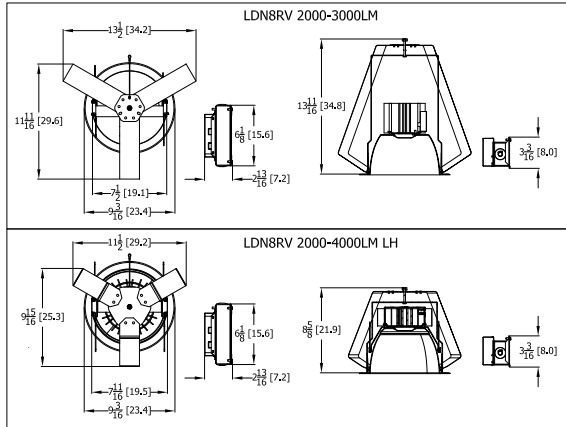
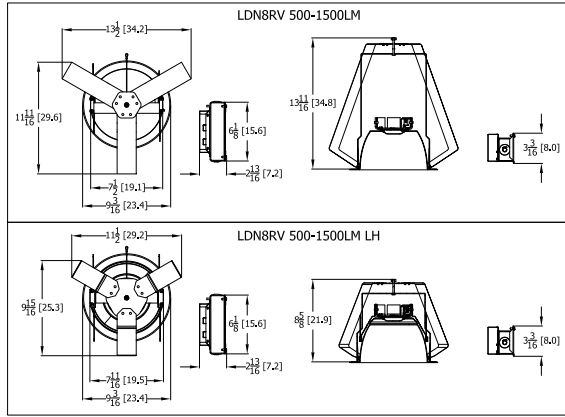
**LDNRV**


**LDN4RV**



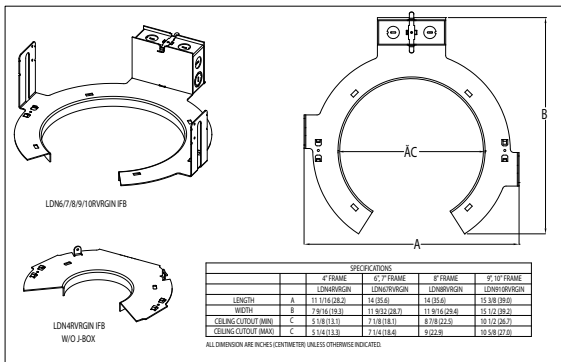
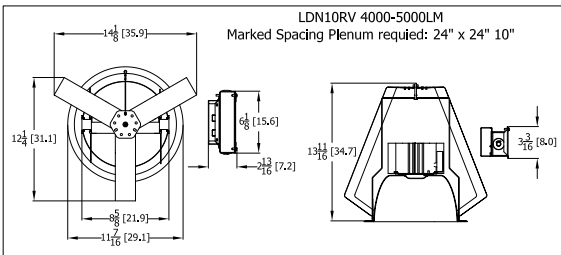
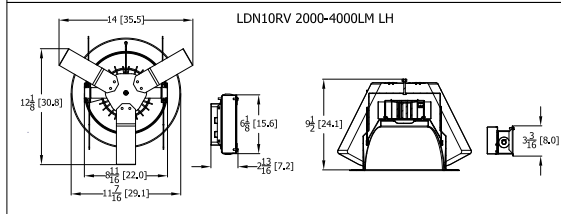
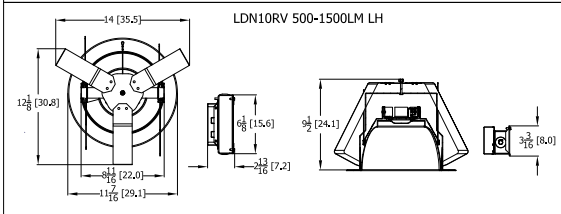
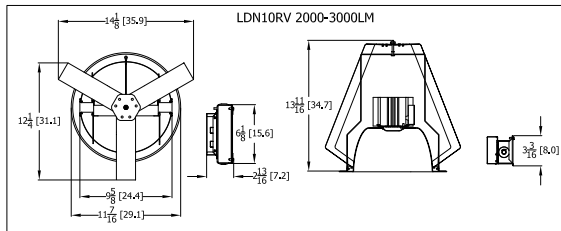
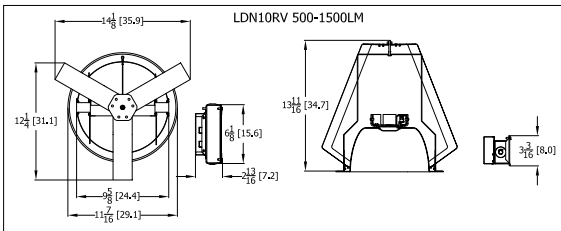
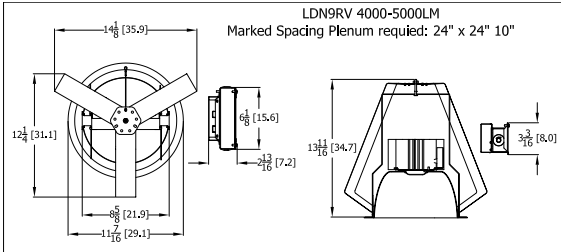
	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number LDN8RV 40/20 LR8AR LSS MVOLT GZ10</p> <p>Notes</p>	<p>Type <b>8"</b></p>
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**LDNRV**




	<b>Project 19-29918-2</b> <b>Boeing LED Lighting Retrofit</b>	<b>Catalog Number</b> <b>LDN8RV 40/20 LR8AR LSS MVOLT GZ10</b>	<b>Type</b> <b>8"</b>
	<b>Submitted By</b> <b>ALA LLC</b>	<b>Notes</b>	

### LDNRV



LDNRV



	<p>Project 19-29918-2 Boeing LED Lighting Retrofit</p> <p>Submitted By ALA LLC</p>	<p>Catalog Number LDN8RV 40/20 LR8AR LSS MVOLT GZ10</p> <p>Notes</p>	<p>Type <b>8"</b></p>
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## LDNRV

### Choose Wall Controls.

nLIGHT offers multiple styles of wall controls – each with varying features and user experience.



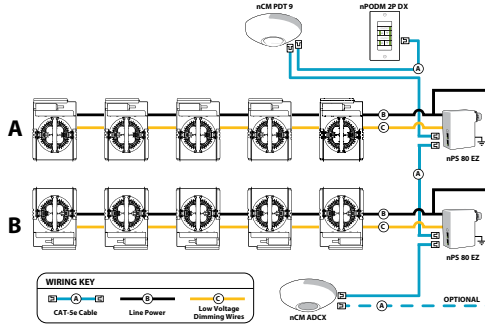
**Push-Button WallPod**  
Traditional tactile buttons and LED user feedback



**Touch WallPod**  
Contemporary capacitive touch style buttons with audible clicker for user feedback



**Graphic WallPod**  
Full color touch screen provides a sophisticated look and feel



### EXAMPLE

#### Group Fixture Control\*

\*Application diagram applies for fixtures with eldoLED drivers only.

- nPS 80 EZ** Dimming/Control Pack (qty 2 required)
- nPDM 2P DX** Dual On/Off/Dim Push-Button WallPod
- nCM ADCX** Daylight Sensor with Automatic Dimming Control
- nCM PDT 9** Dual Technology Occupancy Sensor

**Description:** This design provides a dual on/off/dim wall station that enables manual control of the fixtures in Row A and Row B separately. Additionally, a daylight harvesting sensor is provided so the lights in row B can be configured to dim automatically when daylight is available. An occupancy sensor turns off all lights when the space is vacant.

### nLight® AIR Control Accessories:

Order as separate catalog number. Visit [www.acuitybrands.com/products/controls/nlightair](http://www.acuitybrands.com/products/controls/nlightair).

Wall switches	Model number
On/Off single pole	rPODB [color]
On/Off two pole	rPODB 2P [color]
On/Off & raise/lower single pole	rPODB DX [color]
On/Off & raise/lower two pole	rPODB 2P DX [color]
On/Off & raise/lower single pole	rPODBZ DX WH <sup>1</sup>

### Notes

- 1 Can only be ordered with the RESZ zone control sensor version.

### nLight AIR

nLight AIR is the ideal solution for retrofit or new construction spaces where adding communication is cost prohibitive. The integrated nLight AIR rPP20 Power Pack is part of each Indy L-Series Luminaire. These individually addressable controls offer the ultimate in flexibility during initial setup and for space repurposing.



### Simple as 1,2,3

1. Install the nLight® AIR fixtures with embedded smart sensor
2. Install the wireless battery-powered wall switch
3. With CLAIRITY app, pair the fixtures with the wall switch and if desired, customize the sensor settings for the desired outcome



### A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® control networks when ordered with drivers marked by a **shaded background**\*
- This luminaire is part of an A+ Certified solution for nLight control networks, providing advanced control functionality at the luminaire level, when selection includes driver and control options marked by a **shaded background**\*

To learn more about A+, visit [www.acuitybrands.com/aplus](http://www.acuitybrands.com/aplus).

\*See ordering tree for details

## Dunbar Field Life extended using Sulzer Multiphase Pumps

**“The advent of high power multiphase pumps is changing the world of oil production, in particular by allowing the exploitation of fields nearing the end of their useful lives. This revolutionary technique has been operated since Autumn 1999 on the Dunbar platform, in the British segment of the North Sea”**

TOTALFINA ELF Exploration & Production Magazine  
March 2001



### Sulzer Multiphase Pumps

- The Sulzer MPP range of pumps are of the helico-axial design originally developed from the Poseidon research programme.
- Pumps of this design are particularly well suited to high capacities. Current installations include pumps with a total capacity of over 500,0000 bpd

### The role of Multiphase Pumping

Multiphase Pumping is essentially a means of adding energy to the unprocessed effluent which enables gas/liquid mixtures to be transported over longer distances without the need for prior phase separation. This also enables the wells to produce at a lower WHFP (Wellhead Flowing Pressure) and so consequently :

- The production from existing fields and weak wells is increased
- Ultimate recovery is increased
- Life of a field can be extended.
- Development costs are reduced

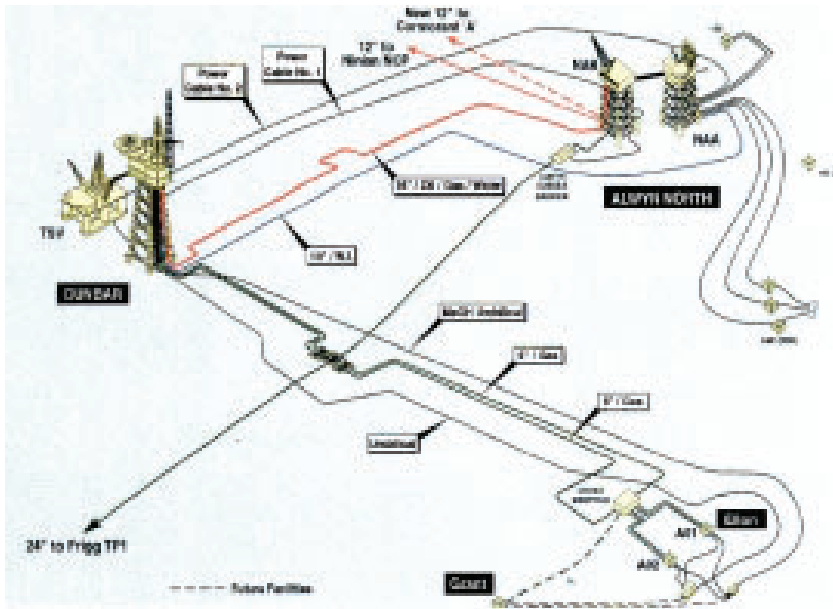
The Dunbar development is an example which demonstrates how these benefits have been realised in the field.

### The Dunbar Field

The Dunbar field is located 120 km North East of the Shetland Islands and 440 km from Aberdeen. Dunbar is a wellhead platform which is operated as a satellite of the Alwyn North Platform located 22 km to the North East.

In the first phase of production the wellhead pressure was sufficient for the effluent to flow naturally from Dunbar fields along a 16" multiphase pipeline to the Alwyn platform.

The introduction of multiphase pumps on Dunbar for the second phase has enabled production to continue in the face of declining wellhead pressure.



The Dunbar field

**Why multiphase pumps**

The two main alternatives considered for the second production phase were :

Firstly a conventional system comprising a separator operated at low pressure with the liquids pumped and the gas compressed upstream of the multiphase pipeline

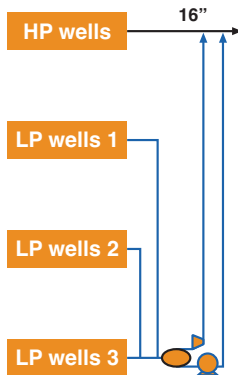
Secondly an innovative system using multiphase pumps to boost the low pressure wells directly in into the multiphase pipeline.

Multiphase pumps were selected in preference to a separator based solution because :

- There would be no need to modify the existing facilities or process operating conditions
- They provide a more cost effective solution
- A module incorporating multiphase pumps would be over 30% lighter
- Vertically installed pumps minimised space requirements
- Weight and space reductions would facilitate the design of the proposed cantilevered module extension

Operational flexibility maximised by implementing a well segregation scheme using multiphase pumps

**Conventional concept**



**Well segregation scheme**

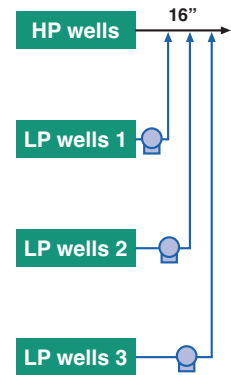
This scheme makes maximum use of the natural energy of the wells which means that electrical power requirements are minimised.

There are three independent lines

- High pressure wells bypass the pumps
- LP wells will be boosted from approx 70 to 125 bar.g via an 8 stage pump
- Note : Both pumps are identical although the pump in this line is destaged to 8 stages
- LLP wells will be boosted from approx 50 to 125 bar.g via a 12 stage pump
- There is also provision for a third pump for even lower pressure wells (20-30 bar.g)

This system therefore matches pumping requirements to evolving and fluctuating production requirements

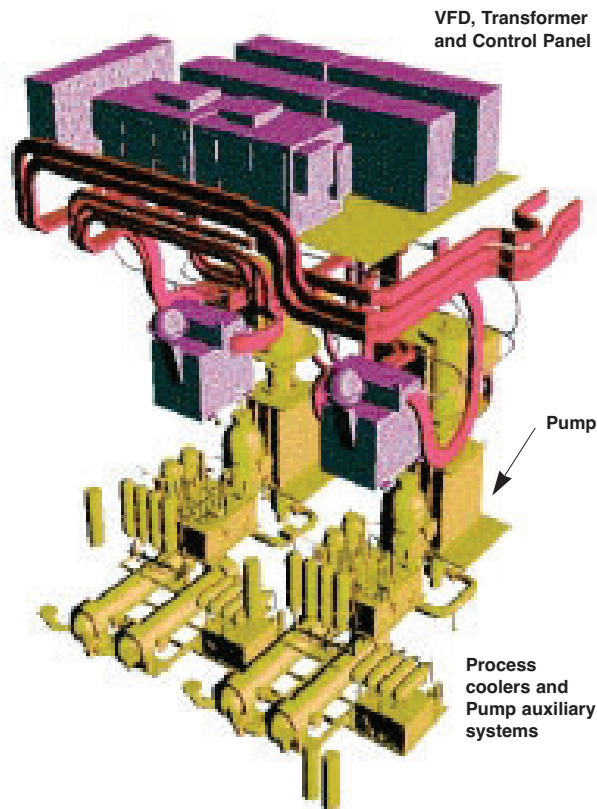
TotalFina Elf estimate that by 2004, approximately 84% of the oil production will be boosted



## Well segregation scheme

The pumpset packages were supplied by a consortium between Sulzer and ABB (who were responsible for the electrical equipment). Each pumpset comprises the following main items

- Process Cooler (by TotalFinaElf)
- Buffer tank at pump suction
- Multiphase Pump
- Epicyclic gearbox
- Lube oil and seal oil systems
- Electric motor
- Frequency converter
- Transformer
- Anti-harmonic filters



Main Pumpset Components

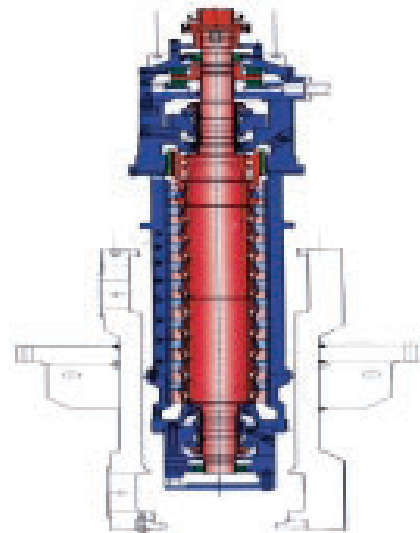
## Pump Description

Total Capacity	<b>180,000 bpd</b>
GVF	<b>30 – 90%</b>
Suction Pressure	<b>50 – 70 Bar.g</b>
Discharge Pressure	<b>125 Bar.g</b>
Speed Range	<b>3,500 to 6,000 rpm</b>
Motor Rating	<b>4500 kW</b>

## Pump design features include:

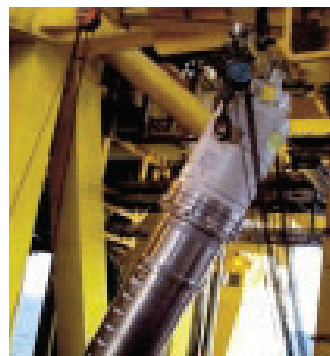
- Vertical barrel installation
- Axially split inner casing
- Twistlock design
- Tilting pad bearings
- Balance piston

These are the largest multi-phase pumps installed offshore world wide.



## Cartridge replacement

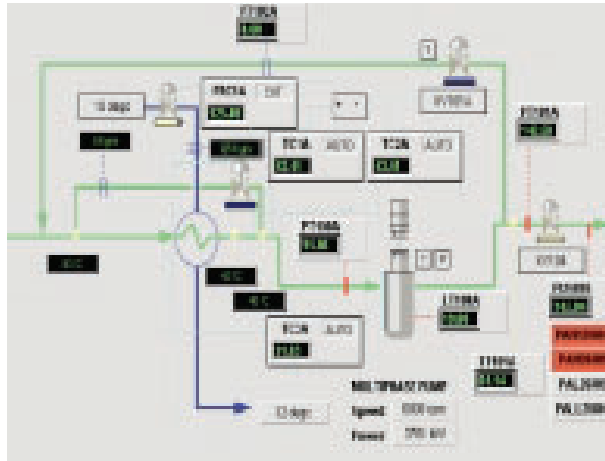
- Twistlock casing design facilitates cartridge withdrawal.
- Cartridges of different hydraulic design or stage combinations can be fitted to suit evolving production requirements





## Pumpset Control

- The pump speed is adjusted via the frequency converter to suit process and export requirements.
- The pump is designed for use on an unmanned installation. Pump monitoring and speed control can be effected remotely from Alwyn



## Installation

The pump was incorporated into the module at the fabrication yard. The module measures 12m x 7.5m x 19m high and weighs 650 tonnes. The module was installed on the platform in the summer of 1999 and the pumps commissioned in November of the same year.

Since the pumps were commissioned, the pressure in certain wells has declined further. To compensate for this, the pump in the LP line has since been updated to 12 stages.

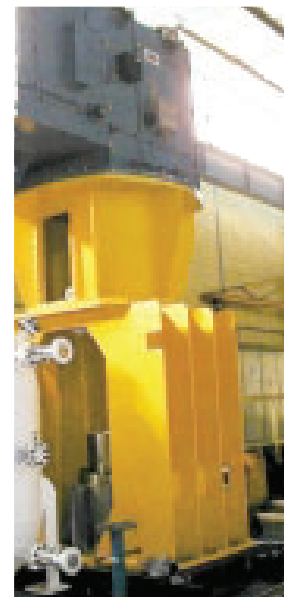
## Field Reserves significantly increased

The importance of this multiphase pump installation is demonstrated by TotalFinaElf's estimate that the impact on production from the Dunbar field will be as follows :

### "Key Figures :

- Estimated Reserves in 1986 : 435 million bep
- Reserves re-assesses in 1994 at 700 bep
- Estimated reserves in 2001 owing to multiphase pumps; 1.2 billion bep"

TOTALFINA ELF Exploration & Production Magazine  
March 2001





# Comfort™ Series Air Conditioners



Proven, reliable comfort, up to 16.5 SEER rating



Qualifying Models Only

24AAA6, 24ABC6, 24AAA5, 24ACC4, 24ABB3, 24ABB3\*\*C

## What You Can Expect From Carrier

Innovation, efficiency, quality: Carrier® Comfort™ Series air conditioners represent years of research and design with one goal in mind – making your family comfortable. With standard models and units designed specifically for the rigors of coastal area installations, Comfort Series air conditioners represent the Carrier quality, environmental stewardship and lasting durability that have endured for more than a century. And, to ensure maximum year-round performance, your dealer can include a new Carrier gas furnace or fan coil and thermostat, all backed by the indoor comfort experts.



### Efficiency

SEER (Seasonal Energy Efficiency Ratio) ratings are like your car's MPG – the higher the number, the greater the potential for savings. Comfort™ Series air conditioners offer a range of efficiencies that start at your region's minimum SEER and reach as high as 16.5 SEER.



### Durability

A galvanized steel cabinet, heavy-duty wire coil guard and baked-on powder paint provide superior protection against dings, dents and other outdoor threats. For home comfort in a coastal environment, ask about Comfort™ Series models with WeatherShield™ protection for extra-tough, longer lasting corrosion resistance to withstand the harsh sea coast air.



### Environment

Carrier was the first to offer systems with Puron® refrigerant, which does not contribute to ozone depletion. Our century-plus commitment to delivering energy-saving comfort continues with our insistence on earning ENERGY STAR® designation on most of our Comfort™ Series air conditioners.



### Sound

Carrier® Comfort™ Series air conditioners cool your home quietly. All models include components that help keep sound levels low, including an aerodynamic top and quiet motor mounts.

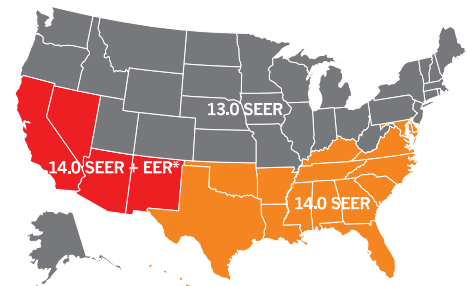


### Limited Warranty

To the original owner, Carrier® Comfort™ Series air conditioners are covered by a 10-year parts limited warranty upon timely registration. The limited warranty period is five years if not registered within 90 days of installation. Jurisdictions where warranty benefits cannot be conditioned on registration will receive the registered limited warranty period. See warranty certificate at [carrier.com](http://carrier.com) for complete details and restrictions.

## Regional Efficiency Standards

On January 1, 2015, a new set of minimum efficiency standards took effect. Under the new standards, there are different efficiency minimums for air conditioners in each of three regions – North, Southeast and Southwest. Your Carrier® dealer will have a Comfort™ Series air conditioner to meet your region's minimum requirement.



■ North ■ Southeast ■ Southwest

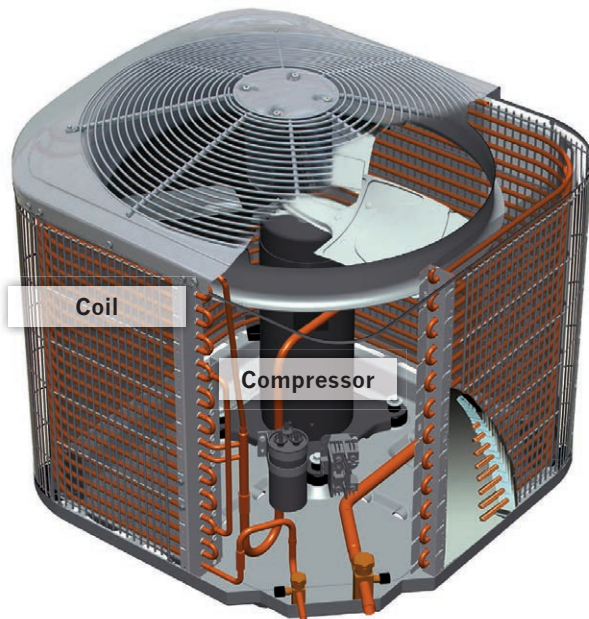
\*12.2 EER < 45,000 Btu/h, 11.7 EER ≥ 45,000 Btu/h

# A Range of Comfort

Carrier delivers cooling systems in a range of shapes and sizes. Check out this side-by-side comparison to see how our efficient Comfort™ Series air conditioners measure up against our Infinity® and Performance™ models.

	Infinity® Series	Performance™ Series	Comfort™ Series
<b>Performance</b>	Variable-speed rotary, two-stage and single-stage scroll compressors available	Two-stage and single-stage scroll compressors available	Single-stage scroll compressor
<b>Efficiency</b>	Up to 21.0 SEER rating	Up to 17.5 SEER rating	Up to 16.5 SEER rating
<b>Durability</b>	WeatherArmor™ Ultra cabinet protection	WeatherArmor™ Ultra cabinet protection	WeatherArmor™ cabinet protection
<b>Controls</b>	Infinity® Touch Control	Côr™ Wi-Fi® Thermostat	Carrier® Wi-Fi® Thermostat
<b>Sound</b>	Silencer System II™, dBA as low as 56	Silencer System II™, dBA as low as 72	dBA as low as 72
<b>Limited Warranty</b>	10-year parts*	10-year parts*	10-year parts*

\* Upon timely registration. The warranty period is five years if not registered within 90 days of installation. Wi-Fi® is a registered trademark of the Wi-Fi Alliance Corporation.



Comfort™ 16 Air Conditioner Shown

## The Carrier® Difference

If you could look under the hood of a Carrier Comfort™ Series air conditioner, you'd see what drives the performance: a serious commitment to quality. Our microtube coil technology saves space and provides lasting comfort with its corrosion-resistant construction. And, our smooth-running compressor represents the solid, reliable performance you expect.

Comfort Series air conditioners are built to look their best while enduring exposure to hail, errant soccer balls, lawn equipment and more. The cabinet plays an important role in sound as well, using an aerodynamic top to facilitate airflow and keep operating sound to a minimum.

Visit [carrier.com](http://carrier.com) for model comparisons and product specifications.

Explore the full line of Carrier® air conditioners and other system components to find the ideal fit for your home.

24AAA6, 24ABC6, 24AAA5, 24ACC4, 24ABB3, 24ABB3\*\*C

## The Total Indoor Comfort System

Your Carrier® dealer will recommend a system that is best suited to meet your home-comfort needs and local weather environment:

1. **Air Conditioner** provides reliable, high-efficiency cooling for long-lasting comfort and energy savings.
2. **Gas Furnace** provides reliable, high-efficiency heating for long-lasting comfort and energy savings.
3. **Wi-Fi® Thermostat** offers precise, programmable comfort from your web-connected device.
4. **Zoning** sets different temperatures for up to three different areas of your home for truly customized comfort and enhanced utility savings.
5. **Air Cleaner** improves air quality by removing harmful and irritating airborne pollutants from your home.
6. **Humidifier** replenishes moisture to dry air.
7. **UV Lamp** inhibits the growth of contaminants on the evaporator coil, leaving your home with cleaner, fresher indoor air.
8. **Ventilator** combines fresh outdoor air with conditioned indoor air for improved air quality – great for today's tightly constructed home.
9. **Evaporator Coil** is matched with the proper outdoor unit to provide top cooling efficiency and years of reliable service.



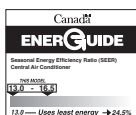
## More Than a Century of Cool

In 1902, a determined engineer answered one of mankind's most nagging questions: How do we make hot, sticky, indoor air go away? In creating the world's first modern air conditioning system, Willis Carrier forever changed indoor life, and, more than a century later, the corporation that bears his name takes inspiration from his example.

Carrier continues to improve on our founder's breakthroughs, introducing new technologies that make life at home even cooler. Today, our nationwide network of experts continues to advance Willis Carrier's lifework. Your expert Carrier® dealer is equipped to evaluate your home and create a customized system designed around your lifestyle.



As an ENERGY STAR® partner, Carrier Corporation has determined that qualifying models meet ENERGY STAR guidelines for energy efficiency. Ask your dealer for details or visit [www.energystar.gov](http://www.energystar.gov).



turn to the experts™



01-824-083-25

[carrier.com](http://carrier.com) 1-800-CARRIER

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Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice or without incurring obligations.





## Houston Community College Case Study

### **Houston Community College Nets Sustainable Results**

*TD Industries Puts its Skilled Team on Campus*

**Houston Community College (HCC) serves more than 70,000 students with 66 facilities covering 623 square miles. TD Industries maintains and services all of HCC's campus facilities.**



[tdindustries.com](http://tdindustries.com)

### **The Situation**

More than 40 TD facility partners support the HCC system. They provide all mechanical, electrical and plumbing services, including:

- HVAC systems,
- general maintenance,
- preventive and corrective maintenance,
- elevators and wheelchair lifts,
- building automation systems (BAS),
- building energy management systems (BEMS),
- building security systems (BSS),
- fire life safety equipment (FLSE, and
- computerize maintenance management system (CMMS) .



With its large geographic area and customer base, TD's challenges include:

- Managing and controlling the budget,
- Serving multiple locations and reaching them in Houston's high traffic corridors,
- Keeping customers, including students, faculty, administrators and visitors, satisfied,
- Dealing with fast transitions of less than 30 days,
- Maintaining and improving system reliability, and
- Attracting and retaining good technically competent managers and technicians.

Along with on-site facilities support, TD Industries provides incremental service and support from the company's Houston branch office. TD's goal with the HCC is to ensure a mutually responsive partnership that considers both short and long-term facilities needs and costs.

### **The Solution**

For technical support, TD employs the Maximo Computerize Maintenance Management System (CMMS). TD has also designed and implemented a preventive maintenance program based on the reliability centered maintenance (RCM) approach. In addition, TD has implemented a do-it-now (DIN) team to respond to customer needs.

