ADDENDUM NO. 2

DATE: October 17, 2023
PROJECT: **Village of Gurnee HVAC Replacement and Upgrades**
OWNER: VILLAGE OF GURNEE
TO: PROSPECTIVE BIDDERS

This Addendum forms a part of the Contract Documents and addresses the submitted Requests for Information on pages 2-53 of this document.

Signed: Jodi Luka

Jodi Luka, MPAP
Management Analyst
Village of Gurnee

Please acknowledge receipt and include with bid documents. Failure to do so may disqualify the Bidder.

Firm	By
Name	Title

Prasino Engineering, LLC
747 East Boughton Road
STE 208
Bolingbrook, IL 60440
www.prasinoeng.com
info@prasinoeng.com

Request for Information

RFI Response Date: October 17, 2023

Recipient: All Registered Bidders

Project Owner: Village of Gurnee

Project Location: 325 O'Plaine Road, Gurnee, Illinois 60031

Project Name: HVAC Replacement and Upgrades

Sealed Bids Due: October 24, 2023 at 10:00AM CST

Question 1: Please furnish the approved submittals and IOM for the Owner pre-purchased equipment. Need details on how the units will be broken down for shipment and assembly instructions.
Response 1: Please refer to attached documents within Appendix A and Appendix B for approved submittals and documentation provided to date from manufacturer. The Air Handling Unit is assembled from the factory and the contractor will be responsible to break-down and reassemble as necessary to carry into mechanical mezzanine.

Question 2: Will Village unload and store, insure and warranty owner pre-purchased equipment? Contactor to pick up from owner stored and deliver to jobsite.
Response 2: Owner/Village of Gurnee will unload and store variable frequency drives and condensing unit.

- Variable frequency drives on single pallet located at Public Works at 1151 Kilbourne Rd., Gurnee, Illinois. Contractor shall be responsible for transporting from Public Works to Village Hall when equipment installation is necessary.
- Condensing unit located at Fire Station 1 at 4580 Old Grand Ave, Gurnee, Illinois. Contractor shall be responsible for transporting from Fire Station 1 to Village Hall when equipment installation is necessary.
- Air handling unit to be shipped from factory directly to Village Hall. Contractor shall be responsible for unloading and protecting equipment while on site.

Owner has photo documentation of existing conditions of variable frequency drives and condensing unit prior to turn-over to contractor.

PRASINO ENGINEERING

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Question 3: Please provide the factory ship date of the owner furnished equipment. We will need for calculation and generation of schedule and liquidated damage risk.
Response 3: Please refer to below information from Trane. Condensing unit and variable frequency drives to be located per Response 2 above by end of October 2023. Air Handling Unit scheduled to be at Village Hall by June 7, 2024.

PROJECT NAME Gurnee Village
PROJECT NUMBER R110141

Sales Order #	Order Status	Qty	Equipment Description	Tag [Serial #]	Est Ship Date	Ship From	Ship To	
R1X099A	RLSD	1	VFDs	MAT-1-1	SHPD	Danfoss	Fire Station 3	
R1X094A	RLSD	1	20-60 Ton Air-Cooled Condensing Unit (RAUC20)	CU	10/13/2023	CLAR	Fire Station 3	
R1X098A	RLSD	1	Performance Climate Changer (CSAA)	VAV AHU	6/5/2024	CLB	AHU Public Works	

Question 4: Will the building office space occupants and furniture/desk/computers be active during construction? or will we be able to work above and personnel will be relocated while we work above there spaces?. Should we assume some protection of floors and office furniture during above ceiling work activities?
Response 4: Building occupants and furniture will be relocated by the Owner as necessary. Contractor shall coordinate all phasing and schedule with Owner as building cannot be vacated completely during construction. Refer to Drawing M0.00 Mechanical Demolition Notes for further information regarding protection of construction site.

Question 5: Contradiction in drawings and specs: is the condensing unit being shipped from the Fire Station or the Public Works facility?
Response 5: The shipping location recently changed to: Fire Station 1 at 4580 Old Grand Ave in Gurnee, Illinois 60031.

Question 6: Please confirm the existing ductwork to remain will be sufficient for new VAV design pressure (4" w.c.).
Response 6: There is an add alternate to clean and seal all ductwork. The system will be run at 1.5" w.c. with high pressure safeties set to 2.25" w.c. to ensure original ductwork can be used. Design engineer did not have the original project submittals to confirm original construction.

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Request for Information

Question 7: Is one of the Hot/Cold supplies to the mixing boxes being demolished form existing mix box (main hot and cold to remain)? . Does it matter which one , cap the other at main? We assume the inlet size tap to vav matches an existing hot or cold duct high side duct main? Please confirm intent.
Response 7: The intent is to use half of the "cold" taps and cap the hot taps for the new VAV boxes. The other half then shall use the "Hot" taps and the cold taps will be capped. The exact locations will need to be determined during construction once the extent of the ductwork is better known. Contractor shall plan on "New" taps from the medium pressure mains.

Question 8: The construction cost estimate or budget.
Response 8: A construction cost estimate or budget has not been developed.

Question 9: The anticipated construction start date.
Response 9: Refer to attached document within Appendix C for anticipated construction schedule.

Question 10: The anticipated construction completion date.
Response 10: Refer to attached document within Appendix C for anticipated construction schedule.

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Request for Information

APPENDIX A – AIR HANDLING UNIT SUBMITTAL

AHU Submittal

Prepared For:
RTM

Date: May 26, 2023

Job Name:
Gurnee Village Hall AHU and CU- K91H27282

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	Performance Climate Changer (CSAA)

Claudia Hurt
Trane U.S. Inc.
7100 South Madison
Willowbrook, IL 60527
Office Phone: (630) 734-3200

The attached information describes the equipment we propose to furnish for this project and is submitted for your approval.

Submittal acceptance and return is a critical step, so please ensure submittals are returned with approval to release to production within 14 days of submittal date.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Tag Data - Performance Climate Changer (CSAA) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	VAV AHU	1	Performance Climate Changer (CSAA)	CSAA040UA

Product Data - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Unit level options
- Indoor unit
- Unit size 40
- 6in. integral base frame
- UL listed unit
- Single metal handle - ganged latches
- 333.6510 Total unit length
- Field Provided (mtrs, lights, controls)

Controls and VFD/starter
- No controller
- Supply fan field provided VFD
- Return/exhaust fan field provided VFD

Warranty
- Standard warranty only

Fan section (Pos #1)
- Fan section
- Return fan
- Door- left side
- Outward swing
- 24.5in. dd plenum, 80% width, H press
- Higher efficiency
- 2 Fan quantity
- Plenum fan
- Left side drive
- NEMA premium compliant ODP
- Voltage 200-208/3
- NEMA motor hps only
- 7.5 max applied hp
- 1800 RPM
- Inverter balance with shaft grounding
- Top damper - opposed blade
- Field provided VFD

Air mixing section (Pos #2)
- Air mixing section
- Reduced length mixing box
- Door- left side
- Back damper - high velocity parallel
- Front full face opening
- Top damper - high velocity parallel
- 2in. filter frame
- Pleated media (Field Installed)
- MERV 8

Coil section (Pos #3)
- Horizontal coil
- Extended medium
- Left side - coil supply
- Unit coil height
- Heating coil
- Hot water
- Type "UA" coil
- 2 rows
- 144 Coil fins per foot (fins per meter)
- Aluminum fins
- Delta flo E (energy efficient)
- .016" (0.406 mm) copper tubes

1/2in. tube diameter (12.7 mm)
Galvanized steel coil casing
No turbulators
Coil connections - Standard

Access section (Pos #4)

Access/blank/turning section
Extended medium
Door- left side

Access section (Pos #5)

Access/blank/turning section
Extra large
Door- left side

Coil section (Pos #6)

Horizontal coil
Large
Door- left side
Stainless steel drain pan
Left side - drain connection
Left side - coil supply
Unit coil height
Cooling coil
Refrigerant
Type "UF" coil
6 rows
90 Coil fins per foot (fins per meter)
Aluminum fins
Delta flo E (energy efficient)
.025" (0.635 mm) copper tubes
1/2in. tube diameter (12.7 mm)
Stainless steel coil casing
Coil connections - Standard

Fan section (Pos #7)

Fan section
Supply fan
18.25in. dd plenum, full width, H press
Higher efficiency
4 Fan quantity
Plenum fan
Left side drive
NEMA premium compliant ODP
Voltage 200-208/3
NEMA motor hps only
7.5 max applied hp
1800 RPM
Inverter balance with shaft grounding
Field provided VFD

Discharge plenum (Pos #8)

Discharge plenum
Door- left side
Top rectangular opening

Performance Data - Performance Climate Changer (CSAA)

Tags	**VAV AHU**	
Unit level options		
Position		
Length (in)	333.651	
Width (in)	112.500	
Height (in)	70.750	
Rigging weight (lb)	8636.3	
Installed weight (lb)	8657.5	
Roof curb weight (lb)	0.0	
Actual airflow (cfm)	20000	
Unit elevation (ft)	0.00	
Shipping split 1 weight (lb)	1870.8	
Shipping split 2 weight (lb)	1407.9	
Shipping split 3 weight (lb)	1037.7	
Shipping split 4 weight (lb)	1367.8	
Shipping split 5 weight (lb)	2973.4	
Discharge plenum		
Position	**#8**	
Section length (in)	50.000	
Section weight (lb)	893.6	
Discharge 1 top - airflow (cfm)	20000	
Discharge 1 top - area (sq ft)	13.34	
Discharge 1 top - pressure drop (in H2O)	0.070	
Total section pressure drop (in H2O)	0.070	
Discharge 1 top - face velocity (ft/min)	1500	
Fan section		
Position	**#1**	**#7**
Section length (in)	50.678	37.343
Section weight (lb)	1870.8	2079.8
Fan airflow (cfm)	20000	20000
Elevation (ft)	0.00	0.00
Overall ESP (in H2O)	1.000	2.000
Total static pressure (in H2O)	1.995	4.321
Maximum TSP @ 60 Hz (in H2O)	2.063	4.321
Fan pressure drop (in H2O)	1.995	2.038
Speed (rpm)	1745	2363
Total brake horsepower (hp)	12.843	21.528
Unit static efficiency (%)	48.97	63.29
Motor hertz (Hz)	59.00	80.00
Discharge 1 top - airflow (cfm)	20000	-
Discharge 1 front - face velocity (ft/min)	494	494
Discharge 1 top - face velocity (ft/min)	1600	-
Discharge 1 front - pressure drop (in H2O)	0.038	0.038
Discharge 1 top - pressure drop (in H2O)	0.239	-
Discharge 1 front - area (sq ft)	40.50	40.50
Discharge 1 top - area (sq ft)	12.50	-
Access section		
Position	**#4**	**#5**
Section length (in)	19.000	63.750
Section weight (lb)	324.8	712.9
Coil section		
Position	**#3**	**#6**
Section length (in)	19.000	48.000
Section weight (lb)	498.7	1367.8
Coil performance airflow (cfm)	20000	20000

Tags	**VAV AHU**	
Unit airflow (cfm)	20000	20000
Coil face area (sq ft)	39.93	39.93
Coil face velocity (ft/min)	501	501
Air pressure drop (in H2O)	0.213	0.654
Coil section pressure drop (in H2O)	0.213	0.654
Coil rigging weight (lb)	176.0	605.4
Coil installed weight (lb)	197.2	-
Top or single coil dry weight (lb)	176.0	605.4
Leaving dry bulb (F)	90.00	55.00
Leaving wet bulb (F)	-	52.90
Entering dry bulb (F)	45.00	80.00
Entering wet bulb (F)	-	67.00
Fluid type	Water	-
Coil fluid percentage (%)	100.00	-
Entering fluid temperature (F)	180.00	-
Leaving fluid temperature (F)	160.00	-
Fluid temperature drop (F)	20.00	-
Standard fluid flow rate (gpm)	97.48	-
Fluid pressure drop (ft fluid)	15.30	-
Fluid velocity (ft/s)	7.27	-
Fluid volume (gal)	2.55	22.55
Liquid temp entering TXV (F)	-	115.00
Saturated suction temperature (F)	-	37.47
Suction superheat (F)	-	8.00
Sensible capacity (MBh)	-	548.01
Total capacity (MBh)	976.05	859.76
Number of distributors ( )	-	4
Air mixing section		
Position	**#2**	
Section length (in)	45.380	
Section weight (lb)	909.1	
Opening 1 back - airflow (cfm)	20000	
Opening 1 front - airflow (cfm)	20000	
Opening 1 top - airflow (cfm)	20000	
Opening 1 back - area (sq ft)	10.01	
Opening 1 front - area (sq ft)	45.77	
Opening 1 top - area (sq ft)	10.01	
Opening 1 back - face velocity (ft/min)	1998	
Opening 1 top - face velocity (ft/min)	1998	
Opening 1 back - pressure drop (in H2O)	0.700	
Opening 1 top - pressure drop (in H2O)	0.339	
Opening 1 back total pressure drop (in H2O)	0.700	
Opening 1 top total pressure drop (in H2O)	0.339	
Back inlet type	Unducted	
Top inlet type	Ducted	
Greatest entry PD (in H2O)	0.700	
Filter condition	Mid-life	
Filter airflow (cfm)	20000	
Filter area (sq ft)	40.83	
Filter face velocity (ft/min)	490	
Filter pressure drop (in H2O)	0.645	
Filter total pressure drop (in H2O)	0.645	
Total mixing section pressure drop (in H2O)	1.346	
Front total pressure drop (in H2O)	0.000	
Back total pressure drop (in H2O)	0.700	

Tags	VAV AHU	
Top total pressure drop (in H2O)	0.339	
Bottom total pressure drop (in H2O)	0.000	
Right side total pressure drop (in H2O)	0.000	
Left side total pressure drop (in H2O)	0.000	

Mechanical Specifications - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

GENERAL

Per ASHRAE 62.1 recommendation, indoor air handling units will be stretch or shrink wrapped to protect unit from in-transit rain and debris.

Installing contractor is responsible for long term storage in accordance with the Installation, Operation, and Maintenance manual (CLCH-SVX07*-EN).

Unit shall be UL and C-UL Listed.

Supply fans within the scope of AHRI Standard 430 are "Certified by the AHRI Central Station Air-Handling Unit (AHU) Certification Program, based on AHRI Standard 430/431. AHRI certified units are subject to rigorous and continuous testing, have performance ratings independently measured and are third-party verified. Certified units may be found in the AHRI Directory at www.ahridirectory.org".

Unit sound performance data shall be reported as sound power. Trane, in providing this program and data, does not certify or warrant NC levels. These levels are affected by factors specific to each application and/or installation and therefore unable to be predicted or certified by Trane. Refer to product data for specific fan footnote references.

Unit Construction

All unit panels shall be 2" solid, double-wall construction to facilitate cleaning of unit interior. Unit panels shall be provided with a mid-span, no-through-metal, internal thermal break. Casing thermal performance shall be such that under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on the casing exterior.

All exterior and interior indoor AHU panels will be made of galvanized steel.

Unit Paint

Unit to ship unpainted from factory. If required, unit to be painted by 3rd party finisher, or by painting contractor at job site.

