



Installation, Operation and Maintenance

Performance Climate Changer™ Air Handlers

Model CSAA

Indoor and Outdoor Units Sizes 3-120



SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions, and Notices appear at appropriate sections throughout this literature. Read these carefully:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE:

Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that

must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians **MUST** put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. **ALWAYS** refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians **MUST** put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit.

Failure to follow recommendations could result in death or serious injury.

Ultraviolet (UV) Germicidal Irradiation Lights!

The United States Environmental Protection Agency (EPA) believes that molds and bacteria inside buildings have the potential to cause health problems in sensitive individuals. If specified, Trane provides ultraviolet lights (UV-C) as a factory-engineered and installed option in select commercial air handling products for the purpose of reducing microbiological growth (mold and bacteria) within the equipment. When factory provided, polymer materials that are susceptible to deterioration by the UV-C light will be substituted or shielded from direct exposure to the light. In addition, UV-C radiation can damage human tissue, namely eyes and skin. To reduce the potential for inadvertent exposure to the lights by operating and maintenance personnel, electrical interlocks that automatically disconnect power to the lights are provided at all unit entry points to equipment where lights are located.

⚠ WARNING

Equipment Damage From Ultraviolet (UV) Lights!

Trane does not recommend field installation of ultraviolet lights in its air handling equipment for the intended purpose of improving indoor air quality. High intensity C-band ultraviolet light is known to severely damage polymer (plastic) materials and poses a personal safety risk to anyone exposed to the light without proper personal protective equipment (could cause damage to eyes and skin). Polymer materials commonly found in HVAC equipment that may be susceptible include insulation on electrical wiring, fan belts, thermal insulation, various fasteners and bushings. Degradation of these materials can result in serious damage to the equipment.

Trane accepts no responsibility for the performance or operation of our air handling equipment in which ultraviolet devices were installed outside of the Trane factory.



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Introduction

Overview of Manual

Use this manual to install, startup, operate, and maintain the Performance Climate Changer™ air handler model CSAA. Carefully review the procedures discussed in this manual to minimize installation and startup difficulties.

Nameplate

Each Performance air handler section includes one or more nameplate/label (see [Figure 1](#)), which identifies the

type of section and functional components, customer tagging information, the unit serial number, the unit order number, the build-section position for installation, and the unit model number.

Note: The unit serial number and order number is required when ordering parts or requesting service for a Trane air handler.

Figure 1. Performance air handler section nameplate

Trane order number
Unit level serial number
Service model number
Unit tagging
Section location
Functional section type
Notes and additional section information
Agency listings and/or agency certifications

Performance Climate Changer™ Air Handler

ORDER NO. / BL	CHV186A / A
SERIAL NO.	K11A03992
UNIT MODEL NO.	CSAA017UAC00
TAG ID	AHU-1
BUILD SECTION	1 OF 4

FAN SECTION
MOTOR VOLTAGE 200/60/3
MOTOR HORSEPOWER (HP) 5.0
MOTOR FLA (PER NEC) 17.5

NOTE: AN EXTERNAL OVERLOAD DEVICE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (OR CEC) IS REQUIRED WHEN NOT PROVIDED BY TRANE.
SUPPLY AIR TEMPERATURE LIMITATIONS:
104 F MAX IN DRAW-THRU ARRANGEMENTS
200 F MAX IN BLOW-THRU ARRANGEMENTS
FIELD CONDUCTORS SHALL HAVE INSULATION RATING NOT LESS THAN 600V

DISCHARGE PLENUM SECTION

Airflow

AIRI CERTIFIED™
www.airidirectory.org
Central Station Air Handlers
AIRI Standard 430

UL US LISTED
Central - Station Air Handler
541R File Sa5348
Evaluated to UL 1995 & C8A-C22.2 No. 236

General Information

Operating Environment

The Performance Climate Changer™ air handler is a central station air handler for indoor and outdoor applications. When considering the placement of the air handler, it is important to consider the operating environment. The acceptable ambient temperature range for unit operation is -40°F to 140°F (-40°C to 60°C).

For heating applications, a special motor may be required to withstand the higher temperatures. Motors with Class B insulation are acceptable for ambient temperatures up to 104° F, while motors with Class F insulation can withstand ambient temperatures to +140° F (60° C).

Note: Units with UL approval have a maximum ambient temperature requirement of 104°F. The customer should provide adequate freeze protection for the coils. See "Routine Maintenance," p. 131 for more information.

Unit Description

The Performance Climate Changer air handler is designed for a variety of controlled-air applications. The basic unit consists of a fan, heating and/or cooling coils, filters, and dampers.

Trane air handlers ship as complete assemblies or in sub-assemblies if shipping splits are required. Some assembly is required when the unit ships in subassemblies.

A wide variety of components is available for Trane air handlers, including numerous fan, coil, and filter options, access sections, diffusers, discharge plenums, face-and-bypass sections, UL-approved electric heat sections, humidifiers, mixing boxes, moisture eliminator sections, exhaust dampers, controls, blenders and airflow monitoring stations.

For more information, refer to the following documents, available from your local Trane sales engineer:

- CLCH-PRC022A-EN, Performance Climate Changer™ Air Handler catalog
- CLCH-PRC023A-EN, Performance Climate Changer™ Air Handler dimensions
- CLCH-PRC016-EN, Performance Climate Changer™ Air Handler quick select
- CLCH-SVN05A-EN, Roof Curbs for Performance Climate Changer™ Air Handlers installation instructions
- CLCH-PRG003-EN, Performance Climate Changer™ Air handler guide specifications
- CLCH-SLB017-EN, Performance Climate Changer™ Air Handler sales brochure

- CLCH-SVX08A-EN, Gas Heat in Performance Climate Changer™ Air Handlers installation, operation, and maintenance guide
- COIL-SVX01A-EN, Coils installation, operation, and maintenance guide

Factory-Mounted Controls

Trane air handlers are available with a wide selection of factory-mounted controls, including controllers, motor starters, and variable frequency drives (VFD).

Most control components are mounted inside the unit. Depending on the system configuration, this may include damper actuators, dirty filter switches, averaging temperature sensors, and low limit switches. VFDs, starters, controllers, control transformers, static pressure transducers, DC power supplies, and customer interface relays will be in enclosures mounted on the inside of the unit.

Small items that cannot be factory-mounted, such as space temperature sensors, outside air temperature sensors, and humidity sensors, will ship inside the control enclosures, or packaged and shipped inside the fan or mixing box section. Larger items are shipped inside the fan section.

Note: All control valves ship directly to the "ship-to address" from the vendor unless another address is given on the Trane sales order.

All factory-mounted control systems (controls that are factory-wired to a unit controller or termination strip) ordered without starters or variable-frequency drives (VFDs) are provided with 120 to 24 Vac control transformers mounted and wired in the auxiliary control panel. The customer must provide 120 Vac control power, 50/60 Hz, typically 3 amps for unit sizes 3 to 57 and 5 amps for unit sizes 66 to 100. A dedicated 15-amp circuit is recommended.

Factory-mounted control systems ordered with factory-mounted starters or VFDs are supplied with line to 24 Vac control transformers. No additional power wiring is required.

Pre-Packaged Solutions for Controls

If the air handler has been selected using one of Trane's pre-packaged solutions options for controls, there are a number of resources available to aid in commissioning and start-up of the unit. These resources include commissioning sheets, graphics and technical application notes. The technical application notes include the control sequencing, Trane Graphic Programming (TGP) and Rover set-up files for the specific unit selected. These resources are available through your local Trane sales office.

For more information on controls, refer to the following manuals:



General Information

- Programmable UC600 controllers
 - BAS-SVX45C-EN, Installation, Operation, and Maintenance Tracer UC600 Programmable Controller
 - X39641178-01D, UC600 Installation Instructions
 - X39641191-01A, Installing the Tracer TD7 Display
 - BAS-SVX50C-EN, Tracer TD7 Display for the Tracer UC600 Programmable Controller Installation, Operation, and Maintenance Guide
- TR150 Drives
 - BAS-SVX59A-EN TR150 Design Guide
 - BAS-SVP16A-EN TR150 Programming Guide

Wiring

WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

Entrances are generally provided for field-installation of high and low voltage wiring through a pipe/nipple connection in the unit depending on unit configuration with or without factory-mounted controls. Before installation, consider overall unit serviceability and accessibility before mounting, running wires (power), making penetrations, or mounting any components to the cabinet.

Wiring to the air handler must be provided by the installer and must comply with all national and local codes. The fan motor nameplate includes a wiring diagram. If there are any questions concerning the wiring of the motor, write down the information on the motor nameplate and contact your local Trane sales office.

Pre-Installation

Receiving and Handling

Inspection

Upon delivery, thoroughly inspect all components for any shipping damage that may have occurred, and confirm that the shipment is complete. See ["Receiving Checklist"](#) section for detailed instructions.

Note: Delivery cannot be refused. All units are shipped F.O.B. factory. Trane is not responsible for shipping damage.

Packaging/Shipping

Performance air handlers ship as a complete unit or in individual sections to be field assembled. Indoor air handler sections are stretch-wrapped or shrink-wrapped before shipping. All factory shipping protection should be removed upon delivery. This wrapping is for transit protection only.

Indoor Performance air handlers ship in subassemblies if the total length of the units exceeds 98 inches or if the total weight exceeds the limits shown in [Table 1](#).

Note: These limits are based on a four-point lift.

Table 1. Shipping length and weight limitations for indoor air handlers

Unit Size	Maximum Unit Weight (lb.)	Maximum Unit Length (in)
3-31	<2,500	98
35, 36	<3,900	98
40, 41	<4,300	98
50-58	<5,100	98
66-120	<8000	98

Outdoor Performance air handler sections are not wrapped, but openings are covered to comply with LEED EQ Credit 5.

[Table 2](#) outlines weight and length shipping limits for outdoor air handler sections.

Table 2. Shipping length and weight limitations for outdoor air handlers

Unit Size	Minimum Length (in.)	Maximum Length (in.)	Maximum Weight (lb.)
3-31	24.50	360.00	8,000
35-58	24.50	96.00 ¹	12,000
66-120	24.50	96.00 ¹	12,000

Notes: ¹Some specialty sections can be attached to the adjacent section even if this causes length to be greater than 96 inches, up to 118.44 inches.

Smaller components and hardware may be shipped separately, or shipped inside the unit. This hardware is typically packaged in a clear plastic envelope or cardboard box, and can be found inside the fan, mixing box, or access section.

Identification

Each air handler section includes a nameplate identifying the section type and functional components, customer tagging information, unit serial number, unit order number, the build-section position for installation, and the unit model number. See ["Nameplate"](#) on page 6.

Handling

Air handlers have an integral base frame designed with the necessary number of lift points for safe installation. See ["Lifting and Rigging"](#) on page 22.

Indoor air handlers sizes 3-30 are shipped with a shipping skid designed for forklift transport.

Receiving Checklist

Complete the following checklist immediately after receiving shipment to detect possible shipping damage.

- ☐ Check to ensure that the shipment is complete. Small components may ship inside the unit or ship separately. Check the parts list to ensure all materials are present. If any component is missing, contact your local Trane sales office.
- ☐ Check all units, components, connections, and piping. Check fan wheel for free rotation by spinning manually. Check all doors, latches and hinges. Inspect interior of each unit or section. Inspect coils for damage to fin surface and coil connections. Check for rattles, bent corners, or other visible indications of shipping damage. Tighten loose connections.
- ☐ If a unit is damaged, make specific notations concerning the damage on the freight bill. Do not refuse delivery.
- ☐ Notify the carrier's terminal of the damage immediately by phone and mail. Request an immediate joint inspection of the damage by the carrier and consignee.
- ☐ Notify your Trane sales representative of the damage and arrange for repair. Do not attempt to repair the unit without consulting the Trane representative.
- ☐ Inspect the unit for concealed damage as soon as possible after delivery. Report concealed damage to the freight line. It is the receiver's responsibility to provide reasonable evidence that concealed damage did not occur after delivery. Take photos of damaged material if possible.

Note: Concealed damage must be reported within 15 days of receipt.



Pre-Installation

Jobsite Storage

Indoor air handlers and field-installed accessories must be protected from the elements. A controlled indoor environment is recommended for proper storage.

Note: All factory shipping protection should be removed. This wrapping is for transit protection only.

The unit controller and all other electrical/electronic components should be stored in conditions of -20°F to 120°F and 5 to 95 percent relative humidity, non-condensing. Electrical components are not moisture-tolerant.

Outdoor units require no special protection for storage prior to installation.

Outdoor Storage

NOTICE:

Corrosion!

Use only canvas tarps to cover air handlers. Plastic tarps can cause condensation to form in and on the equipment, which could result in corrosion damage or wet storage stains.

Outdoor storage is not recommended for units that will be installed indoors. However, when outdoor storage is necessary, several things must be done to prevent damage:

Note: Keep the equipment on the original wooden blocks/skid for protection and ease of handling.

- Select a well-drained area, preferably a concrete pad or blacktop surface.
- Place the unit on a dry surface or raised off the ground to assure adequate air circulation beneath the unit and to assure no portion of the unit will contact standing water at any time.
- Loosen the belt tension on the drive belts.
- Cover the unit securely with a canvas tarp.
- Do not stack units.
- Do not pile other material on the unit.

Long-Term Storage

For longer periods of storage, allow proper clearance around the unit to perform periodic inspections and maintenance on the equipment. While the unit is in storage:

- Every two weeks, rotate the fan and motor shaft 30 revolutions by hand. Check for free rotation.
- Every six months, check fan shaft bearings and grease lines. Add grease using a manual grease gun following the lubrications recommendations in "Fan Bearing Lubrication" on page 143.

- Check the motor lubrication; remove and clean grease plugs and check for the presence of moisture in the grease. If moisture is present, remove the motor and send it to an authorized repair shop for bearing inspection/replacement. If no moisture is present, refer to the motor manufacturer's lubrication recommendation for proper lubrication.

Site Preparation

- Ensure the installation site can support the total weight of the unit (see "[Dimensions and Weights](#)" on page 12 for approximate section weights; refer to the unit submittals for actual weights).
- Allow sufficient space for adequate free air and necessary service access (see "[Service Clearances](#)" on page 12). Refer to submittals for specific minimums.
- Allow room for supply and return piping, ductwork, electrical connections, and coil removal.
- Ensure there is adequate height for condensate drain requirements. See "[Drain Pan Trapping](#)" on page 93.

Note: If unit is installed in a mechanical room on a pad, inadequate height may necessitate core-drilling the floor to attain proper trap height. Insufficient height could inhibit condensate drainage and result in flooding the unit and/or equipment room.

NOTICE:

Microbial Growth!

The floor or foundation must be level and the condensate drain at the proper height for proper coil drainage and condensate flow. Standing water and wet surfaces inside the equipment can become an amplification site for microbial growth (mold), which could cause odors and damage to the equipment and building materials.

- Confirm the roof curb or foundation of the mounting platform is level and large enough to accommodate the unit. Refer to the unit submittals for specific dimensions.
- Provide adequate lighting for maintenance personnel to perform maintenance duties.
- Provide permanent power outlets in close proximity to the unit for installation and maintenance.
- Depending upon job requirements, 120 Vac power may need to be provided for the unit controller. Refer to submittals for more information. A dedicated 15-amp circuit is recommended.
- Wiring for the air handler must be provided by the installer and must comply with all national and local electrical codes.
- If the unit integral base frame ceiling suspension provisions are not used, the installer/contractor must provide a ceiling-suspended mounting frame

designed to support the length, width, and weight of the entire air-handling unit. See ["Ceiling Suspension" on page 27](#) for more information.

- Rooftop curb-mounted units must be sealed tightly to the curb. Use proper sealants and roof-to-curb sealing techniques to prevent water and air leakage. Refer to CLCH-SVN05A-EN Roof Curbs for Performance Climate Changer™ Air Handlers Installation Instructions.

Note: Preparation of the roof curb or pier mount and roof openings should be completed prior to lifting the unit to the roof.

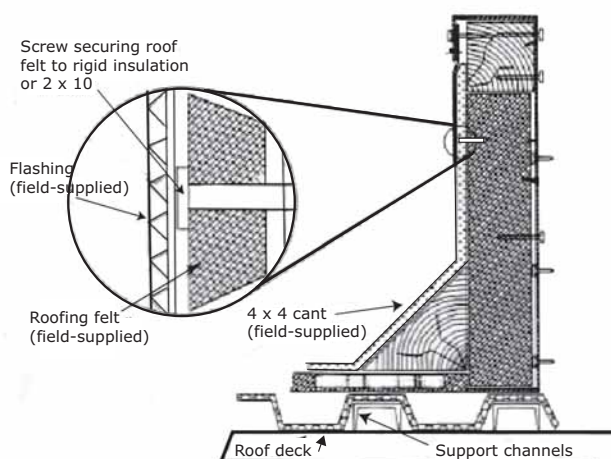
Roof Curb Installation Checklist

See CLCH-SVN05A-EN Roof Curbs for Performance Climate Changer™ Air Handlers Installation Instructions for information on installing roof curbs.

It is recommended that the curb be installed directly on the support members and fastened to the supports using tack welds or other equivalent methods. Properly supported decking should be installed inside the air handler section of the curb when this method is used. See [Figure 2](#).

1. Verify that the roof structure can adequately support the combined weight of the unit and curb assembly.
2. Ensure that the selected installation location provides sufficient service and operational clearances.
3. Remove any twist within the curb due to roof supports and square the curb.
4. Level the curb.
5. Secure the curb to the roof support members.
6. Install 2-inch thick boards or rigid insulation around the curb.
7. Install cant strips around the curb.
8. Bring field supplied roofing felt up to the top of the curb nailing strips. Nail felt into place.
9. Install field supplied flashing under the lip of the curb flanges and over the felt.
10. Apply sealant to the four corners.
11. Caulk all joints between the curb and the roof. Attach the gasket material to the curb's top flanges (entire perimeter) and to the supply and return air duct opening panel flanges.

Figure 2. Cross section of typical curb installation on new construction



Dimensions and Weights

Service Clearances

A minimum clearance of the section width plus 12 inches on the access door side of the gas heat section is recommended for routine maintenance. This clearance

Figure 3. Service Clearance

provides enough room to replace the heat exchanger in the event of failure. The section side panels must be removed to access the heat exchanger. Refer to [Table 3](#) for service clearance recommendations for the air handler.

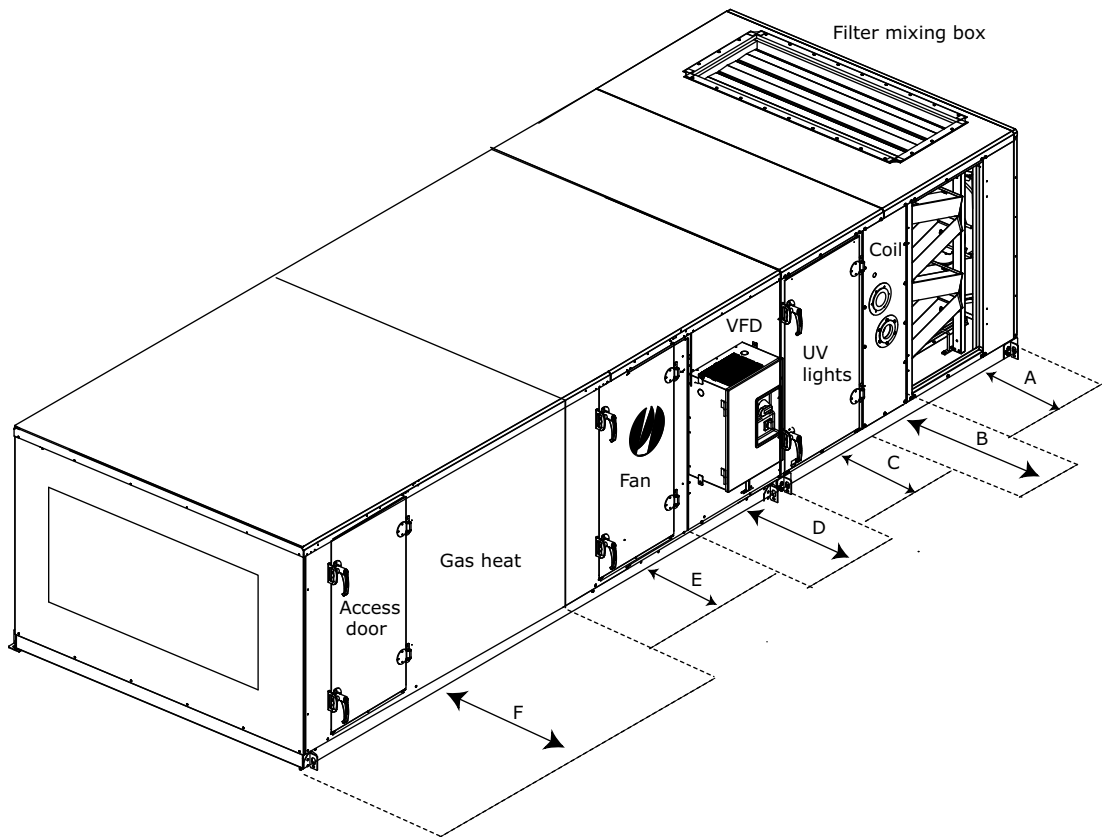
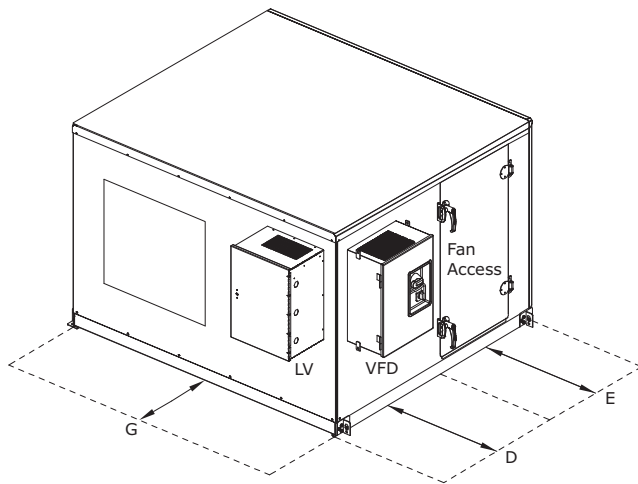


Table 3. Service clearance dimensions (inches)

Component	3	4	6	8	10	12	14	17	21	22	25	26	30	31	35	36	40	41	50	51	57	58	66	80	100	120
A (filter)	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	52	56	58	58
B (coil)	48	59	59	66	77	82	87	87	95	77	95	77	109	87	115	96	128	96	141	110	141	110	156	156	170	197
C (UV Lights)	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	52	56	58	58
C (Catalytic Air Cleaner)	43	59	59	63	75	81	83	83	58	75	58	75	83	83	75	59	83	83	83	83	83	83	83	83	83	83
D (external starter or VFD or LV box)	61	61	61	61	61	61	61	61	64	64	64	64	64	64	64	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	48	48	48	48	48	48	48
E (fan)	48	48	48	48	51	54	58	61	60	51	66	51	66	58	66	60	70	60	77	66	77	66	93	93	101	101
F (gas heat - Ext Vestibule)	n/a	n/a	89	90	108	100	100	105	115	n/a	115	n/a	118	n/a	136	n/a	140	n/a	156	n/a	156	n/a	170	179	180	n/a
F (gas heat - Int Vestibule)	n/a	n/a	56	63	74	79	84	84	92	n/a	92	n/a	106	n/a	112	n/a	125	n/a	138	n/a	138	n/a	153	153	167	194

Note: At a minimum, the above 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, hoods, pipe cabinets, etc. Sufficient clearance must be provided on all sides of unit for removal of access panels, plug panels, or section-to-section attachment brackets. Clearance for starters, VFDs, or other high-voltage devices must be provided per NEC requirements.

Note: For specific dimensional and weight information, refer to the unit submittals. The dimensions and weights in this manual are approximate. Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice.

Figure 4. Service clearance for control box

Table 4. Service clearance dimensions (inches) for control box

HV Component	LV Component		3	4	6	8	10	12	14	17	21	22	25	26	30	31	35	36	40	41	50	51	57	58	66	80	100	120
Starter or VFD	None	G	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
18 point terminal strip	None	G	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
>18 point terminal strip	None	G	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
None	18 point terminal strip	G	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
None	>18 point terminal strip	G	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36



Dimensions and Weights

Section Dimensions and Weights

Table 5. Section dimensions (inches) and weights (pounds) - unit sizes 3-30

Nominal airflow	1500	2000	3000	4000	5000	6000	7000	8500	10,500	11,000	12,500	13,000	15,000
Airflow at 625 fpm	2169	3475	4338	4581	6075	8331	9025	11,806	13,456	13,194	16,944	18,231	19,025
Unit size	3	4	6	8	10	12	14	17	21	22	25	26	30
Height - indoor unit	29.00	29.00	35.25	37.75	37.75	41.50	41.50	49.00	52.75	67.25	61.50	85.50	61.50
Width	31.50	44.00	44.00	50.50	61.50	66.50	72.00	72.00	80.00	61.50	80.00	61.50	93.50
Height for outdoor unit includes base drip lip	36.25	36.38	42.63	45.13	45.13	49.25	49.25	56.75	60.50	n/a	69.25	n/a	69.25
Weight add for outdoor unit (lbs/in. of unit length)	1.66	1.91	1.91	2.04	2.27	2.40	2.51	2.51	2.68	n/a	2.68	n/a	2.94
Access or blank													
-Small horizontal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
	48.05	57.43	60.55	66.67	74.92	80.55	84.67	88.41	96.28	89.63	100.65	98.73	110.78
-Medium horizontal	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
	59.91	71.18	75.25	82.74	92.66	99.61	104.57	109.45	119.10	111.84	124.79	123.71	136.97
-Extended-medium horizontal	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	74.73	88.37	93.62	102.82	114.83	123.43	129.44	135.74	147.62	139.60	154.97	154.93	169.71
-Medium-large horizontal	24.50	24.50	24.50	26.50	26.50	26.50	26.50	24.50	24.50	26.50	24.50	26.50	24.50
	121.60	107.28	113.84	132.94	148.08	159.18	166.74	164.66	178.99	170.14	188.17	189.27	205.72
-Large horizontal or turning	34.00	34.00	34.00	36.00	36.00	36.00	36.00	36.00	34.00	36.00	46.00	46.00	46.00
	137.75	164.85	179.46	208.50	235.01	257.70	271.35	293.42	314.60	315.97	413.45	428.50	457.18
-Extra-large horizontal or turning	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	50.25	56.50	56.50	56.50
	143.68	188.92	205.18	240.63	263.83	288.68	303.68	335.49	407.29	395.09	476.83	494.06	525.93
-Ducted inlet or ducted outlet section	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
	48.10	57.40	60.50	66.70	74.90	80.50	84.70	88.40	96.30	89.60	100.60	98.70	110.80
Blender	19.00	24.50	24.50	26.50	36.00	36.00	36.00	36.00	34.00	30.500	46.00	36.00	46.00
	94.86	132.71	146.30	173.34	238.64	264.12	276.73	303.71	323.59	300.15	427.13	385.06	470.25
Cool Dry Quiet (CDQ) Desiccant Dehumidification	52.00	52.00	52.00	52.00	55.00	58.00	58.00	58.00	56.00	n/a	56.00	n/a	58.00
	495.00	651.00	694.00	792.00	1011.00	1165.00	1326.00	1390.00	1793.00		1876.00		2029.00
Coils													
-Small horizontal (with 4-row UW)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
	116.10	148.55	174.35	205.79	244.49	285.13	307.44	352.47	433.37	433.22	502.46	523.01	572.50
-Medium horizontal (with 8-row UW)	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
	168.65	220.23	265.58	318.97	382.53	450.07	488.32	569.79	700.27	690.67	817.63	840.58	941.48
-Extended-medium horizontal (with 8-row UW)	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	185.58	239.53	286.06	341.16	406.80	476.00	516.35	599.24	737.96	721.58	858.03	878.74	985.30
-Medium-large horizontal (with 10-row W)	24.50	24.50	24.50	26.50	26.50	26.50	26.50	24.50	24.50	26.50	24.50	26.50	24.50
	270.61	359.79	433.08	554.88	656.63	777.26	884.93	1013.57	1262.10	1175.58	1478.66	1503.93	1503.93
-Large horizontal or vertical (with 10-row W)	34.00	34.00	34.00	36.00	36.00	36.00	36.00	36.00	34.00	36.00	46.00	46.00	46.00
	302.77	396.45	471.99	597.03	702.74	826.53	938.18	1081.30	1333.70	1234.32	1652.36	1652.73	1652.73
-Electric Heat Coil	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	n/a	46.00	n/a	56.50
	295.00	364.00	413.00	480.00	563.00	622.00	666.00	731.00	876.00		1012.00		1244.00
Integral-face-and-bypass coil													
-Less than 4 rows	n/a	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50	26.50
	n/a	355.20	367.21	470.21	541.93	585.86	619.66	733.14	792.88	858.31	805.52	1047.84	940.46
-4 rows	n/a	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00
	n/a	543.54	560.74	725.48	835.34	901.70	950.23	1131.90	1216.48	1313.83	1399.66	1613.03	1439.40

Table 5. Section dimensions (inches) and weights (pounds) - unit sizes 3-30

Unit size	3	4	6	8	10	12	14	17	21	22	25	26	30
Controls section (includes largest available VFD)	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50
	184.00	208.00	253.00	272.00	295.00	315.00	327.00	350.00	428.00	419.00	453.00	464.00	487.00
Diffuser	10.00	10.00	10.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	19.00	19.00	19.00
	45.70	55.08	58.20	80.39	90.31	97.26	102.22	107.10	116.75	109.49	152.62	152.58	167.36
Discharge plenum													
-Horizontal	34.00	34.00	34.00	36.00	36.00	36.00	36.00	36.00	34.00	36.00	46.00	46.00	46.00
	135.40	162.50	177.11	206.15	232.66	255.35	269.00	291.07	312.25	313.62	411.10	426.15	454.83
-Vertical	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	n/a	56.50	n/a	56.50
	159.90	211.48	233.54	275.69	306.29	339.58	358.68	401.43	486.37	n/a	570.00	n/a	634.27
Energy Wheel	n/a	52.00	52.00	52.00	55.00	58.00	58.00	58.00	56.00	n/a	56.00	n/a	58.00
		609.00	663.00	765.00	911.00	1085.00	1208.00	1269.00	1484.00		1595.00		1868.00
Face-and-Bypass Dampers													
-Face-and-bypass	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	105.60	129.06	141.70	157.63	178.68	199.15	209.53	224.50	248.05	137.25	265.62	152.58	291.36
-External face-and-bypass	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	22.00	19.00	27.75	19.00
	122.68	155.15	167.79	190.70	219.68	241.45	255.80	270.77	300.08	153.91	317.53	207.22	353.22
-Internal face-and-bypass or face damper only	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	107.95	140.46	149.91	174.82	203.43	227.60	241.91	255.18	291.55	137.25	306.62	152.58	341.36
Fan													
-Belt-drive plenum fan with motor	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	n/a	56.50	n/a	56.50
	397.87	538.34	631.36	682.55	875.00	951.91	1069.39	1239.89	1443.56		1494.52		1751.34
-Housed FC fan with motor	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	50.25	56.50	56.50	56.50
	368.77	449.75	544.28	589.00	721.69	882.15	904.21	1054.64	1329.38	1295.80	1487.55	1511.37	1710.85
-Housed AF/BC fan with motor	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	50.25	56.50	56.50	56.50
	378.87	467.35	574.68	649.40	849.71	920.08	942.14	1098.21	1432.10	1444.53	1572.28	1609.10	1797.21
-Direct-drive plenum fan with motor	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	50.25	56.50	56.50	56.50
	373.16	516.35	535.05	692.86	795.54	912.52	936.26	991.99	1380.92	1237.09	1541.05	1600.04	1652.91
Filters													
-Side load 2-in. angled	24.50	24.50	24.50	26.50	26.50	26.50	26.50	24.50	24.50	24.50	24.50	24.50	24.50
	134.55	163.83	175.66	202.44	225.96	251.82	265.94	314.12	347.50	348.70	403.70	418.53	454.19
-Side load 4-in. angled	24.50	24.50	24.50	26.50	26.50	26.50	26.50	24.50	24.50	24.50	24.50	24.50	24.50
	141.89	176.87	192.86	209.64	247.16	254.22	273.54	352.07	379.13	361.27	409.37	470.37	465.65
-Side load cartridge 12-in. or short bag 18-in.	24.50	24.50	24.50	26.50	26.50	26.50	26.50	24.50	24.50	24.50	24.50	24.50	24.50
	125.03	159.79	176.46	220.46	234.88	284.12	303.60	335.02	365.40	342.50	439.69	440.65	479.36
-Side load 2-in. flat	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
	70.27	86.53	91.98	103.59	117.74	133.81	141.07	148.02	165.52	160.19	182.07	177.12	198.93
-Side load 4-in. flat	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
	81.56	104.62	114.08	117.09	143.40	142.66	154.67	202.82	213.64	189.17	217.75	254.10	249.73
-Side load 2-in. and 4-in. combination flat	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	100.62	128.19	139.09	144.56	174.73	185.69	201.37	252.57	268.17	252.01	288.98	326.16	326.58
-Long bag 30-in.	36.00	41.00	41.00	44.00	42.50	42.50	42.50	44.00	50.25	50.25	46.00	40.00	46.00
	159.54	203.31	223.70	269.26	289.43	330.97	349.19	382.94	461.96	395.90	488.89	462.06	523.37
-Front-load HEPA	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
	240.36	262.50	346.16	368.01	407.75	439.62	452.92	569.28	692.30	595.47	750.47	837.36	822.10
-Front-load cartridge	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
	215.15	237.79	285.59	310.12	341.11	386.04	399.01	470.25	525.86	468.47	580.13	552.53	651.47
-Front-load short bag	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
	222.35	246.75	279.75	306.39	335.16	369.65	383.67	432.15	473.60	487.79	518.05	573.98	566.55