One of the greatest transitions for HCC was moving from outsourcing to multiple vendors to bringing their facilities work back in-house and using additional resources as needed. To effectively make this transition, TD met with existing suppliers and evaluated those outsourced activities versus on-site work.

TD recommended that the majority of the facilities work move back on-site with TD staff and M/WBE Business Partners. The outcome was a zone maintenance approach along with a highly skilled all zone Business System Group, M/WBE business partners and backup support from TD's Houston branch office. This team composition has enabled rapid response to on-site maintenance requirements.



In order to meet TAMU's requirements for HVAC components and installations, TD procured and installed the following:

- 5 Air Handling Units
- 1 Outside Air Handling Units
- 8 Fan Coil Units
- 16 Airflow Monitoring Stations
- Two 20 hp Chilled Water Pumps
- Two 7.5 hp Heating Hot Water Pumps
- 2 Sound Attenuators
- 107 Fan Powered Terminal Units
- 128 Single Duct VAV Terminal Units
- Siemens was subcontracted to perform the installation of the Building Automation System, and integrate it to the main network on campus.
- Sound and acoustical accommodations were made to the HVAC system and the vertical storm drain risers with added insulation.
- More than 170,000 pounds of ductwork including double wall spiral and over seven miles of piping were fabricated in TD's manufacturing facility.

### **The Success**

The project was completed on time and on budget. Skanska USA and TAMU were impressed with TD's proactive communications, BIM leadership role and periodic safety audits conducted throughout the project.

*TD was also recognized for the firm's professionalism in working with other trades and the owner's representatives.*



[tdindustries.com](http://tdindustries.com)





## Texas A&M LAAH Building Case Study

### Delivering a Sustainable Performance Facility for Texas A&M

*TD Focuses on Best Practices for Higher Education Project*

**The Liberal Arts and Humanities Building (LAAH) is a five-story, 125,000 square-foot facility located in the historic core of Texas A&M University's flagship campus in College Station, Texas. The \$46 million building is the first to be designed specifically for instruction and scholarship in the arts and humanities. Designed to meet LEED silver rating, it will contain faculty offices, classrooms, computer-based teaching classrooms, theater performance studios, music practice and rehearsal rooms, recording studios and music teaching labs.**



[tdindustries.com](http://tdindustries.com)

### The Situation

The Texas A&M University System's Office of Facilities Planning and Construction (OFPC) is committed to excellence in design and sustainability in the construction and renovation of buildings for all A&M System facilities. All new construction must meet Leadership in Energy and Environmental Design (LEED) Silver standards. The OFPC also develops guidelines that affect every aspect of a building's design, operations, maintenance, sustainability and energy performance.

In January 2011, Texas A&M University (TAMU) awarded Skanska USA the contract to build the LAAH facility with a targeted completion date of the summer of 2012. The building was designed by Brown Reynolds Watford (BRW) Architects. Shah Smith & Associates acted as the MEP Engineer. Skanska USA engaged TD Industries under a hard bid or lump sum contract to provide HVAC services on the project.

TAMU's goals for the project were:

1. For the building to meet its sustainability guidelines;
2. For the project to be completed on time and on budget;
3. For a safe, clean jobsite; and
4. For construction to be conducted with as little disruption as possible to campus activities.

The building's location in the center of the campus created some logistical issues which required significant coordination of numerous trade subcontractors and the placement/storage of material and equipment. In addition, all trades had to allow for scheduling in order to meet TAMU's requirement that all trade contractors participate in its inspections and re-inspections during each phase of construction.

### The Solution

TD prides itself in designing and constructing HVAC systems that meet the most stringent sustainability guidelines regarding air quality, acoustics, lighting, energy efficiency, system automation and controls and water conservation. TD is also adept in its use of Building Information Modeling (BIM) and takes a leadership role in leading the BIM process with other trades.







## Houston Community College Case Study

### **Houston Community College Nets Sustainable Results**

*TDIndustries Puts its Skilled Team on Campus*

**Houston Community College (HCC) serves more than 70,000 students with 66 facilities covering 623 square miles. TDIndustries maintains and services all of HCC's campus facilities.**



[tdindustries.com](http://tdindustries.com)

### **The Success**

By completing the majority of the work on-site with highly trained TD personnel, two major benefits were achieved for HCC:

1. Increased customer response time and satisfaction, and
2. Budget efficiencies.

TD helped HCC succeed in reducing costs and improving life cycle operations by redesigning HCC's current operations and applying new technologies and a skillful team of technicians to maintain and support HCC's facilities.

By improving reliability and system comfort, HCC has experienced fewer corrective calls due to TD's improved preventive maintenance system. Monthly reporting enables TD to manage costs and performance.

Best of all, savings per year has been \$2 million with a projected \$10 million over the life of the 5-year contract.

For large campus solutions, TD's truck-based service, fire and life safety department, building automation controls (BAS) and special projects departments provide the depth and resources that deliver sustainable results.





Product Title	Building Type / Size	Typical Sales Leader	Sales Process
<b>Energy Solutions</b>	<ul style="list-style-type: none"> <li>• Greater than 100,000 sq/ft</li> <li>• Multi Building Campus</li> <li>• Large Process Loads</li> </ul>	<ul style="list-style-type: none"> <li>• Special Projects, Business Development Manager</li> </ul>	<ul style="list-style-type: none"> <li>• Miller Heiman Sales Process</li> </ul>
<b>TDSaves</b>	<ul style="list-style-type: none"> <li>• Less than 100,000 sq/ft</li> </ul>	<ul style="list-style-type: none"> <li>• Truck Based Service, Business Development Manager</li> </ul>	<ul style="list-style-type: none"> <li>• Sandler Sales Process</li> </ul>

**Characteristics of a Sale**

- Sold to Owners of Buildings
- Follows a Structured Sales Process that includes an Energy Audit
- Reduced operating costs pay for project and services
- Negotiated at the Executive Level
- Includes ongoing Measurement and Verification (M&V) of savings
- Can include an Energy Savings Guarantee
- Includes Multi-Year Support Services
- Often includes utility incentives and financing

**Partial List of Energy Conservation Measures**
**HVAC**

- Replace worn-out inefficient equipment
- Install variable frequency drives
- Perform retro-commissioning
- Install/upgrade, integrate building control systems
- Chiller Control Systems

**Plumbing**

- Water Saving Fixtures
- Intelligent Irrigation Controls
- Replace inefficient boilers and water heaters
- Solar Thermal

**Electrical**

- Lighting Fixture Retrofits
- Power Factor Correction
- Demand Response Program
- Solar PV

**Support Services**

- Service Agreements
- M&V Services
- Building Performance Management (**utiliVisor**)

**This information outlines the “Go to market Strategies” Using Utility Savings as the Value Proposition**

- It is to be used as a guideline helping you make the right decisions on the type of proposal, presentation and product offering.
- It also instructs you on which sales technique is appropriate for a given job opportunity.
- Following these guidelines as closely as possible increases the chances for better customer relations and higher margins.

## **TAB 3 - PERFORMANCE CAPABILITY**

### **TAB 3 CONTENTS:**

**APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT**

**APPENDIX D, EXHIBIT B, OMNIA PARTNERS ADMINISTRATION AGREEMENT PRIOR TO CONTRACT AWARD**

**APPENDIX D, EXHIBITS F, FEDERAL FUNDS CERTIFICATIONS AND G. NEW JERSEY BUSINESS COMPLIANCE**

**OFFEROR'S POLICIES**

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## EXHIBIT A

### RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

#### 1.0 Scope of National Cooperative Contract

*Capitalized terms not otherwise defined herein shall have the meanings given to them in the Master Agreement or in the Administration Agreement between Supplier and OMNIA Partners, Public Sector.*

#### 1.1 Requirement

*Region 4 ESC (hereinafter defined and referred to as “Principal Procurement Agency”), on behalf of itself and the National Intergovernmental Purchasing Alliance Company, a Delaware corporation d/b/a OMNIA Partners, Public Sector (“OMNIA Partners, Public Sector”), is requesting proposals for HVAC Equipment, Installation, Service & Related Products. The intent of this Request for Proposal is any contract between Principal Procurement Agency and Supplier resulting from this Request for Proposal (“Master Agreement”) be made available to other public agencies nationally, including state and local governmental entities, public and private primary, secondary and higher education entities, non-profit entities, and agencies for the public benefit (“Public Agencies”), through OMNIA Partners, Public Sector’s cooperative purchasing program. The Principal Procurement Agency has executed a Principal Procurement Agency Certificate with OMNIA Partners, Public Sector, an example of which is included as Exhibit D, and has agreed to pursue the Master Agreement. Use of the Master Agreement by any Public Agency is preceded by their registration with OMNIA Partners, Public Sector as a Participating Public Agency in OMNIA Partners, Public Sector’s cooperative purchasing program. Registration with OMNIA Partners, Public Sector as a Participating Public Agency is accomplished by Public Agencies entering into a Master Intergovernmental Cooperative Purchasing Agreement, an example of which is attached as Exhibit C, and by using the Master Agreement, any such Participating Public Agency agrees that it is registered with OMNIA Partners, Public Sector, whether pursuant to the terms of the Master Intergovernmental Purchasing Cooperative Agreement or as otherwise agreed to. The terms and pricing established in the resulting Master Agreement between the Supplier and the Principal Procurement Agency will be the same as that available to Participating Public Agencies through OMNIA Partners, Public Sector.*

*All transactions, purchase orders, invoices, payments etc., will occur directly between the Supplier and each Participating Public Agency individually, and neither OMNIA Partners, Public Sector, any Principal Procurement Agency nor any Participating Public Agency, including their respective agents, directors, employees or representatives, shall be liable to Supplier for any acts, liabilities, damages, etc., incurred by any other Participating Public Agency. Supplier is responsible for knowing the tax laws in each state.*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*This Exhibit A defines the expectations for qualifying Suppliers based on OMNIA Partners, Public Sector's requirements to market the resulting Master Agreement nationally to Public Agencies. Each section in this Exhibit A refers to the capabilities, requirements, obligations, and prohibitions of competing Suppliers on a national level in order to serve Participating Public Agencies through OMNIA Partners, Public Sector.*

*These requirements are incorporated into and are considered an integral part of this RFP. OMNIA Partners, Public Sector reserves the right to determine whether or not to make the Master Agreement awarded by the Principal Procurement Agency available to Participating Public Agencies, in its sole and absolute discretion, and any party submitting a response to this RFP acknowledges that any award by the Principal Procurement Agency does not obligate OMNIA Partners, Public Sector to make the Master Agreement available to Participating Procurement Agencies.*

## **1.2 Marketing, Sales and Administrative Support**

*During the term of the Master Agreement OMNIA Partners, Public Sector intends to provide marketing, sales, partnership development and administrative support for Supplier pursuant to this section that directly promotes the Supplier's products and services to Participating Public Agencies through multiple channels, each designed to promote specific products and services to Public Agencies on a national basis.*

*OMNIA Partners will assign the Supplier a Director of Partner Development who will serve as the main point of contact for the Supplier and will be responsible for managing the overall relationship between the Supplier and OMNIA Partners. The Director of Partner Development will work with the Supplier to develop a comprehensive strategy to promote the Master Agreement and will connect the Supplier with appropriate stakeholders within OMNIA Partners including, Sales, Marketing, Contracting, Training, and Operations & Support.*

*The OMNIA Partners, Public Sector marketing team will work in conjunction with Supplier to promote the Master Agreement to both existing Participating Public Agencies and prospective Public Agencies through channels that may include:*

- A. Marketing collateral (print, electronic, email, presentations)*
- B. Website*
- C. Trade shows/conferences/meetings*
- D. Advertising*
- E. Social Media*

*The OMNIA Partners, Public Sector sales teams will work in conjunction with Supplier to promote the Master Agreement to both existing Participating Public Agencies and prospective Public Agencies through initiatives that may include:*

- A. Individual sales calls*
- B. Joint sales calls*
- C. Communications/customer service*
- D. Training sessions for Public Agency teams*
- E. Training sessions for Supplier teams*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*The OMNIA Partners, Public Sector contracting teams will work in conjunction with Supplier to promote the Master Agreement to both existing Participating Public Agencies and prospective Public Agencies through:*

- A. Serving as the subject matter expert for questions regarding joint powers authority and state statutes and regulations for cooperative purchasing*
- B. Training sessions for Public Agency teams*
- C. Training sessions for Supplier teams*
- D. Regular business reviews to monitor program success*
- E. General contract administration*

*Suppliers are required to pay an administrative fee of 4% of the greater of the Contract Sales under the Master Agreement and Guaranteed Contract Sales under this Request for Proposal. Supplier will be required to execute the OMNIA Partners, Public Sector Administration Agreement (Exhibit B).*

## **1.3 Estimated Volume**

*The dollar volume purchased under the Master Agreement is estimated to be approximately \$10 million annually. While no minimum volume is guaranteed to Supplier, the estimated annual volume is projected based on the current annual volumes among the Principal Procurement Agency, other Participating Public Agencies that are anticipated to utilize the resulting Master Agreement to be made available to them through OMNIA Partners, Public Sector, and volume growth into other Public Agencies through a coordinated marketing approach between Supplier and OMNIA Partners, Public Sector.*

## **1.4 Award Basis**

*The basis of any contract award resulting from this RFP made by Principal Procurement Agency will, at OMNIA Partners, Public Sector's option, be the basis of award on a national level through OMNIA Partners, Public Sector. If multiple Suppliers are awarded by Principal Procurement Agency under the Master Agreement, those same Suppliers will be required to extend the Master Agreement to Participating Public Agencies through OMNIA Partners, Public Sector. Utilization of the Master Agreement by Participating Public Agencies will be at the discretion of the individual Participating Public Agency. Certain terms of the Master Agreement specifically applicable to the Principal Procurement Agency (e.g. governing law) are subject to modification for each Participating Public Agency as Supplier, such Participating Public Agency and OMNIA Partners, Public Sector shall agree without being in conflict with the Master Agreement. Participating Agencies may request to enter into a separate supplemental agreement to further define the level of service requirements over and above the minimum defined in the Master Agreement (i.e. invoice requirements, order requirements, specialized delivery, diversity requirements such as minority and woman owned businesses, historically underutilized business, governing law, etc.). It shall be the responsibility of the Supplier to comply, when applicable, with the prevailing wage legislation in effect in the jurisdiction of the Participating Agency. It shall further be the responsibility of the Supplier to monitor the prevailing wage rates as established by the appropriate department of labor for any increase in rates during the term of the Master Agreement and adjust wage rates accordingly. Any supplemental agreement developed as a result of the Master Agreement is exclusively between the Participating Agency and the Supplier (Contract Sales are reported to OMNIA Partners, Public Sector).*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*All purchase orders issued and accepted by the Supplier may survive expiration or termination of the Master Agreement. Participating Agencies' purchase orders may exceed the term of the Master Agreement if the purchase order is issued prior to the expiration of the Master Agreement. Supplier is responsible for reporting all sales and paying the applicable administrative fee for sales that use the Master Agreement as the basis for the purchase order, even though Master Agreement may have expired.*

## 1.5 Objectives of Cooperative Program

*This RFP is intended to achieve the following objectives regarding availability through OMNIA Partners, Public Sector's cooperative program:*

- A. Provide a comprehensive competitively solicited and awarded national agreement offering the Products covered by this solicitation to Participating Public Agencies;*
- B. Establish the Master Agreement as the Supplier's primary go to market strategy to Public Agencies nationwide;*
- C. Achieve cost savings for Supplier and Public Agencies through a single solicitation process that will reduce the Supplier's need to respond to multiple solicitations and Public Agencies need to conduct their own solicitation process;*
- D. Combine the aggregate purchasing volumes of Participating Public Agencies to achieve cost effective pricing.*

## 2.0 REPRESENTATIONS AND COVENANTS

*As a condition to Supplier entering into the Master Agreement, which would be available to all Public Agencies, Supplier must make certain representations, warranties and covenants to both the Principal Procurement Agency and OMNIA Partners, Public Sector designed to ensure the success of the Master Agreement for all Participating Public Agencies as well as the Supplier.*

### 2.1 Corporate Commitment

*Supplier commits that (1) the Master Agreement has received all necessary corporate authorizations and support of the Supplier's executive management, (2) the Master Agreement is Supplier's primary "go to market" strategy for Public Agencies, (3) the Master Agreement will be promoted to all Public Agencies, including any existing customers, and Supplier will transition existing customers, upon their request, to the Master Agreement, and (4) that the Supplier has read and agrees to the terms and conditions of the Administration Agreement with OMNIA Partners, Public Sector and will execute such agreement concurrent with and as a condition of its execution of the Master Agreement with the Principal Procurement Agency. Supplier will identify an executive corporate sponsor and a separate national account manager within the RFP response that will be responsible for the overall management of the Master Agreement.*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## 2.2 Pricing Commitment

*Supplier commits the not-to-exceed pricing provided under the Master Agreement pricing is its lowest available (net to buyer) to Public Agencies nationwide and further commits that if a Participating Public Agency is eligible for lower pricing through a national, state, regional or local or cooperative contract, the Supplier will match such lower pricing to that Participating Public Agency under the Master Agreement.*

## 2.3 Sales Commitment

*Supplier commits to aggressively market the Master Agreement as its go to market strategy in this defined sector and that its sales force will be trained, engaged and committed to offering the Master Agreement to Public Agencies through OMNIA Partners, Public Sector nationwide. Supplier commits that all Master Agreement sales will be accurately and timely reported to OMNIA Partners, Public Sector in accordance with the OMNIA Partners, Public Sector Administration Agreement. Supplier also commits its sales force will be compensated, including sales incentives, for sales to Public Agencies under the Master Agreement in a consistent or better manner compared to sales to Public Agencies if the Supplier were not awarded the Master Agreement.*

## 3.0 SUPPLIER RESPONSE

*Supplier must supply the following information in order for the Principal Procurement Agency to determine Supplier's qualifications to extend the resulting Master Agreement to Participating Public Agencies through OMNIA Partners, Public Sector.*



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## 3.1 Company

### *A. Brief history and description of Supplier to include experience providing similar products and services.*

TDIndustries- A Partnership of the Spirit

Founded in 1946, TDIndustries has developed into one of America's premier facilities service and specialty construction companies. We are among the top 60 specialty Environmental / Mechanical/ Plumbing and Service companies in the United States and among the top 3 in Texas.

By creating a partnership with you, our customers, we are able to fulfill all your indoor environment needs through our diverse mix of lifecycle services and value-based solutions. TDIndustries is also among the most experienced facility construction companies in Texas. We know how to stage a project in an occupied building/campus setting, plan and implement the work with minimal disruption to the business at hand. In addition, our large pool of experienced technicians and installers gives TDIndustries the ability to deliver large-scale construction projects all at once on multiple campuses or at individual locations.

TDIndustries customers and employees work to fulfill our mission: We are committed to providing outstanding career opportunities by exceeding our customers' expectations through continuous aggressive improvement.

In-House Capabilities and Services – Our goal is to help you make the most of your investment in a facility. TDIndustries capably provides self-performed construction, installation, service and operations for the following systems that serve Government Entities existing facilities or ground-up construction projects.

- » Energy Savings Performance and Management Solutions
- » Facilities Maintenance and Operations / Facilities Management Services
- » Building Automation Systems / Systems Integration Services
- » Heating, Ventilation and Air Conditioning
- » Plumbing / Electrical / Refrigeration
- » Process and High Purity Piping
- » Life Safety Systems
- » Site-based Facilities Management Services

We believe that having more in-house capabilities than our traditional competitors adds tremendous benefit to Government Entities.

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## *B. Total number and location of sales persons employed by Supplier.*

TDIndustries employs 2,807 partners in nine different geographies.

## *C. Number and location of support centers (if applicable) and location of corporate office.*

- » Dallas Office (Corporate Office), 13850 Diplomat Drive, Dallas, TX 75234
- » Fort Worth Office, Fort Worth, TX
- » Lubbock Office, Lubbock, TX
- » Richardson Office, Richardson, TX
- » San Antonio Office, San Antonio, TX
- » Austin Office, Austin, TX
- » Houston Office, Houston, TX
- » Phoenix Office, Phoenix, AZ
- » Denver Office, Denver, CO

## *D. Annual sales for the three previous fiscal years.*

- » 2019 - \$694,000,000
- » 2018 - \$630,992,356
- » 2017 - \$604,187,137

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

a. Submit FEIN and Dunn & Bradstreet report.

FEIN Number: 26-0464612

2/18/2019

D&B Credit - Report - Summary

Information not correct? [Submit an investigation](#)

Order Reference: [connie.williams@tdindustries.com](mailto:connie.williams@tdindustries.com) | Report as of: 02-18-2019 8:26 PM |  
using Currency as USD ([Change](#))

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company

**Address:** 13850 Diplomat Dr, Dallas, TX, 75234, UNITED STATES

**Phone:** (972) 888-9500

**D-U-N-S:** 00-736-8780

---

<b>Failure Score</b> <span style="font-size: 2em; color: #e67e22;">44</span> <small>▲ 12 (in the last month)</small>	<b>Delinquency Score</b> <span style="font-size: 2em; color: #e67e22;">81</span> <small>▼ 5 (in the last month)</small>	<b>Age of Business</b> <span style="font-size: 2em; color: #e67e22;">73 years</span> <small>1946 Year Started</small>	<b>Employees</b> <span style="font-size: 2em; color: #e67e22;">1,600</span> <small>900 (here)</small>
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### COMPANY PROFILE

<b>D-U-N-S</b> 00-736-8780	<b>Mailing Address</b> United States	<b>Employees</b> 1,600 (900 here)
<b>Legal Form</b> Corporation (US)	<b>Telephone</b> (972) 888-9500	<b>Age (Year Started)</b> 73 years (1946)
<b>History Record</b> Clear	<b>Website</b> <a href="http://www.tdindustries.com">www.tdindustries.com</a>	<b>Named Principal</b> Paul Minton, CHM
<b>Ownership</b> Not publicly traded	<b>Present Control Succeeded</b> 1946	<b>Line of Business</b> Plumbing/heating/air cond contractor

**Street Address:**  
 13850 Diplomat Dr  
 Dallas TX 75234  
 UNITED STATES

### RISK ASSESSMENT

Overall Business Risk

Maximum Credit Recommendation

<https://credit.dnb.com/report/007368780?country=US>

1/4



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Summary



## Dun & Bradstreet Thinks...

- Overall assessment of this organization over the next 12 months: **STABLE CONDITION**
- Based on the predicted risk of business discontinuation: **LIKELIHOOD OF CONTINUED OPERATIONS**
- Based on the predicted risk of severely delinquent payments: **LOW POTENTIAL FOR SEVERELY DELINQUENT PAYMENTS**

US\$ 2,650,000

The recommended limit is based on a moderately low probability of severe delinquency.

## D&B Viability Rating

### Portfolio Comparison Score

2

Low Risk (1)

High Risk (9)

Company's risk level is: **LOW**

Probability that a company will go out of business, become dormant/inactive, or file for bankruptcy/insolvency within the next 12 months: **3.00 %**

## Failure Score Formerly Financial Stress Score

44

Low Risk (100)

High Risk (1)

Company's risk level is: **MODERATE**

Probability of failure over the next 12 months: **0.27 %**

### Past 12 Months



## Delinquency Score Formerly Commercial Credit Score

81

Low Risk (100)

High Risk (1)

Company's risk level is: **LOW-MODERATE**

Probability of delinquency over the next 12 months: **2.47 %**

### Past 12 Months



## PAYDEX

79

Low Risk (100)

High Risk (0)

Days Beyond Terms : **2**

### Past 24 Months



## D&B Rating

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

Employee Size	Risk Indicator	D&B Credit - Report - Summary	Employee Size	Risk Indicator
<b>1R</b> : 10 employees and over	<b>3</b> : Moderate Risk		<b>1R</b> : 10 employees and over	<b>2</b> : Low Risk

LEGAL EVENTS	TRADE PAYMENTS																										
<table border="1"> <thead> <tr> <th>Events</th> <th>Occurrences</th> <th>Last Filed</th> </tr> </thead> <tbody> <tr> <td>Bankruptcies</td> <td>0</td> <td>-</td> </tr> <tr> <td>Judgements</td> <td>0</td> <td>-</td> </tr> <tr> <td>Liens</td> <td>0</td> <td>-</td> </tr> <tr> <td>Suits</td> <td>0</td> <td>-</td> </tr> <tr> <td>UCC</td> <td>33</td> <td>11-01-2017</td> </tr> </tbody> </table>	Events	Occurrences	Last Filed	Bankruptcies	0	-	Judgements	0	-	Liens	0	-	Suits	0	-	UCC	33	11-01-2017	<p><b>Highest Past Due</b></p> <p>US\$ 20,000</p> <table border="1"> <tbody> <tr> <td><b>Highest Now Owing</b></td> <td><b>Total Trade Experiences</b></td> </tr> <tr> <td><b>US\$ 2,000,000</b></td> <td><b>258</b></td> </tr> <tr> <td><b>Largest High Credit</b></td> <td><b>Average High Credit</b></td> </tr> <tr> <td><b>US\$ 4,000,000</b></td> <td><b>US\$ 69,858</b></td> </tr> </tbody> </table>	<b>Highest Now Owing</b>	<b>Total Trade Experiences</b>	<b>US\$ 2,000,000</b>	<b>258</b>	<b>Largest High Credit</b>	<b>Average High Credit</b>	<b>US\$ 4,000,000</b>	<b>US\$ 69,858</b>
Events	Occurrences	Last Filed																									
Bankruptcies	0	-																									
Judgements	0	-																									
Liens	0	-																									
Suits	0	-																									
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<b>US\$ 4,000,000</b>	<b>US\$ 69,858</b>																										

OWNERSHIP
<p>This company is a <b>Global Ultimate, Domestic Ultimate, Headquarters</b></p> <p><b>Global Ultimate, Domestic Ultimate</b>  <a href="#">TDINDUSTRIES, INC.</a>  <b>UNITED STATES</b>            D-U-N-S Number <a href="#">00-736-8780</a></p> <p>Total Members in <a href="#">Family Tree</a> - 12</p> <p>Branches</p> <p>11</p>

FINANCIAL OVERVIEW
<p>This company does not have a Financial Summary.</p>

WEB & SOCIAL
<p>NOTE: The information in this section is gathered using sophisticated search algorithms to identify relevant stories about this business. Please note that on occasion WWW and Twitter information may be erroneously matched to articles that may also contain similar terminology. Readers should ensure article applicability prior to making risk decisions.</p>

COUNTRY/REGIONAL INSIGHT
<p><b>United States</b></p> <p><b>Risk Category</b></p> <p>LOW MODERATE HIGH</p> <p>Low Risk High Risk</p> <p>Labour market strength continues to defy expectations.</p>

<https://credit.dnb.com/report/007368780?country=US>



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Summary

Texas & Louisiana People: Construction business updates for February 2019 ENR 05-Feb-2019

Satori Capital Invests in Able Machinery Movers Business Wire 11-Jan-2019

TDIndustries Promotes Sheri Tillman to General Counsel CONTRACTOR Magazine 18-Dec-2018

Pace of Work Holds Steady for Region's Subcontractors ENR 12-Dec-2018

Silicon Valley's Radical New Idea: Treat Employees Well AFKInsider 07-Dec-2018

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<https://credit.dnb.com/report/007368780?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Risk Assessment

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Risk Assessment

#### D&B RISK ASSESSMENT

##### Overall Business Risk



##### Maximum Credit Recommendation

US\$ 2,650,000

##### Dun & Bradstreet Thinks...

- Overall assessment of this organization over the next 12 months: **STABLE CONDITION**
- Based on the predicted risk of business discontinuation: **LIKELIHOOD OF CONTINUED OPERATIONS**
- Based on the predicted risk of severely delinquent payments: **LOW POTENTIAL FOR SEVERELY DELINQUENT PAYMENTS**

The recommended limit is based on a moderately low probability of severe delinquency.

