STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: (402) 471-6500
Fax: (402) 471-2089

PAGE	ORDER DATE
1 of 2	12/12/24
BUSINESS UNIT	BUYER
9000	BROOK TAYLOR (AS)

VENDOR NUMBER: 551728

VENDOR ADDRESS:

TRANE COMPANY
PO BOX 845053
DALLAS TX 75284-5053

CONTRACT NUMBER
89622 O4

THE CONTRACT PERIOD IS:

APRIL 04, 2020 THROUGH DECEMBER 09, 2029

THIS SERVICE CONTRACT HAS BEEN AMENDED PER THE FOLLOWING INFORMATION:

THIS CONTRACT IS NOT AN EXCLUSIVE CONTRACT TO FURNISH THE SERVICES SHOWN BELOW, AND DOES NOT PRECLUDE THE PURCHASE OF SIMILAR SERVICES FROM OTHER SOURCES.

THE STATE RESERVES THE RIGHT TO EXTEND THE PERIOD OF THIS CONTRACT BEYOND THE TERMINATION DATE WHEN MUTUALLY AGREEABLE TO THE VENDOR/CONTRACTOR AND THE STATE OF NEBRASKA.

Originally awarded from GSA Master Agreement Number 47QSWA20D002A

Contract to supply and deliver Alarm and Signal Systems, Facility Management Systems to the State of Nebraska.

This is a direct contract with the vendor utilizing a price match to General Services Administration (GSA) Contract Number 47QSWA20D002A in accordance with §73-813. This is a standalone contract and is not formally tied to the GSA contract. The GSA contract in reference is effective as of December 10, 2019.

The referenced GSA contract can be found at https://www.gsaadvantage.gov

The Purchase Order must include the State of Nebraska GSA-Like Contract 89622 O4 and the Trane U.S. Inc DBA Trane GSA Master Agreement Number 47QSWA20D002A.

Political Subdivisions are responsible for processing Purchase Orders directly with the contracted vendor.

(For the file: All requests for proposal (RFP) evaluation, etc., are retained by the GSA. The RFP and Contract are bid and awarded by the GSA.)

State Contacts:
Name: Mark Craft
Phone: (402) 370-3169
Cell: (402) 430-7451

Vendor Contact:
Matt Foertsch
Cell: 503-849-0050
Email: MFoertsch@trane.com

(2/19/20 SC)

AMENDMENT ONE (1) AS ATTACHED. (7/20/21 SC)

DS

Signed by: Brook Taylor 9D9E6EDF47644F8... 1/29/2025
BUYER

DocuSigned by: D5D6C0E236ED496... 1/29/2025
MATERIEL ADMINISTRATOR

STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
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PAGE	ORDER DATE
2 of 2	12/12/24
BUSINESS UNIT	BUYER
9000	BROOK TAYLOR (AS)
VENDOR NUMBER: 551728	

CONTRACT NUMBER
89622 O4

AMENDMENT TWO (2) AS ATTACHED. (1/24/22 SC)
AMENDMENT THREE (3) AS ATTACHED. (12/12/24 BT)

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	FACILITY MANAGEMENT SYSTEMS	10,000,000.0000	$	1.0000	10,000,000.00
	Total Order				**10,000,000.00**

Initial
BT
BUYER INITIALS

Amendment Three
Contract Number 89622 O4

Facility Management Systems

Between
The State of Nebraska
And
Trane Company

THIS AMENDMENT is entered into by and between the State of Nebraska ("State/Entity") and Trane Company ("Vendor").

WHEREAS, the State of Nebraska has a contract with Vendor identified as 89622 O4 for use by state agencies and other entities.

WHEREAS, the terms of the contract specifically state that the contract may be amended when mutually agreeable to the Vendor and the State of Nebraska.

NOW, THEREFORE, it is agreed by the parties to amend the contract as follows:

1. The above-named contract expired December 09, 2024.

2. The contract end date, wherever such reference appears in the contract, shall be changed from December 09, 2024 to December 09, 2029 to reflect the execution of the first option period of the price-match GSA Master Agreement 47QSWA20D002A.

IN WITNESS WHEREOF, the parties have executed this amendment as of the date of execution by both parties below.

State of Nebraska

By: DocuSigned by: D5D6C0E236ED496...

Name: Michelle Potts

Title: Materiel Administrator

Date: 1/29/2025

Vendor: Trane Company

By: Signed by: Matt Foertsch E8FA2BD427694C1...

Name: Matt Foertsch

Title: Area General Manager

Date: 1/6/2025

STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: (402) 471-6500
Fax: (402) 471-2089

PAGE	ORDER DATE
1 of 2	01/24/22
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)

CONTRACT NUMBER
89622 O4

VENDOR NUMBER: 551728

VENDOR ADDRESS:

TRANE COMPANY
PO BOX 845053
DALLAS TX 75284-5053

THE CONTRACT PERIOD IS:

APRIL 04, 2020 THROUGH DECEMBER 09, 2024

THIS SERVICE CONTRACT HAS BEEN AMENDED PER THE FOLLOWING INFORMATION:

THIS CONTRACT IS NOT AN EXCLUSIVE CONTRACT TO FURNISH THE SERVICES SHOWN BELOW, AND DOES NOT PRECLUDE THE PURCHASE OF SIMILAR SERVICES FROM OTHER SOURCES.

THE STATE RESERVES THE RIGHT TO EXTEND THE PERIOD OF THIS CONTRACT BEYOND THE TERMINATION DATE WHEN MUTUALLY AGREEABLE TO THE VENDOR/CONTRACTOR AND THE STATE OF NEBRASKA.

Originally awarded from GSA Master Agreement Number 47QSWA20D002A

Contract to supply and deliver Facility Management Systems to the State of Nebraska as per the attached specifications for the period April 4, 2020 through December 9, 2024. The contract may be renewed for three (3) additional five (5) year periods when mutually agreeable to the vendor and the State of Nebraska.

The Purchase Order must include the State of Nebraska GSA-Like Contract 89622 O4 and the Trane U.S. Inc DBA Trane GSA Master Agreement Number 47QSWA20D002A.

Political Subdivisions are responsible for processing Purchase Orders directly with the contracted vendor.

State Contacts:
Mark Craft: (402) 370-3169 or cell #: (402) 430-7451

Vendor Contact:
Matt Foetsch
11937 Portal Rd
La Vista, NE 68128
Cell: 503-849-0050
Email: mfoetsch@trane.com

(For the file: All requests for proposal (RFP) evaluation, etc., are retained by the GSA. The RFP and Contract are bid and awarded by the GSA.)

(For the file: The GSA/Trane U.S. Inc DBA Trane Master Price Agreement contract period was effective December 9, 2019. The Participating Addendum for Nebraska became effective April 4, 2020.)

(2/19/20 sc)

AMENDMENT ONE (1) AS ATTACHED. (7/20/21 sc)

AMENDMENT TWO (2) AS ATTACHED. (1/24/22 sc)

DocuSigned by:
Annette Walton 2/1/2022
2358B0EE0E87446...
BUYER

DS
PK

DocuSigned by:
Amara Block 2/2/2022
4CFF37411B2A4A2...
MATERIEL ADMINISTRATOR

STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
1526 K Street, Suite 130
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PAGE	ORDER DATE
2 of 2	01/24/22
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)
VENDOR NUMBER: 551728	

CONTRACT NUMBER
89622 O4

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	FACILITY MANAGEMENT SYSTEMS	10,000,000.0000	$	1.0000	10,000,000.00
	Total Order				**10,000,000.00**

DS
AW
BUYER INITIALS

AMENDMENT TWO
Contract 89622 O4
Facility Management Systems for the State of Nebraska
Between
The State of Nebraska and Trane Company

This Amendment (the "Amendment") is made by the State of Nebraska and Trane Company (the "Contractor") parties to Contract 89622 O4 (the "Contract") and upon mutual agreement and other valuable consideration, the parties agree to and hereby amend the contract upon execution as follows:

References to "supply and deliver alarm and signal systems" in the contract will be deleted.
Line 1 will be deleted and replaced with the following:

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	FACILITY MANAGEMENT SYSTEMS	10,000,000.0000	$	1.0000	10,000,000.0000

This Amendment and any attachments hereto will become part of the Contract. Except as set forth in this Amendment, the Contract is unaffected and shall continue in full force and effect in accordance with its terms. If there is conflict between this Amendment and the Contract or any earlier amendment, the terms of this Amendment will prevail.

IN WITNESS WHEREOF, the parties have executed this Amendment as of the date of execution by both parties below.

State of Nebraska

By: DocuSigned by: Amara Block 4CFF2711162A4A2...

Name: Amara Block

Title: Interim Materiel Administrator

Date: 2/2/2022

Contractor: Trane Company

By: DocuSigned by: Matt Foertsch E8FA2BD427694C1...

Name: Matt Foertsch

Title: Area General Manager

Date: 2/1/2022

STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: (402) 471-6500
Fax: (402) 471-2089

PAGE	ORDER DATE
1 of 2	07/20/21
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)

VENDOR NUMBER: 551728

VENDOR ADDRESS:

TRANE COMPANY
PO BOX 845053
DALLAS TX 75284-5053

CONTRACT NUMBER
89622 O4

THE CONTRACT PERIOD IS:

APRIL 04, 2020 THROUGH DECEMBER 09, 2024

THIS SERVICE CONTRACT HAS BEEN AMENDED PER THE FOLLOWING INFORMATION:

THIS CONTRACT IS NOT AN EXCLUSIVE CONTRACT TO FURNISH THE SERVICES SHOWN BELOW, AND DOES NOT PRECLUDE THE PURCHASE OF SIMILAR SERVICES FROM OTHER SOURCES.

THE STATE RESERVES THE RIGHT TO EXTEND THE PERIOD OF THIS CONTRACT BEYOND THE TERMINATION DATE WHEN MUTUALLY AGREEABLE TO THE VENDOR/CONTRACTOR AND THE STATE OF NEBRASKA.

Originally awarded from GSA Master Agreement Number 47QSWA20D002A

Contract to supply and deliver Alarm and Signal Systems, Facility Management Systems to the State of Nebraska as per the attached specifications for the period April 4, 2020 through December 9, 2024. The contract may be renewed for three (3) additional five (5) year periods when mutually agreeable to the vendor and the State of Nebraska.

The Purchase Order must include the State of Nebraska GSA-Like Contract 89622 O4 and the Trane U.S. Inc DBA Trane GSA Master Agreement Number 47QSWA20D002A.

Political Subdivisions are responsible for processing Purchase Orders directly with the contracted vendor.

State Contacts:
Mac Hunt: (402) 471-8354
Mark Craft: (402) 370-3169 or cell #: (402) 430-7451

Vendor Contact:
Matt Foertsch
11937 Portal Rd
La Vista, NE 68128
Cell: 503-849-0050
Email: mfoertsch@trane.com

(For the file: All requests for proposal (RFP) evaluation, etc., are retained by the GSA. The RFP and Contract are bid and awarded by the GSA.)

(For the file: The GSA/Trane U.S. Inc DBA Trane Master Price Agreement contract period was effective December 9, 2019. The Participating Addendum for Nebraska became effective April 4, 2020.)

(2/19/20 sc)

AMENDMENT ONE (1) AS ATTACHED. (7/20/21 sc)

DocuSigned by:
Annette Walton 8/26/2021
2358B0EE0E87446...
BUYER

DS
PK

DocuSigned by:
Amara Block 8/27/2021
4CFF2711162A4A2...
MATERIEL ADMINISTRATOR

STATE OF NEBRASKA SERVICE CONTRACT AMENDMENT

State Purchasing Bureau
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PAGE	ORDER DATE
2 of 2	07/20/21
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)

VENDOR NUMBER: 551728

CONTRACT NUMBER
89622 O4

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
1	ALARM AND SIGNAL SYSTEMS FACILITY MANAGEMENT SYSTEMS	10,000,000.0000	$	1.0000	10,000,000.00
	Total Order				**10,000,000.00**

DS

BUYER INITIALS

AMENDMENT ONE
Contract 89622 O4
Alarm and Signal Systems, Facility Management Systems for the State of Nebraska
Between
The State of Nebraska and Trane Company

This Amendment (the "Amendment") is made by the State of Nebraska and Trane Company (the "Contractor") parties to Contract 89622 O4 (the "Contract") and upon mutual agreement and other valuable consideration, the parties agree to and hereby amend the contract upon execution as follows:

Vendor Contact information will be deleted and replaced with the following:

Vendor Contact:
Matt Foertsch
11937 Portal Rd
La Vista, NE 68128
Cell: 503-849-0050
Email: mfoertsch@trane.com

This Amendment and any attachments hereto will become part of the Contract. Except as set forth in this Amendment, the Contract is unaffected and shall continue in full force and effect in accordance with its terms. If there is conflict between this Amendment and the Contract or any earlier amendment, the terms of this Amendment will prevail.

IN WITNESS WHEREOF, the parties have executed this Amendment as of the date of execution by both parties below.

State of Nebraska

By: DocuSigned by: Amara Block 4CFF2711162A4A2...

Name: Amara Block

Title: Interim Materiel Administrator

Date: 8/27/2021

Contractor: Trane Company

By: * Anna M. McDonah

Name: Anna M. McDonah

Title: Contract Manager

Date: 08/26/21

* NOTE: Subject to the terms of the GSA Contract Number 47QSWA20D002A.

STATE OF NEBRASKA SERVICE CONTRACT AWARD

State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, Nebraska 68508

Telephone: (402) 471-6500
Fax: (402) 471-2089

PAGE	ORDER DATE
1 of 2	02/13/20
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)

VENDOR NUMBER: 551728

VENDOR ADDRESS:

TRANE COMPANY
PO BOX 845053
DALLAS TX 75284-5053

CONTRACT NUMBER
89622 O4

AN AWARD HAS BEEN MADE TO THE VENDOR/CONTRACTOR NAMED ABOVE FOR THE SERVICES AS LISTED BELOW FOR THE PERIOD:

APRIL 04, 2020 THROUGH DECEMBER 09, 2024

THIS CONTRACT IS NOT AN EXCLUSIVE CONTRACT TO FURNISH THE SERVICES SHOWN BELOW, AND DOES NOT PRECLUDE THE PURCHASE OF SIMILAR SERVICES FROM OTHER SOURCES.

THE STATE RESERVES THE RIGHT TO EXTEND THE PERIOD OF THIS CONTRACT BEYOND THE TERMINATION DATE WHEN MUTUALLY AGREEABLE TO THE VENDOR/CONTRACTOR AND THE STATE OF NEBRASKA.

Originally awarded from GSA Master Agreement Number 47QSWA20D002A

Contract to supply and deliver Alarm and Signal Systems, Facility Management Systems to the State of Nebraska as per the attached specifications for the period April 4, 2020 through December 9, 2024. The contract may be renewed for three (3) additional five (5) year periods when mutually agreeable to the vendor and the State of Nebraska.

The Purchase Order must include the State of Nebraska GSA-Like Contract 89622 O4 and the Trane U.S. Inc DBA Trane GSA Master Agreement Number 47QSWA20D002A.

Political Subdivisions are responsible for processing Purchase Orders directly with the contracted vendor.

State Contacts:
Mac Hunt: (402) 471-8354
Mark Craft: (402) 370-3169 or cell #: (402) 430-7451

Vendor Contact:
Kaylinn Nienhueser
5720 South 77th Street
Ralston, NE 68127-4202
Cell: (402) 705-2939
Office: (402) 331-7111
E-Mail: kaylinn.nienhueser@trane.com

(For the file: All requests for proposal (RFP) evaluation, etc., are retained by the GSA. This RFP and Contract are bid and awarded by the GSA.)

(For the file: The GSA/Trane U.S. Inc DBA Trane Master Price Agreement contract period was effective December 9, 2019. The Participating Addendum for Nebraska became effective April 4, 2020.)

(2/19/20 sc)

Line	Description	Estimated Quantity	Unit of Measure	Unit Price	Extended Price
1	ALARM AND SIGNAL SYSTEMS FACILITY MANAGEMENT SYSTEMS	10,000,000.0000	$	1.0000	10,000,000.00

4/1/20 Annette Walton 4/1/2020
BUYER

4/1/2020
MATERIEL ADMINISTRATOR

STATE OF NEBRASKA SERVICE CONTRACT AWARD

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PAGE	ORDER DATE
2 of 2	02/13/20
BUSINESS UNIT	BUYER
9000	ANNETTE WALTON (AS)
VENDOR NUMBER: 551728	

CONTRACT NUMBER
89622 O4

Line	Description	Quantity	Unit of Measure	Unit Price	Extended Price
	Total Order				**10,000,000.00**

BUYER INITIALS

STATE OF NEBRASKA

PARTICIPATING ADDENDUM
ALARM AND SIGNAL SYSTEMS, FACILITY MANAGEMENT SYSTEMS AND SERVICE
MA GSA CONTRACT # 47QSWA20D002A

Between
TRANE U.S.INC. (d/b/a TRANE)
[hereinafter "Contractor"]
And
State of Nebraska
[hereinafter "Participating State" or "Participating" Entity]
State Contract Number: 89622 O4

SCOPE

The scope of this contract is to provide alarm and signal systems facility management systems and service per the GSA contract # 47QSWA20D002A ("GSA") to State of Nebraska agencies, boards and commissions, and political sub-divisions

a. **Political subdivisions are able to use this contract.**

b. **CONTRACT PERIOD: April 4, 2020 through 12/9/2024.**

c. **PRICES**
Prices shall be net, including transportation and delivery charges fully prepaid by the Contractor, F. O. B. Destination. No additional charges will be allowed for packing, packages or partial delivery costs.

PRIMARY CONTACTS

Contractor

Name:	KAYLINN NIENHUESER
Address:	11937 PORTAL RD SUITE 100 68128
Telephone:	402-705-2939
Fax:	
Email:	Kaylinn.Nienhueser@trane.com

Participating Entity

Name:	State of Nebraska
Address:	1526 K St, Ste. 130, Lincoln, NE 68508
Telephone:	402-471-6500
Fax:	402-471-2089
Email:	as.materielpurchasing@nebraska.gov

State of Nebraska Standard Terms and Conditions Below

IMPORTANT NOTICE/POSTING OF DOCUMENTS
Pursuant to Neb. Rev. Stat. § 84-602.02, State contracts in effect as of January 1, 2014, and contracts entered into thereafter, must be posted to a public website. The resulting contract will be posted to a public website managed by DAS, which can be found at:

https://statecontracts.nebraska.gov/

Any entity awarded a contract agrees not to sue, file a claim, or make a demand of any kind, and will indemnify and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials from and against any and all claims, liens, demands, damages, liability, actions, causes of action, losses, judgments, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses, sustained or asserted against the State, arising out of, resulting from, or attributable to the posting of the contract, awards, and other documents.

A. NOTIFICATION

Communications regarding the executed contract shall be in writing and shall be deemed to have been given if delivered personally or mailed, by U.S. Mail, postage prepaid, return receipt requested, to the parties at their respective addresses set forth below, or at such other addresses as may be specified in writing by either of the parties. All notices, requests, or communications shall be deemed effective upon personal delivery or five (5) calendar days following deposit in the mail.

B. GOVERNING LAW

Notwithstanding any other provision of this contract, or any amendment or addendum(s) entered into contemporaneously or at a later time, the parties understand and agree that, (1) the State of Nebraska is a sovereign state and its authority to contract is therefore subject to limitation by the State's Constitution, statutes, common law, and regulation; (2) this contract will be interpreted and enforced under the laws of the State of Nebraska; (3) any action to enforce the provisions of this agreement must be brought in the State of Nebraska per state law; (4) the person signing this contract on behalf of the State of Nebraska does not have the authority to waive the State's sovereign immunity, statutes, common law, or regulations; (5) the indemnity, limitation of liability, remedy, and other similar provisions of the final contract, if any, are entered into subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity; and, (6) all terms and conditions of the final contract, including but not limited to the clauses concerning third-party use, licenses, warranties, limitations of liability, governing law and venue, usage verification, indemnity, liability, remedy or other similar provisions of the final contract are entered into specifically subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity.

The Parties must comply with all applicable local, state and federal laws, ordinances, rules, orders, and regulations.

C. INDEMNIFICATION

1. GENERAL

The Contractor agrees to defend, indemnify, and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials ("the indemnified parties") from and against any and all claims, liens, demands, damages, liability, actions, causes of action, losses, judgments, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses ("the claims"), sustained or asserted against the State for personal injury, death, or property loss or damage, arising out of, resulting from, or attributable to the willful misconduct, negligence, error, or omission of the Contractor, its employees, Subcontractors, consultants, representatives, and agents, resulting from this contract, except to the extent such Contractor liability is attenuated by any action of the State which directly and proximately contributed to the claims.

2. INTELLECTUAL PROPERTY

The Contractor agrees it will, at its sole cost and expense, defend, indemnify, and hold harmless the indemnified parties from and against any and all claims, to the extent such claims

arise out of, result from, or are attributable to, the actual or alleged infringement or misappropriation of any patent, copyright, trade secret, trademark, or confidential information of any third party by the Contractor or its employees, Subcontractors, consultants, representatives, and agents; provided, however, the State gives the Contractor prompt notice in writing of the claim. The Contractor may not settle any infringement claim that will affect the State's use of the Licensed Software without the State's prior written consent, which consent may be withheld for any reason.

If a judgment or settlement is obtained or reasonably anticipated against the State's use of any intellectual property for which the Contractor has indemnified the State, the Contractor shall, at the Contractor's sole cost and expense, promptly modify the item or items which were determined to be infringing, acquire a license or licenses on the State's behalf to provide the necessary rights to the State to eliminate the infringement, or provide the State with a non-infringing substitute that provides the State the same functionality. At the State's election, the actual or anticipated judgment may be treated as a breach of warranty by the Contractor, and the State may receive the remedies provided under this contract.

3. PERSONNEL

The Contractor shall, at its expense, indemnify and hold harmless the indemnified parties from and against any claim with respect to withholding taxes, worker's compensation, employee benefits, or any other claim, demand, liability, damage, or loss of any nature relating to any of the personnel, including subcontractor's and their employees, provided by the Contractor.

4. SELF-INSURANCE (Statutory)

The State is self-insured for any loss and purchases excess insurance coverage pursuant to Neb. Rev. Stat. § 81-8,239.01 (Reissue 2008). If there is a presumed loss under the provisions of this agreement, Contractor may file a claim with the Office of Risk Management pursuant to Neb. Rev. Stat. §81-8,829 through 81-8,306 for review by the State Claims Board. The State retains all rights and immunities under the State Miscellaneous (Section 81-8,294), Tort (Section 81-8,209), and Contract Claim Acts (Section 81-8,302), as outlined in Neb. Rev. Stat. § 81-8,209 et seq. and under any other provisions of law and accepts liability under this agreement to the extent provided by law.

D. ATTORNEY'S FEES

In the event of any litigation, appeal, or other legal action to enforce any provision of the contract, the Parties agree to pay all expenses of such action, as permitted by law and if order by the court, including attorney's fees and costs, if the other party prevails.

E. ASSIGNMENT, SALE OR MERGER

Either party may assign the contract upon mutual written agreement of the other party. Such agreement shall not be unreasonably withheld.

The Contractor retains the right to enter into a sale, merger, acquisition, internal reorganization, or similar transaction involving Contractor's business. Contractor agrees to cooperate with the State in executing amendments to the contract to allow for the transaction. If a third party or entity is involved in the transaction, the Contractor will remain responsible for performance of the contract until such time as the person or entity involved in the transaction agrees in writing to be contractually bound by this contract and perform all obligations of the contract.

F. CONTRACTING WITH OTHER POLITICAL SUBDIVISIONS OF THE STATE OR ANOTHER STATE

The Contractor may, but shall not be required to, allow agencies, as defined in Neb. Rev. Stat. §81-145, to use this contract. The terms and conditions, including price, of the contract may not be amended. The State shall not be contractually obligated or liable for any contract entered into pursuant to this clause.

The Contractor may, but shall not be required to, allow other states, agencies or divisions of other states, or political subdivisions of other states to use this contract. The terms and conditions, including price, of this contract shall apply to any such contract, but may be amended upon mutual consent of the Parties. The State of Nebraska shall not be contractually or otherwise obligated or liable under any contract entered into pursuant to this clause. The State shall be notified if a contract is executed based upon this contract.

Contractor and the political subdivisions may negotiate additional terms and conditions that are not inconsistent with the Master Agreement and Participating Addendum. Political subdivisions may enter into any form of agreement for which they have statutory authority.

G. BREACH

Either Party may terminate the contract, in whole or in part, if the other Party breaches its duty to perform its obligations under the contract in a timely and proper manner. Termination requires written notice of default and a thirty (30) calendar day (or longer at the non-breaching Party's discretion considering the gravity and nature of the default) cure period. Said notice shall be delivered by Certified Mail, Return Receipt Requested, or in person with proof of delivery. Allowing time to cure a failure or breach of contract does not waive the right to immediately terminate the contract for the same or different contract breach which may occur at a different time.

In case of breach by the Contractor, the State may, without unreasonable delay, make a good faith effort to make a reasonable purchase or contract to purchased goods in substitution of those due from the contractor. The State may recover from the Contractor as damages the difference between the costs of covering the breach. Notwithstanding any clause to the contrary, the State may also recover the contract price together with any incidental or consequential damages defined in UCC Section 2-715, but less expenses saved in consequence of Contractor's breach.

The State's failure to make payment shall not be a breach, and the Contractor shall retain all available statutory remedies. (See Indemnity - Self-Insurance and Payment)

H. NON-WAIVER OF BREACH

The acceptance of late performance with or without objection or reservation by a Party shall not waive any rights of the Party nor constitute a waiver of the requirement of timely performance of any obligations remaining to be performed.

I. NOTICE OF POTENTIAL CONTRACTOR BREACH

If Contractor breaches the contract or anticipates breaching the contract the Contractor shall immediately give written notice to the State. The notice shall explain the breach or potential breach, and may include a request for a waiver of the breach if so desired. The State may, at its discretion, temporarily or permanently waive the breach. By granting a temporary waiver, the State does not forfeit any rights or remedies to which the State is entitled by law or equity, or pursuant to the provisions of the contract. Failure to give immediate notice, however, may be grounds for denial of any request for a waiver of a breach.

J. SEVERABILITY

If any term or condition of the contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and conditions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the provision held to be invalid or illegal.

K. FORCE MAJEURE

Neither party shall be liable for any costs or damages, or for default resulting from its inability to perform any of its obligations under the contract due to a natural or manmade event outside the control and not the fault of the affected party ("Force Majeure Event"). The Party so affected shall immediately make a written request for relief to the other party, and shall have the burden of proof to justify the request. The

other Party may granted the relief requested; relief may not be unreasonably withheld. Labor disputes with the impacted party's own employees will not be considered a Force Majeure Event.

L. CONFIDENTIALITY

All materials and information provided by the Parties or acquired by a Party on behalf of the other Party shall be regarded as confidential information. All materials and information provided or acquired shall be handled in accordance with federal and state law, and ethical standards. Should said confidentiality be breached by a Party, the Party shall notify the other Party immediately of said breach and take immediate corrective action.

It is incumbent upon the Parties to inform their officers and employees of the penalties for improper disclosure imposed by the Privacy Act of 1974, 5 U.S.C. 552a. Specifically, 5 U.S.C. 552a (i)(1), which is made applicable by 5 U.S.C. 552a (m)(1), provides that any officer or employee, who by virtue of his/her employment or official position has possession of or access to agency records which contain individually identifiable information, the disclosure of which is prohibited by the Privacy Act or regulations established thereunder, and who knowing that disclosure of the specific material is prohibited, willfully discloses the material in any manner to any person or agency not entitled to receive it, shall be guilty of a misdemeanor and fined not more than $5,000.

M. EARLY TERMINATION

The contract may be terminated as follows:

1. The State and the Contractor, by mutual written agreement, may terminate the contract at any time.

2. The State, at its sole discretion, may terminate the contract for any reason upon thirty (30) calendar day's written notice to the Contractor. Such termination shall not relieve the Contractor of warranty or other service obligations incurred under the terms of the contract. In the event of termination the Contractor shall be entitled to payment, determined on a pro rata basis, for products or services satisfactorily performed or provided.

3. The State may terminate the contract immediately for the following reasons:

a. if directed to do so by statute;
b. upon termination of the master contract by the Lead State;
c. Contractor has made an assignment for the benefit of creditors, has admitted in writing its inability to pay debts as they mature, or has ceased operating in the normal course of business;
d. a trustee or receiver of the Contractor or of any substantial part of the Contractor's assets has been appointed by a court;
e. fraud, misappropriation, embezzlement, malfeasance, misfeasance, or illegal conduct pertaining to performance under the contract by its Contractor, its employees, officers, directors, or shareholders;
f. an involuntary proceeding has been commenced by any party against the Contractor under any one of the chapters of Title 11 of the United States Code and (i) the proceeding has been pending for at least sixty (60) calendar days; or (ii) the Contractor has consented, either expressly or by operation of law, to the entry of an order for relief; or (iii) the Contractor has been decreed or adjudged a debtor;
g. a voluntary petition has been filed by the Contractor under any of the chapters of Title 11 of the United States Code;
h. Contractor intentionally discloses confidential information;
i. Contractor has or announces it will discontinue support of the deliverable; and,
j. In the event funding is no longer available.

N. CONTRACT CLOSEOUT

Upon termination of the contract for any reason the Contractor shall within thirty (30) days, unless stated otherwise herein:

1. Transfer all completed or partially completed deliverables to the State;
2. Transfer ownership and title to all completed or partially completed deliverables to the State;
3. Return to the State all information and data, unless the Contractor is permitted to keep the information or data by contract or rule of law. Contractor may retain one copy of any information or data as required to comply with applicable work product documentation standards or as are automatically retained in the course of Contractor's routine back up procedures;
4. Cooperate with any successor contactor, person or entity in the assumption of any or all of the obligations of this contract;
5. Cooperate with any successor contactor, person or entity with the transfer of information or data related to this contract;
6. Return or vacate any state owned real or personal property.

Nothing in this Section should be construed to require the Contractor to surrender intellectual property, real or person property, or information or data owned by the Contractor for which the State has no legal claim.

O. INDEPENDENT CONTRACTOR/OBLIGATIONS

It is agreed that the Contractor is an independent contractor and that nothing contained herein is intended or should be construed as creating or establishing a relationship of employment, agency, or a partnership.

The Contractor is solely responsible for fulfilling the contract. The Contractor or the Contractor's representative shall be the sole point of contact regarding all contractual matters.

The Contractor shall secure, at its own expense, all personnel required to perform the services under the contract. The personnel the Contractor uses to fulfill the contract shall have no contractual or other legal relationship with the State; they shall not be considered employees of the State and shall not be entitled to any compensation, rights or benefits from the State, including but not limited to, tenure rights, medical and hospital care, sick and vacation leave, severance pay, or retirement benefits.

By-name personnel commitments made in the Contractor's bid shall not be changed without the prior written approval of the State. Replacement of these personnel, if approved by the State, shall be with personnel of equal or greater ability and qualifications.

The Contractor warrants that all persons assigned to the project shall be employees of the Contractor or a Subcontractor, and shall be fully qualified to perform the work required herein. Personnel employed by the Contractor or a subcontractor to fulfill the terms of the contract shall remain under the sole direction and control of the Contractor or the subcontractor respectively.

With respect to its employees, the Contractor agrees to be solely responsible for the following:

1. Any and all pay, benefits, and employment taxes and/or other payroll withholding;
2. Any and all vehicles used by the Contractor's employees, including all insurance required by state law;
3. Damages incurred by Contractor's employees within the scope of their duties under the contract;
4. Maintaining Workers' Compensation and health insurance that complies with state and federal law and submitting any reports on such insurance to the extent required by governing law;
5. Determining the hours to be worked and the duties to be performed by the Contractor's employees; and,

6. All claims on behalf of any person arising out of employment or alleged employment (including without limit claims of discrimination alleged against the Contractor, its officers, agents, or subcontractors or subcontractor's employees).

If the Contractor intends to utilize any subcontractor, the Subcontractor's level of effort, tasks, and time allocation must be clearly defined in the Contractor's bid. The Contractor shall agree that it will not utilize any Subcontractors not specifically included in its bid in the performance of the contract without the prior written authorization of the State.

The State reserves the right to require the Contractor to reassign or remove from the project any Contractor or Subcontractor employee.

Contractor shall insure that the terms and conditions contained in any contract with a sub-contractor does not conflict with the terms and conditions of this contract.

The Contractor shall include a similar provision, for the protection of the State, in the contract with any Subcontractor engaged to perform work on this contract.

P. EMPLOYEE WORK ELIGIBILITY STATUS

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of employees physically performing work within the State. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of an employee.

Q. ATTORNEY'S FEES

In the event of any litigation, appeal, or other legal action to enforce any provision of the contract, the Parties agree to pay all expenses of such action, as permitted by law and if order by the court, including attorney's fees and costs, if the other party prevails.

R. COMPLIANCE WITH CIVIL RIGHTS LAWS AND EQUAL OPPORTUNITY EMPLOYMENT/NONDISCRIMINATION (STATUTORY)

The Contractor shall comply with all applicable local, state, and federal statutes and regulations regarding civil rights laws and equal opportunity employment. The Nebraska Fair Employment Practice Act prohibits Contractors of the State, and their Subcontractors, from discriminating against any employee or applicant for employment, with respect to hire, tenure, terms, conditions, compensation, or privileges of employment because of race, color, religion, sex, disability, marital status, or national origin (Neb. Rev. Stat. §48-1101 through 48-1125). The Contractor guarantees compliance with the Nebraska Fair Employment Practice Act, and breach of this provision shall be regarded as a material breach of contract. The Contractor shall insert a similar provision in all Subcontracts for goods or services to be covered by this contract.

S. COOPERATION WITH OTHER CONTRACTORS

Contractor may be required to work with or in close proximity to other contractors or individuals that may be working on the same or different projects. The Contractor shall agree to cooperate with such other contractors or individuals, and shall not commit or permit any act which may interfere with the performance of work by any other contractor or individual. Contractor is not required to compromise Contractor's intellectual property or proprietary information unless expressly required to do so by this contract.