Dimensions and Weights

Table 5. Section dimensions (inches) and weights (pounds) - unit sizes 3-30

Unit size	3	4	6	8	10	12	14	17	21	22	25	26	30
Gas heat													
- 200 MBH	n/a	n/a	57.00 752.92	57.00 797.85	59.00 852.48	57.00 912.57	57.00 937.05	60.00 1011.83	60.00 1074.91	n/a	n/a	n/a	n/a
- 300 MBH	n/a	n/a	73.00 901.27	73.00 953.49	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
- 360 MBH	n/a	n/a	n/a	n/a	77.00 1093.23	73.00 1131.38	68.00 1127.89	71.00 1211.08	69.00 1264.50	n/a	69.00 1348.04	n/a	66.00 1298.88
- 560 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	71.00 1191.99	69.00 1246.59	n/a	65.00 1307.47	n/a	66.00 1441.79
- 700 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	83.00 1479.92	75.00 1503.43	n/a	75.00 1599.35	n/a	76.00 1745.65
- 860 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	81.00 1606.36	n/a	81.00 1711.24	n/a	76.00 1804.77
- 1000 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	87.00 1364.25	n/a	90.00 1497.35	n/a	85.00 1560.01
Humidifier													
-Building Steam	14.00 125.00	14.00 146.00	14.00 165.00	14.00 184.00	14.00 226.00	14.00 269.00	14.00 286.00	14.00 324.00	14.00 354.00	14.00 368.00	14.00 398.00	14.00 500.00	14.00 452.00
-Atmospheric Steam	14.00 127.00	14.00 168.00	14.00 178.00	14.00 203.00	14.00 252.00	14.00 276.00	14.00 312.00	14.00 339.00	14.00 396.00	14.00 344.00	14.00 432.00	14.00 396.00	19.00 528.00
Mixing box													
-with angled filters	34.00 137.75	34.00 164.85	34.00 179.46	36.00 208.50	36.00 235.01	36.00 257.07	36.00 271.35	36.00 293.42	34.00 314.60	36.00 315.97	46.00 413.45	46.00 428.50	46.00 457.18
-with front/back Traq and top Traq dampers	36.00 191.06	41.00 247.07	41.00 272.06	44.00 321.58	42.50 356.08	42.50 396.49	42.50 418.78	44.00 463.57	50.25 555.65	51.00 549.18	56.50 646.61	n/a	56.50 715.15
-reduced length with side/top/back/bottom airfoil damper	23.40 131.80	23.40 158.30	23.40 177.90	23.40 202.80	23.40 231.60	23.40 257.60	28.40 298.40	28.40 328.40	28.40 370.10	n/a	28.40 408.10	n/a	32.50 485.80
Multizone													
- 3-deck vertical discharge	n/a	n/a	61.00 1125.00	61.00 1313.00	66.00 1671.00	71.00 1899.00	71.00 2063.00	71.00 2211.00	82.00 2757.00	n/a	82.00 2991.00	n/a	82.00 3425.00
- 2-deck vertical discharge	n/a	n/a	61.00 763.00	61.00 899.00	66.00 1099.00	71.00 1266.00	71.00 1380.00	71.00 1526.00	82.00 1882.00	n/a	82.00 2108.00	n/a	82.00 2413.00
-3-deck horizontal discharge	n/a	n/a	52.00 1031.00	52.00 1219.00	52.00 1511.00	57.00 1729.00	57.00 1892.00	57.00 2034.00	72.00 2603.00	n/a	72.00 2829.00	n/a	72.00 3267.00
-2-deck horizontal discharge	n/a	n/a	52.00 701.00	52.00 832.00	52.00 982.00	57.00 1145.00	57.00 1253.00	57.00 1396.00	72.00 1755.00	n/a	72.00 1975.00	n/a	72.00 2264.00
Silencer													
-3 ft	38.00 198.00	38.00 256.00	38.00 286.00	38.00 319.00	38.00 359.00	38.00 442.00	38.00 461.00	38.00 512.00	38.00 573.00	38.00 562.00	38.00 699.00	38.00 659.00	38.00 800.00
-5 ft	62.00 308.00	62.00 391.00	62.00 436.00	62.00 483.00	62.00 541.00	62.00 678.00	62.00 704.00	62.00 780.00	62.00 873.00	62.00 858.00	62.00 1073.00	62.00 1005.00	62.00 1215.00
Trane Catalytic Air Cleaning System (TCACS)	36.00 334.73	36.00 367.14	36.00 389.21	36.00 434.66	36.00 470.05	36.00 497.59	36.00 514.12	36.00 544.30	36.00 599.38	36.00 690.80	36.00 665.11	36.00 777.83	36.00 711.12
UV light	14.00 76.02	14.00 93.64	14.00 98.69	14.00 120.26	14.00 135.22	14.00 146.68	14.00 155.07	14.00 162.95	14.00 179.84	n/a	14.00 188.71	n/a	14.00 218.33

Table 5. Section dimensions (inches) and weights (pounds) - unit sizes 3-30

Sections below are for outdoor units only													
Unit size	3	4	6	8	10	12	14	17	21	22	25	26	30
Diagonal economizer													
-with airfoil dampers	46.00	49.00	50.00	48.00	53.00	53.00	57.00	52.00	63.00	n/a	57.00	n/a	63.00
	187.00	231.00	256.00	276.00	334.00	365.00	407.00	414.00	534.00		548.00		649.00
-with airfoil damper and one side Traq damper	46.00	49.00	50.00	48.00	53.00	53.00	57.00	52.00	63.00	n/a	57.00	n/a	63.00
	204.00	247.00	271.00	290.00	349.00	378.00	426.00	431.00	555.00		565.00		689.00
Exhaust damper section for outdoor unit	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	n/a	19.00	n/a	19.00
	93.30	113.30	124.30	140.20	159.60	176.70	186.80	204.00	229.10		250.50		280.40
Hoods													
-Back inlet hood with airfoil and Traq dampers	22.25	44.00	44.00	50.38	61.50	66.38	71.88	72.00	79.88	n/a	79.88	n/a	93.38
	22.00	45.00	47.00	47.00	52.00	69.00	74.00	74.00	74.00		128.00		166.00
-Side inlet hood with airfoil and Traq dampers	20.00	20.00	20.00	20.00	22.88	22.88	31.38	25.75	29.13	n/a	25.75	n/a	27.88
	17.00	17.00	22.00	22.00	31.00	42.00	50.00	50.00	50.00		84.00		96.00
-Exhaust hood with airfoil damper	20.00	20.00	20.00	20.00	22.88	22.88	31.38	25.75	29.13	n/a	25.75	n/a	27.88
	12.00	12.00	16.00	16.00	21.00	29.00	30.00	30.00	30.00		59.00		67.00
-Economizer inlet hood	45.50	49.00	49.50	48.00	53.00	53.00	56.50	52.00	62.50	n/a	57.00	n/a	62.50
	41.00	37.00	45.00	61.00	68.00	76.00	137.00	174.00	179.00		214.00		224.00
Pipe cabinet weight													
15 inches long, 36 inches deep	104.00	104.00	116.00	120.00	120.00	127.00	127.00	141.00	148.00	n/a	164.00	n/a	164.00
24 inches long, 36 inches deep	122.00	122.00	135.00	140.00	140.00	147.00	147.00	162.00	170.00	n/a	187.00	n/a	187.00
48 inches long, 36 inches deep	169.00	169.00	184.00	191.00	191.00	200.00	200.00	218.00	228.00	n/a	249.00	n/a	249.00
96 inches long, 36 inches deep	263.00	263.00	284.00	293.00	293.00	305.00	305.00	331.00	343.00	n/a	373.00	n/a	373.00
Note: ¹ Nominal airflow is based on 500 fpm through a nominal coil (i.e. 500xunit size 8=4000 cfm). ² Airflow@625 fpm through the flat filter (maximum filter velocity). ³ Height includes standard 2.5-inch base frame for sizes 3-57 and 6-inch base frame for sizes 66-120. ⁴ Height includes 6-inch base frame for sizes 3-120. ⁵ Variable lengths available from 14-96 inches. ⁶ Fan section weights include the heaviest fan with the largest ODP motor available. ⁷ Nominal length and height shown for discharge plenums. Variable plenum height and length is available from 0.5 to 1.5 of nominal. ⁸ Access section required with humidifiers for dispersion distance.													

Table 6. Section dimensions (inches) and weights (pounds) - unit sizes 31-120

Nominal airflow	15,500	17,500	18,000	20,000	20,500	25,000	25,500	28,500	29,000	33,000	40,000	50,000	60,000
Airflow at 625 fpm	22,138	23,263	25,000	25,519	30,138	34,375	34,306	39,581	39,722	47,225	53,475	65,106	76,388
Unit size	31	35	36	40	41	50	51	57	58	66	80	100	120
Height - indoor unit	85.50	67.25	89.00	67.25	104.00	75.75	104.00	85.50	116.25	92.50	107.50	119.75	119.75
Width	72.00	100.00	80.00	112.50	80.00	125.50	93.50	125.50	93.50	140.50	140.50	154.50	182.00
Height for outdoor unit includes base drip lip	n/a	75.00	n/a	75.00	n/a	84.38	n/a	94.13	n/a	97.63	112.63	124.88	124.88
Weight add for outdoor unit (lbs/in. of unit length)	n/a	3.02	n/a	3.28	n/a	3.73	n/a	6.12	n/a	2.57	2.57	2.80	3.25
Access or blank													
-Small horizontal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	n/a	n/a	n/a	n/a
	106.61	211.11	207.98	227.92	224.38	254.69	242.54	265.35	255.92				
-Medium horizontal	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	15.00	15.00	15.00	15.00
	133.18	241.53	238.68	260.24	257.35	290.28	277.55	302.41	292.80				
-Extended-medium horizontal	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	166.39	279.57	277.04	300.64	298.56	334.76	321.32	348.74	338.89				
-Medium-large horizontal	26.50	24.50	29.50	24.50	29.50	24.50	29.50	24.50	29.50	24.50	24.50	24.50	24.50
	202.93	321.40	319.24	345.09	343.89	410.37	369.46	427.50	389.59				
-Large horizontal or turning	46.00	48.00	46.00	48.00	46.00	48.00	46.00	48.00	46.00	49.00	54.00	60.00	60.00
	467.28	514.42	509.00	557.22	561.11	639.24	615.72	682.26	661.42				
-Extra-large horizontal or turning	n/a	63.75	n/a	63.75	n/a	68.50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		624.86		675.12		809.42							



Dimensions and Weights

Table 6. Section dimensions (inches) and weights (pounds) - unit sizes 31-120

Unit size	31	35	36	40	41	50	51	57	58	66	80	100	120
-Ducted inlet or ducted outlet section	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
	106.60	211.10	208.00	227.90	224.40	254.70	242.50	265.30	255.90	372.90	389.30	428.30	478.60
Blender	40.00	48.00	48.00	48.00	48.00	48.00	54.00	48.00	48.00	49.00	54.00	60.00	60.00
	449.80	540.76	495.07	593.46	616.31	675.51	656.33	731.75	718.81	970.30	1112.23	1345.03	1567.62
Cool Dry Quiet (CDQ) Desiccant Dehumidification	n/a	56.00	n/a	56.00	n/a	59.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2914.00		3122.00		4224.00							
Coils													
-Small horizontal (with 4-row UW)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00				
	594.43	690.59	675.23	754.61	792.51	934.27	922.65	1044.33	1014.74	n/a	n/a	n/a	n/a
-Medium horizontal (with 8-row UW)	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	15.00	15.00	15.00	15.00
	968.56	1094.27	1095.29	1219.78	1290.73	1561.92	1523.08	1759.58	1686.19	2220.94	2558.94	3094.04	3638.44
-Extended-medium horizontal (with 8-row UW)	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	1009.31	1148.70	1138.74	1279.06	1337.01	1613.56	1572.75	1813.06	1738.19	2275.46	2615.73	3163.21	3712.02
-Medium-large horizontal (with 10-row W)	26.50	24.50	29.50	24.50	29.50	24.50	29.50	24.50	29.50	24.50	24.50	24.50	24.50
	1737.73	1955.08	2017.86	2216.68	2355.51	2754.49	2791.28	3215.01	3116.00	3876.05	4488.82	5499.42	6713.50
-Large horizontal or vertical (with 10-row W)	46.00	48.00	46.00	48.00	46.00	48.00	46.00	48.00	46.00				
	1896.66	2131.70	2161.23	2401.84	2508.26	2985.19	2955.21	3454.40	3287.59	n/a	n/a	n/a	n/a
-Electric Heat Coil	n/a	63.75	n/a	63.75	n/a	68.50	n/a	48.00	n/a	49.00			
		1666.00		1825.00		2267.00		2297.00		2857.00	n/a	n/a	n/a
Integral-face-and-bypass coil													
-Less than 4 rows	26.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50
	1190.19	1129.66	1407.86	1168.40	1449.00	1793.80	1640.15	1956.80	1817.25	2322.61	2378.60	2865.77	2936.42
-4 rows	43.00	43.00	43.00	43.00	43.00								
	1836.97	1677.52	2148.28	1720.20	2196.84	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Controls section (includes largest available VFD)	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50	28.50
	496.00	637.00	649.00	674.00	698.00	745.00	747.00	787.00	790.00	964.00	1031.00	1146.00	1266.00
Diffuser	19.00	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	27.50	37.25	37.25	37.25
	164.04	319.05	316.89	342.74	341.54	381.33	367.11	397.35	387.24	571.76	715.78	781.92	860.66
Discharge plenum													
-Horizontal	46.00	48.00	46.00	48.00	46.00	48.00	46.00	48.00	46.00	49.00	54.00	60.00	60.00
	464.93	627.24	621.68	677.47	682.71	772.27	745.34	821.10	798.32	1058.35	1198.64	1423.88	1585.80
-Vertical	n/a	63.75	n/a	63.75	n/a	68.50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		876.48		949.58		1136.53							
Energy Wheel	n/a	61.00	n/a	65.00	n/a	65.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		2403.00		2742.00		3111.00							
Face-and-Bypass Dampers													
-Face-and-bypass	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	164.04	473.39	274.69	556.23	296.21	630.10	318.97	714.61	336.54	888.33	973.60	1093.88	1205.53
-External face-and-bypass	27.75	22.00	27.75	22.00	27.75	22.00	27.75	22.00	27.75	39.00	39.00	39.00	39.00
	222.16	566.46	341.83	660.36	368.32	740.29	395.56	831.66	417.20	1256.07	1348.84	1498.11	1643.69
-Internal face-and-bypass or face damper only	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00	19.00
	164.04	502.53	274.69	575.62	296.21	678.20	318.97	714.61	336.54	888.33	954.26	1082.84	1194.50
Fan													
-Belt-drive plenum fan with motor	n/a	53.50	n/a	53.50	n/a	57.50	n/a	59.50	n/a	61.00	63.00	73.75	82.25
		2368.54		2740.37		3263.68		3599.82		4062.62	4745.62	6223.51	7341.11
-Housed FC fan with motor	73.25	63.75	80.50	63.75	80.50	68.50	88.00	68.50	88.00	84.00	92.00	96.00	96.00
	1832.18	2400.18	2423.46	2603.08	2771.01	3151.89	3312.75	3235.63	3414.05	4201.67	4922.58	5297.62	5600.08
-Housed AF/BC fan with motor	73.25	63.75	80.50	63.75	80.50	68.50	88.00	68.50	88.00	84.00	92.00	96.00	96.00
	1979.55	2429.71	2568.99	2695.61	2863.54	3221.42	3382.28	3305.16	3483.58	4311.38	5101.29	6025.44	6891.90

Dimensions and Weights

Table 6. Section dimensions (inches) and weights (pounds) - unit sizes 31-120

Unit size	31	35	36	40	41	50	51	57	58	66	80	100	120
-Direct-drive plenum fan with motor	73.25 1673.71	63.75 2057.87	80.50 2804.47	63.75 2406.73	80.50 3039.54	68.50 3469.95	88.00 4268.88	68.50 3545.86	88.00 4349.06	84.00 4903.24	92.00 5456.86	96.00 7176.65	96.00 7382.51
Filters													
-Side load 2-in. angled	24.50 469.97	24.50 593.86	24.50 562.37	24.50 649.06	24.50 652.32	27.50 770.02	24.50 688.86	27.50 797.89	24.50 777.14	27.50 989.00	27.50 1088.02	27.50 1157.16	27.50 1282.20
-Side load 4-in. angled	24.50 477.66	24.50 594.02	24.50 567.56	24.50 631.64	24.50 663.25	27.50 768.20	24.50 747.25	27.50 805.97	24.50 778.73	27.50 999.89	27.50 1105.14	27.50 1201.91	27.50 1338.65
-Side load cartridge 12-in. or short bag 18-in.	24.50 487.55	24.50 681.24	24.50 637.25	24.50 668.25	24.50 762.69	27.50 878.57	24.50 874.81	27.50 934.14	24.50 980.36	27.50 1239.99	27.50 1364.91	27.50 1746.31	27.50 1903.54
-Side load 2-in. flat	14.00 198.17	14.00 319.66	14.00 322.85	14.00 358.18	14.00 358.29	14.00 408.69	14.00 392.33	14.00 438.52	14.00 426.12	15.00 598.12	15.00 637.02	15.00 716.56	15.00 817.63
-Side load 4-in. flat	14.00 241.97	14.00 359.20	14.00 350.39	14.00 375.13	14.00 404.69	14.00 451.33	14.00 461.82	14.00 498.71	14.00 476.21	15.00 657.87	15.00 729.15	15.00 803.46	15.00 913.90
-Side load 2-in. and 4-in. combination flat	19.00 322.00	19.00 476.00	19.00 484.13	19.00 504.37	19.00 570.61	19.00 600.40	19.00 646.20	19.00 671.64	19.00 667.97	19.00 853.08	19.00 981.02	19.00 1078.09	19.00 1165.92
-Long bag 30-in.	37.25 505.93	37.25 657.41	37.25 700.77	37.25 716.04	37.25 802.78	37.25 826.72	37.25 883.10	37.25 906.56	37.25 944.63	37.25 1094.61	37.25 1270.51	37.25 1393.17	37.25 1549.80
-Front-load HEPA	40.00 874.09	40.00 985.62	40.00 1176.01	40.00 1128.46	40.00 1267.90	40.00 1397.21	40.00 1449.89	40.00 1520.35	40.00 1561.45	40.00 1845.81	40.00 2141.38	40.00 2553.97	40.00 2924.72
-Front-load cartridge	40.00 637.18	40.00 867.68	40.00 796.62	40.00 922.78	40.00 931.37	40.00 1093.06	40.00 1061.94	40.00 1173.89	40.00 1168.54	40.00 1449.48	40.00 1671.46	40.00 1923.09	40.00 2155.95
-Front-load short bag	45.00 622.53	45.00 750.89	45.00 778.04	45.00 799.75	45.00 885.35	45.00 917.08	45.00 968.65	45.00 979.84	45.00 1048.59	45.00 1231.49	45.00 1365.35	45.00 1538.95	45.00 1696.33
Gas heat													
- 200 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
- 300 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
- 360 MBH	n/a	66.00 1402.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
- 560 MBH	n/a	66.00 1594.61	n/a	64.00 1468.07	n/a	64.00 1853.53	n/a	64.00 1900.53	n/a	n/a	n/a	n/a	n/a
- 700 MBH	n/a	73.00 1895.19	n/a	75.00 1804.11	n/a	74.00 2190.52	n/a	74.00 2241.91	n/a	74.00 2490.63	n/a	n/a	n/a
- 860 MBH	n/a	80.00 2046.29	n/a	75.00 2098.72	n/a	74.00 2280.52	n/a	74.00 2331.91	n/a	74.00 2580.63	74.00 2198.81	n/a	n/a
- 1000 MBH	n/a	80.00 1723.73	n/a	81.00 1844.68	n/a	77.00 2325.57	n/a	77.00 2082.86	n/a	74.00 2300.63	74.00 1918.81	84.00 3156.04	92.00 3125.34
- 1250-1750 MBH	n/a	101.00 2540.84	n/a	105.00 2717.94	n/a	106.00 3264.84	n/a	106.00 2942.76	n/a	109.00 3309.39	109.00 2949.68	92.00 3878.54	102.00 3886.60
- 2000 MBH	n/a	n/a	n/a	n/a	n/a	114.00 3758.71	n/a	114.00 3430.29	n/a	112.00 3688.33	112.00 3320.33	109.00 4503.52	109.00 4391.21
-2400 MBH	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	118.00 3890.31	112.00 3455.33	121.00 4715.85	119.00 4668.51
Humidifier													
-Building Steam	14.00 561.00	14.00 544.00	14.00 622.00	14.00 599.00	14.00 684.00	14.00 782.00	14.00 773.00	14.00 897.00	14.00 807.00	15.00 1123.00	15.00 1215.00	15.00 1363.00	15.00 1551.00
-Atmospheric Steam	19.00 471.00	19.00 581.00	19.00 508.00	19.00 665.00	19.00 570.00	19.00 724.00	19.00 683.00	19.00 803.00	19.00 742.00	19.00 977.00	19.00 1078.00	19.00 1265.00	19.00 1492.00



Dimensions and Weights

Table 6. Section dimensions (inches) and weights (pounds) - unit sizes 31-120

Unit size	31	35	36	40	41	50	51	57	58	66	80	100	120
Mixing box													
-with angled filters	46.00 467.28	48.00 519.12	46.00 513.70	48.00 561.92	46.00 565.81	48.00 653.36	46.00 629.45	48.00 653.36	46.00 675.14	49.00 946.02	54.00 1077.83	60.00 1287.99	60.00 1433.55
-with front/back Traq and top Traq dampers	n/a 966.49	63.75 966.49	n/a 1073.80	63.75 1073.80	n/a 1261.78	68.50 1261.78	n/a 1365.59	68.50 1365.59	n/a 1907.28	84.00 2151.42	92.00 2473.12	96.00 2790.48	96.00 2790.48
-reduced length with side/top/back/bottom airfoil damper	n/a 708.50	35.50 708.50	n/a 795.10	38.50 795.10	n/a 947.60	41.50 947.60	n/a 1022.70	41.50 1022.70	n/a 1328.50	41.50 1453.60	41.50 1731.30	47.00 2025.40	53.00 2025.40
Multizone													
- 3-deck vertical discharge	n/a 4263.00	92.00 4263.00	n/a 4732.00	92.00 4732.00	n/a 5739.00	96.00 5739.00	n/a 5739.00	n/a 5739.00	n/a 5739.00	n/a 5739.00	n/a 5739.00	n/a 5739.00	n/a 5739.00
- 2-deck vertical discharge	n/a 2965.00	92.00 2965.00	n/a 3267.00	92.00 3267.00	n/a 3986.00	96.00 3986.00	n/a 3986.00	n/a 3986.00	n/a 3986.00	n/a 3986.00	n/a 3986.00	n/a 3986.00	n/a 3986.00
-3-deck horizontal discharge	n/a 4020.00	78.00 4020.00	n/a 4471.00	78.00 4471.00	n/a 5276.00	78.00 5276.00	n/a 5276.00	n/a 5276.00	n/a 5276.00	n/a 5276.00	n/a 5276.00	n/a 5276.00	n/a 5276.00
-2-deck horizontal discharge	n/a 2725.00	78.00 2725.00	n/a 3006.00	78.00 3006.00	n/a 3633.00	78.00 3633.00	n/a 3633.00	n/a 3633.00	n/a 3633.00	n/a 3633.00	n/a 3633.00	n/a 3633.00	n/a 3633.00
Silencer													
-3 ft	38.00 826.00	38.00 918.00	38.00 951.00	38.00 974.00	38.00 1013.00	38.00 1226.00	38.00 1142.00	38.00 1332.00	38.00 1312.00	38.00 1573.00	38.00 1741.00	38.00 2196.00	38.00 2555.00
-5 ft	62.00 1272.00	62.00 1335.00	62.00 1478.00	62.00 1439.00	62.00 1558.00	62.00 1795.00	62.00 1759.00	62.00 1945.00	62.00 2030.00	62.00 2313.00	62.00 2555.00	62.00 3230.00	62.00 3786.00
Trane Catalytic Air Cleaning System (TCACS)	36.00 825.55	36.00 881.59	36.00 916.32	36.00 935.35	36.00 945.79	36.00 1044.28	36.00 1043.64	36.00 1148.17	36.00 1132.38	36.00 1362.38	36.00 1451.30	36.00 1707.27	36.00 1881.13
UV light	14.00 n/a	14.00 325.48	14.00 n/a	14.00 352.71	14.00 n/a	14.00 394.34	14.00 n/a	14.00 419.43	14.00 n/a	15.00 574.52	15.00 604.11	15.00 667.60	15.00 758.72
Sections below are for outdoor units only													
Diagonal economizer													
-with airfoil dampers	n/a 931.00	75.00 931.00	n/a 1062.00	83.00 1062.00	n/a 1120.00	72.00 1120.00	n/a 1223.00	76.00 1223.00	n/a 1680.00	83.00 1680.00	86.00 1851.00	93.00 2173.00	93.00 2396.00
-with airfoil damper and one side Traq damper	n/a 973.00	75.00 973.00	n/a 1101.00	83.00 1101.00	n/a 1169.00	72.00 1169.00	n/a 1266.00	76.00 1266.00	n/a 1722.00	83.00 1722.00	86.00 1920.00	93.00 2290.00	93.00 2494.00
Unit size	31	35	36	40	41	50	51	57	58	66	80	100	120
Exhaust damper section for outdoor unit	n/a 450.80	24.50 450.80	n/a 489.90	24.50 489.90	n/a 565.60	24.50 565.60	n/a 586.60	22.40 586.60	n/a 755.30	22.40 755.30	22.40 820.10	22.40 935.50	22.40 1058.30
Hoods													
-Back inlet hood with airfoil and Traq dampers	n/a 176.00	99.88 176.00	n/a 195.00	112.38 195.00	n/a 230.00	125.38 230.00	n/a 270.00	125.38 270.00	n/a 317.00	126.00 317.00	140.00 344.00	140.00 491.00	167.25 566.00
-Side inlet hood with airfoil and Traq dampers	n/a 122.00	40.88 122.00	n/a 128.00	40.88 128.00	n/a 161.00	44.75 161.00	n/a 174.00	37.25 174.00	n/a 189.00	37.25 189.00	37.25 258.00	43.00 412.00	48.75 415.00
-Exhaust hood with airfoil damper	n/a 73.00	40.88 73.00	n/a 77.00	40.88 77.00	n/a 93.00	39.63 93.00	n/a 114.00	37.25 114.00	n/a 129.00	37.25 129.00	37.25 174.00	43.00 206.00	48.75 221.00
-Economizer inlet hood	n/a 195.00	75.00 195.00	n/a 275.00	83.00 275.00	n/a 358.00	72.00 358.00	n/a 345.00	75.50 345.00	n/a 418.00	83.00 418.00	86.00 522.00	93.00 629.00	93.00 778.00
Pipe cabinet weight													
15 inches long, 36 inches deep	n/a	175.00	n/a	175.00	n/a	191.00	n/a	209.00	n/a	215.00	243.00	265.00	265.00
24 inches long, 36 inches deep	n/a	199.00	n/a	199.00	n/a	216.00	n/a	236.00	n/a	243.00	273.00	298.00	298.00
48 inches long, 36 inches deep	n/a	263.00	n/a	263.00	n/a	284.00	n/a	309.00	n/a	317.00	354.00	385.00	385.00
96 inches long, 36 inches deep	n/a	392.00	n/a	392.00	n/a	421.00	n/a	454.00	n/a	466.00	517.00	558.00	558.00

Fans/Motors

Starter/VFD Weights

Fan weights do not include starter/VFD weights. [Table 7](#) gives approximate starter/VFD weights.

Table 7. Approximate starter and VFD weights per horsepower (lbs.)

Horsepower	1	1.5	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125
Starter ¹	65	65	65	65	65	65	65	65	65	97	97	97	97	97	97	97	97
VFD ²	123	123	132	124	125	136	151	162	177	197	241	325	332	243	258	294	314

Note: ¹These weights represent the largest available starter. ²VFD weights include transformer, distribution block, and enclosure.

Motor Weights

Fan weights provided in this manual include the heaviest ODP (open drip-proof) motor. Approximate motor weights are shown in [Table 8](#).

Table 8. Approximate motor weights (pounds)

Motor Type	Motor RPM	Horsepower															
		3/4	1	1-1/2	2	3	5	7-1/2	10	15	20	25	30	40	50	60	75
Energy efficient ODP (EEOP)	1800	24	29														
NEMA Premium ODP (HEOP)	1200		39	77	91	147	126	249	300	375	443	594	667				
NEMA Premium TEFC (HETC)	1200		56	96	109	148	185	310	341	423	481	614	655				
NEMA Premium ODP (HEOP)	1800		36	42	47	76	82	118	148	234	263	330	379	488	521	698	808
NEMA Premium TEFC (HETC)	1800		47	54	56	91	108	159	185	285	315	452	481	578	670	808	889
NEMA Premium ODP (HEOP)	3600		36	36	37	89	104	173	203	267	243	261	407				
NEMA Premium TEFC (HETC)	3600		36	53	62	85	103	154	176	287	322	448	496				

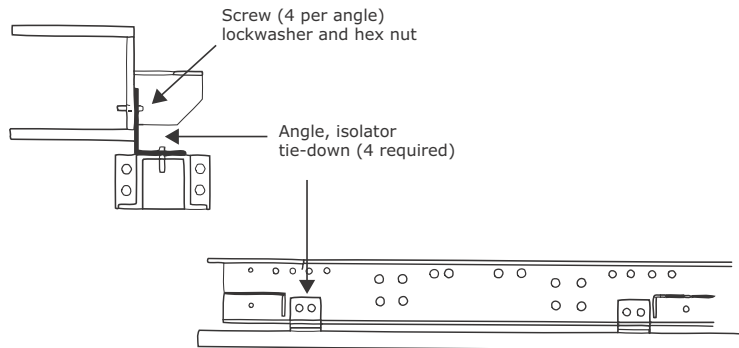
Installation - Mechanical

Lifting and Rigging

Remove Shipping Tie-Downs

Prior to unit placement, remove the shipping tie-downs. See [Figure 5](#).

Figure 5. Isolator tie-down removal



- Shipping tie-downs are located at each corner of the isolation base. See [Figure 6](#), [Figure 7](#), [Figure 8](#), and [Figure 9](#).