#### D&B VIABILITY RATING

##### Portfolio Comparison Score



##### Rating Confidence Level



##### Data Depth

- Rich Firmographics
- Extensive Commercial Trading Activity
- Basic Financial Attributes

Level of Risk  
**Low**

Probability of becoming no longer viable  
**3.00%**

Percentage of businesses ranked with this score  
**16.00%**

Average probability of becoming no longer viable  
**5.00%**

#### FAILURE SCORE Formerly Financial Stress Score



- Low proportion of satisfactory payment experiences to total payment experiences
- UCC Filings reported
- High proportion of slow payment experiences to total number of payment experiences
- High number of enquiries to D&B over last 12 months

Level of Risk  
**Moderate**

Raw Score  
**1470**

Probability of Failure  
**0.27%**

Average Probability of Failure for Businesses in D&B Database  
**0.48%**

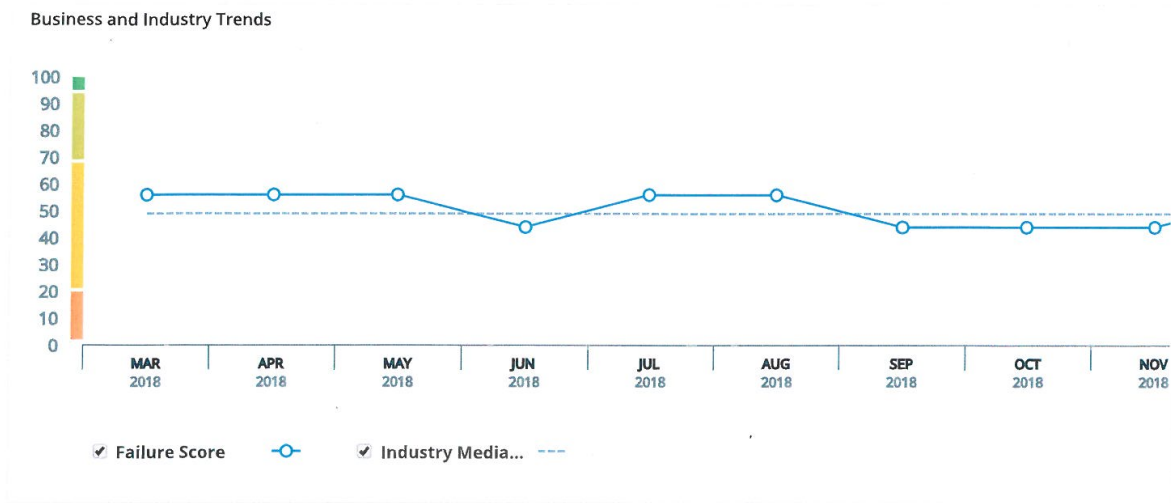
<https://credit.dnb.com/report/007368780/risk-assessment?country=US>



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Risk Assessment



**DELINQUENCY SCORE** Formerly Commercial Credit Score

81  
Low Risk (100)

High Risk (1)

- Higher risk industry based on delinquency rates for this industry
- Proportion of slow payments in recent months
- Proportion of past due balances to total amount owing

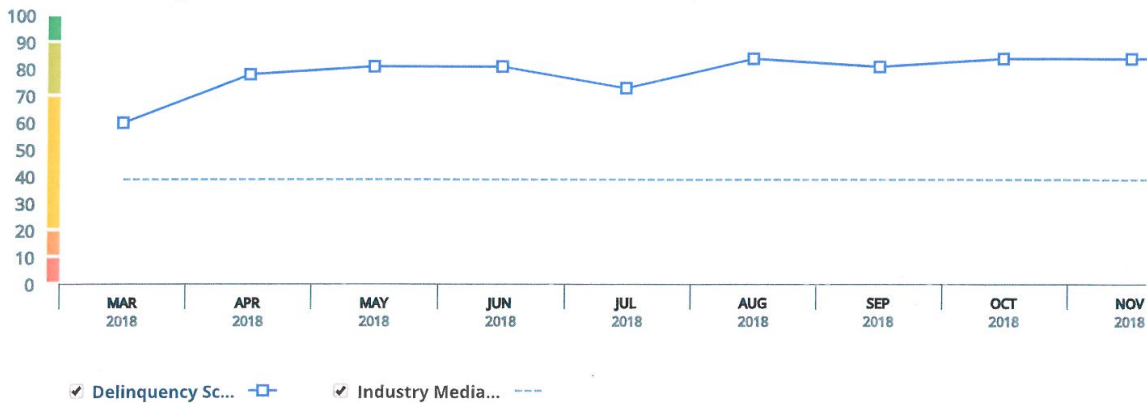
Level of Risk  
**Low-Moderate**

Raw Score  
**553**

Probability of Delinquency  
**2.47%**

Compared to Businesses in D&B Database  
**10.20%**

**Business and Industry Trends**



**PAYDEX**

Based on 24 months of data

79  
Low Risk (100)

High Risk (0)

Risk of Slow Pay  
**Low**

Payment Behavior  
**2 Days Beyond Terms**

**Business and Industry Trends**

1711 - Plumbing/heating/air cond contractor

<https://credit.dnb.com/report/007968780/risk-assessment?country=US>

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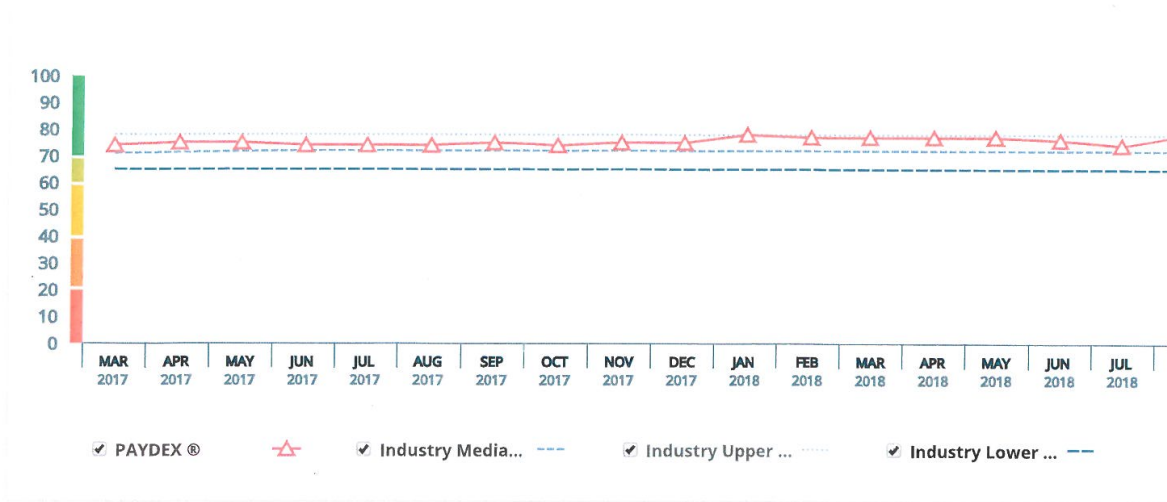




# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Risk Assessment



## D&B RATING

Current Rating as of 04-26-2016

Previous Rating

Employee Size

Risk Indicator

Employee Size

Risk Indicator

**1R** : 10 employees and over

**3** : Moderate Risk

**1R** : 10 employees and over

**2** : Low Risk

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Trade Payments

#### TRADE PAYMENTS SUMMARY (Based on 24 months of data)

Overall Payment Behavior

**2**

Days Beyond Terms

% of Trade Within Terms

**72%**

Highest Past Due

**US\$  
20,000**

Highest Now Owing:

US\$ 2,000,000

Total Trade

Experiences:

258

Largest High Credit:  
US\$ 4,000,000

Average High Credit:  
US\$ 69,858

Total Unfavorable

Comments:

0

Largest High Credit:  
US\$ 0

Total Placed in

Collections:

1

Largest High Credit:  
US\$ 0

#### TRADE PAYMENTS BY CREDIT EXTENDED (Based on 12 months of data)

Range of Credit Extended (US\$)	Number of Payment Experiences	Total Value	% Within Terms
100,000 & over	19	US\$ 12,650,000	98
50,000 - 99,999	10	US\$ 640,000	92
15,000 - 49,999	34	US\$ 890,000	83
5,000 - 14,999	32	US\$ 227,500	78
1,000 - 4,999	56	US\$ 102,500	65
Less than 1,000	57	US\$ 20,500	61

#### TRADE PAYMENTS BY INDUSTRY (Based on 24 months of data)

[Collapse All](#) | [Expand All](#)

Industry Category	Number of Payment Experiences	Largest High Credit (US\$)	% Within Terms (Expand to View)	1 - 30 Days Late (%)	31 - 60 Days Late (%)	61 - 90 Days Late (%)	91 + Days Late (%)
▶ 14 - Mining and Quarrying of Non-metallic Minerals except Fuels	1	35,000					

<https://credit.dnb.com/raport/007368780/trade-payments?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

Industry Category	Number of Payment Experiences	Largest High Credit (US\$)	% Within Terms (Expand to View)	1 - 30 Days Late (%)	31 - 60 Days Late (%)	61 - 90 Days Late (%)	91 + Days Late (%)
▶ 17 - Construction - Special Trade Contractors	6	1,000,000					
▶ 30 - Rubber and Miscellaneous Plastics Products	1	7,500					
▶ 35 - Industrial and Commercial Machinery and Computer Equipment	23	4,000,000					
▶ 36 - Electronic and other electrical equipment and components except computer equipment	7	500,000					
▶ 37 - Transportation Equipment	3	25,000					
▶ 38 - Measuring Analyzing and Controlling Instruments; Photographic Medical and Optical Goods; Watches and Clocks	2	10,000					
▶ 42 - Motor Freight Transportation and Warehousing	1	500					
▶ 47 - Transportation Services	1	1,000					
▶ 48 - Communications	12	95,000					
▶ 49 - Electric, Gas and Sanitary Services	1	250					
▶ 50 - Wholesale Trade - Durable Goods	62	1,000,000					
▶ 51 - Wholesale Trade - Nondurable Goods	9	20,000					
▶ 55 - Automotive Dealers and Gasoline Service Stations	1	15,000					
▶ 57 - Home Furniture Furnishings and Equipment Stores	1	1,000					
▶ 59 - Miscellaneous Retail	4	30,000					
▶ 60 - Depository Institutions	4	10,000					
▶ 61 - Nondepository Credit Institutions	7	25,000					
▶ 70 - Hotels Rooming Houses Camps and other Lodging Places	1	1,000					
▶ 72 - Personal Services	2	7,500					
▶ 73 - Business Services	18	60,000					
▶ 75 - Automotive Repair, Services and Parking	7	5,000					
▶ 87 - Engineering Accounting Research Management and Related Services	3	25,000					
▶ 93 - Public Finance Taxation and Monetary Policy	12	20,000					

<https://credit.dnb.com/report/007368780/trade-payments?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

Industry Category	Number of Payment Experiences	Largest High Credit (US\$)	% Within Terms (Expand to View)	1 - 30 Days Late (%)	31 - 60 Days Late (%)	61 - 90 Days Late (%)	91 + Days Late (%)
TRADE LINES							
Select Date Range							
Date of Experience	Payment Status	Selling Terms	High Credit (US\$)	Now Owes (US\$)	Past Due (US\$)	Months Since Last Sale	
02/19	Pays Promptly	-	2,500	750	0	1	
02/19	Pays Prompt to Slow 45+	-	2,500	0	0	Between 2 and 3 Months	
01/19	payment-status-discount	-	2,500	50	50	Between 4 and 5 Months	
01/19	Pays Promptly	-	1,000,000	0	0	1	
01/19	Pays Promptly	-	1,000,000	1,000,000	0	1	
01/19	Pays Promptly	-	600,000	600,000	0	1	
01/19	Pays Promptly	-	400,000	250,000	0	1	
01/19	Pays Promptly	-	200,000	0	0	1	
01/19	Pays Promptly	-	100,000	10,000	0	1	
01/19	Pays Promptly	-	75,000	10,000	0	1	
01/19	Pays Promptly	-	55,000	5,000	0	1	
01/19	Pays Promptly	-	45,000	5,000	0	1	
01/19	Pays Promptly	N30	45,000	45,000	0	1	
01/19	Pays Promptly	-	40,000	0	0	Between 6 and 12 Months	
01/19	Pays Promptly	-	30,000	2,500	0	1	
01/19	Pays Promptly	-	25,000	15,000	0	1	
01/19	Pays Promptly	-	20,000	0	0	Between 6 and 12 Months	
01/19	Pays Promptly	-	15,000	7,500	0	1	
01/19	Pays Promptly	-	15,000	10,000	0	1	
01/19	Pays Promptly	-	10,000	0	0	1	
01/19	Pays Promptly	-	7,500	2,500	0	1	
01/19	Pays Promptly	-	7,500	7,500	0	1	
01/19	Pays Promptly	-	7,500	2,500	0	1	
01/19	Pays Promptly	-	5,000	0	0	1	

<https://credit.dnb.com/report/007368780/trade-payments?country=US>



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

Date of Experience	Payment Status	Selling Terms	High Credit (US\$)	Now Owes (US\$)	Past Due (US\$)	Months Since Last Sale
01/19	Pays Promptly	-	2,500	0	0	Between 6 and 12 Months
01/19	Pays Promptly	N30	2,500	2,500	0	1
01/19	Pays Promptly	-	2,500	1,000	0	1
01/19	Pays Promptly	-	2,500	250	0	1
01/19	Pays Promptly	-	2,500	2,500	0	1
01/19	Pays Promptly	-	2,500	2,500	100	1
01/19	Pays Promptly	N30	1,000	0	0	1
01/19	Pays Promptly	-	1,000	0	0	Between 6 and 12 Months
01/19	Pays Promptly	-	1,000	0	0	Between 2 and 3 Months
01/19	Pays Promptly	-	1,000	0	0	Between 4 and 5 Months
01/19	Pays Promptly	-	1,000	0	0	Between 6 and 12 Months
01/19	Pays Promptly	-	1,000	500	0	1
01/19	Pays Promptly	-	1,000	0	0	Between 6 and 12 Months
01/19	Pays Promptly	N30	1,000	0	0	Between 6 and 12 Months
01/19	Pays Promptly	-	1,000	500	0	1
01/19	Pays Promptly	-	1,000	750	0	1
01/19	Pays Promptly	-	750	750	0	1
01/19	Pays Promptly	N30	750	750	0	1
01/19	Pays Promptly	N90	500	50	0	1
01/19	Pays Promptly	-	500	0	0	Between 6 and 12 Months
01/19	Pays Promptly	-	500	0	0	Between 6 and 12 Months
01/19	Pays Promptly	PROX	500	50	0	1
01/19	Pays Promptly	-	500	0	0	Between 2 and 3 Months
01/19	Pays Promptly	-	500	50	0	1
01/19	Pays Promptly	-	250	0	0	Between 4 and 5 Months

<https://credit.dnb.com/report/007368780/trade-payments?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

Date of Experience	Payment Status	Selling Terms	High Credit (US\$)	Now Owes (US\$)	Past Due (US\$)	Months Since Last Sale
01/19	Pays Promptly	-	50	0	0	Between 4 and 5 Months
01/19	Pays Prompt to Slow 15+	-	1,000	1,000	500	1
01/19	Pays Prompt to Slow 30+	-	250,000	0	0	Between 6 and 12 Months
01/19	Pays Prompt to Slow 30+	-	55,000	35,000	5,000	1
01/19	Pays Prompt to Slow 30+	-	25,000	0	0	1
01/19	Pays Prompt to Slow 30+	-	15,000	5,000	0	1
01/19	Pays Prompt to Slow 30+	-	5,000	5,000	1,000	1
01/19	Pays Prompt to Slow 30+	-	2,500	0	0	Between 2 and 3 Months
01/19	Pays Prompt to Slow 30+	-	1,000	750	100	1
01/19	Pays Prompt to Slow 30+	-	1,000	1,000	0	1
01/19	Pays Prompt to Slow 30+	-	750	0	0	1
01/19	Pays Prompt to Slow 30+	N30	750	0	0	Between 6 and 12 Months
01/19	Pays Prompt to Slow 60+	-	-	100	0	1
01/19	Pays Prompt to Slow 60+	-	2,500	0	0	Between 4 and 5 Months
01/19	Pays Prompt to Slow 90+	-	7,500	2,500	750	1
01/19	Pays Prompt to Slow 90+	-	2,500	500	500	Between 2 and 3 Months
01/19	Pays Prompt to Slow 90+	-	250	250	250	1
01/19	Pays Prompt to Slow 150+	N30	250	0	0	Between 2 and 3 Months
01/19	Pays Slow 30+	-	2,500	0	0	Between 6 and 12 Months
01/19	Pays Slow 30+	-	1,000	250	0	1
01/19	Pays Slow 30+	-	1,000	1,000	1,000	1
01/19	Pays Slow 30+	-	500	100	100	Between 2 and 3 Months

<https://credit.dnb.com/report/007368780/trade-payments?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Trade Payments

<u>Date of Experience</u>	Payment Status	Selling Terms	High Credit (US\$)	Now Owes (US\$)	Past Due (US\$)	Months Since Last Sale
01/19	Pays Slow 90+	-	50	50	50	Between 2 and 3 Months
01/19	Pays Slow 120+	-	1,000	1,000	1,000	1
01/19	-	Cash account	0	0	0	Between 2 and 3 Months
12/18	Pays Slow 15+	-	5,000	5,000	5,000	1
12/18	Pays Slow 90+	-	1,000	750	0	1
12/18	Pays Slow 180+	-	50	0	0	Between 6 and 12 Months

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Legal Events

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Legal Events

The following Public Filing data is for information purposes only and is not the official record. Certified copies can only be obtained from the official source.

<b>Judgements</b> 0 Latest Filing: -	<b>Liens</b> 0 Latest Filing: -	<b>Suits</b> 0 Latest Filing: -	<b>UCC Filings</b> 33 Latest Filing: 11-01-2017
--	---------------------------------------	---------------------------------------	---

#### EVENTS

All Event Types

All Dates

Apply

Reset

#### UCC Filing - Original

Filing Date	05-02-2017
Filing Number	170014892385
Received Date	05-09-2017
Collateral	Negotiable instruments and proceeds - Account(s) and proceeds - Timber and proceeds - Oil, gas and minerals and proceeds - and OTHERS
Secured Party	JPMORGAN CHASE BANK, N.A., DALLAS, TX
Debtors	TDINDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

#### UCC Filing - Original

Filing Date	05-01-2017
Filing Number	170014834644
Received Date	05-09-2017
Collateral	Account(s) and proceeds - Timber and proceeds - Oil, gas and minerals and proceeds - Fixtures and proceeds - and OTHERS
Secured Party	JPMORGAN CHASE BANK, N.A., DALLAS, TX

https://credit.dbb.com/report/007368780/legalEvents?country=US

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Legal Events

Debtors

TDINDUSTRIES, INC.

Filing Office

SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

## UCC Filing - Continuation

Filing Date	01-23-2017
Filing Number	20170480662
Received Date	03-10-2017
Original Filing Date	06-28-2007
Original Filing Number	2007 2469111
Secured Party	JPMORGAN CHASE BANK, N.A., LOUISVILLE, KY
Debtors	TD INDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE

## UCC Filing - Original

Filing Date	04-11-2016
Filing Number	160011444405
Received Date	04-19-2016
Collateral	Leased Building(s)
Secured Party	NORTEX MODULAR LEASING AND CONSTRUCTION COMPANY DBA BOXX MODULAR, LEWISVILLE, TX
Debtors	TD INDUSTRIES, FORT WORTH, TX
Filing Office	SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

## UCC Filing - Continuation

Filing Date	03-09-2015
Filing Number	1500068550
Received Date	03-10-2015
Original Filing Date	08-31-2010
Original Filing Number	100025337112
Secured Party	JPMORGAN CHASE BANK, N.A., LOUISVILLE, KY
Debtors	TDINDUSTRIES, INC.

<https://credit.dnb.com/report/007368780/legalEvents?country=US>

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Legal Events

Filing Office

SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

## UCC Filing - Continuation

Filing Date	01-12-2012
Filing Number	2012 0161275
Received Date	02-24-2012
Original Filing Date	06-28-2007
Original Filing Number	2007 2469111
Secured Party	JPMORGAN CHASE BANK, N.A., LOUISVILLE, KY
Debtors	TD INDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE

## UCC Filing - Original

Filing Date	08-31-2010
Filing Number	100025337112
Received Date	09-07-2010
Collateral	Inventory and proceeds - Account(s) and proceeds - General intangibles(s) and proceeds - Equipment and proceeds - Chattel paper and proceeds
Secured Party	JPMORGAN CHASE BANK, N.A., LOUISVILLE, KY
Debtors	TDINDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

## UCC Filing - Original

Filing Date	03-05-2010
Filing Number	100006401466
Received Date	03-19-2010
Collateral	Equipment and proceeds
Secured Party	UNITED RENTALS NORTHWEST, INC., IRVING, TX
Debtors	TDINDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

## UCC Filing - Original



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Legal Events

Filing Date	06-28-2007
Filing Number	2007 2469111
Received Date	08-07-2007
Collateral	Inventory and proceeds - Account(s) and proceeds - General intangibles(s) and proceeds - Equipment and proceeds - Chattel paper and proceeds
Secured Party	JPMORGAN CHASE BANK, N.A., LOUISVILLE, KY
Debtors	TD INDUSTRIES, INC.
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE
<b>UCC Filing - Original</b>	
Filing Date	02-02-2007
Filing Number	2007 0434851
Received Date	05-21-2007
Collateral	Equipment
Secured Party	TOYOTA MOTOR CREDIT CORPORATION, TORRANCE, CA
Debtors	TD INDUSTRIES LTD
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE
<b>UCC Filing - Amendment</b>	
Filing Date	01-22-2007
Filing Number	2007 0260017
Received Date	02-26-2007
Original Filing Number	6457277 2
Secured Party	MOORE, TAMMY
Debtors	TD INDUSTRIES LTD
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE
<b>UCC Filing - Original</b>	
Filing Date	12-29-2006
Filing Number	6457277 2
Received Date	01-25-2007

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

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D&B Credit - Report - Legal Events

Collateral	Equipment
Secured Party	TOYOTA MOTOR CREDIT CORPORATION, TORRANCE, CA
Debtors	TD INDUSTRIES MANAGEMENT LLC
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE

## UCC Filing - Original

Filing Date	12-27-2006
Filing Number	6454506 7
Received Date	01-25-2007
Collateral	Equipment
Secured Party	TOYOTA MOTOR CREDIT CORPORATION, TORRANCE, CA
Debtors	TD INDUSTRIES LTD
Filing Office	SECRETARY OF STATE/UCC DIVISION, DOVER, DE

## UCC Filing - Original

Filing Date	02-09-2006
Filing Number	060004515566
Received Date	02-24-2006
Collateral	Leased Computer equipment including proceeds and products - Leased Business machinery/equipment including proceeds and products - Leased Equipment including proceeds and products
Secured Party	KIP AMERICA, INC., JACKSONVILLE, FL
Debtors	TD INDUSTRIES MANAGEMENT LLC
Filing Office	SECRETARY OF STATE/UCC DIVISION, AUSTIN, TX

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There may be additional UCC Filings in D&B's file on this company available by contacting 1-800-234-3867.

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

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D&B Credit - Report - Legal Events

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Special Events

**TDINDUSTRIES, INC.**

Tradestyle(s): -

 Track this Company



## Special Events

12-19-2016

The Chief Executive Officer is now Paul Minton, CHM.

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Company Profile

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Company Profile

#### COMPANY OVERVIEW

<b>D-U-N-S</b> 00-736-8780	<b>Mailing Address</b> United States	<b>Employees</b> 1,600 (900 here)
<b>Legal Form</b> Corporation (US)	<b>Telephone</b> (972) 888-9500	<b>Age (Year Started)</b> 73 years (1946)
<b>History Record</b> Clear	<b>Website</b> <a href="http://www.tdindustries.com">www.tdindustries.com</a>	<b>Named Principal</b> Paul Minton, CHM
<b>Ownership</b> Not publicly traded	<b>Present Control Succeeded</b> 1946	<b>Line of Business</b> Plumbing/heating/air cond contractor

#### Street Address:

13850 Diplomat Dr  
Dallas TX 75234  
UNITED STATES

#### BUSINESS REGISTRATION

Corporate and business registrations reported by the secretary of state or other official source as of: -  
This data is for informational purposes only, certification can only be obtained through the Office of the Secretary of State.

<b>Registered Name</b>	TDINDUSTRIES, INC.
<b>Corporation Type</b>	Corporation (US)
<b>Business Commenced On</b>	1946

#### PRINCIPALS

##### Officers

PAUL MINTON, CHM  
HAROLD F. MACDOWELL, CEO  
LAWRENCE UNDERWOOD, EXECUTIVE

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Company Profile

MAUREEN UNDERWOOD, EX V PRES  
JASON CINEK, SR V PRES  
MICHAEL J. KOTUBEY, PRES  
ROD JOHANNSEN, V PRES  
PHIL CLAYBROOKE, V PRES  
BEN HOUSTON, DIR  
MICHAEL J FITZPATRICK, CFO

## Directors

DIRECTOR(S): THE OFFICER(S)

## COMPANY EVENTS

The following information was reported on: 11-24-2018

The Texas Secretary of State's business registrations file showed that TDIndustries, Inc. was registered as a Corporation on June 25, 2007, under the file Registration number 0800834585.

Business started 1946. 100% of capital stock is owned by ESOP.

### RECENT EVENTS:

On September 17, 2010, an inside source stated that TDIndustries, Inc., Dallas, TX, was acquired by JBS Mechanical, Inc., Phoenix, AZ, on September 2, 2010, for \$2.2 million. With this transaction TDIndustries, Inc. discontinued its business and its operations were integrated into TDIndustries, Inc., Tempe, AZ. Further details were unavailable.

PAUL MINTON. Antecedents are unknown.

HAROLD F. MACDOWELL born 1961. 1985-present active here.

MAUREEN UNDERWOOD. Antecedents are unknown.

JASON CINEK. Antecedents are unknown.

MICHAEL J. KOTUBEY. Served as president of MMC Contractors.

ROD JOHANNSEN. Antecedents are unknown.

PHIL CLAYBROOKE. Antecedents are unknown.

BEN HOUSTON born 1936. 1961-present active here.

MICHAEL J FITZPATRICK born 1949. 1984-present active here.

AFFILIATES: The following are related through common principals, management and/or ownership: TDIndustries Holdings, Dallas, TX. Started in 2001. Operates as a Delaware limited liability company. TDIndustries Management, Dallas, TX. Started in 2001. Operates as a Delaware limited liability company.

On January 27, 2010, an investigation revealed that the previous telephone number listed for TD Industries Inc (469 374-8733) was incorrect, and appears to have been changed without the company's knowledge. The correct telephone number is now reported as (972) 888-9500.

Former name of the business was TD Industries LTD.

## BUSINESS ACTIVITIES AND EMPLOYEES

The following information was reported on: 11-24-2018

### Business Information

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Company Profile

## Business Information

<b>Description</b>	Contractor of heating and air conditioning systems. Contracts call for. Terms are. Has 4000 account(s). Terms are Net 30 days and contractual basis. Sells to commercial concerns. Territory : United States.
<b>Employees</b>	1,600 which includes officer(s). 900 employed here.
<b>Financing Status</b>	Secured
<b>Seasonality</b>	Nonseasonal.
<b>Tenure</b>	Owns
<b>Facilities</b>	Owns 120,000 sq. ft. in a two story steel building.
<b>Location</b>	Suburban business section on well traveled street.

## SIC/NAICS Information

SIC Codes	SIC Description	Percentage of Business
1711	Plumbing/heating/air cond contractor	-
17110400	Heating and air conditioning contractors	-
NAICS Codes	NAICS Description	
238220	Plumbing, Heating, and Air-Conditioning Contractors	

## GOVERNMENT ACTIVITY

### Activity Summary

<b>Borrower(Dir/Guar)</b>	No
<b>Administrative Debt</b>	No
<b>Contractor</b>	Yes
<b>Grantee</b>	No
<b>Party excluded from federal program(s)</b>	No

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Financials

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Financials

Source: D&B | Currency: All figures shown in USD unless otherwise stated

#### KEY BUSINESS RATIOS

Statement date	Based on Number of Establishments		
12-31-2000	25		
	Ratio for the business	Industry Median	Industry Quartile
<b>Profitability</b>			
Return On Assets	-	3.1	-
Return on Net Worth	-	13.3	-
Return on Sales	-	1.4	-
<b>Short Term Solvency</b>			
Current Liabilities to Inventory	999.9	948.3	1
Current Liabilities Over Net Worth	212.2	158.1	1
Current Ratio	1.7	1.5	1
Quick Ratio	1.4	1.2	1
<b>Efficiency</b>			
Accounts Payable to Sales	-	10.3	-
Assets Over Sales	-	49.7	-
Collection Period	-	82.5	-
Sales to Inventory	-	64.3	-
Sales Over Net Working Capital	-	8.6	-
<b>Utilization</b>			
Total Liabilities Over Net Worth	362.0	237.1	1

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Financials

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Financials

Source: D&B | Currency: All figures shown in USD unless otherwise stated

#### KEY BUSINESS RATIOS

Statement date	Based on Number of Establishments		
12-31-2000	25		
	Ratio for the business	Industry Median	Industry Quartile
<b>Profitability</b>			
Return On Assets	-	3.1	-
Return on Net Worth	-	13.3	-
Return on Sales	-	1.4	-
<b>Short Term Solvency</b>			
Current Liabilities to Inventory	999.9	948.3	1
Current Liabilities Over Net Worth	212.2	158.1	1
Current Ratio	1.7	1.5	1
Quick Ratio	1.4	1.2	1
<b>Efficiency</b>			
Accounts Payable to Sales	-	10.3	-
Assets Over Sales	-	49.7	-
Collection Period	-	82.5	-
Sales to Inventory	-	64.3	-
Sales Over Net Working Capital	-	8.6	-
<b>Utilization</b>			
Total Liabilities Over Net Worth	362.0	237.1	1

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Web and Social

## TDINDUSTRIES, INC.

Tradestyle(s): -

Track this Company



### Web & Social

The information in this section is gathered using sophisticated search algorithms to identify relevant stories about this business. Please note that on occasion WWW and Twitter information may be erroneously matched to articles that may also contain similar terminology. Readers should ensure article applicability prior to making risk decisions.

#### LATEST NEWS

Powered By FirstRain

Texas & Louisiana People: Construction business updates for February 2019 ENR 05-Feb-2019

Satori Capital Invests in Able Machinery Movers Business Wire 11-Jan-2019

TDIndustries Promotes Sheri Tillman to General Counsel CONTRACTOR Magazine 18-Dec-2018

Pace of Work Holds Steady for Region's Subcontractors ENR 12-Dec-2018

Silicon Valley?s Radical New Idea: Treat Employees Well AFKInsider 07-Dec-2018

Big project, big time and cost savings Building Design & Construction 14-Nov-2018

TDIndustries Wins Safety, Project Awards from ABC Contracting Business Magazine 09-Oct-2018

CRE Opinion: Why Internships Matter For Our Industry's Future SideDish 02-Oct-2018

See who's getting hired, promoted at Crescent Real Estate, Haynes and Boone and more for the first week of September. Biz Beat Blog 10-Sep-2018

#### TOP BUSINESS TWEETS

Powered By FirstRain

There are no recent tweets to show.

#### MANAGEMENT CHANGES

Powered By FirstRain

There are no management changes to show.

#### EVENT TIMELINE

Powered By FirstRain

DEC-2018

TDIndustries Promotes Sheri Tillman to General Counsel 18-Dec-2018

NOV-2018

Big project, big time and cost savings 14-Nov-2018

OCT-2018

TDIndustries Wins Safety, Project Awards from ABC 09-Oct-2018

SEP-2018

See whos getting hired, promoted at Crescent Real Estate, Haynes and Boone and more for the first week of September. 10-Sep-2018

AUG-2018

How ABC Members Are Working Together to Include Women on the Jobsite 27-Aug-2018

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

2/18/2019

D&B Credit - Report - Web and Social

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# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## *E. Describe any green or environmental initiatives or policies.*

We are committed to helping to build a cleaner future! As our business grows, we want to make sure we minimize our impact on the Earth's climate. So we are taking every step we can to implement innovative and responsible environmental practices throughout Region 4 ESC to reduce our carbon footprint, reduce waste, promote energy conservation, ensure efficient computing, and much more. We would like vendors to partner with us in this enterprise. To that effort, we ask respondents to provide their companies environmental policy and/or green initiative.