T. PERMITS, REGULATIONS, LAWS

The contract price shall include the cost of all royalties, licenses, permits, and approvals, whether arising from patents, trademarks, copyrights or otherwise, that are in any way involved in the contract. The Contractor shall obtain and pay for all royalties, licenses, and permits, and approvals necessary for

the performance of the contract. The Contractor must guarantee that it has the full legal right to the materials, supplies, equipment, software, and other items used to execute this contract.

U. ANTITRUST

The Contractor hereby assigns to the State any and all claims for overcharges as to goods and/or services provided in connection with this contract resulting from antitrust violations which arise under antitrust laws of the United States and the antitrust laws of the State.

V. DRUG POLICY

Contractor certifies it maintains a drug free work place environment to ensure worker safety and workplace integrity. Contractor agrees to provide a copy of its drug free workplace policy at any time upon request by the State.

W. OWNERSHIP OF INFORMATION AND DATA/DELIVERABLES

The State shall have the unlimited right to publish, duplicate, use, and disclose all information and data developed or obtained by the Contractor on behalf of the State pursuant to this contract.

The State shall own and hold exclusive title to any deliverable developed as a result of this contract. Contractor shall have no ownership interest or title, and shall not patent, license, or copyright, duplicate, transfer, sell, or exchange, the design, specifications, concept, or deliverable

X. STATE PROPERTY

The Contractor shall be responsible for the proper care and custody of any State-owned property which is furnished for the Contractor's use during the performance of the contract. The Contractor shall reimburse the State for any loss or damage of such property; normal wear and tear is expected.

Y. SITE RULES AND REGULATIONS

The Contractor shall use its best efforts to ensure that its employees, agents, and Subcontractors comply with site rules and regulations while on State premises. If the Contractor must perform on-site work outside of the daily operational hours set forth by the State, it must make arrangements with the State to ensure access to the facility and the equipment has been arranged. No additional payment will be made by the State on the basis of lack of access, unless the State fails to provide access as agreed to in writing between the State and the Contractor.

Z. ADVERTISING

The Contractor agrees not to refer to the contract award in advertising in such a manner as to state or imply that the company or its goods are endorsed or preferred by the State. Any publicity releases pertaining to the project shall not be issued without prior written approval from the State.

BB. DISASTER RECOVERY/BACK UP PLAN

The Contractor shall have a disaster recovery and back-up plan, of which a copy should be provided upon request to the State, which includes, but is not limited to equipment, personnel, facilities, and transportation, in order to continue services as specified under the specifications in the contract in the event of a disaster.

CC. PAYMENT

State will render payment to Contractor when the terms and conditions of the contract and specifications have been satisfactorily completed on the part of the Contractor as solely determined by the State. (Neb. Rev. Stat. Section 73-506(1)). The State may require the Contractor to accept payment by electronic means such as ACH deposit. In no event shall the State be responsible or liable to pay for any services provided by the Contractor prior to the Effective Date of the contract, and the Contractor hereby waives any claim or cause of action for any such services.

DD. PROHIBITION AGAINST ADVANCE PAYMENT (STATUTORY)

Payments shall not be made until contractual deliverable(s) are received and accepted by the State.

EE. LATE PAYMENT (STATUTORY)

The Contractor may charge the responsible agency interest for late payment in compliance with the State of Nebraska Prompt Payment Act (See Neb. Rev. Stat. §§ 81-2401 through 81-2408).

FF. FUNDING OUT CLAUSE FOR LOSS OF APPROPRIATION (STATUTORY)

The State's obligation to pay amounts due on the Contract for a fiscal years following the current fiscal year is contingent upon legislative appropriation of funds. Should said funds not be appropriated, the State may terminate the contract with respect to those payments for the fiscal year(s) for which such funds are not appropriated. The State will give the Contractor written notice thirty (30) calendar days prior to the effective date of termination. All obligations of the State to make payments after the termination date will cease. The Contractor shall be entitled to receive just and equitable compensation for any authorized work which has been satisfactorily completed as of the termination date. In no event shall the Contractor be paid for a loss of anticipated profit.

GG. RIGHT TO AUDIT (STATUTORY)

The State shall have the right to audit the Contractor's performance of this contract upon a thirty (30) day written notice. Contractor shall utilize generally accepted accounting principles, and shall maintain the accounting records, and other records and information relevant to the contract (Information) to enable the State to audit the contract. (Neb. Rev. Stat. §84-304 et seq.) The State may audit and the Contractor shall maintain the information during the term of the contract and for a period of five (5) years after the completion of this contract or until all issues or litigation are resolved, whichever is later. The Contractor shall make the Information available to the State at Contractor's place of business or a location acceptable to both Parties during normal business hours. If this is not practical or the Contractor so elects, the Contractor may provide electronic or paper copies of the Information. The State reserves the right to examine, make copies of, and take notes on any Information relevant to this contract, regardless of the form or the Information, how it is stored, or who possesses the Information. In no circumstances will contractor be required to create or maintain documents not kept in the ordinary course of contractor's business operations, nor will contractor be required to disclose any information, including but not limited to product cost data, which is confidential or proprietary to contractor.

The Parties shall pay their own costs of the audit unless the audit finds a previously undisclosed overpayment by the State. If a previously undisclosed overpayment exceeds three percent of the total contract billings, or if fraud, material misrepresentations, or non-performance is discovered on the part of the Contractor, the Contractor shall reimburse the State for the total costs of the audit. Overpayments and audit costs owed to the State shall be paid within ninety (90) days of written notice of the claim. The Contractor agrees to correct any material weaknesses or condition found as a result of the audit.

HH. TAXES

The State is not required to pay taxes and assumes no such liability as a result of this solicitation. The Contractor may request a copy of the Nebraska Department of Revenue, Nebraska Resale or Exempt Sale Certificate for Sales Tax Exemption, Form 13 for their records. Any property tax payable on the Contractor's equipment which may be installed in a state-owned facility is the responsibility of the Contractor.

II. INVOICES

Invoices for payments must be submitted by the Contractor to the agency requesting the services with sufficient detail to support payment. Itemized invoices will be submitted to the invoice to address included on the purchase order. The terms and conditions included in the Contractor's invoice shall be deemed to be solely for the convenience of the parties. No terms or conditions of any such invoice shall be binding upon the State, and no action by the State, including without limitation the payment of any such invoice in whole or in part, shall be construed as binding or estopping the State with respect to any such term or condition, unless the invoice term or condition has been previously agreed to by the State as an amendment to the contract.

JJ. INSPECTION AND APPROVAL

Final inspection and approval of all work required under the contract shall be performed by the designated State officials.

If a simple inspection of the goods would reveal nonconformity, notice of nonconformity should be provided to the vendor as soon as reasonably practical, but not to exceed thirty (30) days from receipt of goods. This includes visual inspection of product to ensure packaging is not damaged, dented or compromised.

The State and/or its authorized representatives shall have the right to enter any premises where the Contractor or Subcontractor duties under the contract are being performed, and to inspect, monitor or otherwise evaluate the work being performed. All inspections and evaluations shall be at reasonable times and in a manner that will not unreasonably delay work

KK. WARRANTY

The manufacturer's standard warranty shall apply and be in effect for at least one (1) year from the date the equipment was placed in service.

LL. REPORTS

The Contractor agrees to provide a quarterly utilization report, reflecting new sales to the State during the associated fee period, less any credits. The report shall be in the format developed by the Lead State and as agreed to by the Contractor. The report will be provided in secure electronic format and/or submitted electronically to the State as listed below.

The Contractor shall also provide to the State of Nebraska primary contact person quarterly utilization reports containing at a minimum the following information pertaining to State of Nebraska agencies, boards, commissions, and political subdivisions utilization:

Ordering Entity
Purchase order number;
Description;
Quantity; and
Price.

These reports will be provided in Excel format and sent via email on a quarterly basis as follows:

Period End	**Report Due**
December 31	January 31
March 31	April 30
June 30	July 31
September 30	October 31

Reports shall be sent to: as.materielpurchasing@nebraska.gov; to the attention of the Participating Entity's primary contact. Please include the contract number, 89622 O4, in the subject line of the email.

OO. INSURANCE REQUIREMENTS

The Contractor shall throughout the term of the contract maintain insurance as specified herein and provide the State a current Certificate of Insurance/Accord Form (COI) verifying the coverage. The Contractor shall not commence work on the contract until the insurance is in place. If Contractor subcontracts any portion of the Contract the Contractor must, throughout the term of the contract, either:

1. Provide equivalent insurance for each subcontractor and provide a COI verifying the coverage for the subcontractor;
2. Require each subcontractor to have equivalent insurance and provide written notice to the State that the Contractor has verified that each subcontractor has the required coverage; or,

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June 30	July 31
September 30	October 31

Reports shall be sent to: as.materielpurchasing@nebraska.gov; to the attention of the Participating Entity's primary contact. Please include the contract number, 79894 O4, in the subject line of the email.

OO. INSURANCE REQUIREMENTS

The Contractor shall throughout the term of the contract maintain insurance as specified herein and provide the State a current Certificate of Insurance/Accord Form (COI) verifying the coverage. The Contractor shall not commence work on the contract until the insurance is in place. If Contractor subcontracts any portion of the Contract the Contractor must, throughout the term of the contract, either:

1. Provide equivalent insurance for each subcontractor and provide a COI verifying the coverage for the subcontractor;
2. Require each subcontractor to have equivalent insurance and provide written notice to the State that the Contractor has verified that each subcontractor has the required coverage; or,

3. Provide the State with copies of each subcontractor's Certificate of Insurance evidencing the required coverage.

The Contractor shall not allow any Subcontractor to commence work until the Subcontractor has equivalent insurance. The failure of the State to require a COI, or the failure of the Contractor to provide a COI or require subcontractor insurance shall not limit, relieve, or decrease the liability of the Contractor hereunder.

In the event that any policy written on a claims-made basis terminates or is canceled during the term of the contract or within one (1) year of termination or expiration of the contract, the contractor shall obtain an extended discovery or reporting period, or a new insurance policy, providing coverage required by this contract for the term of the contract and one (1) year following termination or expiration of the contract.

If by the terms of any insurance a mandatory deductible is required, or if the Contractor elects to increase the mandatory deductible amount, the Contractor shall be responsible for payment of the amount of the deductible in the event of a paid claim.

Notwithstanding any other clause in this contract, the State may recover up to the liability limits of the insurance policies required herein.

1. **WORKERS' COMPENSATION INSURANCE**

The Contractor shall take out and maintain during the life of this contract the statutory Workers' Compensation and Employer's Liability Insurance for all of the contactors' employees to be engaged in work on the project under this contract and, in case any such work is sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all of the subcontractor's employees to be engaged in such work. This policy shall be written to meet the statutory requirements for the state in which the work is to be performed, including Occupational Disease. **The policy shall include a waiver of subrogation in favor of the State. The COI shall contain the mandatory COI subrogation waiver language found hereinafter**. The amounts of such insurance shall not be less than the limits stated hereinafter. For employees working in the State, the policy must be written by an entity authorized by the State of Nebraska Department of Insurance to write Workers' Compensation and Employer's Liability Insurance for Nebraska employees.

2. **COMMERCIAL GENERAL LIABILITY INSURANCE AND COMMERCIAL AUTOMOBILE LIABILITY INSURANCE**

The Contractor shall take out and maintain during the life of this contract such Commercial General Liability Insurance and Commercial Automobile Liability Insurance as shall protect Contractor and any subcontractor performing work covered by this contract from claims for damages for bodily injury, including death, as well as from claims for property damage, which may arise from operations under this contract, whether such operation be by the Contractor or by any subcontractor or by anyone directly or indirectly employed by either of them, and the amounts of such insurance shall not be less than limits stated hereinafter.

The Commercial General Liability Insurance shall be written on an **occurrence basis**, and provide Premises/Operations, Products/Completed Operations, Independent Contractors, Personal Injury, and Contractual Liability coverage. **The policy shall include the State, and others as required by the contract documents as Additional Insured(s). This policy shall be primary, and any insurance or self-insurance carried by the State shall be considered secondary and non-contributory**. **The COI shall contain the mandatory COI liability waiver language found hereinafter.** The Commercial Automobile Liability Insurance shall be written to cover all Owned, Non-owned, and Hired vehicles.

REQUIRED INSURANCE COVERAGE	
COMMERCIAL GENERAL LIABILITY	
General Aggregate	$2,000,000
Products/Completed Operations Aggregate	$2,000,000
Personal/Advertising Injury	$1,000,000 per occurrence
Bodily Injury/Property Damage	$1,000,000 per occurrence
Medical Payments	$10,000 any one person
Damage to Rented Premises	$300,000 each occurrence
Contractual	Included
XCU Liability (Explosion, Collapse, and Underground Damage)	Included
Independent Contractors	Included
If higher limits are required, the Umbrella/Excess Liability limits are allowed to satisfy the higher limit.	
LIQUOR LIABILITY	
Where applicable, as a stand-alone policy or may be included in CGL above.	$1,000,000 Each Occurrence $2,000,000 Aggregate
WORKER'S COMPENSATION	
Employers Liability Limits	$500K/$500K/$500K
Statutory Limits- All States	Statutory - State of Nebraska
Voluntary Compensation	Statutory
COMMERCIAL AUTOMOBILE LIABILITY	
Bodily Injury/Property Damage	$1,000,000 combined single limit
Include All Owned, Hired & Non-Owned Automobile liability	Included
Motor Carrier Act Endorsement	Where Applicable
UMBRELLA/EXCESS LIABILITY	
Over Primary Insurance	$5,000,000 per occurrence
	Trane's Time Element Pollution (CGL) endorsement and MCS-90 (auto) endorsement
MANDATORY COI SUBROGATION WAIVER LANGUAGE	
"Workers' Compensation policy shall include a waiver of subrogation in favor of the State of Nebraska."	
MANDATORY COI LIABILITY WAIVER LANGUAGE	
"Commercial General Liability & Commercial Automobile Liability policies shall be primary and any insurance or self-insurance carried by the State shall be considered secondary and non-contributory. The State of Nebraska is included as an additional insured."	

If the mandatory COI subrogation waiver language or mandatory COI liability waiver language on the COI states that the waiver is subject to, condition upon, or otherwise limit by the insurance policy a copy of the relevant sections of the policy must be submitted with the COI so the State can review the limitations imposed by the insurance policy.

3. EVIDENCE OF COVERAGE

The Contractor should furnish the State, prior to beginning work and upon PA execution, a certificate of insurance coverage complying with the above requirements to the attention of:

State of Nebraska Attn: COI
1526 K St. Ste. 130
Lincoln, NE 68508
as.materielpurchasing@nebraska.gov

These certificates or the cover sheet should reference the contract number, and the certificates shall include the name of the company, policy numbers, effective dates, dates of expiration, and amounts and types of coverage afforded. If the State is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall be responsible for all reasonable costs properly attributable thereto.

Reasonable notice of cancellation of any required insurance policy must be submitted to Administrative Services State Purchasing Bureau when issued and a new coverage binder shall be submitted immediately to ensure no break in coverage.

4. DEVIATIONS

The insurance requirements are subject to limited negotiation. Negotiation typically includes, but is not necessarily limited to, the correct type of coverage, necessity for Workers' Compensation, and the type of automobile coverage carried by the Contractor.

IN WITNESS WHEREOF, the parties have executed this Addendum as of the date of execution by both parties below.

Participating State/Entity: State of Nebraska	**Contractor: TRANE U.S.INC. (d/b/a TRANE)**
By:	By: *
Name: Doug Carlson	Name: Anna M. McDonah
Title: AS Materiel Administrator	Title: Contract Manager
Date: 4/1/2020	Date: March 31, 2020

* NOTE: Subject to the terms of the GSA Contract Number 47QSWA20D002A.

Alarm and Signal Systems
Facility Management Systems

FSC Group 084 Total Solutions for Law Enforcement, Security, Facilities Management, Fire, Rescue, Clothing, Marine Craft and Emergency/Disaster Response
FSC CLASS: 63

Trane U.S. Inc. (d/b/a TRANE),
3600 Pammel Creek Road
LaCrosse, Wisconsin 54601-7599
1-800-877-1327

Contract Number: 47QSWA20D002A

Contract Period: 12/10/2019 to 12/9/2024

Business Size: Large

Authorized FSS Schedule Price List

Federal Supply Service
U.S. General Services Administration

TABLE OF CONTENTS

CONTRACT MODIFICATIONS

This Schedule Contract Price List includes Modifications through No. **PA-0002, effective January 17, 2020**.

INFORMATION FOR ORDERING OFFICES

1a. Awarded Special Item Numbers:

SIN	Description
246-42-1	Facility Management Systems
246-1000	Security, Alarm & Signal Systems Ancillary Services
246-51	Installation of Security/Facility Management Systems Requiring Construction
246-52	Professional Security/Facility Management Services
246-53	Facility Management and Energy Solutions

1b. Lowest Price Model Number and Lowest Unit Price for the Special Item Number Awarded in the Contract – See Pricing.

1c. Hourly Rates – See Pricing.

2. Maximum Order:

SIN 246-42-1.....$150,000 per order.

SIN 246-1000.....$150,000 per order.

SIN 246-51.....$200,000 per order.

SIN 246-52.....$200,000 per order.

SIN 246-53 $200,000 per order.

Pursuant to FAR 8.405-1, The Maximum Order established in Schedule contracts is the threshold at which it is advantageous for an ordering office to seek further concessions from a Contractor. The Contractor may accept an order of any amount, including one exceeding the maximum order threshold. For an order in an amount above the maximum order threshold for the specific SIN in the contract, a Government purchaser should seek further concessions from the Contractor. When presented with such a request, the Contractor may grant additional concessions, offer the product at the existing contract price, or refuse the order.

3. Minimum Order:

$100.00 per order.

4. Geographic Coverage (delivery area):

The scope of the contract is the 48 contiguous states, Alaska, Hawaii, Puerto Rico, Washington, D.C., and U.S. Territories.

5. Points of Production (city, county, and state or foreign country):

Name of Manufacturer	Production Point
Trane U.S. Inc.	3600 Pammel Creek Road LaCrosse LaCrosse County Wisconsin 54601-7599 Phone: 608-787-2000 Phone (Marketing):608-787-3907 Fax: 608-787-2204 www.trane.com
Trane U.S. Inc.	4833 White Bear Parkway St. Paul Ramsey County Minnesota 55110 Phone: 1-800-877-1327 Fax: 651-407-4197 E-mail: GSASchedule@trane.com www.trane.com
Trane U.S. Inc.	CDS 3600 Pammel Creek Road LaCrosse LaCrosse County Wisconsin 54601-7511 Phone: 608-787-3926 Fax: 608-787-3005 E-mail: cdshelp@trane.com www.trane.com
Trane U.S. Inc.	101 William White Boulevard Pueblo Pueblo County Colorado 81001-4800 Phone: 1-888-244-5537 Fax: 719-585-3896 www.trane.com
Trane U.S. Inc.	2701 Wilma Rudolph Blvd. Clarksville Montgomery County Tennessee 37040-5846 Phone: 931-648-5945 Fax: 931-648-5901 www.trane.com

Trane U.S. Inc. 182 Colton Belt Parkway
McGregor
McLennan County
Texas 76657-3411
Phone: 254-299-6300
Fax: 254-299-6671
www.trane.com

Trane U.S. Inc. Inland Marketing Services
3030 Airport Road
La Crosse
La Crosse County
Wisconsin 54603-1251
Phone: 608-787-3926
Fax: 608-783-4705
www.trane.com

Trane U.S. Inc. 4500 Morris Field Drive
Charlotte
Mecklenberg County
North Carolina 28208
Phone: 800-755-5115
Fax: 704-398-4681
www.trane.com

Trane U.S. Inc. 1515 Mercer Road
Lexington
Lexington-Fayette County
Kentucky 40511
Phone: 800-228-1666
Fax: 859-288-2618
www.trane.com

Trane U.S. Inc. 7610 Industrial Highway
Macon
Bibb County
Georgia 31216
Phone: 478-781-6495
Fax: 478-784-4239
www.trane.com

Trane U.S. Inc. Lynn Haven Unit
200 Aberdeen Loop
Panama City
Bay County
Florida 32405
Phone: 850-271-6030
Fax: 850-271-6040
www.trane.com

Trane U.S. Inc. 141 Commons Pkwy
Columbia
Lexington County
South Carolina 29203
Phone: 1-877-788-7263
www.trane.com

Trane U.S. Inc. 9900 Aire Circle
Fort Smith
Arkansas 72916
Phone: 479-648-7400
Fax: 479-648-7499
www.trane.com

Trane U.S. Inc. Grand Rapids
5005 Corporate Exchange Blvd SE
Grand Rapids
Michigan 49512
Phone: 844-801-6048
www.trane.com

Trane U.S. Inc. Rushville
1300 N. Benjamin St.
Rushville
Indiana 46173
Phone: 765-932-7200
www.trane.com

6. Discounts from Commercial List Prices:

GSA Net Prices are shown on the attached GSA Price List. Negotiated discount has been deducted and the IFF has been included.

7. Quantity Discounts:

To be determined at the Task Order Level.

8. Prompt Payment Terms:

Prompt payment is ½% 10 days Net 30 days from date of invoice or date of acceptance, whichever is later. Credit card transactions are excluded.

Information for Ordering Offices: Prompt Payment Terms cannot be negotiated out of the contractual agreement in exchange for other concessions."

9a. Government Commercial Credit Card:

Government purchase cards are accepted.

9b. Government Commercial Credit Card:

Government purchase cards are accepted above the micro-purchase threshold.

10. Foreign Items (list items by country of origin):

None

11a. Time of Delivery:

As negotiated at the Task Order Level.

11b. Expedited Delivery:

As negotiated at the Task Order Level.

11c. Overnight and 2-Day Delivery:

As negotiated at the Task Order Level.

11d. Urgent Requirements:

As negotiated at the Task Order Level.

12. FOB Point:

Shipment shall be F.O.B. Destination with title passing to the Government upon delivery by the carrier, freight allowed and prepaid. The contractor shall be responsible for all expenses connected with the return of defective products or parts. The Government shall be responsible for expenses connected with all other returns. A restocking fee of 15% of the purchase price shall be charged to the Government for the return of non-defective products or parts.

13a. Ordering Address:

See "Trane Sales Offices" section for listing of ordering addresses.

13b. Ordering Procedures:

For supplies and services, the ordering procedures, information on Blanket Purchase Agreements (BPA's) are found in Federal Acquisition Regulation (FAR) 8.405-3.

14. Payment Address:

Payment may be made to:

Trane U.S. Inc.
4833 White Bear Parkway
St. Paul, MN 55110

or to Trane U.S. Inc. in care of one of the Participating Dealers listed in the "Trane Sales Offices" section.

Trane may direct a purchasing office to forward payment to one of the following "remit to" addresses, which will be listed on the invoice:

Trane U.S. Inc.
P.O. Box 406469
Atlanta, GA 30384-6469

Trane U.S. Inc.
P. O. Box 98167
Chicago, IL 60693

Trane U.S. Inc.
P. O. Box 845053
Dallas, TX 75284-5053

Trane U.S. Inc.
File 56718
Los Angeles, CA 90074-6718

Schedule customers seeking to make EFT payments should access CCR (Trane Cage Code 60532, DUNS No. 12-636-5795) or contact Trane Accounts Receivables Department at (608) 787-2629.

15. Warranty Provisions:

Standard Commercial Warranty applies. Contact the contractor for a copy of the warranty.

16. Export Packing Charges:

Point of Exportation for all other overseas locations. In place of a delivery/installation date for equipment, a shipping date shall be specified on the order. The Contractor shall pay for shipment to a CONUS APO/FPO. At the option of the Government, F.O.B. will be Point of Origin, with freight prepaid and invoiced. Authorization for all shipping, export, and other charges must be included on the Government order.

17. Terms and Conditions of Government Purchase Card Acceptance (any thresholds above the micropurchase level):

No special concessions granted.

18. Terms and Conditions of Rental, Maintenance, or Repair:

For locations in the 48 contiguous states, Alaska, Hawaii, Puerto Rico, and Washington, D.C., maintenance and repair is performed by the sales offices listed in the attached list of Trane Sales Offices in the United States, based on terms and prices set at each sales office. Contact each sales office for maintenance and repair available.

19. Terms and Conditions of Installation:

Installation for locations in the 48 contiguous states, Alaska, Hawaii, Puerto Rico, and Washington, D.C. is performed by the sales offices listed in the attached list of Trane Sales Offices in the United States, based on terms and prices set by each sales office.

20. Terms and Conditions of Repair Parts:

Repair parts are stocked and sold by the sales offices listed under the section "Trane Sales Offices."

20a. Terms and Conditions for any other services.

None.

21. List of Service and Distribution Points:

See Attached List of Trane Sales Offices.

22. List of Participating Dealers:

See Attached List of Trane Sales Offices.

23. Preventive Maintenance:

Preventive Maintenance is performed by the sales offices shown on attached list of Trane Sales Offices.

24a. Environmental Attributes (e.g., recycled content, energy efficiency, and/or reduced pollutants):

The right HVAC system is critical to green building and there are many HVAC strategies to help address energy, indoor environmental quality and water elements that in turn, can help earn LEED credits. Trane, as a leading global supplier of HVAC systems, services and solutions, helps achieve green building goals. Here are just some of the ways that Trane offering is helping buildings go green and attain LEED certification.

Designing and Engineering Your Green Building - TRACE™ 700 is the complete design tool for load, system, energy and economic analysis, and is used to earn LEED EAc1 points. TRACE 700 complies with Appendix G for Performance Rating Method of ASHRAE Standard 90.1-2007 for LEED analysis, and was the first simulation software approved by the IRS for energy-savings certification (EPAct). TRACE is also tested in compliance with ANSI/ASHRAE Standard 140–2007.

Constructing Your Green Building - EarthWise™ Systems use state-of-the-art Trane products, systems and controls to optimize performance. This includes the ability to balance installed cost and operating cost while improving comfort, indoor air quality, and acoustics. EarthWise Systems provide high efficiency/low emissions performance that can be documented over the entire lifetime of the building.

EarthWise™ CenTraVac Chillers are rated by the U.S. Environmental Protection Agency as best-in-class energy-efficient designs and **FEMP** designation. CenTraVac Chillers are also a three time Climate Protection Award winner as the most energy-efficient, lowest-emission large chillers available and are the only chillers in the world to earn Environmental Product Declaration (EPD) registration following the requirements of ISO 14025.

Voyager™, **Precedent™** and **Intellipak™** commercial rooftop air conditioner units and **Odyssey™** split system performance meets or exceeds ASHRAE 90.1 standard. This standard sets acceptable energy efficiency performance requirements and is used by the DOE for both NAECA and EPAct. Some product lines have 2 or 3 tiers of efficiency levels available to choose from and some **Voyager™** Model TC* and YC* are **Energy Star**.

Trane Axiom™ water-source heat pumps (WSHP) deliver high-performance heating and cooling with exceptional efficiency: up to 40 EER on select systems. Within Trane's WSHP line, units are offered for the application of Geothermal and other WSHP systems that help your buildings work better and is a highly efficient technology that uses the ground as a heat source in winter and as a heat sink in summer. Technology is considered as a Renewable Energy.

Operating and Controlling Your Green Building - Tracer ™ controls provide advanced control of complex systems to achieve energy savings and measure performance. Trane 2,000 factory-authorized service professionals, over 300 LEED AP Certified, and over 145 Certified Energy Managers contribute to efficient and sustainable building operations.

Products are identified with environmentally sustainable products symbols in Trane Price List (Catalog or GSA Advantage) as appropriate. Trane currently has products with the following sustainable products symbol designations.

FEMP

24b. Section 508 Compliance:

Not Applicable

25. Data Universal Number System (DUNS) number:

DUNS No. 12-636-5795

26. Notification Regarding Registration in System for Award Management (SAM):

Contractor is registered. Cage Code is 60532.

TRANE SALES OFFICES

TRANE COMPANY-OWNED LOCAL SALES OFFICE

Albany, NY – Central New York
(518) 785-1315
FAX: (518) 785-4359 - Sales
301 Old Niskayuna Road
Latham, New York 12110-2214

Albuquerque, NM
(505) 884-2044
FAX: (505) 884-2449
5501 San Diego Avenue NE
Albuquerque, New Mexico 87113

Allentown, PA
(484) 223-1730
FAX: (484) 2231-1824
5925 Tilghman Street, Suite 70
Allentown, PA 18104

Anchorage, AK
(907) 267-7400
FAX: (907) 267-7481
12101 Industry Way, Bldg C1
Anchorage, AK 99515

Appleton, WI
(920) 734-4531
FAX: (920) 734-2044
2500 N. Lynndale Drive
Appleton, Wisconsin 54914

Asheville, NC
(828) 277-8664
FAX: (828) 277-5848
1400 Sweeten Creek Road
Asheville, NC 28803

Atlanta, GA
(404) 321-7500
FAX: (404) 636-5204
4000 Dekalb Technology Pkwy, Suite 100
Atlanta, Georgia 30340

Augusta, GA
(706) 738-8157
FAX: (706) 733-7842
3342 Commerce Drive
Augusta, GA 30909

Austin, TX
(512) 416-8822
FAX: (512) 416-8894
9801 Metric Blvd., Suite 400
Austin, TX 78758

Baltimore, MD
(410) 403-2200
FAX: (410) 403-2225
10947 Golden West Drive, Suite 100
Hunt Valley, Maryland 21031

Baton Rouge, LA
(225) 298-4280
FAX: (225) 291-9472
11534 Cloverland Avenue
Baton Rouge, LA 70879-8158

Birmingham, AL
(205) 7474-4000
FAX: (205) 747-4006
1030 London Drive, Suite 100
Birmingham, Alabama 35211

Boise, ID
(208) 362-0916
FAX: (208) 362-7463
351 N. Mitchell St., Suite 100
Boise, ID 83704

Boston, MA
(781) 938-9700
FAX: (781) 938-8912
181 Ballardvale Street
Wilmington, Massachusetts 01887

Burlington, VT
(802) 864-3816
FAX: (802) 864-5093
175 Leroy Road
Williston, VT 05495

Cape Girardeau, MO
(573) 334-0591
FAX: (573) 334-0680
1078 Wolverine Lane #D
Cape Girardeau, MO 63701

Charleston, SC
(843) 375-4775
FAX: (843) 375-4776
2011 Clements Ferry Road
Charleston, SC 29492

Charlotte, NC
(704) 525-9600
FAX: (704) 525-8582
4501 South Tryon Street
P.O. Box 240605 (28224)
Charlotte, North Carolina 28217

Chattanooga, TN
(423) 296-1506
FAX: (423) 485-8139
6138 Preservation Drive, Suite 500
Chattanooga, TN 37416

Chicago, IL
(630) 734-3200
FAX: (630) 323-9040
7100 South Madison
Willowbrook, Illinois 60527-5505

Cincinnati, OH
(513) 771-8884
FAX: (513) 772-7281
10300 Springfield Pike
Cincinnati, Ohio 45215

Colorado Springs, CO
(719) 599-3900
FAX: (719) 268-0200
4242 N. Nevada Avenue
Colorado Springs, CO 80907

Columbia, SC
(803) 936-4700
FAX: (803) 936-4715
111 Lott Court
West Columbia, South Carolina 29169

Columbus, OH
(614) 473-3500
FAX: (614) 473-3501
2300 City Gate Drive, Suite 100
Columbus, Ohio 43219-3652

Dallas, TX (TSO)
(972) 406-6000
FAX: (972) 243-1398
P.O. Box 814609
Dallas, Texas 75381-4609
1400 Valwood Parkway, Suite 100
Carrollton, Texas 75006

Davenport, IA
(563) 468-4900
FAX: (563) 391-0277
4801 Grand Ave.
Davenport, Iowa 52807

Denver, CO
(303) 228-3300
FAX: (303) 228-2828
445 Bryant St., Unit 5
Denver, Colorado 80204

Detroit, MI
(248) 596-3600
FAX: (248) 596-3636
37001 Industrial Road
Livonia, Michigan 48150

El Paso, TX
(915) 593-3484
FAX: (915) 593-3490
1405 Vanderbilt Drive
El Paso, TX 79935

Fargo, ND
(701) 235-0521
FAX: (701) 293-3136
300 45th Street SW
Fargo, North Dakota 58103

Fort Collins, CO
(970) 490-1052
FAX: (970) 490-1191
2416 Donnella Court, Unit D
Fort Collins, CO 80524

Fort Wayne, IN
(260) 489-0884
FAX: (260) 489-5117
6602 Innovation Blvd.
Fort Wayne, IN 46818

Fort Worth, TX
(817) 838-1300
FAX: (817) 831-8135
4200 N. Sylvania Avenue
Fort Worth, TX 76137

Fresno, CA
(559) 271-4625
FAX: (559) 271-4630
5599 N. Golden State Blvd.
Fresno, California 93722

Grand Junction, CO
(970) 242-4438
FAX: (970) 248-3959
2387 River Road, Unit 110
Grand Junction, CO 81505

Grand Rapids, MI
(616) 971-1400
FAX: (616) 971-1401
5005 Corporate Exchange Blvd. S.E.
Grand Rapids, Michigan 49512

Greenville, SC
(864) 672-6000
FAX: 864-672-6001
288 Fairforest Way
Greenville, South Carolina 29607

Harrisburg, PA
(717) 561-5400
FAX: (717) 561-5499
3909 TecPort Drive
Harrisburg, Pennsylvania 17111

Hartford, CT
(860) 616-6600
FAX: (860) 616-6599
716 Brook Street, Suite 130
Rocky Hill, CT 06067

Honolulu, HI (TSO)
(808) 845-6662
FAX: (808) 845-2168
2969 Mapunapuna Pl, Ste 101
Honolulu, Hawaii 96819

Huntsville, AL
(256) 837-1030
FAX: (256) 837-2058
4825 Commercial Drive
Huntsville, AL 35816

Indianapolis, IN
(317) 255-8777
FAX: (317) 251-8556
5355 North Post Road
Indianapolis, Indiana 46216

Jacksonville, FL
(904) 363-6088
FAX: (904) 363-1134
8929 Western Way, Suite 1
Jacksonville, Florida 32256

Johnson City, TN
(423) 224-1150
FAX: (423) 224-1151
10384 Wallace Alley Street
Kingsport, Tennessee 37663