Figure 6. Isolator tie-down for unit sizes 3-8

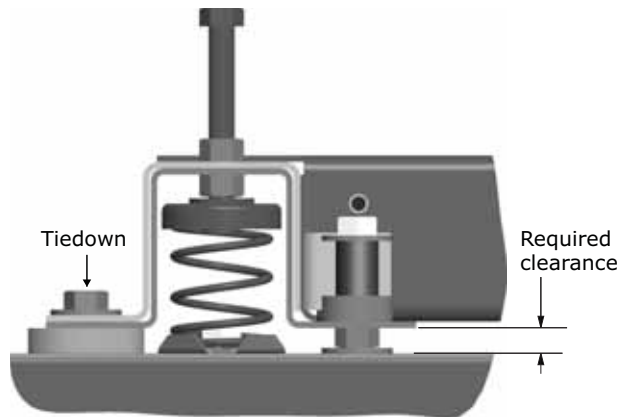


Figure 7. Isolator tie-down for unit sizes 10-30

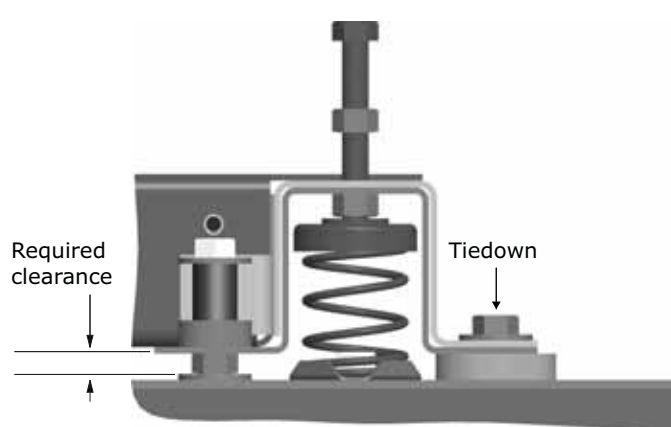


Figure 8. Isolator tie-down removal for unit sizes 66-120

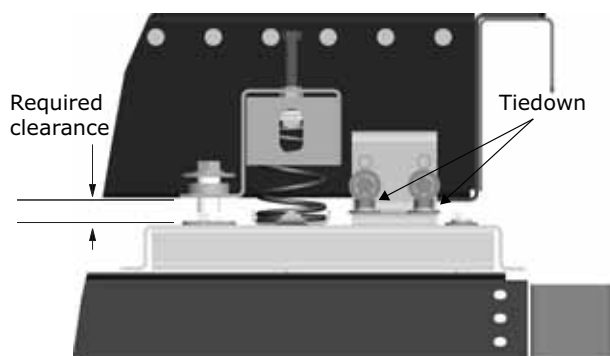
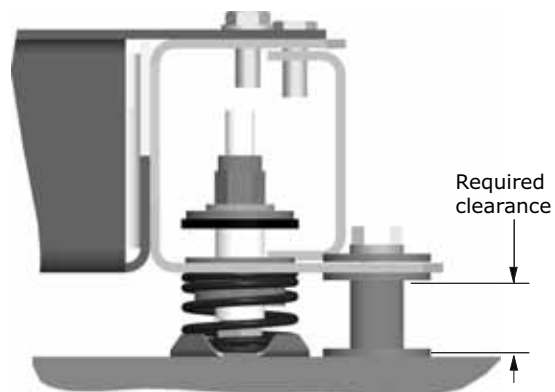
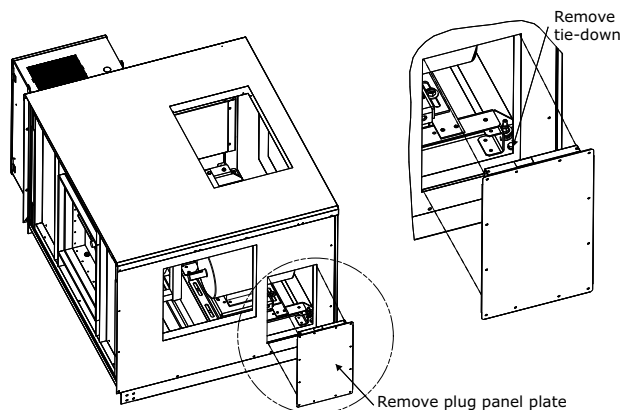


Figure 9. Belt-drive plenum fan tie down



- Access for removal of shipping tie-downs for unit sizes 3-30 is available through the fan section access door or opposite drive-side plug panel. See [Figure 10](#).

Figure 10. Plug panel plate



- Access for removal of shipping tie-downs for unit sizes 3-30 is available through the fan section access door or opposite drive-side plug panel. See [Figure 10](#).
- Remove the bolt. This will release the isolator and make it possible to remove the pipe or spacer.
- Replace plug panel if applicable.

Note: For outdoor air handlers, after isolator tie-down is removed, remove the paper backing from the butyl tape around plug panel perimeter prior to replacing plug panel.

General Lifting Considerations

⚠ WARNING

Risk of Unit Dropping!

Always place, assemble, and suspend modules/subassemblies one at a time. Placing, assembling, and/or suspending more than one module/subassembly at a time could result in module/subassemblies dropping and crushing technicians which could result in death, serious injury, or equipment damage.

⚠ WARNING

Improper Unit Lift!

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property-only damage.

NOTICE:

Equipment Damage!

Keep skid in place until unit is ready to set. Do not move the unit or subassembly without the skid in place as shipped from the factory. Premature skid removal could result in equipment damage.

Before preparing the unit for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed, with more weight in the coil and fan areas. Approximate unit weights are provided in [“Dimensions and Weights” on page 12](#). Refer to the unit submittals for actual section weights. Test the unit for proper balance before lifting.

For outdoor air handlers, preparation of the roof curb or pier mount and roof openings must be completed before lifting to the roof. See CLCH-SVN04A-EN Roof Curbs for Performance Climate Changer Air Handlers installation instructions for details.

⚠ WARNING

Heavy Objects!

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury.

Always rig subassemblies or sections as they ship from the factory. Never bolt sections together before rigging.

- Make the loop of the sling parallel to the direction of airflow, if possible.
- When hoisting the unit into position, use the proper rigging method, such as straps, slings, spreader bars, or lifting lugs for protection and safety.
- Use all lifting lugs provided. See [Figure 11](#) and [Table 12](#) and [Table 9](#) for lug hole sizes and location.

Figure 11. Lifting lugs for low-capacity and high-capacity units

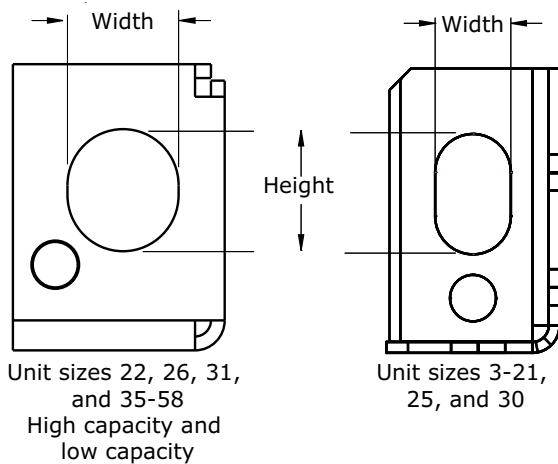


Figure 12. Lifting lug for pipe cabinets and hoods

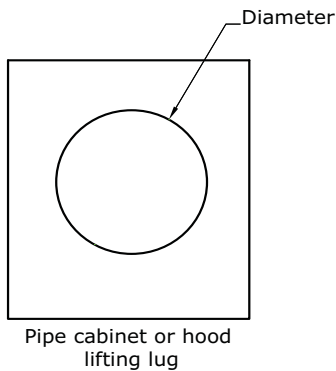


Figure 13. Lifting lug part numbers

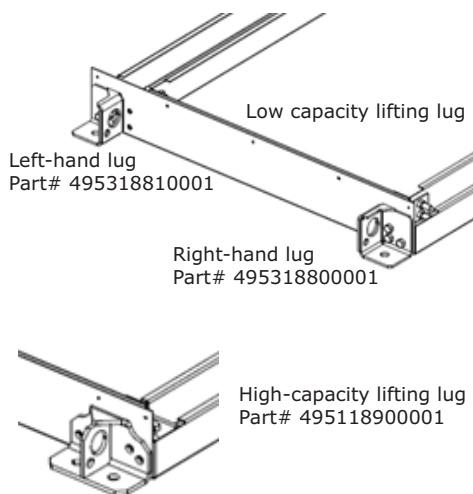
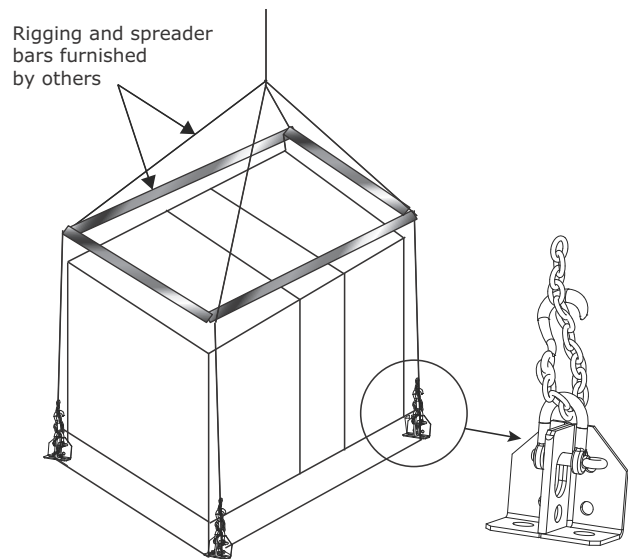


Table 9. Lug hole dimensions for low-capacity (under 3000 lbs.) and high-capacity (3000 lbs and over) units

Section	Location	Unit Size	Width	Height
Unit Lug Hole Size	Indoor	3-21, 25, 30	0.88	1.38
	Indoor	22, 26, 31, 35-58	1.31	1.43
	Indoor	66-120	1.25	2.75
	Outdoor	3-30	1.25	2.75
Pipe Cabinet	Outdoor	3-120	2.5-in. diameter	
Hood	Outdoor	3-120	1-in. diameter	

- For unit sizes 3 to 120 with integral base frame, use field-provided spreader bars and slings to rig units and subassemblies as shown in Figure 14. The air handler is not designed to be lifted or rigged from the top of the unit.

Figure 14. Lifting detail for unit sizes 3 to 120



- For outdoor units, never stack the pipe cabinet or inlet hood on the unit as it is being lifted.
- Do not attach the intake/exhaust hood or pipe cabinet to the unit prior to lifting the unit. Doing so may damage the equipment. Attach the hoods to the unit only after all sections are in place.
- For outdoor air handlers, all shipping supports and crating on the face of the sections must be removed to permit proper fit-up and sealing of the surfaces. Dispose of properly.

Lifting Hoods and Pipe Cabinets

⚠ WARNING

Risk of Unit Dropping!

Always place, assemble, and suspend modules/subassemblies one at a time. Placing, assembling, and/or suspending more than one module/subassembly at a time could result in module/subassemblies dropping and crushing technicians which could result in death, serious injury, or equipment damage.

Figure 15. Lifting inlet and exhaust hoods

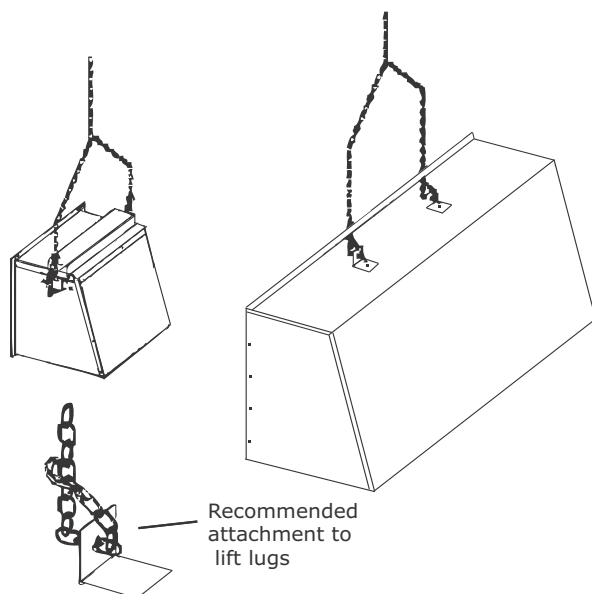
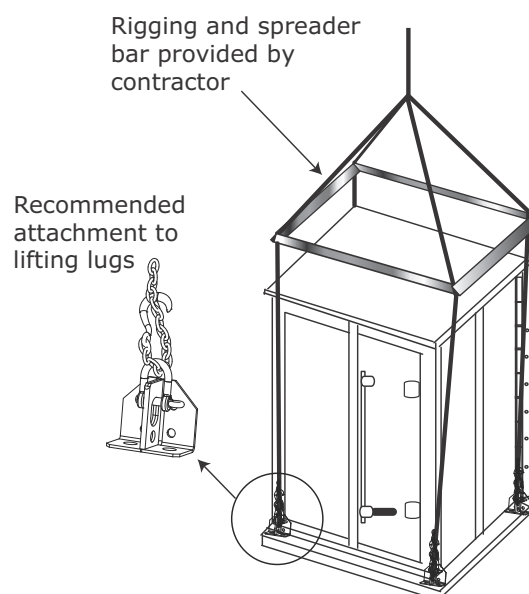


Figure 16. Lifting pipe cabinets



Forklifting Considerations

NOTICE:

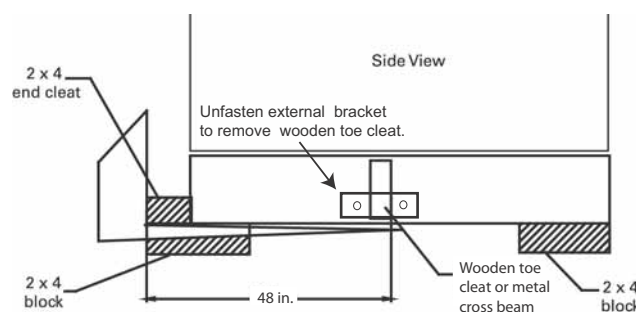
Equipment Damage!

Do not use a fork lift on air handlers or subassemblies larger than size 30. Improper use of fork lifts on units larger than size 30 could result in equipment damage. Trane is not responsible for equipment damage resulting from improper fork lifting practices.

Note: Do not use a forklift on outdoor air handlers or indoor air handlers/subassemblies larger than size 30.

For unit sizes 3-30, a forklift may be used to lift a single section or small subassembly, provided the forks extend under both ends of the base frame, or as indicated in [Figure 17](#). The forks should not contact the bottom of the air handler. Units should only be lifted from the proper end identified by the lifting label on the unit. A lifting crane or other means should be used for larger units where forks cannot extend under both base rails.

Figure 17. Fork lift points with base rail



Unit Placement and Assembly

If the air handler ships in subassemblies or in individual sections, some assembly is required, including:

- Ceiling-suspended indoor unit assembly; see ["Ceiling Suspension" on page 27](#).
- Section-to-section assembly; see ["Section-to-Section Assembly" on page 28](#).

⚠ WARNING

Toxic Fumes!

Keep open flame away from unit exterior or interior. Do not weld or use cutting torch on the exterior or interior of the unit. The unit contains polyurethane insulation. Flame could produce toxic gas which could result in death or serious injury.

:

NOTICE:

Equipment Damage!

The internal sections of this unit containing electrical components must not exceed 104° F operating temperature. Internal sections of the unit which do not contain electrical components must not exceed 200° F temperature. Failure to comply with temperature requirements could result in equipment damage.

Unit Placement

⚠ WARNING

Risk of Unit Dropping!

Always place, assemble, and suspend modules/subassemblies one at a time. Placing, assembling, and/or suspending more than one module/subassembly at a time could result in module/subassemblies dropping and crushing technicians which could result in death, serious injury, or equipment damage.

NOTICE:

Microbial Growth!

The floor or foundation must be level and the condensate drain at the proper height for proper coil drainage and condensate flow. Standing water and wet surfaces inside the equipment can become an amplification site for microbial growth (mold), which could cause odors and damage to the equipment and building materials.

If a unit arrives in sections, then each section must be individually hoisted, set on the housekeeping pad, roof curb, or pier mount and then assembled.

Refer to the unit submittals and unit tagging for correct placement of all sections. If there are any discrepancies between the submittals and the unit tagging, contact your local Trane representative before proceeding.

Following the order of the sections on the unit submittals and tagging, individually place each unassembled section or subassembly in the appropriate installation location.

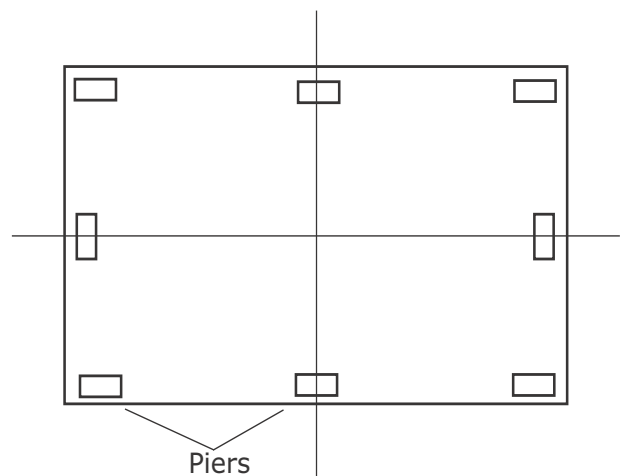
Note: Prior to placing fan section in the appropriate installation location, verify shipping tie-downs have been removed.

For outdoor units, the pipe cabinet must also be mounted as an individual section. Refer to ["Pipe Cabinet Installation" on page 35](#) for specific instructions.

When mounting the unit on a roof curb, make sure the gasketing between the roof curb and unit base provides an airtight seal.

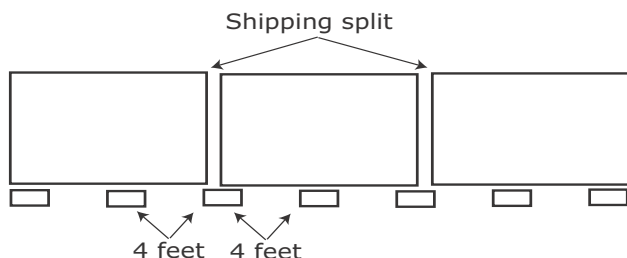
When mounting the unit on a pier mount, locate one pier at each corner as a minimum, directly underneath any shipping split (ensure full support under each side) and then every four feet at equally spaced intervals around the perimeter of the unit. Both the unit and the pipe cabinet should be supported by their base around the entire perimeter. See [Figure 18](#) and [Figure 19](#).

Figure 18. Piers located in each corner and spaced evenly every four feet



Note: Piers beneath shipping splits must be structurally sound to support the weight of the unit.

Figure 19. Side view with two shipping splits - locate one pier directly under each shipping split



Note: Piers beneath shipping splits must be structurally sound to support the weight of the unit.

For proper operation, the unit must be installed level (zero tolerance) in both horizontal axes. For vertical discharge units, allow space under the unit for supply air ductwork connections.

Unit Assembly

Note: Air handlers often include optional factory-provided casing penetration entry points for field-provided wiring. Consider overall unit serviceability and accessibility before mounting, running wires (power), making cabinet penetrations, or mounting any components to the cabinet.

See ["Component Installation Requirements" on page 48](#) for special assembly/installation considerations.

Removing the Shipping Skid

Remove the wooden shipping blocks, wooden toe cleat if there is one, and end cleats prior to lowering unit into final position or installing the unit to the roof curb.

Ceiling Suspension

WARNING

Risk of Unit Dropping!

Do not use mounting legs for ceiling suspension, external isolation, or unit support during module placement. Mounting legs are designed only to secure the unit to the floor, housekeeping pad, or platform. Improper use of the mounting legs as described above could result in unit dropping and crushing technicians which could result in death or serious injury, and equipment damage.

Note: Ceiling suspension is not recommended for units larger than size 57 unless using a field-provided mounting frame.

Using a Field-Provided Mounting Frame

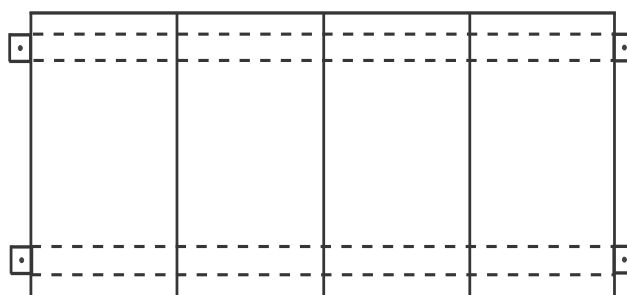
If a field-provided mounting frame is used for ceiling suspension, the installer/contractor must provide a ceiling-suspended mounting frame designed to support the length, width, and weight of the entire air-handling unit. See ["Dimensions and Weights" on page 12](#) for approximate weights.

Note: It is the building engineer's responsibility to size the structural channels and to provide the appropriate hangers.

Structural channels in a field-provided frame can be mounted parallel to airflow or perpendicular to airflow:

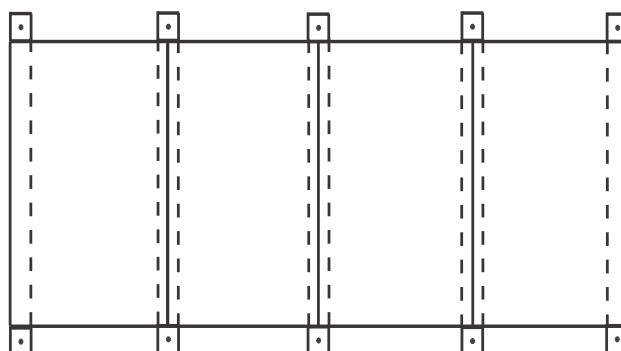
- For parallel-to-airflow channels, size channels based on a four-point load distribution (see [Figure 20](#)).

Figure 20. Typical suspension method-parallel channels



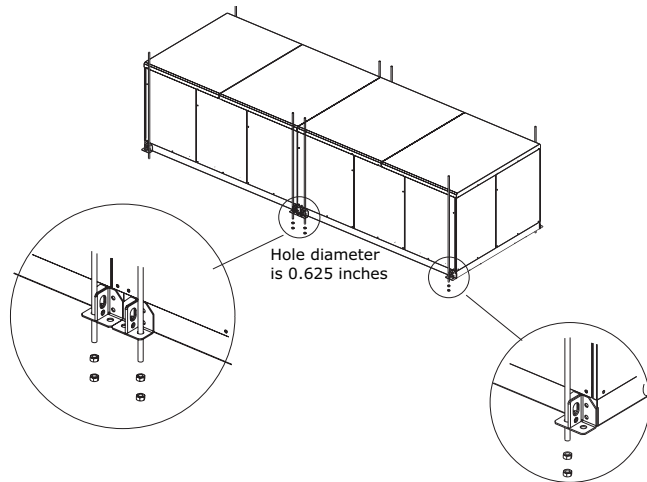
- For perpendicular-to-airflow channels, size channels based on the load distribution of the individual sections and install the channels so that *both ends of every section are supported* (see [Figure 21](#)).

Figure 21. Typical ceiling suspension-perpendicular channels



Using Integral Base Frame

Figure 22. Ceiling suspension for unit sizes 3-57



If using the factory-provided integral base frame for ceiling suspension, individual sections and/or subassemblies will have base frame shipping splits and base frame lifting lugs. When using the base frame for ceiling suspension:

Figure 23. Shipping gusset



Section-to-Section Assembly

Air handlers ship with all necessary assembly hardware and gasket material. The hardware should be packaged in either a clear plastic envelope or cardboard box inside the fan section, access section, or mixing box.

The number of sections to be assembled often makes it necessary to use more than one section to ship the assembly material; therefore, check all sections thoroughly before contacting your Trane sales representative to report missing items.

Sections are joined with gasketing applied to one of the mating surfaces and hardware to bolt the sections together. The gasketing for section-to-section joints is a closed cell foam with adhesive backing.

To assemble the unit:

1. Locate the mounting hardware and gasket material.
2. All shipping supports and crating on the face of the sections must be removed and discarded to permit

- Suspend the unit (on both sides of the unit) at each shipping split lug as well as the four corners of the unit (see [Figure 22](#)). See [Figure 11](#) and [Figure 12](#) and [Table 9](#) on page 24 for lug hole sizes.
- Bolt shipping splits together.

The hanger rods must extend through the bottom of the base lug. It is the building engineer's responsibility to provide the appropriate hangers.

Shipping Gussets

Prior to pulling the shipping splits together, the shipping gussets (see [Figure 23](#)) should be removed to simplify panel removal (except for units required OSHPD certification). If there is enough access after joining the shipping splits, the gussets can be removed after they are joined. The exception to this rule is for size 35-50 stacked units. For these sizes, the gussets should be left in place for the lower level unit unless they are installed in a shipping split that contains a coil. The other exception is when access to install or change out front-loaded filters is restricted or blocked.

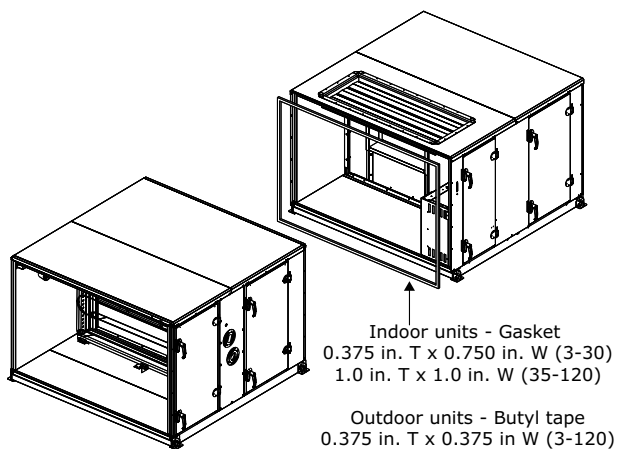
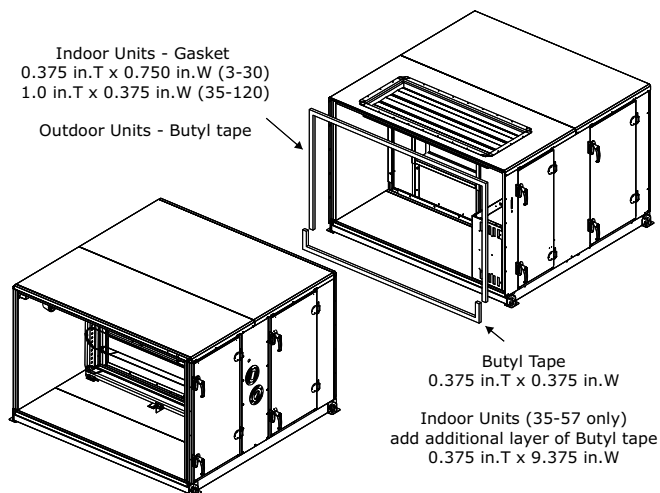
Do not mistake the coil structural gusset (see [Figure 24](#)) used on unit sizes 66-120 with the shipping gussets.

Figure 24. Coil structural gusset

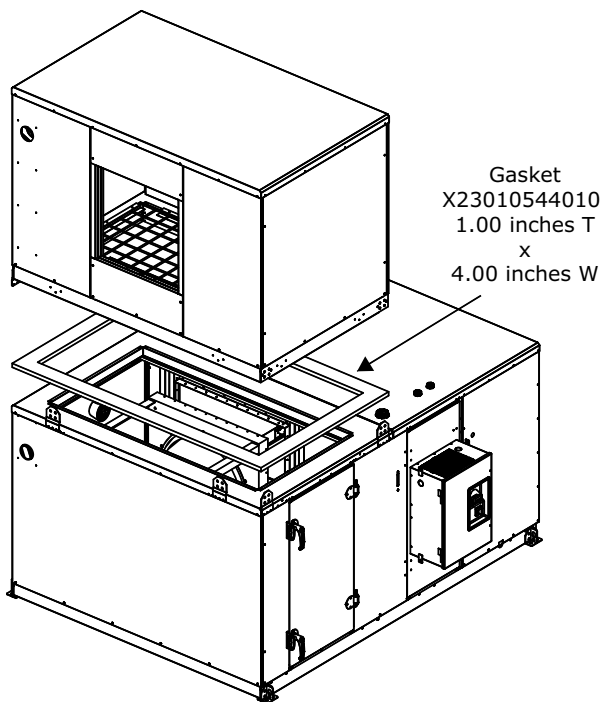
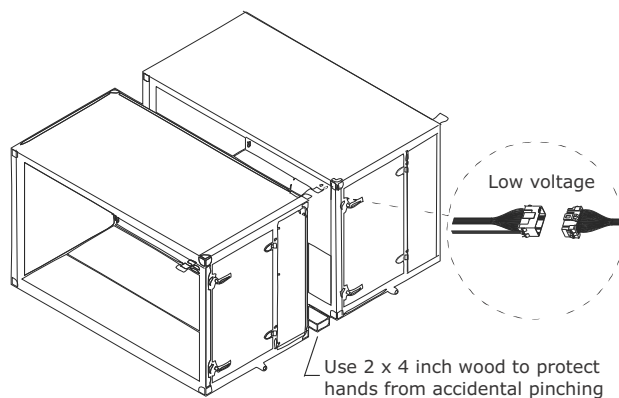


proper fit-up and sealing of the surfaces. Remove any shipping bolts located on the mounting surfaces of the sections (see [Figure 25](#)).

3. Apply the gasketing to one of the mating surfaces; see [Figure 25](#), [Figure 26](#), and [Figure 27](#).

Figure 25. Section-to-section installation

Figure 26. Coil-section-to-downstream-section bolt up with splash guard


Note: Reference the appropriate controller manual for more details on the installation of units with factory-mounted controls.

Figure 27. Stacked unit assembly (shown for sizes 3-50)

Figure 28. Horizontal section-to-section low voltage quick connects


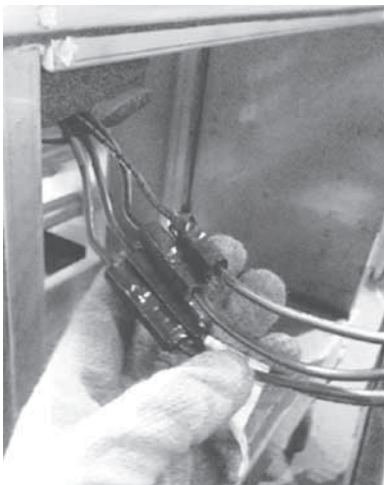
4. If the unit is equipped with factory-mounted controls, move adjacent subassembly within six inches and fasten quick connects where the sections bolt together. See [Figure 28](#) for low voltage. See [Figure 29](#) and [Figure 30](#) for high voltage.

Figure 29. Horizontal section-to-section high voltage quick connects



5. Assemble and seat connections per color code.

Figure 30. Horizontal section-to-section high voltage quick connects

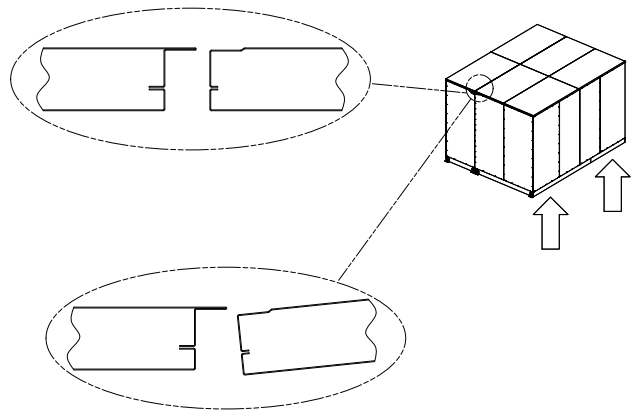


6. Wrap each connection individually with black electrical tape.
7. Fully wrap the connection with tape.
8. Use a bar clamp to pull adjacent shipping section lifting lugs together.
9. For indoor units sizes 66-120 and for outdoor units size 35-120, a wedge block is provided to aid in pulling and aligning the units together. Attach the wedge blocks to both sides of the units being pulled together, matching the correct wedge block with the correct hole pattern. See [Figure 34, p. 32](#).
10. Verify that the subassembly with the overhang profile on the roof is higher than the mating subassembly. If it is not, raise one end of the subassembly and bring the

unit together. See [Figure 31](#).

11. Due to unlevel floor and platforms, the roof may be misaligned as shown in [Figure 31](#). A common solution is to raise one end of the shipping section to clear the hemming before pulling the units together.

Figure 31. Roof alignment (indoor unit only)



12. In addition, an adjustment can also be made to the height of the roof of either subassembly. At the center (width-wise) of the unit, measure the height of each adjacent subassembly and verify that the subassembly with the overlap sheet metal is higher than the mating subassembly roof. If it is not, adjust the height of either subassembly by loosening the screws in the vertical channels or component structure and adjust the height of the roof. See [Figure 32](#) and [Figure 33](#).