TDIndustries believes in doing our part to make the world a greener place. By providing recycling bins at every desk and every trash location, reducing unnecessary printing of documents and eliminating the use of Styrofoam products in our offices, Partners eliminate tons of recyclables from ending up in landfills. Furthermore, we do our part to recycle as much waste as possible on worksites by providing a separate bin for items that can be re-purposed or recycled. TDIndustries is also committed to the environment in the projects we work on. We have completed over 50 LEED certified projects and employ over 40 LEED Accredited Professionals.

## *F. Describe any diversity programs or partners supplier does business with and how Participating Agencies may use diverse partners through the Master Agreement. Indicate how, if at all, pricing changes when using the diversity program. If there are any diversity programs, provide a list of diversity alliances and a copy of their certifications.*

TDIndustries will be self-performing under this contract, and will use HUB/MWBE subcontractors as necessary. Prior to utilizing M/WBE and HUB, TD will provide any necessary documentation to Region 4 and OMNIA Partners. Therefore, pricing will not be changing from the quoted agreement.

## *G. Indicate if supplier holds any of the below certifications in any classified areas and include proof of such certification in the response:*

### *a. Minority Women Business Enterprise: No*

*If yes, list certifying agency: \_\_\_ N/A \_\_\_\_\_*

### *b. Small Business Enterprise (SBE) or Disadvantaged Business Enterprise (DBE): No*

*If yes, list certifying agency: \_\_\_ N/A \_\_\_\_\_*

### *c. Historically Underutilized Business (HUB): No*

*If yes, list certifying agency: \_\_\_ N/A \_\_\_\_\_*

### *d. Historically Underutilized Business Zone Enterprise (HUBZone): No*

*If yes, list certifying agency: \_\_\_ N/A \_\_\_\_\_*

### *e. Other recognized diversity certificate holder: No*

*If yes, list certifying agency: \_\_\_ N/A \_\_\_\_\_*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*H. List any relationships with subcontractors or affiliates intended to be used when providing services and identify if subcontractors meet minority-owned standards. If any, list which certifications subcontractors hold and certifying agency.*

TDIndustries will self perform this contract.

*I. Describe how supplier differentiates itself from its competitors.*

What makes TDIndustries stand out from our competitors is our in-house capabilities. We have the ability to perform design-build improvements with government entities to reduce utility and operating costs on both sides of the utility meter. The majority of the trade contracting work is performed by TD Partners, eliminating markup on trade subcontractor markup- providing unmatched value per dollar invested.

TDIndustries is wholly owned by employees and all employees have the ability to own stock. Over 70% of our employees own stock. Employees with an ownership stake have an even greater incentive to provide value to customers and keep them with TD. We do not take shortcuts or take a short term view of our relationships with our customers. We thrive because our customers see this value and know that TD is the best place in the market to find it.

*J. Describe any present or past litigation, bankruptcy or reorganization involving supplier.*

TDIndustries Legal Statement:

“The Company is a party to a number of legal proceedings arising in the ordinary course of business. In the opinion of management, the resolution of these proceedings will not have a material adverse effect on the financial position or results of operations of the Company.”

*Sheri L. Tillman*

Sheri L. Tillman  
Corporate Counsel  
TDIndustries | [www.tdindustries.com](http://www.tdindustries.com)  
Office 972-888-6844 | Cell 972-375-3603

*K. Felony Conviction Notice: Indicate if the supplier*

- a. is a publicly held corporation and this reporting requirement is not applicable;*
- b. is not owned or operated by anyone who has been convicted of a felony; or*
- c. is owned or operated by and individual(s) who has been convicted of a felony and provide the names and convictions.*

TDIndustries is not owned or operated by anyone who has been convicted of a felony.

*L. Describe any debarment or suspension actions taken against supplier*

TDIndustries has not had any debarment or suspension actions taken against them.



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## 3.2 Distribution, Logistics

*A. Each offeror awarded an item under this solicitation may offer their complete product and service offering/a balance of line. Describe the full line of products and services offered by supplier.*

Our primary service categories are as follows:

- » Restaurant and Refrigeration Services
- » HVAC
- » Plumbing
- » Electrical/Lighting
- » Fire and Life Safety
- » TDControls
- » TDSaves
- » Construction (New, Renovation and Expansion)
- » Emergency Services
- » Energy Audits and Solutions
- » Facility Operations
- » HVAC/Mechanical
- » Indoor Air Quality
- » Planned Maintenance
- » Process Solutions
- » Lean Manufacturing
- » Prefabrication
- » Design Build/Assist

In each of these trades, we offer preventative maintenance, equipment change-out, diagnostics, emergency service, and everything in-between.

TDIndustries provides preventative maintenance, repair and emergency service 1/24 with 300 service technicians. All activities are coordinated by our centralized TDIndustries Customer Service Center, located in our Dallas Headquarters.

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*B. Describe how supplier proposes to distribute the products/service nationwide. Include any states where products and services will not be offered under the Master Agreement, including U.S. Territories and Outlying Areas.*

TDIndustries does not supply services nationwide therefore, TD will only offer products and services in the geographies that we serve. Those geographies are listed below.

- » Dallas, TX
- » Fort Worth, TX
- » Richardson, TX
- » Lubbock, TX
- » San Antonio, TX
- » Austin, TX
- » Houston, TX
- » Phoenix, AZ
- » Tucson, AZ
- » Denver, CO
- » Midland, TX
- » Amarillo, TX

*C. Describe how Participating Agencies are ensure they will receive the Master Agreement pricing; include all distribution channels such as direct ordering, retail or in-store locations, through distributors, etc. Describe how Participating Agencies verify and audit pricing to ensure its compliance with the Master Agreement.*

TDIndustries keeps TD Partners up to date with our cooperative contracts by doing internal trainings. Part of this training is sharing cooperative rates and making sure our TD Partners understand these prices are not to exceed and that our cooperative contract is to be referenced and to request a Certified Proposal Number for each job. Participating Agencies can verify our CPN's with OMNIA Partners to make sure we're being compliant as well as verify pricing with OMNIA Partners or our Cooperative Contract Coordinator.

*D. Identify all other companies that will be involved in processing, handling or shipping the products/service to the end user.*

TDIndustries will self perform all work solicited through this contract.

*E. Provide the number, size and location of Supplier's distribution facilities, warehouses and retail network as applicable.*

TD owns and operates two prefabrication shops in Dallas and Houston, Texas as well as a process solutions shop in Richardson, Texas. Our Dallas shop is 89,000 sf prefabrication shop – one of the largest in the Southwest! This shop is located at 13850 Diplomat Drive, Dallas, TX 75234. In addition, TD has multiple assembly shops.

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

## 3.3 Marketing and Sales

*A. Provide a detailed ninety-day plan beginning from award date of the Master Agreement describing the strategy to immediately implement the Master Agreement as supplier's primary go to market strategy for Public Agencies to supplier's teams nationwide, to include, but not limited to:*

- *Executive leadership endorsement and sponsorship of the award as the public sector go-to-market strategy within first 10 days*

### FIRST 30 DAYS

- » In our first 30 days of being awarded, TD's Cooperative Contract Coordinator will notify all Service Sales Team Leaders that TD has been awarded a new OMNIA HVAC contract.
- » TDIndustries marketing will announce to all TD partners that TD has been awarded for a new HVAC contract with OMNIA Partners. They will be informed of new contract number and what TD services this contract covers.
- » Marketing will work with OMNIA marketing to create a co-branded press release on social media sites. We will also work with OMNIA marketing team to promptly update our landing page for our new contract.

### 60 DAYS

- » Modify existing brochures/marketing materials to incorporate the new contract in our cooperative capabilities.
- » TDIndustries will work with OMNIA Partners, Public Sector team to strategize an OMNIA roadshow in each of our TX and AZ locations. In these roadshow meetings, the market opportunity, customer profiles, contract terms, and business processes will all be reviewed so that all TD partners get the message and are prepared to seize the opportunities. OMNIA partners will be asked to participate in those meetings to provide answers to questions.
- » Plan a meeting with TD Service Sales Team and OMNIA Partner Development Manager and Regional Managers to strategize a sales plan with all that OMNIA has to offer.

### 90 DAYS

- » We will participate in joint marketing activities that OMNIA determines that TDIndustries should participate in, co-host, etc....
- » We will participate in trade shows and exhibitions where the government entities are likely to participate.

We will continuously train and have roundtable discussions with our TD partners to make certain they understand the program rules to better utilize our contracts and be compliant.

***In person events and meetings are contingent on COVID-19 and related policies.***

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*B. Provide a detailed ninety-day plan beginning from award date of the Master Agreement describing the strategy to market the Master Agreement to current Participating Public Agencies, existing Public Agency customers of Supplier, as well as to prospective Public Agencies nationwide immediately upon award, to include, but not limited to:*

- *Creation and distribution of a co-branded press release to trade publications*
- *Announcement, Master Agreement details and contact information published on the Supplier's website within first 90 days*
- *Design, publication and distribution of co-branded marketing materials within first 90 days*
- *Commitment to attendance and participation with OMNIA Partners, Public Sector at national (i.e. NIGP Annual Forum, NPI Conference, etc.), regional (i.e. Regional NIGP Chapter Meetings, Regional Cooperative Summits, etc.) and supplier-specific trade shows, conferences and meetings throughout the term of the Master Agreement*
- *Commitment to attend, exhibit and participate at the NIGP Annual Forum in an area reserved by OMNIA Partners, Public Sector for partner suppliers. Booth space will be purchased and staffed by Supplier. In addition, Supplier commits to provide reasonable assistance to the overall promotion and marketing efforts for the NIGP Annual Forum, as directed by OMNIA Partners, Public Sector.*
- *Design and publication of national and regional advertising in trade publications throughout the term of the Master Agreement*
- *Ongoing marketing and promotion of the Master Agreement throughout its term (case studies, collateral pieces, presentations, promotions, etc.)*
- *Dedicated OMNIA Partners, Public Sector internet web-based homepage on Supplier's website with:*

## **30 DAYS**

TDIndustries marketing will work with OMNIA marketing on a co-branded press release to announce on social media of TD's new HVAC contract.

## **60 DAYS**

Meet with OMNIA Partners, Public Sector team and TD Service Sales Team to plan a series of Open House/Lunch and Learn Meetings for existing and prospective customers to discuss the contract parameters, features and benefits. We would ask OMNIA Regional Managers to participate in those meetings to provide answers to questions and help our sales teams build synergy.

## **90 DAYS**

TDIndustries is committed to attending OMNIA Regional Cooperative Summits in Texas and Arizona. TD is always looking for speaking opportunities to present at trade shows, webinars and other events to let customers/potential customers aware of our OMNIA contract and the benefits of using a cooperative contract. TD is committed to exhibiting at tradeshow where OMNIA will be as well as tradeshow that cater to TD's market to reach a wider customer range.

***In person events and meetings are contingent on COVID-19 and related policies.***

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*C. Describe how Supplier will transition any existing Public Agency customers' accounts to the Master Agreement available nationally through OMNIA Partners, Public Sector. Include a list of current cooperative contracts (regional and national) Supplier holds and describe how the Master Agreement will be positioned among the other cooperative agreements.*

TD will talk to Public Agency customers that are using other cooperatives to inform them about their membership with OMNIA and the value in using our OMNIA contract. We will help them in all they need to know they are being compliant.

TDIndustries currently holds contracts with the following cooperatives:

## **PACE**

- » Building Repair and Maintenance

## **1GPA**

- » Food Service Equipment, Supplies and Repair Services

## **BUYBOARD**

- » HVAC Equipment, Supplies, and Installation of HVAC Equipment
- » Trade Services

## **NCPA**

- » HVAC Equipment, Installation, Service, and Related Products
- » Facilities Management Solutions and Related Services
- » Plumbing Equipment, Installation, Service and Related Services

## **GSA**

- » Complete Facilities Maintenance and Management
- » Refrigeration, Heating, Ventilation, Air Conditioning, Boiler and Chiller, HVAC Maintenance
- » Ancillary Repair and Alterations

OMNIA allows for TD to add our value adds to our contract to be able to service all TD services to our customers. This alone has been a great feature to our contract. Our other cooperative contracts don't allow for all our services, only those associated with the contract title. With TD having such a broad spectrum of services this is very important and valuable to us and especially to our customers. This is a benefit feature that we mention to our customers and has helped in sales with OMNIA.

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*D. Acknowledge Supplier agrees to provide its logo(s) to OMNIA Partners, Public Sector and agrees to provide permission for reproduction of such logo in marketing communications and promotions. Acknowledge that use of OMNIA Partners, Public Sector logo will require permission for reproduction, as well.*

TDIndustries agrees to provide TD's logo to OMNIA and agrees to provide permission for reproduction of such logo in marketing communications and promotions.

*E. Confirm Supplier will be proactive in direct sales of Supplier's goods and services to Public Agencies nationwide and the timely follow up to leads established by OMNIA Partners, Public Sector. All sales materials are to use the OMNIA Partners, Public Sector logo. At a minimum, the Supplier's sales initiatives should communicate:*

- *Master Agreement was competitively solicited and publicly awarded by a Principal Procurement Agency*
- *Best government pricing*
- *No cost to participate*
- *Non-exclusive*

TDIndustries will be proactive in direct sales of supplier's goods and services to Public Agencies in Texas and Arizona with a timely follow up to leads established by OMNIA Partners, Public Sector. We agree to follow all OMNIA branding while going to bid on all projects that are priced through the program. TDIndustries understands and will communicate the four items listed above in our sales initiatives.

*F. Confirm Supplier will train its national sales force on the Master Agreement. At a minimum, sales training should include:*

- *Key features of Master Agreement*
- *Working knowledge of the solicitation process*
- *Awareness of the range of Public Agencies that can utilize the Master Agreement through OMNIA Partners, Public Sector*
- *Knowledge of benefits of the use of cooperative contracts*

TDIndustries will train our regional sales force on the Master Agreement set forth. This will include but is not limited to, key features of the Master Agreement, working knowledge of the solicitation process, awareness of the range of public agencies that can utilize the master agreement through OMNIA partners public sector, and knowledge of benefits of the use of cooperative contracts. Each region will host these trainings with the goal of educating all sales partners to understand the benefits and returns of this contract.

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*G. Provide the name, title, email and phone number for the person(s), who will be responsible for:*

- *Executive Support*
- *Marketing*
- *Sales*
- *Sales Support*
- *Financial Reporting*
- *Accounts Payable*
- *Contracts*

Executive Support:

Crystal Seiler - Professional Services Team Manager  
Crystal.Seiler@TDIndustries.com  
713-996-3121

Marketing:

Lorraine Vuong and TD Marketing Team - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

Sales:

Lorraine Vuong and TD Partners - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

Sales Support:

Lorraine Vuong - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

Financial Reporting:

Lorraine Vuong - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

Accounts Payable:

Lorraine Vuong - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

Contracts:

Lorraine Vuong - Cooperative Contract Coordinator  
Lorraine.Vuong@TDIndustries.com  
713-996-2437

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

H. Describe in detail how Supplier's national sales force is structured, including contact information for the highest-level executive in charge of the sales team.



## LORRAINE VUONG, COOPERATIVE CONTRACTS COORDINATOR

Lorraine is TDIndustries' dedicated liaison with cooperative purchasing networks. Her role is to navigate the administrative and legal needs of both OMNIA and Region 4 to help ensure that TD is delivering service excellence. Lorraine is completely dedicated to this type of business and has the experience and skill to coordinate and facilitate the execution of cooperative contracts.

### Lorraine's Experience

Years of Experience: 15

Education: Accounting Manager, Eldorado Business School

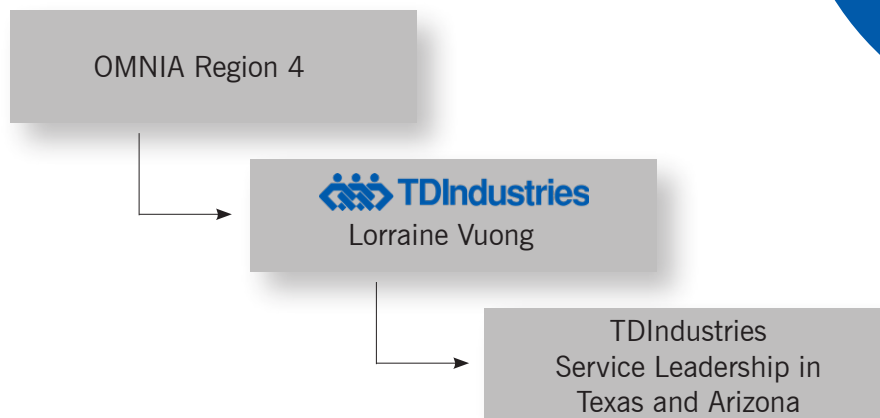
Relevant Training: TASBO Procurement Courses

COOP Experience:

- » OMNIA Partners
- » NCPA
- » GSA
- » TXMAS
- » BuyBoard
- » PACE
- » 1 GPA

**OMNIA Partners and Region 4 will have a single Point of Contact within TDIndustries, Lorraine Vuong. She will disseminate information and coordinate with the appropriate parties within TDIndustries.**

### Flow of Information



TDIndustries provides plumbing, HVAC and electrical maintenance, installation, renovation and preventive maintenance service and repair from twelve offices. We have nine offices in Texas: Dallas; Houston, Austin, San Antonio, Fort Worth, Lubbock, Midland, Amarillo and Richardson. We also serve the state of Arizona, with offices in the Phoenix Metro area and Tucson as well as Colorado with an office in Denver.



# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT



**James Venegas**

Sr. Vice President, Houston Service and Facilities Management  
Years of Experience: 22  
Phone: 832-347-3764  
Email: James.Venegas@TDIndustries.com



**Mary Kobe**

Sales Director, Dallas  
Years of Experience: 9  
Phone: 214-435-5148  
Email: Mary.Kobe@TDIndustries.com



**Jeff Sherman**

Vice President, Fort Worth Service  
Years of Experience: 10  
Phone: 817-683-5557  
Email: Jeff.Sherman@TDIndustries.com



**Clint Allen**

Vice President, Arizona Service  
Years of Experience: 20  
Phone: 602-284-0571  
Email: Clint.Allen@TDIndustries.com



**Bret Smart**

Director, San Antonio Service  
Years of Experience: 14  
Phone: 210-646-8476  
Email: Bret.Smart@TDIndustries.com



**Nicolas Sfeir**

Vice President - Austin  
Years of Experience: 19  
Phone: 512-310-5051  
Email: Nicolas.Sfeir@TDIndustries.com

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*I. Explain in detail how the sales teams will work with the OMNIA Partners, Public Sector team to implement, grow and service the national program.*

TD's Sales Team will work with OMNIA Partners' Public Sector team by creating a strategy session with them to use OMNIA's expertise and tools with TD's sales team expertise. This will consist of looking at membership lists, usage reports, who are TD's current customers, who are TD's target customers. Then strategize how to connect with those customers, what should those conversations consist of, and where and when should OMNIA Regional Managers be part of this connection with a customer.

*J. Explain in detail how Supplier will manage the overall national program throughout the term of the Master Agreement, including ongoing coordination of marketing and sales efforts, timely new Participating Public Agency account set-up, timely contract administration, etc.*

TD has a Cooperative Contract Coordinator, dedicated to managing TD's cooperative contracts. The Cooperative Coordinator will be the point of contact between OMNIA and TD Partners. This Coordinator stays up to date on all with cooperative contracts for TD. The Coordinator also works closely with OMNIA Partners, Public Sector team by having monthly conference calls. The Coordinator keeps partners up to date on any changes with the cooperative contracts, any opportunities that come up to use cooperative contracts, and informs TD partners of their cooperative sales. The Cooperative Coordinator also looks for tradeshow for TD to attend to exhibit to cooperative members to market our OMNIA contract.

*K. State the amount of Supplier's Public Agency sales for the previous fiscal year. Provide a list of Supplier's top 10 Public Agency customers, the total purchases for each for the previous fiscal year along with a key contact for each.*

TD's total 2019 sales with Public Agencies that used our cooperative contracts is \$14,937,632.74.

Here are our top 10 Public Agency customers that used our cooperative contracts:

1. Houston Community College (TX) - James Walker, Maintenance Director, \$5,822,278.12
2. Denton ISD (TX) - Paul Andress, Director of Operations, \$2,353,674.00
3. City of Houston (TX) - Eric Alexander, Senior Procurement Specialist, \$1,233,917.16
4. University of Houston-Downtown (TX) - Abraham Flores, Project Director \$651,025.00
5. Texas Women's University (TX) - Tim Wentrcek, Project Manager - \$412,260.00
6. City of Maricopa (AZ) - Dan Leonard, Maintenance Coordinator \$355,219.77
7. Fort Stockton ISD (TX) - Robert Stallard, Director of Operations \$302,863.92
8. City of Glendale (AZ) - Kevin Phelps, City Manager \$261,638.69
9. Lake Dallas ISD (TX) - David Talbert, Director of Facilities and Operations, \$252,612.83
10. University Health System in San Antonio (TX) - Jim Denton, Project Manager - \$249,902.00

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*K. Describe Supplier's information systems capabilities and limitations regarding order management through receipt of payment, including description of multiple platforms that may be used for any of these functions.*

TD utilizes Microsoft Enterprise Dynamics 365 for marketing, sales, customer service, field service, finance, supply chain management, project operations, and project service automation to manage our sales, P2P (Purchase to Pay) and manufacturing/fabrication processes.

This system is managed in the cloud and is an integrated platform that manages all of TD's processes from marketing to sales to P2P.

*L. Provide the Contract Sales (as defined in Section 10 of the OMNIA Partners, Public Sector Administration Agreement) that Supplier will guarantee each year under the Master Agreement for the initial three years of the Master Agreement ("Guaranteed Contract Sales").*

\$\_\_\_ \$4,000,000 \_\_\_.00 in year one

\$\_\_\_ \$6,000,000 \_\_\_.00 in year two

\$\_\_\_ \$8,000,000 \_\_\_.00 in year three

*To the extent Supplier guarantees minimum Contract Sales, the administration fee shall be calculated based on the greater of the actual Contract Sales and the Guaranteed Contract Sales.*

# APPENDIX D, EXHIBIT A, OMNIA PARTNERS RESPONSE FOR NATIONAL COOPERATIVE CONTRACT

*M. Even though it is anticipated many Public Agencies will be able to utilize the Master Agreement without further formal solicitation, there may be circumstances where Public Agencies will issue their own solicitations. The following options are available when responding to a solicitation for Products covered under the Master Agreement.*

- Respond with Master Agreement pricing (Contract Sales reported to OMNIA Partners, Public Sector).*
- If competitive conditions require pricing lower than the standard Master Agreement not-to-exceed pricing, Supplier may respond with lower pricing through the Master Agreement. If Supplier is awarded the contract, the sales are reported as Contract Sales to OMNIA Partners, Public Sector under the Master Agreement.*
- Respond with pricing higher than Master Agreement only in the unlikely event that the Public Agency refuses to utilize Master Agreement (Contract Sales are not reported to OMNIA Partners, Public Sector).*
- If alternative or multiple proposals are permitted, respond with pricing higher than Master Agreement, and include Master Agreement as the alternate or additional proposal.*

*Detail Supplier's strategies under these options when responding to a solicitation.*

When TDIndustries responds to solicitations by Public Agencies, if there's an opportunity, we present our OMNIA contract pricing and if used it's reported to OMNIA. TD's strategy is that once awarded a solicitation from a Public Agency rather it's OMNIA pricing or agencies, TD's sales team can inform the customer of TD's other services available to them and they can use our OMNIA contract instead of putting out their own solicitation to save them time and money.

# APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

## EXHIBIT B

### ADMINISTRATION AGREEMENT, EXAMPLE

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#### ADMINISTRATION AGREEMENT

THIS ADMINISTRATION AGREEMENT (this "Agreement") is made this \_\_\_ day of \_\_\_\_\_ 20\_\_\_, between National Intergovernmental Purchasing Alliance Company, a Delaware corporation d/b/a OMNIA Partners, Public Sector ("OMNIA Partners, Public Sector"), and TDIndustries, Inc. ("Supplier").

#### RECITALS

**WHEREAS**, the \_\_\_\_\_ (the "Principal Procurement Agency") has entered into a Master Agreement effective \_\_\_\_\_, Agreement No \_\_\_\_\_, by and between the Principal Procurement Agency and Supplier, (as may be amended from time to time in accordance with the terms thereof, the "Master Agreement"), as attached hereto as Exhibit A and incorporated herein by reference as though fully set forth herein, for the purchase of \_\_\_\_\_ (the "Product");

**WHEREAS**, said Master Agreement provides that any or all public agencies, including state and local governmental entities, public and private primary, secondary and higher education entities, non-profit entities, and agencies for the public benefit (collectively, "Public Agencies"), that register (either via registration on the OMNIA Partners, Public Sector website or execution of a Master Intergovernmental Cooperative Purchasing Agreement, attached hereto as Exhibit B) (each, hereinafter referred to as a "Participating Public Agency") may purchase Product at prices stated in the Master Agreement;

**WHEREAS**, Participating Public Agencies may access the Master Agreement which is offered through OMNIA Partners, Public Sector to Public Agencies;

**WHEREAS**, OMNIA Partners, Public Sector serves as the contract administrator of the Master Agreement on behalf of Principal Procurement Agency;

**WHEREAS**, Principal Procurement Agency desires OMNIA Partners, Public Sector to proceed with administration of the Master Agreement; and

**WHEREAS**, OMNIA Partners, Public Sector and Supplier desire to enter into this Agreement to make available the Master Agreement to Participating Public Agencies and to set forth certain terms and conditions governing the relationship between OMNIA Partners, Public Sector and Supplier.

**NOW, THEREFORE**, in consideration of the payments to be made hereunder and the mutual covenants contained in this Agreement, OMNIA Partners, Public Sector and Supplier hereby agree as follows:

#### DEFINITIONS

1. Capitalized terms used in this Agreement and not otherwise defined herein shall have the meanings given to them in the Master Agreement.

# APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

## TERMS AND CONDITIONS

2. The Master Agreement and the terms and conditions contained therein shall apply to this Agreement except as expressly changed or modified by this Agreement. Supplier acknowledges and agrees that the covenants and agreements of Supplier set forth in the solicitation and Supplier's response thereto resulting in the Master Agreement are incorporated herein and are an integral part hereof.

3. OMNIA Partners, Public Sector shall be afforded all of the rights, privileges and indemnifications afforded to Principal Procurement Agency by or from Supplier under the Master Agreement, and such rights, privileges and indemnifications shall accrue and apply with equal effect to OMNIA Partners, Public Sector, its agents, employees, directors, and representatives under this Agreement including, but not limited to, Supplier's obligation to obtain appropriate insurance.

4. OMNIA Partners, Public Sector shall perform all of its duties, responsibilities and obligations as contract administrator of the Master Agreement on behalf of Principal Procurement Agency as set forth herein, and Supplier hereby acknowledges and agrees that all duties, responsibilities and obligations will be undertaken by OMNIA Partners, Public Sector solely in its capacity as the contract administrator under the Master Agreement.

5. With respect to any purchases by Principal Procurement Agency or any Participating Public Agency pursuant to the Master Agreement, OMNIA Partners, Public Sector shall not be: (i) construed as a dealer, re-marketer, representative, partner or agent of any type of the Supplier, Principal Procurement Agency or any Participating Public Agency; (ii) obligated, liable or responsible for any order for Product made by Principal Procurement Agency or any Participating Public Agency or any employee thereof under the Master Agreement or for any payment required to be made with respect to such order for Product; and (iii) obligated, liable or responsible for any failure by Principal Procurement Agency or any Participating Public Agency to comply with procedures or requirements of applicable law or the Master Agreement or to obtain the due authorization and approval necessary to purchase under the Master Agreement. OMNIA Partners, Public Sector makes no representation or guaranty with respect to any minimum purchases by Principal Procurement Agency or any Participating Public Agency or any employee thereof under this Agreement or the Master Agreement.

6. OMNIA Partners, Public Sector shall not be responsible for Supplier's performance under the Master Agreement, and Supplier shall hold OMNIA Partners, Public Sector harmless from any liability that may arise from the acts or omissions of Supplier in connection with the Master Agreement.

7. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, OMNIA PARTNERS, PUBLIC SECTOR EXPRESSLY DISCLAIMS ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES REGARDING OMNIA PARTNERS, PUBLIC SECTOR'S PERFORMANCE AS A CONTRACT ADMINISTRATOR OF THE MASTER AGREEMENT. OMNIA PARTNERS, PUBLIC SECTOR SHALL NOT BE LIABLE IN ANY WAY FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, EXEMPLARY, PUNITIVE, OR RELIANCE DAMAGES, EVEN IF OMNIA PARTNERS, PUBLIC SECTOR IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

## TERM OF AGREEMENT; TERMINATION

8. This Agreement shall be in effect so long as the Master Agreement remains in effect, provided, however, that the provisions of Sections 3 – 8 and 11 – 22, hereof and the

# APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

indemnifications afforded by the Supplier to OMNIA Partners, Public Sector in the Master Agreement, to the extent such provisions survive any expiration or termination of the Master Agreement, shall survive the expiration or termination of this Agreement.

## NATIONAL PROMOTION

9. OMNIA Partners, Public Sector and Supplier shall publicize and promote the availability of the Master Agreement's products and services to Public Agencies and such agencies' employees. Supplier shall require each Public Agency to register its participation in the OMNIA Partners, Public Sector program by either registering on the OMNIA Partners, Public Sector website ([www.omniapartners.com/publicsector](http://www.omniapartners.com/publicsector)), or executing a Master Intergovernmental Cooperative Purchasing Agreement prior to processing the Participating Public Agency's first sales order. Upon request, Supplier shall make available to interested Public Agencies a copy of the Master Agreement and such price lists or quotes as may be necessary for such Public Agencies to evaluate potential purchases.