Johnstown, PA
(814) 266-3020
FAX: (814) 266-3015
1255 Scalp Ave.
Johnstown, Pennsylvania 15904

Kansas City, MO
(913) 599-4664
FAX: (913) 599-4669
8014 Flint
Lenexa, Kansas 66214

Knoxville, TN
(865) 588-0607
FAX: (865) 588-0600
5220 S. Middlebrook Pk.
Knoxville, TN 37921

La Crosse, WI
(608) 788-8430
FAX: (608) 787-0454
2525 Larson Street
La Crosse, WI 54603

Lincoln, NE
(402) 438-9220
FAX: (402) 438-9221
7800 O Street, Suite 101
Lincoln, NE 68540

Long Island, NY
(718) 269-3600
FAX: (718) 269-3758
245 Newtown Rd, Suite 500
Plainview, NY 11803

Los Angeles, CA
(626) 913-7123
FAX: (626) 913-7153
17760 Rowland Street
City of Industry, California 91748

Lubbock, TX
(806) 747-0266
FAX: (806) 744-1033
717 E 40th Street (79404)
PO Box 3963
Lubbock, TX 79452

Macon, GA
(478) 743-5429
FAX: (478) 743-2731
125 Macon West Drive
Macon, GA 31210

Madison, WI
(608) 838-8200
FAX: (608) 838-6015
4801 Voges Road, Suite A
Madison, Wisconsin 53718

Manchester, NH
(603) 263-2060
FAX: (603) 263-2062
47 Constitution Drive
Bedford, New Hampshire 03110

Memphis, TN
(901) 345-6000
FAX: (901) 345-2803
1775 Pyramid Place, Suite 100
Memphis, Tennessee 38132

Miami, FL (
(305) 592-0672
(954) 499-6900
FAX: (954) 499-6901
2884 Corporate Way
Miramar, Florida 33025

Milwaukee, WI
(414) 266-5200
FAX: (414) 266-5216
234 W. Florida Street
Milwaukee, WI 53204

Mobile, AL
(251) 665-2999
FAX: (251) 665-2920
4932 Tufts Road
Mobile, Alabama 36619

Montgomery, AL
(334) 215-2900
FAX: (334) 215-2901
915 Lagoon Business Loop
Montgomery, AL 36117

Nashville, TN
(615) 242-0311
FAX: (615) 726-3357
601 Grassmere Park Drive, Suite 10
Nashville, Tennessee 37211

New Orleans, LA
(504) 733-6789
FAX: (504) 731-0833
530 Elmwood Park Blvd.
Harahan, Louisiana 70123

New York, NY
(718) 269-3600
FAX: (718) 269-3601
45-18 Court Square
Long Island City, New York 11101-4347

North Jersey, NJ
(973) 887-8800
FAX: (973) 887-8844
4 Wood Hollow Road
Parsippany, New Jersey 07054-0436

Oklahoma, OK
(405) 787-2237
FAX: (405) 787-0752
305 Hudiburg Circle
Oklahoma City, Oklahoma 73108

Omaha, NE
(402) 331-7111
FAX: (402) 331-5200
5720 S. 77th Street
Ralston, Nebraska 68127-4202

Orlando, FL
(407) 660-1111
FAX: (407) 660-0303
2301 Lucien Way, Suite 430
Maitland, FL 32751

Pensacola, FL
(850) 473-3840
FAX: (850) 505-9915
580 East Burgess Road
Pensacola, FL 32504

Phoenix, AZ
(602) 258-9600
FAX: (602) 253-3801
850 West Southern Ave
Tempe, Arizona 85282

Pittsburgh, PA
(412) 747-3000
FAX: (412) 747-4550
400 Business Center Dr.
Pittsburgh, Pennsylvania 15205

Portland, ME
(207) 828-1777
FAX: (207) 828-1511
860 Spring St. Unit 1
Westbrook, Maine 04092

Providence, RI
(401) 434-3145
FAX: (401) 434-8537
50 Vision Blvd.
East Providence, Rhode Island 02914

Rapid City, SD
(605) 342-7929
FAX: (605) 342-7930
6807 Sturgis Road
Black Hawk, SD 57718

Reno, NV
(775) 856-3343
FAX: (775) 856-1704
5595 Equity Avenue, Suite 100
Reno, Nevada 89502

Richmond, VA
(804) 747-3588
FAX: (804) 273-0119
10408 Lakeridge Parkway, Suite 100
Ashland, Virginia 23005

Roanoke, VA
(540) 563-2828
FAX: (540) 366-4958
2303 Trane Drive
Roanoke, Virginia 24017

Rochester, NY – Central New York
(585) 256-2500
FAX: (585) 256-0067
75 Town Centre Drive, Suite 300
Rochester, New York 14623

Sacramento, CA
(916) 577-1100
FAX (916) 577-1175
4145 Delmar Road
Rocklin, California 95677

Salt Lake City, UT (CSO)
(801) 972-3352
FAX: (801) 972-3353
2817 South 1030 West
Salt Lake City, Utah 84119

San Antonio, TX
(210) 657-0901
FAX: (210) 657-1761
9535 Ball Street, Suite 1100
P.O. Box 34597 (78265)
San Antonio, Texas78217

San Diego, CA
(858) 576-2500
FAX: (858) 576-2554
3565 Corporate Court
San Diego, California 92123

San Juan, PR
(787) 798-0999
PR #1, Km. 25.1,
Banco Quebrada Arenas
San Juan, Puerto Rico 00926-1900

Savannah, GA
(912) 965-0313
FAX: (912) 965-0314
3609 Ogeechee Blvd., Suite A
Savannah, GA 31405

Seattle, WA
(425) 643-4310
FAX: (425) 643-4314
2333 158th Court NE
Bellevue, Washington 98008

Sioux Falls, SD
(605) 336-8500
FAX: (605) 336-0824
3500 South First Avenue, Suite 150
Sioux Falls, SD 57105

South Bend, IN
(574) 288-4914
FAX: (574) 282-4874
2301 Bendix Drive, Suite 400
South Bend, Indiana 46628

Springfield, MA
(413) 746-3090
FAX: (413) 746-0537
90 Carando Drive
Springfield, MA 01104

Springfield, MO
(417) 863-2110
FAX: (417) 863-2111
540 N. Cedarbrook
Springfield, MO 65802-6324

St. Louis, MO
(636) 305-3600
FAX: (636) 349-0601
101 Matrix Commons Drive
Fenton, Missouri 63026

Syracuse, NY – Central New York
(315) 234-1500
FAX: (315) 433-9120
15 Technology Place
East Syracuse, New York 13057

Tallahassee, FL
(850) 574-1726
FAX: (850) 575-5880
109 Hamilton Park Drive, Suite 1
Tallahassee, FL 32304

Tucson, AZ
(520) 748-1234
FAX: (520) 748-1492
4520 S. Coach Drive
Tucson, AZ 85714

Tulsa, OK
(918) 250-5522
FAX: (918) 250-5419
2201 N. Willow Avenue
Broken Arrow, OK 74012

Toledo, OH - CO
(419) 491-2280
FAX: (419) 491-2279
1001 Hamilton Drive
Holland, Ohio 43528

West Palm Beach, FL
(561-) 683-1521
FAX: (561) 697-8714
6965 Vista Parkway North #11
West Palm Beach, FL 33411

Westchester, NY
(914) 593-0303
12 Skyline Drive
Hawthorne, NY 10532

Wilkes Barre, PA
(570) 654-086510 Freeport Road
Pittston, Pennsylvania 18640-9514

Wichita, KS

(316) 265-9655
FAX: (316) 265-1974
120 Ida St.
P.O. Box 595 (67201)
Wichita, Kansas 67211

TRANE INDEPENDENTLY-OWNED LOCAL SERVICE OFFICES

Billings, MT
(406) 248-4882
FAX: (406) 248-5196
3311 4th Avenue North, Suite 4
Billings, MT 59104

Buffalo, NY
(716) 626-1260
FAX: (716) 626-9412
45 Earhart Drive, Suite 103
Buffalo, New York 14221

Charleston, WV
(304) 346-0549
FAX: (304) 346-8920
540 Leon Sullivan Way (25301)
P.O. Box 627
Charleston, West Virginia 25322

Cleveland, OH
(440) 248-3400
FAX: (440) 349-6980
31200 Bainbridge Road
P.O. Box 76129
Solon, Ohio 44139

Dayton, OH
(937) 264-4343
FAX: (937) 264-4360
815 Falls Creek Drive
Vandalia, OH 45377

Des Moines, IA
(515) 270-0004
FAX: (515) 270-3835
2220 NW 108th Street
Clive, Iowa 50325

Evansville, IN
(812) 421-8725
FAX: (812) 421-8735
1024 East Sycamore Street
Evansville, IN 47714

Flint, MI
(810) 767-7800
FAX: (810) 767-9058
5335 Hill 23 Drive
Flint, Michigan 48507

Fort Myers, FL
(239) 275-9420
FAX: (239) 275-9775
6461 Topaz Court, Suite 1
Fort Myers, FL 33966

Great Falls, MT
(406) 727-5111
FAX: (406) 761-5173
422 9th Street S. (59405)
P.O. Box 2642
Great Falls, Montana 59403

Greensboro, NC
(336) 378-0670
FAX: (336) 274-7487
1915 N. Church Street
P.O. Box 13587 (27415-3587)
Greensboro, North Carolina 27405

Houston, TX
(713) 266-3900
FAX: (713) 266-7011
10555 Westpark Drive
Houston, Texas 77042

Jackson, MS
(601) 956-9211
FAX: (601) 957-9340
746 S. Ridgewood Road
P.O. Box 1557 (39158)
Ridgeland, Mississippi 39157

Lansing, MI
(517) 337-6517
FAX: (517) 337-9493
3350 Pine Tree Road
Lansing, MI 48911

Las Vegas, NV
(702) 876-7530
FAX: (702) 876-5106
3036 S. Valley View Blvd.
Las Vegas, Nevada 89102

Lexington, KY
(859) 514-7000
FAX: (859) 514-7870
2350 Fortune Drive
Lexington, KY 40509-4125

Little Rock, AR
(501) 661-0621
FAX: (501) 661-9109
1501 Westpark, Suite 9
Little Rock, Arkansas 72204-2457

Louisville, KY
(502) 499-7000
FAX: (502) 499-7870
12700 Plantside Drive
Louisville, Kentucky 40299-6387

Norfolk, VA
(757) 558-0200
FAX: (757) 558-9715
1100 Cavalier Blvd.
P.O. Box 6276
Chesapeake, Virginia 23323

Oakland, CA
(510) 433-8940
FAX: (510) 433-8954
383 4th Street, #202
Oakland, CA 94607

Peoria, IL
(309) 691-4224
FAX: (309) 691-1366
8718 N. University
Peoria, Illinois 61615-1681

Philadelphia, PA
(610) 962-1600
FAX: (612) 962-0230
3606 Horizon Drive
P.O. Box 1549
King of Prussia, Pennsylvania 19406

Portland, OR
(503) 620-8031
FAX: (503) 639-1454
Mailing Address:
P.O. Box 23579
Tigard, Oregon 97281
Office Location:
7257 SW Kable Lane
Portland, Oregon 97224

Raleigh, NC
(919) 781-0458
FAX: (919) 781-9195
401 Kitty Hawk Drive
Morrisville, NC 27560

San Francisco, CA
(408) 481-3600
FAX: (408) 481-3666
310 Soquel Way
Sunnyvale, California 94085-4101

Santa Rosa, CA
(707) 542-4213
FAX: (707) 542-9206
987 Airway Court, Suite 18
Santa Rosa, CA 95403

Shreveport, LA
(318) 865-5663
FAX: (318) 861-8481
P.O. Box 6761
504 W. 67th Street
Shreveport, Louisiana 71106

Washington, DC
(240) 306-3000
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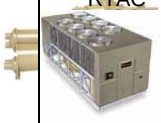
END OF TRANE SALES OFFICES

Rotary Liquid Chillers & Scroll Liquid Chillers

Water-Cooled Series R Rotary Liquid Chillers, Air-Cooled Series R Rotary Liquid Chillers, Water-Cooled and Condenser less Scroll Liquid Chillers, and Water-Cooled and Condenser less Series R Rotary Liquid Chillers

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	RTHD 	Water-Cooled Series R® Rotary Liquid Chillers (175-450 Tons) - Utilize a single compressor/single circuit design with R-134a refrigerant. This model uses the CH530 control panel.	153	See Note 1 Below	
246-42-1	CGAM 	Air-Cooled Scroll Liquid Chillers (20-130 Tons) Uses HFC-410A refrigerant	664	See Note 1 Below	
246-42-1	RTAC 	Air Cooled Series R® Rotary Liquid Chillers (130-500 Tons)	154	See Note 1 Below	
246-42-1	RTWD 	Water-Cooled Series R Rotary Liquid Chillers (60-250 tons)	703	See Note 1 Below	
246-42-1	RTAE 	StealthTM Helical Rotary Chiller (Model RTAE, 150-300 tons)	895	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

CenTraVac™ Water-Cooled Centrifugal Liquid Chillers

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	CVHE 	CenTraVac™ Water-Cooled Centrifugal Liquid Chillers (120-500 Tons)	347	See Note 1 Below	FEMP
246-42-1	CVHF	CenTraVac™ Water-Cooled Centrifugal Liquid Chillers (325-2000 Tons)	347	See Note 1 Below	FEMP
246-42-1	CVHL	CenTraVac™ Centrifugal Water-Cooled Chillers - Series L (400-1800 Tons)	347	See Note 1 Below	FEMP
246-42-1	CVHS 	CenTraVac™ Centrifugal Water-Cooled Chillers - Series S (180-390 Tons)	047	See Note 1 Below	FEMP
246-42-1	CDHF 	CenTraVac™ Water-Cooled Centrifugal Liquid Chillers (1500-3950 Tons)	347	See Note 1 Below	FEMP

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the model centrifugal liquid chiller appropriate for the ordering office's needs.

(2) Centrifugal Chiller models that are configured and selected to achieve an energy efficiency performance better than 0.55 kW/ton are given the "Earthwise™" designation. The purchaser must contact his Trane representative to analyze selection options, chiller performance, pricing, and life-cycle cost benefits in choosing an Earthwise™ model that meets the specific job performance requirements. Earthwise™ chillers conform to the requirements of Executive Order 13123 by being in the top 25th percentile of efficiency for Centrifugal Chiller products sold in the marketplace. Earthwise™ chillers exceed the minimum performance recommendations established by the DOE, Federal Energy Management Program. Trane's Earthwise™ Chiller has received the EPA's Climate Protection Award or being the highest in energy efficiency and lowest in refrigerant emissions.

(3) Products showing the **FEMP** ecolabel meet Federal Energy Management Program (FEMP) recommended performance standards that are in the upper 25% of energy efficiency of that product group, and required under Federal Acquisition Regulation (FAR) Subpart 23.2.

Air-Cooled Liquid Chillers, Single-Zone Rooftop Air Conditioners, and Split System Air-Cooled Condensing Units

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	YC*, TC*, TE* 	Single-Zone Rooftop Air Conditioners (27 1/2 - 50 tons) Voyager	382	See Note 1 Below	
246-42-1	S*HL 	Single-Zone Rooftop Air Conditioners (20 - 75 tons) IntelliPak	383	See Note 1 Below	
246-42-1	RAUJ 	Split System Air-Cooled Condensing Units (20 - 60 tons)	361	See Note 1 Below	
246-42-1	RAUJ 	Split System Air-Cooled Condensing Units (80 - 120 tons)	362	See Note 1 Below	
246-42-1	CAUC	Split System Air-Cooled Condensing Units (20 - 60 tons)	385	See Note 1 Below	
246-42-1	CAUC	Split System Air-Cooled Condensing Units (80 - 120 tons)	386	See Note 1 Below	
246-42-1	TC* 	Voyager 11 Access - 12.5-25 Ton - Packaged Optional Electric Heat/Cooling Rooftop Unit	463	See Note 1 Below	
246-42-1	WC*	Voyager 11 Access - 12.5-20 Ton - Packaged Heat Pump/Cooling Rooftop Unit	465	See Note 1 Below	
246-42-1	YC*	Voyager 11 Access - 12.5-25 Ton - Packaged Gas Heat/Cooling Rooftop Unit	467	See Note 1 Below	
246-42-1	BAY*, FIY*	Voyager 11 Access - 12.5-25 Ton - Accessories	390	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Split System Units

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	TWA 	Odyssey Split System Heat Pumps (6-20 Tons, 60 HZ)	411	See Note 1 Below	
246-42-1	TWE 	Odyssey Split System Air Handlers (5-20 Tons, 60 HZ)	416	See Note 1 Below	
246-42-1	TTA 	Odyssey Split System Air Conditioners Handleers (5-20 Tons, 60 HZ)	419	See Note 1 Below	
246-42-1	351	Odyssey Split System Accessoriers	351	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Light Commercial (LCU) & Small Split Systems

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	161 	Light Commercial Unit (LCU) Heaters	161	See Note 1 Below	
246-42-1	425	Accessories for Small Split Systems, Single Phase	425	See Note 1 Below	
246-42-1	428	Small Split System Heat Pumps, Single Phase	428	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Split System Air Handlers

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	391	Small Split System Air Handler Accessories	391	See Note 1 Below	
246-42-1	420	Small Split System Air Handlers, Single Phase, Hyperion & XB TEM	420	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Precedent Rooftop Units

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	Y*C 	Precedent™ GE, 3-10 Tons Gas/Electric Packaged Rooftop Unit, 3 phase 60Hz	514	See Note 1 Below	
246-42-1	WSC	Precedent™ HP, 3-10 Tons Heat Pump Packaged Rooftop Unit, 3 phase 60Hz	516	See Note 1 Below	
246-42-1	T*C 	Precedent™ AC 3-10 Tons Cooling Packaged Rooftop Unit, 3 phase 60Hz	518	See Note 1 Below	
246-42-1	Y*C 	Precedent™ Packaged Rooftop AC products, 3-5 Tons, Gas/Electric, single phase 60 Hz	513	See Note 1 Below	
246-42-1	WSC 	Precedent™ Packaged Rooftop AC products, 3-5 Tons, Heat Pump, single phase 60 Hz	515	See Note 1 Below	
246-42-1	T*C 	Precedent™ Packaged Rooftop AC products, 3-5 Tons, Cooling, single phase 60 Hz	517	See Note 1 Below	
246-42-1	BAY*, SEN*	Precedent G/E - 3-10 Ton Accessories	289	See Note 1 Below	
246-42-1	YHC**7 	Precedent™ 17 Plus Packaged Rooftop Air Conditioner, 17.5 SEER, 3-5 Tons, Gas/Electric, 3 phase 60 Hz	514	See Note 1 Below	
246-42-1	THC**7 	Precedent™ 17 Plus Packaged Rooftop Air Conditioner, 17.5 SEER, 3-5 Tons, Cooling, 3 phase 60 Hz	518	See Note 1 Below	
246-42-1	YZC	Precedent™ eFlex™Technology Packaged Rooftop Air Conditioners, 20 SEER, 3 – 5 Tons, DX Cooling and gas heat and, 3 phase 60 Hz	514	See Note 1 Below	
246-42-1	TZC	Precedent™ eFlex™Technology Packaged Rooftop Air Conditioners, 20 SEER, 3 – 5 Tons, DX Cooling and electric heat, 3 phase 60 Hz	518	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Climate Change Air Handlers

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	50 	Performance Climate Changer™ Air Handler - Unit Sizes 3- 120.	50	See Note 1 Below	
246-42-1	200	Low Voltage Controls for Climate Changer Air Handling Units	200	See Note 1 Below	
246-42-1	958 	Performance Climate Changers air handler UCCA	958	See Note 1 Below	
246-42-1	959	Performance Climate Changers air handler controls	959	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Water Source Heat Pumps

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
Commercial Premium Efficiency					
246-42-1	EXVE 	Water Source Heat Pumps - High Efficiency Vertical	176	See Note 1 Below	
246-42-1	EXHE 	Water Source Heat Pumps - High Efficiency Horizontal	176	See Note 1 Below	
Commercial High Efficiency					
246-42-1	EXWE 	Water Source Heat Pumps - Commercial High Efficiency Water-to-water	75	See Note 1 Below	
246-42-1	GEVE	Water Source Heat Pumps - Vertical	331	See Note 1 Below	
246-42-1	GEHE 	Water Source Heat Pumps - Horizontal	331	See Note 1 Below	
246-42-1	GECE 	Water Source Heat Pumps - High Efficiency Console	331	See Note 1 Below	
246-42-1	GETE 	Water Source Heat Pump - Vertical Stack	332	See Note 1 Below	
246-42-1	Controls	Water Source Heat Pumps - Optional Factory Mounted Controls	126	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.
(2) All Units include Condensate Overflow, Copper Heat Exchanger and 24V Controls.

Unit Ventilators

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	VUVB 	Vertical Classroom Unit Ventilators	042	See Note 1 Below	
246-42-1	HUVB 	Horizontal Classroom Unit Ventilators	042	See Note 1 Below	
246-42-1	SHLA	Unit Ventilator Shelving and Accessories	077	See Note 1 Below	
246-42-1	Wall Boxes	Unit Ventilator Accessories	077	See Note 1 Below	
246-42-1	SWE	Unit Ventilator Sidewall Exhaust	077	See Note 1 Below	
246-42-1	Controls	Unit Ventilator Controls	242	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Coil Products

SIN	Model Number	Product Description	Product Code	GSA Price	Ecolabel
246-42-1	081	Cooling Coils	081	See Note 1 Below	
246-42-1	082	Heating Coils	082	See Note 1 Below	
246-42-1	223	UniTrane Fan Coil Controls	223	See Note 1 Below	
246-42-1	FF 	Force-Flo Cabinet Heater	277	See Note 1 Below	
246-42-1	FC 	UniTrane Fan-Coil	278	See Note 1 Below	
246-42-1	BC 	Blower Coil Air Handler	290	See Note 1 Below	
246-42-1	292	Blower Coil Controls	292	See Note 1 Below	

NOTES:

(1) GSA Pricing: A Customer should contact Trane for information on pricing and equipment specifications and configurations for the products to ensure appropriate for the ordering office's needs.

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
		ZN511 Products		
246-42-1	4950 0469	Tracer ZN511 Zone Controller with Plastic Cover	100	$213.47
				
246-42-1	4950 0569	Tracer ZN511 Zone Controller with Metal Enclosure	100	$267.65
		MP501 Products		
246-42-1	4950 0486	Tracer MP501 Setpoint Controller with Plastic Cover	103	$212.39
				
246-42-1	4950 0586	Tracer MP501 Setpoint Controller w/ Metal Enclosure	103	$266.57
		Service Tools		
246-42-1	4020 1199	Rover-Software Upgrade Package (s/w)	104	$213.30
246-42-1	X1365149701	Rover LonTalk Hardware Kit	104	$1,012.07
246-42-1	X1365149801	Rover Comm4 Hardware Kit	104	$425.60
246-42-1	X1365150001	Rover LonTalk & Comm4 Software and Hardware	104	$1,560.68
246-42-1	X1365149901	Rover LonTalk Software and Hardware	104	$1,063.99
246-42-1	X1365150201	Rover LonTalk Configuration Only Software and	104	$851.19
246-42-1	X1365150301	Rover Air and Water Balancing Only	104	$993.90
246-42-1	X1365150101	Rover Comm4 Software and Hardware	104	$709.50
246-42-1	X4509148201	Kit - Tracer TU for Chillers	104	$1,305.36
246-42-1	X4509151201	Kit - Tracer TU Controls	104	$1,541.56
246-42-1	X4509151301	Kit - Tracer TU Complete	104	$2,569.27
246-42-1	X4509153601	Tracer TU Balancing Tool	104	$221.69
		End Devices and Sensors		
246-42-1	3430 3017	24 VAC/SPDT Relay Only	107	$10.28
246-42-1	3430 3020	24 VAC/SPDT Relay with Enclosure	107	$20.15
246-42-1	3580 3005	24 VAC Wall Plug-in Transformer	107	$14.39
246-42-1	3581 2021	UL Component Recognized Transformer 120/208/240 VAC, 75 VA	107	$30.42
246-42-1	3581 2022	UL Component Recognized Transformer 120 VAC, 40 VA	107	$11.29
246-42-1	4020 1159	5V Differential Duct Static Pressure Sensor	107	$57.15
246-42-1	4190 2006	Air Flow Sampling Probe	107	$6.58
246-42-1	4190 7020	4-20mA 3% Duct Humidity Sensor	107	$136.87
246-42-1	4190 7021	4-20mA 3% Outside Air Humidity Sensor	107	$174.73
246-42-1	4190 1080	Balco Transmitter - use w/ PCM AI 3-6	107	$64.55
246-42-1	4190 1084	Low Temp. Cutout Manual Reset	107	$92.71
246-42-1	4190 1096	0-50 PSID Diff. Pressure Sensor	107	$410.31
246-42-1	4190 1097	Electric to Pneumatic Transducer w/ Override	107	$112.65
246-42-1	4190 1104	4" Brass Immersion Well	107	$22.61
246-42-1	4190 1106	375 Platinum Outdoor Air Temp w/ Enclosure	107	$22.52
246-42-1	4190 1108	4" Stainless Steel Immersion Well	107	$26.73
246-42-1	4190 1100	Therm. Sealed Temp. Sensor	107	$11.10
246-42-1	4190 1101	Therm. Outdoor Air Temp Sensor	107	$22.61
246-42-1	4190 1112	6" Brass Immersion Well	107	$24.67
246-42-1	4190 1113	6" Stainless Steel Imm Well	107	$30.83
246-42-1	4190 1114	Thermal Well Compound	107	$12.33
246-42-1	4190 1119	385 Plat Duct Avg 24'	107	$100.73
246-42-1	4190 1122	20' Averaging Duct Temperature Sensor	107	$94.56
246-42-1	4190 1123	6' Averaging Duct Temperature Sensor	107	$66.60
246-42-1	4190 1129	4" Thermistor Duct 6' Lead Temperature Sensor	107	$22.61
246-42-1	4190 1130	4" Balco Duct/Immersion Temperature Sensor	107	$42.73
246-42-1	4190 1131	4" 375 Platinum Duct/Immersion Temperature Sensor	107	$34.66
246-42-1	4190 1132	4" Thermistor Duct/Immersion Temperature Sensor	107	$22.61

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
246-42-1	4190 1133	6" Thermistor Duct/Immersion Temperature Sensor	107	$24.67
246-42-1	4190 1134	12" Thermistor Duct Temperature Sensor	107	$27.01
246-42-1	4190 5005	Water Differential Pressure Switch	107	$69.48
246-42-1	4190 5050	Building Static Pressure Sensor Selectable	107	$125.39
246-42-1	4190 5051	Duct Static Pressure Sensor Selectable	107	$125.39
246-42-1	4190 6006	Air Differential Pressure Switch	107	$23.84
246-42-1	4190 7015	Stainless Steel Therm. Wall Plate w/ Logo	107	$11.51
246-42-1	X13310270	Current Sensing Switch	107	$62.48
246-42-1	X1351152801	Zone Sensor (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$17.68
246-42-1	X1351153001	Zone Sensor w/ On + Cancel (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$17.68
246-42-1	X1351152701	Zone Sensor w/ On + Cancel + Set. Adj. (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$31.24
246-42-1	X1351152901	Zone Sensor w/ Set. Adj. (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$31.24
246-42-1	X1316105702	Thumbwheel Hot/Cold (Qty 12 per box)	107	$5.58
246-42-1	X1365146702	Comm. Module, Zone Sensor (Box of 12) (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$37.15
246-42-1	X13790422010	CO2 Demand Vent Wall Sensor	107	$193.17
246-42-1	X13790423010	CO2 Demand Vent Duct Sensor	107	$182.13
246-42-1	X1379044401	Zone Sensor Comb RH Temp 3% 4-20 mA	107	$115.90
246-42-1	X1379087901	Zone Sensor RH 5% 20-4 mA	107	$90.45
246-42-1	X1379084201	Zone Sen Set TOV 3SpFan (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$40.29
246-42-1	X1379084501	Zone Sen Set TOV Fan	107	$40.29
246-42-1	X1379084801	Zone Sen Set TOV 2SpFan (This product is only available as an optional component (part) of a Trane total solution for a Heating Ventilation Air Conditioning (HVAC) system. It is not available for individual purchase.)	107	$40.29
		Building Control Unit		
246-42-1	4020 1095	CCP Upgrade ROM Kit	115	$20.75
246-42-1	4020 1204	BMTX Internal Modem	115	$294.04
246-42-1	4020 1224	BMTX BCU Operator Display Upgrade Kit	115	$1,397.36
246-42-1	4950 0457	Comm 5 Repeater	115	$363.22
246-42-1	BMTX001AAD000	Tracer Summit BMTX (Enhanced BCU), Power = 120 VAC	115	$6,008.86

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
246-42-1	BMTX001AAD001 	Tracer Summit BMTX (Enhanced BCU), Power = 120 VAC, with Internal Modem	115	$6,302.46
246-42-1	BMTX001AAD010 	Tracer Summit BMTX (Enhanced BCU), Power = 120 VAC, with Operator Display	115	$7,405.78
246-42-1	BMTX001AAD011 	Tracer Summit BMTX (Enhanced BCU), Power = 120 VAC, with Operator Display and Internal Modem	115	$7,699.82
246-42-1	BMTX001BAD000 	Tracer Summit BMTX (Enhanced BCU), Power = 230 VAC	115	$6,008.86
246-42-1	BMTX001BAD001 	Tracer Summit BMTX (Enhanced BCU), Power = 230 VAC, with Internal Modem	115	$6,302.46
246-42-1	BMTX001BAD010 	Tracer Summit BMTX (Enhanced BCU), Power = 230 VAC, with Operator Display	115	$7,405.78
246-42-1	BMTX001BAD011 	Tracer Summit BMTX (Enhanced BCU), Power = 230 VAC, with Operator Display and Internal Modem	115	$7,699.82
246-42-1	BMTX001CAD000	Tracer Summit BMTX (Enhanced BCU), Frame Mount - CE Listed (24V)	115	$6,008.86
246-42-1	BMTX001CAD001	Tracer Summit BMTX (Enhanced BCU) Frame Mount w/ Modem - CE Listed (24V)	115	$6,302.46
246-42-1	BMTX001EAD000	Tracer Summit BMTX (Enhanced BCU) Frame Mount - UL Listed (24V)	115	$6,008.86
246-42-1	BMTX001EAD001	Tracer Summit BMTX (Enhanced BCU) Frame Mount w/ Modem - UL Listed (24V)	115	$6,302.46
246-42-1	4950 0531	BMTX Retrofit kit for BMTS & BMTW BCU	115	$6,008.86
246-42-1	4950 0535	BMTX Retrofit kit for BMTS & BMTW BCU with modem	115	$6,302.46
246-42-1	4950 0534	BMTX retrofit kit for Tracer 100 with modem	115	$6,302.46
246-42-1	4950 0532	BMTX retrofit kit for Tracer 100	115	$6,008.86

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
		Trace Communications Bridges		
246-42-1	X13651587010	Bridge - Comm2	159	$1,926.96
246-42-1	X13651612010	Tracer Communication Bridge (Comm3 & Comm4): BMTW & BMTS to BMTB Retrofit Kit	159	$1,043.02
246-42-1	X13651613010	Tracer Communication Bridge (Comm3 & Comm4): BMTB Frame Mount	159	$1,560.68
246-42-1	X13651614010	Tracer Communication Bridge (Comm3 & Comm4): Tracer 100 to BMTB Retrofit Kit	159	$1,063.99
246-42-1	BMTB001AAA000	Tracer Communication Bridge (Comm3 & Comm4): BMTB with Enclosure 120VAC	159	$1,043.02
246-42-1	BMTB001BAA000	Tracer Communication Bridge (Comm3 & Comm4): BMTB with Enclosure 230VAC	159	$1,043.02
246-42-1	BMSB001AAA000	Tracer Communication Bridge (Comm3 & Comm4): Bridge Bundle Tracer SC, BMTB Bridge, PM014, 120V	159	$1,850.18
246-42-1	BMSB001AAA010	Tracer Communication Bridge (Comm3 & Comm4): Bridge Bundle Tracer SC, BMTB Bridge, UC400, PM014, 120V	159	$2,012.66
		Tracer Summit Software		
246-42-1	4020 1111	Tracer Summit Current Version Work Package (Windows)	131	$2,137.32
246-42-1	4020 1112	Tracer Summit Current Version Work Demo Package (Windows)	131	$42.83
246-42-1	4020 1113	Tracer Summit Current Version Software Upgrade	131	$568.66
246-42-1	4020 1150	Summit + T100/Tracker Package	131	$2,413.26
246-42-1	4020 1151	T100/Comm Package	131	$277.26
246-42-1	4020 1152	Summit + Building Management Package	131	$2,650.79
246-42-1	4020 1153	Building Management Package	131	$514.35
246-42-1	4020 1154	Summit PCSW and Enterprise Management	131	$4,162.94
246-42-1	4020 1155	Summit Enterprise Management Add-On	131	$2,026.06
		Tracker Hardware and Software		
246-42-1	4020 1185	Tracker PC Software	179	$160.38
246-42-1	4020 1238	Tracker 12 LAN Upgrade	179	$650.17
246-42-1	4020 1239	Tracker 24 LAN Upgrade	179	$1,025.10
246-42-1	BMTK000AAB0110	Building Management Tracker (BMTK): Model 12	179	$1,217.11
246-42-1	BMTK000AAB0210	Building Management Tracker (BMTK): Model 24	179	$1,898.49
246-42-1	BMTK000ABB0110	Building Management Tracker (BMTK): Model 12 with Ethernet and Modem	179	$1,560.40
246-42-1	BMTK000ABB0210	Building Management Tracker (BMTK): Model 24 with Ethernet and Modem	179	$2,241.78
		Legacy Controllers		
246-42-1	35914260	RJ12 to RJ12 Interface Cable	182	$19.54
246-42-1	35914262	9-Pin Female for PC	182	$19.54
246-42-1	35914263	25-Pin Female for PC	182	$19.54
246-42-1	35914270	9 Pin to 25 Pin Adapter, 25 to 25 Pin Cable	182	$37.93
246-42-1	3591 4269	RJ12 to DB25 Male (Modem)	182	$19.54
246-42-1	4950 0341	Transformer/Relay Enclosure	182	$160.35
246-42-1	4950 0345	Large Rooftop Interface	182	$266.46
246-42-1	4950 0372	TCM: Std Ambient, Resin Enclosure	182	$301.02
246-42-1	4950 0373	TCM: Ext Ambient, NEMA 1 Enclosure	182	$345.67
246-42-1	4950 0374	TCM: Ext Ambient, NEMA 4 Enclosure	182	$432.57
		VariTrac Central Control Panel		
246-42-1	X13650939010	Central Control Panel with Operator Display	183	$711.93
246-42-1	X13650941010	Central Control Panel without Operator Display	183	$435.57
246-42-1	X13760015010	Operator Display Panel Only	183	$286.84
246-42-1	X13650943010	Central Control Panel Relay Kit (New)	183	$84.99
246-42-1	X13650576010	Binary Input Controller	183	$354.83