Casing Deflection
The casing shall not exceed 0.0042 inch deflection per inch of panel span at 1.00 times design static pressure. Maximum design static shall not exceed +8 inches w.g. in all positive pressure sections and -8 inches w.g. in all negative pressure sections.

Floor Construction
The unit floor shall be of sufficient strength to support a 300.0 lb load during maintenance activities and shall deflect no more than 0.0042 inch per inch of panel span.

Unit base
Manufacturer to provide a full perimeter integral base frame for either ceiling suspension of units or to support and raise all sections of the unit for proper trapping. Indoor unit base frame will either be bolted construction or welded construction. All outdoor unit base frames shall be welded construction. For indoor units, refer to schedule for base height and construction type. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in total height required for proper trap height.

Insulation
Panel insulation shall provide a minimum thermal resistance (R) value of 13 ft^2-h-^oF/Btu throughout the entire unit. Insulation shall completely fill the panel cavities in all directions so that no voids exist and settling of insulation is prevented. Panel insulation shall comply with NFPA 90A.

Drain Pan

In sections provided with a drain pan, the drain pan shall be designed in accordance with ASHRAE 62.1. To address indoor air quality (IAQ) the drain pan shall be sloped in two planes promoting positive drainage to eliminate stagnant water conditions. Drain pan shall be insulated, and of double wall construction. The outlet shall be the lowest point on the pan, and shall be of sufficient diameter to preclude drain pan overflow under normally expected operating conditions. All drain pans connections shall have a threaded connection, extending a minimum of 2-1/2" beyond the unit base, and shall be made from the same material as the drain pan. Drain pan located under a cooling coil shall be of sufficient size to collect all condensate produced from the coil.
Refer to Product Data for specific information on which sections are supplied with a drain pan, the drain pan material and connection location.

Access Door Construction
Access doors shall be 2" double wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels respectively. All doors shall be provided with a thermal break construction of door panel and door frame. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage. Surface mounted handles shall be provided to allow quick access to the interior of the functional section and to prevent through cabinet penetrations that could likely weaken the casing leakage and thermal performance. Handle hardware shall be designed to prevent unintended closure. Access doors shall be hinged and removable for quick easy access. Hinges shall be interchangeable with the door handle hardware to allow for alternating door swing in the field to minimize access interference due to unforeseen job site obstructions. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section. Door hinges shall be galvanized.

All doors shall be a minimum of 60" high when sufficient height is available or the maximum height allowed by the unit height.

Door handles shall be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit. Optionally for indoor AHUs and as standard on outdoor AHUs, outward swing doors are provided with a single handle linked to multiple latching points. An optional shatterproof window shall be provided in access doors where indicated on the plans. Window shall either be single pane, or thermal dual pane, as defined on schedule. Window shall be capable of withstanding unit operating pressures and shall be safe for viewing UV-C lamps.
Refer to Product Data for specific information on which sections are supplied with an access door, the door location, a single handle and a window.

Lifting Instructions
The air handling units must be rigged, lifted, and installed in strict accordance with the Installation, Operation, and Maintenance manual (CLCH-SVX07G-EN). The units are also to be installed in strict accordance with the specifications. Units may be shipped fully assembled or disassembled to the minimum functional section size in accordance with shipping and job site requirements.

Indoor units shall be shipped on an integral base frame (variable from the standard 2.5" to 8" height) for the purpose of mounting units to a housekeeping pad and providing additional height to properly trap condensate from the unit. The integral base frame may be used for ceiling suspension, external isolation, or as a housekeeping pad. Indoor sizes 3 to 30 will also be shipped with a shipping skid designed for forklift transport. Refer to the unit As-Built or Product Data section of the submittal for the base frame height of each unit.

All units will be shipped with an integral base frame designed with the necessary number of lift points for safe installation. All lifting lugs are to be utilized during lift. The lift points will be designed to accept standard rigging devices and be removable after installation. Units shipped in sections will have a minimum of four points of lift.

MIXING SECTION
A mixing section shall be provided to support the damper assembly for outdoor, return, and/or exhaust air.

Dampers
Dampers shall modulate the volume of outdoor, return, or exhaust air. The dampers shall be of double-skin airfoil design with metal, compressible jamb seals and flexible blade-edge seals on all blades. The blades shall rotate on stainless-steel sleeve bearings. The dampers shall be rated for a maximum leakage rate of 3 cfm/ft² at 1 in. w.g. complying with ASHRAE 90.1 maximum damper leakage. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Dampers may be arranged in a parallel or opposed-blade configuration.

Title 24

The following specifications apply only to units with outside air and return air dampers, with actuators. The 5 year warranty applies only to these items.
This unit contains Economizer that meets or exceeds all mandatory requirements prescribed by Title 24, including but not limited to:

- 5 yr parts only warranty
- Successfully tested to 60,000 Actuations
- Less than 10 cfm/sq.ft. of damper leakage at 1" WG per AMCA 500L

Filters

Mixing sections shall be provided with a filter rack as indicated in the Product Data and As-Built sections of the submittal.

2-inch pleated media filters made with 100% synthetic fibers that are continuously laminated to a supported steel-wire grid with water repellent adhesive shall be provided. Filters shall be capable of operating up to 625 fpm face velocity without loss of filter efficiency and holding capacity. The filters shall have a MERV 8 rating when tested in accordance with the ANSI/ASHRAE Standard 52.2.

COIL SECTION WITH FACTORY INSTALLED COIL
The coil section shall be provided complete with coil and coil holding frame. The coils shall be installed such that headers and return bends are enclosed by unit casings. If two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil and be of the same material as the primary drain pan. Like the primary drain pan, the intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

Coil with Inspection
The coil section shall include an inspection section complete with a double-wall, removable door downstream of the coil for inspection, cleaning, and maintenance. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors shall be provided with a thermal break construction of door panel and door frame.

Hydronic coils shall be supplied with factory installed drain and vent piping to unit casing exterior. Piping is to facilitate field installation of automatic venting or drain valves on coils, which are not supplied with unit. *Refer to the Product Data section of the submittal for the units and/or coils supplied with drain and vent piping*.

No casing penetrations supplied for hydronic drain and vents. If required, piping contractor will need to drill drain and vent penetrations using factory located features provided in coil panel.

Refrigerant Cooling Coils
The coils shall have aluminum fins and seamless copper tubes. The fins shall have collars drawn, belled, and firmly bonded to tubes by mechanical expansion of the tubes. Suction and liquid line connections shall extend to the unit exterior. The coil casing may be galvanized or stainless steel. Refer to the Product Data section of the submittal for the coil casing material.
The coils shall be proof-tested to 715 psig and leak-tested to 650 psig air pressure under water or equivalent tracer gas leak test. After testing, the inside of the coils shall be dried, all connections shall be sealed, and the coil shall be shipped with a charge of dry air or nitrogen.
Suction headers and liquid connections shall be constructed of copper tubing with connections penetrating unit casings to permit sweat connections to refrigerant lines. The coils shall have equalizing vertical distributors sized according to the capacities of the coils. Cooling coil performance is certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org. Heating performance for heat pump or condenser mode is not certified.

Tubes are 1/2" [13 mm] OD 0.025" [0.635 mm] thick copper.

Water Coils (UP, WP, UW, UU, UA, 3W, 3U, W, 5W, 5A, WD, 5D, D1, D2, P, or TT)

The coils shall have aluminum fins and seamless copper tubes. Copper fins may be applied to coils with 5/8-inch tubes. Fins shall have collars drawn, belled, and firmly bonded to tubes by mechanical expansion of the tubes. The coil casing may be galvanized or stainless steel. Refer to the Product Data section of the submittal for the coil casing material.
The coils shall be proof-tested to 300 psig and leak-tested under water to 200 psig. Coils containing water or ethylene glycol are certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org. Propylene glycol and calcium chloride, or mixtures thereof, are outside the scope of AHRI Standard 410 and, therefore, do not require AHRI 410 rating or certification.

Coil connections are constructed of cast iron with female connections, steel block with female connections or steel pipe with male connections. Type P or TT coil connections do not extend out of unit casing. All other water coil types have connections that extend out beyond unit casing. Headers on downstream coil bank of staggered coil sections do not extend beyond the unit casing and must be completed by the on-site piping contractor.

Tubes are 1/2" [13 mm] OD 0.016" [0.406 mm] thick copper.

ACCESS/INSPECTION / TURNING SECTION
A section shall be provided to allow additional access/inspection of unit components and space for field-installed components as needed. An access door shall be provided for easy access. All access sections shall be complete with a double-wall, removable door downstream for inspection, cleaning, and maintenance. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively. All doors downstream of cooling coils shall be provided with a thermal break construction of door panel and door frame.

DIRECT-DRIVE PLENUM FAN SECTION
The fan type shall be provided as required for stable operation and optimum energy efficiency. The fan shall be a single-width, single-inlet, multiblade-type direct-drive plenum fan. Motor bearing life of the direct-drive plenum fan shall be not less than L-10 250,000 hrs**.** *Refer to the Product Data section for fan quantity and number of blades selected within each unit*. Central Station Air Handling Unit Supply Fans are "Certified by the AHRI Central Station Air-Handling Unit (AHU) Certification Program, based on AHRI Standard 430/431. AHRI certified units are subject to rigorous and continuous testing, have performance ratings independently measured and are third-party verified. Certified units may be found in the AHRI Directory at www.ahridirectory.org" Central Station Air Handling Unit Supply Fans shall be tested and rated in-accordance with AHRI Standard 260 for sound performance.

Fans that are selected with inverter balancing shall first be dynamically balanced at design RPM. The fans then will be checked in the factory from 25% to 100% of design RPM to insure they are operating within vibration tolerance specifications, and that there are no resonant frequency issues throughout this operating range. Inverter balancing that requires lockout frequencies inputted into a variable frequency drive to in order to bypass resonant frequencies shall not be acceptable. If supplied in this manner by the unit manufacturer, the contractor will be responsible for rebalancing in the field after unit installation. Fans selected with inverter balancing shall have a maintenance free grounding assembly installed on the fan motor to discharge both static and induced shaft currents to ground.

On units supplied with plenum or motorized impeller fans, door guard(s) shall be supplied on the access door(s) to the fan and those downstream access door(s) where unintended access to the plenum or motorized impeller fan could occur. Door guard is intended to deter unauthorized entry and incidental contact with rotating components. *Refer to the Product Data section for fans with access door guard(s)*.

Motor Frame
The motor shall be mounted integral to the isolated fan assembly and furnished by the unit manufacturer. The motor is mounted inside the unit casing on an adjustable base to permit adjustment of drive belt tension (not applicable for direct drive plenum fans). The motor shall meet or exceed all NEMA Standards Publication MG 1 requirements and comply with NEMA Premium efficiency levels when applicable except for fractional horsepower motors which are not covered by the NEMA classification. The motor shall be T-frame, squirrel cage with size, type, and electrical characteristics as shown on the equipment schedule. *Refer to the Product Data section for selected fan motors within each unit.*

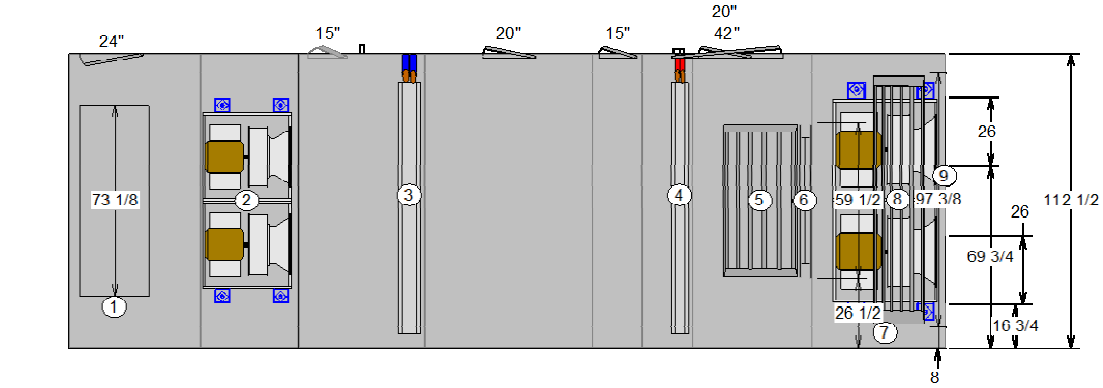
Two-Inch Spring Isolators
Direct-drive fan and motor assemblies shall be internally isolated from the unit casing with 2-inch (50.8 mm) deflection spring isolators. The isolation system shall be designed to resist loads produced by external forces, such as earthquakes, and conform to the current IBC seismic requirements.

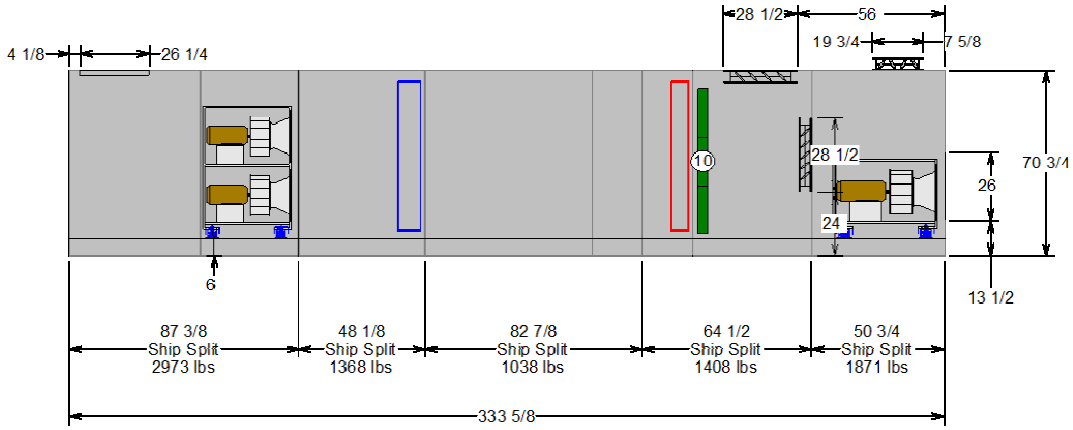
Design VFD frequency is less than line frequency. Use caution during startup to ensure the VFD will not operate at the line frequency, or ensure that the air delivery system can handle being over-pressurized.

Dampers
Dampers within the fan section shall modulate the volume of exhaust air. The dampers shall be of double-skin airfoil design with metal, compressible jamb seals and flexible blade-edge seals on all blades. The blades shall rotate on stainless-steel sleeve bearings. The dampers shall be rated for a maximum leakage rate of 3 cfm/ft² at 1 in. w.g. complying with ASHRAE 90.1 maximum damper leakage. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D.

DISCHARGE PLENUM SECTION
Plenums shall be provided to efficiently turn air and provide sound attenuation. Discharge plenum opening types and sizes shall be scaled to meet engineering requirements. The vertical discharge plenum height may be scaled to accommodate the appropriate discharge duct height.