Figure 32. Adjust height of roof by adjusting vertical channels

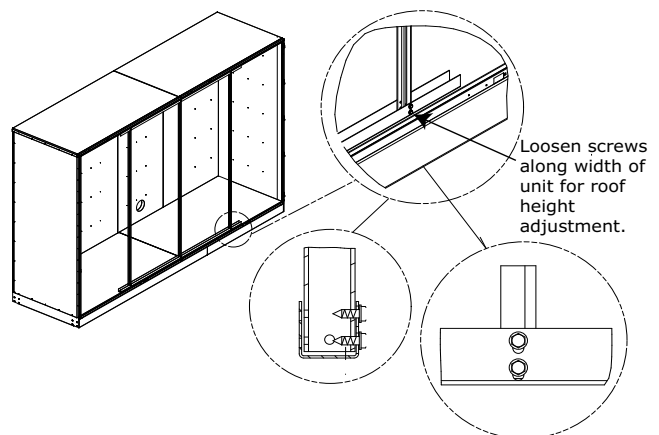
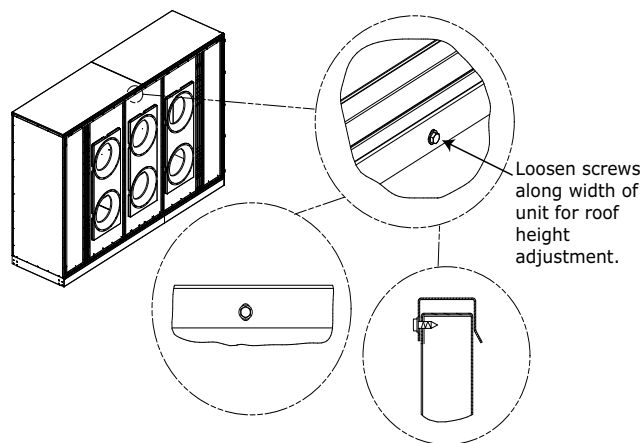
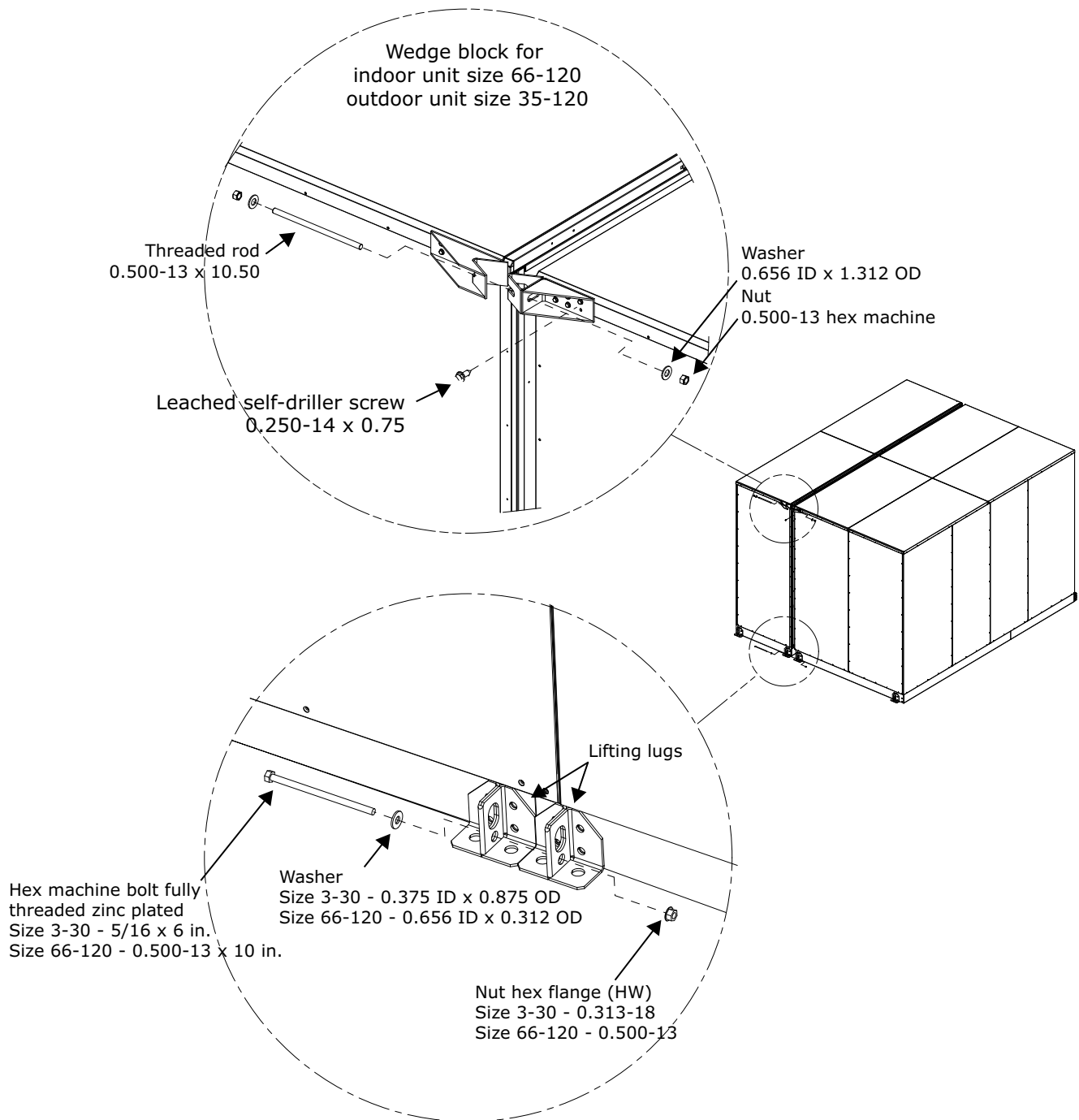


Figure 33. Adjust height of roof by loosening screws



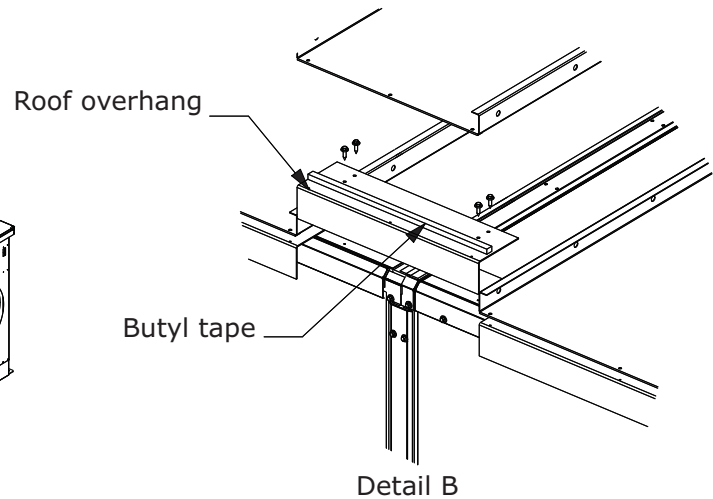
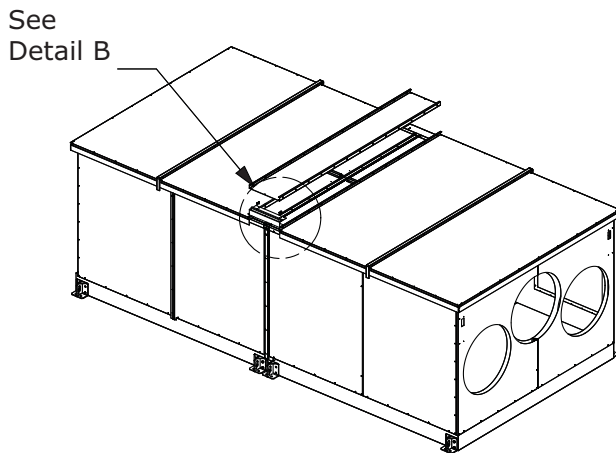
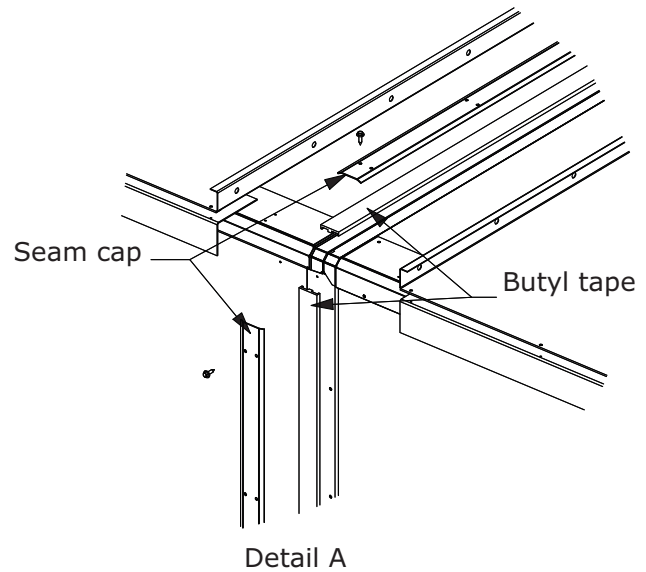
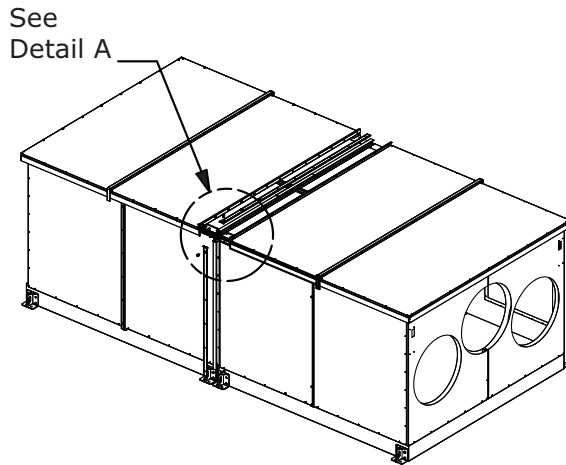
13. For unit sizes 3-30, bolt the unit base frames together using 5/16-inch bolts (see [Figure 34](#)).
14. For unit sizes 35-120, bolt the unit base frames together using ½-threaded rod (see [Figure 34](#)).
15. For sizes 66-120 only, bolt through the wedge blocks using a ½-threaded rod (see [Figure 34](#)). Alternate between tightening on the lifting lug bolts and wedge block bolts until the shipping section comes together.
16. Use straps and come-alongs to compress the gasketing and pull the sections together along the height of the unit.

Figure 34. Base frame split assembly


17. Install the section-to-section screws inserting the appropriate screws through the overlapping flanges using a powered impact gun and taking care not to strip the screws. Outdoor air handlers will ship with a seam cap that is to be installed over the section-to-section seams. Factory-supplied butyl tape must be

applied over the seam prior to seam cap being applied. See [Figure 35](#).

Figure 35. Section-to-section seam cap installation

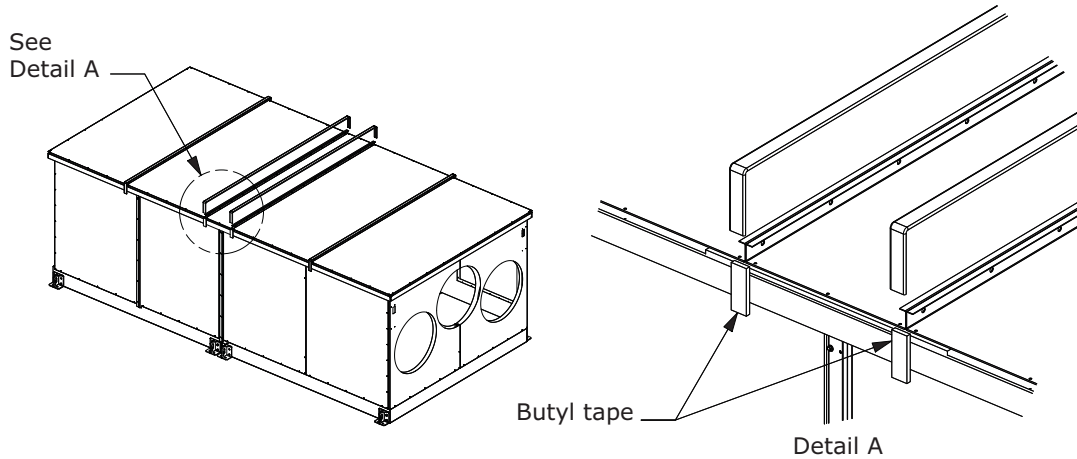


Installation - Mechanical

18. For outdoor air handlers, attach roof overhang angle with number 10 screws. Join outdoor roof panels together at the seams in the direction perpendicular to airflow and secure them in place with 5/16-inch x 3/4-inch bolts and 5/16 lock nuts. Install the roof joint strip to cover the seam between two outdoor roof panels in the perpendicular to airflow direction of. Use 3/8-inch butyl tape to cover the seam between two outdoor roof

panels overhang at the side the unit. Bend joint strip over roof panel and use two number 10 sheet metal screws (one in each roof panel) to secure joint strip. Trim the roof joint strip to insure that it does not protrude more than 1/16-inch beyond outdoor roof overhang (see [Figure 36](#)).

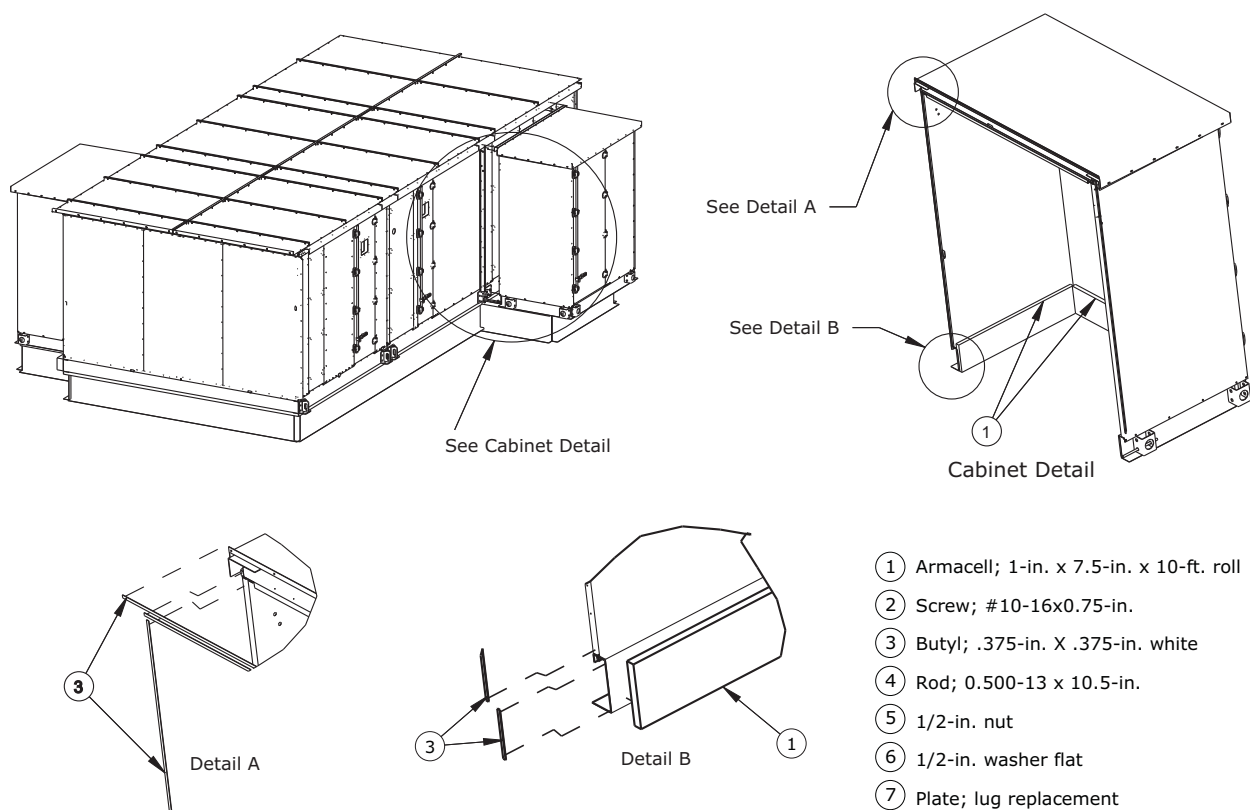
Figure 36. Join outdoor roof panels at the seams



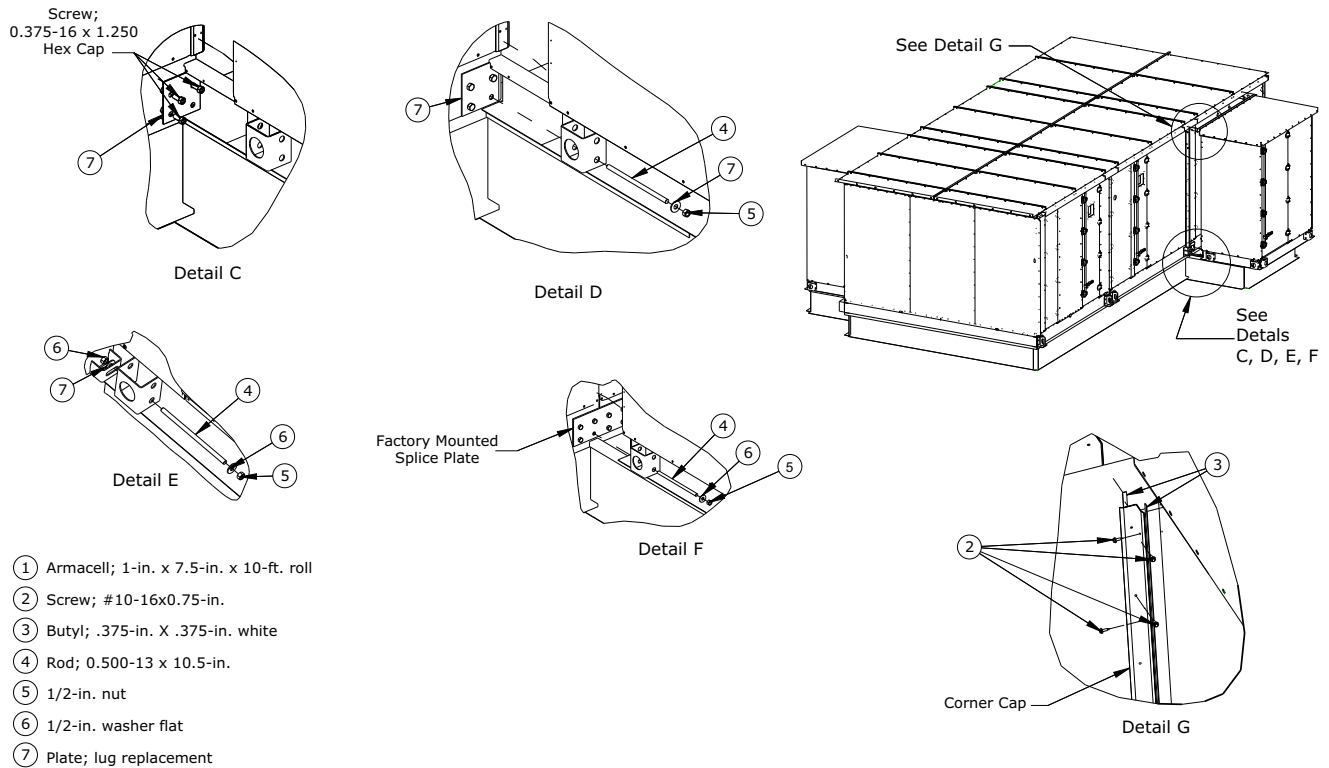
Pipe Cabinet Installation

1. After air handler is completely installed and checked to ensure that the unit is level and square, remove cross base member on pipe cabinet base by removing the four bolts and nuts.

Figure 37. Pipe cabinet installation



1. Install inside corner cap. See [Figure 38](#) Detail A and Detail B.
2. Install 3/8-inch x 3/8 inch white Butyl tape to unit wall where pipe cabinet roof connects.
3. Lift pipe cabinet roof into place and attach to unit wall with screws. See [Figure 38](#).

Figure 38. Pipe cabinet installation details


Pipe Cabinet to be Installed at Shipping Split Joint

1. Remove threaded rod and unit lug that is outside of pipe cabinet.
2. Using three screws from unit lug, install black lug replacement plate in place of unit lug. See [Figure 38](#) Detail C.
3. Lift pipe cabinet into place on roof curb.
4. Slide pipe cabinet into place.
5. Put threaded rod through pipe cabinet lifting lug into weld nut inside baserail to pull the pipe cabinet tight against the unit. See [Figure 38](#) Detail D.

Pipe Cabinet to be Attached to Unit Base Bracket

1. Lift pipe cabinet into place on roof curb.
2. Slide pipe cabinet into place.
3. Put threaded rod through pipe cabinet lifting lug into welded unit base rail bracket to pull the pipe cabinet tight against the unit. See [Figure 38](#) Detail E.

Pipe Cabinet to be installed at a Factory Joint

1. Lift pipe cabinet into place on roof curb.
2. Slide pipe cabinet into place.
3. Put threaded rod through pipe cabinet lifting lug into weld nut inside base rail to pull the pipe cabinet tight against the unit. See [Figure 38](#) Detail F.

Completing Pipe Cabinet Installation

1. Install inside corner cap. See [Figure 38](#).
2. Install 3/8-in. white Butyl tape to unit wall where pipe cabinet roof connects.
3. Lift pipe cabinet roof into place and attach to unit wall with screws. See [Figure 38](#).

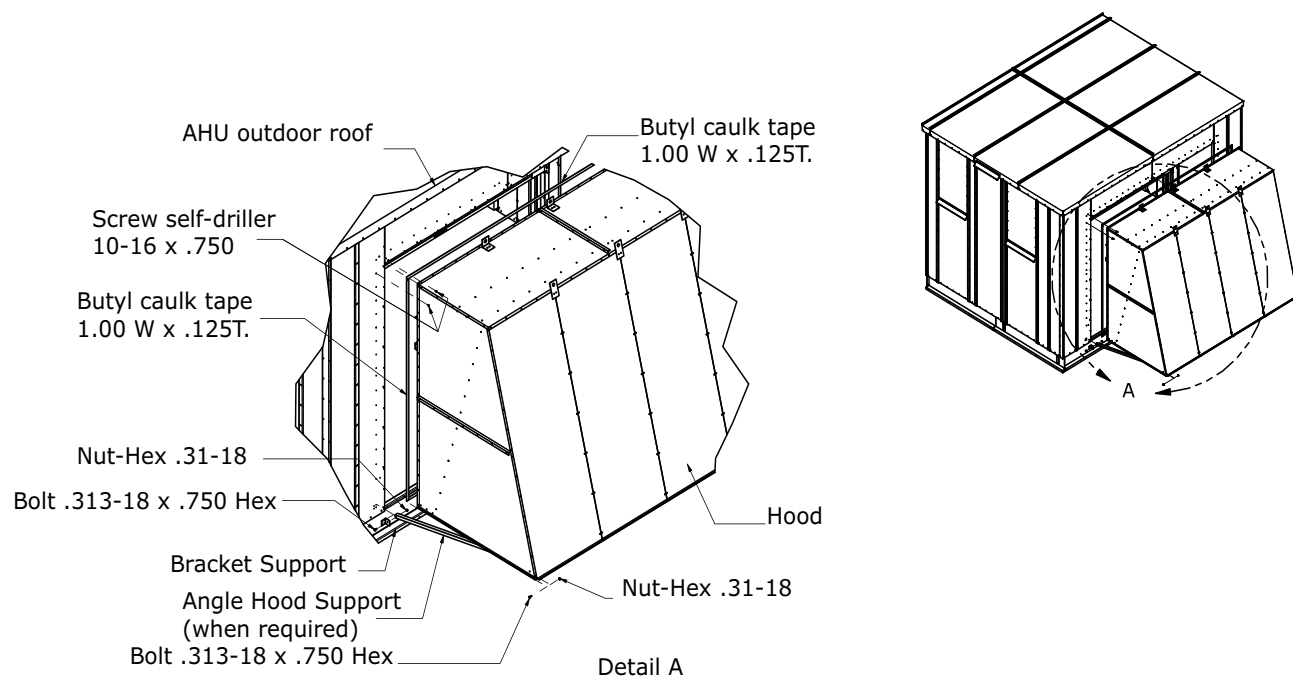
Outdoor Unit Weather Hoods

1. Per the unit drawing determine mounting location of the unit weather hoods.
2. Using the factory provided screws mount the weather hoods to the unit.
3. On larger units, weather hoods may be large enough to require angled down supports. In those cases, the angles are shipped attached to the hood but will need

to be connected to the air handler by the installing contractor. See [Figure 39](#).

Note: It is required that the hoods be sealed to the unit using factory-provided butyl/caulk tape.

Figure 39. Hood installation



Stacked Outdoor Units

Assembly hardware

Table 10. Parts list for outdoor stacked units

Item	Description
1	Gasket: 1.00T x 4.00W
2	Bracket: Stacked unit
3	Screw: 0.313-18 x 0.875 sheet metal
4	Screw: 10-16 x 0.750 self driller
5	Tape: Butyl 0.38T
6	Tape: Ribbed Butyl
7	Plate: Vertical seam cap
8	Tape: 0.12T x 1.00W, gray Butyl
9	Guard: perpendicular to airflow flashing

Item	Description
10	Guard: Energy recovery end cover
11	Guard: Energy recovery end cover
12	Guard: Direction of airflow flashing
13	Guard: Flashing seam cover
14	Adhesive/sealant: Flex polyurethane
15	Bracket: Hood support
16	Angle: Hood support
17	Screw: 0.250-14 x 0.750 self driller

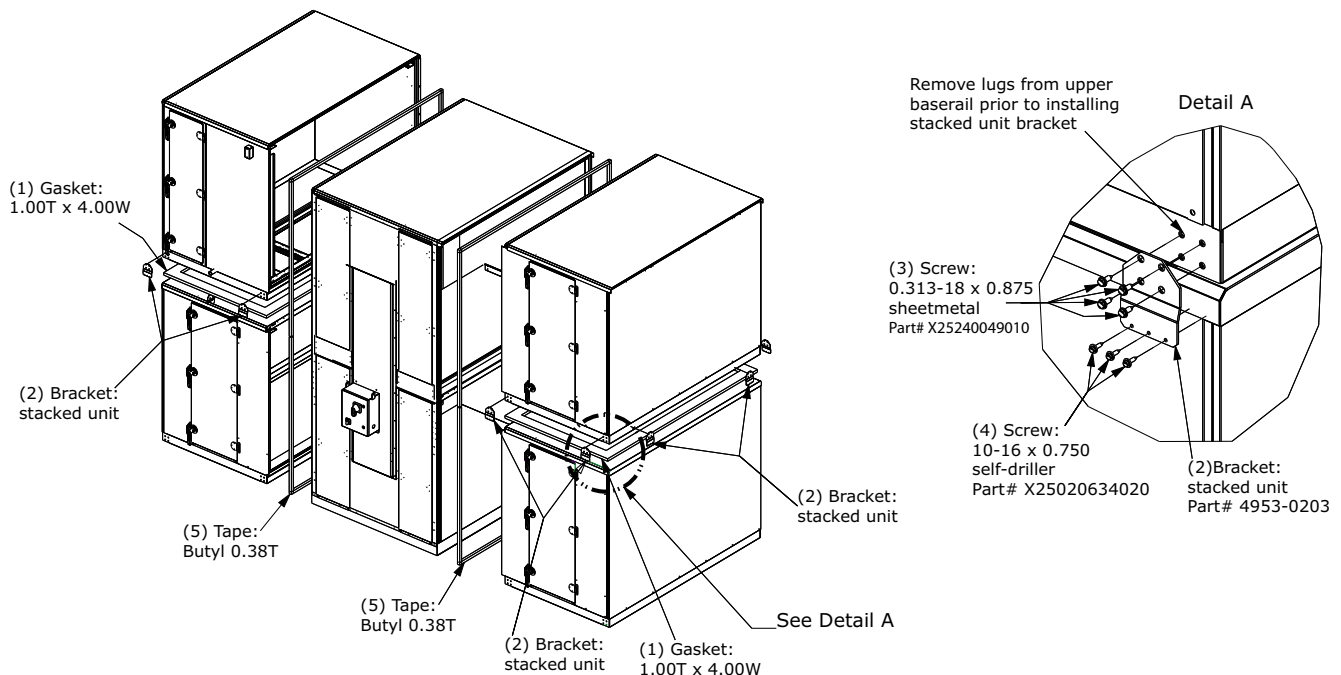
Unit assembly

1. See Figure 40. Apply gasket (Item 1) on top of lower unit. Compress gasketing to ensure a good air seal between upper and lower sections.
2. Place upper unit on lower unit.
3. Remove lifting lugs from top unit and attach stacking brackets (Item 2) to top and bottom units using screws (Item 3 and Item 4). See Detail A in Figure 40. Stacking

brackets (Item 2) are to be used on the right and left sides at each shipping split section end and also on front and back of the unit.

4. Apply Butyl tape (Item 5) to one side of the shipping split section.
5. Slide shipping split sections together, pulling tight using lifting lugs and threaded rod on bottom and straps or pipe clamps on top.

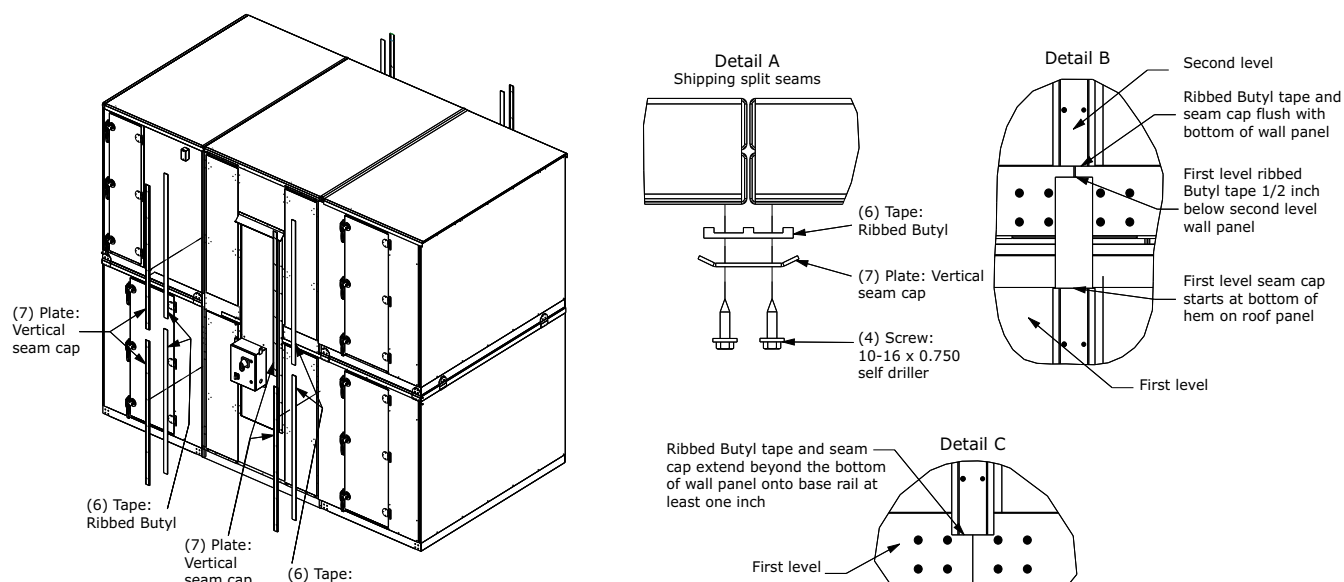
Figure 40. Stacked unit assembly



Vertical Seam Cap Installation

1. See [Figure 41](#). Apply ribbed Butyl tape (Item 6) over all vertical shipping split seams (see Detail A). First level ribbed Butyl tape (Item 6) starts 1/2 inch below second level wall panel (see Detail B), and extends down beyond the bottom of the first level wall panel onto the base rail at least one inch (see Detail C). Second level ribbed Butyl tape (Item 6) starts at bottom of wall panel on second level (see Detail B) and runs up to the top of the second level wall panel.
2. Secure vertical seam cap (Item 7) over ribbed Butyl tape (Item 6) with screws (Item 4) (see Detail A). First level vertical seam cap (Item 7) starts at bottom of hem on roof panels (see Detail B) and extends down onto the base rail at least one inch (see Detail D in [Figure 46](#)). Vertical seam cap (Item 7) on second level starts at bottom of wall panel and extends up (see Detail B). Second level vertical seam cap (Item 7) may extend onto the roof panel.

Figure 41. Vertical seam cap installation



Flashing Installation

For additional information, see “[Flashing Installation Notes](#)” on page 43.

For hood installations, see “[Install flashing and hood](#)” on page 44.

1. See [Figure 42](#). Apply Butyl tape (Item 8) to perpendicular-to-airflow flashing (Item 9) and secure to base rail with screws (Item 4) on front and back of unit (see Detail A in [Figure 46](#)).
2. For energy wheel/CDQ wheel, preassemble end covers (Item 10 and Item 11) to direction-of-airflow flashing

(Item 12) with screws (Item 4). Apply caulk (Item 14) to create water tight seal (see Detail B in [Figure 44](#)).

3. Apply Butyl tape (Item 8) to direction-of-airflow flashing (Item 12) and secure to base rails with screws (Item 4). Start at corners to ensure tight corner seams. Apply caulk (Item 14) to create water-tight seal (see Detail A and Detail C in [Figure 45](#)).
4. Install seam covers (Item 13) to all flashing seams (see Detail D in [Figure 46](#)).