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
		MP581 Products		
246-42-1	4020 1156	Operator Display Upgrade	187	$679.89
246-42-1	4020 1157	MP580/581 Elec Board Only	187	$1,047.88
246-42-1	4020 1180	Portable Programming Stand	187	$117.03
246-42-1	4950 0468	Wall Mount Operator Display	187	$705.78
246-42-1	4950 0491	Portable Operator Display with Case	187	$764.96
246-42-1	BMTM000AAD00	Input Power Supply: 120 VAC, with Enclosure, No Display	187	$910.03
246-42-1	BMTM000AAD01 	Input Power Supply: 120 VAC, with Enclosure and Touch Screen Operator Display	187	$1,406.52
246-42-1	BMTM000BAD00 	Input Power Supply: 230 VAC, with Enclosure, No Display	187	$910.03
246-42-1	BMTM000BAD01 	Input Power Supply: 230 VAC, with Enclosure and Touch Screen Operator Display	187	$1,406.52
246-42-1	BMTM000CAD00	Input Power Supply: 230 VAC, Frame Mount, No Display	187	$744.73
		Tracer UC600		
246-42-1	BMUC600USA0100011 	TracerUC600 Controller	536	$652.89
246-42-1	X1365153801	24 VAC to 1.4A 24 VDC	536	$108.83
246-42-1	X13651571010 	Tracer TD7 Display	536	$478.50
246-42-1	X18210613010	TD7 Portable Carry Case	536	$56.43
246-42-1	X05010511010	Vesa Mount for Display	536	$26.20
		ZN517 Products		
246-42-1	4950 0496 	Tracer ZN517 Unitary Controller with Plastic Cover	639	$363.45
246-42-1	4950 0596	Tracer ZN517 Unitary Controller with Metal Enclosure	639	$428.46
		VV551 Products		
246-42-1	4020 1219	Tracer VV551 Single Duct VAV Controller	640	$231.30
246-42-1	4020 1220	Tracer VV551 Single Duct VAV Controller w/ Belimo Actuator	640	$278.03
246-42-1	4020 1221	Tracer VV551 Single Duct VAV Controller w/ Trane Actuator	640	$251.55

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
		MP503 Products		
246-42-1	4950 0490	Tracer MP503 Setpoint Controller with Plastic Cover	641	$327.31
				
246-42-1	4950 0590	Tracer MP503 Setpoint Controller w/ Metal Enclosure	641	$388.95
		EX2 Products		
246-42-1	4950 0499	EX2 Expansion Module with Plastic Cover	642	$479.94
				
246-42-1	4950 0500	EX2 Expansion Module with Metal Enclosure	642	$531.24
		Enterprise Server		
246-42-1	X40250141001	Tracer ES Express Windows	643	$3,334.38
246-42-1	X4025010401	Tracer ES License (Unlimited)	643	$39,012.36
246-42-1	X40250126010	Tracer ES Full with 1 License	643	$2,364.38
246-42-1	X40250125010	Tracer ES Additional License	643	$562.95
246-42-1	X40250129010	Tracer ES Software Maintenance Plan (SMP) 1 Year	643	$861.31
246-42-1	X4025010701	Tracer ES Express Tower Server with 1 License	643	$3,595.78
246-42-1	X40250129020	Tracer ES Software Maintenance Plan (SMP) 2 Years	643	$1,378.10
246-42-1	X40250129030	Tracer ES Software Maintenance Plan (SMP) 3 Years	643	$1,550.36
246-42-1	X40250130010	Tracer ES Unlimited SMP 1 Year	643	$8,613.10
246-42-1	X40250131010	Tracer ES Renewal for Expired SMP Plan	643	$287.11
		ZN521 Products		
246-42-1	4950 0470	Tracer ZN521 Zone Controller with Plastic Cover	645	$311.60
				
246-42-1	4950 0570	Tracer ZN521 Zone Controller with Metal Enclosure	645	$370.28
		Trane Connectivity Module		
246-42-1	X13651569010	Connectivity Module	668	$711.30
		Trane UC210		
246-42-1	BMUC210ACA0T00011	Preprogrammed UC210 for Bypass Control	898	$190.13
				
246-42-1	BMUC210AAA0100011	UC210 VAV Controller w/out Actuator	898	$191.40
				
246-42-1	BMUC210AAA0T00011	UC210 VAV Controller w/ Trane Actuator	898	$208.29
				
246-42-1	BMUC210AAA0B00011	UC210 VAV Controller w/ Belimo Actuator	898	$230.81
				

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
		Tracer XT		
246-42-1	X45091562010	Tracer XT Software Kit, 700 I/O pts. 200 Historian Tags	949	$18,596.17
246-42-1	X45091562020	Tracer XT Software Kit, 1,500 I/O pts. 300 Historian Tags	949	$30,064.15
246-42-1	X45091562030	Tracer XT Software Kit, 35,000 I/O pts. 600 Historian	949	$38,258.42
		Tracer SC		
246-42-1	BMSC000AAA011000	Tracer SC w/ Power Supply and Base License	1009	$780.95
				
246-42-1	BMCF000AAA0AE00	15 Device Application License	1009	$496.69
		Wireless Controls		
246-42-1	X13790963010	WCI BAA	1247	$191.32
				
246-42-1	X13790964010	WCI Outdoor BAA	1247	$217.07
				
246-42-1	X13790968010	WCS-SD BAA (Display Sensor)	1247	$96.12
				
246-42-1	X13790969010	WCS-SB BAA (Base Sensor)	1247	$65.31
				
246-42-1	X13790973010	WCS-SH (2% Humidity Module)	1247	$95.59
				
		XM Expansion Modules		
246-42-1	X13651563010	XM32 Module (4 Relay)	1250	$160.75
				
246-42-1	X13651537010	XM30 I/O Module (4 UI/AO)	1250	$160.75
				

Building Energy Management & Control Products

SIN Number	Model Number	Product Description	Product Code	GSA Price
246-42-1	X13651597010 	XM70 (8UI, 6UI/AO, 4R, 1P)	1250	$503.05
		Enclosures		
246-42-1	501897940100	Metal Enclosure, UC210	1251	$17.74
246-42-1	X19091354010	10" DIN Rail Enclosure	1251	$76.84
246-42-1	X13651559010	13" DIN Rail Enclsoure 120 V	1251	$177.33
246-42-1	X13651560010	13" DIN Rail Enclosure 230V	1251	$177.33
246-42-1	X13651552010	24" DIN Rail Enclosure 120V	1251	$548.50
246-42-1	X13651554010	24" DIN Rail Enclosure 230V	1251	$548.50
246-42-1	X13651553010	24" Enclosure Display Mount 120V	1251	$632.72
246-42-1	X13651555010	24" Enclosure Display Mount 230V	1251	$632.72
246-42-1	X13651596010	24" Enclosure Solid Door (UUKL) 120 VAC	1251	$611.56
246-42-1	X13651618010	16" DIN Rail Enclosure Solid Door, 120 VAC	1251	$277.82
246-42-1	X13651619010	16" Enclosure, Display Door, 120 VAC	1251	$289.64

Building Automation Systems (BAS)
Training Seminars
University Course Listing - Pricing

SIN Number	Course Number	Course Name	Course Length	GSA Price
		Course Descriptions are Attached.		
		Building Systems & Controls Training		
246-52	BSC01	Tracer Summit System Operation	3.5 days	$ 1,550.00
246-52	BSC02	Tracer Summit 101	4.5 days	$ 1,980.00
246-52	BSC03	Tracer Summit 102	4.5 days	$ 1,980.00
246-52	BSC04	Tracer SC Operation	2.5 days	$1,320.00
246-52	BSC05	Tracer SC Advanced Operation	3 days	$ 1,320.00
246-52	BSC09	Tracer Ensemble Operation	2.5 days	$ 1,320.00
		Technical Service Training		
246-52	TS01	Air Conditioning Service	4.5 days	$ 1,800.00
246-52	TS02	Commercial Service I	4.5 days	$ 1,800.00
246-52	TS03	Airside System Service	4.5 days	$ 1,800.00
246-52	TS04	HVAC Electrical Troubleshooting	4.5 days	$ 1,800.00
246-52	TS05	Chilled Water Systems Service	3.5 days	$ 1,800.00
246-52	TS06	CenTraVac System Operation and	3.5 days	$ 1,950.00
246-52	TS07	CenTraVac Electronic Controls	3.5 days	$ 1,950.00
246-52	TS08	CenTraVac Mechanical Overhaul Service	4.5 days	$ 3,500.00
246-52	TS09	Single Stage Absorption Chillers	4.5 days	$ 1,900.00
246-52	TS10	RTAA Rotary Chillers	3.0 days	$ 1,950.00
246-52	TS11	RTAC Rotary Chillers	3 days	$ 1,950.00
246-52	TS12	RTAE Rotary Chillers	3 days	$ 1,950.00
246-52	TS13	RTHD Rotary Chillers	3 days	$ 1,950.00
246-52	TS14	RTWD Rotary Chillers	3 days	$ 1,950.00
246-52	TS15	Precedent Voyager Rooftops (3-25 ton)	3.5 days	$ 1,950.00
246-52	TS16	IntelliPak I&II Rooftop Units	4.5 days	$ 1,950.00
246-52	TS18	Scroll Chiller Service & Troubleshooting	3.5 days	$ 1,950.00
		Online Classes		
246-52	TS19	IntelliPak Human Interface Navigation & Status Menu	online	$ 75.00
246-52	TS20	ReliaTel Zone Sensor Testing	online	$ 75.00
		Training Packages		
246-52	BSC010	Building Systems & Controls Private Class	2.5 days	$10,000.00
246-52	BSC011	Building Systems & Controls Private Class	3 days	$14,000.00
246-52	BSC012	Building Systems & Controls Private Class	3.5 days	$17,250.00
246-52	BSC013	Building Systems & Controls Private Class	4.5 days	$17,250.00
246-52	TS021	Technical Service Private Class	2 days	$ 6,000.00
246-52	TS022	Technical Service Private Class	3 days	$ 7,500.00
246-52	TS023	Technical Service Private Class	4 days	$ 9,500.00
246-52	PTP01	Platinum Training Package	Custom	$30,000.00
246-52	GTP02	Gold Training Package	Custom	$ 6,000.00

NOTES:

(1) Building Automation System (BAS): Comprised of all of the components of a building control system that provides comfort, view-ability, operability and control of a commercial building's mechanical and other systems.
(2) Training Packages: Customer controls attendee list and pays Trane U.S. Inc. a fixed rate dependent upon number of days training requested and type of training listed above. Trane University supplies instructor, all equipment needed, and any teaching materials.

Trane Rental Services

SIN	Model Number	Product for Rent	Product Code	GSA Monthly Rental Rate
		Rental of Air Cooled Chillers		
246-53	CS-ACC-01	10 Ton Air Cooled Chiller	197	$2,244.70
246-53	CS-ACC-02	15 Ton Air Cooled Chiller	197	$2,244.70
246-53	CS-ACC-03	25 Ton Air Cooled Chiller	197	$2,614.01
246-53	CS-ACC-04	40 Ton Air Cooled Chiller	197	$4,102.46
246-53	CS-ACC-05	60 Ton Air Cooled Chiller	197	$5,168.39
246-53	CS-ACC-06	80 Ton Air Cooled Chiller	197	$6,078.81
246-53	CS-ACC-07	100 Ton Air Cooled Chiller	197	$7,016.33
246-53	CS-ACC-08	125 Ton Air Cooled Chiller	197	$7,741.75
246-53	CS-ACC-09	170 Ton Air Cooled Chiller	197	$10,014.91
246-53	CS-ACC-10	200 Ton Air Cooled Chiller	197	$11,505.05
246-53	CS-ACC-11	300 Ton Air Cooled Chiller (includes trailer)	197	$16,078.81
246-53	CS-ACC-12	400 Ton Air Cooled Chiller (includes trailer, pump, 6" hose box)	197	$21,151.66
246-53	CS-ACC-13	500 Ton Air Cooled Chiller (includes trailer, pump, 6" hose box)	197	$21,138.10
246-53	CS-ACC-14	155 Ton Air Cooled Chiller	197	$9,833.64
246-53	CS-ACC-15	250 Ton Air Cooled Chiller	197	$13,689.77
		Rental of Water-Cooled Chillers		
246-53	CS-WCC-04	500 Ton Water Cooled Chiller	197	$18,896.46
246-53	CS-WCC-06	750 Ton Water Cooled Chiller	197	$26,056.79
246-53	CS-WCC-09	1000 Ton Water Cooled Chiller	197	$32,574.71
246-53	CS-WCC-11	225 Ton Water Cooled Chiller	197	$12,447.65
246-53	CS-WCC-12	350 Ton Water Cooled Chiller	197	$15,808.43
		Pump Rental		
246-53	CS-PU-01	3/5 HP Pump	197	$361.18
246-53	CS-PU-02	7.5/10 HP Pump	197	$541.78
246-53	CS-PU-03	15/20 HP Pump	197	$924.65
246-53	CS-PU-04	25/30 HP Pump	197	$1,159.79
246-53	CS-PU-05	40/50 HP Pump	197	$1,805.58
246-53	CS-PU-06	60 HP Pump	197	$1,805.58
246-53	CS-PU-08	125 HP Pump	197	$3,612.52
246-53	CS-PU-10	100 HP Pump	197	$2,909.47
		Hose Kit Rental		
246-53	CS-HK-01	2.5" Diameter Hose Kit; contains 200 total feet	197	$207.70
246-53	CS-HK-02	4" Diameter Hose Kit: contains 200 total feet	197	$277.50
246-53	CS-HK-03	6" Diameter Hose Kit; contains 200 total feet	197	$647.15
246-53	CS-HK-04	8" Diameter Hose Kit; contains 400 total feet	197	$785.73
246-53	CS-HK-05	10" Diameter Hose Kit; contains 200 total feet	197	$923.63
246-53	CS-HK-06	4" Dia Hose Kit for vertical/suction apps 96 ft total	197	$887.88
		Transformer Rental		
246-53	CS-TR-01	300 kVa Transformer	197	$1,092.54
246-53	CS-TR-02	500 kVa Transformer	197	$1,749.01
246-53	CS-TR-03	750 kVa Transformer	197	$2,624.31
246-53	CS-TR-04	1000 kVa Transformer	197	$2,916.08
246-53	CS-TR-05	1500 kVa Transformer	197	$4,372.80
		Rental of DX/Voyager (Direct Exchange Refrigerant) Units		
246-53	CS-VT-01	10 Ton DX (Direct Exchange Refrigerant) Vertical Tent Unit	197	$1,740.87
246-53	CS-VT-02	20 Ton DX (Direct Exchange Refrigerant) Vertical Tent Unit	197	$2,393.10
246-53	CS-DX-01	25 Ton DX/Voyager (Direct Exchange Refrigerant) Unit	197	$3,096.50
246-53	CS-DX-02	35 Ton DX/Voyager (Direct Exchange Refrigerant) Unit	197	$4,297.62
246-53	CS-DX-03	50 Ton DX/Voyager (Direct Exchange Refrigerant) Unit	197	$6,503.35
		Tower Rental		
246-53	CS-TO-01	500 Ton Tower (mounted on 48 foot step-deck trailer)	197	$9,307.79
246-53	CS-TO-03	270 Ton Tower NO TRAILER	197	$6,204.17
246-53	CS-TO-04	750 Ton Tower (mounted on 48 foot step-deck trailer)	197	$13,262.86

Trane Rental Services

SIN	Model Number	Product for Rent	Product Code	GSA Monthly Rental Rate
		Air Handling Unit (AHU) Rental		
246-53	CS-AHU-01	5000 cfm AHU	197	$2,937.59
246-53	CS-AHU-02	10000 cfm AHU	197	$3,189.33
246-53	CS-AHU-03	25000 cfm AHU	197	$6,715.12
		Flex Duct Rental		
246-53	CS-FD-01	20" Flex Duct [contains (4) 25 foot sections of Flex]	197	$342.55
246-53	CS-FD-02	12" Flex Duct [contains (4) 25 foot sections Black]	197	$283.59
246-53	CS-FD-03	12" Flex Duct [contains (4) 25 foot sections White]	197	$283.59
		Rental of Electric Cable		
246-53	CS-EC-01	2/0 Cable Box (4) 100' Sections of Electric Cable	197	$752.60
246-53	CS-EC-02	4/0 Cable Box (4) 100' Section of Electric Cable	197	$752.60
		Trailer Rental		
246-53	CS-TA-01	48 foot Flatbed Trailer	197	$1,108.25
246-53	CS-TA-02	28 foot Flatbed Trailer	197	$906.75
246-53	CS-TA-03	32 foot Flatbed Trailer	197	$906.75
246-53	CS-TA-04	48 or 53 ft Step Deck Trailer	197	$1,360.13
		Rental of Generators - Standby Rate		
246-53	SR36	36kW Generator - standby rate	197	$1,222.47
246-53	SR60	60kW Generator - standby rate	197	$1,897.74
246-53	SR100	100kW Generator - standby rate	197	$2,332.11
246-53	SR120	120kW Generator - standby rate	197	$2,554.38
246-53	SR140	140kW Generator - standby rate	197	$2,928.10
246-53	SR200	200kW Generator - standby rate	197	$3,533.92
246-53	SR350	350kW Generator - standby rate	197	$5,313.75
246-53	SR450	450kW Generator - standby rate	197	$7,569.97
246-53	SR500	500kW Generator - standby rate	197	$7,296.88
246-53	SR750	750KW Generator - standby rate	197	$10,934.47
246-53	SR1125	1125kW Generator - standby rate	197	$9,359.63
246-53	SR1450	1450kW Generator - standby rate	197	$15,744.39
		Rental of Generators - 8 hour Run Rate		
246-53	08H36	36kW Generator - 8 hour run rate	197	$1,437.96
246-53	08H60	60kW Generator - 8 hour run rate	197	$2,232.50
246-53	08H100	100kW Generator - 8 hour run rate	197	$2,743.44
246-53	08H120	120kW Generator - 8 hour run rate	197	$3,005.01
246-53	08H140	140kW Generator - 8 hour run rate	197	$3,444.81
246-53	08H200	200kW Generator - 8 hour run rate	197	$4,157.35
246-53	08H350	350kW Generator - 8 hour run rate	197	$6,251.27
246-53	08H450	450kW Generator - 8 hour run rate	197	$8,905.94
246-53	08H500	500kW Generator - 8 hour run rate	197	$8,584.40
246-53	08H750	750KW Generator - 8 hour run rate	197	$12,864.06
246-53	08H1125	1125kW Generator - 8 hour run rate	197	$11,010.37
246-53	08H1450	1450kW Generator - 8 hour run rate	197	$18,522.73
		Rental of Generators - 16 hour Run Rate		
246-53	16H36	36kW Generator - 16 hour run rate	197	$2,156.94
246-53	16H60	60kW Generator - 16 hour run rate	197	$3,348.92
246-53	16H100	100kW Generator - 16 hour run rate	197	$4,115.34
246-53	16H120	120kW Generator - 16 hour run rate	197	$4,507.35
246-53	16H140	140kW Generator - 16 hour run rate	197	$5,167.04
246-53	16H200	200kW Generator - 16 hour run rate	197	$6,236.02
246-53	16H350	350kW Generator - 16 hour run rate	197	$9,376.91
246-53	16H450	450kW Generator - 16 hour run rate	197	$13,358.74
246-53	16H500	500kW Generator - 16 hour run rate	197	$12,876.60
246-53	16H750	900750KW Generator - 16 hour run rate	197	$19,296.27
246-53	16H1125	1125kW Generator - 16 hour run rate	197	$16,516.23
246-53	16H1450	1450kW Generator - 16 hour run rate	197	$27,784.10
		Rental of Generators - 24 hour Run Rate		
246-53	24H36	36kW Generator - 24 hour run rate	197	$2,875.92

Trane Rental Services

SIN	Model Number	Product for Rent	Product Code	GSA Monthly Rental Rate
246-53	24H60	60kW Generator - 24 hour run rate	197	$4,465.00
246-53	24H100	100kW Generator - 24 hour run rate	197	$5,486.89
246-53	24H120	120kW Generator - 24 hour run rate	197	$6,009.69
246-53	24H140	140kW Generator - 24 hour run rate	197	$6,889.27
246-53	24H200	200kW Generator - 24 hour run rate	197	$8,314.36
246-53	24H350	350kW Generator - 24 hour run rate	197	$12,502.20
246-53	24H450	450kW Generator - 24 hour run rate	197	$17,811.55
246-53	24H500	500kW Generator - 24 hour run rate	197	$17,168.46
246-53	24H750	750KW Generator - 24 hour run rate	197	$25,728.13
246-53	24H1125	1125KW Generator - 24 hour run rate	197	$22,021.75
246-53	24H1450	1450kW Generator - 24 hour run rate	197	$37,045.47

Trane Rental Services

NOTES:

(1) The total monthly Rental Rate equals the GSA Monthly Rental Rate multiplied by both the Time of Year Multiplier and the Multi-Month Rental Multiplier.
(2) The **Time of Year Multiplier** is set out in the Table below.

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Discount	0.8	0.8	0.8	0.8	0.9	1	1	1	0.9	0.8	0.8	0.8

(3) The **Multi-Month Rental Multiplier** is set out in the Table below.

Months	< 2	3 - 6	> 7
Multiplier	1	0.85	0.75

(4) Trailers are rented as indicated in the Price List at a per month rate, regardless of the time of year or length of the rental. This rate is not discounted. Flatbed trailers are 48-Ft or 53-Ft.
(5) The rental rate for a Transformer is waived if the Transformer is rented with a Chiller.
(6) The Time of Year and Multi-Month Rental Multipliers are not applied to the Rental Rate for Electric Cable.
(7) For rental periods that include partial months, the Rental Rates will be calculated as follows:

First Month

Weekly Rate	= 1/3 Monthly Rate
Daily Rate	= 1/7 Weekly Rate

Ending Month

Weekly Rate	= 1/4 Monthly Rate
Daily Rate	= 1/7 Weekly Rate

(8) **Freight Charges -** Equipment is to be shipped from and returned to Trane designated storage locations with outbound and return freight prepaid by Trane.
(9) **Transformers -** Lugs for transformers must be provided by others and are not included. Transformers kVA 300, 500, 750 are for 208, 240, 480, & 600 Volts. Transformers kVa 1,000 & 1,500 (and some 750's) are for 480, 600, 2400, &4160 Volts.
(10) **Hose Kits -** Trane will not split boxes of the 2.5", 4", or 6" hoses. For 2.5" , 4", and 6", each hose box contains (1) 10ft section, (1) 15ft section, (1) 25ft section, (3) 50ft sections, (2) 90's, (2) 45's, (2) vict-to-flange adapters & vict couplings. For 10" hose box it contains (1) 10ft section, (1) 15ft section, (7) 25ft sections, (2) 90's, (2) 45's, (2) vict-to-flange adapters & vict couplings.
(11) **Electric Cable -** The Time of Year and Multi-Month Rental Multipliers are not applied to the rental rate for Electric Cable. Each 2/0 awg or 4/0 awg cable box contains (4) 100-ft sections, (4) 15-ft male pigtails, and (4) 15-ft female pigtails. If pricing electrical cable boxes please note multiple runs per phase might be required depending on the actual unit chosen. Please call Trane Rental Services at 800-755-5115 for any electrical questions regarding Trane Rental cable boxes. Wiring is only provided for 460V side. If a transformer is required the wiring for the building side must be provided by others.
(12) **Chillers –** 300-ton Air-Cooled chiller pricing includes trailer and chiller is on trailer. 400-ton and 500-ton Air-Cooled chiller pricing includes trailer, pump, and 200-ft hose kit of 6-in hose. All Water-Cooled chillers are stored in Charlotte, NC and ship with a Nitrogen holding change. Refrigerant will be shipped in cylinders on the trailer. The chiller will need to be charged at delivery and the refrigerant recovered before it is sent back.
(13) **Pumps –** Pumps do not have wiring. This must be provided by others.
(14) **Ancillary Items** – Items such as pumps, hose kits, transformers, trailers, and electrical cable can only be rented with a chiller or DX unit. Trane Rentals does not rent these items as stand-alone items.
(15) **Generator Freight Charges** – Generator freight is not included in the generator rental rates. Roundtrip freight for generators will be based on actual freight charges. An estimate of the freight charges can be provided at the time the rental agreement is executed.
(16) **Generator Fueling** – Is not included in the rental rates above and is the responsibility of the Customer.

Customer Direct Services (CDS) Software

Software Description Literature is Attached

SIN Number	Product Number	Product Description	Product Code	GSA Price for Standard License w/ IFF	GSA Price for each Additional License w/ IFF	GSA Price for LAN/Site License w/ IFF
246-42-1	CDS-PKG-C 	TRACE® 700	607	$1,995.00	$995.00	$3,990.00
246-42-1	CDS-PKG-D 	Trane Acoustics Program (TAP™)	610	$495.00	$248.74	$742.50
246-42-1	CDS-PKG-W 	System Analyzer™	622	$995.00	$500.00	$1,492.50
246-42-1	CDS-PKG-A 	TRACE 700 Load Design	603	$695.00	$349.24	$1,042.50
246-42-1	CDS-PKG-T 	Trace 700 Load Express™ (Version 4.1.1)	604	$495.00	$248.74	$742.50
246-42-1	CDS-PKG-CPA 	TRACE 700 Chiller Plant Analyzer	606	$495.00	$248.74	$742.50
246-42-1	CDS-PKG-L 	VariTrane™ Duct Designer	605	$495.00	$248.74	$742.50
246-42-1	CDS-PKG-P 	Trane® Pipe Designer	611	$195.00	$97.99	$292.50
246-42-1	CDS-PKG-E	Distribution Suite	602	$595.00	$298.99	$892.50
246-42-1	CDS-PKG-J 	Trane® Engineering Toolbox	619	$95.00	$47.74	$142.50
246-42-1	CDS-PKG-FLS	TRACE 700 Family LAN Seats				$75.00

NOTES:

(1) CDS Software is subject to annual licensing fee billed at 25% of GSA Price. Payment of this fee entitles the license.
(2) SITE USERS for TRACE 700 family may install software on multiple, standalone computers at on specific location.
(3) LAN USERS for TRACE 700 family may install software on a LAN. Seats must be purchased for each user.

Customer Direct Service (CDS) Training Seminars

Schedule at La Crosse, Wisconsin Site

SIN Number	Course number	Course Name	Product Code	Course Length		GSA Price for Individual Course w/ IFF	GSA Price for 2 Courses w/ IFF	GSA Price for 3 Courses w/ IFF	GSA Price for 4 Courses w/ IFF	GSA Price for each add'l student for a course w/ IFF
246-52	CDS-TRNGL1	System Analyzer™	616	1 Day		$350.00	$650.00	$850.00	$1,000.00	$262.50
246-52	CDS-TRNGL2	TRACE® 700 Load Design	616	1 Day		$350.00	$650.00	$850.00	$1,000.00	$262.50
246-52	CDS-TRNGL3	TRACE® 700	616	1 Day		$350.00	$650.00	$850.00	$1,000.00	$262.50
246-52	CDS-TRNGL4	TRACE 700 Advanced Topics	616	1/2 Days		$350.00	$650.00	$850.00	$1,000.00	$262.50

NOTES:

(1) Customer Direct Service (CDS): Software to assist the engineering community with building and HVAC system design and analysis. CDS sells software licenses, provides technical and engineering support, and training for that software.
(2) The “GSA Price above for each add’l student for a course w/IFF” is applicable only at Trane’s La Crosse, WI location.
(3) Cancellations must be received two weeks prior to class date by fax, mail or email. $200 fee for any cancellations by Customer within 2 weeks of the agreed training date. No Shows will be charged full class price. Trane reserves the right to cancel classes due to weather, illness, or any other reason. All students will be notified as early as possible and CDS' liability will be limited to the return of registration fees.

Customer Direct Service (CDS) Training Seminars

Schedule at Customer's Location Site

SIN Number	Course number	Course Name	Product Code	Course Length		GSA Price for Individual Course w/ IFF
246-52	CDS-TRNGC1	First Day of Training On-Site or 1-10 people	616	1 Day		$750.00
246-52	CDS-TRNGC12	First Day of Training On-Site or 11-15 people	616	1 Day		$1,000.00
246-52	CDS-TRNGC13	First Day of Training On-Site or 16-20 people	616	1 Day		$1,250.00
246-52	CDS-TRNGC14	First Day of Training On-Site or 21-30 people	616	1 Day		$1,500.00
246-52	CDS-TRNGC2	Each Additional Day of Training for 1-10 people	616	Per Day		$650.00
246-52	CDS-TRNGC22	Each Additional Day of Training for 11-15 people	616	Per Day		$750.00
246-52	CDS-TRNGC23	Each Additional Day of Training for 16-20 people	616	Per Day		$1,000.00
246-52	CDS-TRNGC24	Each Additional Day of Training for 21-30 people	616	Per Day		$1,250.00
246-52	CDS-COMRNT-15	1-5 Computers Rental	616	Per Day		$400.00
246-52	CDS-COMRNT-610	10 Computers Rental	616	Per Day		$550.00

NOTES:

(1) Customer Site Training Classes: Same courses on Pg. 37 and the customer determines what they want CDS to provide at their location. Pricing outlined is based on number of days of training and number of attendee/students.
(2) CDS will rent computers for use by the customer during on-site training.
(3) **Cancellation Policy** – A $200 administrative cancellation fee will apply to any cancellations occurring within 2 weeks of the agreed upon training date by Customer.
(4) For training provided at the customer's location, training shall be provided at the billing rate shown above. The customer shall pay for the trainer's travel and per diem expenses. Rates paid as a result of travel must comply with the Federal Travel Regulations or Joint Travel Regulations, as applicable, in effect on the date(s) the travel is performed.

Customer Direct Service (CDS) Training Seminars

Seminar and Software Purchased Together

SIN Number	Product Number	Description	Product Code		Software Alone - GSA Price w/IFF	Training Alone - GSA Price w/ IFF	Software & Training Together - GSA Price w/ IFF
246-42-1 246-52	CDS-TNG-L700	TRACE® 700 Load Design	616		$695.00	$350.00	$870.00
246-42-1 246-52	CDS-TNG-T700	TRACE® 700	616		$1,995.00	$350.00	$2,170.00
246-42-1 246-52	CDS-TNG-SA	System Analyzer™	616		$995.00	$350.00	$1,170.00

NOTES:

(1) Packaged Pricing for the purchase of software and training together is available at Trane's La Crosse, WI site.
(2) At the end of the La Crosse training seminar, all participants will receive a coupon to save 15% off the regular listed software price. To receive this discount, all software orders must be accompanied by this coupon.