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU





1 Opening top
73.13 x 26.26
2 Plenum fan - 18.25in. dd plenum, full width, H press Supply fan 7.5 hp 200-208/3
3 Cooling coil - 6 Rows Coil type 1/2" Unit Optimized, General (UГ)
4 Heating coil - 2 Rows Coil type 1/2" Unit Optimized, Low Water Flow (UA)
5 Damper top-parallel blade 59.5 x 28.5
6 Damper back-parallel blade 28.5 x 59.5
7 Plenum fan - 24.5in. dd plenum, 80% width, H press Return fan 7.5 hp 200-208/3
8 Damper top 97.375 x 19.75
9 Plenum fan inlet back 26 x 26 (2)
10 Flat filters -

Doors
24 width x 58 height
15 width x 61 height
20 width x 61 height
42 width x 61 height

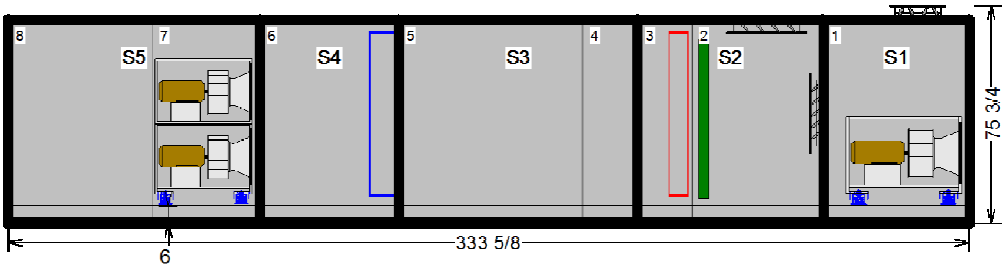
For maneuvering purposes, include 1.125 inches to each ship split length for overlapping panel flange. Flange will not add to overall installed unit length shown.

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

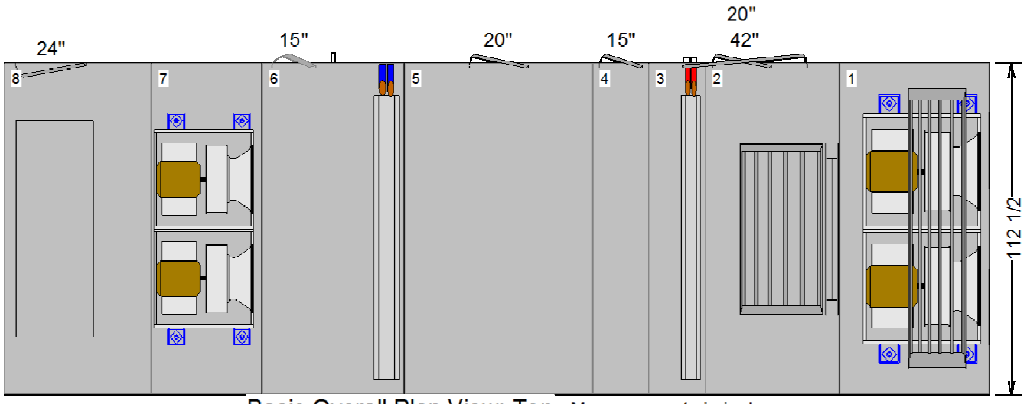
Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Shipping splits are indicated by thick black lines



For maneuvering purposes, include 1.125 inches to each ship split length for overlapping panel flange. Flange will not add to overall installed unit length sh

Pos #	Module	Length	Weight
1	Fan section	50 3/4	1870.75
2	Air mixing section	45 1/2	909.12
3	Coil section	19 1/8	498.74
4	Access section	19 1/8	324.78
5	Access section	63 7/8	712.92
6	Coil section	48 1/8	1367.83
7	Fan section	37 3/8	2079.82
8	Discharge Plenum	50	893.56
	Installed Unit Weight		8657.52 lbs



Basic Overall Plan View: Top - Measurements in inches

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
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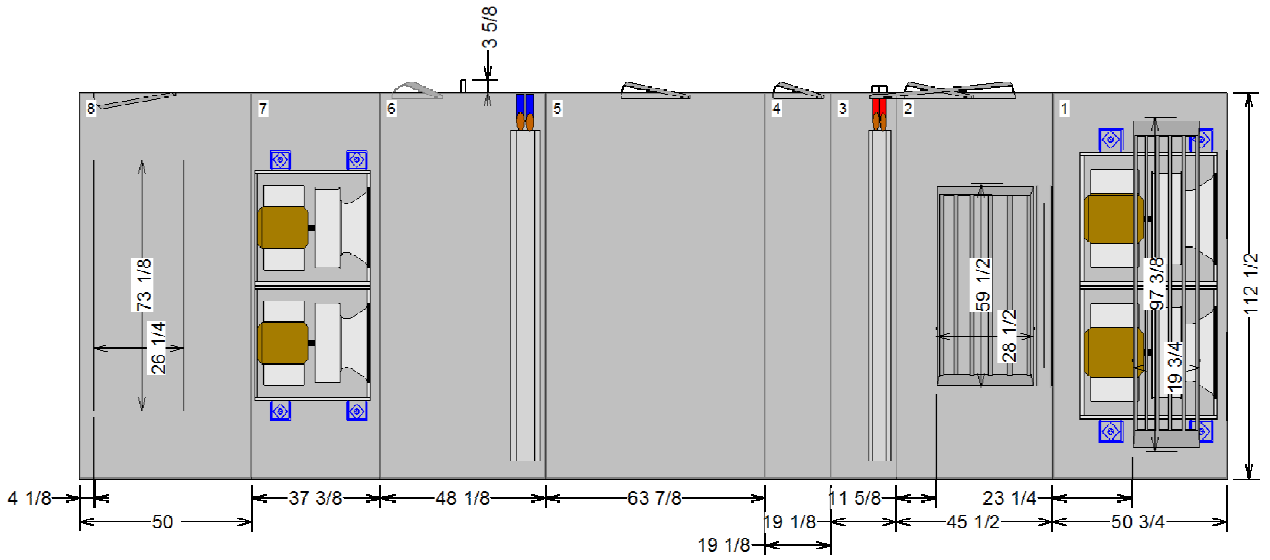
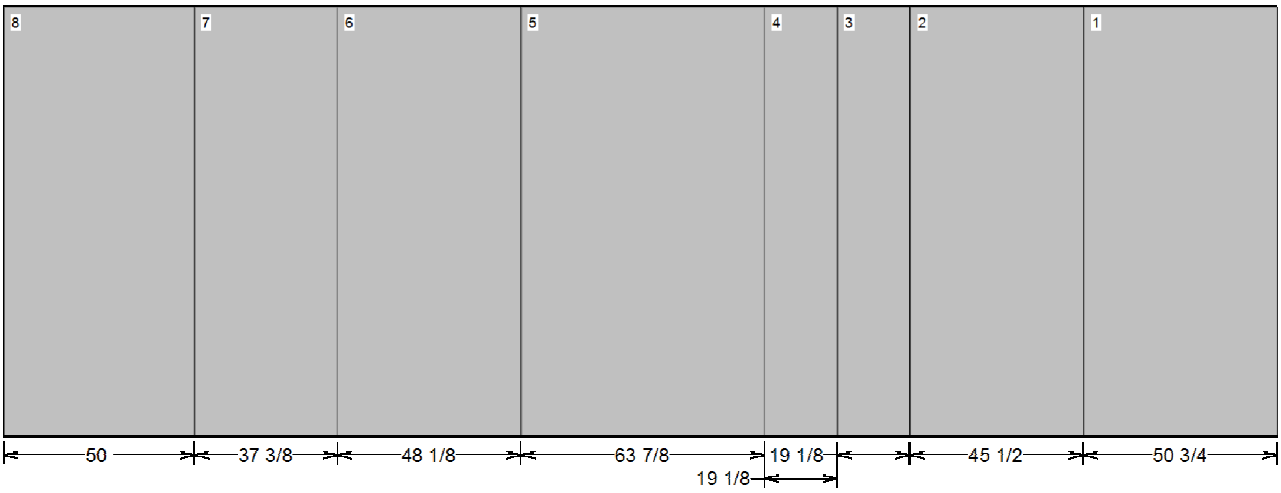
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU



Right Side of Unit

Detailed Plan View: Top - Measurements in inches



Left Side of Unit

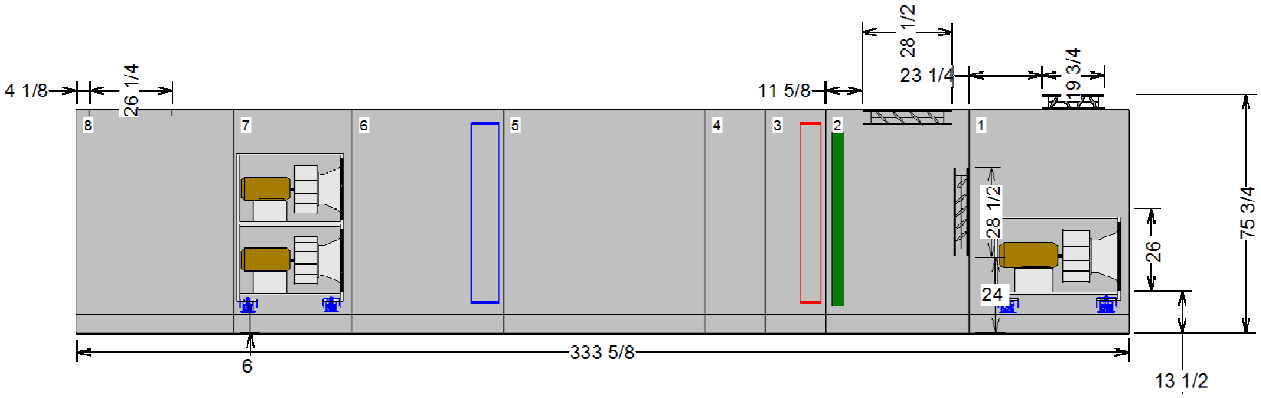
Detailed Plan View: Bottom - Measurements in inches

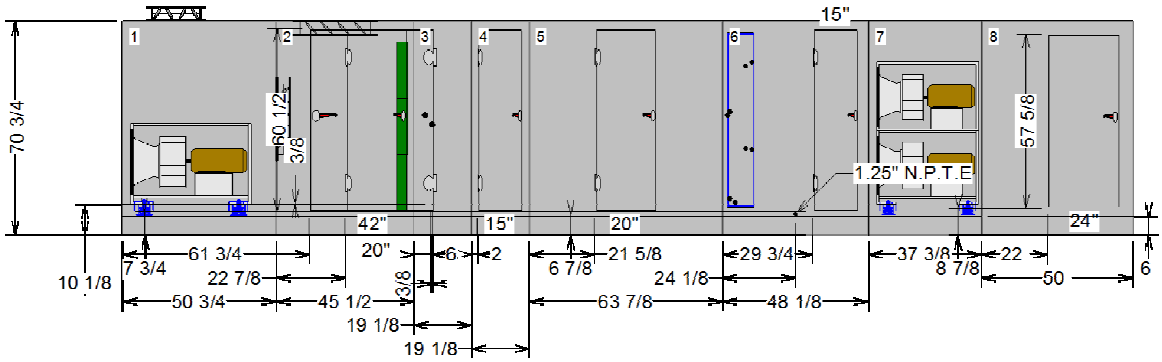
****Placement of electrical conduit may vary by a tolerance of 8" in any direction.**

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU



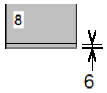


Detailed Elevation View: Left - Measurements in inches

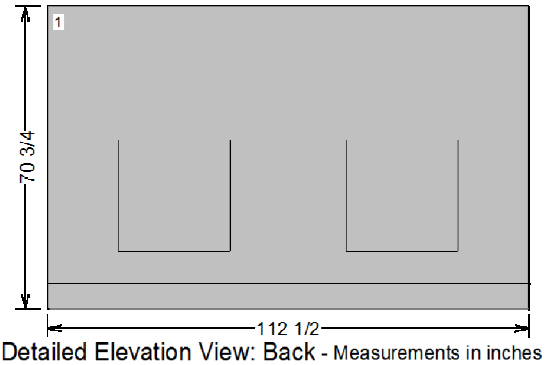
OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU



Detailed Elevation View: Front - Measurements in inches

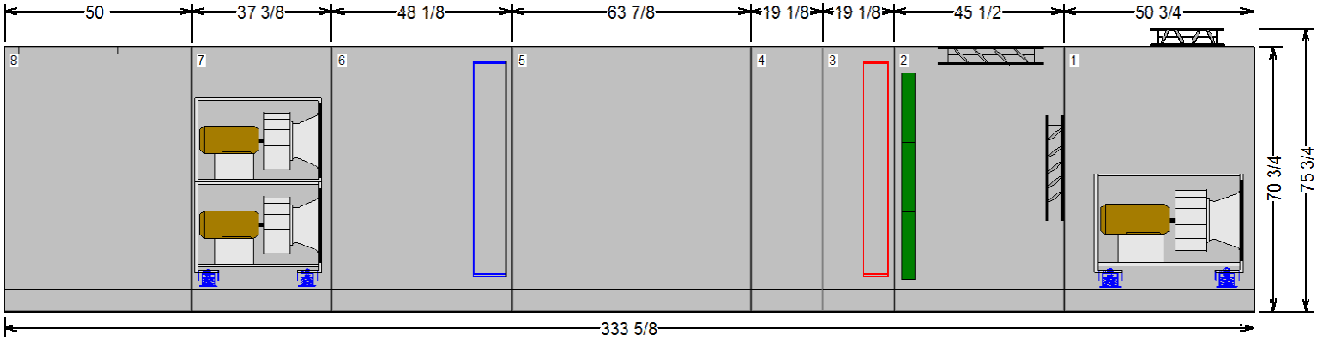


Detailed Elevation View: Back - Measurements in inches

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

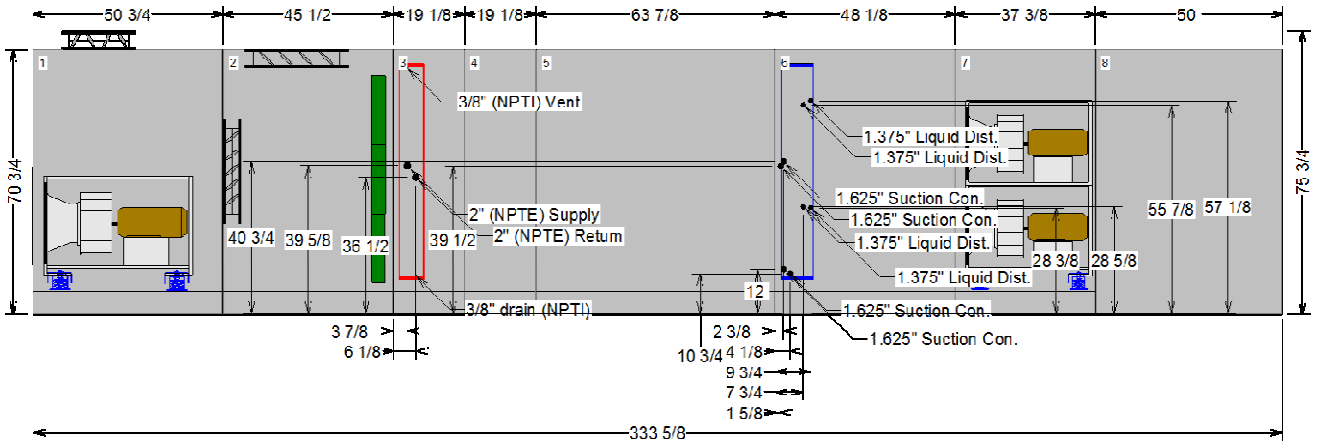


NPTI : National Pipe Thread Internal Connection
NPTE : National Pipe Thread External Connection