Figure 42. Flashing installation

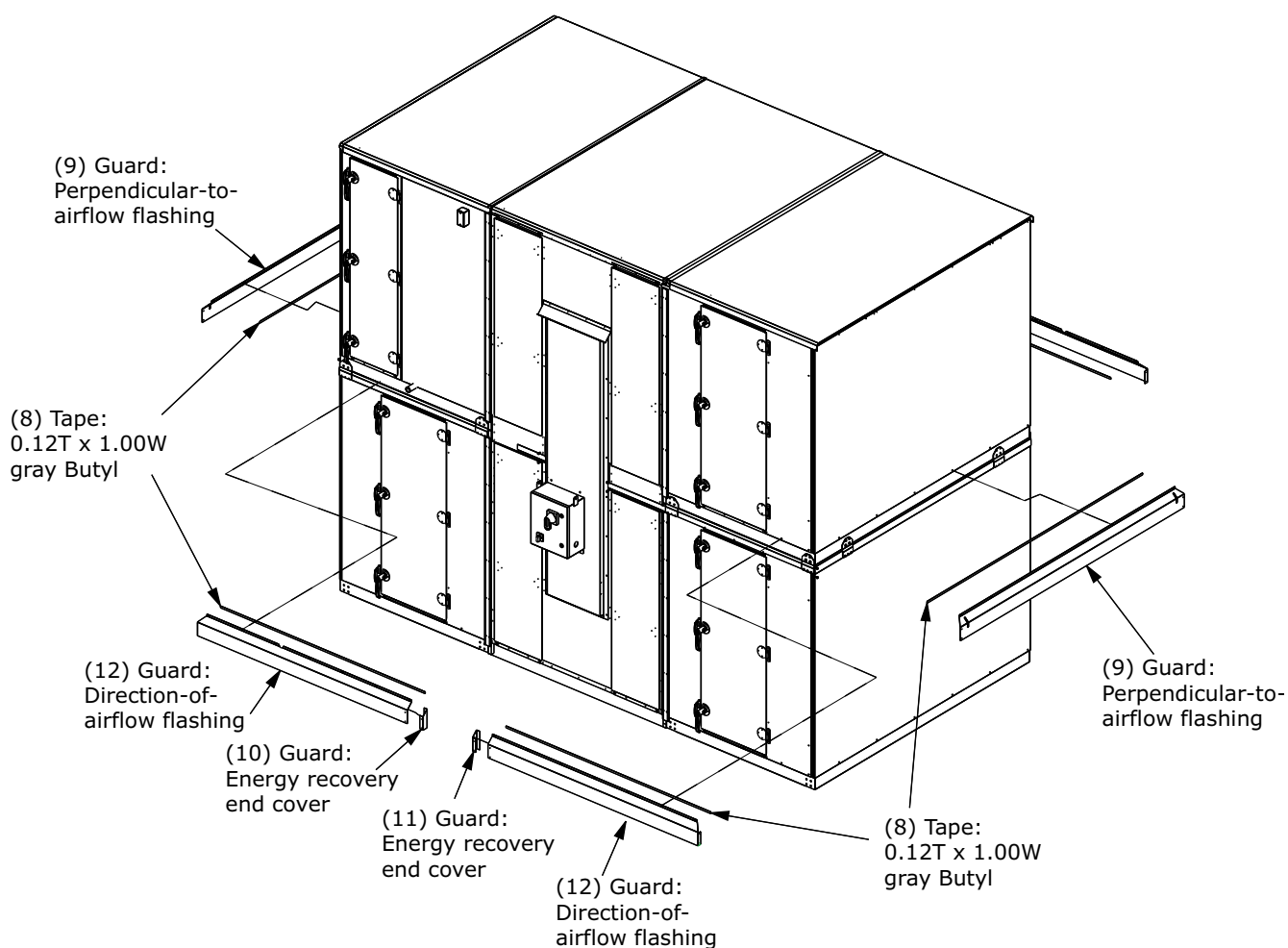


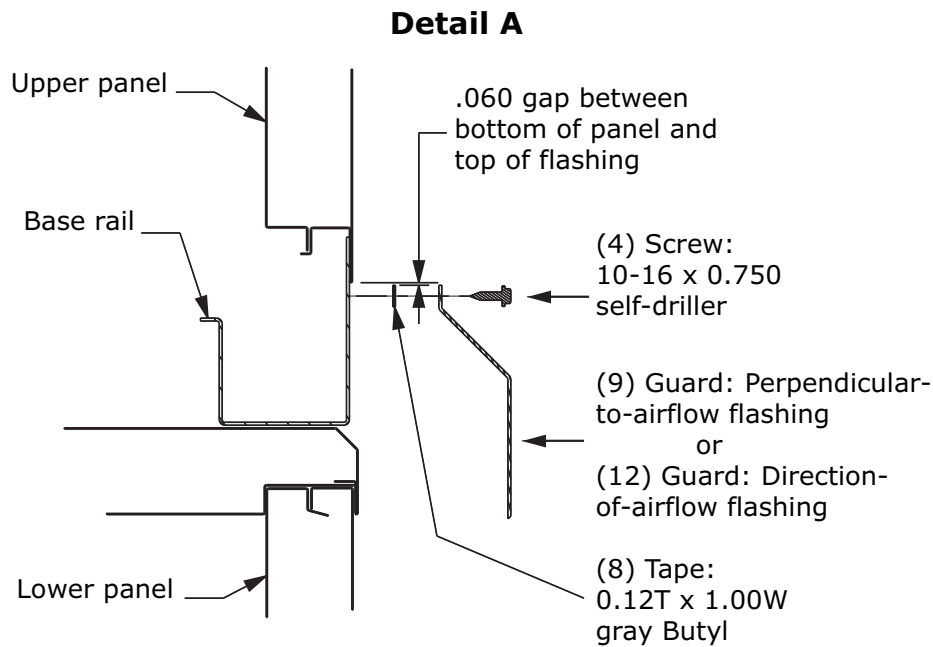
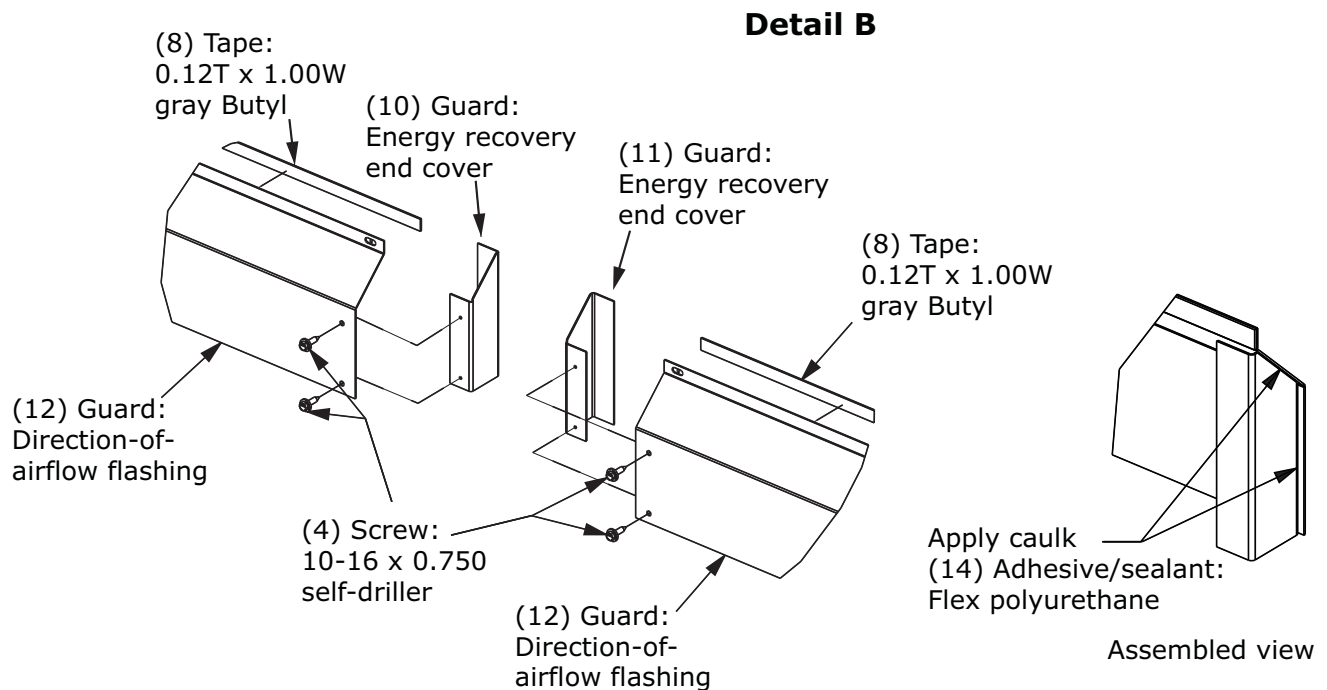
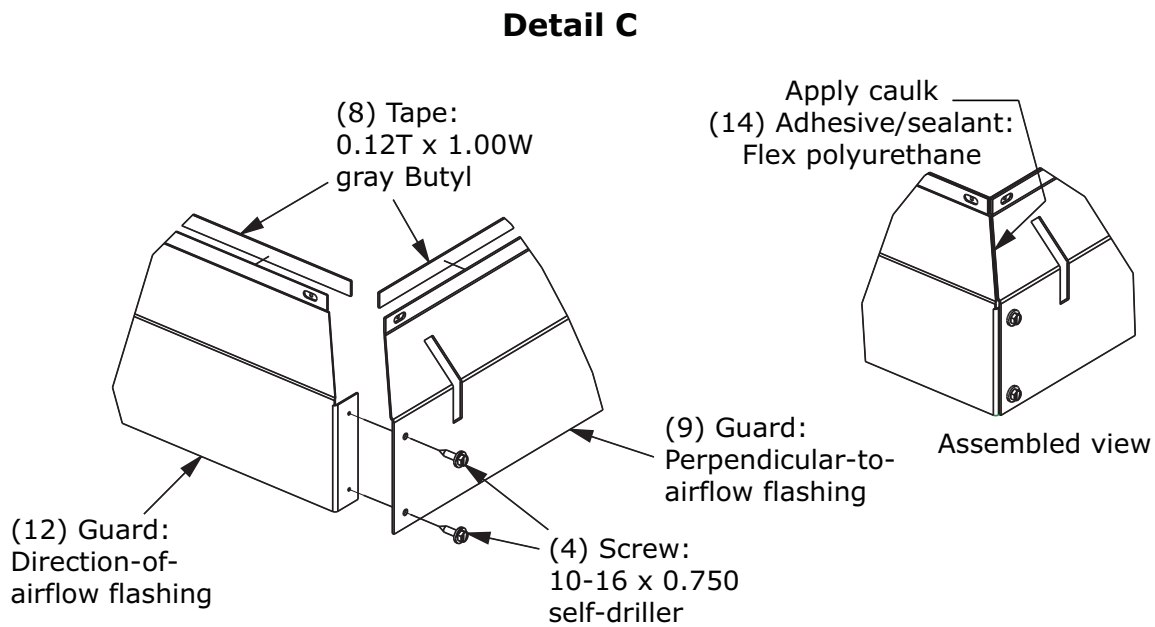
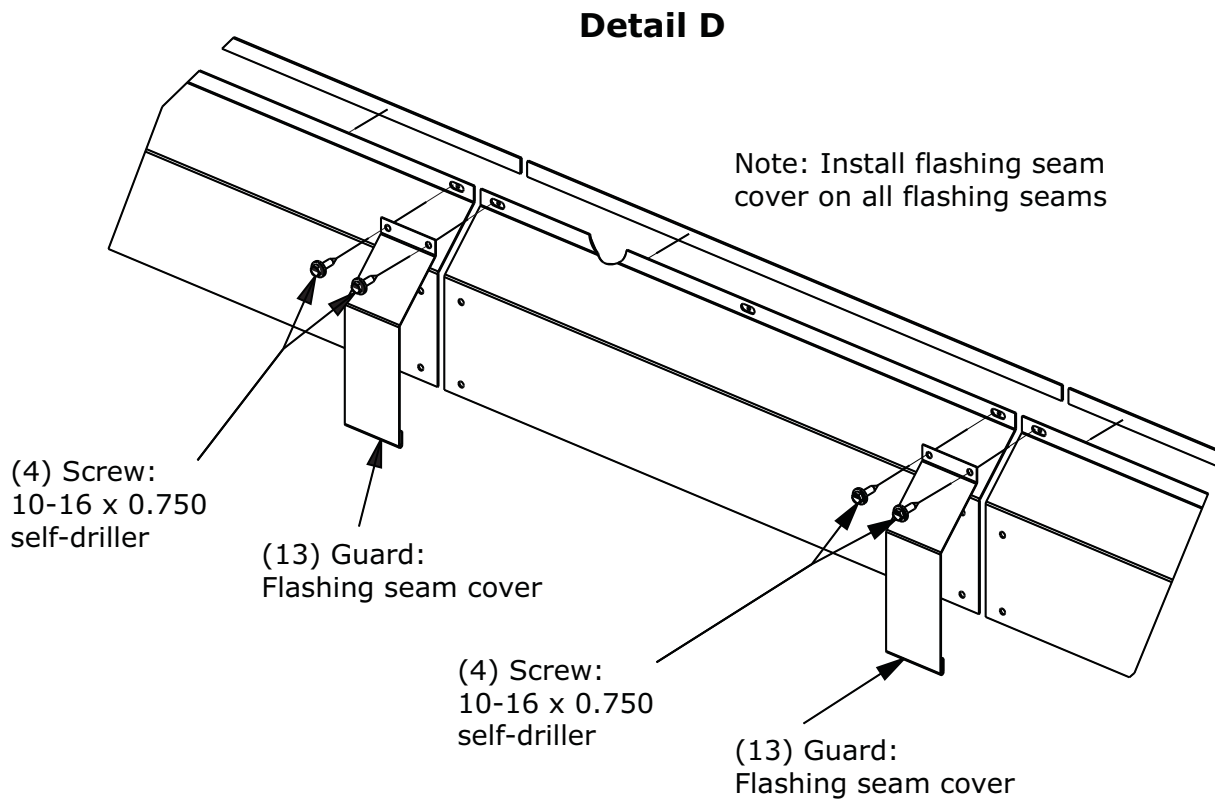
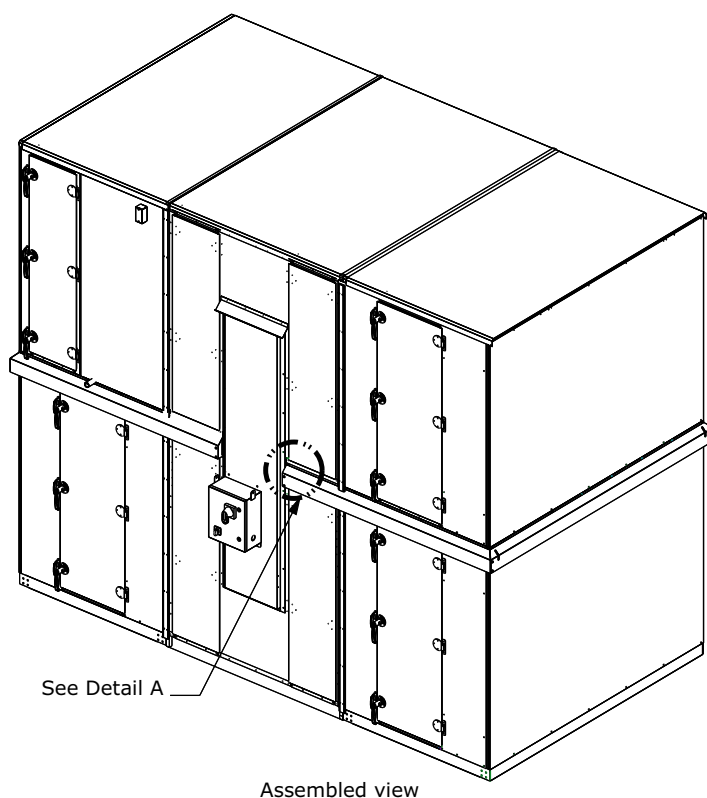
Figure 43. Flashing installation location

Figure 44. Flashing end cover installation applied to energy wheels and CDQ sections


Figure 45. Flashing for corner seams

Figure 46. Flashing seam cover installation


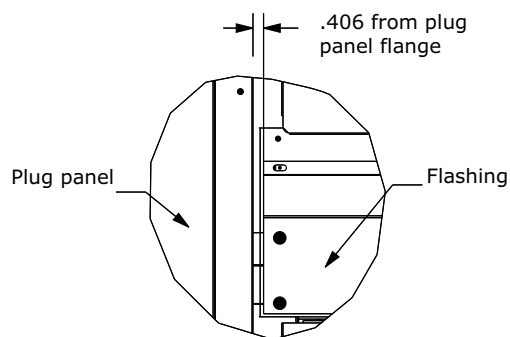
Flashing Installation Notes

- Side flashing will have locating features:
 - Right side front and back pieces will have two diamonds and a tab. Intermediate right side pieces (if present) will have two diamonds and length of part will match the ship group length and mounting holes will match hole pattern on the unit.
 - Left side front and back pieces will have one diamond and a tab. Intermediate left side pieces (if present) will have one diamond and length of part will match the ship group length and mounting holes will match hole pattern on the unit.
- Flashing runs full length on right/left sides of unit except on access side when an energy recovery section is present. For energy recovery section without full height doors, flashing will extend to removable plug panel. For energy recovery section with full height doors, flashing will be flush with edge of vertical seam caps (see Detail A in Figure 47).
- Flashing runs full length on front/back of unit. Front/back flashing will not have any locating features and will always have mitre (one piece will have two mitres, two pieces will have one mitre).

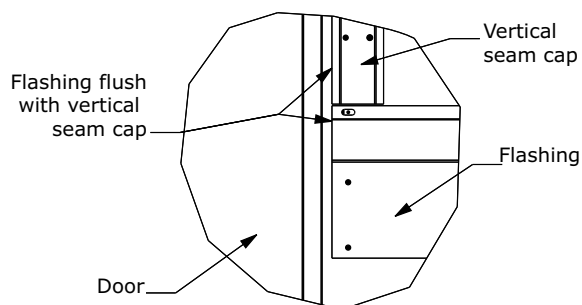
Figure 47. Side flashing installation



Detail A
without full height doors



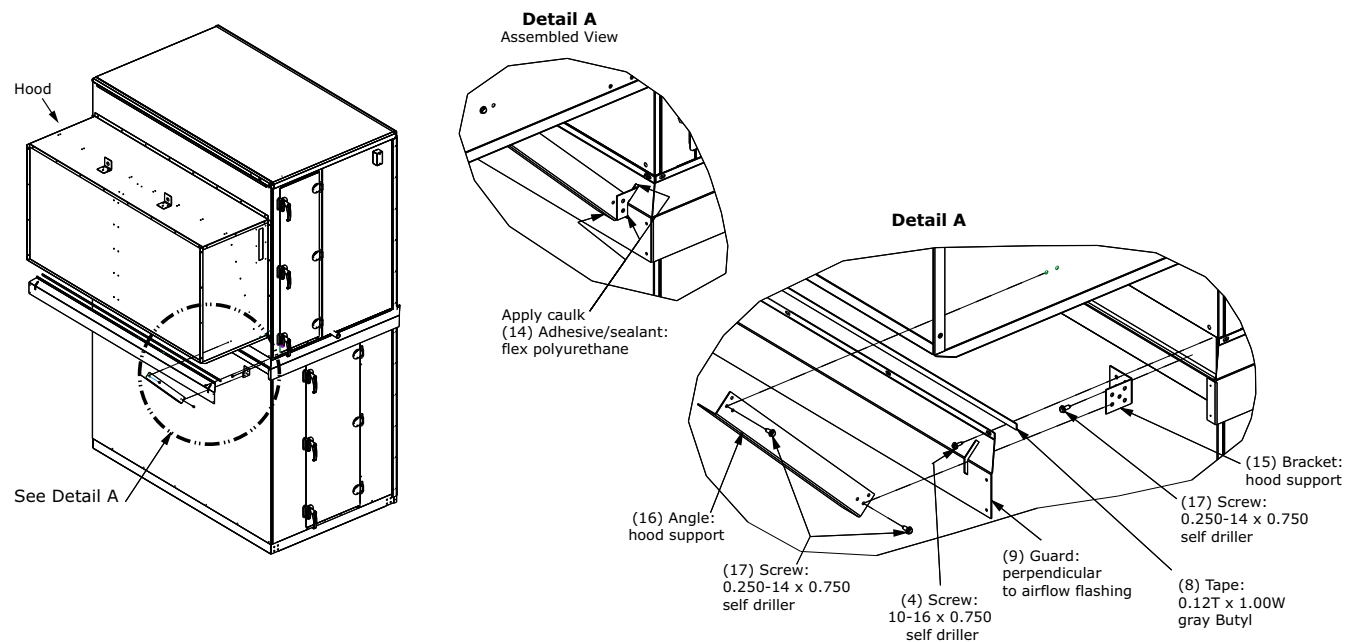
Detail A
with full height doors



Install flashing and hood

1. See [Figure 48](#). Secure two hood support brackets (Item 15) to base rail with screws (Item 17).
2. Apply Butyl tape (Item 8) to flashing (Item 9) and place over hood support brackets (Item 15) using cut in flashing and secure to base rails with screws (Item 4).
3. See ["Outdoor Unit Weather Hoods" on page 37](#) for hood installation instructions.
4. Secure hood support angles (Item 16) to hood support brackets (Item 15) and to the hood side panels with screws (Item 17).
5. Apply caulk (Item 14) around hood support bracket (Item 15), hood support angle (Item 16), and cutout in perpendicular-to-airflow flashing (Item 9) to ensure water-tight seal.

Figure 48. Stacked unit assembly



Indoor Dual-Path SDU/Winterizer Assembly

⚠ WARNING

Heavy Objects!

Do not stack air handlers unless factory-designed and factory-approved. When stacking units, factory-designed unit support brackets must be used. Stacking units without factory-approval and without factory-provided support brackets could result in the base unit collapsing under the weight of the top unit which could result in death or serious injury and property damage.

A dual-path, Split Dehumidification Unit (SDU)/winterizer air handler consists of two units that are stacked together in a draw-thru arrangement that share one supply fan. The unit on the first level (primary unit) is designed to handle the return air and is larger than the unit on the second level (secondary unit), which is designed to handle outside air.

Factory-designed unit support brackets are provided with all factory-approved, dual-path SDUs or winterizer air handlers.

- A horizontal SDU/winterizer dual-path air handler incorporates a horizontal supply fan on the first level with a top opening in the primary unit that aligns with a bottom opening in the secondary unit.
- A vertical SDU/winterizer dual-path air handler incorporates a vertical supply fan on the second level with a back opening that aligns with a front opening in the secondary unit.

To assemble air handlers utilizing factory-approved and factory-provided dissimilar unit sizes for horizontal SDU or winterizer applications, join all similar size shipping sections per [“Section-to-Section Assembly” on page 28](#).

Horizontal SDU/Winterizer Assembly

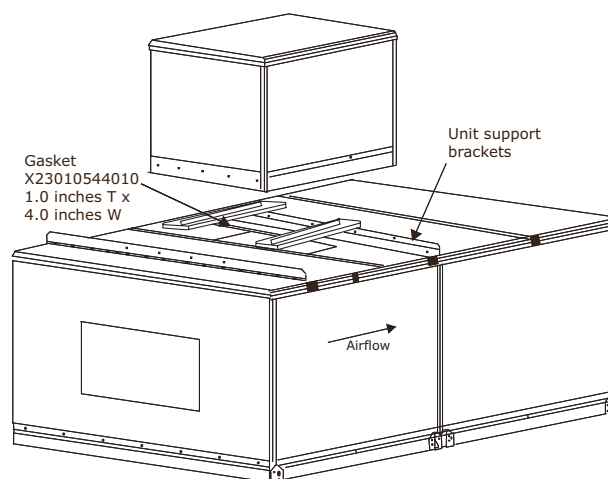
To assemble dissimilar unit sizes for an indoor horizontal SDU/winterizer configuration:

1. Locate the mounting hardware and gasket material.

Note: Black unit support brackets ship pre-installed on the primary (larger) unit section.

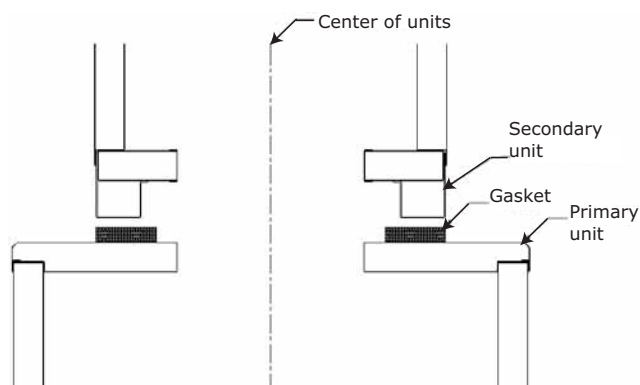
2. Apply gasket in direction of airflow between the black unit support brackets to the roof of the primary unit. See [Figure 49](#). The gasket needs to be placed such that it will be directly under the integral base frame of the secondary (smaller) unit to be stacked on top. The secondary unit will be centered along the width on the primary unit.

Figure 49. Apply gasket in direction of airflow



3. If there is an opening in the roof of the primary unit, apply gasket perpendicular to airflow on the roof next to the opening (air entering side only).
4. Lift the secondary unit, following instructions in [“General Lifting Considerations” on page 23](#) (see [Figure 14](#)), and place on the black unit support brackets (see [Figure 50](#)). The secondary unit must be centered on the primary unit between the black unit support brackets.

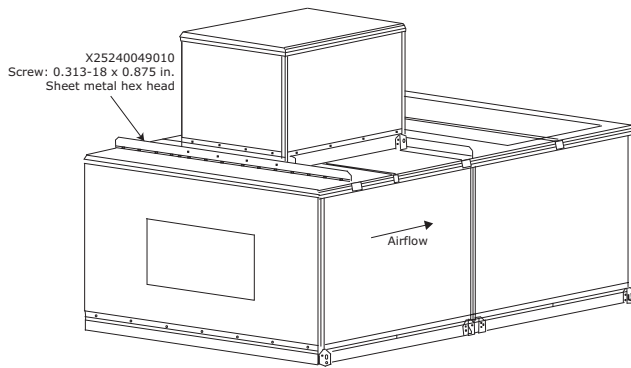
Figure 50. Place secondary unit on black unit support brackets.



Installation - Mechanical

5. Install screws as shown in [Figure 51](#) inserting the appropriate screws using a powered impact gun and taking care not to strip the screws.
6. Remove the secondary unit lifting lugs one at a time and reinstall screws after sections are set in final position.

Figure 51. Install screws using powered impact gun.

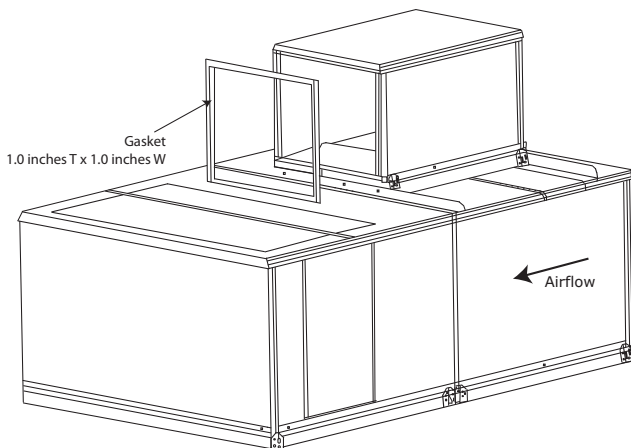


Vertical SDU/Winterizer Assembly

To assemble dissimilar unit sizes for an indoor vertical SDU/winterizer configuration:

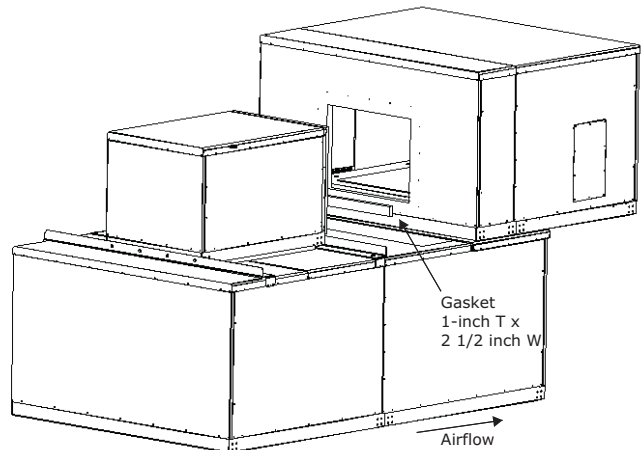
1. Apply gasketing to the mating surface of the secondary unit (see [Figure 52](#)).

Figure 52. Apply gasketing to mating surface of secondary unit



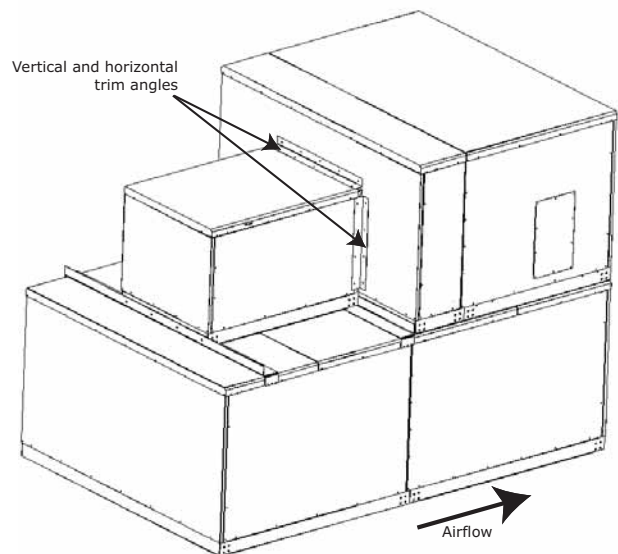
2. Apply gasketing to the mating surface of the primary unit at the bottom of the opening (see [Figure 53](#)).

Figure 53. Apply gasketing to the mating surface of the primary unit.



3. Lift the secondary unit, follow instructions in ["General Lifting Considerations"](#) on page 23 (see [Figure 14](#)), and place on the black unit support brackets (see [Figure 50, p. 45](#)). The secondary unit must be centered on the primary unit between the black unit support brackets.
4. Install trim angles as shown in [Figure 54](#) inserting the 10-16 x 3/4-inch self-drilling screws using a powered impact gun and taking care not to strip the screws.

Figure 54. Install trim angles



External Raceway Assembly

For air handling units with factory-installed power wiring extending from the first level to the second level, wiring must be connected and assembled in a raceway. See [Figure 55](#).

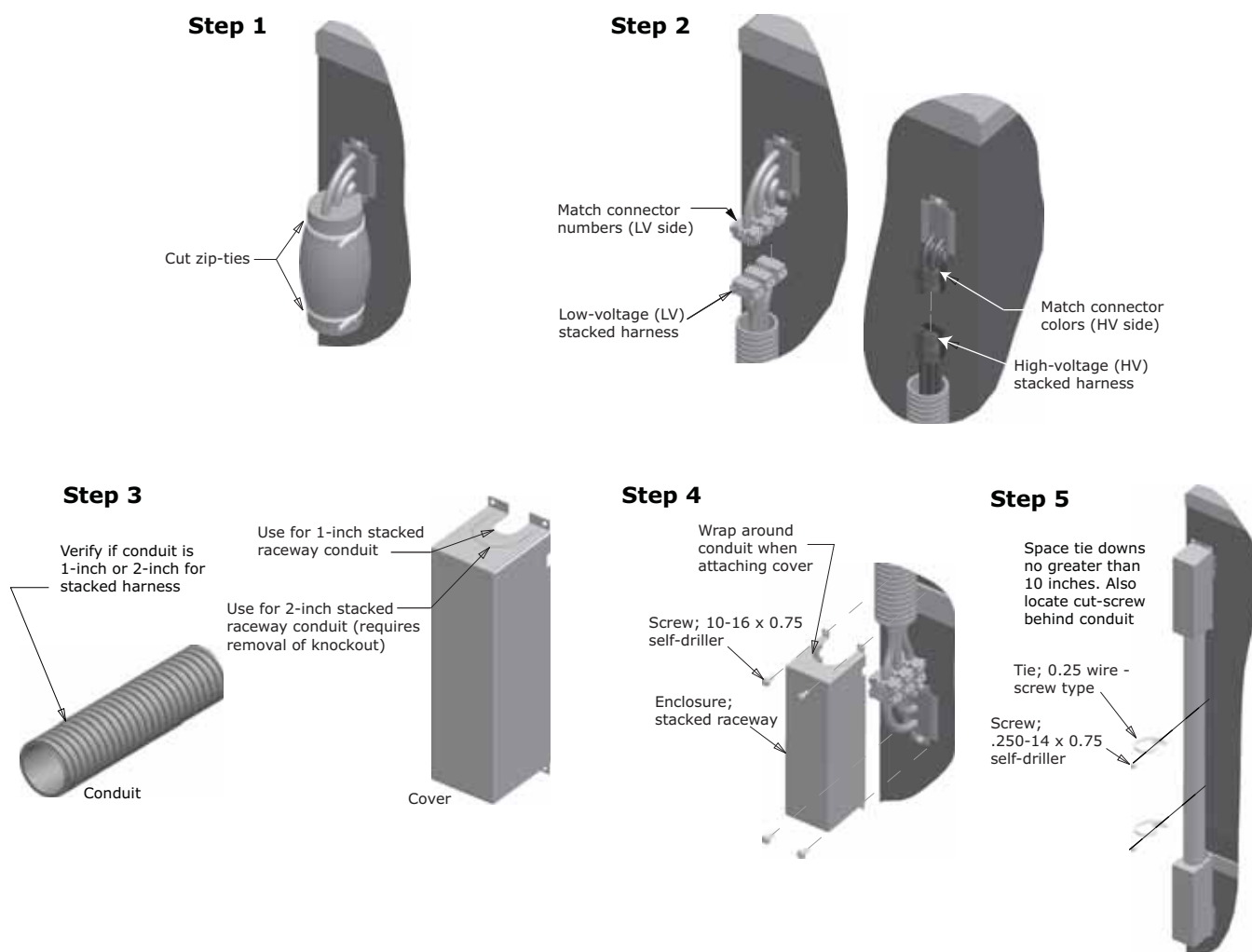
1. Cut zip ties. Remove protective foam cover from connectors.
2. Attach stacked raceway harness connectors, matching connector colors on the high voltage side and connector numbers on the low voltage side.
3. Verify conduit size.