EDUCATIONAL LITERATURE & MATERIALS

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
AIR CONDITIONING CLINICS					
Purpose: Scripted training presentations used to educate on the fundamentals of heating, ventilating, and air conditioning (HVAC). Each clinic includes a student workbook, with corresponding quiz questions/problems. Audience: The content is technical in nature and the original intended audience was HVAC system designers and installing contractors who wanted to learn the basics of HVAC. However, in the past the audience has been extremely broad and has included HVAC system designers, installing contractors, architects, system operators, servicing technicians, and owners. Definitions: International System of Units (SI) and/or inch-pound units (IP). Dual units contain both IP/SI.					
FUNDAMENTALS SERIES					
246-1000	TRG-TRC001EN	Psychrometric Charting (2000)	IP units only	Discussion of the properties of air and the use of the psychrometric chart. Topics include: sensible and latent heat, heat and moisture change, elements of the psychrometric chart, sensible heat ratio (SHR), determining required airflow (cfm) and refrigeration (tons), analyses of basic systems at full and part load (modulating coil, reheat, face-and-bypass, variable volume).	$16.00
246-1000	TRG-TRC002-EN	Cooling and Heating Load Estimating (2000)	Dual units (IP/SI)	Presentation of cooling and heating load estimating procedures to used for accurate HVAC equipment selections. The clinic presents the ASHRAE Cooling Load Temperature Difference (CLTD), Solar Cooling Load Factor (SCL), and Cooling Load Factor (CLF) method. Topics include: human comfort, indoor and outdoor design conditions, cooling load estimation, conduction heat gain and loss, solar heat gain, internal heat gains, infiltration, ventilation, fan heat, heating load estimation, single-space psychrometric analysis (sensible heat ratio or SHR, supply airflow, supply air temperature, coil load), multiple-space psychrometric analysis (block load versus sum-of-peaks), plenum versus space loads, and benefits of computerized load analysis.	$16.00
246-1000	TRG-TRC003-EN	Refrigeration Cycle (1999)	Dual units (IP/SI)	Presentation of the basic principles of the vapor-compression refrigeration cycle. Topics include: principles of heat transfer, sensible heat, latent heat of vaporization, refrigerants, mechanical refrigeration cycle components (compressor, condenser, evaporator, expansion device), and pressure–enthalpy (P-h) chart (superheat, subcooling, refrigeration effect, heat of compression).	$16.00
246-1000	TRG-TRC004-EN	Refrigeration Compressors (2000)	Dual units (IP/SI)	Introduction of the common compressor types used in air-conditioning applications, including reciprocating, scroll, helical-rotary (screw), and centrifugal. Topics include: review of the basic refrigeration cycle, open, semi-hermetic, hermetic, types of compressors, principles of compressor operation, methods of compressor capacity control (cylinder unloaders, cycling, slide valve, inlet vanes, variable-speed), methods of system-level control (direct expansion versus chilled water, constant volume versus VAV), and preventing evaporator freeze-up (sensing suction temperature, hot gas bypass).	$16.00
246-1000	TRG-TRC005-EN	Refrigeration System Components (1998)	Dual units (IP/SI)	Discussion of the components used in a vapor-compression refrigeration system. Topics include: review of the refrigeration cycle, condensers (air-cooled, water-cooled, evaporative) and their control, evaporators (finned-tube, shell-and-tube) and their control, thermostatic expansion valve, superheat and subcooling, solenoid valve, liquid line filter drier, moisture-indicating sight glass, suction line filter, hot gas muffler, shutoff valve, and access ports.	$16.00
246-1000	TRG-TRC006-EN	Refrigerant Piping (2002)	Dual units (IP/SI)	Review of refrigeration system piping considerations, design guidelines, and sizing recommendations. Topics include: suction line, discharge (hot gas) line, liquid line, hot gas bypass line, traps, double risers, refrigeration accessories required, insulation.	$16.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	TRG-TRC007-EN	Fundamentals of HVAC Acoustics (2001)	Dual units (IP/SI)	Discussion of the fundamental concepts of acoustics as it applies to buildings and HVAC systems. Topics include: sound wave, frequency, broadband sound, tones, octave bands, one-third octave bands, sound power and sound pressure, decibels, loudness, A-weighting, Noise Criteria (NC), Room Criteria (RC), sones, phons, acoustical analysis procedure, source-path-receiver model, computerized analysis tools, attenuation and regeneration, sound transmission, sound absorption, sound reflection, room effect, equipment sound rating, free field, reverberent field, semireverberent field, industry rating standards, reverberent room method, ARI Standard 260.	$16.00
				EQUIPMENT SERIES	
246-1000	TRG-TRC010-EN	Centrifugal Water Chillers (1999)	Dual units (IP/SI)	Description of the components, operation, and application of a centrifugal water chiller. Topics include: centrifugal compressor, condenser, expansion device (orifice plates), economizer, evaporator, motor, starters, controls, the refrigeration cycle, purge system, compressor capacity control (surge, inlet vanes, multi-stage compressor, adjustable frequency drive or variable speed drive), maintenance considerations, and application considerations (condensing temperature control, constant or variable evaporator water flow, heat recovery, free cooling, short water loops, ARI Standard 550/590-1998).	$16.00
246-1000	TRG-TRC011-EN	Absorption Water Chillers (2000)	Dual units (IP/SI)	Discussion of the fundamentals of the absorption refrigeration cycle as it pertains to water chillers. Topics include: absorption refrigeration cycle (generator or concentrator, condenser, evaporator, absorber, heat exchanger), system fluids (water, lithium bromide), equilibrium chart, single-effect versus double-effect chillers, indirect-fired versus direct-fired chillers, chiller/heaters, capacity control methods (energy valve, AFD), causes of crystallization and methods of prevention, purge operation, general maintenance considerations (corrosion inhibitors), cooling-water temperature limitations, combination gas-and-electric plants, special considerations for direct-fired chillers, ASHRAE Standard 15, and ARI Standard 560.	$16.00
246-1000	TRG-TRC012-EN	Helical-Rotary Water Chillers (1999)	Dual units (IP/SI)	Presentation of the components, operation, and application of a helical-rotary (screw) water chiller. Topics include: helical-rotary compressor, oil separator, condenser (water-cooled and air-cooled), expansion device, liquid/vapor separator, evaporator, starter, controls, the refrigeration cycle, refrigerants, compressor capacity control, slide valve operation, maintenance considerations, and a brief list of application considerations (air-cooled or water-cooled condensing, condensing temperature control, constant or variable evaporator water flow, short water loops, ARI Standard 550/590-1998).	$16.00
246-1000	TRG-TRC013-EN	Air Conditioning Fans (2004)	Dual units (IP/SI)	Coverage of fan system performance, types of fans, and methods of control. Topics include: static pressure vs. velocity pressure, fan performance curves, fan—system interaction, basic types of fans (forward curved - FC, backward inclined - BI, airfoil - AF, vaneaxial, and variable-pitch vaneaxial - VPVA), methods of fan control (riding the fan curve, discharge dampers, inlet vanes, variable speed, and variable-pitch blade control), and fan applications considerations (static pressure control, system effects, non-standard conditions – altitude, and equipment certification standards.).	$12.00
				SYSTEMS SERIES	

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	TRG-TRC014-EN	VAV Systems (2001)	Dual units (IP/SI)	Summary of the variable air volume (VAV) approach to air conditioning. Topics include: explanation of VAV, components of a VAV system, terminal unit types (cooling only, reheat, parallel and series fan powered, dual duct), terminal unit controllers (pneumatic, electronic, DDC), diffusers, supply duct design, interior vs. perimeter spaces, system control modes, fan modulation, static pressure control, and system applications considerations (system-level ventilation, freeze protection for coils, part-load space humidity control, building pressure control.).	$16.00
246-1000	TRG-TRC015-EN	Water-Source Heat Pump Systems (2000)	Dual units (IP/SI)	Discussion of the water-source heat pump (WSHP) system. Topics include: operation and components of a heat pump, types of heat pumps, components of a WSHP system, system benefits and issues, system configurations (cooling tower/boiler, ground-coupled, types of ground heat exchangers, hybrid systems), system-level control issues, maintenance considerations, application considerations (ventilation, acoustics, space humidity control, condensate management, airside and waterside economizers, building pressurization, equipment rating standards.).	$16.00
246-1000	TRG-TRC016-EN	Chilled-Water Systems (2001)	Dual units (IP/SI)	Description of chilled-water systems. Topics include: vapor-compression and absorption chiller types, air-cooled vs. water-cooled condensers, packaged vs. split components, ASHRAE Standard 90.1-1999, equipment rating standards (ARI 550, 590, and 560), components of a chilled-water system, coil control (3-way valves, 2-way valves, face-and-bypass dampers), constant vs. variable evaporator flow, chiller plant design concepts (parallel, series, and primary-secondary or decoupled), combined energy (hybrid) plants, low-flow systems, variable-primary-flow systems, heat recovery, sidecar arrangement, free cooling (plate-and-frame heat exchanger, refrigerant migration), and chilled-water system control (chiller sequencing, swing chiller, failure recovery, system optimization, and system-level control).	$16.00
246-1000	TRG-TRC017-EN	HVAC System Control (2002)	Dual units (IP/SI)	Introduction to automatic control of HVAC equipment and systems. Topics include: control loops, types of control action (two position or on/off, floating, proportional, proportional-integral or PI, and proportional-integral-derivative or PID), pneumatic controls, analog-electric controls, microprocessor-based controls or DDC, unit-level control versus system-level control, example unit-level control loops for a VAV air handler (discharge-air temperature, ventilation, airside economizer, mixed-air temperature, static pressure, building pressurization), examples of system-level control (occupied versus unoccupied modes, morning warmup mode, changeover in a two-pipe system, water loop temperature control in a WSHP system), examples of system optimization strategies (fan-pressure optimization, optimum start, chilled-water reset, WSHP loop optimization), normally-open versus normally-closed actuators, common functions of a building automation system (responding to complaints, graphical user interface, time-of-day scheduling, centralized alarms and diagnostics, remote access, reports, preventive maintenance, integration with other systems, multiple-site support), network terminology, dedicated vs. shared networks, communication protocols, gateways, interoperability, BACnet, LonTalk, LonMark.	$16.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	TRG-TRC018-EN	Introduction to HVAC Systems (2004)	Dual units (IP/SI)	Introduction to HVAC systems that dissects the entire system into five subsystems, or "loops." Topics include: requirements for occupant comfort, five "loops" (airside loop, chilled-water loop, refrigeration-equipment loop, heat-rejection loop, controls loop), factors that affect decision to choose a chilled-water versus a direct expansion (DX) system, packaged versus split systems, common HVAC system types, single-zone versus multiple-zone systems, constant-volume versus variable-air-volume systems, packaged terminal air conditioner (PTAC), single-zone packaged DX rooftop, DX split system, chilled-water terminal system (fan coils, classroom unit ventilators, blower coils), two-pipe versus four-pipe systems, water-source heat pump systems, dedicated outdoor-air systems, single-zone VAV, multizone system, three-deck multizone system, changeover-bypass system, multiple-zone VAV system, rooftop VAV system, self-contained DX VAV system, chilled-water VAV system, double-duct VAV system, and factors that impact the selection of the HVAC system.	$16.00
246-1000	TRG-TRC019-EN	Ice Storage Systems (2005)	Dual units (IP/SI)	This clinic focuses on glycol-based ice storage systems, which use an ice-chiller to cool a heat transfer fluid—often a mixture of water and antifreeze, such as glycol—to a temperature below the freezing point of water. This fluid is pumped through an ice storage tank, causing water inside the tank to freeze. Topics include: benefits of ice storage, on-peak versus off-peak, ice storage tank, full storage versus partial storage, ice-making chiller, heat transfer fluid, ethylene glycol versus propylene glycol, common system layouts (small versus large systems), retrofitting existing systems, control of ice storage systems (tactical control versus strategic control).	$16.00
				BUNDLED SETS	
246-1000	1-43.186	Set of all *Air Conditioning Clinic* booklets		Set of all *Air Conditioning Clinic* booklets	$205.00
246-1000	1-43.165	"Air Conditioning Clinic" bundle		This bundle includes: - Set of all *Air Conditioning Clinic* booklets - Ductulator duct sizing calculator - Psychrometric Charts – pad of 25, standard altitude, I-P units	$215.00
				TEXTBOOKS AND MANUALS	
246-1000	AC MANUAL	Trane Air Conditioning Manual (1996)	IP units only	A comprehensive textbook, initially published in the 1930's, on the fundamentals of heating, ventilating, and air conditioning (HVAC). The audience is broad and has historically included students, HVAC system designers, installing contractors, architects, system operators, and service technicians. Chapters include: Heat and Its Measurement, Comfort; Heat Gains; Properties Of Air and The Psychrometric Chart; Calculations For The Conditioned Air Supply; Refrigeration Theory, Compressors, and Refrigeration Cycle Components; Refrigeration and Cooling Apparatus; Use Of Water In Air Conditioning; Air Transport Systems; The Air Conditioning System.	$40.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
		APPLICATION MANUALS			
				Purpose: Comprehensive reference guides to increase awareness and working knowledge of heating, ventilating, and air conditioning (HVAC) system design concepts, component combination possibilities, system operating/control concepts and characteristics, general industry issues, and HVAC fundamentals. Audience: The intended audience is HVAC system designers. However, depending on the topic, the manual may also be of interest to others in the industry. I-P units only (unless stated otherwise). Note: There are more application manuals that deal specifically with obsolete Trane products and control systems. If they do not appear on this list, these manuals can be found archived on Trane's Eagle™ product information system (search Literature Type = Application Manual). Contact your local Trane office, or e-mail bookstore@trane.com, for further information on Eagle.	
246-1000	SYS-APM001-EN	Multiple Chiller System Design and Control (2009)	Dual units (IP/SI)	Details basic multiple-machine chilled water systems. Topics include: components of a chilled water system, chillers in parallel, chillers in series, primary/secondary (decoupled) systems, effects of temperatures and flow, low flow system designs, distributed pumping, tertiary pumping, chiller plant controls, chilled water reset, chiller staging, variable-primary flow (VPF) systems, heat recovery, free cooling, sidestream arrangement, system design considerations, preferential loading, alternate energy sources, series-counterflow arrangement, redundancy, contingency planning, condenser water systems, and cooling tower control.	$16.00
246-1000	SYS-APM003-EN	Air-to-Air Energy Recovery in HVAC Systems (2008)	Dual units (IP/SI)	Discusses the various air-to-air energy recovery technologies and their application in HVAC systems. Topics include: why recover energy?, sensible- versus total-energy recovery, effectiveness, unbalanced airflow, outdoor-air preconditioning (or exhaust-air heat recovery), supply-air tempering (or reheat) in series or parallel, ASHRAE Standard 90.1, impact on first cost and operating cost, frost prevention methods, minimizing cross leakage, methods of capacity control, coil loops (or coil runaround loops), fixed-plate heat exchangers (or air-to-air heat exchangers), heat pipes, rotary heat exchangers (or heat wheels, enthalpy wheels, desiccant wheels), ARI Standard 1060, controlling energy recovery devices in dedicated outdoor-air systems and mixed-air systems (constant volume, VAV), economizer operation, active desiccant dehumidification systems, local versus centralized preconditioning.	$16.00
246-1000	SYS-APM004-EN	Dehumidification in HVAC Systems (2002)	Dual units (IP/SI)	Discusses the dehumidification performance of various, cold-coil commercial HVAC systems, particularly at part-load conditions. Topics include: why control humidity in buildings, sources of moisture, cold coil versus active desiccant dehumidification, full-load versus part-load conditions, ASHRAE weather data, dehumidification performance of constant-volume systems (impact of climate, impact of outdoor-air quantity, impact of packaged direct expansion DX equipment, impact of energy recovery, fan-speed adjustment, mixed-air bypass, return-air bypass, dual path air handlers, supply-air tempering or reheat), dehumidification performance of VAV systems (impact of minimum airflow settings, impact of supply-air temperature reset, supply-air tempering at VAV terminals, using colder supply-air temperatures), dedicated outdoor-air systems (neutral versus cold, to the space versus to other units, design procedures, general application considerations (humidity control during unoccupied periods, building pressure control, airside economizer control), psychrometric analyses, ASHRAE Standards 62 and 90.1.	$16.00
246-1000	SYS-APM005-EN	Waterside Heat Recovery in HVAC Systems (2003)	Dual units (IP/SI)	This manual focuses on waterside heat recovery. It describes concepts and mechanical implementation, and identifies system-level characteristics for effective operation and control. Topics include: why use heat recovery?, heat-recovery chiller types, system configurations and control modes, heat rejection control, common uses of recovered heat, and analysis methods.	$16.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	SYS-APM007-EN	Rooftop VAV Systems (2012)	Dual units (IP/SI)	Discusses proper design and application of packaged rooftop, variable air volume (VAV) systems. Topics include: basic system operation, benefits and drawbacks of a rooftop VAV system, in-depth coverage of the components that make up the system (packaged rooftop unit, VAV terminal units, air distribution system, hot water heating system, controls), solutions to address common design challenges (zoning, ventilation, humidity control, energy efficiency, acoustics), several system variations (cold air distribution, single-zone VAV, air-to-air energy recovery), and common unit-level and system-level control functions (including system optimization strategies).	$16.00
246-1000	SYS-APM008-EN	Chilled-Water VAV Systems (2012)		Discusses proper design and application of chilled-water, variable air volume (VAV) systems. Topics include: basic system operation, benefits and drawbacks of a chilled-water VAV system, in-depth coverage of the components that make up the system (VAV air-handling unit, VAV terminal units, air distribution system, chilled-water system, hot water heating system, controls), solutions to address common design challenges (zoning, ventilation, humidity control, energy efficiency, acoustics), several system variations (cold air distribution, single-zone VAV, air-to-air energy recovery, dual-duct VAV systems), and common unit-level and system-level control functions (including system optimization strategies).	$16.00
246-1000	SYS-APM009-EN	Central Geothermal Systems (2011)		Discusses proper design and control of central geothermal bidirectional cascade systems that use borefields. Topics include system design considerations (borefield, ground water, water temperatures, chiller/heater selection, system piping, system design options (optimum efficiency design features, supplemental heat, auxiliary energy rejection, contingency cooling, chilled-water pump control), airside considerations (heating design, economizer control, freeze protection, ASHRAE Standard 90.1 compliance), system operation and control (heating only, cooling only and simultaneous heating and cooling).	$20.00
246-1000	SYS-APM010-EN	Water-Source and Ground-Source Heat Pump Systems (2013)		Discusses proper design and application of water-source (WSHP) and ground-source heat pump (GSHP) systems. Topics include: basic system operation; benefits and drawbacks of a WSHP system; in-depth coverage of the components that make up the system (water-source heat pumps, water distribution system, heat rejection and heat addition, dedicated outdoor-air system); solutions to address common design challenges (thermal zoning, ventilation, humidity control, energy efficiency, acoustics); several system variations (ground-coupled, surface-water, and ground-water heat pump systems, as well as several hybrid system configurations); and common unit-level and system-level control functions (including system optimization strategies).	$16.00
246-1000	ISS-APM001-EN	Acoustics in Air Conditioning (2006)	Dual units (IP/SI)	Discusses the fundamentals of sound to aid in the design of quiet HVAC systems. Topics include: definitions, frequency, octave bands, sound power vs. sound pressure, sound ratings (A-weighting, B-weighting, C-weighting, noise criteria - NC, room criteria – RC, sone, phone), sound measurement methods, equipment sound rating and industry standards (ARI, AMCA, ASHRAE), source-path-receiver, sound paths, attenuation, transmission loss, regenerated noise, room effect, and fan-generated noise.	$16.00
246-1000	APP-APM001-EN	Refrigerating Systems and Machinery Rooms: ASHRAE Standard 15 (2012)	Dual units (IP/SI)	Details ASHRAE Standard 15-2010 as it relates to water-chiller refrigeration systems that require machinery (or mechanical or equipment) rooms. Topics include: ASHRAE Standard 34, refrigerants, refrigerant safety classifications, standards vs. guidelines, ASHRAE Standard 15, machinery room, ventilation for machinery rooms, pressure relief piping, refrigerant monitors, equipment room design specification, indirect open-spray systems, MER, SCBA, and ANSI Standards.	$16.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	AM-SYS-6	Variable Air Volume Duct Design (1981)	IP Units only	Covers information pertaining to variable volume duct design with special attention given to the static regain method. Topics include: computerized duct design, round vs. rectangular ductwork, duct heat gain, fitting efficiency, duct design rules, typical duct layout errors, high-velocity duct fittings, and static pressure sensor location.	$4.00
246-1000	SYS-AM-7	Water Source Heat Pump System Design (1994)	IP Units only	Describes the water source heat pump system, including design, selection, installation, and controls. Topics include: components, basic operation, system design, control recommendations, typical system operation parameters, boiler, cooling tower and pump selection, piping design recommendations, water regulating valve and variable speed pumping, hybrid systems, condensate drain lines, freeze protection.	$16.00
246-1000	AM-SYS-9	Self-Contained/VAV System Design (1984)	IP Units only	Discusses the various aspects of self-contained/VAV system applications and to provide suggestions that will help the designer make the best possible design decisions when applying this equipment. Topics include: system components, VAV terminal unit types, equipment selection, zoning, interior vs. perimeter zones, cooling tower and condenser water pump and piping, freeze protection, system control, airside economizer, waterside economizer, building pressurization, system-level controls, and system optimization.	$5.00
246-1000	SYS-AM-10	Ice Storage Systems (1987)	IP Units only	Intended to aid designers in the design of ice storage systems using ethylene glycol. Topics include: types of thermal storage (chilled water, ice, eutectic salts), full storage vs. partial storage, ice storage selection and capacity, chiller selection, ice storage system design and control. NOTE: See also the "Ice Storage Systems" series of Engineered Systems Clinics (ISS-CLC-1, 2, 3, 4).	$5.00
246-1000	SYS-AM-13	Absorption Chiller System Design (1999)	Dual units (IP/SI)	Helps designers correctly apply absorption chillers into systems. Topics include: absorption refrigeration cycle, types of absorption chillers, gas cooling with absorption, economic analysis, chiller control, chiller plant design and control (heat recovery, thermal storage, heating applications), installation (exhaust stack, ASHRAE Standard 15, combustion air), and maintenance considerations.	$16.00
246-1000	SYS-AM-15	Managing Building Moisture (2010)	IP Units only	This manual helps HVAC system designers identify and quantify moisture sources in buildings. It also presents moisture-management techniques related to the building envelope, the occupied space and the mechanical-equipment room. Topics include: indoor air quality (IAQ), comfort, moisture sources, condensation, building envelope, dehumidification, equipment room moisture, ventilation air, moisture and equipment, drain pans, condensate traps, insulation, infiltration, vapor-pressure diffusion, design and control strategies, humid climates, and humidity control.	$16.00
246-1000	AM-CON-10	Hot Gas Bypass Control (1982)	IP Units only	Explains the hot gas bypass (HGBP) system by discussing what it is, why and when it should be used, how it is properly applied, and how to size/adjust a HGBP valve. Includes: hot gas bypass to evaporator inlet, hot gas bypass to suction line.	$1.25
246-1000	AM-CON-17	Building Pressurization Control (1982)	IP Units only	Reviews several key definitions and outlines these space pressure control systems: natural relief, barometric relief, constant volume return fan, constant volume exhaust fan, powered barometric relief, coordinated exhaust/supply fan control, coordinated return/supply fan control, volume reset of return fan, direct pressurization control, and sequenced control of multiple exhaust fans. Points out system performance characteristics and suggests control applications. Includes a general discussion, design considerations, system alternatives, and recommended equipment for the application.	$5.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	ICS-AM-4	Control of Ice Storage Systems (1988)	IP Units only	Reviews ice storage controls as a part of a Trane Integrated Comfort system. Topics include: operating modes, control sequence development, demand-limiting vs. time-of-use, data gathering and monitoring and ice inventory, control of system components (chiller, pump, blending valve, bypass valve), system control and monitoring, load profiles, ice inventory, and points lists.	$5.00
246-1000	ED-FAN	Fans and Their Application in Air Conditioning (1982)	IP Units only	Provides a detailed overview of fan fundamentals intended to help system designers understand their performance, selection, application and control. Topics include: terminology, testing, fan performance curve, system resistance curve, fan surge, fan paralleling, types of fans (forward curved, backward inclined, radial, tubular, axial, fan laws, industry standards (AMCA), inlet and discharge conditions, transitions, drive and bearing losses, fan modulation devices (scroll volume damper, inlet and discharge dampers, inlet vanes, speed modulation, blade pitch variation), parallel and series operation, draw-thru vs. blow-thru, supply fans in systems, return fans, motors and controls, types of motor starters, power transmission, sound and vibration control, selection, specification, installation, maintenance, troubleshooting, and field measurement methods.	$10.00

ENGINEERS NEWSLETTER LIVE DVDS

Purpose: Engineers Newsletter Live is a series of programs focused on the design and control of heating, ventilating, and air conditioning (HVAC) systems. The content of each program is objective, technical and educational in nature. The series is produced and presented by the Trane Applications Engineering team

Audience: The intended audience for these programs is HVAC system designers. However, depending on the topic, the program may also be of interest to others in the industry. Asterisks designate programs accredited for continuing education by American Institute of Architects (AIA) and United States Green Building Council (USGBC). Assessment is required for credit please visit www.trane.com/continuingeducation to submit the associated quiz for continuing education credit.

Length/Language/Units: Each program is 90 minutes long, in English, with I-P units displayed only.