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU



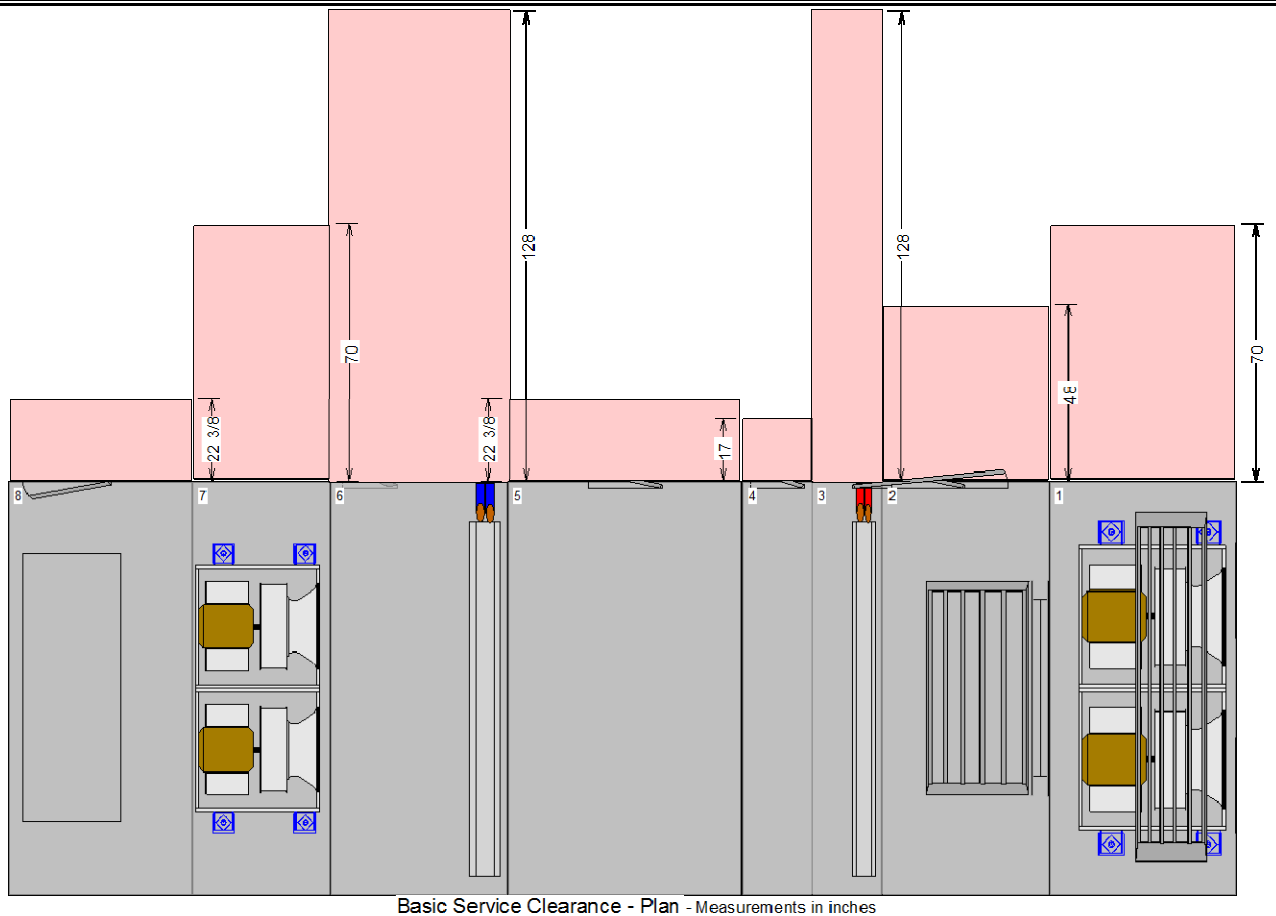
Coil connection view: Left - Measurements in inches

NPTI : National Pipe Thread Internal Connection
NPTE : National Pipe Thread External Connection

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Dimensional Drawings - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU



Basic Service Clearance - Plan - Measurements in inches

OPENING AND DIMENSIONS MAY VARY FROM CONTRACT DOCUMENTS / RETURN OF APPROVED DRAWINGS CONSTITUTES ACCEPTANCE OF THESE VARIANCES / NOT TO SCALE

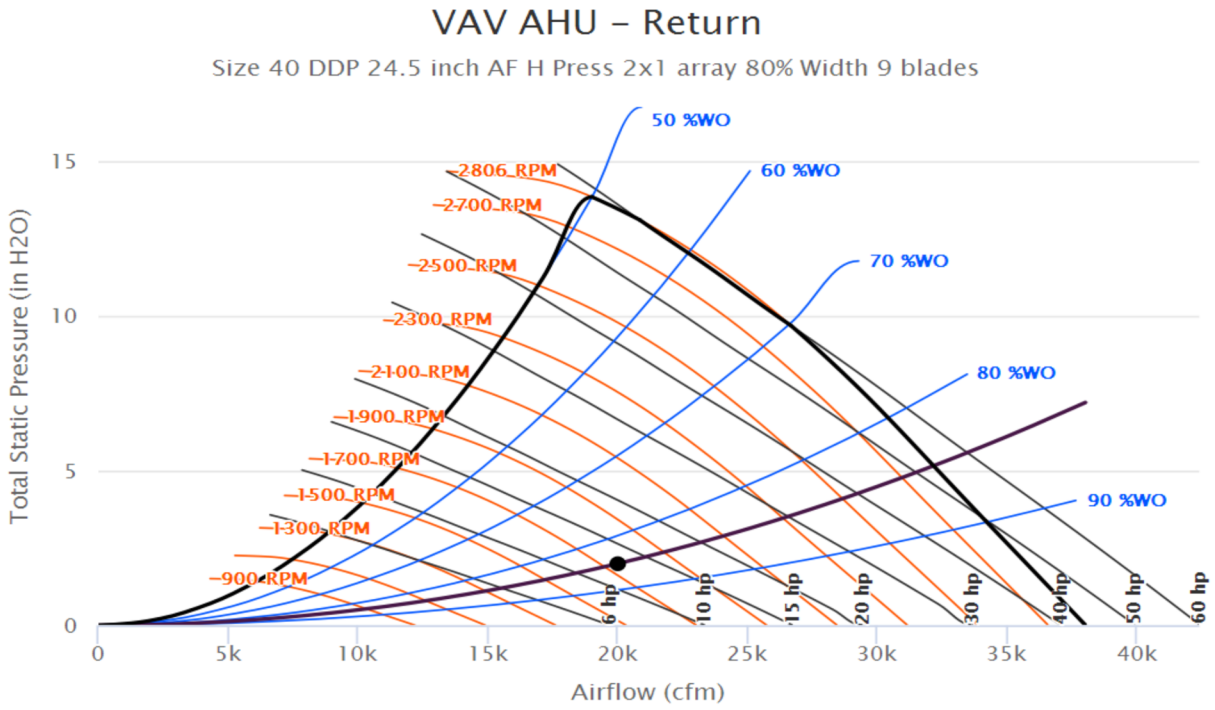
Unit size: 40	Job Name: Gurnee Village Hall AHU and CU- K91H27282	Unit Casing: 2in Double Wall Foam
Product group: Indoor unit	Actual airflow: 20000 cfm	Proposal Number:
Integral base frame: 6in. integral base frame	Sales Office: Chicago Main Office	Tags: VAV AHU
Paint:		Rigging/Installed Weight: 8636.3 lb / 8657.5 lb

Fan Curve - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Fan Details

Unit Size	24UR	**Operating Brake Power**	12.843 hp
Motor Frequency	59.00 Hz	**Altitude**	0.00 ft
Operating Airflow	20,000 cfm	**Design Temp.**	70.00 F
Operating Static Pressure	1.995 in H2O	**Efficiency**	48.97 %
Operating RPM	1,745 rpm		

Design VFD frequency is less than line frequency. Ensure the air delivery system can handle being pressurized to the 60 hz operating point on the fan curve.

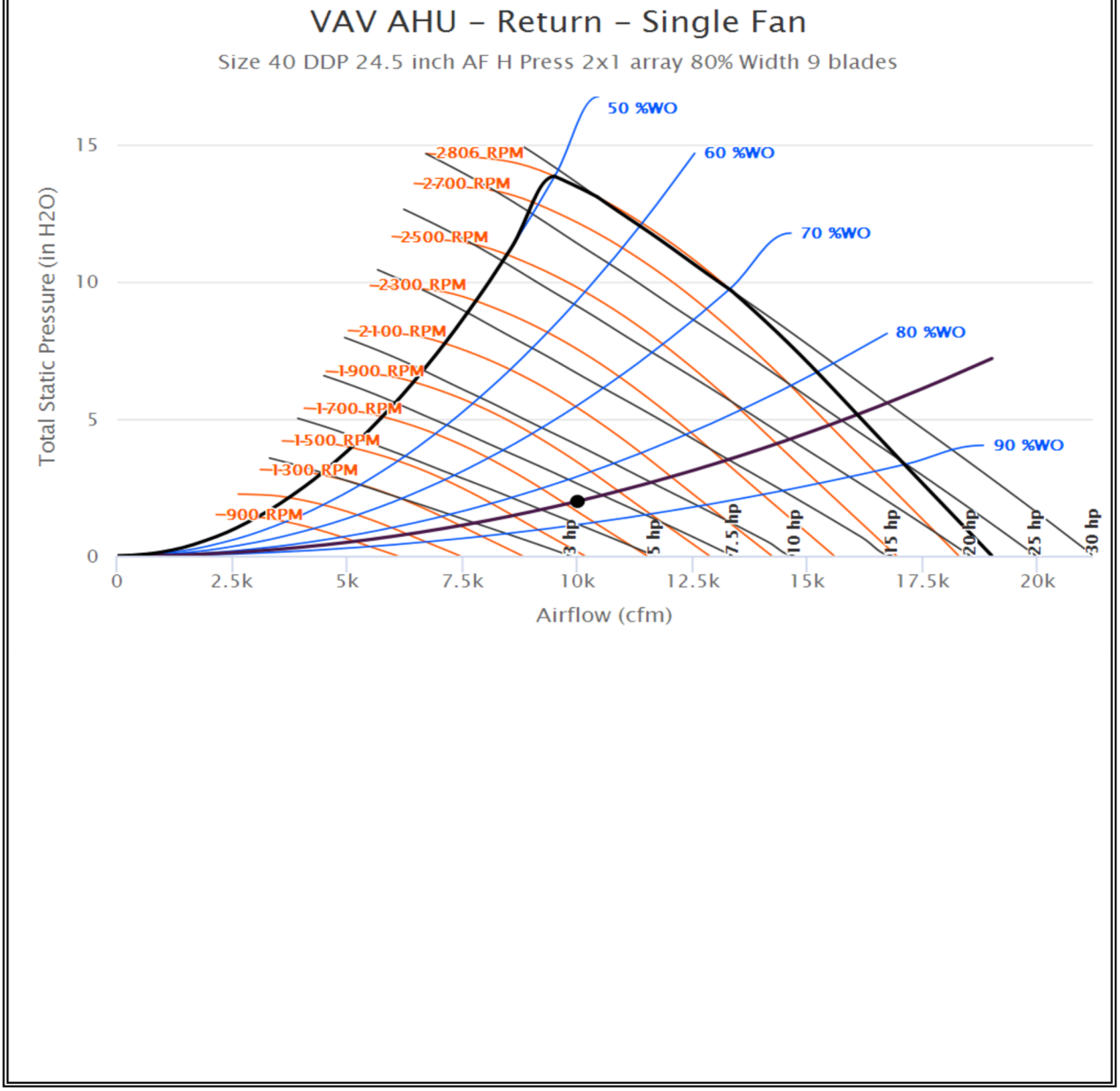


Fan Curve - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Fan Details

Unit Size	24UR	**Operating Brake Power**	6.421 hp
Motor Frequency	59.00 Hz	**Altitude**	0.00 ft
Operating Airflow	10,000 cfm	**Design Temp.**	70.00 F
Operating Static Pressure	1.995 in H2O	**Efficiency**	48.97 %
Operating RPM	1,745 rpm		

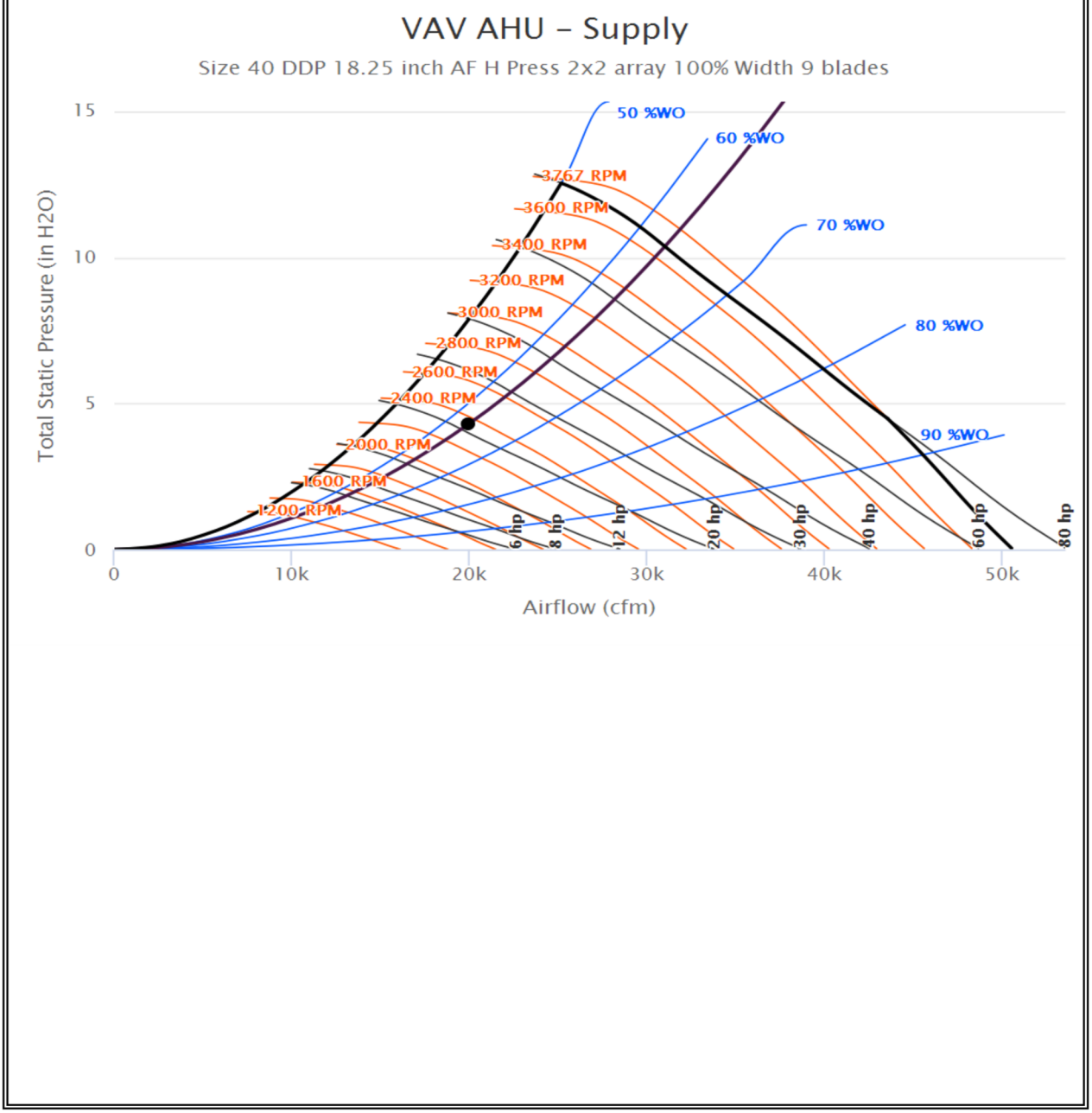
Design VFD frequency is less than line frequency. Ensure the air delivery system can handle being pressurized to the 60 hz operating point on the fan curve.