Figure 55. External raceway

4. Attach covers.
5. Secure conduit.

Part numbers:

- Indoor
 - External Raceway Kit: KIT09713
- Outdoor
 - External Raceway Kit - Top: KIT16191
 - External Raceway Kit - Bottom: KIT16192



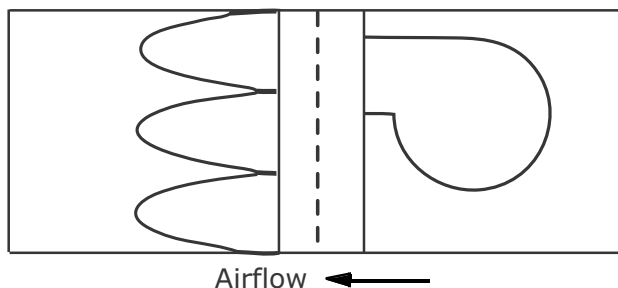
Component Installation Requirements

The components in the air handler may have installation requirements that could affect the unit's performance.

Diffuser Section

Diffuser sections are usually placed between a fan and a downstream coil or filter. Because placement is critical to unit performance, verify the correct placement of the diffuser section before assembling the unit (see [Figure 56](#)).

Figure 56. Diffuser placement sizes 3 to 120



Filter Section

Bag and cartridge filter sections can be used as a pre-filter section, a final filter section, or both. This use is determined by the filter's placement in relation to the fan.

- A final filter is placed after the fan.
- A pre-filter is placed before the fan.

Note: Cartridge and bag filters provided by Trane are fitted with a 7/8-inch header that fits in the filter track. If using filters supplied by another manufacturer, filters should be purchased with a 7/8-inch header. In some cases it may be necessary to gasket other manufacturers' filters to ensure a good air seal.

Filters should be installed when the unit is set. This will protect internal components, such as the heating and cooling coils.

Final Filter Section

A final filter section should not be bolted directly to the face of a fan section. One or more intermediate sections must be placed between the fan discharge and the filter section.

Pre-Filter Section

A pre-filter section has no special installation requirements unless placed directly upstream of a plenum fan. In these configurations, ensure a blank section is placed between the fan inlet and the filter section.

Trane recommends the use of disposable pre-filters with high-efficiency filters. Disposable pre-filters slide into the mounting tracks just ahead of the bag/cartridge filters.

Filter Installation

⚠ WARNING

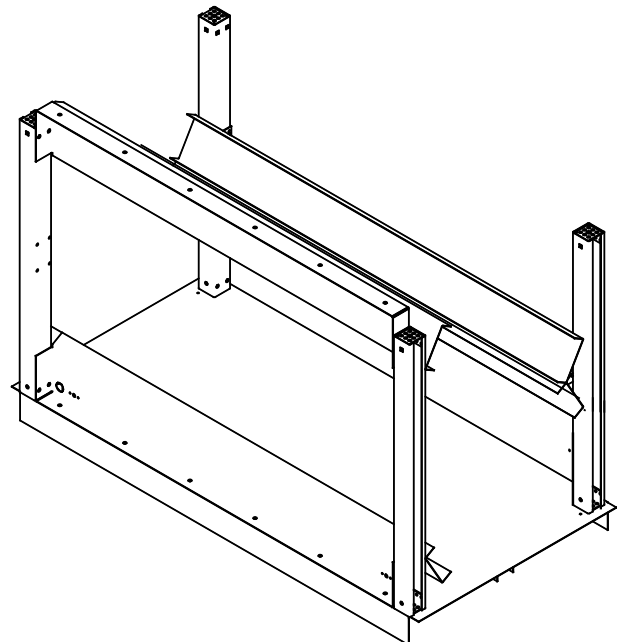
Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

To install filters:

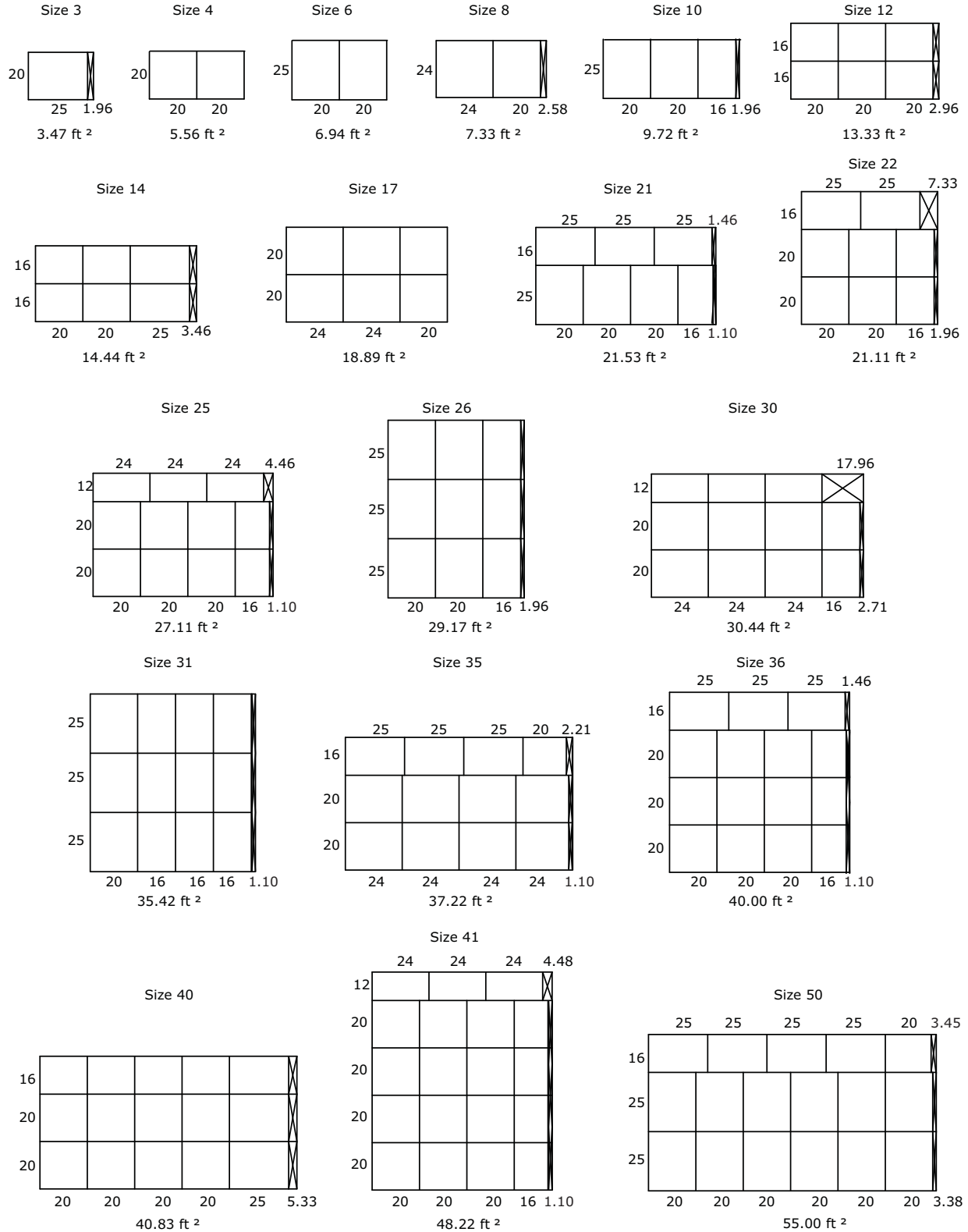
1. Disconnect the power to the unit.
 2. Open the filter section access door.
 3. Slide the filters into the tracks.
- Note: Bag filters must be installed with the pleats in the vertical plane.*
4. The block-off is permanently installed and will create a seal when the access door is closed.
 5. Close the access door slowly to allow any gasketing to compress.

Figure 57. Filter block-off placement



Filter Placement

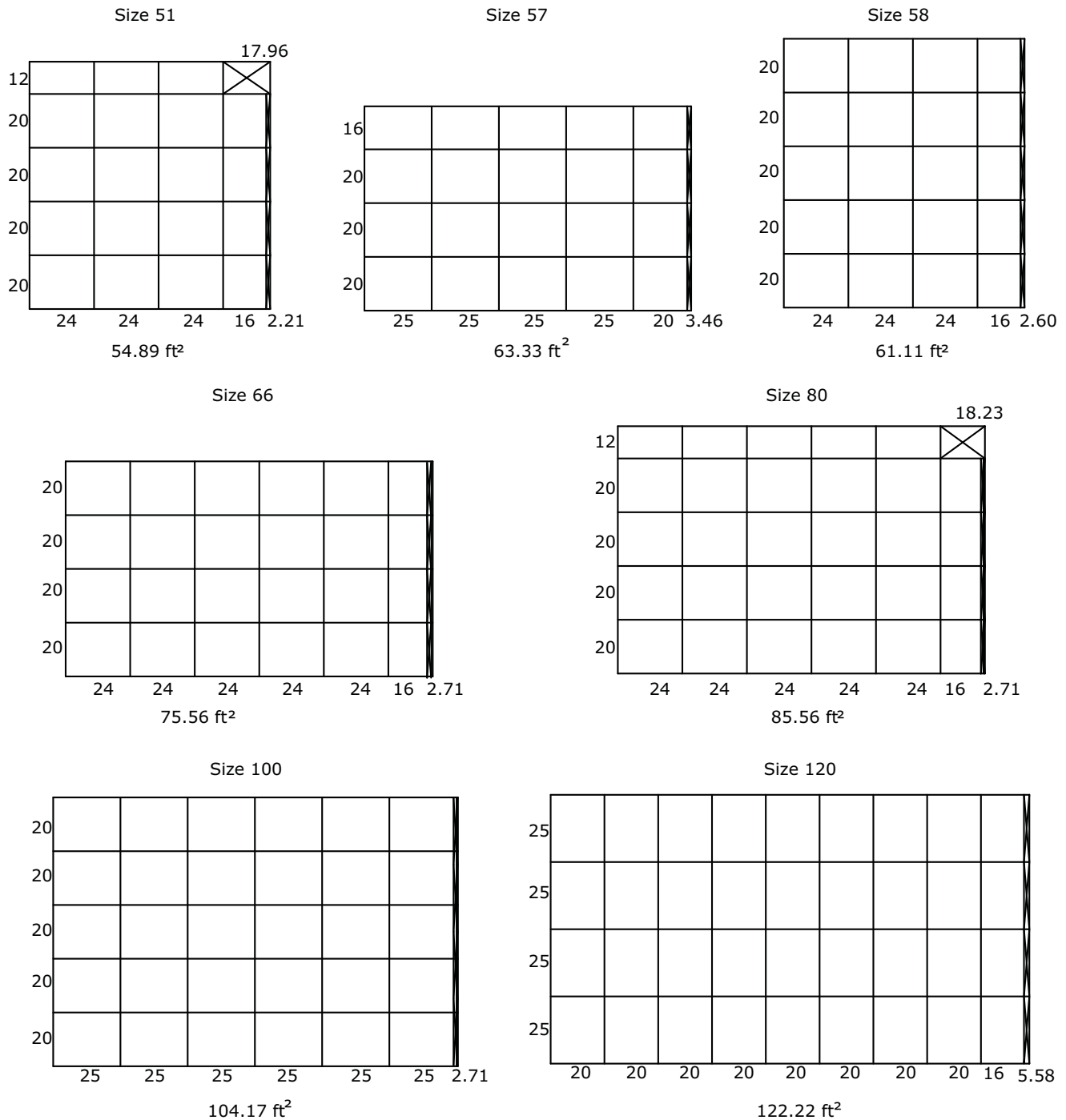
Figure 58. 2-inch and 4-inch flat filter placement for unit sizes 3-50 - side loading





Component Installation Requirements

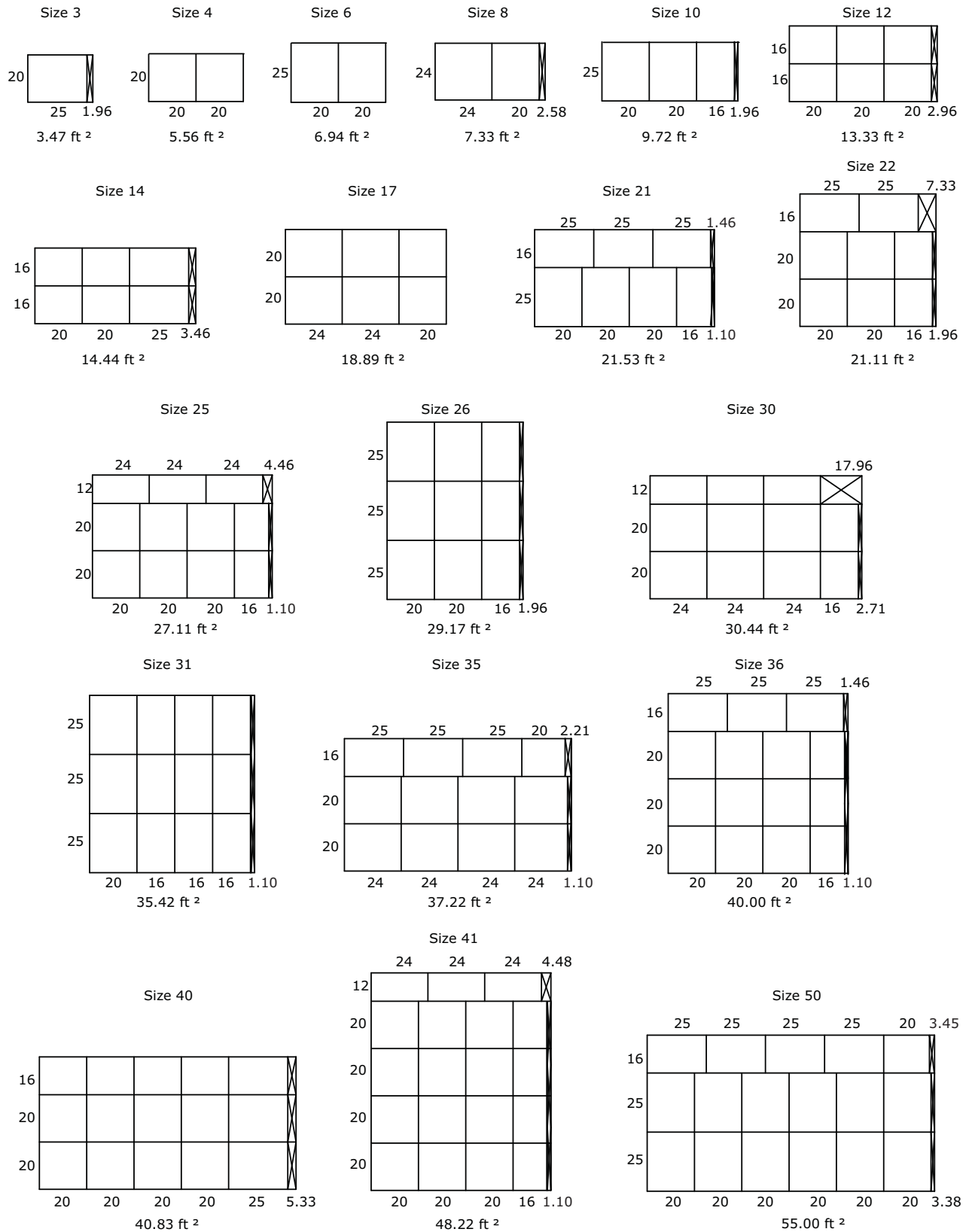
Figure 59. 2-inch and 4-inch flat filter placement for unit sizes 51-120 - side loading



Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

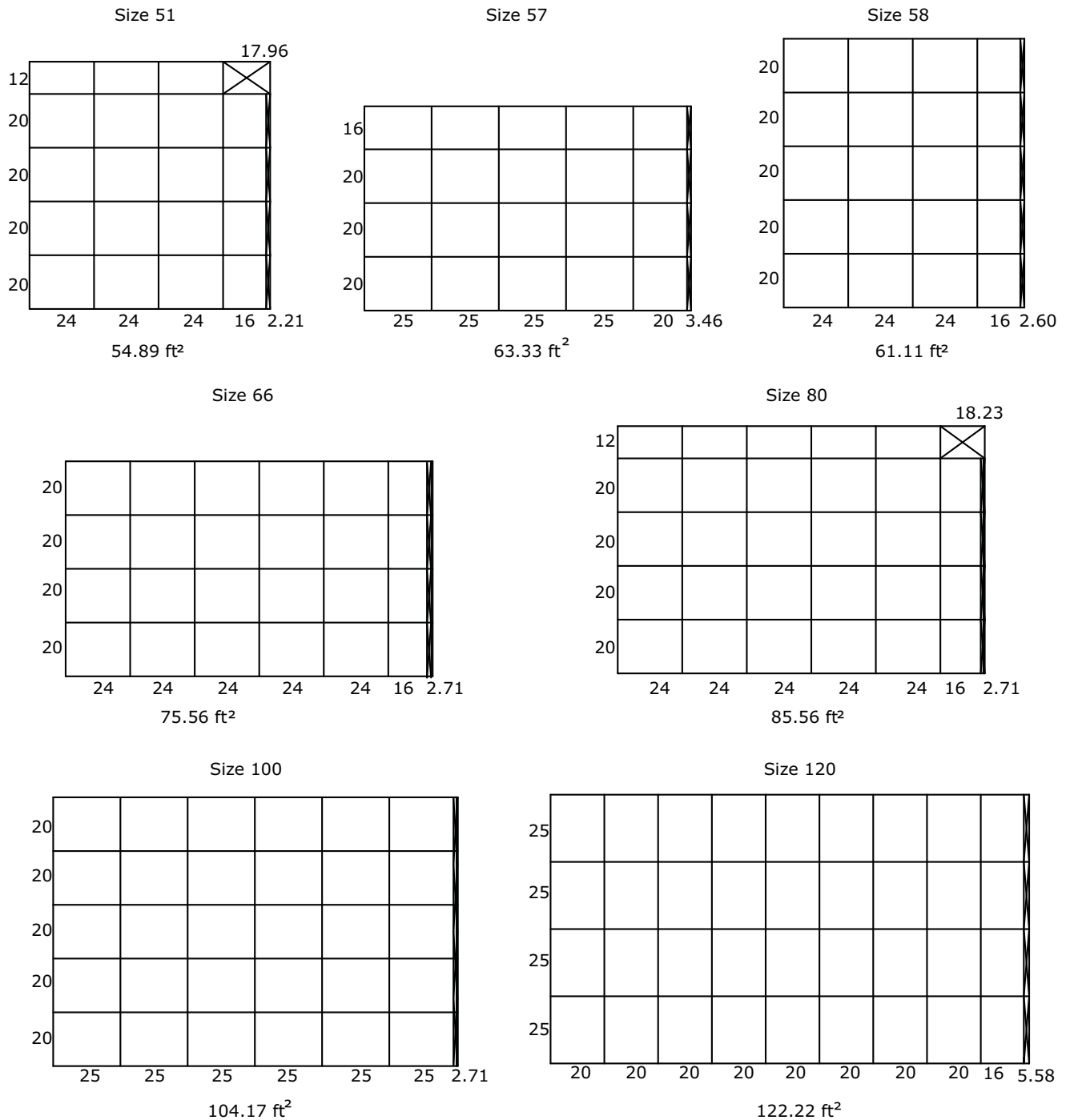
Component Installation Requirements

Figure 60. 2-inch/4-inch combination flat filter placement for unit sizes 3-50 - side loading



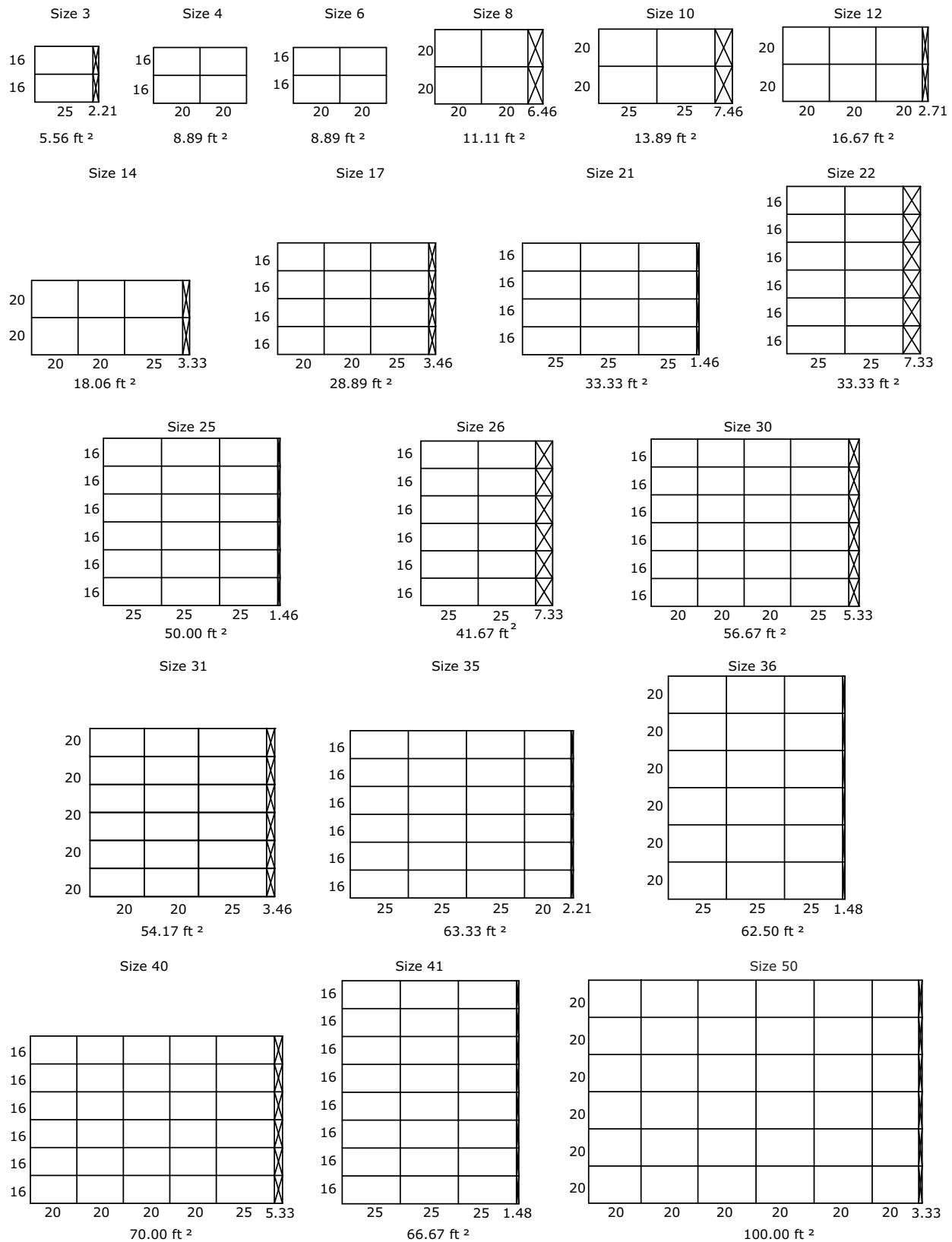
Component Installation Requirements

Figure 61. 2-inch/4-inch combination flat filter placement for unit sizes 51-120 - side loading



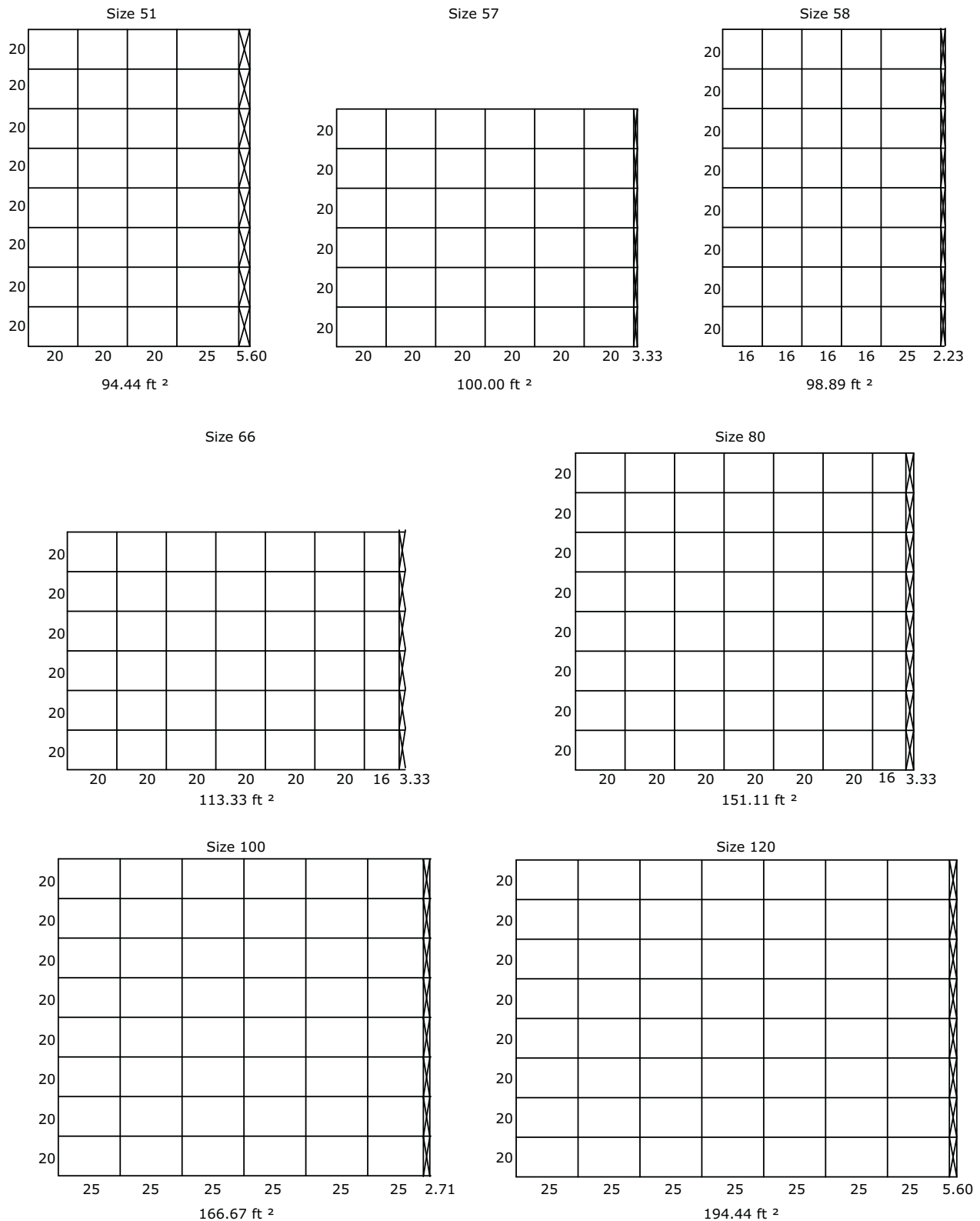
Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

Figure 62. 2-inch and 4-inch angled filter placement for unit sizes 3-50 - side loading



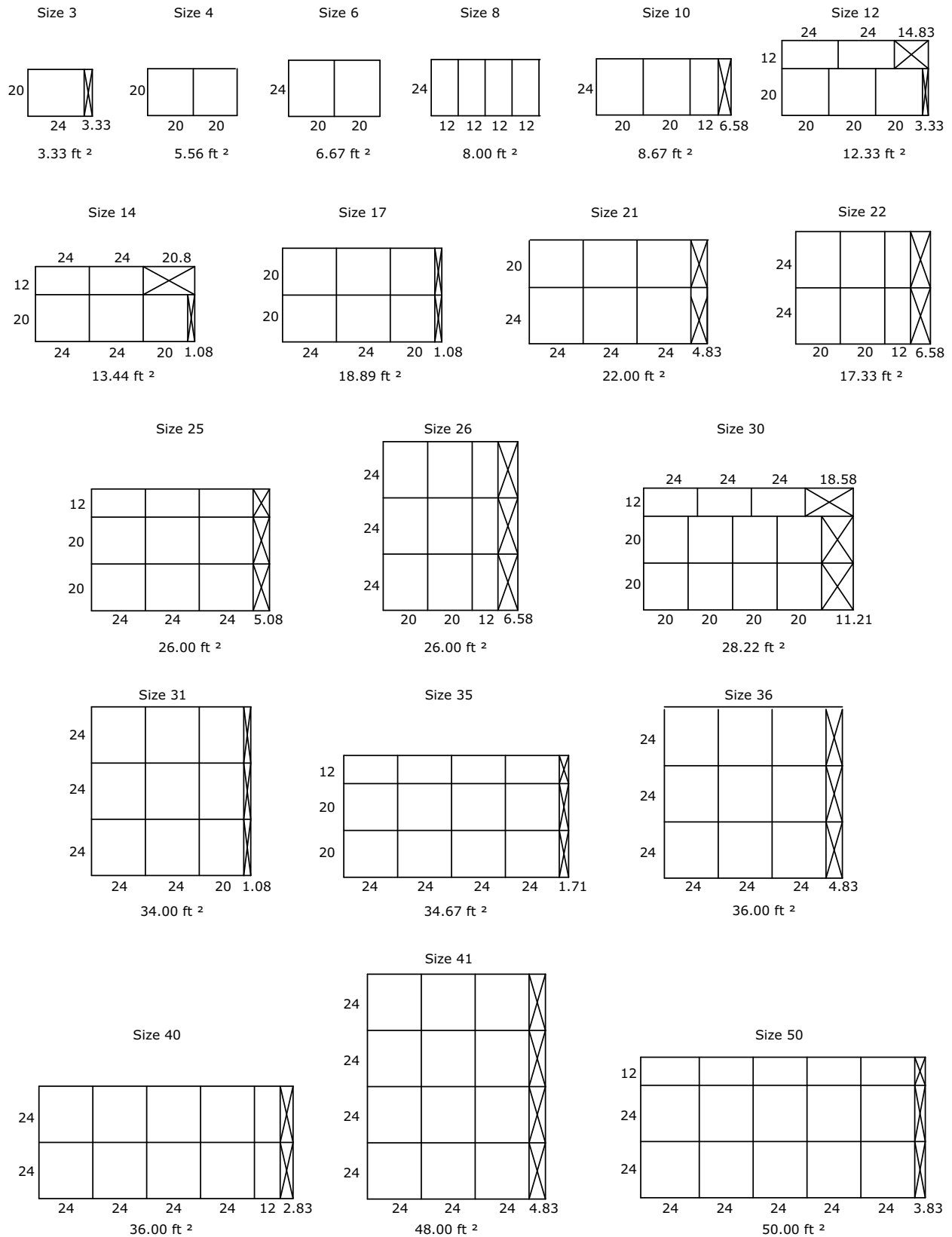
Component Installation Requirements

Figure 63. 2-inch and 4-inch angled filter placement for unit sizes 51-120 - side loading



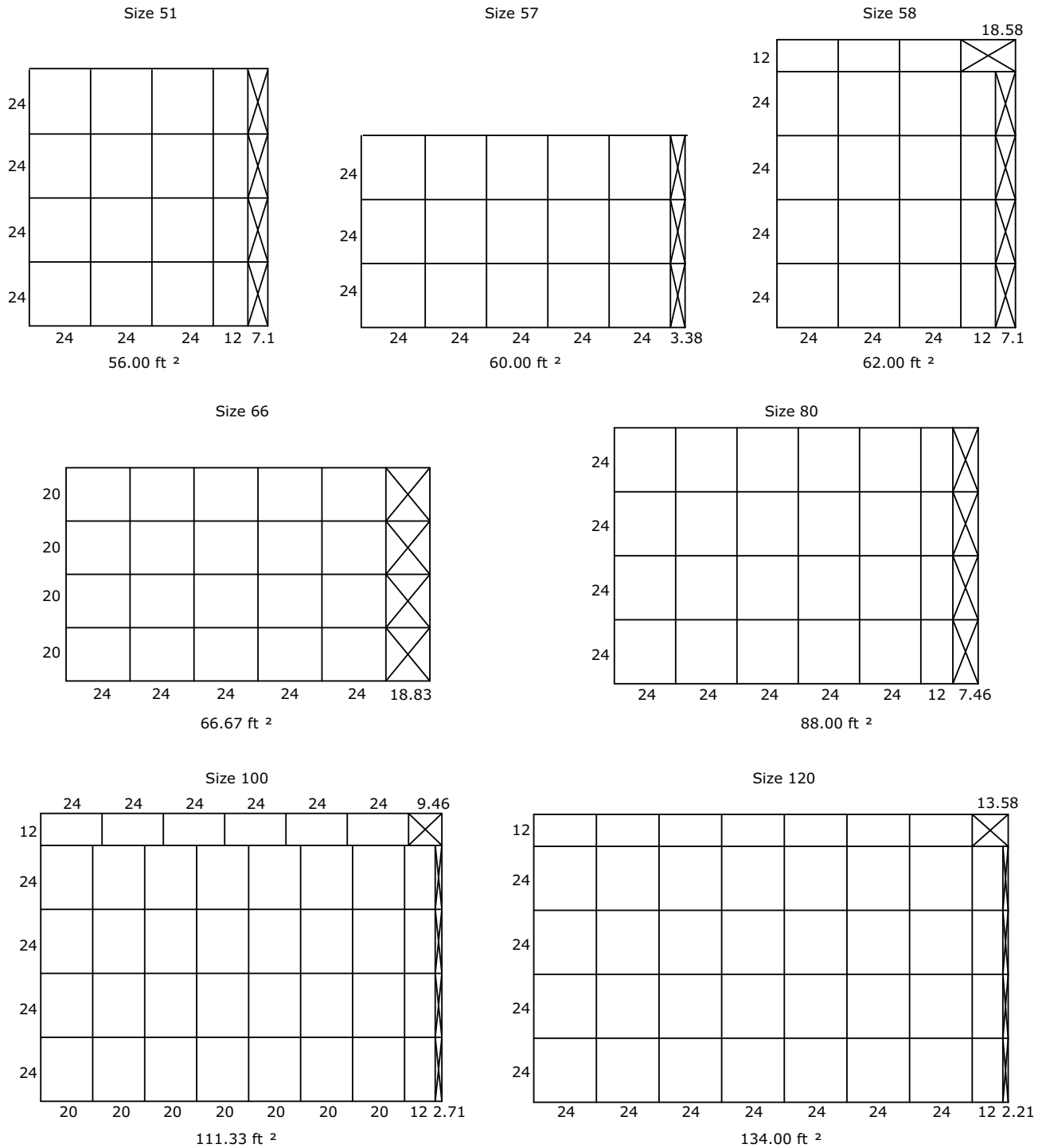
Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