246-1000	APP-CMC001-EN	The Low Dollar Chiller Plant (August, 1999)	IP Units only	Gain an understanding of low-flow chiller system designs that will result in reduced capital, energy, and installed costs. Topics include: low flow, cooling tower performance, chilled-water coil performance, chiller-tower optimization, series chillers, variable-primary-flow systems.	$30.00
246-1000	APP-CMC002-EN	Specifying Quality Sound (March, 2000)	IP Units only	Provides an understanding of how product sound data is developed and how to performance optimize an air-handling unit. Topics include: space sound level targets (NC, RC), acoustical analysis, source-path-receiver method, ARI 260, cost effective noise control ideas (fan types, air handler casing, wall construction, return air path, silencers).	$30.00
246-1000	APP-CMC003-EN	Lowering Supply Air Temperatures (May, 2000)	IP Units only	This program explores the impact on system first cost and operating costs when lower air temperature principles are applied using modern-day equipment and technologies. The common concerns associated with low-temperature air systems are discussed along with strategies to address these issues. Topics include: cold air, chilled-water coil performance, fan-powered VAV boxes, vapor retarder, building pressurization, diffuser selection.	$30.00
246-1000	APP-CMC004-EN	Advanced System Control Strategies (June, 2000)	IP Units only	This program discusses key air-handling system control issues like building pressure control, system ventilation control, damper control, and various reset strategies. Advanced control ideas related to the impact of energy recovery within systems is also covered. All of these topics are discussed with an eye toward compliance with ASHRAE Standards 62 and 90.1, while maintaining comfort and minimizing system operating and life-cycle costs. Topics include: ventilation reset, dual versus single damper mixing boxes, fan-pressure optimization, optimized damper control, building pressurization control, control of air-to-air energy recovery (economizer, capacity modulation).	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC005-EN	Building Moisture and Humidity Management (August, 2000)	IP Units only	Provides a better understanding of the issue of building moisture control and the part-load dehumidification performance of various constant-volume system configurations. Other topics include: ASHRAE weather data, sensible- (peak dry bulb) and latent-design (peak dew point) conditions, psychrometric analysis (full load and part load), impact of total energy recovery, mixed-air bypass, return-air bypass, split dehumidification unit (SDU), supply air tempering (reheat), ASHRAE Standard 90.1.	$30.00
246-1000	APP-CMC006-EN	Air-to-Air Energy Recovery (October, 2000)	IP Units only	Addresses the available energy-recovery technologies; how they are applied in various systems; whether or not the investment is worth the return; and what works best and why. Topics include: sensible- versus total-energy recovery, effectiveness, balanced versus unbalanced airflows, coil loops, heat pipes, fixed-plate heat exchangers, sensible wheels (heat wheels), total-energy wheels (enthalpy wheels), psychrometric analysis (cooling and heating), equipment downsizing, frost prevention, capacity modulation, VAV systems, constant-volume systems, dedicated outdoor-air systems (cold and neutral), control modes for all these systems, ASHRAE Standard 90.1.	$30.00
246-1000	APP-CMC007-EN	Geothermal Heat Pump Systems (May, 2001)	IP Units only	By watching the program, viewers will understand the critical factors in the success of geothermal heat pump systems, consider the advantages and disadvantages, understand the economic considerations, and system variations. Topics include: conventional boiler-cooling tower WSHP system, geothermal heat pump system design process (site evaluation, loop sizing, life-cycle cost evaluation), types of geothermal heat exchangers (vertical, horizontal, spiral or slinky), surface water systems, ground temperatures, GLHEPRO loop design software, hybrid systems, ARI/ASHRAE/ISO Standard 13256-1, ASHRAE Standard 90.1.	$30.00
246-1000	APP-CMC008-EN	Dedicated Outdoor-Air Systems (September 2001)	IP Units only	By watching the program, viewers will learn when separate conditioning of ventilation air is best applied; understand the pros and cons of dedicated outdoor-air ventilation systems in comparison to other system types; and understand the code requirements. Other topics include: system configurations (neutral-to-space, cold-to-space, neutral-to-units, cold-to-units), neutral versus cold air, system design procedures, system optimization ideas, application considerations (recovered heat for reheat, after-hours humidity control, building pressurization, economizer operation, outdoor-air preconditioning with air-to-air energy recovery) and ASHRAE Standard 90.1.	$30.00
246-1000	APP-CMC009-EN	Split System Refrigerant Piping Design (December 2001)	IP Units only	A lower-cost and more reliable system is achieved by applying the “new rules” for sizing refrigerant lines with R-22 Trane scroll compressor split systems. The manufacturer should size the line whenever possible, but since some of the techniques presented in this program wouldn’t have been considered good practice in the past, it’s important to understand why. The purpose of this ENL is to learn how Trane has refocused the piping practices to achieve a less-costly and more reliable operating system; discover the traits of effective refrigerant piping; understand when to use the various line-sizing tools; and learn when and when not to use hot gas bypass.	$30.00
246-1000	APP-CMC012-EN	Coil Fundamentals (February, 2002)	IP Units only	This ENL reviews the basic principles of heat transfer and how they’re exploited in coil technology. Topics include: how chilled-water coil selections affect the entire system, how to properly apply DX coils in cooling applications, the advantages and disadvantages of face-split, row-split, and intertwined refrigerant coil arrangements, and how to avoid freeze-ups and operational problems in steam systems	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC013-EN	Commercial Building Pressurization (April, 2002)	IP Units only	This ENL reviews the basic principles of building pressure control in commercial buildings. Topics include: why control building pressure, (impact of overly positive or overly negative building pressure, what impacts building pressure? (intermittent local exhaust fan operation, airside economizer, stack effect, wind), natural relief, barometric relief (local in the space, or central at the unit), central relief fan (control options), central return fan (control options), and pressure sensor (indoor and outdoor) location and selection.	$30.00
246-1000	APP-CMC014-EN	Underfloor Air Distribution (February, 2003)	IP Units only	This ENL program discusses the benefits and issues associated with underfloor air distribution (UFAD) systems and common system configurations. Topics include: potential benefits and potential problems, floor options, type of floor diffusers, types of terminal equipment, common system configurations, and control considerations (economizer, dehumidification, heating, plenum pressure control)	$30.00
246-1000	APP-CMC015-EN	Variable-Primary-Flow Chilled-Water Systems (May, 2003)	IP Units only	This ENL program discusses variable-primary-flow (VPF) chilled-water systems. Topics include: comparison of a primary-secondary (decoupled) system to a variable-primary-flow system, advantages of VPF systems, proper selection of chillers for VPF applications, control sequence of operation, impact of VPF on plant design (series chillers, retrofit projects, manifolded or dedicated pumps, different type and size of chillers), and ASHRAE Standard 90.1 requirements.	$30.00
246-1000	APP-CMC016-EN	High Performance Schools (October, 2003)	IP Units only	This program briefly reviews common attributes of High Performance School initiatives. Topics include: government initiatives, elements of High Performance School programs, indoor air quality, contaminant source control (location of outdoor air intakes), ventilation (calculating design ventilation rates, demand-controlled ventilation), building moisture control (moisture sources, methods for minimizing moisture problems), improving dehumidification performance of HVAC system (chilled-water terminal systems, single-zone DX systems, central VAV air-handling systems), acoustics in classrooms (ANSI/ASI Standard 12.60, reverberation time, absorption, background sound), lowering background sound of HVAC system (acoustical analysis, attenuation options), challenges of financing educational priorities (capital versus operating budgets, potential sources of funding, life-cycle cost analysis).	$30.00
246-1000	APP-CMC017-EN	HVAC and LEED (February, 2004)	IP Units only	This program provides an overview of the U.S. Green Building Council's "Leadership in Energy and Environmental Design" (LEED) Green Building Rating System, with specific focus placed on how it relates to HVAC systems.	$30.00
246-1000	APP-CMC018-EN	Improving Dehumidification in Restaurants and Retail Stores (May, 2004)	IP Units only	This program discusses why humidity control is important for restaurants and retail stores (dry goods and wet goods), demonstrates how the constant-volume direct expansion (DX) equipment that is commonly used in these building types may not dehumidify adequately at part load, proposes some system designs that can offer enhanced humidity control, and discusses how ventilation requirements affect system design.	$30.00
246-1000	APP-CMC019-EN	Small Chilled-Water Systems – Design and Application (September, 2004)	IP Units only	This program discusses which small-capacity applications favor chilled water, and explains how to simplify the design, control, and operation of small chilled-water systems. For the purpose of this program, a “small” chilled-water system is less than 120 tons in capacity, and contains one or two air-cooled chillers.	$30.00
246-1000	APP-CMC020-EN	Cooling Towers and Condenser-Water Systems – Design and Operation (January, 2005)	IP Units only	Proper design of a chilled water system can greatly affect its energy use and life-cycle costs. Fine-tuning the design and operation can go a long way toward minimizing energy costs—but it also requires a good understanding of how the system components affect each other. This ENL examines cooling tower–chiller interaction at various conditions, and discusses techniques to minimize initial and/or operating costs.	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC022-EN	Energy Analysis – LEED™ Modeling (May, 2005)	IP Units only	Energy models are a critical requirement in the U.S. Green Building Council's LEED-NC rating system. Under Energy & Atmosphere (EA) Credit 1, a prospective LEED building can earn up to 10 points if the project team can demonstrate optimized energy performance. The greater the reduction in energy cost, the more points may be awarded. This program will discuss methods of building design and operation to reduce energy costs (including daylighting, HVAC design parameters, and control options) and how to earn EA Credit 1 points by effectively modeling energy-saving designs.	$30.00
246-1000	APP-CMC023-EN	ASHRAE Standard 62.1-2004: Ventilation Requirements (September, 2005)	IP Units only	In the 2004 version of ASHRAE Standard 62.1, the entire Ventilation Rate Procedure (VRP) has been revamped. This procedure is used to determine the minimum ventilation requirements for commercial, institutional, and high-rise residential buildings. The new VRP changes the requirements for breathing-zone and system-intake ventilation airflow by better accounting for the "additivity" of contaminants from different sources (people vs. building). It also details system ventilation efficiency for multiple-zone systems. This ENL takes a detailed look at the design and operation of various ventilation systems and their compliance with the new requirements.	$30.00
246-1000	APP-CMC024-EN	CO2-Based Demand-Controlled Ventilation (November, 2005)	IP Units only	The mobility of a building's occupants poses a ventilation challenge…to bring enough outdoor air into the building to help assure good indoor air quality without wasting energy by bringing in (and conditioning) too much. This ENL discusses the use of carbon-dioxide (CO2) sensors to vary outdoor airflow based on actual demand. It also considers the related requirements for compliance with ASHRAE Standard 62.1-2004.	$30.00
246-1000	APP-CMC025-EN	Variable-Speed Drives and Their Effect on HVAC System Components (February, 2006)	IP Units only	Variable-speed drives (VSDs) can save energy, but the savings may not equal "the cube of the speed" in every case. This ENL looks at how VSDs affect the performance of pumps, cooling-tower fans, air-handler fans, and chillers, and discusses the differences in VSD control in each of these applications	$30.00
246-1000	APP-CMC026-EN	HVAC Systems and Airside Economizers (May, 2006)	IP Units only	Airside economizers can lower annual energy costs by using outdoor air to help satisfy the building cooling load. This ENL discusses their use and control in constant- and variable-volume airside systems. It also considers the implications of the energy-use requirements in ASHRAE Standard 90.1 for airside economizing.	$30.00
246-1000	APP-CMC027-EN	HVAC Design for Places of Assembly (September, 2006)	IP Units only	Places of assembly such as auditoriums, gymnasiums and houses of worship create design and operational challenges for HVAC systems. Loads and ventilation requirements due to the number of people in the space are a challenge for any HVAC system. However, these issues can be overcome with proper system knowledge, design and operation.	$30.00
246-1000	APP-CMC028-EN	Energy-Saving Strategies for Rooftop VAV Systems* (November, 2006)	IP Units only	Rooftop variable-air-volume (VAV) systems are used to provide comfort in a wide range of building types and climates. This ENL discusses HVAC system design and operating strategies that can save energy in these systems. Topics include: high efficiency equipment, air-to-air energy recovery, relief fan vs. return fan, evaporative condensing, hot gas bypass, hot gas reheat, maintenance program, fan-powered VAV, single-zone VAV, airside economizer, fan-pressure optimization, optimum start, optimum stop, supply-air-temperature reset, ventilation optimization (demand-controlled ventilation, ventilation reset), TRACE 700.	$30.00
246-1000	APP-CMC029-EN	Waterside Heat Recovery (February, 2007)	IP Units only	Green building initiatives, coupled with changes in building codes and standards, have renewed interest in applications that recover condenser heat from water-cooled chillers. This ENL describes how waterside energy recovery works, what is necessary for implementation, and identifies system-level characteristics for effective operation and control	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC030-EN	Improving Dehumidification in HVAC Systems (September, 2007)	IP Units only	Managing humidity should be a key design consideration in any HVAC application. This ENL will discuss the challenge of dehumidifying at part load, for both chilled-water and cycling compressor systems, and describe ways to improve the dehumidification performance of commonly-used HVAC systems. Topics include: modulating chilled water coil, cycling compressors, impact of ventilation, impact of oversizing, total-energy recovery, cool-reheat (hot gas reheat, condenser water heat recovery), face-and-bypass dampers (mixed-air bypass, return-air bypass), reduce airflow (multi-speed fan, VAV, single-zone VAV), dual paths (dedicated outdoor-air system, split dehumidification unit or SDU), desiccants (CDQ), and TRACE 700 humidity modeling and reports.	$30.00
246-1000	APP-CMC031-EN	LEED® Case Studies (November, 2007)	IP Units only	As of the program date, the number of LEED certified buildings stands at over 800, with more than 6,500 additional buildings in the pipeline for certification. With USGBC's aggressive goal of having 100,000 certified buildings by 2010 there is no doubt this will be a major impact on the built environment. Sustainable design, construction, and operation will be increasingly requested by building owners. This ENL will provide an in-depth review of LEED certified projects in a variety of building types and geographic locations. Unlike the previous LEED-related programs, this ENL provides interviews with various project stakeholders to review LEED credits that were obtained for each project, the original design intent, challenges and lessons learned.	$30.00
246-1000	APP-CMC032-EN	Energy-Saving Strategies for LEED® and the Energy Policy Act* (May, 2008)	IP Units only	According to the U.S. Green Building Council (USGBC), buildings account for 36 percent of the energy used in the United States. This ENL program discusses energy-saving strategies to implement for various HVAC system types, and quantifies the impact of each toward achieving LEED points under the "Optimize Energy Performance" credit. It includes a detailed review of an energy modeling study conducted to demonstrate the potential energy cost savings (for various strategies, climate zones, and HVAC system types) for achieving LEED points and demonstrates how these same strategies can help the building owner qualify for tax deductions through the Energy Policy Act. The presentation provides design engineers with a better understanding of the "big picture" of building energy use, including the impact of the building envelope, lighting, plug loads, and processes and covers common mistakes made when modeling for LEED points.	$30.00
246-1000	APP-CMC033-EN	Small Chilled-Water Systems – Part II (September, 2008)	IP Units only	More than 80 percent of new buildings in the U.S. are less than 25,000 square feet and almost all buildings are less than 200,000 square feet. This program identifies challenges and opportunities for chilled-water systems in these buildings from 20 to 500 tons. In addition, many low-rise buildings seeking LEED certification have traditionally not been strong candidates for chilled-water systems. If they are 150,000 square feet or less, their baseline for achieving LEED points under EAc1 will not be a chilled-water system. However, these applications may find it easier to beat their baseline and earn more points if they consider a chilled-water system.	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC034-EN	ASHRAE Standards 62.1 and 90.1, and VAV Systems* (November, 2008)	IP Units only	Many designers want to comply with both Standard 62.1 and Standard 90.1. Requirements from both standards have been incorporated into many building codes, and the minimum requirements of both standards must be met as prerequisites to LEED certification. In attempting to comply with the ventilation requirements of Standard 62.1 AND the energy-limiting requirements of Standard 90.1, some designers have concluded that it's next to impossible to do so using traditional VAV systems. While in some specific cases these designers might be right, in most cases they are not right. In this program, the immediate past Chair of SSPC 62.1 (Dennis Stanke), the immediate past Chair of SSPC 90.1 (Mick Schwedler), and the one of the authors of the VAV-related sections in the User Manuals for both standards (Steve Taylor), discuss the potentially conflicting requirements and design choices	$30.00
246-1000	APP-CMC035-EN	LEED® 2009 Modeling and Energy Analysis* (March, 2009)	IP Units only	USGBC's LEED 2009 green building certification program was released in January this year. This presentation will cover the major changes in LEED 2009 and how they impact the HVAC practitioner. Chair of SSPC 90.1, Mick Schwedler, Scott Hintz of the Trane CDS support group and Chris Hsieh cover new regional credits, re-weighting of credit points, changes to the LEED AP credentialing and maintenance program, new modeling features that can help gain LEED points and much more.	$30.00
246-1000	APP-CMC036-EN	Ice Storage System Design and Application* (May, 2009)	IP Units only	Thermal storage, specifically ice storage, is not only an easy way to store energy but it is reemerging as a valuable energy and energy cost saving technology for building owners. This presentation provides a bit of theory and application, then demonstrates the design steps for a small ice storage system from layout to operation and control. Presenters discuss how to make it affordable, expose hidden costs that may raise ROI, and identify and address the most common stumbling blocks.	$30.00
246-1000	APP-CMC037-EN	Air-Handling Systems, Energy, and IAQ* (November, 2009)	IP Units only	Air-handling systems are key elements for building comfort and air quality, but they use energy. How much energy? The answer depends on system configuration and control strategies. This program presents various design and control strategies that can help reduce energy use, along with some interesting new technologies for improving indoor air quality (IAQ).	$30.00
246-1000	APP-CMC038-EN	Fans In Air-Handling Systems* (March 2010)	IP Units only	Fans used in air-handling systems often have significant impact on energy use and acoustics. How much of an impact depends on how a fan is selected, installed and operated. Presentation covers fan performance curves and fan laws, different fan types (fan blade shape, housed vs. plenum fans, direct-drive plenum fans, fan arrays), how a fan interacts with various types of systems, considerations when selecting a fan (efficiency, acoustics, footprint) and ASHRAE Standard 90.1 fan power limitations. The discussion will help you determine the best fan selection based on the requirements of your specific application.	$30.00
246-1000	APP-CMC039-EN	Central Geothermal Systems* (May 2010)	IP Units only	Most designers are familiar with heat pump systems, using small, "geothermal" heat pumps, distributed throughout the building, that are coupled with a ground source heat exchanger. Project teams are also considering central geothermal systems consisting of one or two chillers coupled with a closed, geothermal loop which exchanges heat with the earth. These systems offer premium energy efficiency, with the additional benefit of centralized maintenance, acoustic advantages, and flexibility.	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC040-EN	ASHRAE Standard 90.1-2010* (October 2010)	IP Units only	ASHRAE Standard 90.1-2010 was published in November 2010 with an aggressive goal of 30 percent energy-cost savings over the 2004 version of the standard. Trane experts on the 90.1 committee share their insights on the new requirements and implementation. This program discusses the major change with specific emphasis on mechanical-related system design, control and modeling, mechanical updates, including equipment efficiencies, design requirements for waterside, airside and ventilation, control updates for system design and operation, modeling changes for Appendix G baseline definitions and proposed buildings and summaries for lighting, envelope and other changes.	$30.00
246-1000	APP-CMC041-EN	Upgrading Existing Chilled-Water Systems (March 2011)	IP Units only	Existing chilled-water systems provide the capability to cool buildings efficiently. Yet there are often ways that these existing systems can be upgraded and improved to increase efficiency and better serve building occupants. In this presentation we discuss chiller retrofits and replacement; explore different design parameters (flow rates and temperatures) and the opportunities they offer existing systems; examine use of variable flow in existing systems; and consider controls to optimize and reduce system energy use	$30.00
246-1000	APP-CMC042-EN	High Performance VAV Systems (June 2011)	IP Units only	Variable-air-volume (VAV) systems have been used to provide comfort in a wide range of building types and climates. This ENL will discuss design and control strategies that can significantly reduce energy use and ensure proper ventilation in VAV systems. Topics include: ventilation system design and control, optimized VAV system controls, cold air distribution, other energy-saving strategies, and dehumidification enhancements.	$30.00
246-1000	APP-CMC043-EN	Dedicated Outdoor-Air Equipment (October 2011)	IP Units only	Previous ENLs have discussed system design and control considerations for dedicated outdoor-air systems. This ENL will shift the discussion to the various types of equipment used for dedicated OA conditioning, from packaged DX units to split DX systems to air handlers and water chillers.	$30.00
246-1000	APP-CMC044-EN	High-Performance Green Buildings: ASHRAE Standard 189.1-2011 (March 2012)	IP Units only	More and more building owners and municipalities want a standard for buildings which exceed minimum building codes. ASHRAE Standard 189.1-2011 Design of High-Performance Green Buildings addresses this demand. It's a mandatory-language code-intended standard with provisions related to building sites, water use, energy efficiency, general environmental impact, and indoor environmental quality. This ENL presents an overview of the standard and provides some insight regarding its potential impact on future building codes and building designs.	$30.00
246-1000	APP-CMC045-EN	Energy-Saving Strategies for Water-source and Ground-source Heat Pump Systems (June 2012)	IP Units only	This ENL discusses HVAC system design and control strategies that can save energy in water-source heat pump (WSHP) and ground-source heat pump (GSHP) systems. Topics include the latest technologies being used in heat pumps, design and control of the water distribution loop and dedicated outdoor-air system, ground-source systems, and a review of the requirements in ASHRAE Standard 90.1 that apply to WSHP/GSHP systems.	$30.00
246-1000	APP-CMC046-EN	Air-to-Air Energy Recovery (October 2012)	IP Units only	With the increased focus on reducing energy use in buildings, more projects are considering the use of air-to-air energy recovery. And energy codes are evolving to require energy recovery in more applications. This ENL will discuss the various technologies used for air-to-air energy recovery and the importance of properly controlling these devices in various systems types.	$30.00
246-1000	APP-CMC047-EN	ASHRAE Standard 62.1-2010 (February 2013)	IP Units only	The 2010 version of ASHRAE Standard 62.1 will likely be the basis for the next version of the International Mechanical Code, and it is expected to be a prerequisite for version 4 of the LEED Green Building Rating System. This ENL provides an update of the 2010 version of the standard, and focus on the Ventilation Rate Procedure for calculating zone and system ventilation airflows.	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC048-EN	Single-Zone VAV Systems (April 2013)	IP Units only	Recent changes to ASHRAE Standard 90.1 require single-zone VAV systems in some applications. This ENL reviews these new requirements, discusses the benefits of single-zone VAV systems (energy savings, better part-load dehumidification, and lower part-load sound levels), identifies common applications for this system, and discusses ways to address application-related challenges (air distribution, demand-controlled ventilation, and building pressure control). In addition, we review a case study of a retrofit project where a constant-volume rooftop unit was replaced with a single-zone VAV unit.	$30.00
246-1000	APP-CMC049-EN	All-Variable-Speed Chilled-Water Plants (October 2013)	IP Units only	Variable frequency drives (VFDs) are being used on all chilled-water system components (fans, pumps, and chillers), and for good reason. When systems are properly designed and controlled, they offer the opportunity for significant energy savings as well as improved operation. With these new opportunities come new complexities. This ENL discusses all-variable-speed chilled-water system design and control. Discussion will include individual component and system performance as well as system design options and control.	$30.00
246-1000	APP-CMC050-EN	LEED v4 (March 2014)	IP Units only	LEED continues to thrive with more than 1.6 million square feet of space certified every day. In this ENL, Trane applications engineers will discuss changes in the latest version of LEED and how they impact HVAC practitioners.	$30.00
246-1000	APP-CMC051-EN	Applying Variable Refrigerant Flow (May 2014)	IP Units only	This program discusses some of the challenges of applying a variable refrigerant flow (VRF) system, such as complying with ASHRAE Standards 15 and 90.1, meeting the ventilation requirements of ASHRAE Standard 62.1, and zoning to maximize the benefit of heat recovery. In addition, we review the current state of modeling VRF in energy simulation software.	$30.00
246-1000	APP-CMC052-EN	Chilled Water Terminal Systems (Oct 2014)	IP Units only	Trane applications engineers discuss system design and control strategies for various types of chilled-water terminal systems, including fan-coils, chilled beams, and radiant cooling. Topics include: types of terminal equipment, variable-speed terminal fan operation, dedicated OA system design, chilled-water system design, and complying with ASHRAE 90.1 requirements	$30.00
246-1000	APP-CMC053-EN	Variable-Speed Compressors On Chillers (Mar 2015)	IP Units only	Trane applications engineers discuss the operational, performance and application differences for centrifugal (dynamic compression) and helical-rotary (positive displacement) compressors. Discussion includes an overview of how variable-speed drives affect chilled-water system components, physics of centrifugal compressor chillers and screw compressor chillers, applications that benefit from each technology, importance of proper life-cycle analysis and application considerations to leave the viewer with an understanding of which technologies bring real value to different system applications.	$30.00
246-1000	APP-CMC054-EN	Coils Selection and Optimization (May 2015)	IP Units only	Trane engineers discuss the application, selection, and optimization of both chilled-water and hot-water coils. Topics include a discussion about the impact of both water and air velocities on coil performance, a review of example selections for chilled-water and hot-water coils to demonstrate the tradeoffs of cost, pressure drop, and capacity, and an overview of various methods to prevent water coils from freezing during cold weather.	$30.00
246-1000	APP-CMC055-EN	Evaluating Sound Data (May 2015)	IP Units only	Sound data is the foundation of acoustical analysis and it is often used for comparing equipment from different manufacturers. Unfortunately not all manufacturers present sound data in the same format. In this ENL, Trane Applications Engineers focus on clarifying sound data terms and weighting methods so that the differences in sound data presentation are apparent. Examples of the common mistakes made when comparing chillers, air-handlers, VAV units, and fan coils are discussed.	$30.00

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	APP-CMC056-EN	Chilled-Water System Design Trends (October 2015)	IP Units only	Improved technology and controls for chilled-water systems over the past several years enable these types of systems to do more and save more. This ENL reviews recent advancements in technology and trends due to these developments, system strategies that can take advantage of the latest technology and when various system strategies should be used. Consideration will be given to: variable primary, primary secondary, constant flow, series chillers, chilled water reset, pump pressure optimization, flow rates and turndown, heat exchanger types, and the components of air- and water-cooled systems.	$30.00
				HVAC SYSTEM DESIGN TOOLS	
246-1000	94.24	Ductulator® (1998)	Dual units (IP/SI)	Hand held rotating calculator used for sizing supply and return duct systems using the equal friction design method. Includes scales for friction loss per unit length, air volume, air velocity, round duct diameter, and rectangular duct diameters. One side uses I-P units, the other side uses SI units. Includes a protective sleeve with ASHRAE recommended design air velocities for system components/applications.	$10.00
246-1000	1-43.190	Psychrometric Chart (1983) - standard altitude (29.921 in. Hg) - 11” x 17” pad of 25 sheets - Includes "coil curves"	I-P Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$7.50
246-1000	1-43.191	Psychrometric Chart (1983) - standard altitude (29.921 in. Hg) - (1) 11” x 17” laminated chart - Includes "coil curves"	I-P Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$15.00
246-1000	1-43.192	Psychrometric Chart (1983) - standard altitude (29.921 in. Hg) - 11” x 17” pad of 25 sheets - Includes "coil curves"	I-P Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$5.00
246-1000	1-43.195	Psychrometric Chart (1983) - high altitude (24 in. Hg) - 8.5” x 11” pad of 25 sheets - Includes "coil curves"	I-P Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$5.00
246-1000	1-43.196	Psychrometric Chart (1983) - standard altitude (101 kPa) - 11” x 17” pad of 25 sheets - Includes "coil curves"	SI Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$7.50

SIN	Order Number [ORDER FORM on Web]	Title (Publication Date)	IP or DUAL Units	Abstract	GSA Price
246-1000	1-43.197	Psychrometric Chart (1983) - standard altitude (101 kPa) - (1) 11” x 17” laminated chart	SI Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$15.00
246-1000	OSA 214 E	Psychrometric Chart (1996) - standard altitude (101 kPa) - 8.5” x 11” pad of 25 sheets - SI units - Includes "coil curves"	SI Units	Chart used for determining properties of moist air and analyzing air conditioning processes.	$7.50
246-1000	1-43.198	Equilibrium Chart for Lithium Bromide Solutions (1983) - (1) 11” x 17” laminated chart	I-P Units	Chart used for determining properties of a lithium bromide solution used in the absorption refrigeration cycle.	$15.00

GSA Pricing of Labor

SIN	Reference Number	Trane Position Title	Service Contract Labor Standards	Description	GSA Price			
					West	Central	Northeast	Southeast
246-1000/ 246-51	S020	HVAC Field Technician	Non-Exempt	Functional Description: Responsible for retrofit and repair of environmental-comfort systems, utilizing knowledge of air conditioning theory, pipe fitting, and mechanical layouts. **Minimum Experience:** Typically requires 5 years of related experience. **Minimum Education:** Associate's degree or equivalent from a Technical/Trade School with a certificate in Heating, Ventilation, and Air Conditioning and five (5) years related experience; or seven (7) years related experience; or equivalent combination of education and experience.	**$153.86**	**$187.59**	**$187.12**	**$144.00**
246-1000/ 246-51	S021	HVAC Field Technical – Apprentice	Non-Exempt	Functional Description: Assists HVAC Field Technicians in the installation and repair of environmental control systems, utilizing knowledge of refrigeration theory, control systems, pipe fitting, and structural layouts. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school with a certificate in Heating, Ventilation, and Air Conditioning; or six months to one-year related experience and/or training; or equivalent combination of education and experience.	**$133.60**	**$161.58**	**$148.00**	**$132.82**
246-1000/ 246-51	S022	HVAC Field Technician – Team Leader	Non-Exempt	Functional Description: Performs and directs HVAC Field Technicians who accomplish the repair/retrofit/replacement installation of environment comfort systems, utilizing knowledge of air conditioning theory, pipe fitting and mechanical layouts. **Minimum Experience:** Typically requires 5 years of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school with a certificate in Heating, Ventilation, and Air Conditioning; and five (5) years HVAC experience, or equivalent combination of education and experience. Must have knowledge of various HVAC products, systems, electronics, and pneumatic controls.	**$192.81**	**$196.60**	**$219.11**	**$160.56**
246-1000/ 246-51	S049	HVAC Field Technician – Senior	Non-Exempt	Functional Description: Applies training, knowledge and experience of HVAC systems at a Journeyman level HVAC Service Technician. Performs all work in the service and maintenance field on all major types of equipment, and is responsible for retrofit and repair of environmental-comfort systems, utilizing knowledge of air conditioning theory, pipe fitting, and mechanical layouts. **Minimum Experience:** Typically requires 7 years of related experience. **Minimum Education:** Associate's degree (A.A.) or equivalent from a technical / trade school with a certificate in Heating, Ventilation, and Air Conditioning and seven (7) years related experience; or ten (1) years related experience; or equivalent combination of education and experience.	**$177.11**	**$190.12**	**$195.27**	**$155.52**

GSA Pricing of Labor

SIN	Reference Number	Trane Position Title	Service Contract Labor Standards	Description	GSA Price			
					West	Central	Northeast	Southeast
246-1000/ 246-51	S118	Project Administrator – Service	Non-Exempt	Functional Description: Possesses project documentation, materials, job costing, status monitoring, invoicing, and administrative closeout of a service project. This position is required to closely interact with the Project Manager and assigned project staff to ensure the timely completion of services scope of work. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** One-year certificate from college or technical school; or six (6) months to two (2) years or related experience and/or training; or equivalent combination of education and experience. Familiarity with the operation of Energy Management Systems, HVAC Systems, and/or Temperature Controls preferred.	**$128.80**	**$115.99**	**$121.21**	**$119.99**
246-1000/ 246-51	S154	Service Helper	Non-Exempt	Functional Description: Assists HVAC Field Technicians in routine maintenance and inspections on existing systems. **Minimum Experience:** Typically requires 1 year of related experience involving building trades or operation and service to buildings or HVAC. **Minimum Education:** High School Diploma or GED.	**$131.03**	**$128.99**	**$135.95**	**$135.02**
246-1000/ 246-51	S082	Project Engineer II – Controls	Exempt	Functional Description: Performs hardware and software design activities for building automation systems. Applies engineering principles and practices for work on assigned projects. Designs cost effective control solutions to meet project requirements. Works directly on the project team to assist the Project Manager with project commissioning. **Minimum Experience:** Typically requires 3-6 years of related experience. **Minimum Education:** Bachelor's degree in Engineering and 3-4 years experience; or Associate's degree or equivalent from two-year college or technical school in electrical engineering and a certificate in HVAC or AAS and BAS in electrical engineering and 5-6 years related experience; or equivalent combination of education and experience.	**$275.40**	**$162.82**	**$156.48**	**$196.68**
246-1000/ 246-51	S083	Project Engineer II – Energy	Exempt	Functional Description: Performs technical analysis, review, measurement, and verification of financially guaranteed projects. Provides technical analysis and review for performance monitoring or contracts, and applies engineering principles and practices on assigned projects. **Minimum Experience:** Typically requires 3 years of related experience. **Minimum Education:** Bachelor's degree in Engineering and three (3) years experience; or equivalent combination of education and experience. Knowledge and experience with HVAC, control, electrical systems and proficiency with energy analysis tools such as TRACE and system analyzer. Working knowledge of cost and savings studies incorporating energy conservation measures.	**$278.94**	**$206.28**	**$239.31**	**$166.08**

TRANE

GSA Pricing of Labor

SIN	Reference Number	Trane Position Title	Service Contract Labor Standards	Description	GSA Price			
					West	Central	Northeast	Southeast
246-1000/ 246-51	S084	Project Engineer II – Systems	Exempt	Functional Description: Performs complex planning, estimating and design activities for the layout of equipment, commercial and industrial facilities. Determines the scope of projects, estimates cost, designs and documents HVAC and electrical systems and procures components. Works directly on the project team to assist the Project Manager with project commissioning. **Minimum Experience:** Typically requires 3-6 years of related experience. **Minimum Education:** Bachelor's degree in Engineering and 3-4 years related experience; or Associate's degree (A.A.) or equivalent from two-year college or technical school in electrical engineering and a certificate in HVAC or AAS and BAS in electrical engineering and 5-6 years related experience; or equivalent combination of education and experience.	**$278.94**	**$170.66**	**$239.31**	**$166.06**
246-1000/ 246-51	S085	Project Manager – Controls	Exempt	Functional Description: Manages all aspects of HVAC control projects, from beginning to end, with direct responsibility for project execution while leading a team, or teams, to accomplish specific objectives in a given time frame and with available resources. Responsible for the administration, implementation, and management of HVAC control projects. Ensures assigned projects' scope of work, schedule, and budget are achieved. **Minimum Experience:** Typically requires 2-6 years of related experience. **Minimum Education:** Bachelor's degree in Electrical or Mechanical Engineering or Construction Management with a minimum of two (2) years of project management, controls, HVAC or related experience, or a minimum of six (6) years of project management, controls, HVAC or related experience; or an equivalent combination of education and experience.	**$223.17**	**$210.05**	**$190.73**	**$195.59**
246-1000/ 246-51	S089	Project Manager – Contracts	Exempt	Functional Description: Manages all aspects of HVAC contract projects, from beginning to end, with direct responsibility for project execution while leading a team, or teams, to accomplish specific objectives in a given time frame and with available resources. Responsible for the administration, implementation, and management of control projects. Accountable for assigned projects' scope of work, schedule, and budget. **Minimum Experience:** Typically requires 2-6 years of related experience. **Minimum Education:** Bachelor's degree in Electrical or Mechanical Engineering or Construction Management with a minimum of two (2) years of project management, HVAC (systems, equipment, installation or service) or related experience, or a minimum of six (6) years or project management, HVAC (systems, equipment, installation, or service) or related experience; or an equivalent combination of education and experience.	**$238.41**	**$178.54**	**$197.67**	**$196.21**

TRANE

GSA Pricing of Labor

SIN	Reference Number	Trane Position Title	Service Contract Labor Standards	Description	GSA Price			
					West	Central	Northeast	Southeast
246-1000/ 246-51	S104	Project Engineer Team Leader	Exempt	Functional Description: Performs hardware and software design activities for building automation systems. Applies engineering principles and practices for work on assigned projects. Designs cost effective control solutions to meet project requirements. Works directly with the project team to assist with project commissioning. Directs and assists other project engineers on the team related to opportunities and obstacles in managing the engineering workload. Possesses a familiarity with the concepts of new construction, renovation/retrofit; performance contracting, and service project management. **Minimum Experience:** Typically requires 2-4 years of related experience. **Minimum Education:** Bachelor's degree in engineering and two (2) to three (3) years experience; or Associate's degree or equivalent from two-year college or technical school in electrical engineering and a certificate in HVAC or AAS and BAS in electrical engineering and three (3) to four (4) years related experience; or equivalent combination of education and experience.	**$278.94**	**$209.78**	**$239.31**	**$196.68**
246-1000/ 246-51	S119	Project Administrator – Contracting	Non-Exempt	Functional Description: Responsible for project set-up, document control, data entry, billing, contract monitoring, and administrative closeout of each project. This position is required to closely interact with the Project Manager and assigned project staff to assist with the timely completion of each project. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** One-year certificate from college or technical school; or six (6) months of related experience and/or training; or equivalent combination of education and experience. Familiarity with the operation of Energy Management Systems, HVAC Systems and/or Temperature Controls preferred.	**$123.02**	**$133.11**	**$150.22**	**$133.58**
246-1000/ 246-51	S120	Computer Aided Drafter	Non-Exempt	Functional Description: Responsible for creating computer aided design (CAD) drawings using standard CAD digitizing techniques and skills. Also responsible for the system graphics required to support automation systems design. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** Associate's degree from college or technical school in Computer-Aided Design or Drafting; or at least six (6) months related experience and/or training; or equivalent combination of education and experience. Working knowledge of AutoCAD or other computer aided design, Microsoft Office software required.	**$132.02**	**$92.05**	**$107.18**	**$89.58**
246-1000/ 246-51	S121	Controls Technician	Non-Exempt	Functional Description: Performs more complex commissioning, diagnosis, and repair of environmental-control systems, utilizing knowledge of electronics, direct digital control, airflow, hydronics, refrigeration theory, and control techniques. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school or six (6) months experience in control systems; or equivalent combination of education and experience.	**$172.85**	**$159.98**	**$187.59**	**$166.50**

GSA Pricing of Labor

SIN	Reference Number	Trane Position Title	Service Contract Labor Standards	Description	GSA Price			
					West	Central	Northeast	Southeast
246-1000/ 246-51	S152	Controls Technician – Entry Level	Non-Exempt	Functional Description: Performs and assists under direction complex commissioning, diagnosis, and repair of environmental-control systems, utilizing knowledge of electronics, direct digital control, airflow, hydronics, refrigeration theory, and control techniques. Performs these tasks on simple control projects. **Minimum Experience:** Typically requires 6 months of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school or six (6) months experience in control systems; or equivalent combination of education and experience.	**$172.85**	**$137.90**	**$154.25**	**$165.43**
246-1000/ 246-51	S167	Project Engineer I – Systems	Non-Exempt	Functional Description: Project development - Performs planning, estimating and design activities for the layout of equipment, commercial and industrial facilities. Assists in determining the scope of projects, estimates cost, designs and documents HVAC and electrical systems and procures components. Works directly on the project team to assist the Project Manager with project commissioning. **Minimum Experience:** Typically requires 4-5 years of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school in electrical engineering and a certificate in HVAC or AAS and BAS in electrical engineering and 4-5 years related experience; or equivalent combination of education and experience.	**$114.77**	**$117.26**	**$162.35**	**$143.16**
246-1000/ 246-51	S168	Project Engineer I – Energy	Non-Exempt	Functional Description: Project development - provides technical analysis and review for performance monitoring on contracts. Applies knowledge of technology and applications on assigned projects. **Minimum Experience:** Typically requires 5-6 years of related experience. **Minimum Education:** Knowledge and 5-6 years experience with HVAC, control, electrical systems and proficiency with energy analysis tools such as TRACE and system analyzer. Working knowledge of cost and savings studies incorporating energy conversation measures.	**$114.77**	**$117.26**	**$162.35**	**$143.16**
246-1000/ 246-51	S169	Project Engineer I – Controls	Non-Exempt	Functional Description: Project development which includes applying engineering principles and practices on assigned projects. Designs cost effective control solutions to meet project requirements. Works directly on the project team to assist with project commissioning. **Minimum Experience:** Typically requires 4-5 years of related experience. **Minimum Education:** Associate's degree or equivalent from two-year college or technical school in electrical engineering and a certificate in HVAC or AAS and BAS in electrical engineering and 4-5 years related experience; or equivalent combination of education and experience.	**$114.77**	**$117.26**	**$142.06**	**$143.16**

Labor Categories under SIN 246-1000 Ancillary Services and SIN 246-51 Installation Involving Construction

The rates shown above are for labor services performed during standard work hours and are the GSA ceiling rates (maximum price) for the region. These rates are adjusted to the Trane Commercial Sales Office (CSO) within the region where the work will be performed. An overtime premium is not charged for exempt overtime labor services (See Service Contract Act Exempt / Non-Exempt listing). That is not the case for non-exempt positions.

Overtime Rates. For NE labor services performed after the standard workday (typically 5:00pm), the published rates in appendices do not apply and this Standard-Time (ST) rate should be multiplied by 1.5 to obtain the Over-Time (OT) rate for applicable NE job descriptions. Saturday after noon (12pm), Sunday and holiday work is at Premium-Time (PT). It is typically double-time (standard rate is multiplied by 2.0). These premium rates are charged unless it is established up front that there will be a work week change, for example, the workweek for services will be Sunday to Thursday. This must be negotiated and agreed to by both parties up front. Also, some work on Saturdays may be considered. West = States of Arizona, Alaska, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oklahoma, Oregon, Texas, Utah, Washington, Wyoming
Central = States of Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
Northeast = States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia, Washington DC Southeast = States of Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia

GSA Pricing of Labor
GSA Hourly Billing Rates (Davis Bacon Act)

SIN	Reference Number	Labor Category	Wage Determination	GSA Price			
				West	Central	Northeast	Southeast
246-51	DB01	Acoustical Installer	Davis Bacon Act	$90.19	$126.84	$117.58	$60.90
246-51	DB02	Carpenters	Davis Bacon Act	$87.68	$126.84	$117.58	$60.90
246-51	DB03	Mason/Concrete Finisher	Davis Bacon Act	$63.66	$127.76	$99.16	$64.85
246-51	DB04	Drywall Hanger	Davis Bacon Act	$82.76	$126.84	$117.58	$54.66
246-51	DB05	Electrician	Davis Bacon Act	$128.98	$149.66	$125.81	$92.48
246-51	DB06	Floor Laying Carpet	Davis Bacon Act	$57.46	$114.70	$109.65	$54.78
246-51	DB08	Glazier	Davis Bacon Act	$136.28	$124.30	$106.84	$50.74
246-51	DB09	Ironworker – Reinforcing	Davis Bacon Act	$85.77	$118.04	$128.03	$90.90
246-51	DB10	Ironworker - Structural	Davis Bacon Act	$85.77	$140.90	$128.03	$90.90
246-51	DB11	Laborer	Davis Bacon Act	$58.74	$113.37	$83.85	$47.42
246-51	DB12	Mechanical Insulator	Davis Bacon Act	$58.74	$131.43	$136.05	$52.76
246-51	DB13	Painters	Davis Bacon Act	$77.45	$104.53	$108.12	$55.84
246-51	DB14	Plasters	Davis Bacon Act	$77.92	$127.76	$99.16	$60.90
246-51	DB15	Plasterer Tender	Davis Bacon Act	$58.74	$99.65	$83.85	$54.66
246-51	DB16	Plumbers & Pipefitters	Davis Bacon Act	$127.53	$166.26	$148.72	$98.21
246-51	DB17	Roofer	Davis Bacon Act	$56.11	$121.38	$137.12	$52.01
246-51	DB18	Sheet Metal Worker	Davis Bacon Act	$136.28	$155.33	$138.82	$69.95
246-51	DB19	Welders – Building	Davis Bacon Act	$127.53	$166.26	$148.72	$98.21

NOTES ON OVERTIME:

Davis Bacon Act Labor Categories under SIN 246-51 Installation Involving Construction

The rates shown are for labor services performed during standard work hours and are the GSA ceiling rates (maximum price) for the region. These rates are adjusted to the Trane Commercial Sales Office (CSO) within the region where the work will be performed. Since all of these labor categories are listed on the Davis-Bacon Act wage determinations, an overtime premium will be charged for these services.

Overtime Rates. If the labor categories listed in this price list are performed after the standard eight (8) hour workday, the rates above do not apply and this Standard-Time (ST) rate should be multiplied by 1.5 to obtain the Over-Time (OT) rate for the applicable labor category. Holiday work is at Premium-Time (PT). It is typically double-time (standard rate is multiplied by 2.0). These premium rates are charged unless it is established up front that there will be a work week change, for example, the workweek will be Sunday to Thursday. This must be negotiated and agreed to by both parties up front and must be complaint with DBA provisions.

TRACE™ 700 (CDS-PKG-C)

As a systems and services provider, we understand the challenges of designing the most efficient, lowest cost HVAC system solution. That's why we developed Trane Air Conditioning Economics, or TRACE™—an award-winning design-and-analysis software program that helps HVAC professionals optimize the design of a building's heating, ventilating and air-conditioning system based on energy utilization and life-cycle cost.