10. Supplier shall provide such marketing and administrative support as set forth in the solicitation resulting in the Master Agreement, including assisting in development of marketing materials as reasonably requested by Principal Procurement Agency and OMNIA Partners, Public Sector. Supplier shall be responsible for obtaining permission or license of use and payment of any license fees for all content and images Supplier provides to OMNIA Partners, Public Sector or posts on the OMNIA Partners, Public Sector website. Supplier shall indemnify, defend and hold harmless OMNIA Partners, Public Sector for use of all such content and images including copyright infringement claims. Supplier and OMNIA Partners, Public Sector each hereby grant to the other party a limited, revocable, non-transferable, non-sublicensable right to use such party's logo (each, the "Logo") solely for use in marketing the Master Agreement. Each party shall provide the other party with the standard terms of use of such party's Logo, and such party shall comply with such terms in all material respects. Both parties shall obtain approval from the other party prior to use of such party's Logo. Notwithstanding the foregoing, the parties understand and agree that except as provided herein neither party shall have any right, title or interest in the other party's Logo. Upon termination of this Agreement, each party shall immediately cease use of the other party's Logo.

## ADMINISTRATIVE FEE, REPORTING & PAYMENT

11. An "Administrative Fee" shall be defined and due to OMNIA Partners, Public Sector from Supplier in the amount of \_\_\_ percent (\_\_\_%) ("Administrative Fee Percentage") multiplied by the total purchase amount paid to Supplier, less refunds, credits on returns, rebates and discounts, for the sale of products and/or services to Principal Procurement Agency and Participating Public Agencies pursuant to the Master Agreement (as amended from time to time and including any renewal thereof) ("Contract Sales"). From time to time the parties may mutually agree in writing to a lower Administrative Fee Percentage for a specifically identified Participating Public Agency's Contract Sales.

12. Supplier shall provide OMNIA Partners, Public Sector with an electronic accounting report monthly, in the format prescribed by OMNIA Partners, Public Sector, summarizing all Contract Sales for each calendar month. The Contract Sales reporting format is provided as Exhibit C ("Contract Sales Report"), attached hereto and incorporated herein by reference. Contract Sales Reports for each calendar month shall be provided by Supplier to OMNIA Partners, Public Sector by the 10<sup>th</sup> day of the following month. Failure to provide a Contract Sales Report within the time and manner specified herein shall constitute a material breach of this

## APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

Agreement and if not cured within thirty (30) days of written notice to Supplier shall be deemed a cause for termination of the Master Agreement, at Principal Procurement Agency's sole discretion, and/or this Agreement, at OMNIA Partners, Public Sector's sole discretion.

13. Administrative Fee payments are to be paid by Supplier to OMNIA Partners, Public Sector at the frequency and on the due date stated in Section 12, above, for Supplier's submission of corresponding Contract Sales Reports. Administrative Fee payments are to be made via Automated Clearing House (ACH) to the OMNIA Partners, Public Sector designated financial institution identified in Exhibit D. Failure to provide a payment of the Administrative Fee within the time and manner specified herein shall constitute a material breach of this Agreement and if not cured within thirty (30) days of written notice to Supplier shall be deemed a cause for termination of the Master Agreement, at Principal Procurement Agency's sole discretion, and/or this Agreement, at OMNIA Partners, Public Sector's sole discretion. All Administrative Fees not paid when due shall bear interest at a rate equal to the lesser of one and one-half percent (1 1/2%) per month or the maximum rate permitted by law until paid in full.

14. Supplier shall maintain an accounting of all purchases made by Participating Public Agencies under the Master Agreement. OMNIA Partners, Public Sector, or its designee, in OMNIA Partners, Public Sector's sole discretion, reserves the right to compare Participating Public Agency records with Contract Sales Reports submitted by Supplier for a period of four (4) years from the date OMNIA Partners, Public Sector receives such report. In addition, OMNIA Partners, Public Sector may engage a third party to conduct an independent audit of Supplier's monthly reports. In the event of such an audit, Supplier shall provide all materials reasonably requested relating to such audit by OMNIA Partners, Public Sector at the location designated by OMNIA Partners, Public Sector. In the event an underreporting of Contract Sales and a resulting underpayment of Administrative Fees is revealed, OMNIA Partners, Public Sector will notify the Supplier in writing. Supplier will have thirty (30) days from the date of such notice to resolve the discrepancy to OMNIA Partners, Public Sector's reasonable satisfaction, including payment of any Administrative Fees due and owing, together with interest thereon in accordance with Section 13, and reimbursement of OMNIA Partners, Public Sector's costs and expenses related to such audit.

### GENERAL PROVISIONS

15. This Agreement, the Master Agreement and the exhibits referenced herein supersede any and all other agreements, either oral or in writing, between the parties hereto with respect to the subject matter hereto and no other agreement, statement, or promise relating to the subject matter of this Agreement which is not contained or incorporated herein shall be valid or binding. In the event of any conflict between the provisions of this Agreement and the Master Agreement, as between OMNIA Partners, Public Sector and Supplier, the provisions of this Agreement shall prevail.

16. If any action at law or in equity is brought to enforce or interpret the provisions of this Agreement or to recover any Administrative Fee and accrued interest, the prevailing party shall be entitled to reasonable attorney's fees and costs in addition to any other relief to which it may be entitled.

17. This Agreement and OMNIA Partners, Public Sector's rights and obligations hereunder may be assigned at OMNIA Partners, Public Sector's sole discretion to an affiliate of OMNIA Partners, Public Sector, any purchaser of any or all or substantially all of the assets of OMNIA Partners, Public Sector, or the successor entity as a result of a merger, reorganization, consolidation, conversion or change of control, whether by operation of law or otherwise. Supplier



## APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

may not assign its obligations hereunder without the prior written consent of OMNIA Partners, Public Sector.

18. All written communications given hereunder shall be delivered by first-class mail, postage prepaid, or overnight delivery on receipt to the addresses as set forth below.

A. OMNIA Partners, Public Sector:

OMNIA Partners, Public Sector  
Attn: President  
840 Crescent Centre Drive  
Suite 600  
Franklin, TN 37067

B. Supplier:

TDIndustries, Inc.  
13850 Diplomat Dr.  
Dallas, Texas 75234

19. If any provision of this Agreement shall be deemed to be, or shall in fact be, illegal, inoperative or unenforceable, the same shall not affect any other provision or provisions herein contained or render the same invalid, inoperative or unenforceable to any extent whatever, and this Agreement will be construed by limiting or invalidating such provision to the minimum extent necessary to make such provision valid, legal and enforceable.

20. This Agreement may not be amended, changed, modified, or altered without the prior written consent of the parties hereto, and no provision of this Agreement may be discharged or waived, except by a writing signed by the parties. A waiver of any particular provision will not be deemed a waiver of any other provision, nor will a waiver given on one occasion be deemed to apply to any other occasion.

21. This Agreement shall inure to the benefit of and shall be binding upon OMNIA Partners, Public Sector, the Supplier and any respective successor and assign thereto; subject, however, to the limitations contained herein.


22. This Agreement will be construed under and governed by the laws of the State of Delaware, excluding its conflicts of law provisions and any action arising out of or related to this Agreement shall be commenced solely and exclusively in the state or federal courts in Williamson County Tennessee.

23. This Agreement may be executed in counterparts, each of which is an original but all of which, together, shall constitute but one and the same instrument. The exchange of copies of this Agreement and of signature pages by facsimile, or by .pdf or similar electronic transmission, will constitute effective execution and delivery of this Agreement as to the parties and may be used in lieu of the original Agreement for all purposes. Signatures of the parties transmitted by facsimile, or by .pdf or similar electronic transmission, will be deemed to be their original signatures for any purpose whatsoever.

# APPENDIX D, EXHIBIT B, ADMINISTRATION AGREEMENT

[INSERT SUPPLIER ENTITY NAME]

NATIONAL  
INTERGOVERNMENTAL  
PURCHASING ALLIANCE  
COMPANY, A DELAWARE  
CORPORATION D/B/A OMNIA  
PARTNERS, PUBLIC SECTOR

  
\_\_\_\_\_  
Signature  
Crystal Seiler  
\_\_\_\_\_  
Name

PST Manager  
\_\_\_\_\_  
Title  
6/26/20  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature  
Sarah Vavra  
\_\_\_\_\_  
Name  
Sr. Vice President, Public Sector  
Contracting  
\_\_\_\_\_  
Title  
\_\_\_\_\_  
Date

# APPENDIX D, EXHIBIT C, MASTER INTERGOVERNMENTAL COOPERATIVE PURCHASING AGREEMENT

## EXHIBIT C

### MASTER INTERGOVERNMENTAL COOPERATIVE PURCHASING AGREEMENT, EXAMPLE

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#### **MASTER INTERGOVERNMENTAL COOPERATIVE PURCHASING AGREEMENT**

This Master Intergovernmental Cooperative Purchasing Agreement (this “**Agreement**”) is entered into by and between those certain government agencies that execute a Principal Procurement Agency Certificate (“**Principal Procurement Agencies**”) with National Intergovernmental Purchasing Alliance Company, a Delaware corporation d/b/a OMNIA Partners, Public Sector and/or Communities Program Management, LLC, a California limited liability company d/b/a U.S. Communities (collectively, “**OMNIA Partners, Public Sector**”) to be appended and made a part hereof and such other public agencies (“**Participating Public Agencies**”) who register to participate in the cooperative purchasing programs administered by OMNIA Partners, Public Sector and its affiliates and subsidiaries (collectively, the “**OMNIA Partners Parties**”) by either registering on the OMNIA Partners, Public Sector website ([www.omniapartners.com/publicsector](http://www.omniapartners.com/publicsector) or any successor website), or by executing a copy of this Agreement.

#### RECITALS

**WHEREAS**, after a competitive solicitation and selection process by Principal Procurement Agencies, in compliance with their own policies, procedures, rules and regulations, a number of suppliers have entered into “**Master Agreements**” (herein so called) to provide a variety of goods, products and services (“**Products**”) to the applicable Principal Procurement Agency and the Participating Public Agencies;

**WHEREAS**, Master Agreements are made available by Principal Procurement Agencies through the OMNIA Partners Parties and provide that Participating Public Agencies may purchase Products on the same terms, conditions and pricing as the Principal Procurement Agency, subject to any applicable federal and/or local purchasing ordinances and the laws of the State of purchase; and

**WHEREAS**, in addition to Master Agreements, the OMNIA Partners Parties may from time to time offer Participating Public Agencies the opportunity to acquire Products through other group purchasing agreements.

**NOW, THEREFORE**, in consideration of the mutual promises contained in this Agreement, and of the mutual benefits to result, the parties hereby agree as follows:

1. Each party will facilitate the cooperative procurement of Products.
2. The Participating Public Agencies shall procure Products in accordance with and subject to the relevant federal, state and local statutes, ordinances, rules and regulations that govern Participating Public Agency’s procurement practices. The Participating Public Agencies hereby acknowledge and agree that it is the intent of the parties that all provisions of this Agreement and that Principal Procurement Agencies’ participation in the program described herein comply with all applicable laws, including but not limited to the requirements of 42 C.F.R. § 1001.952(h), as may be amended from time to time. The Participating Public Agencies further acknowledge and agree that they are solely responsible for their compliance with all applicable “safe harbor” regulations, including

# APPENDIX D, EXHIBIT C, MASTER INTERGOVERNMENTAL COOPERATIVE PURCHASING AGREEMENT

but not limited to any and all obligations to fully and accurately report discounts and incentives.

3. The Participating Public Agency represents and warrants that the Participating Public Agency is not a hospital or other healthcare provider and is not purchasing Products on behalf of a hospital or healthcare provider.

4. The cooperative use of Master Agreements shall be in accordance with the terms and conditions of the Master Agreements, except as modification of those terms and conditions is otherwise required by applicable federal, state or local law, policies or procedures.

5. The Principal Procurement Agencies will make available, upon reasonable request, Master Agreement information which may assist in improving the procurement of Products by the Participating Public Agencies.

6. The Participating Public Agency agrees the OMNIA Partners Parties may provide access to group purchasing organization ("**GPO**") agreements directly or indirectly by enrolling the Participating Public Agency in another GPO's purchasing program provided the purchase of Products through the OMNIA Partners Parties or any other GPO shall be at the Participating Public Agency's sole discretion.

7. The Participating Public Agencies (each a "**Procuring Party**") that procure Products through any Master Agreement or GPO Product supply agreement (each a "**GPO Contract**") will make timely payments to the distributor, manufacturer or other vendor (collectively, "**Supplier**") for Products received in accordance with the terms and conditions of the Master Agreement or GPO Contract, as applicable. Payment for Products and inspections and acceptance of Products ordered by the Procuring Party shall be the exclusive obligation of such Procuring Party. Disputes between Procuring Party and any Supplier shall be resolved in accordance with the law and venue rules of the State of purchase unless otherwise agreed to by the Procuring Party and Supplier.

8. The Procuring Party shall not use this Agreement as a method for obtaining additional concessions or reduced prices for purchase of similar products or services outside of the Master Agreement. Master Agreements may be structured with not-to-exceed pricing, in which cases the Supplier may offer the Procuring Party and the Procuring Party may accept lower pricing or additional concessions for purchase of Products through a Master Agreement.

9. The Procuring Party shall be responsible for the ordering of Products under this Agreement. A non-procuring party shall not be liable in any fashion for any violation by a Procuring Party, and, to the extent permitted by applicable law, the Procuring Party shall hold non-procuring party harmless from any liability that may arise from the acts or omissions of the Procuring Party.

10. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, THE OMNIA PARTNERS PARTIES EXPRESSLY DISCLAIM ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES REGARDING ANY PRODUCT, MASTER AGREEMENT AND GPO CONTRACT. THE OMNIA PARTNERS PARTIES SHALL NOT BE LIABLE IN ANY WAY FOR ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, EXEMPLARY, PUNITIVE, OR RELIANCE DAMAGES, EVEN IF THE OMNIA PARTNERS PARTIES ARE ADVISED OF THE POSSIBILITY

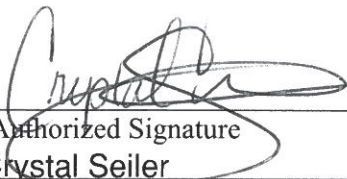
# APPENDIX D, EXHIBIT C, MASTER INTERGOVERNMENTAL COOPERATIVE PURCHASING AGREEMENT

OF SUCH DAMAGES. FURTHER, THE PROCURING PARTY ACKNOWLEDGES AND AGREES THAT THE OMNIA PARTNERS PARTIES SHALL HAVE NO LIABILITY FOR ANY ACT OR OMISSION BY A SUPPLIER OR OTHER PARTY UNDER A MASTER AGREEMENT OR GPO CONTRACT.

11. This Agreement shall remain in effect until termination by either party giving thirty (30) days' written notice to the other party. The provisions of Paragraphs 6 - 10 hereof shall survive any such termination.

12. This Agreement shall take effect upon (i) execution of the Principal Procurement Agency Certificate, or (ii) registration on the OMNIA Partners, Public Sector website or the execution of this Agreement by a Participating Public Agency, as applicable.

**NATIONAL INTERGOVERNMENTAL  
PURCHASING ALLIANCE COMPANY, A  
DELAWARE CORPORATION D/B/A OMNIA  
PARTNERS, PUBLIC SECTOR AND/OR  
COMMUNITIES PROGRAM MANAGEMENT,  
LLC, A CALIFORNIA LIMITED LIABILITY  
COMPANY D/B/A U.S. COMMUNITIES**

  
\_\_\_\_\_  
Authorized Signature  
**Crystal Seiler**  
\_\_\_\_\_  
Name  
PST Manager, TDIndustries, Inc.  
\_\_\_\_\_  
Title and Agency Name  
Date 6/26/20

\_\_\_\_\_  
Signature  
Sarah E. Vavra  
\_\_\_\_\_  
Name  
Sr. Vice President, Public Sector Contracting  
\_\_\_\_\_  
Title  
\_\_\_\_\_  
Date

# APPENDIX D, EXHIBIT D, PRINCIPAL PROCUREMENT AGENCY CERTIFICATE

## EXHIBIT D

### PRINCIPAL PROCUREMENT AGENCY CERTIFICATE, EXAMPLE

#### PRINCIPAL PROCUREMENT AGENCY CERTIFICATE

In its capacity as a Principal Procurement Agency (as defined below) for National Intergovernmental Purchasing Alliance Company, a Delaware corporation d/b/a OMNIA Partners, Public Sector ("OMNIA Partners, Public Sector"), TDIndustries, Inc. agrees to pursue Master Agreements for Products as specified in the attached Exhibits to this Principal Procurement Agency Certificate.

I hereby acknowledge, in my capacity as Authority of and on behalf of TDIndustries, Inc. ("Principal Procurement Agency"), that I have read and hereby agree to the general terms and conditions set forth in the attached Master Intergovernmental Cooperative Purchasing Agreement regulating the use of the Master Agreements and purchase of Products that from time to time are made available by Principal Procurement Agencies to Participating Public Agencies nationwide through OMNIA Partners, Public Sector.

I understand that the purchase of one or more Products under the provisions of the Master Intergovernmental Cooperative Purchasing Agreement is at the sole and complete discretion of the Participating Public Agency.

Authorized Signature, TDIndustries, Inc.

Signature

Crystal Seiler

Name

PST Manager

Title

Date

7/8/20



# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

## EXHIBIT F

### FEDERAL FUNDS CERTIFICATIONS

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#### FEDERAL CERTIFICATIONS

##### ADDENDUM FOR AGREEMENT FUNDED BY U.S. FEDERAL GRANT

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#### TO WHOM IT MAY CONCERN:

Participating Agencies may elect to use federal funds to purchase under the Master Agreement. This form should be completed and returned.

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#### DEFINITIONS

**Contract** means a legal instrument by which a non-Federal entity purchases property or services needed to carry out the project or program under a Federal award. The term as used in this part does not include a legal instrument, even if the non-Federal entity considers it a contract, when the substance of the transaction meets the definition of a Federal award or subaward

**Contractor** means an entity that receives a contract as defined in Contract.

**Cooperative agreement** means a legal instrument of financial assistance between a Federal awarding agency or pass-through entity and a non-Federal entity that, consistent with 31 U.S.C. 6302–6305:

(a) Is used to enter into a relationship the principal purpose of which is to transfer anything of value from the Federal awarding agency or pass-through entity to the non-Federal entity to carry out a public purpose authorized by a law of the United States (see 31 U.S.C. 6101(3)); and not to acquire property or services for the Federal government or pass-through entity's direct benefit or use;

(b) Is distinguished from a grant in that it provides for substantial involvement between the Federal awarding agency or pass-through entity and the non-Federal entity in carrying out the activity contemplated by the Federal award.

(c) The term does not include:

(1) A cooperative research and development agreement as defined in 15 U.S.C. 3710a; or

(2) An agreement that provides only:

(i) Direct United States Government cash assistance to an individual;

(ii) A subsidy;

(iii) A loan;

(iv) A loan guarantee; or

(v) Insurance.

**Federal awarding agency** means the Federal agency that provides a Federal award directly to a non-Federal entity

**Federal award** has the meaning, depending on the context, in either paragraph (a) or (b) of this section:

(a)(1) The Federal financial assistance that a non-Federal entity receives directly from a Federal awarding agency or indirectly from a pass-through entity, as described in § 200.101 Applicability; or

(2) The cost-reimbursement contract under the Federal Acquisition Regulations that a non-Federal entity receives directly from a Federal awarding agency or indirectly from a pass-through entity, as described in § 200.101 Applicability.

(b) The instrument setting forth the terms and conditions. The instrument is the grant agreement, cooperative agreement, other agreement for assistance covered in paragraph (b) of § 200.40 Federal financial assistance, or the cost-reimbursement contract awarded under the Federal Acquisition Regulations.

(c) Federal award does not include other contracts that a Federal agency uses to buy goods or services from a contractor or a contract to operate Federal government owned, contractor operated facilities (GOCOs).

(d) See also definitions of Federal financial assistance, grant agreement, and cooperative agreement.

**Non-Federal entity** means a state, local government, Indian tribe, institution of higher education (IHE), or nonprofit organization that carries out a Federal award as a recipient or subrecipient.

**Nonprofit organization** means any corporation, trust, association, cooperative, or other organization, not including IHEs, that:

(a) Is operated primarily for scientific, educational, service, charitable, or similar purposes in the public interest;



# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

- (b) Is not organized primarily for profit; and
- (c) Uses net proceeds to maintain, improve, or expand the operations of the organization.

**Obligations** means, when used in connection with a non-Federal entity's utilization of funds under a Federal award, orders placed for property and services, contracts and subawards made, and similar transactions during a given period that require payment by the non-Federal entity during the same or a future period.

**Pass-through entity** means a non-Federal entity that provides a subaward to a subrecipient to carry out part of a Federal program.

**Recipient** means a non-Federal entity that receives a Federal award directly from a Federal awarding agency to carry out an activity under a Federal program. The term recipient does not include subrecipients.

**Simplified acquisition threshold** means the dollar amount below which a non-Federal entity may purchase property or services using small purchase methods. Non-Federal entities adopt small purchase procedures in order to expedite the purchase of items costing less than the simplified acquisition threshold. The simplified acquisition threshold is set by the Federal Acquisition Regulation at 48 CFR Subpart 2.1 (Definitions) and in accordance with 41 U.S.C. 1908. As of the publication of this part, the simplified acquisition threshold is \$250,000, but this threshold is periodically adjusted for inflation. (Also see definition of § 200.67 Micro-purchase.)

**Subaward** means an award provided by a pass-through entity to a subrecipient for the subrecipient to carry out part of a Federal award received by the pass-through entity. It does not include payments to a contractor or payments to an individual that is a beneficiary of a Federal program. A subaward may be provided through any form of legal agreement, including an agreement that the pass-through entity considers a contract.

**Subrecipient** means a non-Federal entity that receives a subaward from a pass-through entity to carry out part of a Federal program; but does not include an individual that is a beneficiary of such program. A subrecipient may also be a recipient of other Federal awards directly from a Federal awarding agency.

**Termination** means the ending of a Federal award, in whole or in part at any time prior to the planned end of period of performance.

The following certifications and provisions may be required and apply when Participating Agency expends federal funds for any purchase resulting from this procurement process. Pursuant to 2 C.F.R. § 200.326, all contracts, including small purchases, awarded by the Participating Agency and the Participating Agency's subcontractors shall contain the procurement provisions of Appendix II to Part 200, as applicable.

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## APPENDIX II TO 2 CFR PART 200

**(A) Contracts for more than the simplified acquisition threshold currently set at \$250,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.**

Pursuant to Federal Rule (A) above, when a Participating Agency expends federal funds, the Participating Agency reserves all rights and privileges under the applicable laws and regulations with respect to this procurement in the event of breach of contract by either party.

Does offeror agree? YES \_\_\_\_\_ CS \_\_\_\_\_ Initials of Authorized Representative of offeror

**(B) Termination for cause and for convenience by the grantee or subgrantee including the manner by which it will be effected and the basis for settlement. (All contracts in excess of \$10,000)**

Pursuant to Federal Rule (B) above, when a Participating Agency expends federal funds, the Participating Agency reserves the right to immediately terminate any agreement in excess of \$10,000 resulting from this procurement process in the event of a breach or default of the agreement by Offeror as detailed in the terms of the contract.

Does offeror agree? YES \_\_\_\_\_ CS \_\_\_\_\_ Initials of Authorized Representative of offeror

**(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause**

## APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 CFR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

Pursuant to Federal Rule (C) above, when a Participating Agency expends federal funds on any federally assisted construction contract, the equal opportunity clause is incorporated by reference herein.

Does offeror agree to abide by the above? YES CS Initials of Authorized Representative of offeror

**(D) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).** When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

Pursuant to Federal Rule (D) above, when a Participating Agency expends federal funds during the term of an award for all contracts and subgrants for construction or repair, offeror will be in compliance with all applicable Davis-Bacon Act provisions.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

**(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708).** Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

Pursuant to Federal Rule (E) above, when a Participating Agency expends federal funds, offeror certifies that offeror will be in compliance with all applicable provisions of the Contract Work Hours and Safety Standards Act during the term of an award for all contracts by Participating Agency resulting from this procurement process.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

**(F) Rights to Inventions Made Under a Contract or Agreement.** If the Federal award meets the definition of "funding agreement" under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

Pursuant to Federal Rule (F) above, when federal funds are expended by Participating Agency, the offeror certifies that during the term of an award for all contracts by Participating Agency resulting from this procurement process, the offeror agrees to comply with all applicable requirements as referenced in Federal Rule (F) above.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

(G) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended—Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251- 1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA)

Pursuant to Federal Rule (G) above, when federal funds are expended by Participating Agency, the offeror certifies that during the term of an award for all contracts by Participating Agency member resulting from this procurement process, the offeror agrees to comply with all applicable requirements as referenced in Federal Rule (G) above.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

(H) Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the Executive Office of the President Office of Management and Budget (OMB) guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

Pursuant to Federal Rule (H) above, when federal funds are expended by Participating Agency, the offeror certifies that during the term of an award for all contracts by Participating Agency resulting from this procurement process, the offeror certifies that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation by any federal department or agency. If at any time during the term of an award the offeror or its principals becomes debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation by any federal department or agency, the offeror will notify the Participating Agency.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

(I) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

Pursuant to Federal Rule (I) above, when federal funds are expended by Participating Agency, the offeror certifies that during the term and after the awarded term of an award for all contracts by Participating Agency resulting from this procurement process, the offeror certifies that it is in compliance with all applicable provisions of the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). The undersigned further certifies that:

- (1) No Federal appropriated funds have been paid or will be paid for on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with the awarding of a Federal contract, the making of a Federal grant, the making of a Federal loan, the entering into a cooperative agreement, and the extension, continuation, renewal, amendment, or modification of a Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all covered sub-awards exceeding \$100,000 in Federal funds at all appropriate tiers and that all subrecipients shall certify and disclose accordingly.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

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## RECORD RETENTION REQUIREMENTS FOR CONTRACTS INVOLVING FEDERAL FUNDS

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When federal funds are expended by Participating Agency for any contract resulting from this procurement process, offeror

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

certifies that it will comply with the record retention requirements detailed in 2 CFR § 200.333. The offeror further certifies that offeror will retain all records as required by 2 CFR § 200.333 for a period of three years after grantees or subgrantees submit final expenditure reports or quarterly or annual financial reports, as applicable, and all other pending matters are closed.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

## CERTIFICATION OF COMPLIANCE WITH THE ENERGY POLICY AND CONSERVATION ACT

When Participating Agency expends federal funds for any contract resulting from this procurement process, offeror certifies that it will comply with the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. 6321 et seq.; 49 C.F.R. Part 18).

Does offeror agree? YES CS Initials of Authorized Representative of offeror

## CERTIFICATION OF COMPLIANCE WITH BUY AMERICA PROVISIONS

To the extent purchases are made with Federal Highway Administration, Federal Railroad Administration, or Federal Transit Administration funds, offeror certifies that its products comply with all applicable provisions of the Buy America Act and agrees to provide such certification or applicable waiver with respect to specific products to any Participating Agency upon request. Purchases made in accordance with the Buy America Act must still follow the applicable procurement rules calling for free and open competition.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

## CERTIFICATION OF ACCESS TO RECORDS – 2 C.F.R. § 200.336

Offeror agrees that the Inspector General of the Agency or any of their duly authorized representatives shall have access to any documents, papers, or other records of offeror that are pertinent to offeror's discharge of its obligations under the Contract for the purpose of making audits, examinations, excerpts, and transcriptions. The right also includes timely and reasonable access to offeror's personnel for the purpose of interview and discussion relating to such documents.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

## CERTIFICATION OF APPLICABILITY TO SUBCONTRACTORS

Offeror agrees that all contracts it awards pursuant to the Contract shall be bound by the foregoing terms and conditions.

Does offeror agree? YES CS Initials of Authorized Representative of offeror

**Offeror agrees to comply with all federal, state, and local laws, rules, regulations and ordinances, as applicable. It is further acknowledged that offeror certifies compliance with all provisions, laws, acts, regulations, etc. as specifically noted above.**

Offeror's Name: TDIndustries, Inc.

Address, City, State, and Zip Code: 9525 Derrington Rd. Houston, TX 77064

Phone Number: 713-996-3121 Fax Number: \_\_\_\_\_

Printed Name and Title of Authorized Representative: Crystal Seiler, PST Manager

Email Address: crystal.seiler@tdindustries.com

Signature of Authorized Representative:  Date: 6/26/20

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

## FEMA SPECIAL CONDITIONS

Awarded Supplier(s) may need to respond to events and losses where products and services are needed for the immediate and initial response to emergency situations such as, but not limited to, water damage, fire damage, vandalism cleanup, biohazard cleanup, sewage decontamination, deodorization, and/or wind damage during a disaster or emergency situation. By submitting a proposal, the Supplier is accepted these FEMA Special Conditions required by the Federal Emergency Management Agency (FEMA).

“Contract” in the below pages under FEMA SPECIAL CONDITIONS is also referred to and defined as the “Master Agreement”.

“Contractor” in the below pages under FEMA SPECIAL CONDITIONS is also referred to and defined as “Supplier” or “Awarded Supplier”.

### **Conflicts of Interest**

No employee, officer, or agent may participate in the selection, award, or administration of a contract supported by a FEMA award if he or she has a real or apparent conflict of interest. Such a conflict would arise when the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of these parties, has a financial or other interest in or a tangible personal benefit from a firm considered for award. 2 C.F.R. § 200.318(c)(1); See also Standard Form 424D, ¶ 7; Standard Form 424B, ¶ 3. i. FEMA considers a “financial interest” to be the potential for gain or loss to the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of these parties as a result of the particular procurement. The prohibited financial interest may arise from ownership of certain financial instruments or investments such as stock, bonds, or real estate, or from a salary, indebtedness, job offer, or similar interest that might be affected by the particular procurement. ii. FEMA considers an “apparent” conflict of interest to exist where an actual conflict does not exist, but where a reasonable person with knowledge of the relevant facts would question the impartiality of the employee, officer, or agent participating in the procurement. c. Gifts. The officers, employees, and agents of the Participating Public Agency nor the Participating Public Agency (“NFE”) must neither solicit nor accept gratuities, favors, or anything of monetary value from contractors or parties to subcontracts. However, NFE’s may set standards for situations in which the financial interest is de minimus, not substantial, or the gift is an unsolicited item of nominal value. 2 C.F.R. § 200.318(c)(1). d. Violations. The NFE’s written standards of conduct must provide for disciplinary actions to be applied for violations of such standards by officers, employees, or agents of the NFE. 2 C.F.R. § 200.318(c)(1). For example, the penalty for a NFE’s employee may be dismissal, and the penalty for a contractor might be the termination of the contract.