Fan Curve - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Fan Details

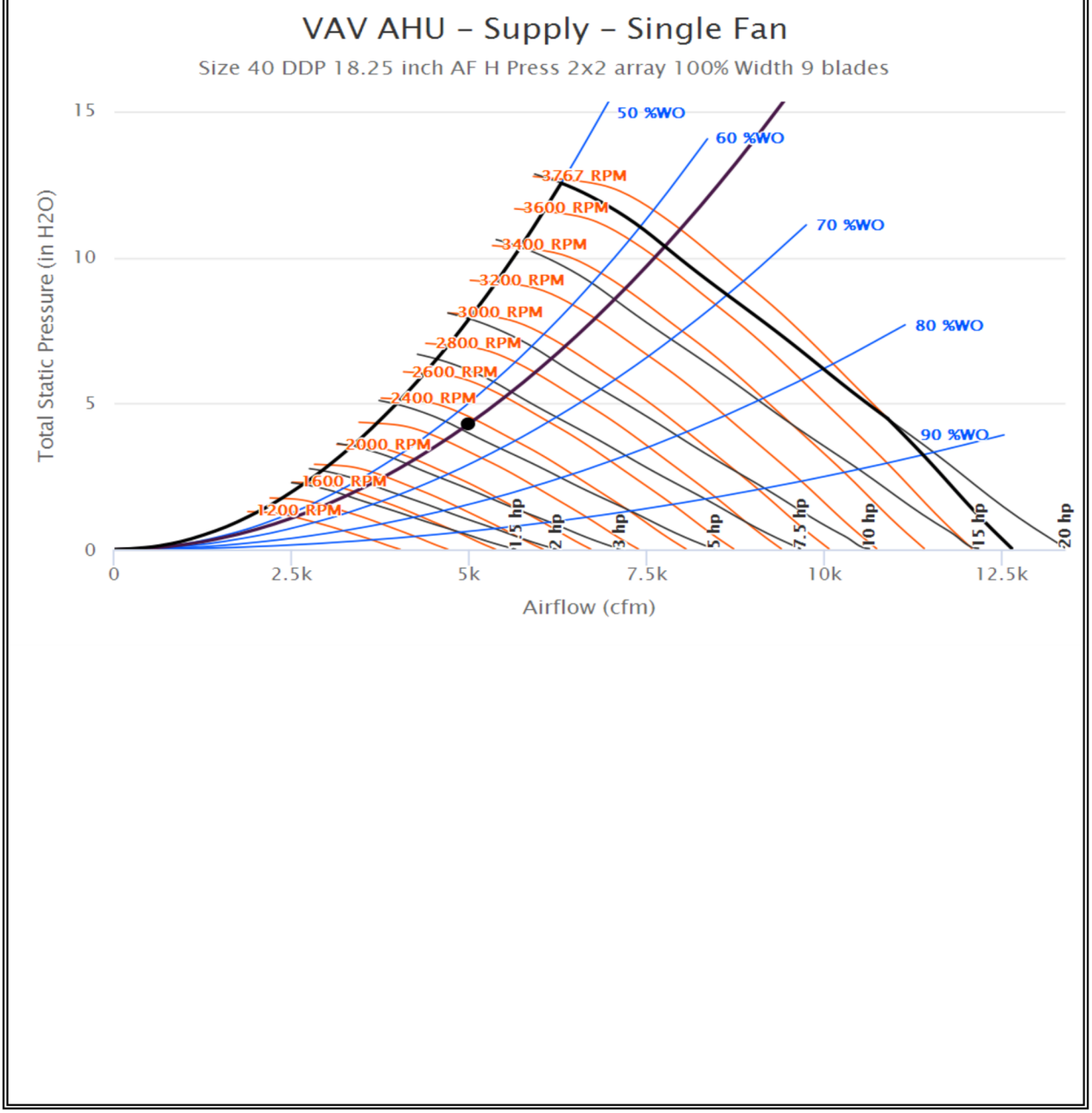
Unit Size	18UF	**Operating Brake Power**	21.528 hp
Motor Frequency	80.00 Hz	**Altitude**	0.00 ft
Operating Airflow	20,000 cfm	**Design Temp.**	70.00 F
Operating Static Pressure	4.321 in H2O	**Efficiency**	63.29 %
Operating RPM	2,363 rpm		



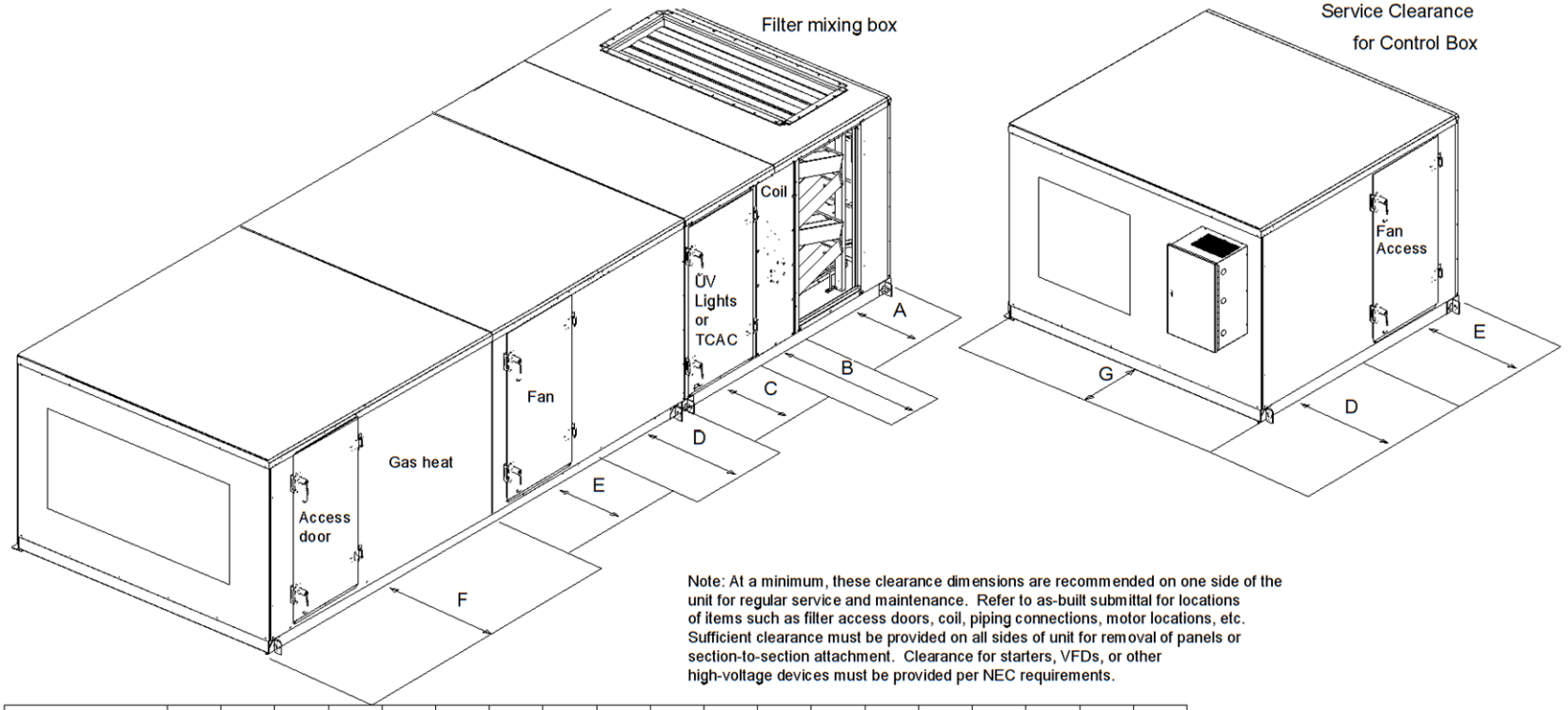
Fan Curve - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Fan Details

Unit Size	18UF	**Operating Brake Power**	5.382 hp
Motor Frequency	80.00 Hz	**Altitude**	0.00 ft
Operating Airflow	5,000 cfm	**Design Temp.**	70.00 F
Operating Static Pressure	4.321 in H2O	**Efficiency**	63.29 %
Operating RPM	2,363 rpm		



EXAMPLE UNIT - NOT CONFIGURED AS SELECTED.



Note: At a minimum, these clearance dimensions are recommended on one side of the unit for regular service and maintenance. Refer to as-built submittal for locations of items such as filter access doors, coil, piping connections, motor locations, etc. Sufficient clearance must be provided on all sides of unit for removal of panels or section-to-section attachment. Clearance for starters, VFDs, or other high-voltage devices must be provided per NEC requirements.

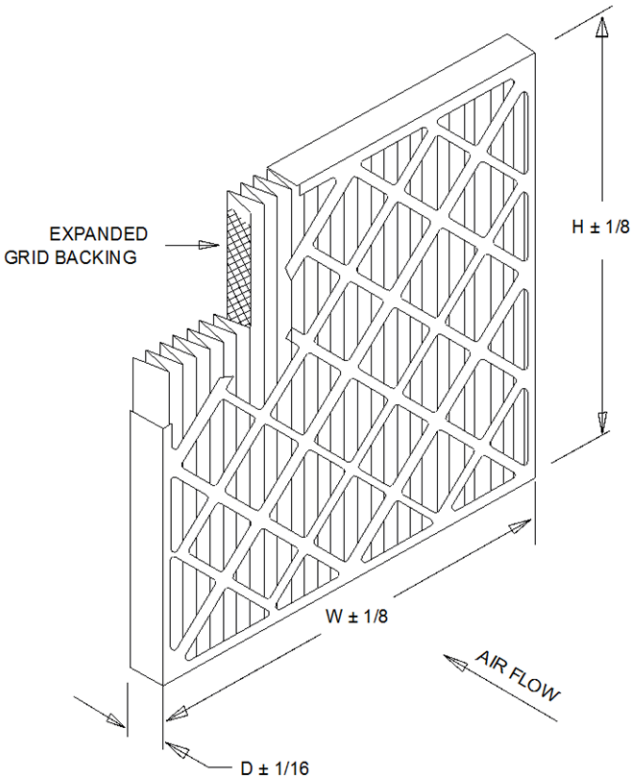
Component	3	4	6	8	10	12	14	17	21	25	30	35	40	50	57	66	80	100	120
A (filter)	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	52	56	58	58
B (coil, humidifier)	48	59	59	66	77	82	87	87	95	95	109	115	128	141	141	156	156	170	197
B (staggered coil)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	67	67	76	80	88	96	96	105	105	113	129
C (UV Lights)	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	52	56	58	58
C (TCAC)	43	59	59	63	75	81	83	83	58	58	83	75	83	83	83	83	83	75	83
D (External Starter, VFD, LV box or Overload box)	61	61	61	61	61	61	61	61	64	64	64	64	64	64	64	64	64	64	64
D (Internal Starter or VFD)	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
E (fan)	48	48	48	48	51	54	58	61	60	66	66	66	70	77	77	93	93	101	101
F (Gas Heat Ext Vestible)	N/A	N/A	89	90	108	100	100	105	115	115	118	136	140	156	156	170	179	180	N/A
F (Gas Heat Int Vestible)	N/A	N/A	56	63	74	79	84	84	92	92	106	112	125	138	138	153	153	167	194

Component	All Sizes
G (Side mount LV box)	36
G (Front mount LV box)	13

Accessory - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

Base Detail

Accessory - Performance Climate Changer (CSAA)
Item: A1 Qty: 1 Tag(s): VAV AHU

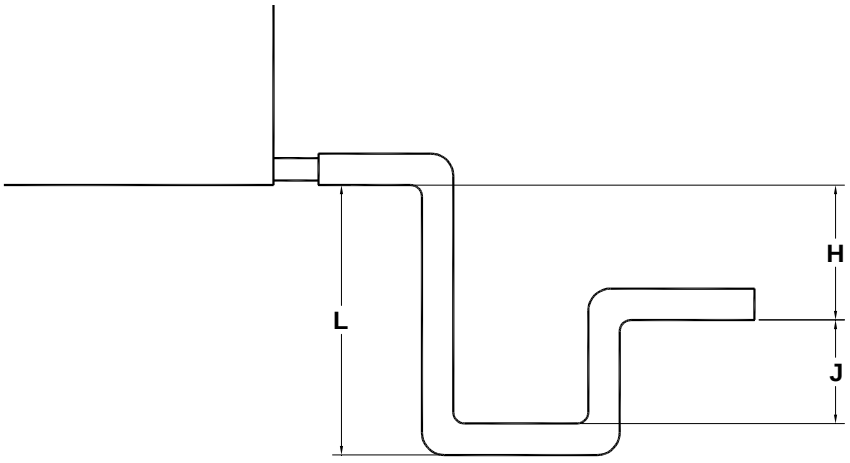


STANDARD CONSTRUCTION
1. 100 % Synthetic White Un-Dyed Media
2. 10.0 Pleats Per Foot
3. Expanded Metal Pleat Supports
4. Moisture Resistant Beverage Board Frame
5. Double Wall Frame

NOTES
1. MERV 8-A Per ASHRAE 52.2-2007 Appendix J.
2. Final Resistance: 1/0" W.G.
3. Rated Velocity: 500 FPM
4. Class 2 Filter Per U.L. Standard 900
5. Maximum Operating Temperature: 225 DEG. F