TRACE 700 helps you compare the energy and economic impact of building-related selections such as architectural features, HVAC systems, HVAC equipment, building utilization or scheduling, and financial options.

Compared with other economic analysis software, TRACE 700 advantages include:

Extensive Modeling Functionality

Choose from over 50 airside systems, air- and waterside economizers, advanced chiller plant configurations, water-source and central and distributed ground-source systems, VRF and UFAD systems, dedicated outdoor-air systems and optimized control strategies.

Integration

ASHRAE Standard 90.1 equipment and envelope libraries, gbXML (green build XML) imports, weather files, templates, ASHRAE 62.1-2010 Ventilation Rate Procedure, Building Information Modeling (BIM) and more.

Compliance

TRACE 700 complies with Appendix G for Performance Rating Method of ASHRAE Standard 90.1-2007 and 2010 for LEED analysis, and was the first simulation software approved by the IRS for energy-savings certification (EPAct). TRACE is also tested in compliance with ANSI/ASHRAE Standard 140-2011 and 2014. As such, TRACE is qualified for the 179D Commercial Building Tax Credits.

TRACE 700 Program Features

The TRACE™ 700 Advantage

TRACE 700 enables building designers to optimize the building, system and equipment designs on the basis of energy utilization and life-cycle cost. The Trane software for TRACE 700 facilitates analysis of the energy and economic effects of virtually any chiller plant configuration by allowing users to manipulate a wide range of variables and create a profile of their specific building.

Select System Features

Underfloor air distribution systems
Active and passive chilled-beam systems
Displacement ventilation systems
Variable refrigerant flow systems
Dedicated outdoor air systems
Airside economizers
Optimum stop/start
Fan-pressure optimization
ASHRAE Standard 62.1/CO2 -based, demand-controlled ventilation (DCV)
Energy recovery (total-energy wheel, Trane CDQ, coil-runaround loop)
Supply-air-temperature reset
Drag-and-drop room assignments
Optimal chiller sequencing

Select Equipment Features

Chiller Plant Wizard (decoupled arrangement, parallel series, variable-primary flow, switchover control)
Cogeneration
Thermal energy storage
Direct-fired absorption chillers
Low-flow chilled water
Free cooling (plate-and-frame, refrigerant migration, strainer cycle, double-bundle heat recovery)
Cooling tower with VFD
Chiller-tower optimization
Domestic hot water
Sophisticated evaporative cooling

Multiple Equipment Types

Air/water-cooled chillers
Air/water-cooled unitary
Water-source heat pumps
Ground-source heat pumps

Boilers
Electric resistance heat
Gas-fired heat exchanger

Equipment Library

Default Equipment
ASHRAE Standard 90.1-2004
ASHRAE Standard 90.1-2007
ASHRAE Standard 90.1-2010

TRACE 700 Integration

Templates allow same room criteria to be entered once and applied to (or changed in) an unlimited number of rooms.
Building Information Modeling (BIM) in the form of a gbXML import from CAD (e.g. Revit), allows users to conduct extensive load and energy calculations in TRACE 700.
Choose from nearly 500 pre-defined **weather locations** or import weather data from TMY, TMY2,TMY3, TRY, WY2, CEC, CTZ, CWC, and IWEC files. Models can be calculated using a reduced year weather file allowing for quick results or a full-year model can be run accounting for every hour of the year. View the list of International weather data.
ASHRAE Standard 170 calculate ventilation requirements for healthcare facilities per Standard 170, Standard 62.1 or a combination of both.
ASHRAE Standard 62 Ventilation Rate Procedure during the design process to calculate the correct amount of outdoor air to be introduced at the air handler.

TRACE 700 Compliance

LEED analysis - ability to model proposed and baseline models from ASHRAE Standard 90.1 for LEED analysis. The latest versions of TRACE introduced the new LEED Guide and Baseline Building Creator, and LEED Automation which make modeling for LEED certification faster and easier.

ANSI/ASHRAE Standard 140-2011 and 179D Commercial Building Tax Credits for projects placed in service on or before Dec 31, 2015 – tested in compliance with Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs

ANSI/ASHRAE Standard 140 – 2014 and 179D Commercial Building Tax Credits for projects placed in service on or after Jan 1, 2016 – tested in compliance with Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs.

Trane Acoustics Program (TAP™) (CDS-PKG-D)

Acoustic levels can be a key element of high performance indoor environment quality, and they are often difficult to determine. Trane Acoustical Program analysis software makes it easy to accurately predict and compare system sound levels. Quickly compare the sound characteristics of several system alternatives and choose the one that best satisfies the design criteria.

Trane Acoustical Program is updated to incorporate changes made by ASHRAE. As a result, Trane Acoustical Program is an excellent tool for predicting background sound levels from HVAC equipment. The program can be used to meet LEED® for Schools EQ Prerequisite 3 and EQ Credit 9.

System Analyzer (CDS-PKG-W)

System Analyzer is a comparative analysis tool for preliminary evaluations of HVAC systems based on energy and economic performance. Use it to quickly evaluate virtually any combination of air distribution system(s) and cooling/heating equipment for a specific building type and weather location

The intuitive reports and graphs help you evaluate the benefits of prospective system designs, which systems might be appropriate for an initial design, or to get a general idea of how one system-and-equipment combination performs when compared with another.

Preliminary Modeling Functionality

The intuitive user interface provides built-in templates to help even an HVAC novice create a comprehensive, accurate analysis in as little as ten minutes! In fact, System Analyzer was voted Product of the Year 2007 by *Consulting-Specifying Engineer*. The magazine polled more than 45,000 subscribers and awarded System Analyzer with gold honors in the HVAC category.

Integration

System Analyzer includes full integration into the TRACE Family of HVAC design and analysis tools using the same calculations engine as our industry-leading TRACE™ 700. This allows you to easily import preliminary System Analyzer evaluations and HVAC designs into TRACE 700 to further refine models.

System Analyzer, an award-winning software analysis program, makes it easy to evaluate different HVAC systems based on energy and economic comparisons. Perform a preliminary system analysis on virtually any combination of air distribution system(s) and cooling/heating equipment for a specific building type and weather location.

System Analyzer can compare up to four system design alternatives per project—making it easier for you to choose the best HVAC system for a particular application. Use the program's intuitive reports and graphs to share the results with the design team and weigh the benefits of prospective system designs.

Six easy steps to getting started

It only takes six steps and just minutes to prepare a design analysis. Each step is simplified in the program with predefined templates. The template information can be used for preliminary runs or customized for your specific building, systems and plants.

Calculate and compare

System Analyzer uses information about the building, its location (weather) and the HVAC systems under consideration to automate four sets of calculations to predict the energy consumption and life cycle costs of the HVAC system: building cooling and heating loads based on local weather; equipment cooling and heating loads; energy consumed by the HVAC system; and costs of owning and operating the HVAC system. The program’s output reports provide a concise overview of the critical information, allowing for a straightforward comparison of alternatives.

TRACE™ 700 Load Design (CDS-PKG-A)

TRACE 700 Load Design provides all of the options and modeling capabilities you expect in a comprehensive load analysis tool, combined with a whole new level of usability that makes load design easy.

We have integrated Load 700 with TRACE 700 to give you the same look and feel and extended capabilities as TRACE 700. All the added features (applicable to load design) in TRACE 700 will now be available to Load 700 users. Also, we've aligned calculation engines, file extensions and libraries to enable users of both programs to transfer archived files back and forth without any additional steps needed.

TRACE™ 700 Load Design

TRACE 700 Load Design is comprised the first two phases (Load and Design) of the TRACE (Trane Air Conditioning Economics) program.

Load Phase

The Load phase of the program calculates the peak sensible and latent zone loads, as well as the *block sensible* and *latent* loads for the building. In addition, the hourly sensible and latent loads, including *weather-dependent* loads, are calculated for each zone, based on the weather library.

Loads defined in the calculation are:

External Loads
- Wall Load
- Glass Load
- Roof Load
- Floor Load
- Internal Loads
- Lighting Loads
- People Loads
- Miscellaneous Loads

The specific entries required to facilitate these calculations are:

External Loads

Weather
- Weather Library (geographic location)
- Outdoor Design

Solar
- Latitude and Longitude
- Time Zone
- Clearness Number
- Design Month
- Building Orientation

Construction
- Roof Heat Transfer Properties
- Roof Area
- Wall Heat Transfer Properties
- Glass U-Value

 Percent Glass
 Glass Shading Coefficient
Internal Loads
Room Design Temperature (setpoint)
 Summer, Winter
Design Values
 Lighting
 People Sensible and Latent Heat
 People Density
 Miscellaneous Sensible and Latent Heat
Utilization Schedules
 Lighting
 People
 Miscellaneous

Day Calculations

• Weather data for one day
• Sunrise and sunset time, solar declination angle, degrees equation of time, hour constants

Hour Calculations

• Direction cosines of sun, direct normal solar intensity, sky brightness

Zone Calculations

• Ground brightness, angle of incidence, direct solar radiation, sky diffuse radiation, ground diffuse radiation, total solar radiation
• Wall load
• Transmission and absorption factors of glass
• Glass film coefficient
• Solar heat gain through glass
• Glass load
• Roof load
• Floor load
• Partition load
• Internal loads, people, lights, miscellaneous

Design Phase

The Design phase of the TRACE program calculates the design supply-air temperatures, heating and cooling capacities, and supply air quantities given the peak load files generated by the Load phase. For applications where the building design parameters are known, you can override the calculation of these values using optional entries to the System phase. This gives you the ability to simulate existing buildings with installed equipment that may not be sized according to the loads calculated in the Load phase.
The entries required for these calculations are as follows:

• Output from Load phase
 Zone peak loads
 Building block loads
• Room design conditions
• Outside-air conditions
• Outside-air percentage
• Percentage of internal and wall loads to return air
• System type
• System fan static pressure
• Fan motor efficiency
• Infiltration
• Reheat minimum airflow

The Design phase will first assign the peak or block load calculated by the Load phase to the systems providing cooling. Once the loads have been assigned, the latent and sensible components of the loads are totaled and the sensible heat ratio
(SHR) for each system is determined.
Knowing the design room conditions, design outside-air conditions, percent of outside air used for ventilation, and fan heat, the supply-air dry-bulb temperatures for each system are psychrometrically established. Applying this supply-air dry-bulb temperature to each zone, the required peak airflow for each individual zone is determined. For peak-air systems, the system airflow is determined by totaling the zone peak airflows. For block-air systems, the system airflow is based on the block load of the system.
From the earlier psychrometric simulation, the coil-entering and leaving enthalpy conditions can be determined. The program then modifies the enthalpy difference to correct for the design barometric pressure. The modified enthalpy difference is subsequently used to calculate the design cooling capacity.
The design heating capacity for primary systems is calculated by summing the wall, glass, floor, and roof loads plus the ventilation and infiltration loads at the winter design temperature. In addition, mixing and reheat systems will include a reheat load. All internal and solar loads should conservatively be scheduled unavailable when arriving at the final design heating capacity.

Assignment of Loads

The first step in the design phase is to assign zone sensible loads to the system that will ultimately handle that particular load. The assignment of loads to the return air also takes place. The percentage of lights, wall, and roof loads assigned to return air will reduce the zone sensible load. The system type will determine whether the system space cooling loads are based on the block-system load or the sum-of-thezone peak loads.
If no skin system is specified, all of the heating and cooling loads are assigned to the primary system.

QSYSc =
QLITEs × (1–PCLRA) + QPEOPs + QMISCs + QWALLc × (1–PCWRA) + QGLASSc + QROOFc × (1–PCRRA) + QFLOORc + QINFc

QSYSh =
QWALLh × (1–PCWRA) + QGLASSh + QROOFh × (1–PCRRA) + QFLOORh + QINFh

Where:

QSYSc = system level cooling load
QSYSh = system level heating load
PCLRA = percent load to return air
QPEOPs = people load
QMISCs = miscellaeneous load
QWALL = wall load
PCWRA = percent wall return air
QGLASS = glass load
QROOF = roof load
PCRRA = percent roof return air
QFLOOR = floor load
QINFc = K × CFMINF × (SDDB – RMDBc)
QINFh = K × CFMINF × (SDDB – RMDBh)
h = heating
c = cooling

If a heating-only skin system is specified, only the wall, glass and floor heating loads are assigned to the skin system, and the remaining heating loads are assigned to the primary system.
If a heating/cooling skin system is specified both the heating and cooling wall, and the glass and roof loads are assigned to the skin system. The remaining loads are assigned to the primary system. Only the primary system may handle latent loads.

System Cooling Supply-Air Dry Bulb (SADBc)

Once the system loads have been assigned, the psychrometric iteration to find

SADBc is performed using the following procedure.
Step A. Calculate the system SHR and the temperature increase due to the supply and return fans.
Step B. 1. Assume a value for coil leaving dry bulb and then
2. Determine the cooling supply air dry bulb, SADBc.
Given the SHR line and SADBc, the wet bulb can be taken from the psych chart.
Step C. Calculate cooling coil airflow. The coil airflow may be a sum-of-the-peaks airflow, or a block airflow.
Step D. Determine the temperature increase due to the return-air loads and returnair fan. Use only block return-air loads.
Step E. Determine the return-air temperature.
Step F. Determine the return/outside air mixture condition.
Note that RACFM = Coil CFM – OACFM.
Step G. Determine the coil-entering condition. For draw-through fan configurations, the coil-entering condition is the same as the return/outside air mix. For blowthrough fan configurations, the supply fan heat must be added first.
Step H. Determine the new coil-leaving condition.
Follow the coil line from the coil-entering condition down to the previous assumption for CLDB.
If the difference between the humidity ratios is less than one percent, the iteration stops. Otherwise, follow the coil line down to where it intersects the SHR line (for draw through) or to where it intersect the SHR line minus fan heat (for blow through). Restart the iteration at Step B2.
When cooling supply-air dry bulb is entered, the psychrometric iteration will calculate the room humidity ratio at which the psychrometric iteration of the TRACE program converges.

Zone Airflows and Heating Supply-Air Dry Bulb (SADBh)

After the cooling supply-air dry bulb temperature has been determined for the system, the program calculates the cooling airflow for each zone served by that system. This airflow calculation is based on the peak sensible loads of the zone, as previously calculated and assigned.
Once the zone cooling airflows have been determined for both the primary and skin system, the heating supply-air dry bulb temperature (SADBh) can be calculated.
When system types FC or VTCV are used as skin systems, skin SADBh is initially calculated using the total skin winter design load (QSKINh) and the sum of the skin cooling zone airflows.
If, however, the skin SADBh calculated is greater than the skin SADBh input by the user, or is greater than 125°F, the final SADBh value will be reset to the lower value between the 125°F and user input skin SADBh. If the calculated value of skin SADBh is overridden by the user, the design skin system SADBh must be recalculated.
The zone skin cooling airflows are then recalculated.
For primary systems, the heating supply-air temperature is initially based on the worst case zone (assuming 20 percent over-design) and the zone cooling airflow.
If, however, the calculated value of SADBh is greater than the system SADBh entered or is above 125° F, the final value will be reset to the lower value, either
125° F or the SADBh entry.
Once the system heating supply-air dry bulb is known, temporary values of zone heating airflows are calculated.
At this point, both a "heating" and "cooling" airflow is known for all zones. Zones which are *heating only* have final zone airflow set to the heating airflow value.
Zones which are *heating/cooling* have final zone airflow set to the larger of the cooling and heating airflow value.
Note: All airflows are calculated on a basis of standard airflow unless specified otherwise in the Load Parameters dialog box.

System Airflows

For *peak-air systems*, the fan airflow is the sum of the airflows of the zones served by that system.

For *block-air systems*, the fan airflow is based on the system block sensible load.

System Cooling Capacity

Next, the design capacity is determined from the coil-entering and the coil-leaving condition.

Once the humidity ratios are adjusted for altitude corrections, the return and outdoor air mixture enthalpy and coil-leaving enthalpy are calculated. The cooling capacity is then calculated.

For the double-duct, multizone and bypass multizone systems, the coil airflow is increased by five percent to account for damper leakage. The ventilation load is included in the overall cooling capacity.

System Heating Capacity

The heating capacity requirement is calculated for skin systems. Repeat this process for primary systems.

Design Calculation Summary

- Assign Loads
- Read Building and Zone Peak Loads
- Assign Loads to Zones
- Assign Zone Loads to System
- Determine System Cooling SADB
- Read Input File
- System Sensible Heat Ratio
- Fan Heat
- Cooling Supply-Air Dry Bulb and Supply-Air Humidity Ratio
- Determine Zone Airflows
- Supply-Air Dry-Bulb Heating
- Zone Heating Airflow
- Zone Airflow, System Airflow, Outside Airflow
- Zone Output
- Determine System Capacity
- Supply-Air Dry Bulb if blow-through or Coil-Leaving Dry Bulb if drawthrough
- Return-Air Dry Bulb and Return-Air Humidity Ratio
- Return and Outside Air; Coil-Leaving Enthalpy
- Design Cooling Capacity and Design Heating Capacity
- System Output

TRACE™ 700 Load Express (CDS-PKG-T)

TRACE 700 Load Express is Trane's HVAC design tool for your light commercial design needs. This quick-and-easy software application uses ASHRAE-approved algorithms to calculate cooling and heating loads, as well as airflow capacities. TRACE™ 700 Load Express now offers most of the features and capabilities found in TRACE 700 Load Design software. TRACE 700 Load Express offers up to 20 rooms/zones and 4 system types: Constant Volume, Variable Volume, Heating Only, and Changeover-bypass.

Also, we've aligned calculation engines, file extensions and libraries to enable users of both programs to transfer archived files back and forth without any additional steps needed.his

TRACE 700 Load Express lets new designers and experienced users alike perform accurate load calculations in minutes with just five simple steps:

1. Select a weather profile.
2. Define templates.
3. Enter room parameters.
4. Describe the air-handling system.
5. Assign rooms to systems.

TRACE™ 700 Chiller Plant Analyzer (CDS-PKG-CPA)

TRACE 700 Chiller Plant Analyzer software saves time by allowing easy plant configuration comparisons with a detailed wizard. The program calculates the energy and economic effects of virtually any chiller plant configuration using load profiles generated based on location and pre-defined building types. The software uses the accuracy of the TRACE 700 calculation engine with basic user-defined inputs for cooling and heating peak loads, building type, and building location.

TRACE 700 Chiller Plant Analyzer

Preface

In 1973 the first version of Trane Air Conditioning Economics, TRACE, became the first computer program of its type. It is a complete load, system, energy and economic analysis program that compares the energy and economic impact of such building alternatives as architectural features, HVAC systems, HVAC equipment, building utilization or scheduling, and economic options.

TRACE 700 Chiller Plant Analyzer was created using the backbone of TRACE. It is, in essence, an analytic tool for building system analyzers. It enables them to optimize the equipment designs on the basis of energy utilization and life-cycle cost. This program is not intended for building design.

TRACE 700 Chiller Plant Analyzer can also be invaluable for assessing the energy and economic impact of chiller plant renovations.

Introduction

To fully appreciate the capabilities of TRACE 700 Chiller Plant Analyzer and to obtain maximum value from its use, the following is a thorough explanation of the program.

Program Organization

The TRACE 700 Chiller Plant Analyzer program incorporates five major phases, each with specific tasks or functions that must be performed to provide a complete energy and economic analysis. The names of these phases are load, design, system simulation, equipment simulation and economic analysis.

The calculation procedures used in TRACE are based upon 8,760 hours of operation of the building and its service system. These procedures use techniques recommended in the appropriate ASHRAE publications or produce results which are consistent with such recommended techniques.

This document shows the calculation procedures used in the TRACE program.

Load Phase, Design Phase, Airside System Simulation

The Load, design, and system simulation phases are all done behind the scenes in the program. These results are dependent on the weather and the selected building type and are then passed on to the Equipment Simulation.

Equipment Simulation

The equipment loads, by system and by hour, are then provided to the equipment simulation phase, along with a description of the equipment to be used in the system. The previously described weather information is also input into this phase.

Regardless of whether the equipment has air-cooled or water-cooled condensing, the weather affects the overall part load efficiencies.

The essential function of the equipment phase is to translate equipment loads, by hour, into energy consumption by source. The loads are translated into kilowatthours of electricity, therms of gas, oil, district hot water or chilled water, even to the extent of calculating the total gallons of make-up water required by a cooling tower or the energy consumed by the crankcase heaters of a reciprocating compressor. The entry requirements of this phase

consist only of the equipment types for heating and cooling as well as pumping heads and pump motor efficiency for each system where hydronic pumping is involved.
This data is utilized within the program to call for the equipment library, which is the performance information for the various pieces of equipment. This information is used to convert system loads into energy consumption for subsequent processing to the economic analysis phase.
It is important to note it is not necessary for the user to enter the part load performance of equipment accessories into the program. They are already contained in the equipment library and are accessed when called for by the user.

Economic Phase

The next and final major phase of the program is the economic analysis phase. This phase utilizes user entries, such as the utility rates and equipment installed cost data, along with other economic information such as mortgage life, cost of capital,
etc., to compute annual owning and operating costs. It also calculates the various financial measurements of an investment such as cash flow effect, profit and loss effect, payout period and return on additional investment between alternatives.
In very simple terms, the program determines how much it costs to operate one plant compared with another. It then computes the present worth of the savings and the incremental return on the additional investment. It is keyed to provide information the owner needs to make his or her final economic decision, including monthly and yearly utility costs over the life of the HVAC system.

VariTrane™ Duct Designer (CDS-PKG-L)

VariTrane Duct Designer streamlines duct design and improves calculation precision, letting you optimize your designs while obtaining a minimum pressure system. VariTrane Duct Designer enables you to organize the layout structure of your duct system and provides detailed engineering information on a section-by-section basis making revisions and updates easier.

The software is based on engineering data and procedures outlined in the *ASHRAE Fundamentals Handbook*. It includes tested data from ASHRAE Fitting database and from United McGill to provide the most accurate modeling possible.

The VariTrane Duct Designer program consists of three applications:

Duct Configurator helps you model and size duct supply duct systems.
Ductulator® quickly sizes system components and determines the appropriate nominal duct size for equal friction applications.
Fitting Loss Calculator quickly identifies the optimal fittings and sizes for each duct section by comparing their efficiency and cost.

Trane Pipe Designer (CDS-PKG-P)

The Trane pipe Designer streamlines the pipe design process. Use the program to determine required pipe sizes, find the critical path for proper pump sizing, and calculate pressure drops through valves/fittings or from elevation changes.

Trane Pipe Designer helps you:

- Model new piping designs
- Evaluate existing piping systems
- Incorporate a combination of old and new layouts
- Examine open and closed systems
- Create a complete bill of materials

Distribution Suite (CDS-PKG-E)

The Trane Pipe Designer and VariTrane Duct Designer are sold together for a discount as the Distribution Suite package.

Trane Pipe Designer

The Trane pipe Designer streamlines the pipe design process. Use the program to determine required pipe sizes, find the critical path for proper pump sizing, and calculate pressure drops through valves/fittings or from elevation changes.

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- Evaluate existing piping systems
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- Examine open and closed systems
- Create a complete bill of materials

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Trane Engineering Toolbox (CDS-PKG-J)

Engineering Toolbox provides nine calculation tools to simplify HVAC design and service tasks. The latest version of the Engineering Toolbox is an intuitive redesign that provides a consolidated input and output view, an advanced report generation method for comparing multiple datasets and additional refrigerant and fluid types.

Engineering Toolbox includes the following calculation tools:

Power Factor Correction helps determine the required amount of capacitance for power factor correction.
Refrigerant Line Sizing allows selection of sizes of the interconnecting piping in a refrigerant system including suction line, discharge line and liquid line for a given system.
Properties of Air calculates all properties of moist or dry air at normal HVAC conditions using one state point.
Mixed Air Properties calculates all properties of moist or dry air at normal HVAC conditions using two state points.
Fluid Properties calculates physical properties for eight common HVAC fluids.
Ductulator® this electronic version simplifies the manual process of sizing ductwork based on Friction Losses by Darcy and Colebrook Equation.
Refrigerant Properties calculates physical properties for several common HVAC refrigerants.
Fan Law Calculator calculates adjusted fan properties by applying either the 1st or 4th fan law on a set of initial and adjusted conditions.
Unit Converter facilitates quick, accurate conversion between almost every possible HVAC unit of measure from one system to another.

TRACE™ 700 Family LAN Seats (CDS-PKG-FLS)

If you choose to install your TRACE 700 family software on a LAN, you will need to purchase concurrent user seats for simultaneous access to the program. TRACE 700 family software includes TRACE700, TRACE 700 Load Design, TRACE 700 Load Express, and TRACE 700 Chiller Plant Analyzer. LAN USERS for TRACE 700 family may install software on a LAN. Seats must be purchased for each user.

Tracer Summit® System Operation (BSC01)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Day 1-3: 8 a.m.–4:30 p.m.; Day 4: 8:00 –11:30 a.m.	2.5	System Operation

Register Now! Trane Education Center

Course Description

In this course students will learn to perform common and advanced operations with their installed Tracer Summit building management system. This highly interactive basic course includes presentations and hands-on workshops where students practice using the common applications of a Tracer Summit building management system and learn how to monitor and control building mechanical systems.

Note: This is a good course to take if you're planning to take Tracer Summit 101.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Create and modify schedules/holidays and exceptions.
- Create, modify and plot graphs of trends.
- Respond, route and print alarms.
- Create and modify users and passwords.
- Create and modify basic graphics.
- Monitor chiller plant control.
- Apply knowledge of schedules, area, and variable air systems applications to controls building air systems.

Who Should Attend

Tracer Summit System Operations is intended for Trane service technicians and Tracer Summit system owners, building engineers and operators.

Prerequisites

None

Pre-Work

None

Tracer Summit® 101 (BSC02)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Day 1-2: 8 a.m. – 5p.m.; Day 3: 8:00 –11:30 a.m.	3.2	Summit 101

Register Now! Trane Education Center

Course Description

This Tracer Summit installation course is intended for BAS personnel and Applied Systems Contractors who will be responsible for engineering, installing and commissioning Tracer Summit Projects. The skills taught in the installation workshops are intended for those who will install Tracer Summit hardware and configure applications.

Specific Sourse Objectives

Upon completion of this course, participants should be able to:

- Install BCU hardware.
- Apply Ethernet LAN protocols in the HVAC system.
- Configure a BCU with an IP address.
- Configure a site.
- Install LonTalk® devices on a BCU including Generic LonTalk Devices (GLDs).
- Install Trane Legacy Comm 3/4 devices.
- Configure Area and VAS applications.
- Create schedules.
- Configure alarm and message routing.
- Create and configure points.
- Create custom graphics.
- Back up and restore a site.

Who Should Attend

Tracer Summit 101 is intended for Trane technicians and applied systems contractors.

Prerequisites

While not a required prerequisite, Tracer Summit System Operation is highly recommended prior to taking Tracer Summit 101.

Pre-Work

All pre-work must be completed prior to coming to class. Students will be tested on this material the first day.

Required pre-work includes:

- Introduction to LonTalk self-paced learning

Tracer Summit® 102 (BSC03)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Day 1-4: 8 a.m.–5 p.m.; Day 3: 8:00 –11:30 a.m.	3.2	Summit 102

Register Now! Trane Education Center

Course Description

Students are introduced to the standard Tracer applications included with the Tracer Summit software through lecture and extensive hands-on workshops. In addition to the standard Tracer applications, the course also covers the custom programming language (CPL) used in Tracer Summit.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Set up and operate area control.
- Set up and operate Variable Air Systems (VAS) [Comm4 and LonTalk®].
- Set up and operate Chiller Plant Control (CPC).
- Write programs using CPL.

Who Should Attend

Tracer Summit 102 is intended for Trane technicians and contractors who have successfully completed Tracer Summit 101 and have a solid working knowledge of those subjects.

Prerequisites

- Tracer Summit 101

Pre-Work

All pre-work must be completed prior to coming to class. Students will be tested on this material the first day.

Required pre-work includes:

- Online document attached to course details in your Trane Education Center account

Tracer® SC Operation (BSC04)

Length:	Day and time:	Continuing Education Units:	Recommended search:
2.5 days	Day 1-2: 8 a.m.–4:30 p.m.; Day 3: 8:00 –11:30 a.m.	1.8	SC Operation

Register Now! Trane Education Center

Course Description

In the Tracer SC Operation course, students learn to operate and modify an installed Tracer SC system. This highly interactive course includes presentations, demonstrations and hands-on workshops where students practice using the software applications integral to a Tracer SC building management system.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Monitor and control building mechanical systems.
- Utilize contract documentation to identify control component locations.
- Create new user accounts and control their level of access within the Tracer SC.

- Navigate the Tracer SC user interface.
- Create and modify custom time-of-day schedules.
- Apply knowledge of schedules, area, and variable air system applications to control building air systems.
- Respond to hot and cold calls.
- Respond to alarm conditions.
- Generate data logs and reports.
- Back up your Tracer SC.

Who Should Attend

Tracer SC Operations is intended for Trane service technicians and Tracer SC system owners, building engineers and operators.

Prerequisites

Introduction to the Tracer SC System e-learning module is recommended but not required.

Pre-Work

None

Tracer® SC Advanced Operation (BSC05)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Day 1–3: 8 a.m.–4:30 p.m.	2.1	Advanced Operation

Register Now! Trane Education Center

Course Description

The Tracer SC Advanced Operation course builds on the knowledge and skills learned in the Tracer SC Operation course. This course will enable learners to expand their skillset to complete a variety of advanced operations, control strategies and energy saving methods to get the most value out of their Tracer SC building control system.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Define and apply coordinated control methods using spaces, Area, VAV Air Systems and schedules.
- Create area application and understand the different configurations options.
- Create HVAC, analog and binary schedules.
- Set up and modify data logs with advanced configurations.
- Use Tracer TU™ to backup, restore and upgrade firmware for Trane unit controllers.
- Configure alarming for binary and analog points.
- Create custom alarm categories and notification classes.
- Route alarm categories to users.
- Work with Tracer Graphical Editor (TGE) to modify graphics.

Who Should Attend

Tracer SC Advanced Operation is intended for Tracer SC system owners, operators and building engineers who have previously completed the Tracer SC Operation course and want to go deeper.

Prerequisites

- Tracer SC Operation

Tracer SC Advanced Operation is an advanced operations course. Students must also be proficient at using a personal computer and familiar with using a web browser.

Pre-Work

None

Tracer Ensemble™ Operation (BSC09)

Length:	Day and time:	Continuing Education Units:	Recommended search:
2.5 days	Day 1-2: 8 a.m.–4:30 p.m.; Day 3: 8:00 –11:30 a.m.	1.8	Ensemble Operation

Register Now! Trane Education Center

Course Description

Tracer Ensemble Operation is specifically designed for building operators and administrators to become more efficient with their Tracer Ensemble software which is a Web-enabled service and monitoring tool for multiple building facilities. Tracer Ensemble allows building operators and administrators access to Tracer Ensemble from the local network or the Internet to monitor and control their building system. Students will have the opportunity to work with the Tracer Ensemble software to become more familiar with common tasks.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Create user roles and user profiles
- Navigate Tracer Ensemble Buildings
- Use override control to manipulate building systems
- Make changes to building schedules
- Manage building alarms
- Log data
- Create custom reports
- Set up Tenant Services
- Use Critical Control to limit access in Tracer Ensemble

Who Should Attend

Tracer Ensemble Operation is intended for building operators and owners with Tracer Ensemble.

Prerequisites

This is an operations-level class. Students must have an operating-level understanding of personal computers and the Windows operating system. Students must possess knowledge of Tracer Summit or Tracer SC depending upon which system is installed in their facility.

Pre-Work

None

Training Packages

Trane University can provide private training if you are unable to attend one of our scheduled classes. Trane University professional education private training is offered through two tracks.

1. Building Systems and Controls Private Class (BSC010, BSC011, BSC012, BSC013), focusing on system design and optimization, is valuable for

- Facility owners and management
- Engineers

2. Technical Service Private Class (TS021, TS022, TS023),
focusing on operation, maintenance and troubleshooting, was developed for:

- HVAC service and maintenance technicians
- Maintenance supervisors
- Mechanical contractors

Customer controls attendee list and pays Trane a fixed rate dependent upon number of days training requested and selects a custom course schedule of training courses offered. Trane University supplies instructor, all equipment needed, and any teaching materials.

Air Conditioning Service (TS01)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Air Conditioning Service

Register Now! Trane Education Center

Course Description

This is a comprehensive, entry-level air conditioning service course. It concentrates on essential refrigeration knowledge that all HVAC technicians must eventually possess in order to perform competent HVAC service work. After attending, technicians should have acquired knowledge in tool usage, basic system theory, metering devices, system problem identification, superheat, sub-cooling, piping, evacuation and recharging techniques.

This course is 45–50 percent lab intensive. Packaged rooftop units, 2 to 5 tons, are used in the lab sessions. A separate course is available to help develop electrical troubleshooting skills.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Draw and explain basic system theory.
- Identify the four basic parts of the refrigeration system and how they work.
- Use refrigeration instruments.
- Perform system logging.
- Perform system evacuation and charging.
- Diagnose and correct start up and service problems related to refrigeration systems.
- Measure and adjust superheat and sub-cooling using classroom methods.
- Demonstrate refrigerant recovery procedures.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is well suited for entry-level air conditioning and/or HVAC maintenance mechanics, service technicians and industrial or facility maintenance technicians. An electrician with new responsibilities in air conditioning maintenance and service will also benefit.

Qualifications

The student should have some basic mechanical and electrical background in addition to an aptitude and interest for work with HVAC equipment.

Commercial Service 1 (TS02)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Commercial Service 1

Register Now! Trane Education Center

Course Description

This course exposes the student to light commercial unit operation, set-up and troubleshooting, dual compressor units, refrigerant troubleshooting, heating fundamentals, combustion analysis and unit airflow set-up and checkout. Hands-on training, using Trane light commercial 5- to 25-ton lab equipment, enhances the existing knowledge of technicians who already have appropriate fundamental A/C service skills. The course emphasizes a systematic approach to HVAC service troubleshooting.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Interpret temperature/pressure readings on an operating system.
- Discuss start-up and service problems within a refrigeration system.
- Measure airflow using appropriate airflow instruments to determine basic airside problems.
- Determine heating efficiency.
- Check gas systems using proper test procedures.
- Use ANSI®/Trane wiring diagrams to properly test single- and three-phase electrical systems and components.
- Demonstrate the basics of psychrometrics.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is ideal for dealer, contractor or owner maintenance technicians progressing from residential to light commercial service who have experience in HVAC.