### **Contractor Integrity**

A contractor must have a satisfactory record of integrity and business ethics. Contractors that are debarred or suspended as described in Chapter III, ¶ 6.d must be rejected and cannot receive contract awards at any level.

### **Public Policy**

A contractor must comply with the public policies of the Federal Government and state, local government, or tribal government. This includes, among other things, past and current compliance with the:

- a. Equal opportunity and nondiscrimination laws
- b. Five affirmative steps described at 2 C.F.R. § 200.321(b) for all subcontracting under contracts supported by FEMA financial assistance; and FEMA Procurement Guidance June 21, 2016 Page IV- 7
- c. Applicable prevailing wage laws, regulations, and executive orders

### **Affirmative Steps**

For any subcontracting opportunities, Contractor must take the following Affirmative steps:

1. Placing qualified small and minority businesses and women’s business enterprises on solicitation lists;
2. Assuring that small and minority businesses, and women’s business enterprises are solicited whenever they are potential sources;

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and
5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

## **Bid Guarantee**

For proposals that are to include construction/reconstruction/renovation and related services, bids must be accompanied by Certified or Cashier's Check or an approved Bid Bond in the amount of not less than five percent (5%) of the total bid. Surety shall provide a copy of the Power of Attorney authorizing the Executing Agent the authority to execute the bid bond documents and bind the Surety to the bid bond conditions. The bid bond shall have a corporate Surety that is licensed to conduct business in the state of the lead agency and authorized to underwrite bonds in the amount of the bid bond.

## **Prevailing Wage Requirements**

When applicable, the awarded Contractor (s) and any and all subcontractor(s) agree to comply with all laws regarding prevailing wage rates including the Davis-Bacon Act, applicable to this solicitation and/or Participating Public Agencies. The Participating Public Agency shall notify the Contractor of the applicable pricing/prevailing wage rates and must apply any local wage rates requested. The Contractor and any subcontractor(s) shall comply with the prevailing wage rates set by the Participating Public Agency.

## **Federal Requirements**

If products and services are issued in response to an emergency or disaster recovery the items below, located in this FEMA Special Conditions section of the Federal Funds Certifications, are activated and required when federal funding may be utilized.

### **2 C.F.R. § 200.326 and 2 C.F.R. Part 200, Appendix II, Required Contract Clauses**

#### 9. Termination for Convenience:

The right to terminate this Contract for the convenience of the Participating Public Agency is retained by the Participating Public Agency. In the event of a termination for convenience by the Participating Public Agency, the Participating Public Agency shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor's receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by the Participating Public Agency, in accordance with the terms and provisions of the Contract Documents, an amount not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the project site or away from the project site, as approved in writing by the Participating Public Agency but not yet paid for and which cannot be returned, and actual, reasonable and documented demobilization costs, if any, paid by Contractor and approved by the Participating Public Agency in connection with the Scope of Work in place which is completed as of the date of termination by the Participating Public Agency and that is in conformance with the Contract Documents, less all amounts previously paid for the Work. No amount ever shall be owed or paid to Contractor for lost or anticipated profits on any part of the Scope of Work not performed or for consequential damages of any kind.

#### 10. Equal Employment Opportunity:

The Participating Public Agency highly encourages Contractors to implement Affirmative Action practices in their employment programs. This means Contractor should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information.

During the performance of this contract, the contractor agrees as follows:

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's non-compliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: *Provided*, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

11. During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the

## APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States."



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## 12. Davis Bacon Act and Copeland Anti-Kickback Act.

- a. Applicability of Davis-Bacon Act. The Davis-Bacon Act only applies to the emergency Management Preparedness Grant Program, Homeland Security Grant Program, Nonprofit Security Grant Program, Tribal Homeland Security Grant Program, Port Security Grant Program, and Transit Security Grant Program. **It does not apply to other FEMA grant and cooperative agreement programs, including the Public Assistance Program.**
- b. All prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141-3144 and 3146-3148) as supplemented by Department of Labor regulations at 29 C.F.R. Part 5 (Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction)). See 29 C.F.R. Part 200, Appendix II, ¶ D.
- c. In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week.
- d. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.
- e. In contracts subject to the Davis-Bacon Act, the contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. § 3145), as supplemented by Department of Labor regulations at 29 C.F.R. Part 3 (Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States). The Copeland Anti- Kickback Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to FEMA.
- f. The regulation at 29 C.F.R. § 5.5(a) does provide the required contract clause that applies to compliance with both the Davis-Bacon and Copeland Acts. However, as discussed in the previous subsection, the Davis-Bacon Act does not apply to Public Assistance recipients and subrecipients. **In situations where the Davis-Bacon Act does not apply, neither does the Copeland “Anti-Kickback Act.”** However, for purposes of grant programs where both clauses do apply, FEMA requires the following contract clause:

### “Compliance with the Copeland “Anti-Kickback” Act.

- (1) Contractor. The contractor shall comply with 18 U.S.C. § 874, 40U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.
- (2) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as the FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses
- (3) Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.”

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## 13. Contract Work Hours and Safety Standards Act.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. Where applicable (see 40 U.S.C. § 3701), all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by Department of Labor regulations at 29 C.F.R. Part 5. See 2 C.F.R. Part 200, Appendix II, ¶ E.
- c. Under 40 U.S.C. § 3702, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the workweek.
- d. The requirements of 40 U.S.C. § 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
- e. The regulation at 29 C.F.R. § 5.5(b) provides the required contract clause concerning compliance with the Contract Work Hours and Safety Standards Act:

### “Compliance with the Contract Work Hours and Safety Standards Act.

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.
- (3) Withholding for unpaid wages and liquidated damages. The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

liquidated damages as provided in the clause set forth in paragraph (2) of this section.

- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.”

## 14. Rights to Inventions Made Under a Contract or Agreement.

- a. Stafford Act Disaster Grants. This requirement **does not apply to the Public Assistance, Hazard Mitigation Grant Program, Fire Management Assistance Grant Program, Crisis Counseling Assistance and Training Grant Program, Disaster Case Management Grant Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program**, as

FEMA awards under these programs do not meet the definition of “funding agreement.”

- b. If the FEMA award meets the definition of “funding agreement” under 37 C.F.R. § 401.2(a) and the non-Federal entity wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the non-Federal entity must comply with the requirements of 37 C.F.R. Part 401 (Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements), and any implementing regulations issued by FEMA. See 2 C.F.R. Part 200, Appendix II, ¶ F.
  - c. The regulation at 37 C.F.R. § 401.2(a) currently defines “funding agreement” as any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal government. This term also includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as defined in the first sentence of this paragraph.
15. Clean Air Act and the Federal Water Pollution Control Act. Contracts of amounts in excess of \$150,000 must contain a provision that requires the contractor to agree to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act (42 U.S.C. §§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387). Violations must be reported to FEMA and the Regional Office of the Environmental Protection Agency. See 2 C.F.R. Part 200, Appendix II, ¶ G.

- a. The following provides a sample contract clause concerning compliance for contracts of amounts in excess of \$150,000:

### “Clean Air Act

- (1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
- (2) The contractor agrees to report each violation to the (name of the state agency or local or Indian tribal government) and understands and agrees that the (name of the state agency or local or Indian tribal government) will, in turn, report each violation as required to assure notification to the (name of recipient), Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

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- (3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

## Federal Water Pollution Control Act

- (4) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
- (5) The contractor agrees to report each violation to the (name of the state agency or local or Indian tribal government) and understands and agrees that the (name of the state agency or local or Indian tribal government) will, in turn, report each violation as required to assure notification to the (name of recipient), Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
- (6) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.”

## 16. Debarment and Suspension.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. Non-federal entities and contractors are subject to the debarment and suspension regulations implementing Executive Order 12549, *Debarment and Suspension* (1986) and Executive Order 12689, *Debarment and Suspension* (1989) at 2 C.F.R. Part 180 and the Department of Homeland Security’s regulations at 2 C.F.R. Part 3000 (Non procurement Debarment and Suspension).
- c. These regulations restrict awards, subawards, and contracts with certain parties that are debarred, suspended, or otherwise excluded from or ineligible for participation in Federal assistance programs and activities. See 2 C.F.R. Part 200, Appendix II, ¶ H; and *Procurement Guidance for Recipients and Subrecipients Under 2 C.F.R. Part 200 (Uniform Rules): Supplement to the Public Assistance Procurement Disaster Assistance Team (PDAT) Field Manual* Chapter IV, ¶ 6.d, and Appendix C, ¶ 2 [hereinafter *PDAT Supplement*]. A contract award must not be made to parties listed in the SAM Exclusions. SAM Exclusions is the list maintained by the General Services Administration that contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. SAM exclusions can be accessed at [www.sam.gov](http://www.sam.gov). See 2 C.F.R. § 180.530; *PDAT Supplement*, Chapter IV, ¶ 6.d and Appendix C, ¶ 2.
- d. In general, an “excluded” party cannot receive a Federal grant award or a contract within the meaning of a “covered transaction,” to include subawards and subcontracts. This includes parties that receive Federal funding indirectly, such as contractors to recipients and subrecipients. The key to the exclusion is whether there is a “covered transaction,” which is any non-procurement transaction (unless excepted) at either a “primary” or “secondary” tier. Although “covered transactions” do not include contracts awarded by the Federal Government for purposes of the non-procurement common rule and DHS’s implementing regulations, it does include some contracts awarded by recipients and subrecipient.
- e. Specifically, a covered transaction includes the following contracts for goods or services:
  - (1) The contract is awarded by a recipient or subrecipient in the amount of at least \$25,000.

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

- (2) The contract requires the approval of FEMA, regardless of amount.
- (3) The contract is for federally required audit services.
- (4) A subcontract is also a covered transaction if it is awarded by the contractor of a recipient or subrecipient and requires either the approval of FEMA or is in excess of \$25,000.

d. The following provides a debarment and suspension clause. It incorporates an optional method of verifying that contractors are not excluded or disqualified:

## “Suspension and Debarment

- (1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such the contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- (2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
- (3) This certification is a material representation of fact relied upon by (insert name of subrecipient). If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (name of state agency serving as recipient and name of subrecipient), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- (4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.”

## 17. Byrd Anti-Lobbying Amendment.

- c. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- d. Contractors that apply or bid for an award of \$100,000 or more must file the required certification. See 2 C.F.R. Part 200, Appendix II, ¶ I; 44 C.F.R. Part 18; *PDAT Supplement*, Chapter IV, 6.c; Appendix C, ¶ 4.
- e. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.

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Such disclosures are forwarded from tier to tier up to the non-Federal award. See PDAT Supplement, Chapter IV, ¶ 6.c and Appendix C, ¶ 4.

- f. The following provides a Byrd Anti-Lobbying contract clause:

“Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient.”

## APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements (To be submitted with each bid or offer exceeding \$100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge, that:

1.No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2.If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form- LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

3.The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

**The Contractor, TDIndustries, Inc., certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 3801 et seq., apply to this certification and disclosure, if any.**

# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

  
Signature of Contractor's Authorized Official

Crystal Seiler, PST Manager  
Name and Title of Contractor's Authorized Official

6/26/20  
Date

## 18. Procurement of Recovered Materials.

- g. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- h. A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with Section 6002 of the Solid Waste Disposal Act, Pub. L. No. 89-272 (1965) (codified as amended by the Resource Conservation and Recovery Act at 42 U.S.C. § 6962). See 2 C.F.R. Part 200, Appendix II, ¶ J; 2 C.F.R. § 200.322; *PDAT Supplement*, Chapter V, ¶ 7.
- i. The requirements of Section 6002 include procuring only items designated in guidelines of the EPA at 40 C.F.R. Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired by the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.
- j. The following provides the clause that a state agency or agency of a political subdivision of a state and its contractors can include in contracts meeting the above contract thresholds:

“(1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA- designated items unless the product cannot be acquired—

(i) Competitively within a timeframe providing for compliance with the contract performance schedule;

(ii) Meeting contract performance requirements; or

(iii) At a reasonable price.

(2) Information about this requirement, along with the list of EPA- designate items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.”

## 19. Additional FEMA Requirements.

- k. The Uniform Rules authorize FEMA to require additional provisions for non- Federal entity contracts. FEMA, pursuant to this authority, requires or recommends the following:

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## I. Changes.

To be eligible for FEMA assistance under the non-Federal entity's FEMA grant or cooperative agreement, the cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope. FEMA recommends, therefore, that a non-Federal entity include a changes clause in its contract that describes how, if at all, changes can be made by either party to alter the method, price, or schedule of the work without breaching the contract. The language of the clause may differ depending on the nature of the contract and the end-item procured.

## m. Access to Records.

All non-Federal entities must place into their contracts a provision that all contractors and their successors, transferees, assignees, and subcontractors acknowledge and agree to comply with applicable provisions governing Department and FEMA access to records, accounts, documents, information, facilities, and staff. See DHS Standard Terms and Conditions, v 3.0, ¶ XXVI (2013).

## n. The following provides a contract clause regarding access to records:

"Access to Records. The following access to records requirements apply to this contract:

(4) The contractor agrees to provide (insert name of state agency or local or Indian tribal government), (insert name of recipient), the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

(5) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

(6) The contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract."

## 20.DHS Seal, Logo, and Flags.

o. All non-Federal entities must place in their contracts a provision that a contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval. See DHS Standard Terms and Conditions, v 3.0, ¶ XXV (2013).

p. The following provides a contract clause regarding DHS Seal, Logo, and Flags: "The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre- approval."

## 21.Compliance with Federal Law, Regulations, and Executive Orders.

q. All non-Federal entities must place into their contracts an acknowledgement that FEMA financial assistance will be used to fund the contract along with the requirement that the



# APPENDIX D, EXHIBIT F, FEDERAL FUNDS CERTIFICATIONS

contractor will comply with all applicable federal law, regulations, executive orders, and FEMA policies, procedures, and directives.

- r. The following provides a contract clause regarding Compliance with Federal Law, Regulations, and Executive Orders: "This is an acknowledgement that FEMA financial assistance will be used to fund the contract only. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives."

## 22.No Obligation by Federal Government.

- s. The non-Federal entity must include a provision in its contract that states that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.
- t. The following provides a contract clause regarding no obligation by the Federal Government: "The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract."

## 23.Program Fraud and False or Fraudulent Statements or Related Acts.

- u. The non-Federal entity must include a provision in its contract that the contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to its actions pertaining to the contract.
- v. The following provides a contract clause regarding Fraud and False or Fraudulent or Related Acts: "The contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the contractor's actions pertaining to this contract."

Additional contract clauses per 2 C.F.R. § 200.325

For applicable construction/reconstruction/renovation and related services: A payment and performance bond are both required for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided in the contract.

**Offeror agrees to comply with all terms and conditions outlined in the FEMA Special Conditions section of this solicitation.**

Offeror's Name: TDIndustries, Inc.

Address, City, State, and Zip Code: 9525 Derrington Rd., Houston, TX 77064

Phone Number: 713-996-3121 Fax Number: \_\_\_\_\_

Printed Name and Title of Authorized Representative: Crystal Seiler, PST Manager

Email Address: crystal.seiler@tdindustries.com

Signature of Authorized Representative:  Date: 6/26/20

# APPENDIX D, EXHIBIT G, NEW JERSEY BUSINESS COMPLIANCE

Not Applicable.

# TAB 4 - QUALIFICATION AND EXPERIENCE

## TAB 4 CONTENTS:

QUALIFICATIONS

EXPERIENCE

FIVE REFERENCES

# QUALIFICATIONS AND EXPERIENCE

*Provide a brief history of the Offeror, including year it was established and corporate office location.*

TDIndustries- A Partnership of the Spirit

Dallas Headquarters: 13850 Diplomat Drive, Dallas, Texas, 75234

Founded in 1946, TDIndustries has developed into one of America's premier facilities service and specialty construction companies. We are among the top 60 specialty Environmental / Mechanical/ Plumbing and Service companies in the United States and among the top three in Texas.

By creating a partnership with you, our customers, we are able to fulfill all your indoor environment needs through our diverse mix of lifecycle services and value-based solutions. TDIndustries is also among the most experienced facility construction companies in Texas. We know how to stage a project in an occupied building/campus setting, plan and implement the work with minimal disruption to the business at hand. In addition, our large pool of experienced technicians and installers gives TDIndustries the ability to deliver large-scale construction projects all at once in multiple campuses or in individual stages.

TDIndustries customers and employees work to fulfill our mission: We are committed to providing outstanding career opportunities by exceeding our customers' expectations through continuous aggressive improvement.

In-House Capabilities and Services – Our goal is to help you make the most of your investment in a facility. TDIndustries capably provides self-performed construction, installation, service and operations for the following systems that serve Government Entities existing facilities or groundup construction projects.

- » Energy Savings Performance and Management Solutions
- » Facilities Maintenance and Operations / Facilities Management Services
- » Building Automation Systems/Systems Integration Services
- » Heating, Ventilation and Air Conditioning
- » Plumbing / Electrical / Refrigeration
- » Process and High Purity Piping
- » Life Safety Systems
- » Site-based Facilities Management Services

We believe that having more in-house capabilities than our traditional competitors adds tremendous benefit to Government Entities.

# QUALIFICATIONS AND EXPERIENCE

## *ii. Describe Offeror's reputation in the marketplace.*

The proof of our reputation is that our clients come back to us time and time again, which has allowed TDIndustries to grow to be the largest mechanical contractor in the southwest with 74 years of success. The core values for TDIndustries are to build and maintain trusting relationships, Fiercely protect the safety of all partners, Lead with a servant's heart, Passionately pursue excellence, and Celebrate the power of individual differences.

## *iii. Describe Offeror's reputation of products and services in the marketplace.*

TD has grown to be the largest mechanical contractor in the southwest because we know our products and deliver the highest quality in service, construction, and our preconstruction expertise. Delivering high quality products since 1946 has allowed us to leverage our relationships with our distributors and suppliers to outfit our customers with the highest quality at the best price.

## *iv. Describe the experience and qualification of key employees.*

In each of our twelve offices, we have dedicated TD partners who are focused on the Turnkey Retrofit and Services needed to satisfy any project work that is contracted through OMNIA. The facilities services include design, construction, maintenance services, energy management, building automation and controls, training, and support. TD will dispatch/assign the appropriately skilled technician to fulfill the technical degree of each project.

To appropriately staff each project with licensed technicians, TD goes above and beyond to license each technician to support continuous aggressive improvement by doing year round training for all partners. In 2019 our partners participated in 80,342 hours of training.

## *v. Describe Offeror's experience working with the government sector.*

TDIndustries has a long standing relationship with many areas of the government and has been extremely successful in those relationships. This is seen with TD's contract renewals with the State of Texas, the public school systems, city contracts, and confidential secure locations.

## *vi. Describe past litigation, bankruptcy, reorganization, state investigations of entity or current officers and directors.*

TDIndustries Legal Statement:

"The Company is a party to a number of legal proceedings arising in the ordinary course of business. In the opinion of management, the resolution of these proceedings will not have a material adverse effect on the financial position or results of operations of the Company."

*Sheri L. Tillman*

Sheri L. Tillman

Corporate Counsel TDIndustries | [www.tdindustries.com](http://www.tdindustries.com) Office 972-888-6844 | Cell 972-375-3603

# QUALIFICATIONS AND EXPERIENCE

vii. Provide a minimum of 5 customer references relating to the products and services within this RFP. Include entity name, contact name and title, contact phone and email, city, state, years serviced, description of services and annual volume.

## ARIZONA

City of Maricopa  
Dan Leonard - Maintenance Coordinator Public Works  
P: (602) 513-2495  
E: Daniel.Leonard@maricopa-az.gov  
Maricopa, AZ  
Years Serviced: 5 years  
Description: HVAC, Plumbing, Restaurant, Electrical, General Services, and Change Out Projects  
Annual Volume: \$340,381

## HOUSTON

Houstonfirst Corporation  
John Gonzalez - Vice President  
P: (713) 853-8299  
E: John.Gonzalez@Houstonfirst.com  
Houston, TX  
Years Serviced: 11 +  
Description: Full facilities contract  
Annual Volume: \$5.2 Million

## FORT WORTH

Arlington ISD  
David Jackson - HVAC Supervisor  
P: (682) 867-7639  
E: djackso7@aisd.net  
Arlington, TX  
Years Serviced: 3 years  
Description: Boiler preventative maintenance , HVAC, and plumbing demand service, special project construction mechanical change outs  
Annual Volume: \$700,000

## AUSTIN

Texas State University  
Jeremy Stolfa Assistant Athletic Director  
P: (512) 245-2023  
E: stolfa@txstate.edu  
San Marcos, TX  
Years Serviced: 5 years  
Description: HVAC & Commercial Refrigeration  
Annual Volume: \$150,000

## DALLAS

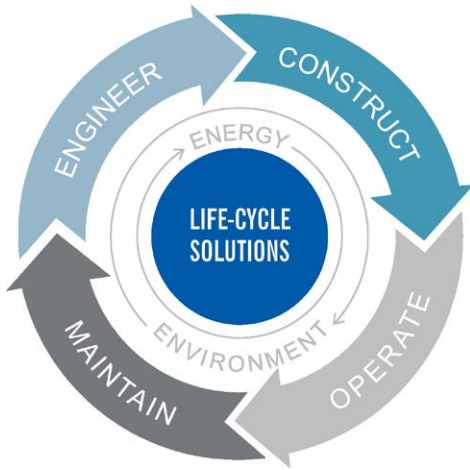
Communities Foundation of Texas  
Beverly Garner Senior Director, Property and Facilities  
P: (817) 823-4884  
E: Rbgarner@cftexas.org  
Dallas, TX  
Years Serviced: 6 years  
Description: HVAC maintenance contract for Chiller, cooling towers, AHUS, Condenser Pumps, ect., T&M work for other trades also for Plumbing, CRFES, and electrical  
Annual Volume: \$91,000

## SAN ANTONIO

Fort Stockton ISD  
Robert Stallard - Director of Operations  
P: (432) 336-4039  
E: Robert.Stallard@FSISD.net  
Fort Stockton, TX  
Years Serviced: 1 year  
Description: HVAC Services Contract  
Annual Volume: \$300,000

# QUALIFICATIONS AND EXPERIENCE

viii. Provide any additional information relevant to this section.



## LIFE-CYCLE SOLUTIONS

Unlike most mechanical construction providers, TDIndustries is also a full service design, facility management and demand-service provider.

By being a life-cycle mechanical contractor we are able to offer our customers a “one-stop shop” solution for our customers. We understand the unique requirements of critical operating systems.

## SAFETY

### COVID-19 PROTOCOL

With COVID-19 affecting the economy in a negative way, companies have found themselves in a recession-like situation, faster and earlier than expected. With the unknown ahead, TD is proactively working to keep partners safe and clients happy.

To stay ahead of the pandemic and to help ensure the safety of others, TD has implemented protocol for COVID-19 on every jobsite including:



### SAFETY AWARDS

TDIndustries continues to be acknowledged as a leader in safety at the local, regional and national levels, most recently by the Associated General Contractors (AGC) of America where TDIndustries won the Second Place National Construction Safety Excellence Award for a Specialty Contractor with Over 1 Million Work Hours. The award was earned based on results, risk mitigation, hazard identification and control, training and a comprehensive safety program. For many years, those results (EMR, TRIR and other measurements) tell the same story - TD is a leader in the Specialty Contracting Industry. Our safety metrics have consistently been among the best in the country.

In 2019 TDIndustries’ Safety Culture was recognized by both AGC and ABC:

- ABC Pinnacle Safety Award
- Second Place National Construction Safety Excellence Award by the Associated General Contractors of America (AGC)

# TD'S WORLD-CLASS SAFETY PROGRAM

Our commitment to safety is reflected in our Core Values. Our Partners are the most valued assets of the company and the welfare of everyone is of the highest importance. We continually and aggressively communicate our safety programs to our Partners and subcontractors.

TDIndustries remains committed to continuously improving our safety programs and culture. In an effort to become a world-class safety focused organization, we began to practice behavioral-based safety. Following this process leads to a more proactive approach, focusing on safe behaviors to prevent injuries. In 2016, we debuted the TD Safety Observation Training (TSOT) program for behavior-based safety training. All leaders from the CEO to foremen have underwent TSOT education.

Safety Observations are the key to improving safety performance by addressing the lead measure indicators and behaviors before they manifest as incidents. These tools will be incorporated into our safety program for this project as well. All local Partners attend our safety orientations which cover all major safety topics for construction sites.



To help ensure a drug-free workplace, we have a comprehensive drug testing program including: pre-employment drug screen, post-incident drug screen, random drug screens and screening upon probable cause. In addition, we require weekly safety meetings, as well as a “Pre-Task Safety Plan” which consists of an outline of individual tasks, any required PPE and how to perform the task safely.

## RECENT SAFETY DATA

	EMR	LTIR	TRIR	TOTAL HOURS WORKED
2019	.63	.03	1.4	6,661,989
2018	.77	.3	2.3	6,136,430
2017	.7	.2	2	5,686,471
2016	.73	.2	2.3	4,671,298
2015	.68	.1	2	4,167,223

## A SAMPLE OF TD TRAININGS AND CERTIFICATIONS FOR SUPERINTENDENTS, SUPERVISORS, AND MORE

All field supervisors or leads are required to take TEXO Safety First, OSHA 10-hour safety training, as well as other TD required training such as PPE, Fall Protection, EEW, Lockout-Tagout, etc.



FIRST AID/CPR



PPE



LADDER



TEXO SAFETY FIRST



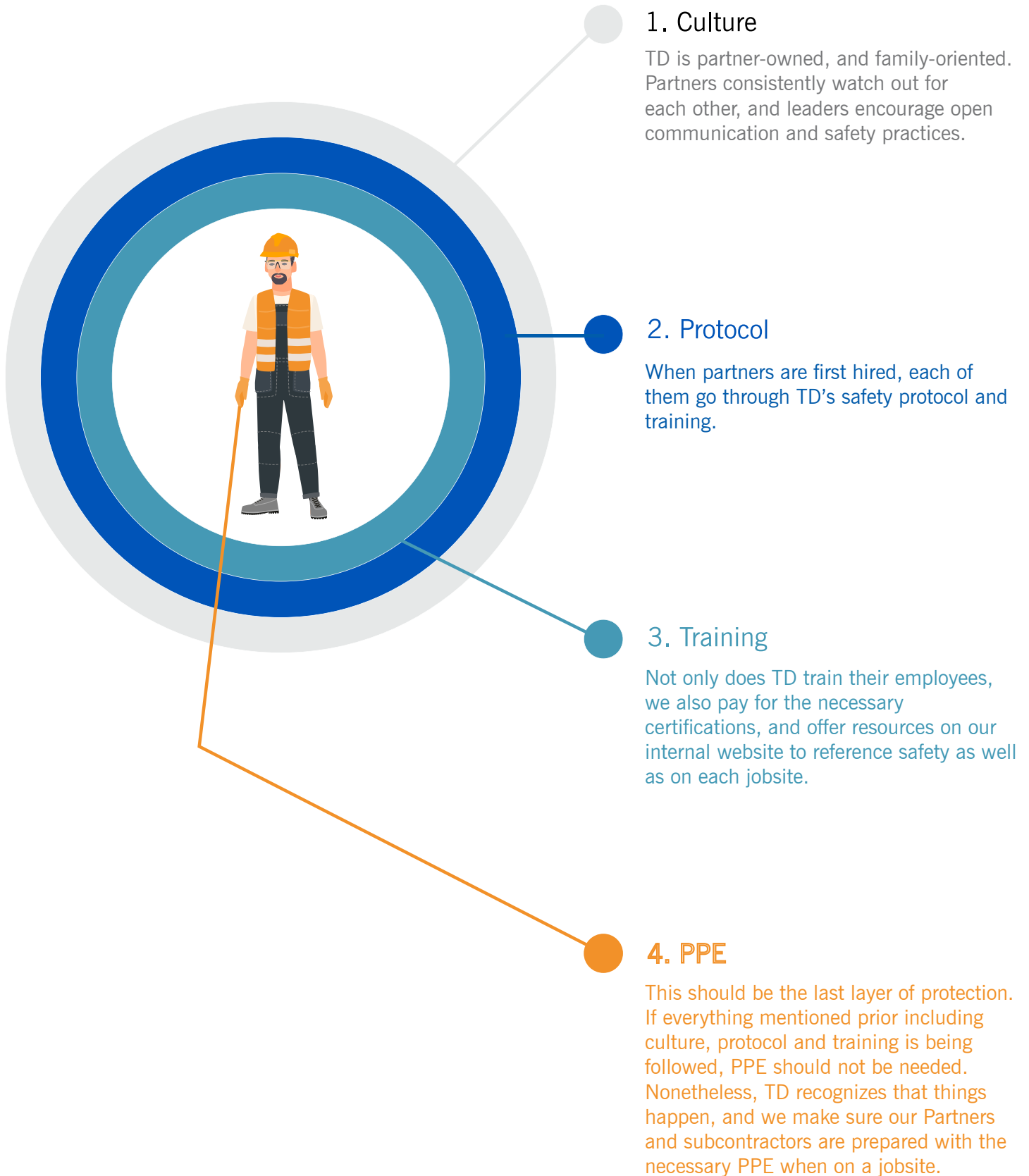
OSHA TRAINING





# WHAT IS THE VALUE OF TD'S SAFETY RESOURCES?

## LAYERS OF PROTECTION



# HOW DOES TD STAY UP TO DATE?

## SAFETY APP

TD teamed with application developer, SmartTagIt, to utilize a new real-time and integrated safety app to send notifications, share pre-task safety plans, inspections, observations, and safety alerts.