MODEL NUMBER	NOMINAL SIZE IN. W X H X D	ACTUAL SIZE IN. W X H X D	RATED AIR FLOW CFM	INITIAL RESISTANCE IN. W.G.	MEDIA AREA SQ. FT.
MX40-STD2-217	10 X 20 X 2	9-1/2 X 19-1/2 X 1-3/4	700	0.29	4.7
MX40-STD2-220	12 X 20 X 2	11-1/2 X 19-1/2 X 1-3/4	840	0.29	5.5
MX40-STD2-210	12 X 24 X 2	11-3/8 X 23-3/8 X 1-3/4	1000	0.29	6.2
MX40-STD2-239	14 X 20 X 2	13-1/2 X 19-1/2 X 1-3/4	980	0.29	5.7
MX40-2TD2-241	14 X 25 X 2	13-1/2 X 24-1/2 X 1-3/4	1220	0.29	7.1
MX40-STD2-245	15 X 20 X 2	14-1/2 X 19-1/2 X 1-3/4	1050	0.29	6.2
MX40-STD2-201	16 X 20 X 2	15-1/2 X 19-1/2 X 1-3/4	1120	0.29	6.7
MX40-STD2-216	16 X 24 X 2	15-3/8 X 23-3/8 X 1-3/4	1340	0.29	8.0
MX40-STD2-202	16 X 24 X 2	15-1/2 X 24-1/2 X 1-3/4	1400	0.29	8.0
MX40-STD2-280	15 X 20 X 2	17-1/2 X 19-1/2 X 1-3/4	1250	0.29	7.8
MX40-STD2-212	18 X 24 X 2	17-3/8 X 23-3/8 X 1-3/4	1500	0.29	9.3
MX40-STD2-285	18 X 25 X 2	17-1/2 X 24-1/2 X 1-3/4	1570	0.29	9.7
MX40-STD2-203	20 X 20 X 2	19-1/2 X 19-1/2 X 1-3/4	1400	0.29	8.3
MX40-STD2-211	20 X 24 X 2	19-3/8 X 23-3/8 X 1-3/4	1670	0.29	9.9
MX40-STD2-204	20 X 25 X 2	19-1/2 X 24-1/2 X 1-3/4	1750	0.29	10.3
MX40-STD2-205	24 X 24 X 2	23-3/8 X 23-3/8 X 1-3/4	2000	0.29	11.7
MX40-STD2-225	25 X 25 X 2	24-1/2 X 24-1/2 X 1-3/4	2170	0.29	13.6

Accessory - Performance Climate Changer (CSAA)
Trap Schedule
Item: A1 Qty: 1 Tag(s): VAV AHU



Drain pan trapping for section under negative pressure

L = H + **J** + pipe diameter where:
H = 1 inch for each inch of negative pressure (loaded filters) plus 1 inch
J = ½ **H**

Drain pan trapping for section under positive pressure

L = H + **J** + pipe diameter where:
H = 1/2 inch (minimum)
J = ½ inch plus the unit positive static pressure at coil discharge (loaded filters)

Unit Tag(s)	Unit Size	Entering Ext. Static Pressure (in H2O)	Discharge Ext. Static Pressure (in H2O)	Drain pan Section Location	Recommended Trap Dimensions[1]			Selected Baserail Height (in)[1]
					H (in)	J (in)	L (in)	
VAV AHU[2]	Unit size 40	1.000	1.000	Coil section [6]	4.567	2.284	8.101	6.000

[1] To ensure proper condensate trapping the field installed housekeeping pad height is the responsibility of the contractor.
[2] The external static pressure used for fan selection was assumed to be divided 50% to entering duct external static pressure and 50% discharge external static pressure.

Accessory - Performance Climate Changer (CSAA)
Filter Schedule
Item: A1 Qty: 1 Tag(s): VAV AHU

Unit Tag(s)	Filter Location	Filter Arrangement	Filter Depth	Filter Type	MERV Rating	Filter Quantity	Filter Size
VAV AHU	Air mixing section [2]	Flat	2in. filter frame	Pleated media	MERV 8	4 1 8 2	16 x 20 16 x 25 20 x 20 20 x 25

Field Wiring - Performance Climate Changer (CSAA)
MCA MOP Schedule
Item: A1 Qty: 1 Tag(s): VAV AHU

Unit Tag(s)	Circuit	Circuit Description	Voltage/Phase/Hz	MCA (A)	MOP (A)
VAV AHU[3]	1	Supply fan motor (each x 4)	200-208/3/60	29.13	50.00
	2	Return fan motor (each x 2)	200-208/3/60	29.13	50.00

[3] For multiple direct drive fans with no factory mounted VFD there will be no factory wiring from the individual motors. Field provisions need to be made to provide wiring, individual motor overloads and VFD.

Field Installed Options - Part/Order Number Summary
This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - Performance Climate Changer (CSAA)

Item	Tag(s)	Qty	Description	Model Number
A1	VAV AHU	1	Performance Climate Changer (CSAA)	CSAA040UA

Field Installed Option Description	Part/Ordering Number
Pleated media	

Prasino Engineering, LLC
747 East Boughton Road
STE 208
Bolingbrook, IL 60440
www.prasinoeng.com
info@prasinoeng.com

Request for Information

APPENDIX B – CONDENSING UNIT SUBMITTAL

Condensing Unit Submittal

Prepared For:
RTM

Date: May 26, 2023

Job Name:
Gurnee Village Hall AHU and CU- K91H27282

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	Air-Cooled Condensing Units (Commercial)

Claudia Hurt
Trane U.S. Inc.
7100 South Madison
Willowbrook, IL 60527
Office Phone: (630) 734-3200

The attached information describes the equipment we propose to furnish for this project and is submitted for your approval.

Submittal acceptance and return is a critical step, so please ensure submittals are returned with approval to release to production within 14 days of submittal date.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Tag Data - Air-Cooled Condensing Units (Commercial) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	CU	1	20-60 Ton Air-Cooled Condensing Unit (RA	RAUJC604B_ 3A*D***0

Product Data - Air-Cooled Condensing Units (Commercial)

Item: A1 Qty: 1 Tag(s): CU

Standard Unit
Condenser: Air-cooled
R-410A refrigerant
60 ton unit
460 Volt 60 Hertz 3 Phase
No controls
Low ambient damper(s) control
cULus approval
Non-fused disconnect switch
Suction service valve
Spring isolators (unit) (Field Installed)
1st Year Labor warranty whole unit
Refrigerant warranty 1st year only

Performance Data - 20-60 Ton Air-Cooled Condensing Unit (RAUC20)

Tags	CU
Net total capacity (MBh)	669.98
Ambient (F)	95.00
Elevation (ft)	0.00
Compressor power (kW)	61.05
Cond fan motor power (kW)	5.47
Total power (Cond only) (kW)	66.52
EER @ AHRI (Cond only) (EER)	11.2
Min circuit ampacity (A)	120.00
Max overcurrent protection (A)	125.00
Recommended dual element (A)	125.00
Compressor 1 RLA (A)	25.50
Compressor 1 count (Each)	4.00
Compressor 2 RLA (A)	0.00
Compressor 2 count (Each)	0.00
Condenser motor FLA (A)	1.80
Condenser motor count (Each)	6.00
Suction line size-horizontal	2-1/8 in.
Suction line size - vertical	2-1/8 in.
Liquid line size	7/8 in.
Est refrigerant charge per ckt. (lb)	0.0
Refrigerant type	R410a
Refrigerant charge(no evap) - 50 ft (lb)	24.0
Refrigerant charge(no evap) - 100 ft (lb)	36.0
Refrigerant charge(no evap) - 150 ft (lb)	48.0
Liquid temp ent expansion device (F)	102.02
Min operating weight (lb)	2803.0
Max operating weight (lb)	3462.0
Application type	Standalone RAUJ Condenser
Saturated Suction Temperature (F)	35.47

Mechanical Specifications - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

General - R410A
All air-cooled condensing units shall have scroll compressors and are factory assembled and wired. Each unit shall ship from the factory with a nitrogen holding charge. Units shall be constructed of 14-gauge welded galvanized steel frame with 14 and 16-gauge galvanized steel panels and access doors. Units shall have factory mounted, louvered, full-length steel grilles to protect the condenser coils and piping. Unit surface shall be phosphatized and finished with an air-dry paint. This air-dry paint finish shall be durable enough to withstand a minimum of 672-consecutive-hour salt spray application in accordance with standard ASTM B117.

Compressors - R-410A
Trane 3-D Scroll compressors have simple mechanical design with only three (3) major moving parts. Scroll type compression provides inherently low vibration. 3-D compressors provide a completely enclosed compression chamber with no leakage paths. The compressor is suction gas cooled, direct drive, 3600 RPM hermetic motors. The Scroll compressor includes a centrifugal oil pump, oil level sight glass, and an oil charging valve.

Refrigerant Management - R-410A
Split systems can have significantly more refrigerant than packaged systems and thus require controls to reliably manage this excess refrigerant. Each compressor shall have crankcase heaters installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles. Additionally, the condensing unit shall have controls to initiate refrigerant isolation at system shut down on each refrigerant circuit. To be operational, the refrigerant isolation cycle requires a field-installed isolation solenoid valve on the common liquid line near the evaporator.

Note: Under extreme conditions, R410a refrigerant can present special challenges with piping and system design. Whenever refrigerant line set lengths approach 150 equivalent feet and/or design ambient temperature exceeds 115 degrees F, contact your Trane Account Executive to review application requirements.

Unit Control - R410A
Factory provided 115-volt control circuit includes fusing and control power transformer. The unit is wired with magnetic contactors for compressor and condenser motors, three-leg solid-state compressor overload protection, and high/low pressure cutouts. Charge isolation, reset relay and anti-recycle compressor timer is provided. Across-the-line start is standard.

Dual Circuit, Condenser Coils for 40-60 Ton Units - R-410A
Condenser coils are dual circuited having an Aluminum Microchannel design. The coils are burst tested and leak tested. Factory installed liquid line service valves are standard.

Dual Refrigerant Circuit w/Four Capacity Stages for 40-60 Ton Units - R410A
Each unit has dual refrigeration circuits. Each circuit has two (2) compressors manifolded together utilizing a passive oil system. Each unit has four capacity stages. Capacity modulation is accomplished by turning compressors on and off.

Condenser Fans - R-410A
Condenser fans are direct driven with motors having thermal overload protection and permanently lubricated ball bearings.

No System Control - R-410A
No System Control provides a terminal strip for step control provided by others. The system provides internal 3 minute fixed on and 5 minute fixed off time delays and compressor contactors. Each unit is equipped with a phase loss/reversal/low voltage monitor which protects 3-phase equipment from phase loss, phase reversal, and low voltage. Any fault condition will produce a Failure Indicator LED, and send the unit into an emergency stop condition. The system temperature ?step? controller must be field provided and installed.

Note: For No Controls units with system temperature ?step? controllers provided by others, the controller must include 5 minute on/off interstage timers to coordinate with the units fixed on/off time delay relays.

Low Ambient Control R-410A
Low ambient option extends unit operation from 40 F to 0 F [4.5 to -17.8 C] by utilizing an external damper assembly for head pressure control.

Non-Fused Unit Disconnect Switch - R-410A
A non-fused disconnect switch is mounted in the control box and provides for interruption of power for servicing the unit. Lugs are suitable for copper wires only. No overcurrent or short circuit protection is provided for unit by this switch.

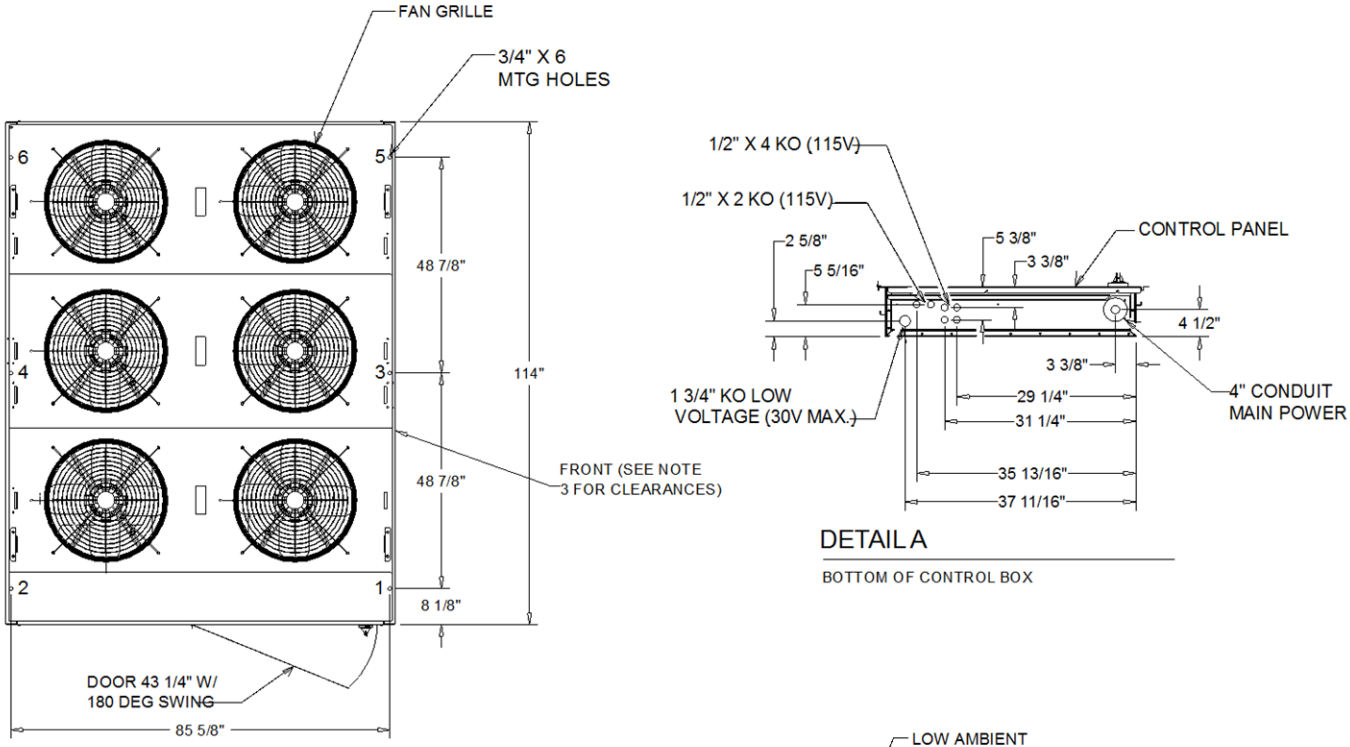
Spring Vibration Isolators - R-410A
Spring vibration isolators are supplied for field installation under the unit base to minimize transmission of unit vibrations.