Figure 64. Long bag filter placement for unit sizes 3-50 - side loading



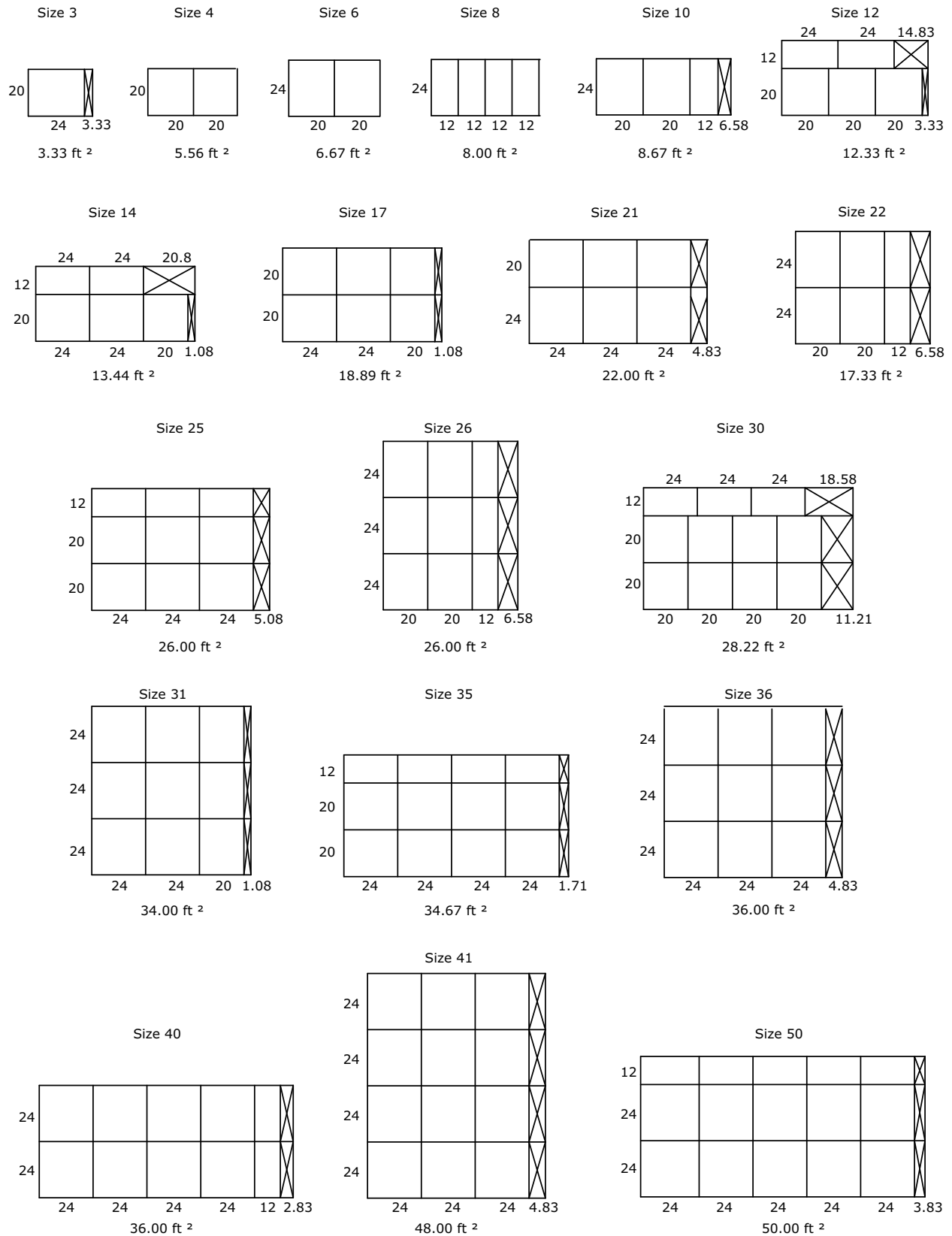
Component Installation Requirements

Figure 65. Long bag filter placement for unit sizes 57-120 - side loading



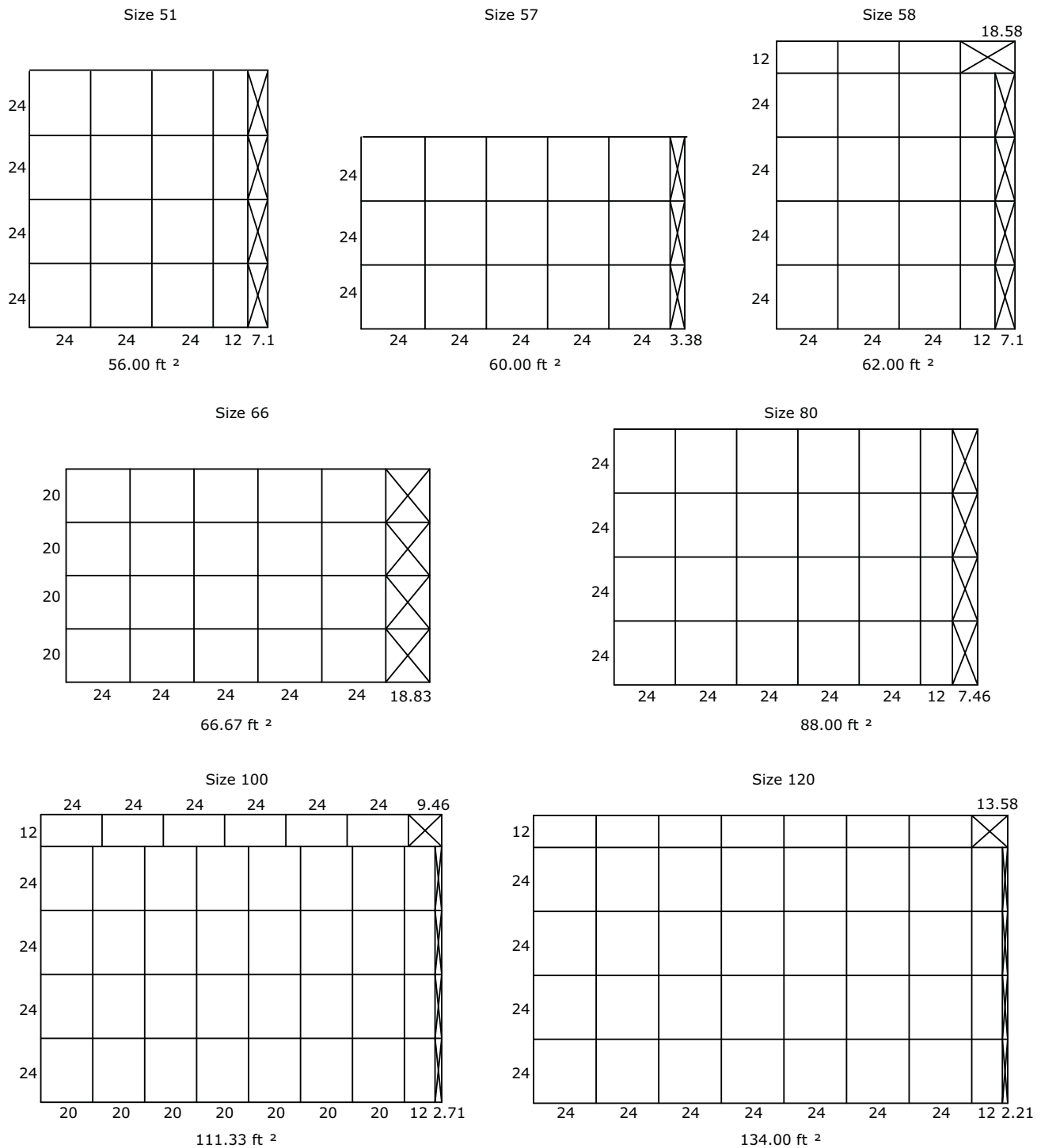
Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

Figure 66. Short bag filter placement for unit sizes 3-50 - side loading



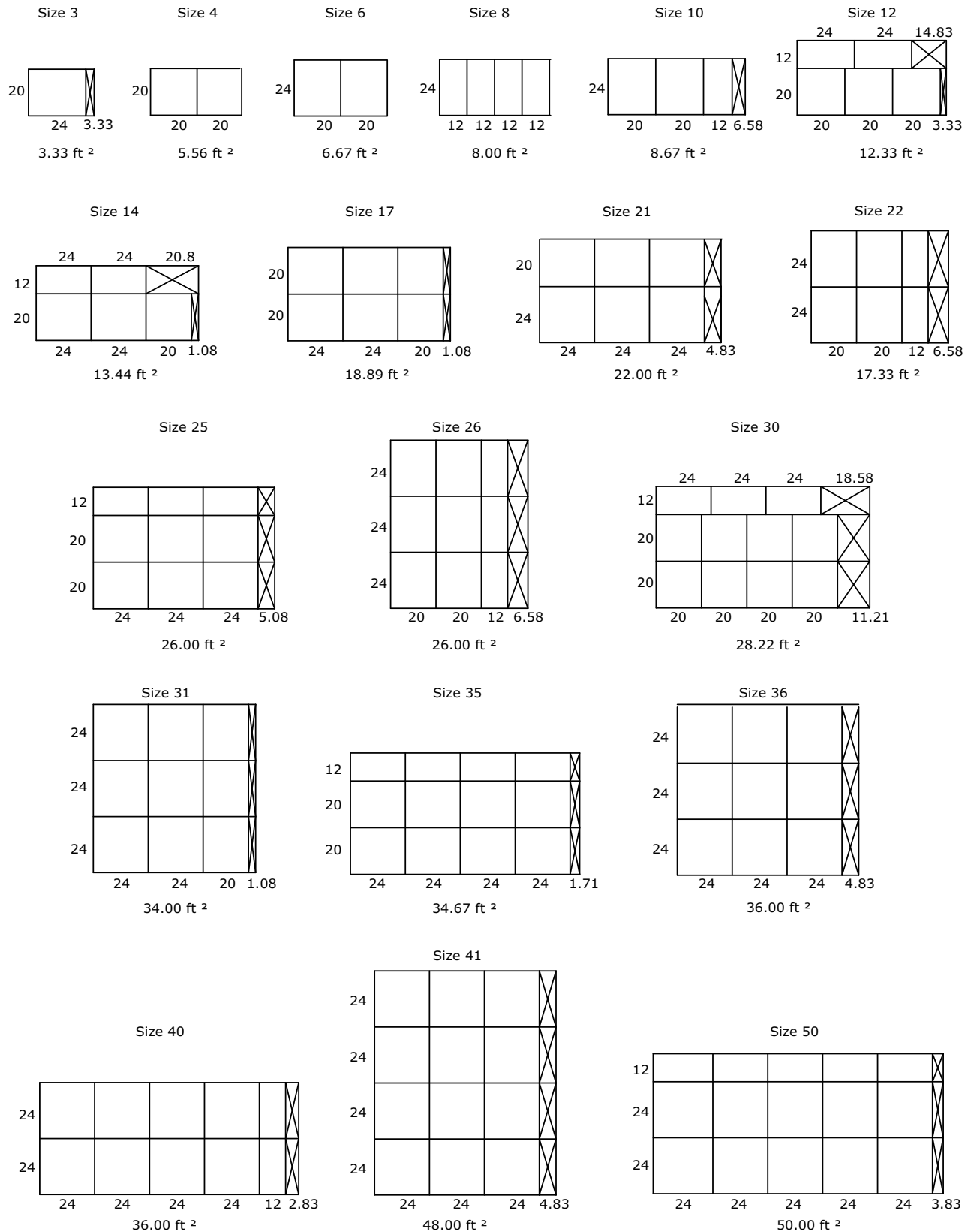
Component Installation Requirements

Figure 67. Short bag filter placement for unit sizes 51-120 - side loading



Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

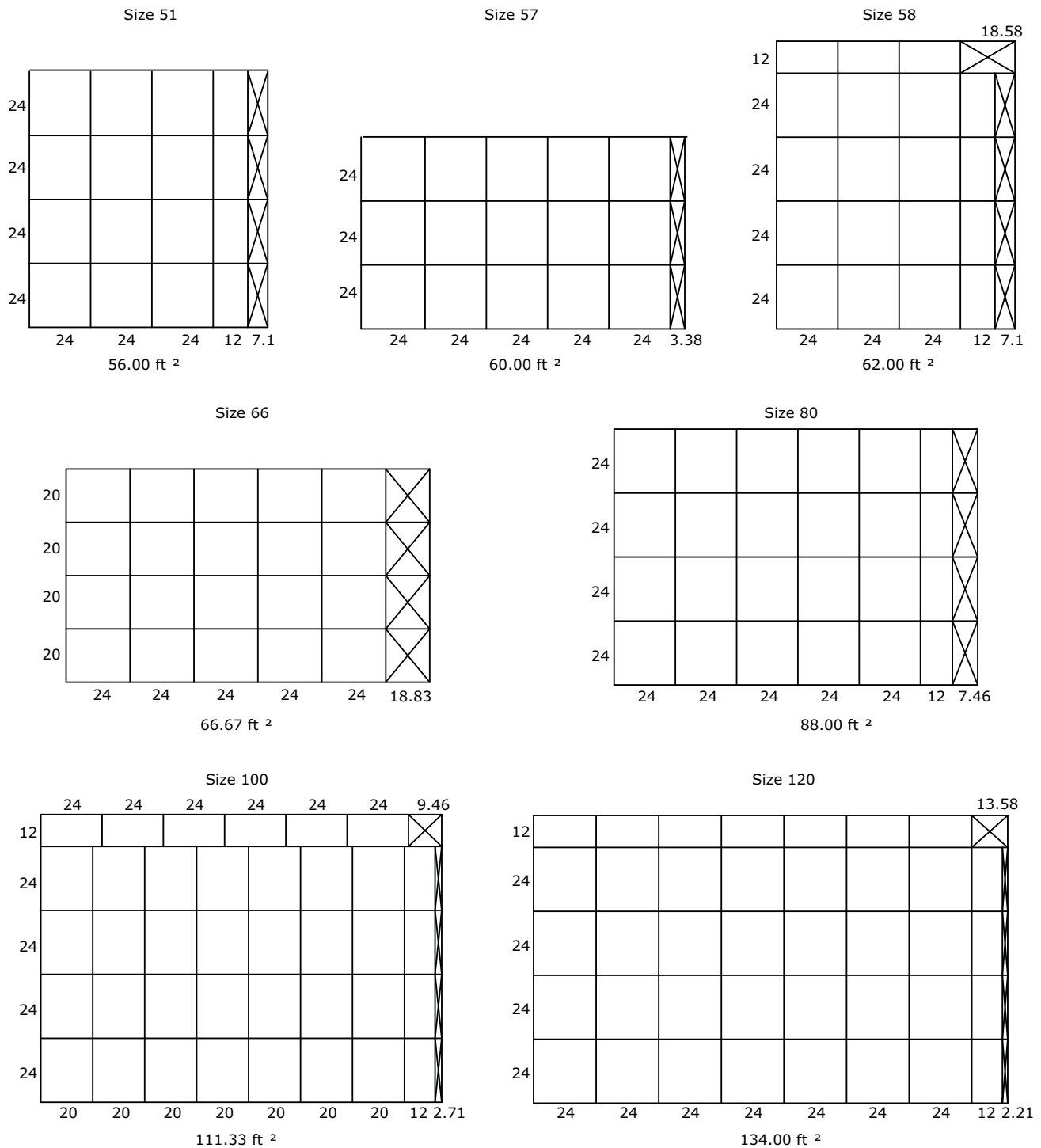
Figure 68. Cartridge filter placement for unit sizes 3-50 - side loading





Component Installation Requirements

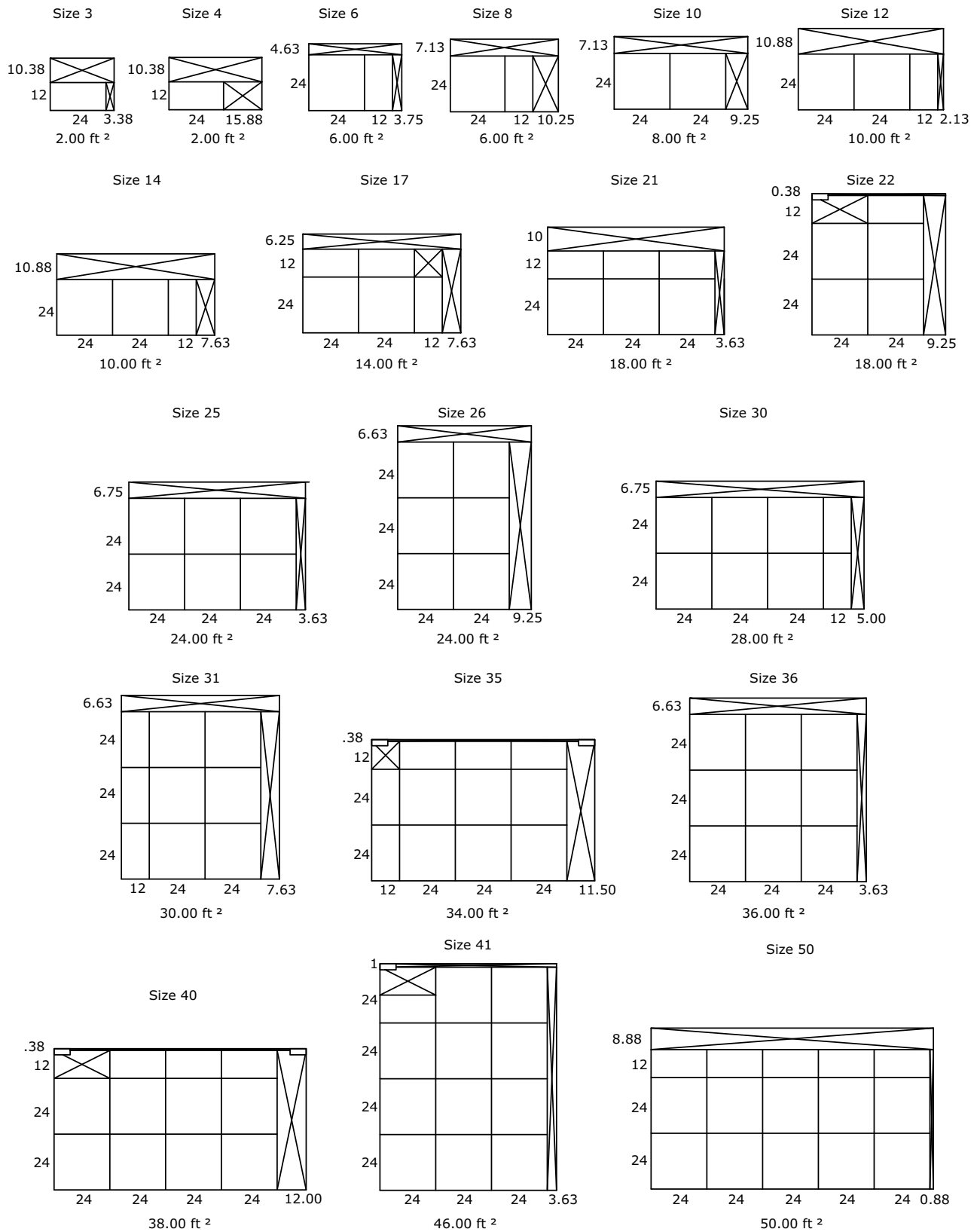
Figure 69. Cartridge filter placement for unit sizes 51-120 - side loading



Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

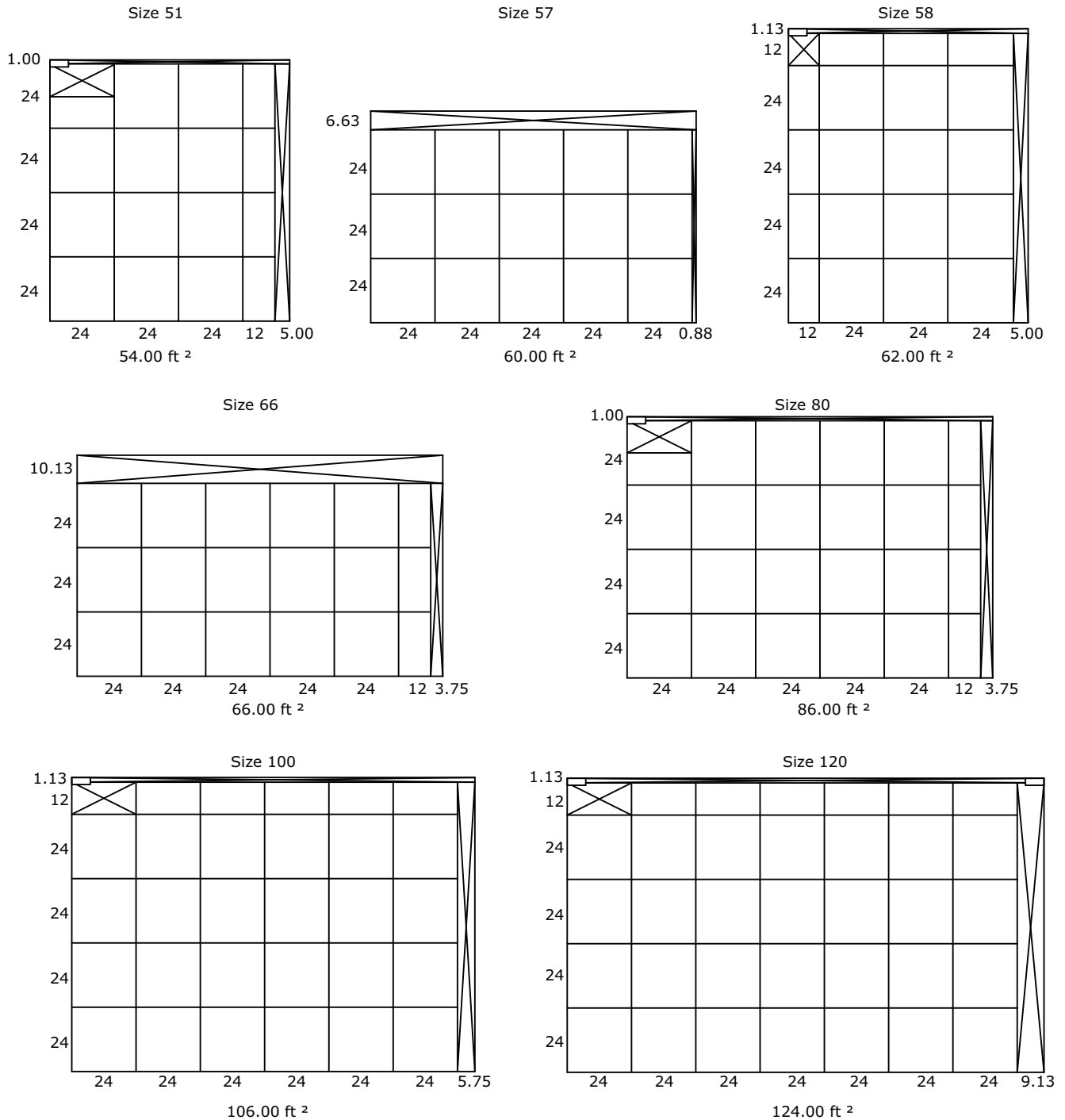
Component Installation Requirements

Figure 70. Bag and cartridge filter placement for unit sizes 3-50 - front loading



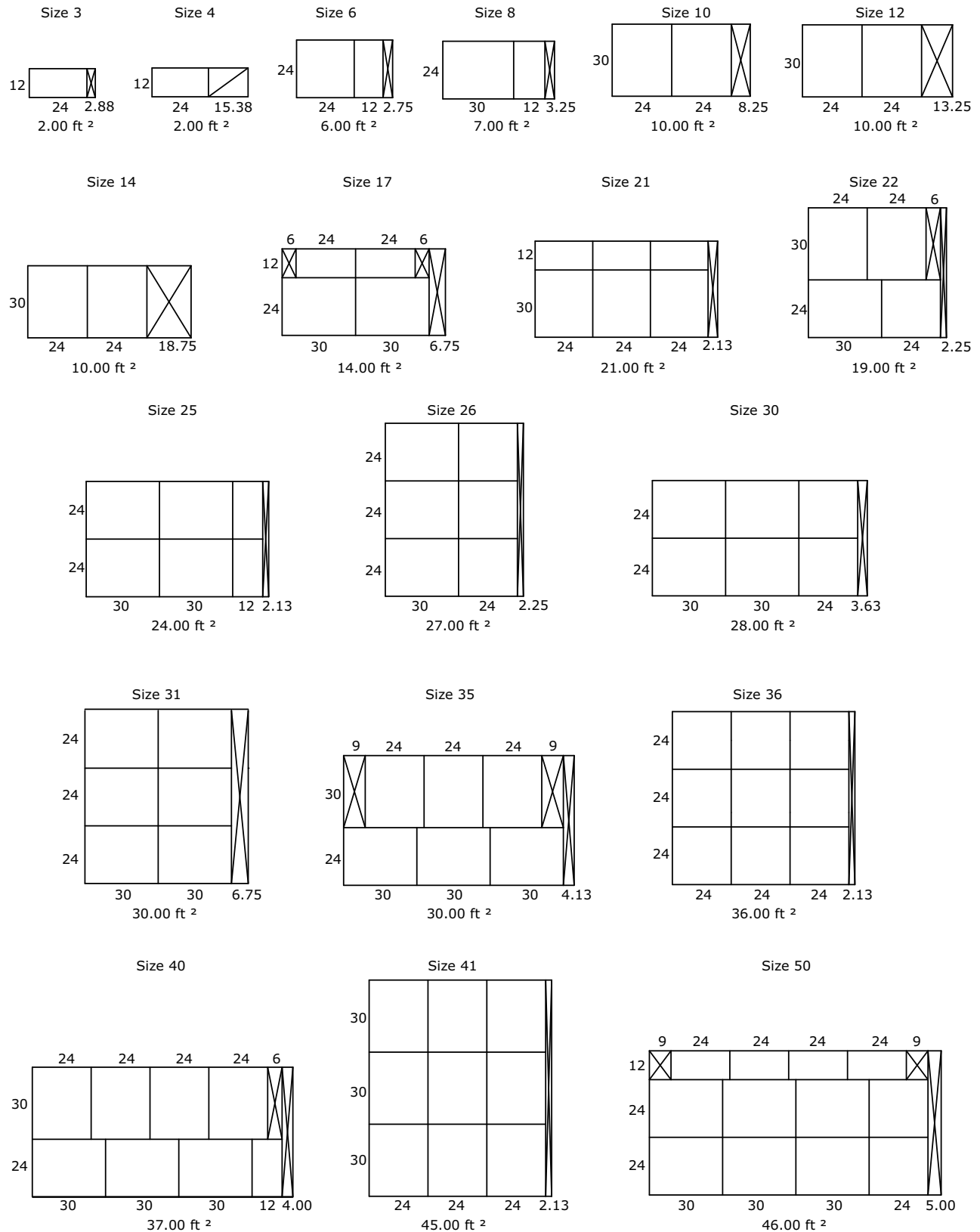
Component Installation Requirements

Figure 71. Bag and cartridge filter placement for unit sizes 51-120 - front loading



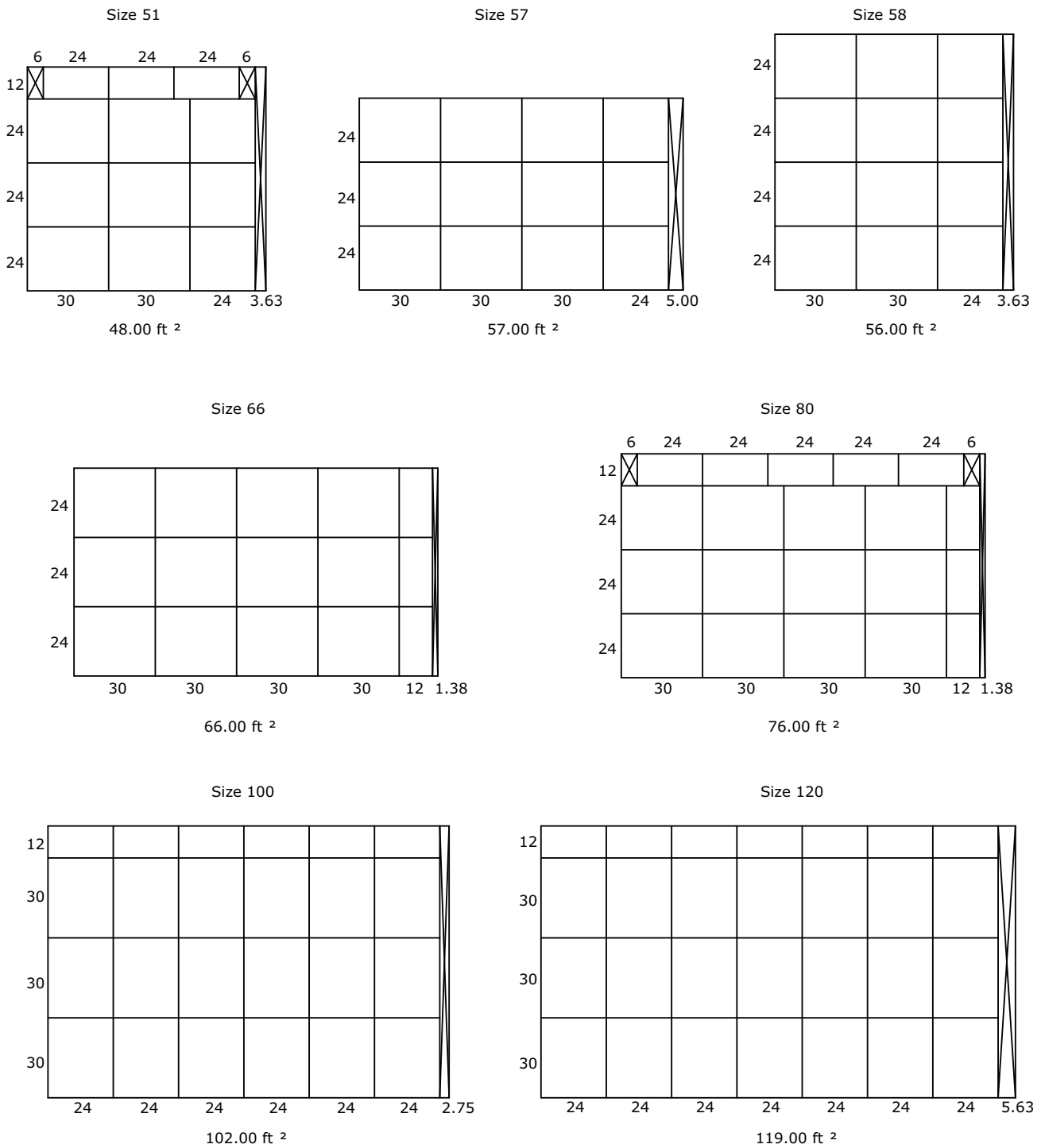
Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

Figure 72. HEPA filter placement for unit size 3-50 - front loading



Component Installation Requirements

Figure 73. HEPA filter placement for unit size 57-120 - front loading



Filter racks have a 1.5 ft T x 1.0 ft W gasket (X23010565010) applied to blockoff.

Fan Section

The fan section can be configured as either draw-thru or blow-thru. Review the submittals and unit tagging information prior to assembly to determine placement.

⚠ WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.

Fan Isolation

The fan-and-motor assembly is internally isolated. The fan and motor bases are bolted to a minimum of four spring

isolators. The isolators are secured to the fan section support base.