The system offers robust reporting and safety metrics. The alerts and observations include Partner feedback on their own severity-level rating of the condition or behavior observed.

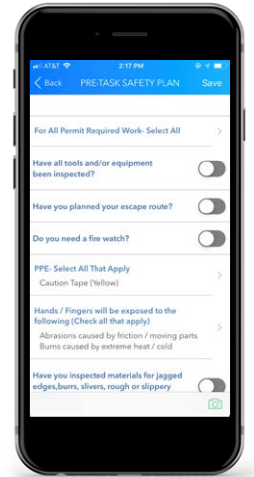
### The safety app helps make TD's safety processes:

- » Easier to follow
- » More effective
- » More engaging

The app brings better awareness of hazards and improved planning. It is used by 900+ Partners, including all field leadership and up, plus all service technicians. Partners performing either safety inspections or safety observations have been provided SmartTagIt accounts.

### The app will also:

- » Manage the safety performance on all job sites
- » Fix hazards
- » Provide tools to stop unsafe working behaviors
- Engage in proactive safety processes consistently and often



Sample Pre-Task Safety Plan

## TAB 5 - VALUE ADD

### TAB 5 CONTENTS:

ADDITIONAL INFORMATION RELATED TO PRODUCTS AND SERVICES OFFEROR PROPOSES TO ENHANCE AND ADD VALUE TO THE CONTRACT.

# ADDITIONAL INFORMATION

i. Provide any additional information related to products and services Offeror proposes to enhance and add value to the Contract.

<p><b>Facilities Maintenance and Operations/Facilities Management Services</b></p> <p><b>Please see Attachment “G-1”</b></p>	<p>Type: Full Facility Operations and Maintenance</p> <p>Our Customers:</p> <ul style="list-style-type: none"> <li>» Airports</li> <li>» Higher Education</li> <li>» Convention and Entertainment</li> <li>» Corporate Environment</li> <li>» Data Centers/Critical Environments</li> <li>» Government</li> <li>» Healthcare</li> <li>» School Districts</li> </ul> <p>Personnel: All work performed by TD Partners</p> <p>Detailed Features and Benefits:</p> <p>Your buildings serve a deeper purpose; it provides a welcoming, safe environment that houses your customers, staff, and students. We tailor facilities management service to support your business goals. With a local on-site highly qualified team and a wide range of services, we stand ready to flex with your business needs.</p> <ul style="list-style-type: none"> <li>» Mechanical system operation and maintenance</li> <li>» Vertical transportation</li> <li>» Security systems</li> <li>» Renovation and retrofit</li> <li>» Fire Life and Safety</li> <li>» Lighting</li> <li>» Energy Management</li> <li>» Cost containment</li> <li>» LEED certification</li> </ul>
<p><b>Fire Life and Safety (FLS)</b></p> <p><b>Please see Attachment “G-2”</b></p>	<p>Type: Code Compliance, Auditing, Design Engineering, Construction Management, Operation and Maintenance, Training</p> <p>Fire Suppression Systems and Services</p> <p>Personnel: All work performed by TD Partners</p> <p>Detailed Features and Benefits:</p> <p>TDIndustries offers a full range of Fire/Life Safety and Fire Suppression Systems and Services. The need for innovation and continuous improvement methods has never been greater. With our leadership and training programs, we will put in place highly trained personnel to provide a turnkey project performing all key technical, management, and financial functions.</p>

# ADDITIONAL INFORMATION

<p><b>Energy Savings Performance and Management Solutions</b></p> <p><b>Please see Attachment “G-3”</b></p>	<p>Type: Energy Auditing and Facility Assessment</p> <ul style="list-style-type: none"> <li>» Preliminary Audit-Expert modeling and analysis of baseline energy usage and savings</li> <li>» Detailed Energy Audit-Project development and economic analysis</li> </ul> <p>Personnel: All work performed by TD Partners</p> <p>Detailed Features and Benefits:</p> <ul style="list-style-type: none"> <li>» In-house Design Engineering and Specification</li> <li>» Construction Project Management</li> <li>» Procurement of materials and trade labor</li> <li>» Safety coordination by our in-house Certified Safety Professional and OSHA-Authorized Trainer</li> <li>» Continuous Commissioning</li> <li>» Ongoing Maintenance and Support Services</li> <li>» Guaranteed Savings Performance Monitoring and Verification</li> <li>» Performance guarantee backed by a history of financial strength, organizational longevity</li> <li>» Facility Staff and Occupant Training</li> <li>» Financing Procurement Support</li> <li>» Including identifying and securing all available grants, rebates, and incentives available to offset project costs</li> </ul>
<p><b>Automation/Controls</b></p> <p><b>Please see Attachment “G-4”</b></p>	<p>Type: Building Automation Systems/Systems Integration Services (BPSI Anti-Terrorism Facility Protection, Intelligent Irrigation Matters, Lighting, Metering, Security/Access Controls, System Integration)</p> <p>Personnel: All work performed by TD Partners</p> <p>Detailed Features and Benefits:</p> <p>TDIndustries develops, deploys, and supports the entire spectrum of intelligent automation and sustainability technologies because they save our customers money. Not only reducing energy costs, but maintenance and emergency costs as well. At the same time, smart systems increase overall efficiency and tenant satisfaction, and extend the life of your building. Our processes dramatically affect long-term planning and your bottom line.</p> <p>They drive efficiencies that, in the end, pay for themselves, including:</p> <ul style="list-style-type: none"> <li>» Total integration of the systems in your building</li> <li>» Reduce operating expenses</li> <li>» You get to make better system choices</li> <li>» A centralized location for all facility data</li> <li>» Web-based interface and open systems architecture</li> <li>» Real-time measurement</li> <li>» Increased tenant satisfaction</li> <li>» Increased employee productivity</li> <li>» Increased property value</li> </ul>

# ADDITIONAL INFORMATION

<p><b>Truck Based Services</b></p> <p><b>Please see Attachment “G-5”</b></p>	<p>Type: We offer complete Refrigeration, HVAC, Plumbing, and Electrical repair and maintenance services.</p> <p>Personnel: All work performed by TD Partners</p> <p>Detailed Features and Benefits:</p> <p>We offer a wide variety of superior services ready for immediate response and resolution of jobs of all sizes and complexity. Our comprehensive truck based services, ServiceLink technology, and our broad spectrum of service and repair plans are just a few of the ways we support our commitment to service.</p>
<p><b>Refrigeration</b></p> <p><b>Please see Attachment “G-5”</b></p>	<p>Type: Commercial Refrigeration Installation, Repair and Maintenance</p> <p>Personnel: All work performed by TD Partners</p> <p>TD works with a variety of manufacturers to offer you the best possible costs on equipment and parts. We also provide preventative maintenance contracts to increase the efficiency and extend the life of your equipment. Our employees are highly trained and experienced to install and service commercial refrigeration systems and are on call 24/7/365 to provide your company with emergency repairs. We support a variety of equipment with low temperature needs and HVAC (heating, ventilation, and air conditioning) sales and service.</p> <p>A sample of the types of facilities we service:</p> <ul style="list-style-type: none"> <li>» Supermarkets</li> <li>» Colleges and Schools</li> <li>» Convenience Stores</li> <li>» Restaurants</li> <li>» Taverns &amp; Bars</li> <li>» Manufacturing Facilities</li> <li>» Refrigerated Warehouses</li> </ul>

# ADDITIONAL INFORMATION

<b>HVAC</b> <b>Please see Attachment "G-5"</b>	Type: Commercial Heating & Air Conditioning System Services
	Personnel: All work performed by TD Partners
	Detailed Features and Benefits:  TD offers comprehensive services for boilers, chillers, air handlers, pumping systems, control systems, and water treatment. Our performance guarantees are unmatched by any other company in this industry. Not only is your exposure to risk reduced, but the quality of service you can expect is superior as well. Regularly scheduled inspections, 24- hour emergency service, full-service maintenance and repairs all extend the life of your systems.
<b>Electrical</b> <b>Please see Attachment "G-5"</b>	Type: Electrical Repair Services
	Personnel: All work performed by TD Partners
	Detailed Features and Benefits:  TD is Equipped to handle all of your electrical needs with highly skilled technicians who are licensed and certified in the latest national electrical codes, city codes, and OSHA safety regulations. our service professionals are empowered to give on-site quotes for providing: <ul style="list-style-type: none"> <li>» Interior Finish-Out</li> <li>» Industrial Systems</li> <li>» Electrical Controls</li> <li>» Infrared Imaging Services</li> <li>» Lighting Contracts</li> <li>» Multifamily Services</li> <li>» Outdoor Lighting</li> <li>» Retrofits and Upgrades</li> </ul>
<b>Plumbing</b> <b>Please see Attachment "G-5"</b>	Type: Commercial Plumbing Services
	Personnel: All work performed by TD Partners
	Detailed Features and Benefits:  For the total lifecycle of your facility - repairs, replacements, renovations, or retrofits - TD has the resources in place. Fully licensed plumbers are available 24 hours a day, seven days a week, to provide: <ul style="list-style-type: none"> <li>» Boiler/Chiller System Repair and Maintenance</li> <li>» Hydro-Jet Service</li> <li>» Water System Repair and Maintenance</li> <li>» Sewer System Repair and Maintenance</li> <li>» Gas System Repair and Maintenance</li> <li>» Certified Backflow Testing</li> <li>» OSHA Certified Confined Entry</li> <li>» Certified Medical Gas Installation and Repair</li> <li>» Electronic Leak Detection</li> <li>» Electronic Line Location</li> <li>» Pro-Temp Service and Maintenance</li> </ul>

# ADDITIONAL INFORMATION

## ATTACHMENT “G-1”

### FACILITY MAINTENANCE / MANAGEMENT SERVICE

#### EXECUTIVE SUMMARY

Thank you for giving TDIndustries the opportunity to provide our proposal for Facility Maintenance Service. We are excited by the opportunity to serve The Cooperative Purchasing Network. TDIndustries has the knowledge, experience, capabilities and flexibility to mobilize a workforce to meet the facility challenges facing OMNIA.

The need for innovation and continuous improvement methods has never been greater. With our leadership and training programs, we will put in place a highly trained, competent site manager backed by professional management and a dedicated facility support and local service team. We will further develop a total facility service plan around your facility needs and support our onsite Supervisor with additional local technicians as needed. We will make the transition to TDIndustries seamless and provide ongoing service with no disruption to OMNIA.

Our staffing plan is built on flexibility. The billable cost presented in the Pricing Section covers staffing as required in the RFP.

*Benefit to the Agency Members of OMNIA—You get the benefit of our experience and capabilities in Facilities Management to develop and implement a staffing plan to meet your needs, at no additional charge.*

#### MANAGEMENT AND TECHNICAL EXPERTISE

TDIndustries proposes a manager that will proactively and effectively manage all aspects of facility services. He will be supported by an Operations Manager and our Professional Services Group. Our organization is specifically designed for efficiency with the flexibility to comply with both OMNIA and TDIndustries' operational requirements.

Benefit to the Agency Members of OMNIA—With TDIndustries' leadership and knowledge of facilities, policies and procedures, the transition period will be short with no disruptions—which will increase efficiencies and save you money.

#### CERTIFICATION/TRAINING OF MULTI-SKILLED WORKFORCE

TDIndustries utilizes highly-skilled technicians at all of our continuous-presence mechanical and facilities services sites. Each TDIndustries employee is tested using TDIndustries' Progression Program. This training and certification program focuses on written and hands-on criteria to determine employee skill levels. The employee then enters the program with the full support of management to continue their career development in as many crafts as desired.

*Benefit to the Agency Members of OMNIA—You will not waste any time or money developing a new certification /training program. You will also have the assurance that the people performing your repair work have the necessary skills for the job to be performed in a safe, efficient, and correct manner.*



# ADDITIONAL INFORMATION

## ATTACHMENT “G-1”

### FACILITY MAINTENANCE / MANAGEMENT SERVICE

#### EXECUTIVE SUMMARY

##### FULL-SERVICE SUPPLIER

TDIndustries is a full-service supplier of engineering, construction and maintenance service. By selecting TDIndustries, you will have over 2,000 professionals and skilled technicians available to you. This includes specialty services such as total facilities and HVAC repair.

*Benefit to the Agency Members of OMNIA—Any need you might have associated with repairs, maintenance and capital projects is one phone call away.*

##### MAINTENANCE EXPERIENCE

TDIndustries performs over \$141,000,000 annually at continuous-presence and service/facilities maintenance revenue. We bring the successful programs from these operations to you. They include safety, benchmarking, cost control, quality, equipment availability, management model, employee leadership, community involvement and long term relationships.

*Benefit to the Agency Members of OMNIA—You get the benefit of our management processes, procedures and expertise to develop and implement these programs at no additional charge.*

##### SAFETY

TDIndustries is firmly committed to providing excellence in safety. From the CEO to the field supervisor to the technician, every employee recognizes and accepts the requirement to make safety our most important responsibility.

Within TDIndustries, safety and health are not priorities, but values instilled in our employees at all levels.

TDIndustries is focused on getting everyone to automatically think about safety first.

*Benefit to the Agency Members of OMNIA—You will not waste any time or money dealing with the issues that arise from developing a new safety program for your mechanical and facility maintenance operation or from someone being injured in the workplace. These safety programs and policies already exist and produce excellent results.*

##### TRANSITION PLAN

TDIndustries has the experience to implement a smooth transition. We have a structured transition plan with proven processes and procedures refined over hundreds of project startups.

*Benefit to the Agency Members of OMNIA—You get the benefit of TDIndustries’ transition expertise to help ensure no disruption of service at your buildings.*

# ADDITIONAL INFORMATION

## ATTACHMENT “G-2”

### FIRE/LIFE SAFETY AND FIRE SUPPRESSION SYSTEMS

#### EXECUTIVE SUMMARY

Thank you for giving TDIndustries the opportunity to provide our proposal for Fire/Life Safety and Fire Suppression Systems. We are excited by the opportunity to serve The Cooperative Purchasing Network.

TDIndustries offers a full range of Fire/Life Safety and Fire Suppression Systems and Services. The need for innovation and continuous improvement methods has never been greater. With our leadership and training programs, we will put in place highly trained personnel to provide a turnkey project performing all key technical, management, and financial functions.

#### CODE COMPLIANCE AUDITING

TDIndustries uses a holistic approach that combines visual inspection, technical analysis, and interviews with facility staff in order that we may provide OMNIA with a detailed review of the current state of buildings fire alarm and fire suppression systems and current code issues that may impact the building and its occupants. This approach enables our engineers to construct a detailed report and a current code compliance matrix that will provide the highest capacity for improvement and the best value to OMNIA.

*Benefit to the Agency Members of OMNIA—Successful life safety system and infrastructure improvement programs resulting in increased building occupant safety and current code compliance.*

#### DESIGN ENGINEERING

The design engineering process emphasizes minimization of cost while providing quality designs. The same engineers that participated in the audits will complete the project design, create bid specifications, assist with construction management, and consult on operations. TDIndustries refers to this approach as the “closed-loop” management strategy, which insures consistency and a high degree of quality control throughout the project life cycle and is essential in providing OMNIA with an integrated best value solution.

*Benefit to the Agency Members of OMNIA —Allows for a smooth transition from the development stage through the operations stage.*

#### CONSTRUCTION MANAGEMENT

TDIndustries construction management team will inspect the work of all subcontractors for compliance with the design documents and project intent and will develop specific project acceptance criteria, startup, commissioning, and retro-commissioning processes. TDIndustries will focus intently on scheduling work in a manner that minimizes disruption while maintaining a safe environment.

*Benefit to the Agency Members of OMNIA —TDIndustries construction strategy will provide for fast implementation and short construction timelines while minimizing disruptions to the building occupants so that the customer will begin to realize life safety system improvements early in the project while minimizing disruption.*

# ADDITIONAL INFORMATION

## ATTACHMENT “G-2”

### FIRE/LIFE SAFETY AND FIRE SUPPRESSION SYSTEMS

#### EXECUTIVE SUMMARY

##### OPERATION AND MAINTENANCE

TDIndustries will provide a maintenance program for all or part of the contract term, as desired by OMNIA, for all equipment installed under the project. Our role as one of the nation’s most experienced Truck and Site-based Services provider and as an operator of facilities for a wide variety of clients, has enabled us to become expert at developing maintenance plans that will help provide reliable operation with minimal downtime and operational disruption.

*Benefit to the Agency Members of OMNIA —You will receive a maintenance strategy that will be based on cost-effectiveness while ensuring that equipment remains in optimal operating condition through the application of sound preventative and predictive maintenance programs.*

##### TRAINING

TDIndustries primary focus for education will be to ensure that the impacted people understand why changes are being made, the proper use of new equipment, and procedures for reporting equipment not performing properly. Technical training for facility personnel will be to provide comprehensive instruction on the operation, troubleshooting, maintenance, and repair of equipment and systems modified or installed.

*Benefit to the Agency Members of OMNIA —All parties working together to ensure improved safety, reliability, and peace of mind on a sustained basis.*

*“TDIndustries has a team of dedicated professionals ready to support all of OMNIA facility needs”.*

# ADDITIONAL INFORMATION

## ATTACHMENT “G-3”

### ENERGY SAVINGS PERFORMANCE CONTRACTING

#### EXECUTIVE SUMMARY

Thank you for giving TDIndustries the opportunity to provide our proposal for Energy Savings Performance Contracting (ESPC). We are excited by the opportunity to serve The Cooperative Purchasing Network.

TDIndustries offers a full range ESPC Services. The need for innovation and continuous improvement methods has never been greater. With our leadership and training programs, we will put in place highly trained personnel to provide a turnkey project performing all key technical, management, and financial functions.

#### ENERGY AUDITING

TDIndustries uses a holistic approach that combines visual inspection, technical analysis, and interviews with facility staff in order that we may provide OMNIA with an Investment Grade Energy. This approach enables our engineers to construct a detailed model that will provide the highest capacity for improvement and the best value to OMNIA.

*Benefit to the Agency Members of OMNIA—Successful energy efficiency and infrastructure improvement programs resulting in realistic savings.*

#### DESIGN ENGINEERING

The design engineering process emphasizes minimization of cost while providing quality designs. The same engineers that participated in the audits will complete the project design, create bid specifications, assist with construction management, and consult on operations. TDIndustries refers to this approach as the “closed-loop” management strategy, which insures consistency and a high degree of quality control throughout the project life cycle and is essential in providing OMNIA with an integrated best value solution.

*Benefit to the Agency Members of OMNIA —Allows for a smooth transition from the development stage through the operations stage.*

#### CONSTRUCTION MANAGEMENT

TDIndustries construction management team will inspect the work of all subcontractors for compliance with the design documents and ECM intent and will develop specific project acceptance criteria, startup, commissioning, and retro-commissioning processes. TDIndustries will focus intently on scheduling work in a manner that minimizes disruption while maintaining a safe environment.

*Benefit to the Agency Members of OMNIA —TDIndustries construction strategy will provide for fast payback items with short construction timelines to be installed first so that the customer will begin to realize savings early in the project.*

# ADDITIONAL INFORMATION

## ATTACHMENT “G-3”

### ENERGY SAVINGS PERFORMANCE CONTRACTING

#### EXECUTIVE SUMMARY

##### OPERATION AND MAINTENANCE

TDIndustries will provide a maintenance program for all or part of the contract term, as desired by OMNIA, for all equipment installed under the project. Our role as one of the nation’s most experienced Truck and Site-based Services provider and as an operator of central energy plants for a variety of facilities, has enabled us to become expert at developing maintenance plans that will help provide reliable operation with minimal downtime and operational disruption.

*Benefit to the Agency Members of OMNIA —You will receive a maintenance strategy that will be based on cost-effectiveness while ensuring that equipment remains in optimal operating condition through the application of sound preventative and predictive maintenance programs.*

##### MEASUREMENT AND VERIFICATION PLAN DEVELOPMENT

TDIndustries places a great emphasis on the measurement of results and takes great pride in the performance of our projects. We will develop an annual Measurement & Verification (M&V) plan that best meet the requirements of OMNIA and which will be in compliance with International Performance Measurement and Verification Protocols and with the Texas Energy Assessment Monitoring and Verification Guidelines.

*Benefit to the Agency Members of OMNIA —An agreed upon M&V plan that will clearly measure the results and protect OMNIA from the potential of an under-performing project.*

##### TRAINING

TDIndustries primary focus for education will be to ensure that the impacted people understand why changes are being made, the proper use of new equipment, and procedures for reporting equipment not performing properly. Technical training for facility personnel will be to provide comprehensive instruction on the operation, troubleshooting, maintenance, and repair of equipment and systems modified or installed.

*Benefit to the Agency Members of OMNIA —All parties working together to ensure improved comfort, reliability, and guaranteed energy savings on a sustained basis.*

*“TDIndustries has a team of dedicated professionals ready to support all of OMNIA facility needs”.*

# ADDITIONAL INFORMATION

## ATTACHMENT “G-4”

### AUTOMATION AND CONTROLS

#### EXECUTIVE SUMMARY

TD knows and deeply understands how seamlessly, efficiently and optimally buildings operate when they have the right automation and controls. And the truth is, these days you can't afford not to have them.

#### ENERGY AUDITING

That's why having automation and controls are so critical. They dramatically affect long-term planning and your bottom line. Plus they drive efficiencies that, in the end, pay for themselves, including:

- » Total integration of the systems in your building
- » Reduce operating expenses
- » You get to make better system choices
- » A centralized location for all facility data
- » Web-based interface and open systems architecture
- » Real-time measurement
- » Increased tenant satisfaction
- » Increased employee productivity
- » Increased property value

*Benefit to the Agency Members of OMNIA— can make a dramatic difference in how intelligently your business operates. We're here to enhance your facility and guide you toward economies in all areas of your business. However, these days the one area in which you can get the most cost savings is in energy consumption. At the heart of energy savings is automation and controls.*

#### BPSI ANTI-TERRORISM FACILITY PROTECTION

TD has an exclusive agreement with BPSI, the developers of the first complete chemical, biological, radiological, nuclear (CBRN) detection system that actively and reliably protects buildings, mass transit stations, stadiums and public events from airborne toxins. It's a breakthrough, mission-critical detection solution no building should be without.

#### INTELLIGENT IRRIGATION MATTERS

A number of technologically astute irrigation systems are available to help you manage your grounds. Should you need sprinkler systems with automatic sensors, we can provide them. Should you need a sustainable solution, we offer a system that captures and uses rainwater and gray water. But these are just a couple of the many innovative irrigation services available. You can rely on TD professionals' in-depth knowledge and understanding to guide you in determining which systems will be best for your facility.

### AUTOMATION AND CONTROLS

#### EXECUTIVE SUMMARY

##### LIGHTING

Better lighting control increases productivity. That’s why TD is ready with high-level conceptual solutions. We do it all – from design and implementation of new lighting systems to retrofits with existing operations. Either way, we make sure they are properly integrated with other critical building systems.

Sustainability is also paramount in terms of using energy efficiently, which is why TD offers clever daylight strategies to extend light in the workplace. Another unique offering is the manipulation and modulation of artificial lighting to reflect daylight availability.

##### METERING

TD enables you to have real-time knowledge about utility consumption. When you know what’s going on, you save.

The industry-defining solution we offer is utiliVisor, a well-known Continuous Commissioning™ application. Our Web-based, continuous oversight process measures, presents and analyzes key facility indicators – 24/7. It calculates real-time operating cost, and monitors and archives critical building data. You can’t afford not to use it.

TD can install meters and sub-meters, or even integrate with existing meters. Beyond savings on metering solutions, this can also improve your tenant billing accuracy.

##### SECURITY / ACCESS CONTROLS

Safeguarding your building is an area of expertise for us. That’s why TD offers the most sophisticated systems available that include CCTV Camera Systems, Video Badging, Access Control and more. You can feel confident and secure that TD is watching out for you in every way.

##### SYSTEM INTEGRATION

Superior system integration means receiving one intelligent, comprehensive solution that provides effective streamlining of operations, lower installation costs and optimized energy efficiency. It also reduces operating costs, offers multiple protocol management, and gives you something that everybody wants: increased comfort and productivity in the workplace. At TD, you get all this and more, from the following specialized services:

- » Custom Integration Solutions
- » HVAC Control Systems
- » Lighting Control Systems
- » Direct Digital Controls
- » Electronic Access Controls
- » Video Badging
- » CCTV Camera Systems
- » Power Distribution
- » Elevator Controls
- » Planned Maintenance
- » Emergency Systems and Services
- » Software and Programming Support
- » Operator Support and Training
- » Remote Monitoring and Support
- » Multi-Building Campus Integration
- » Utility Metering Solutions
- » Energy Use and Consumption Analysis
- » Design Specification Consulting

# ADDITIONAL INFORMATION

## ATTACHMENT “G-5”

### HVAC, ELECTRICAL, AND PLUMBING

#### EXECUTIVE SUMMARY

#### TRUCK BASED SERVICES

TD has a wide variety of superior services ready for immediate response and resolution of jobs of all sizes and complexity, the core of which is based in our comprehensive Truck-Based Services.

In addition to truck-based services, real-time operations are what drive this excellent offering, the foundation of which is a proprietary, state-of-the-art Tier 1 database. This world-class, highly secure knowledge base is comprised of everything that can possibly be logged from the day we begin your service: start-up dates, service numbers, statistics, strategic plans, LEED reports, energy calculations and more.

More than 65 years of experience has led us to consistently offer you the following tangible benefits:

- » Technical expertise – extensively trained, experienced TD Partners
- » Self-performed delivery
- » Customer Contact Center – 24/7 live operator and dispatch
- » Large truck fleet – 300+ available at all times
- » Broad geographic coverage

*Planned Maintenance Services / Select Capital Projects / Scheduled Repair and Replace Services / Emergency On-Demand Service*

*Benefit to the Agency Members of OMNIA — We are available 24 hours a day, seven days a week, 365 days a year. For service that extends beyond a one-time visit, we offer Diagnostic Evaluation and Problem Resolution. Also, our service plans have no manufacturer bias. TD will research all manufacturers for the absolute best value and application when replacing system components. We work with you to give you the best solutions because we have your best interests in mind.*



## ATTACHMENT “G-5”

### HVAC, ELECTRICAL, AND PLUMBING

#### EXECUTIVE SUMMARY

##### REFRIGERATION

TDIndustries is a local service provider with a wide range of capabilities that include Commercial Kitchen repairs and maintenance. TDIndustries’ local team is comprised of licensed technicians in HVAC, Plumbing, and Electrical adding to total capabilities. The TD commercial kitchen group has extensive experience with a variety of equipment.

This type of equipment includes but is not limited to:

- » Coolers
- » Ice machines
- » Ovens
- » Steamers
- » Warmers
- » Fryers
- » Grills and Griddles
- » Beverage Dispensers
- » Exhaust Systems
- » Walk-in Coolers
- » Batch Freezers
- » Commercial and Industrial Refrigeration

TDIndustries is familiar with numerous purchasing cooperatives allowing TD to streamline purchasing needs on special projects that may be time sensitive. As a local service provider staffed with a 24-hr service call line we are available with response times typically between 2-4 hours and in some cases sooner.

Our Industrial Refrigeration and Food and Beverage Equipment technicians service both hot-side as well as cold-side equipment in food service and industrial or commercial operations.

##### ELECTRICAL

Whether replacing a light switch, rebuilding a 1,000-amp service in the middle of the night, or providing major service upgrades, TD is equipped to handle your electrical needs. Here are the benefits of our services:

- » Highly skilled technicians that are licensed, certified and trained in the latest national electrical codes, city codes and OSHA safety regulations
- » Service professionals empowered to give on-site quotes, offering you competitive estimates
- » Expert installers that deliver interior finish-out and system upgrades

Plus, TD responds 24 hours a day, seven days a week to provide:

- » Electrical Controls
- » Industrial Systems
- » Infrared Camera Services
- » Lighting Contracts
- » Multi-family Service
- » Outdoor Lighting
- » Retrofits and Upgrades
- » Surge Protection

# ADDITIONAL INFORMATION

## ATTACHMENT “G-5”

### HVAC, ELECTRICAL, AND PLUMBING

#### EXECUTIVE SUMMARY

#### PLUMBING

From emergency repairs to a major renovation, a small or large commercial industrial or multi-family installation, TD has the resources. Years of extensive experience, training and education programs enable us to fully understand what it takes to keep your specific system operating at its peak efficiency. Fully licensed plumbers are available 24 hours a day, seven days a week for your convenience. Among the highly specialized plumbing services available are:

- » Boiler/Chiller System Repair and Maintenance
- » Hydro-Jet Service
- » Water System Repair and Maintenance
- » Sewer System Repair and Maintenance
- » Gas System Repair and Maintenance
- » Certified Backflow Testing
- » OSHA-Certified Confined Entry
- » Certified Medical Gas Installation and Repair
- » Electronic Leak Detection
- » Electronic Line Location
- » Sewer Pipe Video Inspection
- » Pro-Temp Service and Maintenance

#### HVAC

TD offers expert, comprehensive services that include everything from boilers, chillers, and air handlers to pumping systems, control systems and water treatment. Our performance guarantees are admittedly unmatched by any other company, so it reduces your risk. You can also expect regularly scheduled inspections, 24-hour emergency service, and full-service maintenance and repairs that extend the life of your systems.

TD's strength in commercial HVAC service is based upon the coupling of high-level thinking with high concept technology. It's a powerful dynamic that empowers expert, brand-savvy TD professionals to investigate and swiftly uncover the root causes of building system failures. And then offer exceptional commercial HVAC solutions you can trust. In the technology arena, TD leverages:

- » Special leak-detection tools, which mean faster and less disruptive repairs
- » Infrared imaging that identifies potentially dangerous situations in your electrical circuitry
- » Vibration analysis that reduces your equipment downtime and extends equipment life

Overall, TD's ability for solving air-conditioning and refrigeration problems is respected throughout the industry. Why? It all comes down to customer trust, which is based on putting you first.