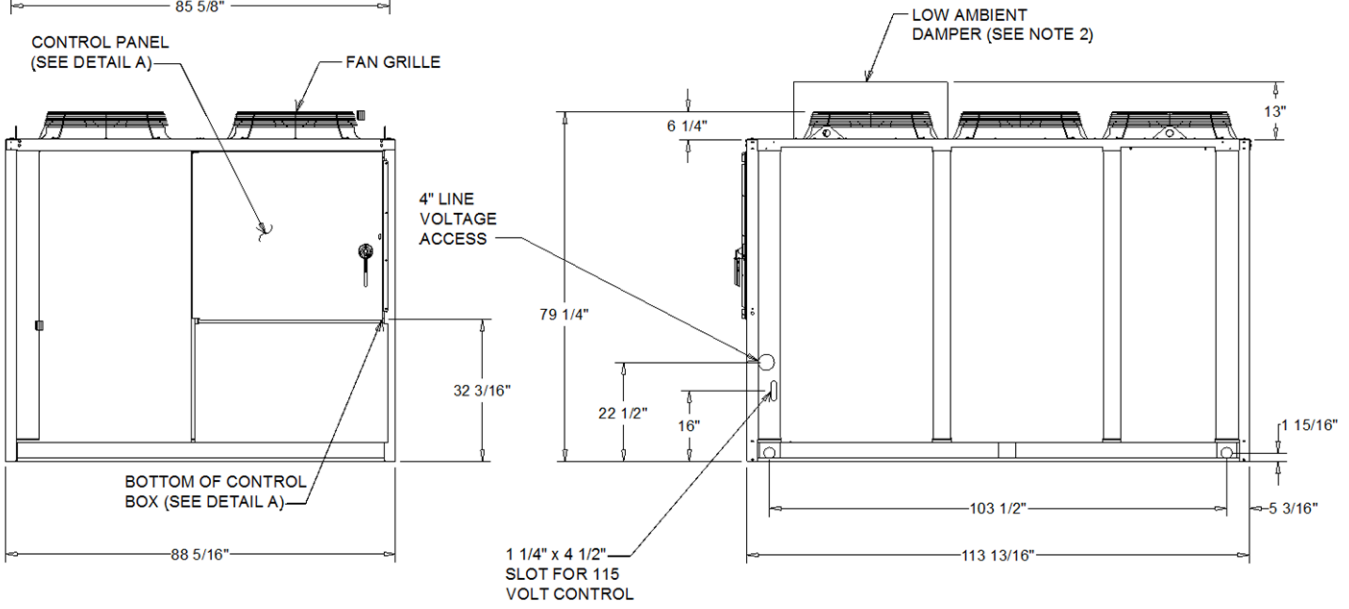
Field Installed; 30% Bleed Valve TXV
Installation shall require use of 30% bleed, Thermal Expansion Valves. Valves shall be field supplied and field installed. Quantity and size shall be determined by the application.

Note: Liquid line solenoids are required for all applications. Trim solenoids cannot be used.

Dimensional Drawings - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

NOTES:
1. SEE CONNECTION DRAWING FOR CONNECTION LOCATION AND SIZES.
2. LOW AMBIENT DAMPER ONLY COMES WITH SELECTED UNIT .
3. FRONT & BACK OF UNIT CLEARANCE 72"". LEFT & RIGHT SIDE OF UNIT CLEARANCE 42"

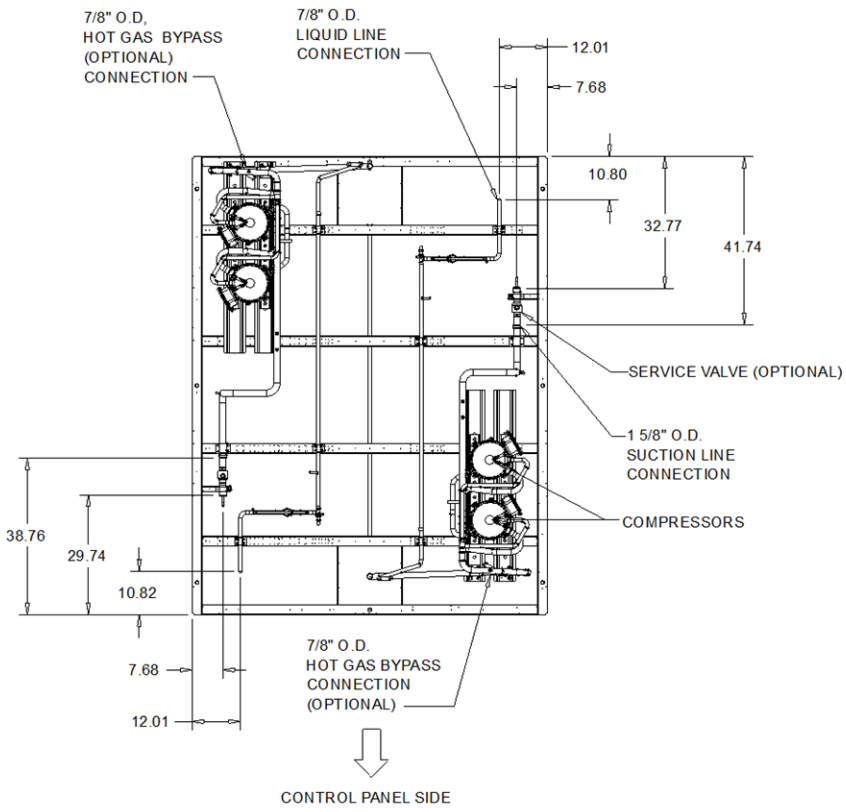




60 TON UNIT
DIMENSIONAL DRAWING

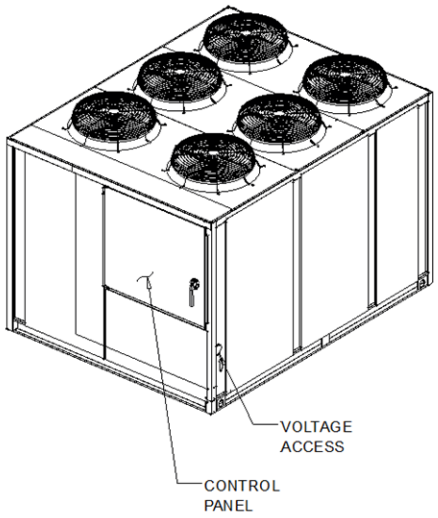
Dimensional Drawings - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

NOTES:
1. VERIFY WEIGHTS, CONNECTIONS, AND ALL DIMENSIONS WITH TRANE INSTALLATION OPERATION MAINTENANCE (IOM) DOCUMENTS BEFORE INSTALLATION.



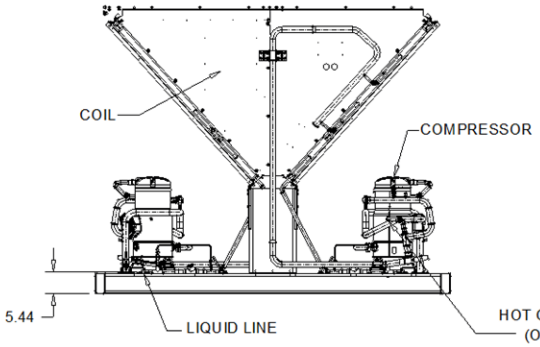
PLAN VIEW OF UNIT

CONNECTION DRAWING



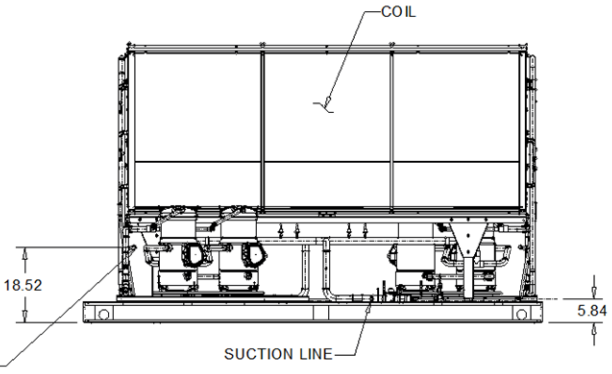
ORIENTATION VIEW OF UNIT

ISOMETRIC DRAWING



CONTROL PANEL (LEFT) SIDE VIEW OF UNIT

CONNECTION DRAWING



BACK VIEW OF UNIT

CONNECTION DRAWING

60 TON UNIT

DIMENSIONAL CONNECTION DRAWING

Dimensional Drawings - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

GENERAL ELECTRICAL DATA

GENERAL

Tonnage / kW:	60 [211.2 kW]
Unit Operating Voltage Range:	414-506
Unit Primary Voltage:	460
Unit Hertz:	60
Unit Phase:	3
Minimum Circuit Ampacity: (3)	120.00 A
Maximum Overcurrent Protection Device: (2)	125.00 A
Recommended Dual Element Fuse: (4)	125.00 A

OUTDOOR MOTOR

Number:	6
Horsepower:	1.0
Motor Speed (rpm):	1,140
Outdoor Motor Full Load amps:	1.8
Outdoor Motor Locked Rotor amps:	9.0

COMPRESSOR

	Circuit A1/A2 - Circuit B1/B2
Tons (ea):	15.0 / 15.0 - 15.0 / 15.0
Compressor Rated Load Amps (ea):	25.5 / 25.5 - 25.5 / 25.5
Locked Rotor Amps (ea):	197.0 / 197.0 - 197.0 / 197.0

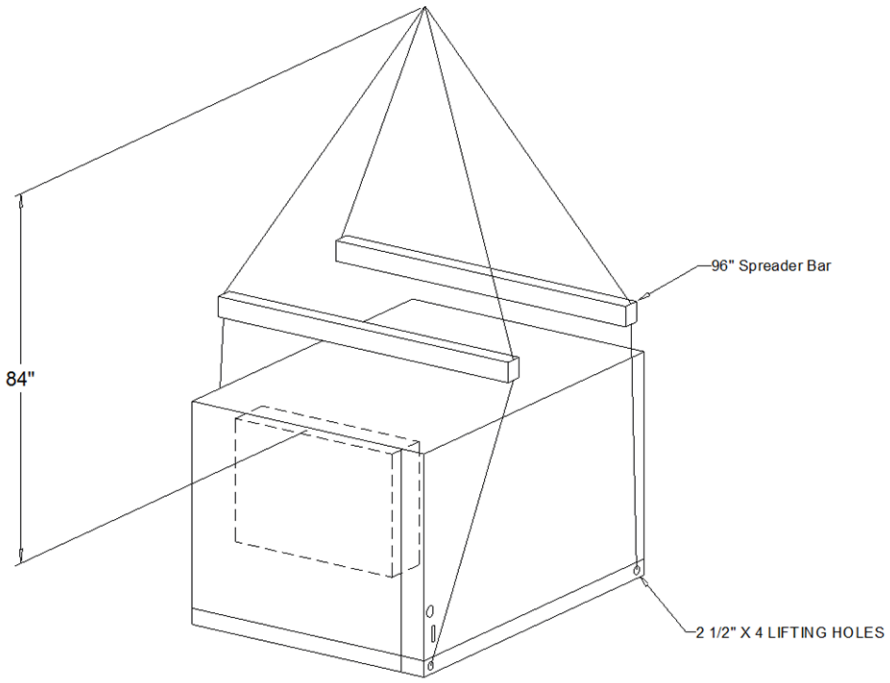
REFRIGERANT OPERATING CHARGRE (Cond Only, per Circuit)

Type:	R-410A
Number of Circuits:	2
Condenser Storage Capacity:	25.0 lb
Refrigerant Operating Charge (Condenser Only) :	23.8 lb

Notes:

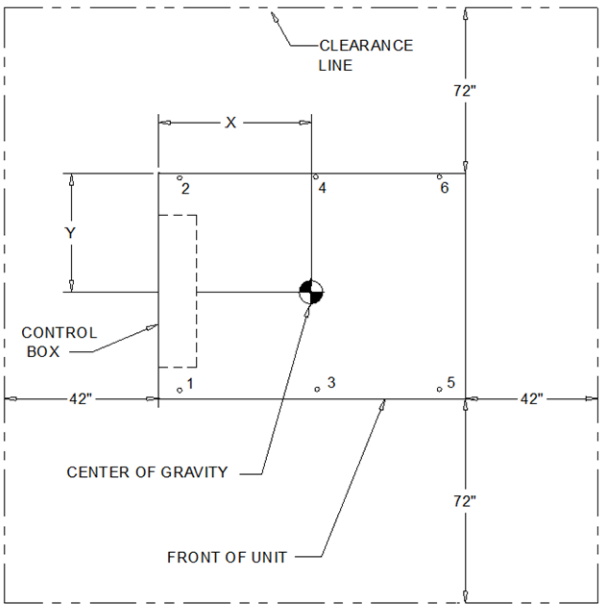
1. Electrical data is for each individual motor.
2. Maximum overcurrent protection permitted by nec 440-22 is 225 percent of largest compressor motor RLA plus the remaining motor RLA and FLA values.
3. Minimum circuit ampacity is 125 percent of the largest compressor motor RLA plus the remaining motor RLA and FLA values.
4. Recommended dual element fuse size is 150 percent of the largest compressor motor RLA plus the remaining motor RLA and FLA values.
5. Local codes may take precedence.
6. Electrical data is pulled from TOPSS (performance engine). If data is missing please check TOPSS.

Weight, Clearance & Rigging - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU



60 TON RIGGING

WEIGHT AND RIGGING



60 TON CENTER OF GRAVITY AND CLEARANCES

WEIGHT AND RIGGING

WEIGHTS AND LOAD POINTS

OPERATING:	2853.0 lb
SHIPPING:	2803.0 lb
LOAD POINTS 1 :	367.2 lb
LOAD POINTS 2 :	332.8 lb
LOAD POINTS 3 :	426.0 lb
LOAD POINTS 4 :	391.6 lb
LOAD POINTS 5 :	692.5 lb
LOAD POINTS 6 :	642.9 lb

*ALL WEIGHTS ARE APPROXIMATE

CENTER OF GRAVITY

X:	52 1/8"
Y:	45 7/8"

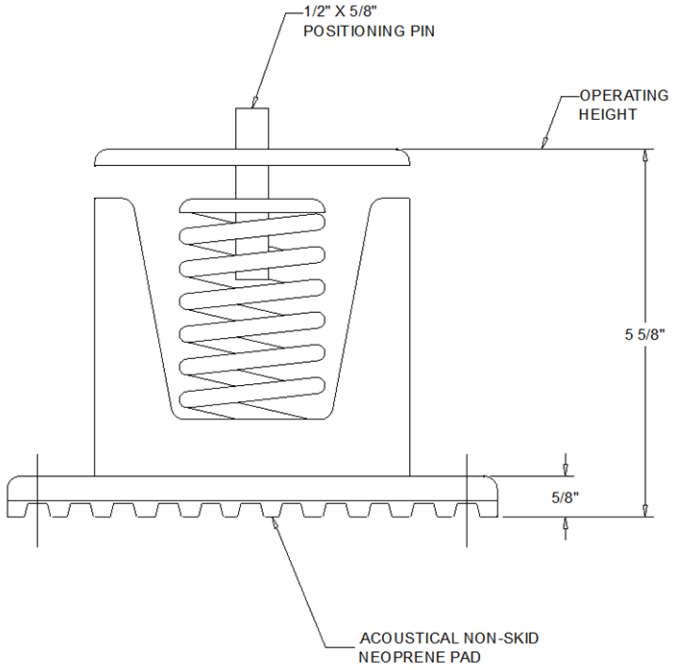
ADD WEIGHTS

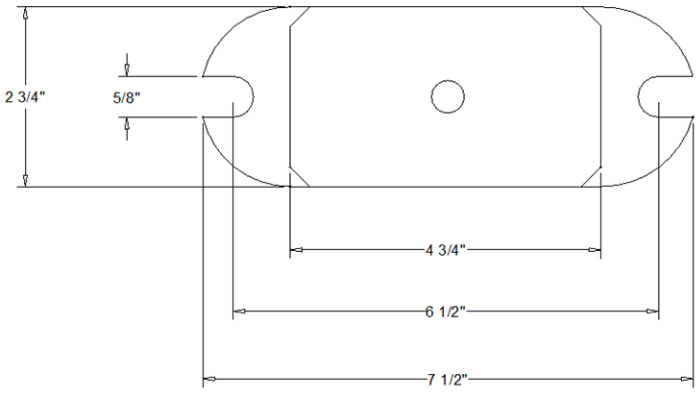
SHIPPING: (4)
OPERATING: (4)

NOTES:
1. OPERATING WEIGHT INCLUDES REFRIGERANT, OIL AND WATER.
2. SHIPPING WEIGHT INCLUDES REFRIGERANT AND OIL CHARGES
3. THE ACTUAL WEIGHT IS SHOWN ON THE NAMEPLATE. WEIGHT SHOWN REPRESENT TYPICAL SHIPPING AND OPERATING WEIGHTS FOR THE UNIT SELECTED.
4. ADD WEIGHT TO TOTAL WEIGHT OF UNIT
5. IF UNITS IS INSTALLED IN A WELL, THE DEPTH OF THE WELL MUST NOT EXCEED THE TOP HEIGHT OF THE UNIT. THE TOP OF THE UNIT MUST HAVE UNRESTRICTED AIRFLOW. PLEASE REFERENCE RECOMMENDED CLEARANCES.