Prerequisites

We recommend attendees meet one of the following:

- Completion of a vocational or technical program in air conditioning/refrigeration
- At least 1.5 years practical experience
- Completion of the Air Conditioning Service Course or HVAC Electrical Troubleshooting Course

Qualifications

Students must also have a working knowledge of the basic theory needed to diagnose the refrigeration cycle and an understanding of the following tools and subjects:

- Refrigeration Manifold Gauge Set
- Volt/Ohmmeter
- Electronic Temperature Meter
- Clamp-on ammeter
- Temperature/Pressure Relationships
- Metering Devices

Airside System Service (TS03)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Airside System

Register Now! Trane Education Center

Course Description

This course covers the operation and setup of a commercial VAV system from the standpoint of the service technician. Shutoff VAV, Bypass VAV and Single Zone VAV will be discussed in the class, although Shutoff VAV (traditional VAV) will be the primary focus. The concepts discussed will apply to new system startup as well as existing buildings. The course also discusses the different fan types used in commercial HVAC units.

The lab exercises are designed around several working VAV systems in our La Crosse, Wisconsin, training lab. This includes IntelliPak® Commercial Self-Contained (CSC) and rooftop units (RTU) with various types of VariTrane® VAV boxes. During the lab exercises, students will use the various tools needed to setup and commission (or re-commission) a VAV system. Also, the Rover™ service tool will be used for VAV box setup and for the purpose of verifying proper system operation from a service perspective. Attendees will learn to recognize important parameters within building plans in order to commission the building as the design engineer intended. The plans used will include the equipment schedule, sequence of operation, airflow requirements, and ventilation.

The course includes systems used in all geographic regions.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Verify system airflow using multiple methods.
- Interpret fan curve data from the various fan types such as forward curve, airfoil, and direct drive plenum.
- Set up and verify proper system air with the fan types used in our lab.
- Describe the capabilities and the limitations of the building control system from a service technician standpoint.
- Using a Rover service tool, analyze air delivery on multiple VAV systems.
- Describe the difference between Single Zone VAV systems and Multiple Zone VAV systems.
- Go through the procedure required to establish the supply pressure setpoint on a VAV system.

Lab Safety

Student participation in any hands-on portion of this course will include ladder safety and use of proper fall protection. It is expected the student will adhere to all other safety requirements as they arise.

Who Should Attend

This course is ideal for advanced service, controls, and maintenance technicians, as well as service contractors. Existing Building Systems personnel and others involved with system commissioning or with ensuring that an HVAC system is operating correctly and efficiently would benefit from this course.

Qualifications

Participants attending this course must have strong HVAC skills or an understanding of engineered building systems. They should also understand the importance of compliance with today's energy efficiency requirements.

HVAC Electrical Troubleshooting (TS04)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Electrical Troubleshooting

Register Now! Trane Education Center

Course Description

This course is intended to improve a technician's ability and confidence when electrically troubleshooting commercial HVAC equipment. The course will broaden the technician's capabilities to troubleshoot controls and other electrical circuits by teaching an understanding of practical electrical theory as applied to the products and components found in HVAC. The information and skills learned should greatly decrease service diagnosis time and take the guesswork out of isolating problems found in single and three-phase air conditioning and heating products. This course makes extensive use of lab hands-on methods.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Define and use fundamental electrical terms, laws and formulas for understanding what electricity is and what it does.
- Discuss the basics of series, parallel and series-parallel circuits.
- Identify the proper usage of meters required to troubleshoot electricity.
- Increase confidence and ability in reading complex wiring diagrams.
- Discuss the control logic and sequence of unit operation.
- Discuss safeties and component operation in Trane equipment.
- Recognize characteristics of single- and three-phase motors and their associated control components.
- Discuss the principal maintenance requirements for longer operating life of electrical components.
- Practice systematic methods of electrical troubleshooting for all major HVAC products.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is ideal for HVAC installers, maintenance mechanics, industrial electrical technicians and apprentice level service technicians who have HVAC servicing responsibility and need a thorough understanding of electrical troubleshooting skills.

Qualifications

Students must have an understanding of the refrigeration cycle and its components.

Chilled Water Systems Service (TS05)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Tue–Thu: 8 am–4:30 pm Fri: 8–11 am	2.5	Chilled Water

Register Now! Trane Education Center

Course Description

This course is intended to provide attendees with a "systems" approach to maintaining and diagnosing problems involving chilled water piping systems from a service perspective. It will show technicians and supervisors how Trane utilizes water flows to obtain efficient chiller operation. The course will also discuss water system conditions that can be detrimental to efficient operation and possibly damaging to system components. Students will take flow measurements in a laboratory setting, using recommended tools and techniques to determine chilled water system performance. Chilled water system types such as decoupled loop, variable-primary flow and others will be discussed.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Demonstrate an understanding of the water principles as applied to a chilled water system.
- Calculate the loop size in a chilled water system in order to understand and prevent short loop issues.
- Measure and verify water flow on a simple chilled water system using a variable frequency drive.
- Calculate water flow in a system using various methods.
- Given the necessary tools, service literature and personal protective equipment (PPE); properly log multiple chillers in our hands-on lab.
- Using operating pumps, calculate flow and then plot changes of flow using a balancing valve.
- Calculate unit capacity on a chiller by using proper tools and methods.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for plant engineers, maintenance supervisors, operating engineers, HVAC service technicians, and maintenance technicians who need an improved understanding of air and chilled water system control and maintenance requirements and techniques.

Qualifications

This course addresses the needs of persons from widely varied backgrounds and does not require in-depth HVAC knowledge. Students should be ready, however, to assimilate HVAC "systems" thinking.

CenTraVac® System Operation and Maintenance (TS06)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Tue–Thu: 8 am–4:30 pm Fri: 8–11 am	2.5	System Fundamentals

Register Now! Trane Education Center

Course Description

This course will familiarize owner maintenance supervisors and technicians with Trane CenTraVac CVHE/F/G/L centrifugal chiller operation and maintenance requirements. It will assist them understanding chilled water systems and load-based chiller dynamics. The course will help technicians troubleshoot and will help chiller owners decide if work can be done in-house or not. Technicians can particularly benefit from coverage on diagnosing and maintaining machine design performance, and learn what can occur if operating outside of these parameters. Students will have the opportunity to observe the manufacturing and the assembly of key components in a factory tour. This course relies primarily on classroom lecture and does not include hands-on maintenance training.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe Trane centrifugal chiller operation and chilled water system theory.
- Observe chiller construction process.
- Use operating logs to recognize normal operation and how abnormal influences affect chiller operation and performance.
- Recognize problems that reduce efficiency and damage equipment.
- Identify system components and their role in the system.
- Identify chilled water piping designs.

Who Should Attend

Our target is individuals responsible for the operation and preventative maintenance of Trane CenTraVac chillers (CVHE/F/G/L). This course will benefit technicians, supervisors or engineers who make planning decisions to support centrifugal chiller maintenance.

Qualifications

Students will benefit from this course in direct relation to their background knowledge of refrigeration, electrical, mechanical, and basic heat transfer systems. This course addresses the needs of individuals from widely varied backgrounds and does not require in-depth HVAC knowledge.

Plant Tour Requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

CenTraVac® Electronic Controls (TS07)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Tue–Thu: 8 am–4:30 pm Fri: 8–11 am	2.5	Electronic Control

Register Now! Trane Education Center

Course Description

This course is intended to update experienced service technicians on Trane CenTraVac chiller control technology. Detailed coverage includes electronic capacity modulation controls found on all Trane centrifugal chillers manufactured between 2001 and the present. Earlier-model control systems are not discussed in depth. This course covers Tracer® CH530 and Tracer AdaptiView™ control system in use at this time.

This is a controls technology class only. Mechanical service course attendance is required for complete CenTraVac Chiller service coverage.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Operate all the controls covered by this course, including systems interface.
- Describe operating logic for Tracer CH530 and Tracer AdaptiView control platforms.
- Use control information for routine operational troubleshooting.
- Use menu-driven diagnostics.

  Functionally diagnose various components of an operating control panel.
- Perform detailed trouble analysis on controls and determine necessary field repairs or replacement action.
- Determine potential electrical or electronic control faults through recommended isolation checkout procedures.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is for technicians who regularly work with Trane CenTraVac CVHE/F/G/L and duplex chillers.

Qualifications

Technicians must be comfortable with electrical controls, electrical meters such as digital volt-ohmmeters and understand refrigeration and centrifugal chiller control requirements. It is helpful if technicians have experience with other HVAC electronic control systems or have attended Trane University's HVAC Electrical Troubleshooting course. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

Plant Tour Requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

CenTraVac® Mechanical Overhaul Service (TS08)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Mechanical Service

Register Now! Trane Education Center

Course Description

This course will broaden any technician's level of service and overhaul expertise. It will help them gain confidence and experience in system start-up, maintenance, repair and major overhaul of water-cooled CenTraVac chillers. The course provides learning situations not otherwise available or that may take months or even years of on-the-job exposure to encounter. This course lays a substantial foundation for the technician's continued professional growth and provides familiarity with other centrifugal chiller products. This is a mechanical service course only. Controls course attendance is required for complete CenTraVac chiller service coverage.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Identify various Trane centrifugal chillers and variations in mechanical components.
- Be familiar with documented factory service information available to support Trane centrifugal chillers.
- Properly maintain and repair chillers with varying lubrication and cooling system designs.
- Properly overhaul a Model CVHE/F/G/L CenTraVac chiller compressor and motor, using factory-recommended procedures.
- Properly inspect compressor and motor components for compliance to factory specifications.

Lab Safety

Students are required to wear steel-tipped footwear, safety glasses and gloves to participate in mechanical lab service procedures. Appropriate work clothes should be worn to disassemble a chiller.

Who Should Attend

This course is designed for technicians or mechanics who have experience in other HVAC chiller products and are beginning to work with centrifugal products. The class is useful for experienced centrifugal service technicians who have no formal centrifugal overhaul training or experience with Trane CenTraVac chillers.

Qualifications

In order to attend this course, a student must meet the following qualifiations:

- Previous heavy refrigeration service experience
- Skills with close tolerance measuring instruments
- Experience with shop rigging of components heavier than 150 lbs

Plant Tour Requirement

Leather shoes which give good protection and long trousers are required. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

Single-Stage Absorption Chillers (TS09)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	Single

Register Now! Trane Education Center

Course Description

This course is a thorough and comprehensive presentation on the foundational understanding of absorption chillers and their refrigeration cycle. Coverage includes a detailed view of absorption chiller components, detailed instruction in the "theory of absorption chiller operation" and in the lithium bromide chemical cycle, the chemistry of inhibitors, overview of capacity control system operation, crystallization causes and effects, purge system operation, performance and operator logging recommendations.

This course utilizes a fully operational absorption chiller with UCP2 micro control. This provides our students a practical, hands-on opportunity to attain the confidence they need to work with these chillers.

IMPORTANT: Be certain that you or your prospective student meets the educational and/or experience requirements to attend this course. Read the "Prerequisites" section carefully.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe absorption chiller construction.
- Recognize major absorber components and describe their functions.
- Discuss the characteristics of lithium bromide in relation to charging and inhibitors.
- Use an Equilibrium Chart to determine system conditions.
- Describe the sequence of control operation (pneumatics and electric).
- Demonstrate how Trane's UCP2™ Adaptive Control™ technology has been applied to absorption chillers.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is for technicians who desire a comprehensive understanding of the theory of absorption refrigeration systems.

Qualifications

The student should have a working knowledge of pneumatic, electrical, heat transfer, steam and mechanical systems.

RTAA Rotary Chillers (TS10)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Tue–Thu: 8 am–4:30 pm	2.1	RTAA

Register Now! Trane Education Center

Course Description

This course provides training for service and facility maintenance technicians who need an in-depth understanding of the controls, maintenance and troubleshooting of Trane's RTAA and RTWA helical-rotary chillers. The course provides insights into compressor design, unit operation, unit installation, start-up requirements, unit performance and service diagnosis. Specific service steps are covered for refrigerant handling and component service.

This course is primarily classroom oriented.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe the theory of helical rotary chiller operation.
- Discuss chiller components and the interrelationships.
- Describe the capabilities of individual chiller designs.
- Read unit wiring and interconnecting diagrams.
- Describe control start sequence and operating logic.
- Discuss system control methods available for building automation.
- Use control information for routine operational troubleshooting.
- Complete routine maintenance requirements for helical-rotary chillers.
- Discuss the limits to field service methods inherent to helical compressor designs.
- Apply proper service techniques with refrigerant handling and component repairs.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for contractors and in-plant HVAC service technicians who will work regularly with Trane RTAA, air-cooled and RTWA water-cooled chillers.

Qualifications

Technicians must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or Trane's UCP1 and UCP2™ chiller control system would be helpful, but are not required.

RTAC Rotary Chillers (TS11)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Tue–Thu: 8 am–4:30 pm	2.1	RTAC

Register Now! Trane Education Center

Course Description

This course covers operation, diagnosis and maintenance for Trane model RTAC rotary chiller CH530 micro electronic control system with additional coverage of refrigeration system components. Emphasis will be placed on operational characteristics of the GP2 compressor, Falling Film evaporator and E-coil design condenser. Additional coverage provided for chiller operation using unit ANSI® Trane wiring diagrams with emphasis on understanding the Adaptive control system logic. Tracer CH530 control architecture and components will also be discussed. This course is primarily classroom oriented.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Discuss the operating characteristics of 140- to 500-ton Trane RTAC rotary chiller machines.
- Explain RTAC chiller construction and the physical relationship of components.
- Describe GP2 compressor construction, operation and checkout.
- Describe Falling Film evaporator construction and operation.
- Discuss the Tracer CH530 control architecture and operating logic.
- Explain the field maintenance and limitations of the Trane RTAC rotary chiller.

Lab Safety

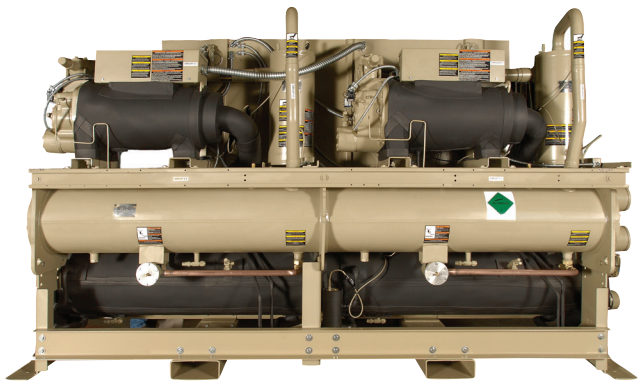
Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for owners, contractors and in-plant HVAC service technicians who will work regularly with Trane RTAC rotary chillers.

Qualifications

Technicians must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or the Trane UCP1 and UCP2™ chiller control system would be helpful, but are not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.



TECHNICAL SERVICE TRAINING

RTAE Rotary Chillers (TS12)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Tue–Thu: 8 am–4:30 pm	2.1	RTAE

Register Now! Trane Education Center

Course Description

This course covers the operation of Trane RTAE stealth rotary chillers. Coverage includes chiller refrigeration system components, construction and operation. Emphasis will be placed on the operational characteristics of the GP4 compressor, CHIL evaporator, Transverse condenser and AFD3 cooling circuit. Additional coverage will be provided on the Trane RTAE UC800 control platform with TD7 AdaptiView™ display, chiller logging and maintenance requirements. This course is primarily classroom oriented.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe the operating characteristics of a RTAE rotary chiller.
- Identify Trane RTAE rotary chiller construction and the physical relationship of components.
- Describe GP4 compressor operation.
- Describe the RTAE CHIL evaporator construction and operation.
- Discuss the Trane RTAE UC800 control platform and operating logic.
- Perform the field service, maintenance of Trane RTAE rotary chillers.
- Identify how the AFD3 Drive works as it relates to Trane RTAE rotary chillers.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for owners, contractors and in-plant HVAC service technicians who will work regularly with Trane RTAE rotary chillers.

Qualifications

The student must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or the Trane CH530 chiller control system would be helpful but are not required.

RTHD Rotary Chillers (TS13)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Tue–Thu: 8 am–4:30 pm	2.1	RTHD

Register Now! Trane Education Center

Course Description

This course covers the operation and maintenance of Trane RTHD helical rotary chiller with Tracer™ CH530 and UC800 control platforms. Coverage includes discussion on the CH530 and UC800 micro electronic controls in addition to refrigeration system components and operational logging. Emphasis will be placed on chiller sequence of operation, construction of refrigeration system components and the chiller's Adaptive Control™ system logic. This course is primarily classroom oriented.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe the operating characteristics of Trane RTHD helical rotary chillers.
- Explain the differences between Tracer CH530 and UC800 control platforms.
- Discuss the service, maintenance and limitations of Trane RTHD rotary chillers.
- Describe Trane RTHD rotary chiller compressor operation with and without TR200 VFD.

Who Should Attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane Series R chillers.

Qualifications

The technician must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or Trane's UCP1 and UCP2™ is helpful but not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

RTWD Rotary Chillers (TS14)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3 days	Tue–Thu: 8 am–4:30 pm	2.1	RTWD

Register Now! Trane Education Center

Course Description

This course provides an in-depth understanding of the controls, maintenance and troubleshooting of the Trane RTWD (CH530) helical rotary chiller. The course also provides insight into compressor design, unit operation, unit performance and service diagnosis. This course is primarily classroom oriented.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe the theory of operation of the Trane RTWD.
- Discuss Trane RTWD platform service procedures, maintenance and troubleshooting.
- Discuss the CH530 control system.
- Explain how the GP2 compressor operates.
- Describe gas pump operation.
- Discuss the problems associated with oil loss.
- Describe oil return.

Who Should Attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane Series R chillers.

Qualifications

The student must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or Trane's UCP1™ and UCP2™ is helpful but not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

Precedent® Voyager™ Rooftops (3–25 Ton Units) (TS15)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Tue–Thu: 8 am–4:30 pm Fri: 8–11 am	2.5	Precedent

Register Now! Trane Education Center

Course Description

This course is designed to provide commercial service technicians in-depth comprehensive coverage of the Trane Precedent and Voyager rooftops with ReliaTel™ controls. Students will be exposed in detail to the mechanical, electrical and control systems of these units and will become knowledgeable in the start-up, maintenance and troubleshooting requirements of these products.This course will also cover updates for each of these units including fans, compressors and refrigerant.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Explain CV, SZVAV and MZVAV unit operation and proper airflow adjustment.
- Demonstrate the ability to read and follow a ReliaTel® schematic.
- Demonstrate proper gas heating checkout and troubleshooting.
- Demonstrate the ability to test and troubleshoot Zone Sensor modules.
- Apply proper techniques to service, diagnose and troubleshoot Precedent and Voyager rooftops with ReliaTel controls.
- Explain the operation of the ReliaTel economizer with CO2 and DCV control.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for commercial rooftop service technicians who have a good understanding of both constant volume and variable air volume rooftops and systems and who need extended knowledge of the Trane Precedent and Voyager rooftops.

Qualifications

Students should have a good understanding of both the refrigeration and combustion cycles and understand airflow dynamics. Students should also be able to follow electrical ladder diagram logic and be familiar with commercial unitary equipment sequence of operation.

Plant Tour Requirement

Classes held in Clarksville TN: Leather shoes which give good protection and long trousers are required for plant tours. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

IntelliPak® I & II Rooftop Units (TS16)

Length:	Day and time:	Continuing Education Units:	Recommended search:
4.5 days	Mon–Thu: 8 am–4:30 pm Fri: 8–11 am	3.2	IntelliPak

Register Now! Trane Education Center

Course Description

The course focus's on operation, start-up and maintenance of 20 to 130 ton IntelliPak I and 90 to 162 ton IntelliPak II rooftop units. Proper service techniques will be discussed to include correct maintenance procedures and intervals. Factory recommended installation and start-up procedures will also be discussed. Attendees will be able to start-up, operate and program unit control microprocessors, as well as understand control logic and check-out procedures with unit diagnostics.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Using IntelliPak terminology, discuss rooftop unit functions.
- Demonstrate circuit board level troubleshooting by using an Intellipak wiring diagram.
- Practice configuration and setup of a unit using an Intellipak Human Interface.
- Demonstrate the proper setup procedure for cooling and heating.
- Discuss and demonstrate pressure transducer troubleshooting.
- Describe the basic IntelliPak sequences of operation.
- Describe scroll compressor construction and operation.
- Diagnose and troubleshoot IntelliPak binary and analog inputs and outputs.
- Test and verify modulating dehumidification.
- Demonstrate an understanding of CV, SZVAV, and VAV air flow properties.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for rooftop service technicians who have a good understanding of both constant volume and variable air volume rooftop units and systems and need additional knowledge regarding startup and maintenance procedures of Trane IntelliPak rooftop units.

Qualifications

Students must have a good understanding of both the refrigeration and combustion cycles and understand airflow dynamics. Students should also be able to follow electrical ladder diagram logic and be familiar with commercial unitary equipment sequence of operation.

Plant Tour Requirement

Leather shoes which give good protection and long trousers are required for plant tours. Neither sandals nor cloth-top shoes are permitted in manufacturing areas.

Scroll Chiller Service & Troubleshooting (TS18)

Length:	Day and time:	Continuing Education Units:	Recommended search:
3.5 days	Tue–Thu: 8 am–4:30 pm Fri: 8–11 am	2.5	Scroll Chiller

Register Now! Trane Education Center

Course Description

This service level course covers the operation, diagnosis and troubleshooting for Trane CGAM liquid chiller 20 to 130 tons and CGWF scroll chiller 20 to 60 tons with additional detailed coverage of R-22 and R-410a refrigeration system components, chiller logging and maintenance procedures. Trane scroll CSHA, CHSD and CSHN compressors construction, operation, maintenance requirements and troubleshooting will also be discussed. Factory recommended installation, start up procedures and chiller logging will be discussed in detail.

This course involves extensive hands-on training.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Describe chiller construction and the relationship of components.
- Given the necessary tools, service literature and personal protective equipment (PPE) properly log a scroll chiller in our hands-on lab.
- Describe the compressor protection processes used with CH530 controls.
- Use the unit wiring and interconnecting diagrams to understand the unit.
- Describe the control start sequence and operating control logic.
- Replace a LLID on a chiller with CH530 control using TechView®.
- Generate an ASHRAE® chiller report on a chiller using TechView.

Lab Safety

Instructor provided PPE is required for the hands-on live circuit portion of this course. The proper clothing should aso be worn: long pants and long sleeves of 100% cotton.

Who Should Attend

This course is intended for contractor and in-plant HVAC service technicians who will work regularly with Trane CGAM and/or CGWF scroll chillers.

Qualifications

The student must have solid electrical skills equal to Trane University's HVAC Electrical Troubleshooting course standards. Service experience with other types of liquid chillers and/or Trane's chiller control systems would be helpful but are not required. Familiarity with basic computing skills, file management and internet downloading procedures is also desirable.

Online Classes

IntelliPak® Human Interface Navigation and Status Menu (TS19)

Length:
1 Hour

Register here:
Trane Education Center

Recommended search:
Intellipak Human

Course Description

The IntelliPak Human Interface Navigation and Status Menu program walks a service technician through basic navigation and status screens for IntelliPak Rooftop Units 20 to 162 tons.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Effectively navigate the Intellipak Human Interface

Online Classes

ReliaTel™ Zone Sensor Testing (TS20)

Length:
30 Minutes

Register here:
Trane Education Center

Recommended search:
ReliaTel

Course Description

This course is designed to provide Trane service technicians with in-depth information on ReliaTel Zone Sensor Module testing and troubleshooting.

Specific Course Objectives

Upon completion of this course, participants should be able to:

- Discuss the basic operation of a Zone sensor.
- Demonstrate how to properly test the Zone Sensor Module.
- Troubleshoot the Zone Sensor Module

System Analyzer Training (CDS-TRNGL1)

System Analyzer is a comparative analysis tool for preliminary evaluations of HVAC systems based on energy and economic performance. Use it to quickly evaluate virtually any combination of air distribution system(s) and cooling/heating equipment for a specific building type and weather location.

The intuitive reports and graphs help you evaluate the benefits of prospective system designs, what systems might be appropriate for an initial design or to get a general idea of how one system-and-equipment combination performs when compared with another.

Trane C.D.S. offers an 8-hour class providing users with a better understanding of System Analyzer allowing them to more effectively use the program. Concepts learned during the training include…

- Learn how to navigate the program and gain a better understanding of the various input fields.
- Discover how the program uses inputs to determine energy consumption and life cycle costs.
- Understand program assumptions and how they relate to results.
- Learn how to create multiple alternatives to model various choices.
- Learn how to create custom library values for specific applications.
- Interpret results and learn how to read the various output reports.
- Practice using the program through in-class exercises
- Discover various resources available to help licensed users

The class was designed primarily for beginning users, but advanced users will find the class useful based on tips provided by the trainer. If you have questions regarding training, please contact Trane C.D.S. at cdshelp@trane.com or 608-787-3926.

TRACE 700 Load Design (CDS-TRNGL2)

TRACE 700 Load software is a separate program incorporating the load and system portion of TRACE 700. In other words, it contains the functionality of TRACE minus the energy and economic portions of the program. Use this program to complete complex building load calculations for virtually any building.

Trane C.D.S. provides a full day of training on TRACE Load Design. By the end of this course, you will be able to:

- Navigate the program and gain a better understanding of the various input fields.
- Understand how design weather is used to determine peak loads.
- Explain how TRACE™ calculates supply temperatures and airflows.
- Summarize the plenum heat balance calculations and how TRACE™ balances airflows.
- Explain how TRACE™ determines coil capacities and how to zone spaces.
- Utilize templates to reduce input time.
- Create multiple alternatives to model various choices.
- Create custom library values for items such as construction types, schedules, and shading plus others.
- Share files and understand the difference between a stand-alone and network installation.
- Summarize advanced features in the program (e.g.modeling ASHRAE Standard 62.1, importing GBXML files, and various system types).
- Interpret results and learn how to read the various output reports.
- Practice using the program through in-class exercises
- Interpret results and the various output reports

The class is designed primarily for beginning users, but advanced users will gain a better understanding of program methodology and garner tips from the trainer.

This class provides basic information critical for understanding subsequent C.D.S. TRACE courses (e.g. TRACE 700 Energy & Economics and the ASHRAE Standard 90.1/LEED Seminar).

Prerequisites: You must hold a valid license for the software. If you need to purchase software, take advantage of the software and training discount.

We also request that you familiarize yourself with the software by completing the tutorials in the *Getting Started Guide* prior to attending class. Access the *Getting Started Guide* from within TRACE by selecting **Help > Documentation > Getting Started**.

TRACE 700 (CDS-TRNGL3)

TRACE 700 software is the benchmark complete load, system, energy and economic analysis program that compares the energy and economic impact of such building alternatives as architectural features, HVAC systems, building utilization or scheduling and economic options.

Trane C.D.S. provides a full day of training on TRACE Energy and Economics. By the end of this course, you will be able to:

- Navigate the program and gain a better understanding of the various input fields.
- Summarize how weather is used to determine peak and off-peak loads.
- Summarize the various daytypes TRACE™ uses to calculate peak and off-peak loads.
- Understand how TRACE™ uses unloading curves to determine energy use.
- Create multiple alternatives to model various choices.
- Create custom library values for cooling and heating equipment.
- Summarize how TRACE™ calculates life-cycle costs and other economic parameters.
- Create custom utility rate structures.
- Identify advanced features in the program to include modeling ASHRAE Standard 62.1, importing GBXML files, and system control strategies.
- Interpret results and learn how to read the various output reports.
- Practice using the program through in-class exercises
- Identify various resources available to help licensed users

The class is designed primarily for intermediate users. The information in this class provides basic information critical for understanding subsequent C.D.S. TRACE courses (e.g. the TRACE 700, LEED, and ASHRAE Standard 90.1 and the Advanced Topics courses).

Prerequisites: You must hold a valid license for the software. If you need to purchase software, take advantage of the software and training discount.

Participants are expected to have previously attended TRACE Load Design training, and if not, to be a proficient TRACE Load user.

TRACE 700 Advanced Topics (CDS-TRNGL4)

In addition to the courses above, C.D.S. offers advanced TRACE 700 training. Please contact us if there is a specific topic you would like to cover. Topics may include the following, but they are dependent on customers' requirements:

- Daylighting
- ASHRAE 62.1 Inputs and Reports
- Airflow Balancing
- Interpreting Outputs
- Air to Air Energy Recovery
- Dedicated OA
- Creating Libraries- schedules, equipment, constructions, etc.
- TES – Thermal energy storage
- Over/under Sizing
- Heat Recovery Chillers
- Waterside Free Cooling
- Cogeneration
- Cooling Tower Operation and Design
- District Energy Modeling
- Life Cycle Cost Analysis
- Geothermal HP Systems
- Terminal Fan Sizing (Parallel and Series)
- Detailed Psychometrics
- Underfloor Air Distribution
- Variable Refrigerant Flow Systems
- Active and Passive Chilled Beams

and many more… just ask!

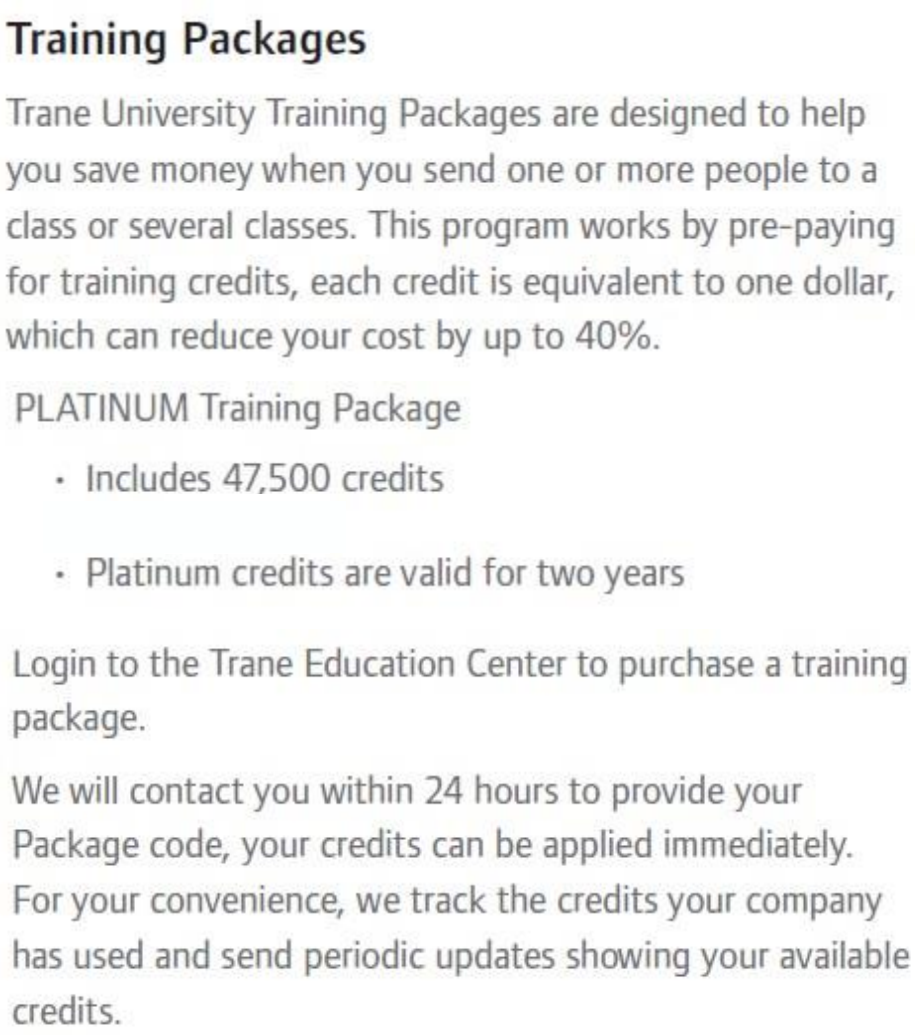
Prerequisites: You must hold a valid license for the software. If you need to purchase software, take advantage of the software and training discount.

Participants are expected to have previously attended TRACE 700 Load and TRACE 700 Energy & Economics courses prior to attending this course. If not, those taking the course should understand how to perform basic functions such as navigation, creating templates, creating custom library values, program methodology, and how to interpret results

Platinum Training Package (PTP01)

Course Description

Trane University can provide pre-paid and packaged deals when sending one or more people to a class or several classes. The PLATINUM Training Package includes 47,500 credits to attend Trane University professional education courses to be used over the term of two years. The student selects their course offerings suited to their needs and takes the courses at their selected pace.



Training Packages

Trane University Training Packages are designed to help you save money when you send one or more people to a class or several classes. This program works by pre-paying for training credits, each credit is equivalent to one dollar, which can reduce your cost by up to 40%.

PLATINUM Training Package

- Includes 47,500 credits
- Platinum credits are valid for two years

Login to the Trane Education Center to purchase a training package.

We will contact you within 24 hours to provide your Package code, your credits can be applied immediately. For your convenience, we track the credits your company has used and send periodic updates showing your available credits.

Gold Training Package (GTP02)

Course Description

Trane University can provide pre-paid and packaged deals when sending one or more people to a class or several classes. The GOLD Training Package includes 7,600 credits to attend Trane University professional education courses to be used over the term of two years. The student selects their course offerings suited to their needs and takes the courses at their selected pace.

Training Packages

Trane University Training Packages are designed to help you save money when you send one or more people to a class or several classes. This program works by pre-paying for training credits, each credit is equivalent to one dollar, which can reduce your cost by up to 40%.

GOLD Training Package - Most Popular!

- Includes 7,600 credits
- Gold credits are valid for one year

Login to the Trane Education Center to purchase a training package.

We will contact you within 24 hours to provide your Package code, your credits can be applied immediately. For your convenience, we track the credits your company has used and send periodic updates showing your available credits.