## **TAB 6 - ADDITIONAL REQUIRED DOCUMENTS**

### **TAB 6 CONTENTS: APPENDIX C**

**ACKNOWLEDGMENT AND ACCEPTANCE OF REGION 4 ESC'S OPEN RECORDS POLICY (APPENDIX C, DOC #1)**

**ANTITRUST CERTIFICATION STATEMENT (TEX. GOVERNMENT CODE 2155.005) (APPENDIX C, DOC#2)**

**IMPLEMENTATION OF HOUSE BILL 1295 CERTIFICATE OF INTERESTED PARTIES (FORM 1295) (APPENDIX C, DOC #3)**

**TEXAS GOVERNMENT CODE 2270 VERIFICATION FORM (APPENDIX C, DOC #4)**

**ANY ADDITIONAL AGREEMENTS OFFEROR WILL REQUIRE PARTICIPATING AGENCIES TO SIGN**

**ACKNOWLEDGMENT AND ACCEPTANCE**  
**OF REGION 4 ESC's OPEN RECORDS POLICY**

**OPEN RECORDS POLICY**

All proposals, information and documents submitted are subject to the Public Information Act requirements governed by the State of Texas once a Contract(s) is executed. If an Offeror believes its response, or parts of its response, may be exempted from disclosure, the Offeror must specify page-by-page and line-by-line the parts of the response, which it believes, are exempt and include detailed reasons to substantiate the exemption. Price is not confidential and will not be withheld. Any unmarked information will be considered public information and released, if requested under the Public Information Act.

The determination of whether information is confidential and not subject to disclosure is the duty of the Office of Attorney General (OAG). Region 4 ESC must provide the OAG sufficient information to render an opinion and therefore, vague and general claims to confidentiality by the Offeror are not acceptable. Region 4 ESC must comply with the opinions of the OAG. Region 4 ESC assumes no responsibility for asserting legal arguments on behalf of any Offeror. Offeror is advised to consult with their legal counsel concerning disclosure issues resulting from this procurement process and to take precautions to safeguard trade secrets and other proprietary information.

*Signature below certifies complete acceptance of Region 4 ESC's Open Records Policy, except as noted below (additional pages may be attached, if necessary).*

Check one of the following responses to the Acknowledgment and Acceptance of Region 4 ESC's Open Records Policy below:

- We acknowledge Region 4 ESC's Open Records Policy and declare that no information submitted with this proposal, or any part of our proposal, is exempt from disclosure under the Public Information Act.
- We declare the following information to be a trade secret or proprietary and exempt from disclosure under the Public Information Act.

*(Note: Offeror must specify page-by-page and line-by-line the parts of the response, which it believes, are exempt. In addition, Offeror must include detailed reasons to substantiate the exemption(s). Price is not confident and will not be withheld. All information believed to be a trade secret or proprietary must be listed. It is further understood that failure to identify such information, in strict accordance with the instructions, will result in that information being considered public information and released, if requested under the Public Information Act.)*

Date

6/26/20

Authorized Signature & Title

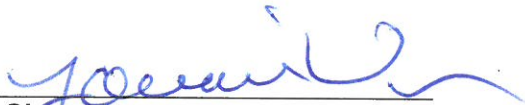
**ANTITRUST CERTIFICATION STATEMENTS**  
**(Tex. Government Code § 2155.005)**  
Attorney General Form

I affirm under penalty of perjury of the laws of the State of Texas that:

1. I am duly authorized to execute this Contract on my own behalf or on behalf of the company, corporation, firm, partnership or individual (Company) listed below;
2. In connection with this proposal, neither I nor any representative of the Company has violated any provision of the Texas Free Enterprise and Antitrust Act, Tex. Bus. & Comm. Code Chapter 15;
3. In connection with this proposal, neither I nor any representative of the Company has violated any federal antitrust law; and
4. Neither I nor any representative of the Company has directly or indirectly communicated any of the contents of this proposal to a competitor of the Company or any other company, corporation, firm, partnership or individual engaged in the same line of business as the Company.

**Company** TDIndustries, Inc.

**Contact**

  
**Signature**

Lorraine Vuong  
**Printed Name**

Cooperative Contracts Coordinator  
**Position with Company**

**Address** 9525 Derrington Rd.

Houston, TX 77064

**Official  
Authorizing  
Proposal**

  
**Signature**

Crystal Seiler  
**Printed Name**

PST Manager  
**Position with Company**

**Phone** 713-996-3121

**Fax** \_\_\_\_\_

**CERTIFICATE OF INTERESTED PARTIES**

**FORM 1295**

1 of 1

Complete Nos. 1 - 4 and 6 if there are interested parties.  
 Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

**OFFICE USE ONLY  
 CERTIFICATION OF FILING**

**1 Name of business entity filing form, and the city, state and country of the business entity's place of business.**  
 TDIndustries, Inc.  
 Houston, TX United States

Certificate Number:  
 2020-639301

Date Filed:  
 07/01/2020

**2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.**  
 Region 4 ESC

Date Acknowledged:

**3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.**  
 20-04  
 HVAC Equipment, Installation, Service & Related Products

4	Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
			Controlling	Intermediary
	N/A			

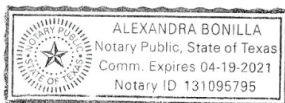
**5 Check only if there is NO Interested Party.**

**6 UNSWORN DECLARATION**

My name is Crystal Seiler and my date of birth is 10/16/85  
 My address is 9525 Derrington Rd Houston Tx 77064 Harris  
(street) (city) (state) (zip code) (country)

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Harris County, State of Texas, on the 8 day of July, 20 20  
(month) (year)



*Crystal Seiler*  
 Signature of authorized agent of contracting business entity  
(Declarant)



**Texas Government Code 2270 Verification Form**

House Bill 89 (85R Legislative Session), which adds Chapter 2270 to the Texas Government Code, provides that a governmental entity may not enter into a contract with a company without verification that the contracting vendor does not and will not boycott Israel during the term of the contract.

Furthermore, Senate Bill 252 (85R Legislative Session), which amends Chapter 2252 of the Texas Government Code to add Subchapter F, prohibits contracting with a company engaged in business with Iran, Sudan or a foreign terrorist organization identified on a list prepared by the Texas Comptroller.

I, Crystal Seiler, as an authorized representative of

TDIndustries, Inc., a contractor engaged by

Insert Name of Company

Region 4 Education Service Center, 7145 West Tidwell Road, Houston, TX 77092, verify by this writing that the above-named company affirms that it (1) does not boycott Israel; and (2) will not boycott Israel during the term of this contract, or any contract with the above-named Texas governmental entity in the future.

Also, our company is not listed on and we do not do business with companies that are on the Texas Comptroller of Public Accounts list of Designated Foreign Terrorists Organizations found at <https://comptroller.texas.gov/purchasing/docs/foreign-terrorist.pdf>.

I further affirm that if our company's position on this issue is reversed and this affirmation is no longer valid, that the above-named Texas governmental entity will be notified in writing within one (1) business day and we understand that our company's failure to affirm and comply with the requirements of Texas Government Code 2270 et seq. shall be grounds for immediate contract termination without penalty to the above-named Texas governmental entity.

I swear and affirm that the above is true and correct.

  
\_\_\_\_\_  
Signature of Named Authorized Company Representative

6/26/20  
Date

### **SPECIAL CONDITIONS**

The below clauses are applicable to the Offer; by Submitting a Sealed Proposal the Offeror is accepting these Special Conditions:

#### **Conflicts of Interest**

No employee, officer, or agent may participate in the selection, award, or administration of a contract supported by a FEMA award if he or she has a real or apparent conflict of interest. Such a conflict would arise when the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of these parties, has a financial or other interest in or a tangible personal benefit from a firm considered for award. 2 C.F.R. § 200.318(c)(1); See also Standard Form 424D, ¶ 7; Standard Form 424B, ¶ 3.

- i. FEMA considers a “financial interest” to be the potential for gain or loss to the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of these parties as a result of the particular procurement. The prohibited financial interest may arise from ownership of certain financial instruments or investments such as stock, bonds, or real estate, or from a salary, indebtedness, job offer, or similar interest that might be affected by the particular procurement.
  - ii. FEMA considers an “apparent” conflict of interest to exist where an actual conflict does not exist, but where a reasonable person with knowledge of the relevant facts would question the impartiality of the employee, officer, or agent participating in the procurement.
- c. Gifts. The officers, employees, and agents of Region 4 ESC nor the Participating Public Agency (“NFE”) must neither solicit nor accept gratuities, favors, or anything of monetary value from contractors or parties to subcontracts. However, NFE’s may set standards for situations in which the financial interest is de minimis, not substantial, or the gift is an unsolicited item of nominal value. 2 C.F.R. § 200.318(c)(1).
- d. Violations. The NFE’s written standards of conduct must provide for disciplinary actions to be applied for violations of such standards by officers, employees, or agents of the NFE. 2 C.F.R. § 200.318(c)(1). For example, the penalty for a NFE’s employee may be dismissal, and the penalty for a contractor might be the termination of the contract.

#### **Contractor Integrity**

A contractor must have a satisfactory record of integrity and business ethics. Contractors that are debarred or suspended as described in Chapter III, ¶ 6.d must be rejected and cannot receive contract awards at any level.

#### **Public Policy**

A contractor must comply with the public policies of the Federal Government and state, local government, or tribal government. This includes, among other things, past and current compliance with the:

- a. Equal opportunity and nondiscrimination laws
- b. Five affirmative steps described at 2 C.F.R. § 200.321(b) for all subcontracting under contracts supported by FEMA financial assistance; and FEMA Procurement Guidance June 21, 2016 Page IV- 7
- c. Applicable prevailing wage laws, regulations, and executive orders



## **Affirmative Steps**

For any subcontracting opportunities, Contractor must take the following Affirmative steps:

1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and
5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce;

### **Federal Requirements**

Services issued under this contract may be in response to an emergency or disaster recovery situation and eligible for federal funding; Services issued in response to an emergency or disaster recovery situation are subject to and must comply with all federal requirements applicable to the funding. The remaining items below, located in this Special Conditions section, are activated and required when federal funding may be utilized.

#### 2 C.F.R. § 200.326 and 2 C.F.R. Part 200, Appendix II, Required Contract Clauses

##### 1. Termination for Convenience:

The right to terminate this Contract for the convenience of Region 4 ESC is retained by Region 4 ESC. In the event of a termination for convenience by Region 4 ESC, Region 4 ESC shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor's receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by Region 4 ESC, in accordance with the terms and provisions of the Contract Documents, an amount not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the project site or away from the project site, as approved in writing by Region 4 ESC but not yet paid for and which cannot be returned, and actual, reasonable and documented demobilization costs, if any, paid by Contractor and approved by Region 4 ESC in connection with the Scope of Work in place which is completed as of the date of termination by Region 4 ESC and that is in conformance with the Contract Documents, less all amounts previously paid for the Work. No amount ever shall be owed or paid to Contractor for lost or anticipated profits on any part of the Scope of Work not performed or for consequential damages of any kind.

##### 2. Equal Employment Opportunity:

Region 4 ESC highly encourages Contractors to implement Affirmative Action practices in their employment programs. This means Contractor should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, political belief or affiliation, age, disability or genetic information.

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's non-compliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order

11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: *Provided*, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

3. "During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.”

4. Davis Bacon Act and Copeland Anti-Kickback Act.

- a. Applicability of Davis-Bacon Act. The Davis-Bacon Act only applies to the emergency Management Preparedness Grant Program, Homeland Security Grant Program, Nonprofit Security Grant Program, Tribal Homeland Security Grant Program, Port Security Grant Program, and Transit Security Grant Program. **It does not apply to other FEMA grant and cooperative agreement programs, including the Public Assistance Program.**
- b. All prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141-3144 and 3146-3148) as supplemented by Department of Labor regulations at 29 C.F.R. Part 5 (Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction)). See 2 C.F.R. Part 200, Appendix II, ¶ D.
- c. In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week.
- d. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The

decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

- e. In contracts subject to the Davis-Bacon Act, the contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. § 3145), as supplemented by Department of Labor regulations at 29 C.F.R. Part 3 (Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States). The Copeland Anti- Kickback Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to FEMA.
- f. The regulation at 29 C.F.R. § 5.5(a) does provide the required contract clause that applies to compliance with both the Davis-Bacon and Copeland Acts. However, as discussed in the previous subsection, the Davis-Bacon Act does not apply to Public Assistance recipients and subrecipients. **In situations where the Davis-Bacon Act does not apply, neither does the Copeland “Anti-Kickback Act.”** However, for purposes of grant programs where both clauses do apply, FEMA requires the following contract clause:

“Compliance with the Copeland “Anti-Kickback” Act.

- (1) Contractor. The contractor shall comply with 18 U.S.C. § 874, 40U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.
- (2) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as the FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses
- (3) Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.”

5. Contract Work Hours and Safety Standards Act.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. Where applicable (see 40 U.S.C. § 3701), all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by Department of Labor regulations at 29 C.F.R. Part 5. See 2 C.F.R. Part 200, Appendix II, ¶ E.

- c. Under 40 U.S.C. § 3702, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the workweek.
- d. The requirements of 40 U.S.C. § 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
- e. The regulation at 29 C.F.R. § 5.5(b) provides the required contract clause concerning compliance with the Contract Work Hours and Safety Standards Act:

“Compliance with the Contract Work Hours and Safety Standards Act.

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.
- (3) Withholding for unpaid wages and liquidated damages. The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-

assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.”

6. Rights to Inventions Made Under a Contract or Agreement.

- a. Stafford Act Disaster Grants. This requirement **does not apply to the Public Assistance**, Hazard Mitigation Grant Program, Fire Management Assistance Grant Program, Crisis Counseling Assistance and Training Grant Program, Disaster Case Management Grant Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program, as

FEMA awards under these programs do not meet the definition of “funding agreement.”

b. If the FEMA award meets the definition of “funding agreement” under 37 C.F.R. § 401.2(a) and the non-Federal entity wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the non-Federal entity must comply with the requirements of 37 C.F.R. Part 401 (Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements), and any implementing regulations issued by FEMA. See 2 C.F.R. Part 200, Appendix II, ¶ F.

- c. The regulation at 37 C.F.R. § 401.2(a) currently defines “funding agreement” as any contract, grant, or cooperative agreement entered into between any Federal agency, other than the Tennessee Valley Authority, and any contractor for the performance of experimental, developmental, or research work funded in whole or in part by the Federal government. This term also includes any assignment, substitution of parties, or subcontract of any type entered into for the performance of experimental, developmental, or research work under a funding agreement as defined in the first sentence of this paragraph.

7. Clean Air Act and the Federal Water Pollution Control Act. Contracts of amounts in excess of \$150,000 must contain a provision that requires the contractor to agree to comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act (42 U.S.C.

§§ 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387). Violations must be reported to FEMA and the Regional Office of the Environmental Protection Agency. See 2 C.F.R. Part 200, Appendix II, ¶ G.

- a. The following provides a sample contract clause concerning compliance

for contracts of amounts in excess of \$150,000:

“Clean Air Act

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C.

§ 7401 et seq.

(2) The contractor agrees to report each violation to the (name of the state agency or local or Indian tribal government) and understands and agrees that the (name of the state agency or local or Indian tribal government) will, in turn, report each violation as required to assure notification to the (name of recipient), Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

Federal Water Pollution Control Act

(1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

(2) The contractor agrees to report each violation to the (name of the state agency or local or Indian tribal government) and understands and agrees that the (name of the state agency or local or Indian tribal government) will, in turn, report each violation as required to assure notification to the (name of recipient), Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

(3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.”

8. Debarment and Suspension.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. Non-federal entities and contractors are subject to the debarment and suspension regulations implementing Executive Order 12549, *Debarment and Suspension* (1986) and Executive Order 12689, *Debarment and Suspension* (1989) at 2 C.F.R. Part 180 and the Department of Homeland Security’s regulations at 2 C.F.R. Part 3000 (Non procurement Debarment and Suspension).



- c. These regulations restrict awards, subawards, and contracts with certain parties that are debarred, suspended, or otherwise excluded from or ineligible for participation in Federal assistance programs and activities. See 2 C.F.R. Part 200, Appendix II, ¶ H; and *Procurement Guidance for Recipients and Subrecipients Under 2 C.F.R. Part 200 (Uniform Rules): Supplement to the Public Assistance Procurement Disaster Assistance Team (PDAT) Field Manual* Chapter IV, ¶ 6.d, and Appendix C, ¶ 2 [hereinafter *PDAT Supplement*]. A contract award must not be made to parties listed in the SAM Exclusions. SAM Exclusions is the list maintained by the General Services Administration that contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. SAM exclusions can be accessed at [www.sam.gov](http://www.sam.gov). See 2 C.F.R. § 180.530; *PDAT Supplement*, Chapter IV, ¶ 6.d and Appendix C, ¶ 2.
- d. In general, an “excluded” party cannot receive a Federal grant award or a contract within the meaning of a “covered transaction,” to include subawards and subcontracts. This includes parties that receive Federal funding indirectly, such as contractors to recipients and subrecipients. The key to the exclusion is whether there is a “covered transaction,” which is any non-procurement transaction (unless excepted) at either a “primary” or “secondary” tier. Although “covered transactions” do not include contracts awarded by the Federal Government for purposes of the non-procurement common rule and DHS’s implementing regulations, it does include some contracts awarded by recipients and subrecipient.
- e. Specifically, a covered transaction includes the following contracts for goods or services:
  - (1) The contract is awarded by a recipient or subrecipient in the amount of at least \$25,000.
  - (2) The contract requires the approval of FEMA, regardless of amount.
  - (3) The contract is for federally required audit services.
  - (4) A subcontract is also a covered transaction if it is awarded by the contractor of a recipient or subrecipient and requires either the approval of FEMA or is in excess of \$25,000.
- d. The following provides a debarment and suspension clause. It incorporates an optional method of verifying that contractors are not excluded or disqualified:

“Suspension and Debarment

- (1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such the contractor is required to verify that none of the contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2

C.F.R.

§ 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by (insert name of subrecipient). If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (name of state agency serving as recipient and name of subrecipient), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.”

9. Byrd Anti-Lobbying Amendment.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. Contractors that apply or bid for an award of \$100,000 or more must file the required certification. See 2 C.F.R. Part 200, Appendix II, ¶ I; 44 C.F.R. Part 18; *PDAT Supplement*, Chapter IV, 6.c; Appendix C, ¶ 4.
- c. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award. See *PDAT Supplement*, Chapter IV, ¶ 6.c and Appendix C, ¶ 4.
- d. The following provides a Byrd Anti-Lobbying contract clause:

“Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended)

Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award

covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient.”

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements (To be submitted with each bid or offer exceeding \$100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form- LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, TDIndustries, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 3801 *et seq.*, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official



Name and Title of Contractor's Authorized Official

Crystal Seiler, PST Manager

Date" 6/26/20

10. Procurement of Recovered Materials.

- a. Applicability: This requirement applies to all FEMA grant and cooperative agreement programs.
- b. A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with Section 6002 of the Solid Waste Disposal Act, Pub. L. No. 89-272 (1965) (codified as amended by the Resource Conservation and Recovery Act at 42 U.S.C. § 6962). See 2 C.F.R. Part 200, Appendix II, ¶ J; 2 C.F.R. § 200.322; PDAT Supplement, Chapter V, ¶ 7.
- c. The requirements of Section 6002 include procuring only items designated in guidelines of the EPA at 40 C.F.R. Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired by the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.
- d. The following provides the clause that a state agency or agency of a political subdivision of a state and its contractors can include in contracts meeting the above contract thresholds:

"(1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA- designated items unless the product cannot be acquired—

- (i) Competitively within a timeframe providing for compliance with the contract performance schedule;
- (ii) Meeting contract performance requirements; or
- (iii) At a reasonable price.

(2) Information about this requirement, along with the list of EPA- designate items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>."

11. Additional FEMA Requirements.

- a. The Uniform Rules authorize FEMA to require additional provisions for non-Federal entity contracts. FEMA, pursuant to this authority, requires or recommends the following:
- b. Changes.

To be eligible for FEMA assistance under the non-Federal entity's FEMA grant or cooperative agreement, the cost of the change, modification, change order, or constructive change must be allowable, allocable, within the scope of its grant or cooperative agreement, and reasonable for the completion of project scope. FEMA recommends, therefore, that a non-Federal entity include a changes clause in its contract that describes how, if at all, changes can be made by either party to alter the method, price, or schedule of the work without breaching the contract. The language of the clause may differ depending on the nature of the contract and the end-item procured.

- c. Access to Records.

All non-Federal entities must place into their contracts a provision that all contractors and their successors, transferees, assignees, and subcontractors acknowledge and

agree to comply with applicable provisions governing Department and FEMA access to records, accounts, documents, information, facilities, and staff. See DHS Standard Terms and Conditions, v 3.0, ¶ XXVI (2013).

- d. The following provides a contract clause regarding access to records:

"Access to Records. The following access to records requirements apply to this contract:

- (1) The contractor agrees to provide (insert name of state agency or local or Indian tribal government), (insert name of recipient), the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.
- (2) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- (3) The contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract."

12. DHS Seal, Logo, and Flags.

- a. All non-Federal entities must place in their contracts a provision that a contractor

shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval. See DHS Standard Terms and Conditions, v 3.0, ¶ XXV (2013).

- b. The following provides a contract clause regarding DHS Seal, Logo, and Flags: “The contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre- approval.”

13. Compliance with Federal Law, Regulations, and Executive Orders.

- a. All non-Federal entities must place into their contracts an acknowledgement that FEMA financial assistance will be used to fund the contract along with the requirement that the contractor will comply with all applicable federal law, regulations, executive orders, and FEMA policies, procedures, and directives.
- b. The following provides a contract clause regarding Compliance with Federal Law, Regulations, and Executive Orders: “This is an acknowledgement that FEMA financial assistance will be used to fund the contract only. The contractor will comply will all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.”

14. No Obligation by Federal Government.

- a. The non-Federal entity must include a provision in its contract that states that the Federal Government is not a party to the contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.
- b. The following provides a contract clause regarding no obligation by the Federal Government: “The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.”

15. Program Fraud and False or Fraudulent Statements or Related Acts.

- a. The non-Federal entity must include a provision in its contract that the contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to its actions pertaining to the contract.
- b. The following provides a contract clause regarding Fraud and False or Fraudulent or Related Acts: “The contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the contractor’s actions pertaining to this contract.”

Additional contract clauses per 2 C.F.R. § 200.325

For applicable construction/reconstruction/renovation and related services: A payment and performance bond are both required for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided in the contract.

**Offeror agrees to comply with all terms and conditions outlined in the Special Conditions section of this solicitation.**

Offeror's Name: TDIndustries, Inc.

Address, City, State, and Zip Code: 9525 Derrington Rd., Houston, TX 77064

Phone Number: 713-939-1986 Fax Number: \_\_\_\_\_

Printed Name and Title of Authorized Representative: Crystal Seiler - PST Manager

Email Address: crystal.seiler@tdindustries.com

Signature of Authorized Representative:  Date: 6/26/20

## DIVERSITY PROGRAMS

*Do you currently have a diversity program or any diversity partners that you do business with? Yes No*

*(If the answer is yes, attach a statement detailing the structure of your program, along with a list of your diversity alliances and a copy of their certifications.)*

Valuing differences has always been one of TD's basic values. And that belief is practiced among our Partners, customers, suppliers and vendors, and within our community. TD understands that the diversity among us is our greatest strength and is critical to our continued success. Our CEO, Harold MacDowell, continuously strives for representation and inclusion at all levels of the organization. TD recognizes that diversity and inclusion are not only the right things to do, but are strategic pillars to achieving our success and growth for the future



# ADDENDUM NO. 1



7145 West Tidwell Road ~ Houston, Texas 77092

(713)-462-7708

[www.esc4.net](http://www.esc4.net)

## NOTICE TO OFFEROR

### ADDENDUM NO. 1

Solicitation Number 20-04

Request for Proposal ("RFP")  
by

Region 4 Education Service Center ("ESC")  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Tuesday, April 7, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 1 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products ("Addendum"). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center ("Region 4 ESC") requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 1 is hereby issued as follows:

1. **Submittal Deadline**: The submittal deadline for this RFP is hereby changed from Tuesday, March 24, 2020 @ 2:00 PM Central Time and extended as indicated below and above:
  - Tuesday, April 7, 2020 @ 10:00 AM Central Time

**RECEIPT OF ADDENDUM NO. 1 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist

## ADDENDUM NO. 2



7145 West Tidwell Road ~ Houston, Texas 77092  
(713)-462-7708  
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### NOTICE TO OFFEROR

### ADDENDUM NO. 2

Solicitation Number 20-04

Request for Proposal ("RFP")  
by

Region 4 Education Service Center ("ESC")  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Tuesday, April 14, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 2 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products ("Addendum"). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center ("Region 4 ESC") requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 2 is hereby issued as follows:

1. **Submittal Deadline:** The submittal deadline for this RFP is hereby changed from Tuesday, April 7, 2020 @ 10:00 AM Central Time and extended as indicated below and above:
  - Tuesday, April 14, 2020 @ 10:00 AM Central Time

**RECEIPT OF ADDENDUM NO. 2 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist

## ADDENDUM NO. 3



7145 West Tidwell Road ~ Houston, Texas 77092  
(713)-462-7708  
[www.esc4.net](http://www.esc4.net)

### NOTICE TO OFFEROR

### ADDENDUM NO. 3

Solicitation Number 20-04

Request for Proposal ("RFP")  
by

Region 4 Education Service Center ("ESC")  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Tuesday, May 5, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 3 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products ("Addendum"). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center ("Region 4 ESC") requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 3 is hereby issued as follows:

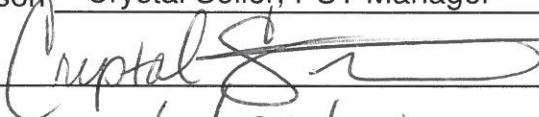
- 1. Submittal Deadline:** The submittal deadline for this RFP is hereby changed from Tuesday, April 14, 2020 @ 10:00 AM Central Time and extended as indicated below and above:
  - Tuesday, May 5, 2020 @ 10:00 AM Central Time

**RECEIPT OF ADDENDUM NO. 3 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler, PST Manager

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist

## ADDENDUM NO. 4



7145 West Tidwell Road ~ Houston, Texas 77092  
(713)-462-7708  
[www.esc4.net](http://www.esc4.net)

### NOTICE TO OFFEROR

#### ADDENDUM NO. 4

Solicitation Number 20-04

Request for Proposal ("RFP")  
by

Region 4 Education Service Center ("ESC")  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Tuesday, May 5, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 4 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products ("Addendum"). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center ("Region 4 ESC") requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 4 is hereby issued as follows:

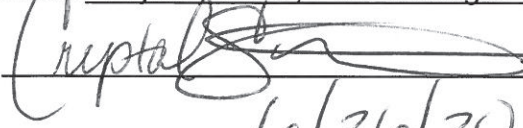
1. **Proposal Format:** The submission requirement in Section 5 in the "Instructions to Offerors" in this RFP is hereby revised as follows:
  - The requirement for two (2) bound copies is waived.
  - Offeror must submit their complete response on two (2) electronic copies; pin/flash drives. Offeror must also submit two (2) electronic proposals free of propriety information to be posted, if awarded a Contract.
2. **Required Documents**
  - Any document requiring appearance before a notary shall be waived until a later date or upon Region 4 ESC request.

**RECEIPT OF ADDENDUM NO. 4 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler, PST Manager

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist



## ADDENDUM NO. 5



7145 West Tidwell Road ~ Houston, Texas 77092  
(713)-462-7708  
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### NOTICE TO OFFEROR

### ADDENDUM NO. 5

Solicitation Number 20-04

Request for Proposal (“RFP”)  
by

Region 4 Education Service Center (“ESC”)  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Thursday, June 18, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 5 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products (“Addendum”). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center (“Region 4 ESC”) requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 5 is hereby issued as follows:

- 1. Submittal Deadline:** The submittal deadline for this RFP is hereby changed from Tuesday, May 5, 2020 @ 10:00 AM Central Time and extended as indicated below and above:
  - Thursday, June 18, 2020 @ 10:00 AM Central Time
- 2. Approval from Region 4 ESC:** Approval of contract award date is hereby changed from June 23, 2020 and extended as indicated below:
  - August 25, 2020 (*tentative and subject to change*)

**RECEIPT OF ADDENDUM NO. 5 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler, PST Manager

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist

## ADDENDUM NO. 6



7145 West Tidwell Road ~ Houston, Texas 77092  
(713)-462-7708  
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### NOTICE TO OFFEROR

### ADDENDUM NO. 6

Solicitation Number 20-04

Request for Proposal (“RFP”)  
by

Region 4 Education Service Center (“ESC”)  
for

HVAC Equipment, Installation, Services & Related Products

**SUBMITTAL DEADLINE: Tuesday, July 14, 2020, 10:00 AM CENTRAL TIME**

This Addendum No. 6 amends the Request for Proposals (RFP) for HVAC Equipment, Installation, Services & Related Products (“Addendum”). To the extent of any discrepancy between the original RFP and this Addendum, this Addendum shall prevail.

Region 4 Education Service Center (“Region 4 ESC”) requests proposals from qualified suppliers with the intent to enter into a Contract for HVAC Equipment, Installation, Services & Related Products. Addendum No. 6 is hereby issued as follows:

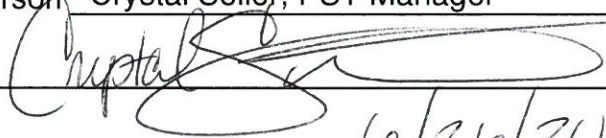
- 1. Submittal Deadline:** The submittal deadline for this RFP is hereby changed from Thursday, June 18, 2020 @ 10:00 AM Central Time and extended as indicated below and above:
  - Tuesday, July 14, 2020 @ 10:00 AM Central Time
- 2. Approval from Region 4 ESC:** Approval of contract award date is hereby changed from June 23, 2020 and extended as indicated below:
  - August 25, 2020 (*tentative and subject to change*)

**RECEIPT OF ADDENDUM NO. 6 ACKNOWLEDGEMENT**

Offeror shall acknowledge this addendum by signing below and include in their proposal response.

Company Name TDIndustries, Inc.

Contact Person Crystal Seiler, PST Manager

Signature 

Date 6/26/20

Crystal Wallace  
Region 4 Education Service Center  
Business Operations Specialist



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