WARNING!
TO PREVENT INJURY OR DEATH AND POSSIBLE EQUIPMENT DAMAGE,
DO NOT USE CHAIN (CABLES) OR SLINGS EXCEPT AS SHOWN
AND USE CABLES STRONG ENOUGH TO SUPPORT UNIT WEIGHT.
TEST LIFT UNIT TO ENSURE PROPER BALANCE AND RIGGING.

Accessory - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU





NOTES:
1. MOUNTING LOCATIONS CORRELATE WITH MOUNTING LOCATIONS SHOWN IN CLEARANCE DRAWING.
2. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION

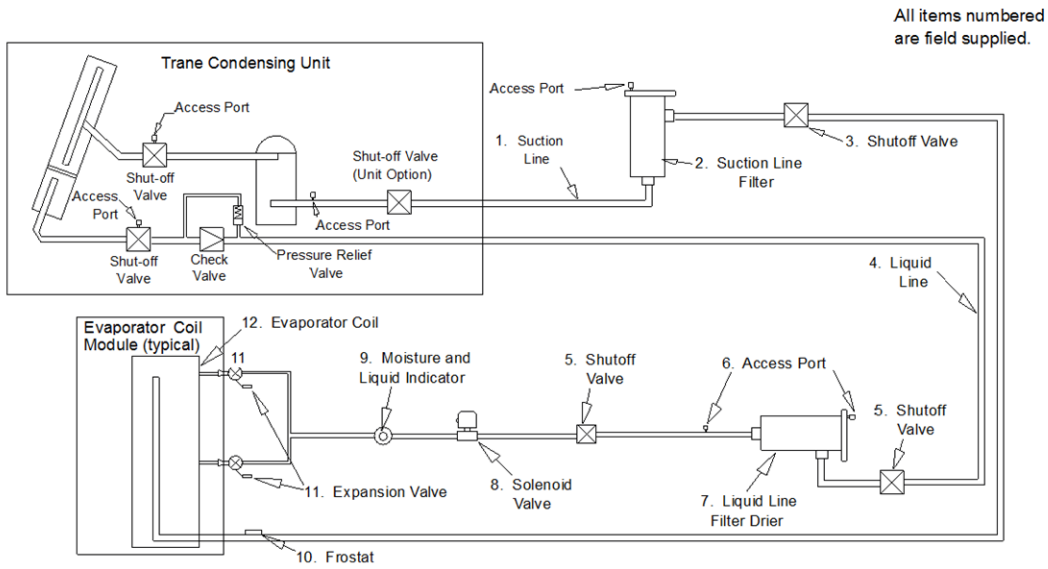
MOUNTING LOCATIONS	
LOCATION 1	CP1D-510
LOCATION 2	CP-1D340
LOCATION 3	CP1D-510
LOCATION 4	CP1D-510
LOCATION 5	CP-1D-900
LOCATION 6	CP-1D-675

MOUNTING ISOLATOR (SPRING)

DIMENSIONAL ACCESSORIES DRAWING

Field Wiring - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

Required Components for Refrigerant Circuits



SUCTION LINE

1. Interconnected Tubing (Suction line)
   Maximum of 50 feet if condenser is above evaporator (If risers are more than 50 feet, the application must be viewed by Trane) Refer to SS-APG012-EN for more details

2. Suction Line
   Filter Drier 1 / ckt suction filter should be the replaceable-core type, and a clean core should be installed after the system is cleaned up

3. Shut-Off Valve
   Manual ball valves for 1 5/8"" tubing.

LIQUID LINE

4. Interconnected Tubing (Liquid Line)
   Refer to applications guide SS-APG012 - EN for vertical & horizontal piping limitations.

5. Shut-Off Valve
   2 Manual ball valves

6. Access Port
   Port used to determine suction pressure. This port is usually a Schraeder valve with a core.

7. Liquid Line
   Filter Drier 1 / ckt liquid filter should be the replaceable-core type, and a clean core should be installed after the system is cleaned up.

8. Solenoid Valves
   Liquid line requires a field supplied and installed isolation solenoid valve within 10 feet of the evaporator. The suggested solenoid uses a 120-volt service and requires code-compliant wiring to the RAUJ condensing unit.

   Note: Trim solenoids cannot be used. They are not compatible with Microchannel condenser coils

9. Moisture and Liquid Indicator
   One moisture-indicating sight glass is to be installed in the main liquid line.

Field Wiring - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

EVAPORATOR

10. Frostat (not required) - The control is mechanically attached to the outside of the refrigerant line, near the evaporator, and wired to the unit control panel See application guide SS-APG012-EN for selection information.

11. Expansion Valves - See application guide SS-APG012-EN for selecting valve quantity and size.
Note: Units with Microchannel condenser coils applied with DX systems will require 30 percent bleed valves.

Expansion Valves for 20-60T MCHE (30 precent Bleed) Evap Circuit Tonnage

REFRIGERANT	MIN.	MAX.	SPORLAN MODEL NUMBER	TRANE PART
R-410A	2.0	3.0	BBIZE-1-1/2-GA (BP/30)	VAL10487
R-410A	2.5	3.5	BBIZE-2-GA (BP/30)	VAL10488
R-410A	3.5	5.0	BBIZE-3-GA (BP/30)	VAL10489
R-410A	4.5	7.0	BBIZE-4-GA (BP/30)	VAL10490
R-410A	6.0	8.5	BBIZE-5-GA (BP/30)	VAL10491
R-410A	7.0	10.0	BBIZE-6-GA (BP/30)	VAL10492
R-410A	8.0	13.5	BBIZE-8-GA (BP/30)	VAL10493
R-410A	11.0	17.5	BBIZE-12-1/2-GA (BP/30)	VAL10494
R-410A	14.0	21.5	BBIZE-15-GA (BP/30)	VAL10495
R-410A	17.0	28.5	OZE-20-GA (BP/30)	VAL10496
R-410A	22.0	30.0	OZE-25-GA (BP/30)	VAL10497

(1) Ton per distributor, choose the valve that matches the evap coil circuit capacity that it serves.
(2) Provide and install one expansion valve per distributor.

Refrigerant Charge and Maximum Line Length

Total interconnecting line length (per circuit)	50 ft	100 ft	150 ft
Condenser and line set approx. refrigerant charge (per circuit) - evaporator charge not included	24.0 lb	36.0 lb	48.0 lb

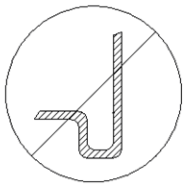
If total interconnecting line length is more than 150 feet, the application must be reviewed by Trane.

**Contact product support for information on refrigeration components and piping applications assistance
***Data in table is pulled from TOPSS selection. If N/A is present, please refer to unit IOM.

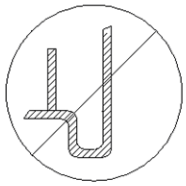
Installation Guidelines

Suction Line Piping

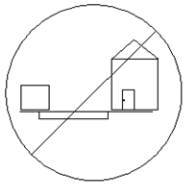
1. Do not use suction line traps.



2. Do not use double risers.



3. Avoid putting suction lines underground.



4. Route suction lines as short and direct as possible.

5. Slope suction line away from the condensing unit 1 inch for every 10 feet.

6. Insulate suction line.

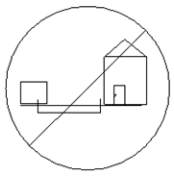
7. The suction filter should be located as close to the compressors as possible.

Field Wiring - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU

Required Components for Refrigerant Circuits Continued

Liquid Line Piping

1. Avoid putting liquid lines underground.



2. Route liquid lines as short and direct as possible.

3. Slope liquid line away from the condensing unit 1 inch for every 10 feet.

4. Only insulate liquid lines that pass through heated areas.

5. Wire solenoid valve per field connection diagram.

6. The liquid line filter drier should be as close to the solenoid valve as possible.

Evaporator Piping

1. Install TXV directly to unit liquid connection.

2. Locate TXV bulb midway between 90F bends on top of suction tube as shown.

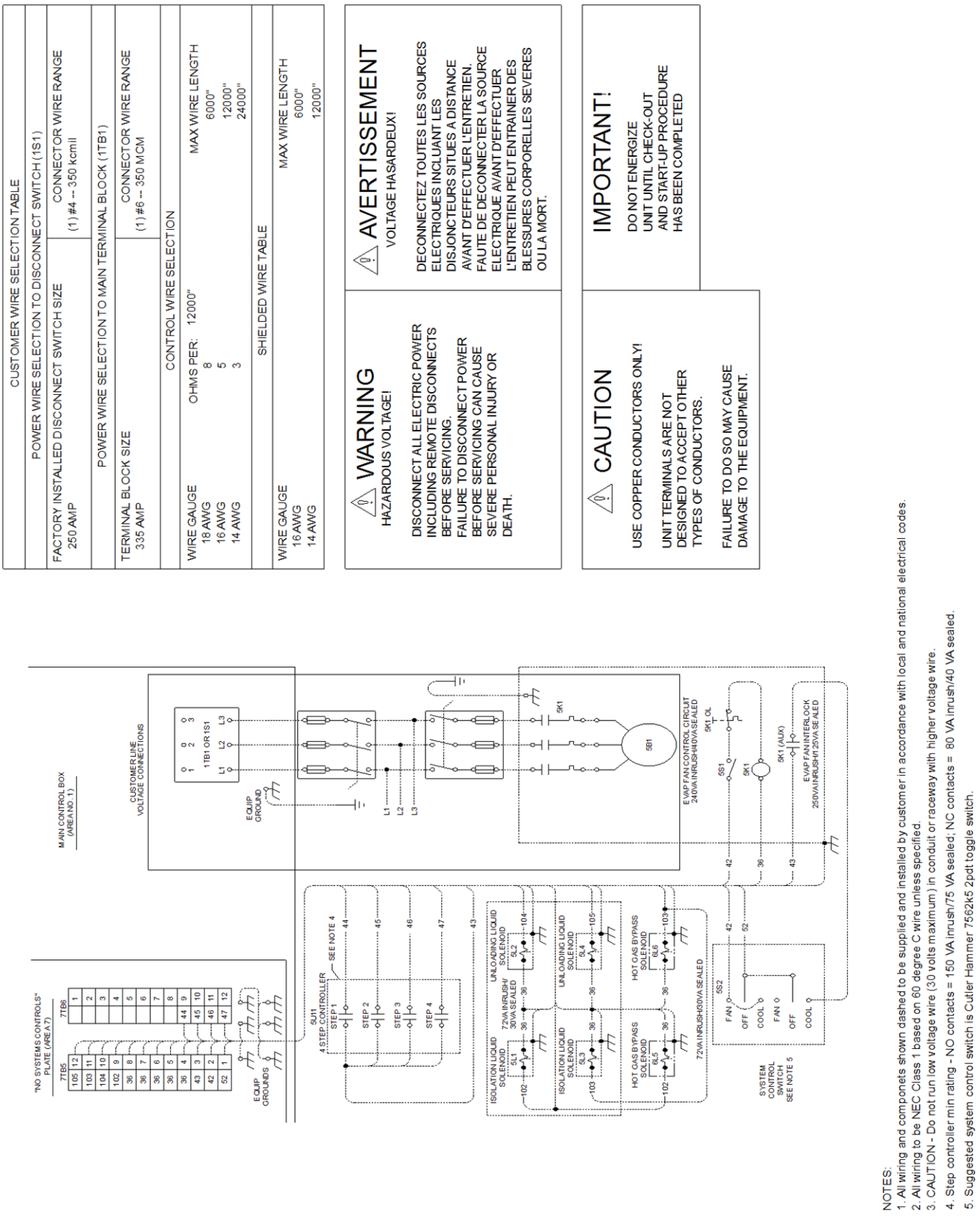
3. Secure bulb to tube with the two clamps provided by the manufacturer and insulate bulb.

4. Install the TXV equalizer line close to & downstream of the bulb, on top of the horizontal suction line.

5. Install frostat per kit instructions on the common suction line as close to the evaporator as possible.

See SS-APG012-EN for DX evaporator piping details.

Field Wiring - Air-Cooled Condensing Units (Commercial)
Item: A1 Qty: 1 Tag(s): CU



Field Installed Options - Part/Order Number Summary
This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - Air-Cooled Condensing Units (Commercial)

Item	Tag(s)	Qty	Description	Model Number
A1	CU	1	20-60 Ton Air-Cooled Condensing Unit (RA	RAUJC604B_ 3A*D***0

Field Installed Option Description	Part/Ordering Number
Spring isolators (unit)	

Prasino Engineering, LLC
747 East Boughton Road
STE 208
Bolingbrook, IL 60440
www.prasinoeng.com
info@prasinoeng.com

APPENDIX C – ANTICIPATED CONSTRUCTION SCHEDULE

	2024																2025	
Task	**September**	**October**	**November**	**December**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**
Phase 1 - Equipment Ordered - Air Handling/Lead Time (45 weeks)																		
Phase 1 - Equipment Ordered - Condensing Unit Lead Time (16 weeks)																		
Phase 1 - Equipment Ordered - VFDs																		
Construction Document Design																		
Bid Advertisement																		
Bidding																		
Bid Opening																		
Village Board Meeting for Bid Review																		
Bid Award																		
Phase 1 - Equipment Ordered as Required By Contractor																		
Phase 1 - Equipment Ordered By Contractor Lead Time																		
Demolition of Old Air Handling Unit																		
Installation of New Air Handling Unit																		
Prasino Site Visit																		
Testing/TAB/Commissioning of New Air Handling Unit																		
Village of Gurnee/Owner Acceptance																		
Phase 2 - Contractor Submittals - VAVs																		
Phase 2 - Prasino Submittal Review																		
Phase 2 - Equipment Ordered - VAVs																		
Phase 2 - VAV Equipment Lead Time																		
Hot Water System Piping Installation																		
Demolition of VAVs/Installation of VAVs - Shall be performed 1-for-1 same time as demo																		
Prasino Site Visit																		
Testing/TAB/Commissioning of VAVs																		
Village of Gurnee/Owner Acceptance																		
Phase 2 - Project Completed																		Δ

Village of Gurnee Activity
Prasino Engineering Activity
Contractor Activity
Manufacturer Activity
Completed