Shipping tie-down bolts are bolted adjacent to the isolators between the fan isolation base and the isolator support frame. The shipping tie-downs secure the isolation base to the support assembly to prevent any damage to the fan section during shipment.

*Note: Remove the tie-downs **only** if the factory-provided isolation is to be used.*

Adjusting the Isolators

Once the shipping tie-downs are removed and the internal isolation is released, it may be necessary to adjust the isolators to achieve the proper operation height of the fan and motor isolation base.

Minimum required clearances are listed in [Table 11](#). To determine the isolator clearances on all unit sizes, measure between the top of the cabinet channel and the bottom of the isolation base channel. See [Figure 74](#), [Figure 75](#), [Figure 76](#), and [Figure 77](#).

Table 11. Minimum isolator clearances (inches)

Unit Size	Fan Type	Required Clearance
3-8	FC, BC, Plenum	1.0
10-31	FC, AF, Plenum	0.5
35-58	FC, AF, Plenum	0.5
66-120	FC, AF, Plenum	1.0

Figure 74. Isolator adjustment for unit sizes 10-30

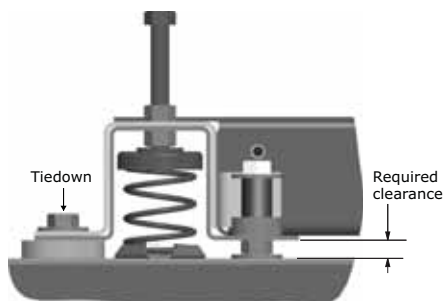


Figure 76. Isolator adjustment for unit sizes 66-120

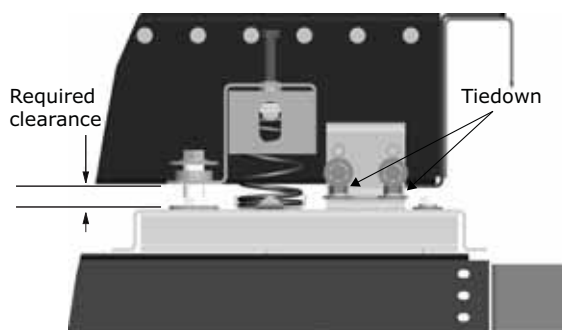


Figure 75. Isolator adjustment for unit sizes 10-30

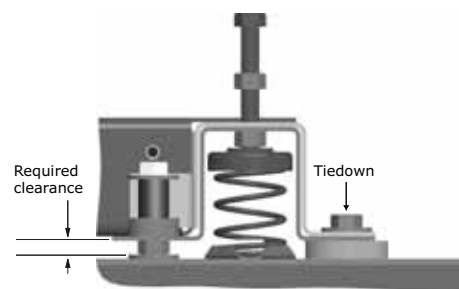
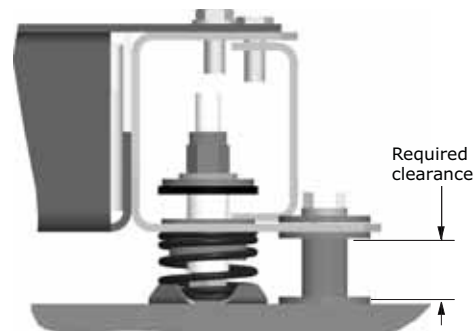


Figure 77. Belt-drive plenum fan isolator adjustment size 3-8



Seismic Application Requirements

Air handling equipment manufactured by Trane is capable of structurally and operationally withstanding the seismic response criteria as required by the International Building Codes (IBC) 2000, 2003, 2006, 2009. Trane has third-party certification for IBC compliance for seismic applications for unit sizes 3-30. Certification for larger sizes is in process.

Note: If seismic isolation has been specified, the following requirements must be adhered to for installation. Failure to follow these instructions would void the warranty.

Anchor Requirements

Single Level Design Break - Size 3-120 Grade to Roof Mounted ($0 \leq S_d \leq 1.85$) Non-Isolated

4000 psi concrete

- 3/8-inch diameter Hilti Kwik Bolt TZ carbon steel concrete anchors attached to unit base rails.
- Install clips at shipping split corners
- Install clips at shipping splits containing fans or coils at 48 inches maximum on-center spacing.
- 2-inch minimum anchor embedment
- 4-3/8-inch minimum distance to the nearest edge
- 4-inch minimum concrete slab thickness

Steel dunnage/steel curb

3/8-inch diameter ASTM A325 or SAE grade 5 bolts attached to unit base located as noted above or 1-inch long 3/16-inch welds at unit base located as noted above.

Stacked Design Break - Size 3-50 Grade to Roof Mounted ($0 \leq S_d \leq 1.85$) Non-Isolated

4000 psi concrete

- 1/2-inch diameter Hilti Kwik Bolt TZ carbon steel concrete anchors attached to unit base rails
- Install clips at all ship split corners.
- Install clips at ship splits with a stacked section at 36 inches maximum on-center spacing.
- Install clips at single level ship splits containing fans or coils at 48 inches maximum on-center spacing.
- 3 1/4-inch minimum anchor embedment
- 7 1/2-inch minimum distance to the nearest edge
- 6-inch minimum concrete slab thickness

Steel dunnage/steel curb

1/2-inch diameter ASTM A325 or SAE Grade 5 bolts attached to unit base located as noted above or 1-inch long 3/16-inch welds at unit bases located as noted above.

Anchor Pattern

Lifting lugs should be used to anchor the unit at the ends of each shipping split. Per the anchor requirements, additional anchoring may be needed. If so, anchors will be provided and installed on the unit. An example of a seismic anchor is shown in [Figure 78](#).

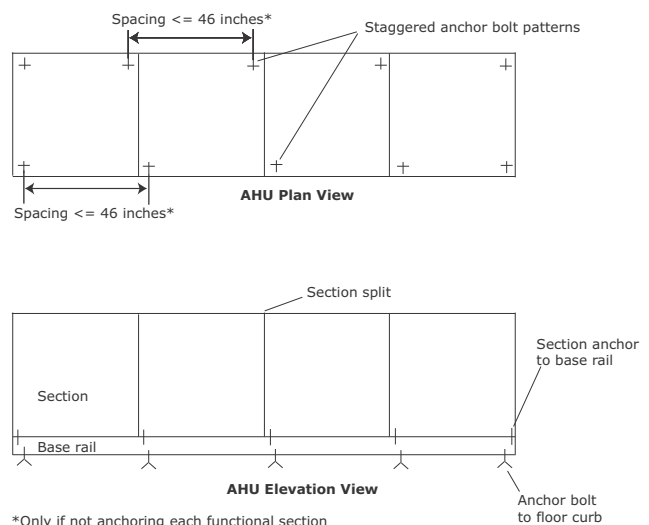
Anchor selection meets or exceeds IBC 2000, 2003, 2006 and 2009 compliance requirements.

Special Inspection per IBC Section 1704 is required on all installations. All anchors listed above must be installed to meet compliance.

Figure 78. Seismic anchor



Figure 79. Seismic anchor pattern



Hurricane Application Requirements

Miami/Dade County Hurricane Certification

Performance Climate Changer air handlers are approved and have been designed to comply with the High Velocity Hurricane Zone of the Florida Building Code.

Notice of compliance and additional product construction details can be found at the Miami-Dade County, Building Code Compliance Office Web site.

The Florida licensed engineer or architect-of-record for the project shall be responsible for the design, sizing, and structural adequacy of the product framework as well as

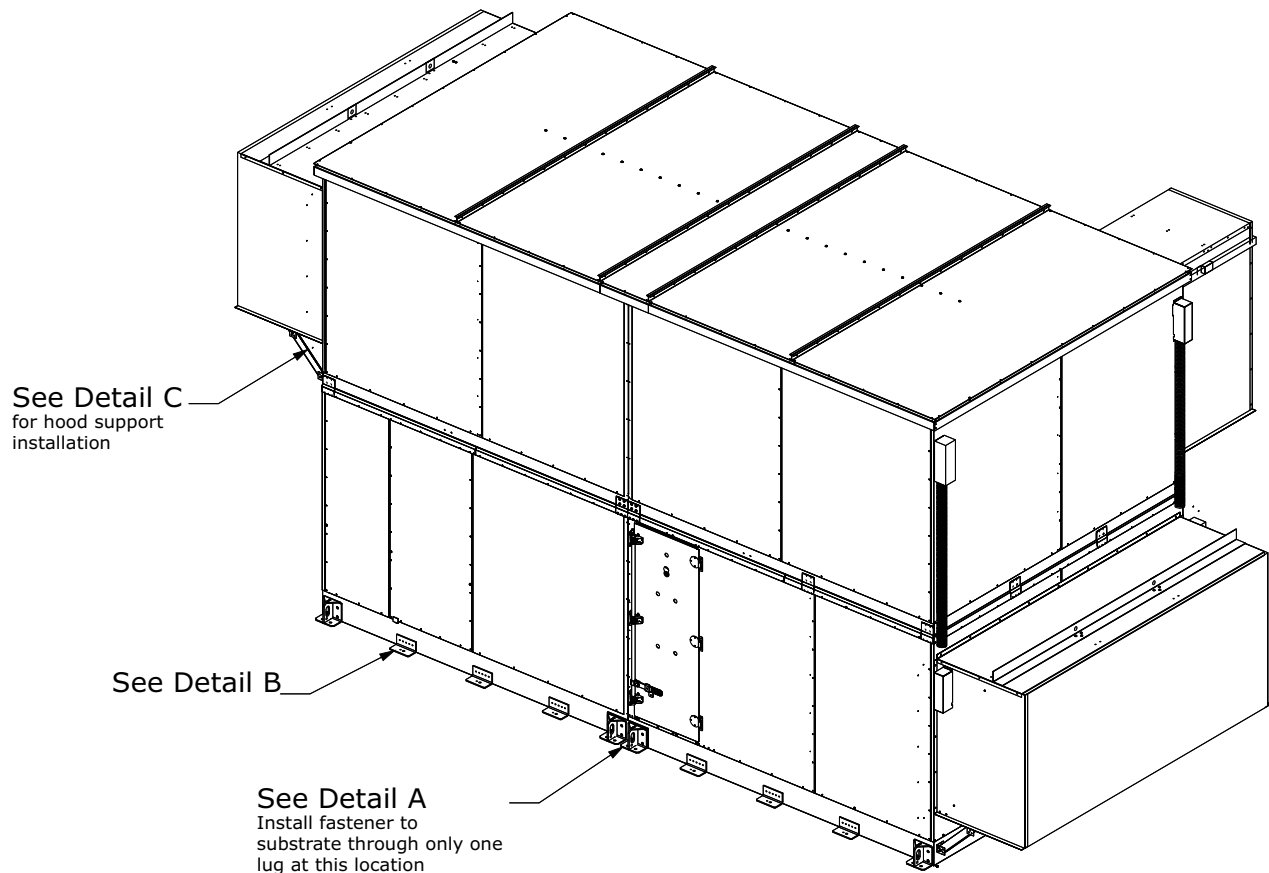
curbing and attachment to the roof, or as accepted by the corresponding building departments.

Anchoring the Unit

The method shown in [Figure 80](#) through [Figure 83](#) is what is approved and recommended for anchoring the unit to substrate and roof curb. Any deviation to this may require the approval of the local building code enforcement agency.

Unit may be installed onto concrete (3.2 ksi min. compressive strength) or 1/4-inch thick steel (36 ksi min. yield) substrates with anchors through lifting lugs and angle clips attached to first level baserail. Unit may also be installed onto a 36 ksi yield steel curb by others.

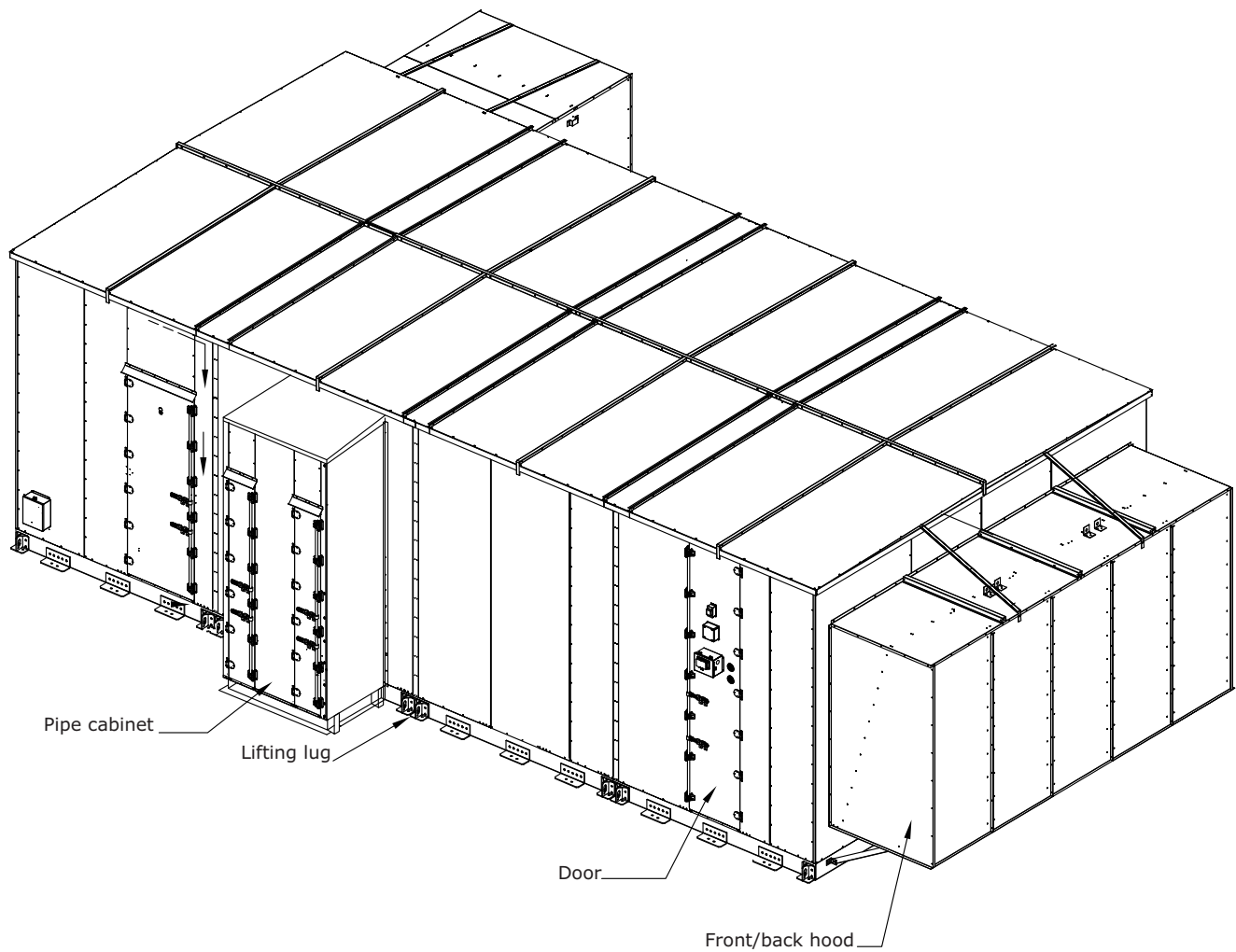
Figure 80. Anchoring size 3-50 units to substrate or roof curb for hurricane applications





Component Installation Requirements

Figure 81. Anchoring size 57-120 units to substrate or roof curb for hurricane applications



Component Installation Requirements

Figure 82. Anchorage details (see Table 12 for minimums) for hurricane applications

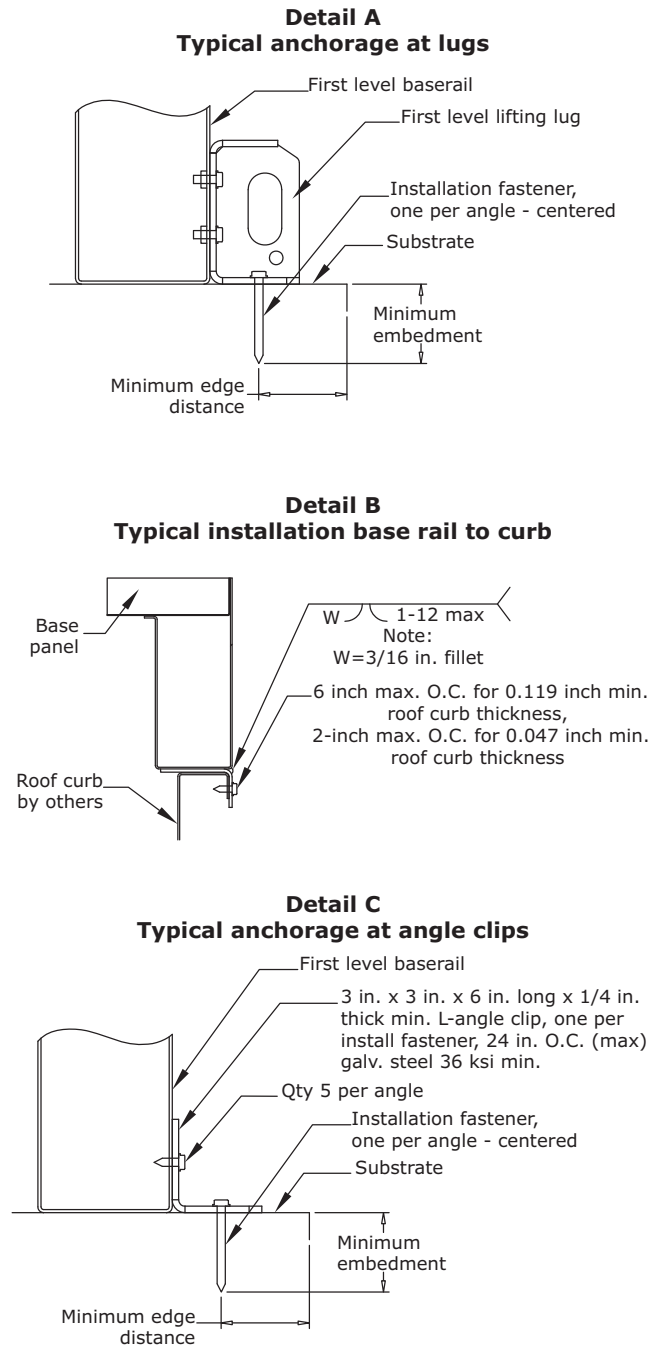
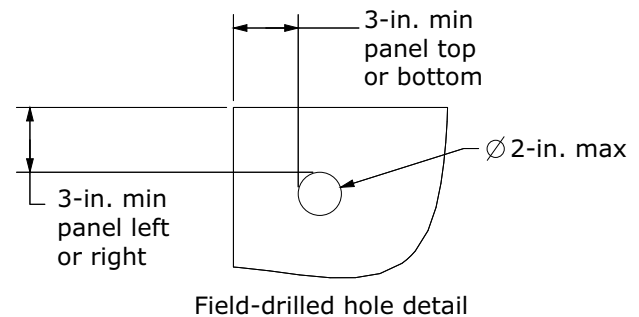


Table 12. Anchorage installation information for hurricane applications

Anchor / substrate	Minimum embedment	Minimum edge distance
1/2-inch powers chem-stud threaded rod installed with chem-stud adhesive capsule in 3.2 ksi minimum concrete substrate	1 1/2 inches	6 inches
1/2-inch HH F-type thread cutting screw installed in 36 ksi minimum steel 1/4-inch thick minimum (full thread engagement)	1/4 inch	1 1/4 inch

Figure 83. Approved field penetrations for hurricane applications



Component Installation Requirements

Figure 84. Hood installation size 3 - 50 - front and back hoods for hurricane applications

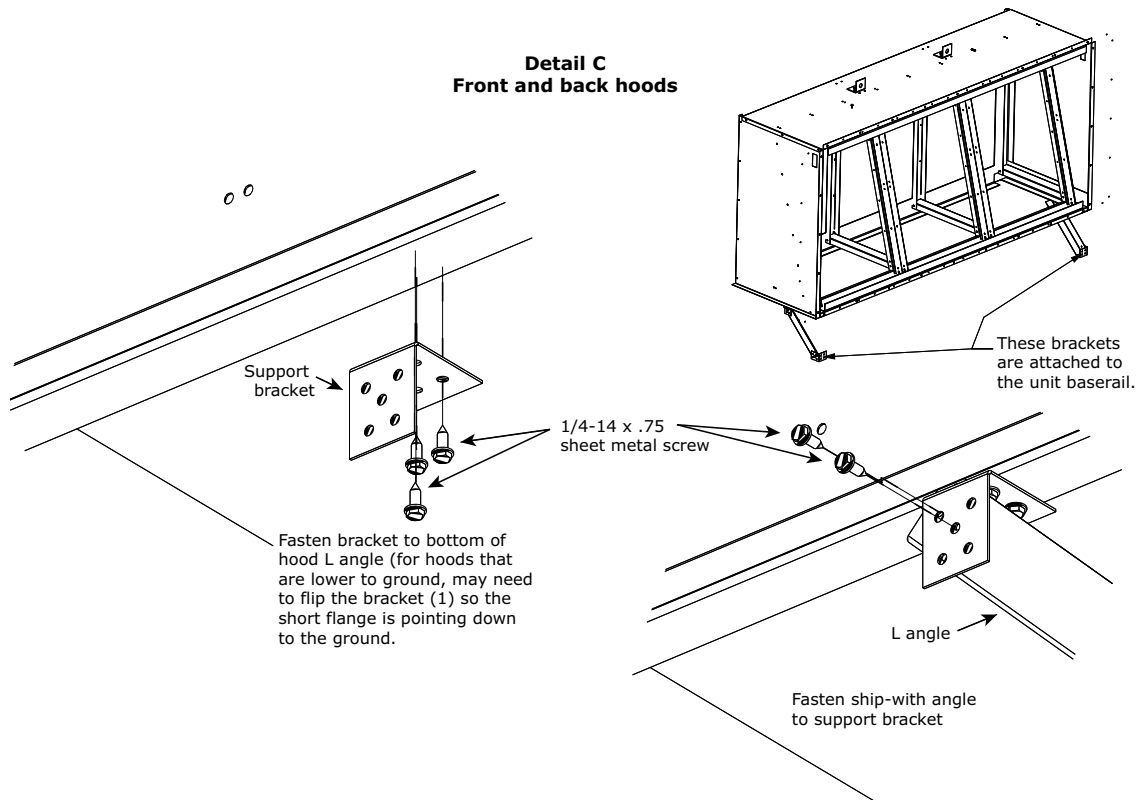
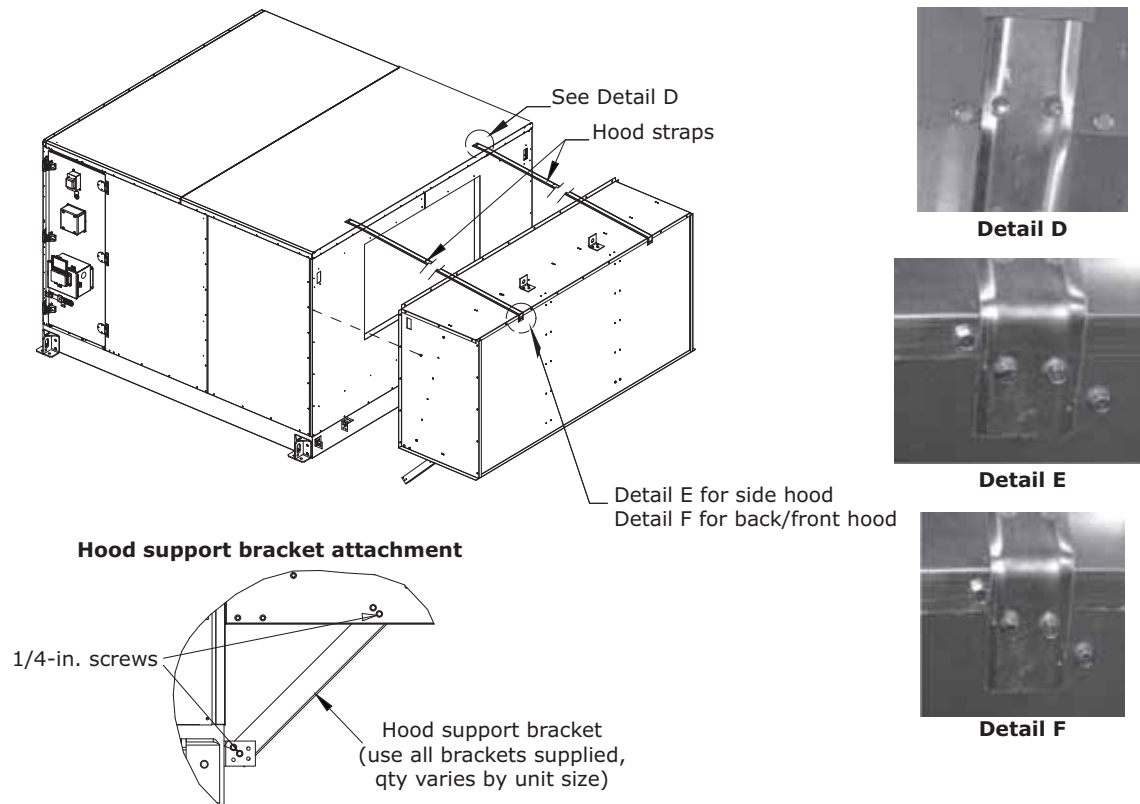
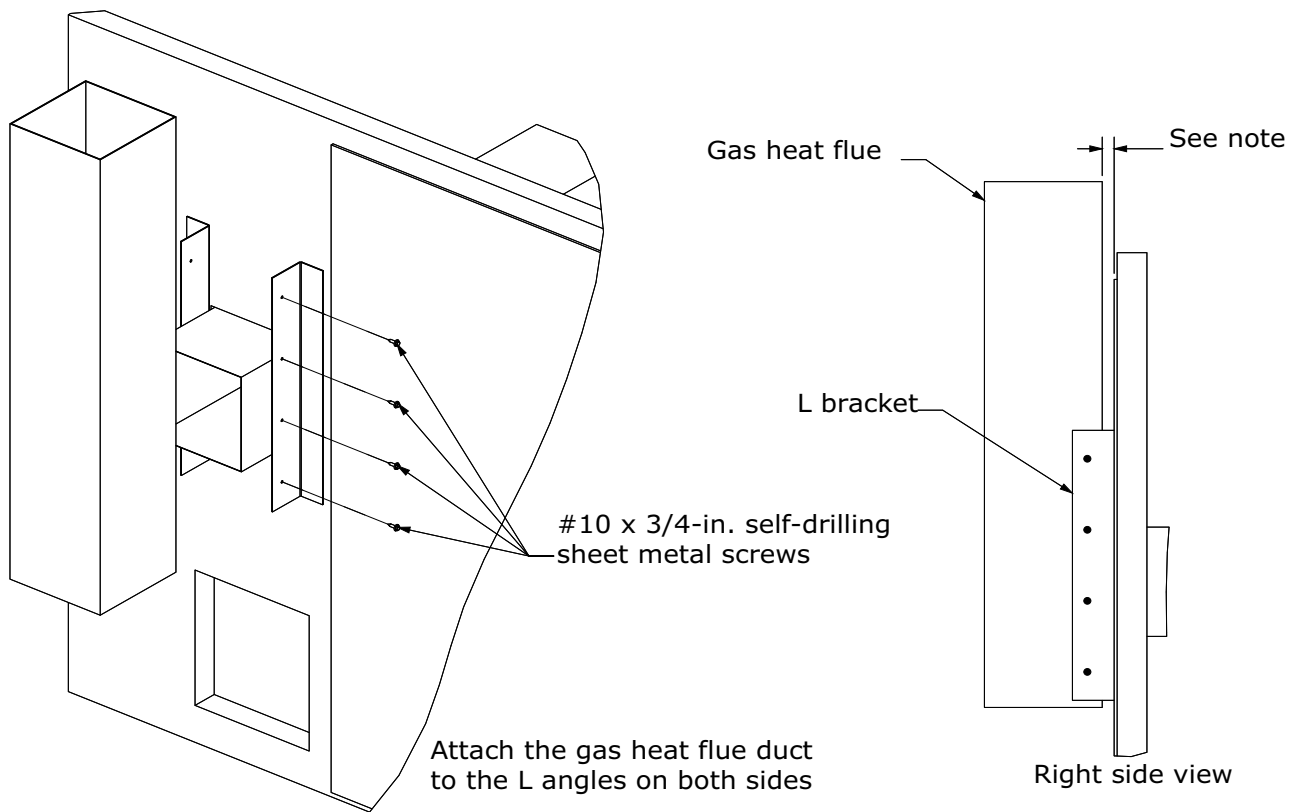


Figure 85. Hood installation size 57 - 120 for hurricane applications



Gas Heat Installation

Figure 86. Gas heat flue installation for hurricane applications



Note:

When installing flue, leave enough clearance to avoid roof's edge and anything above the roof.

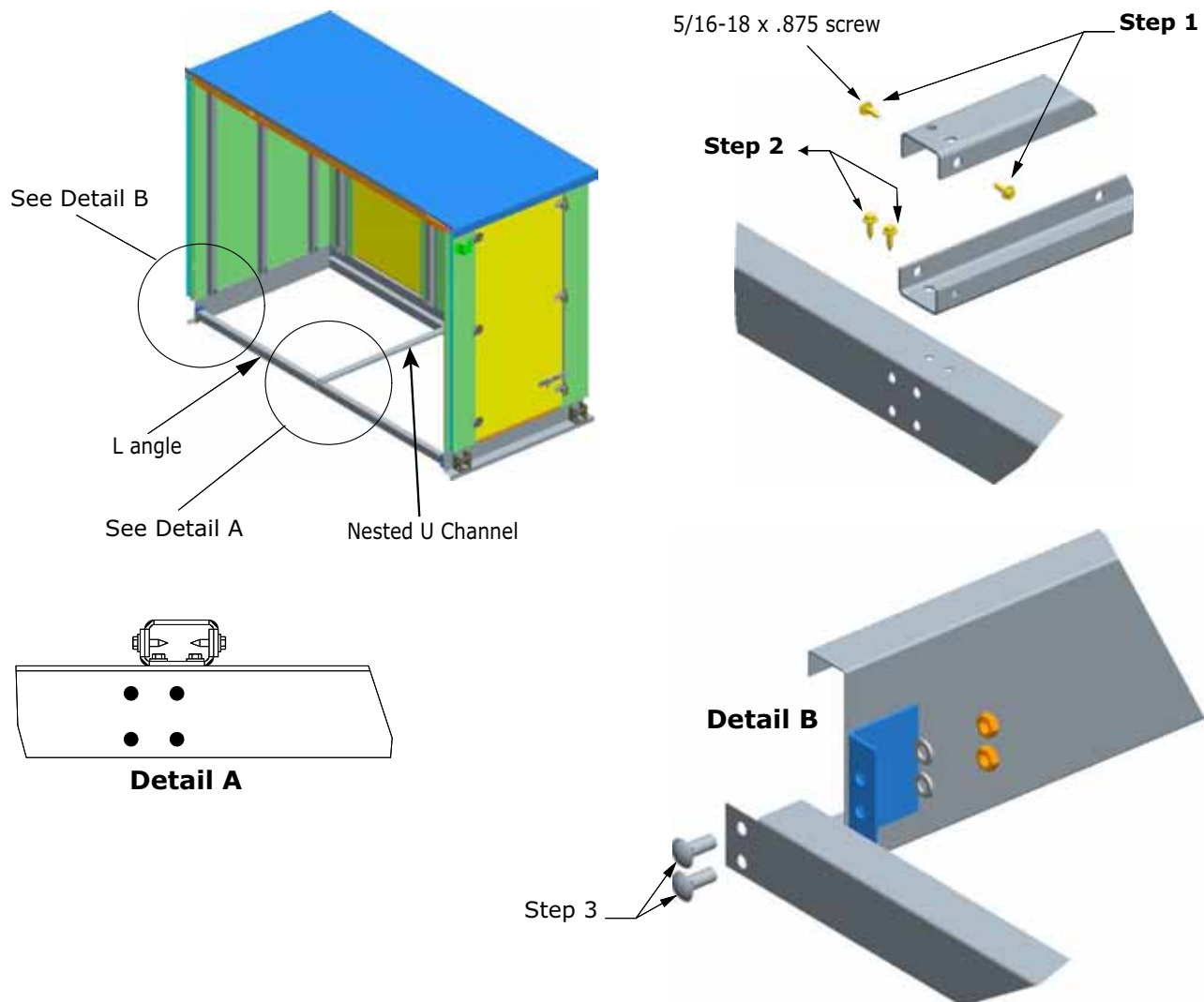
Component Installation Requirements

Pipe Cabinet Installation

Nested U channels and L angle have to be removed to install the pipe cabinet to the unit and reinstall per hurricane certification guidelines. See [Figure 87](#).

1. Remove the fasteners from the top of the nested U channel.
2. Remove the U channel from the unit base L angle and the pipe cabinet base L angle.
3. Remove the corner fasteners from the pipe cabinet base and the unit base L angle. These fasteners are not required to be put back.

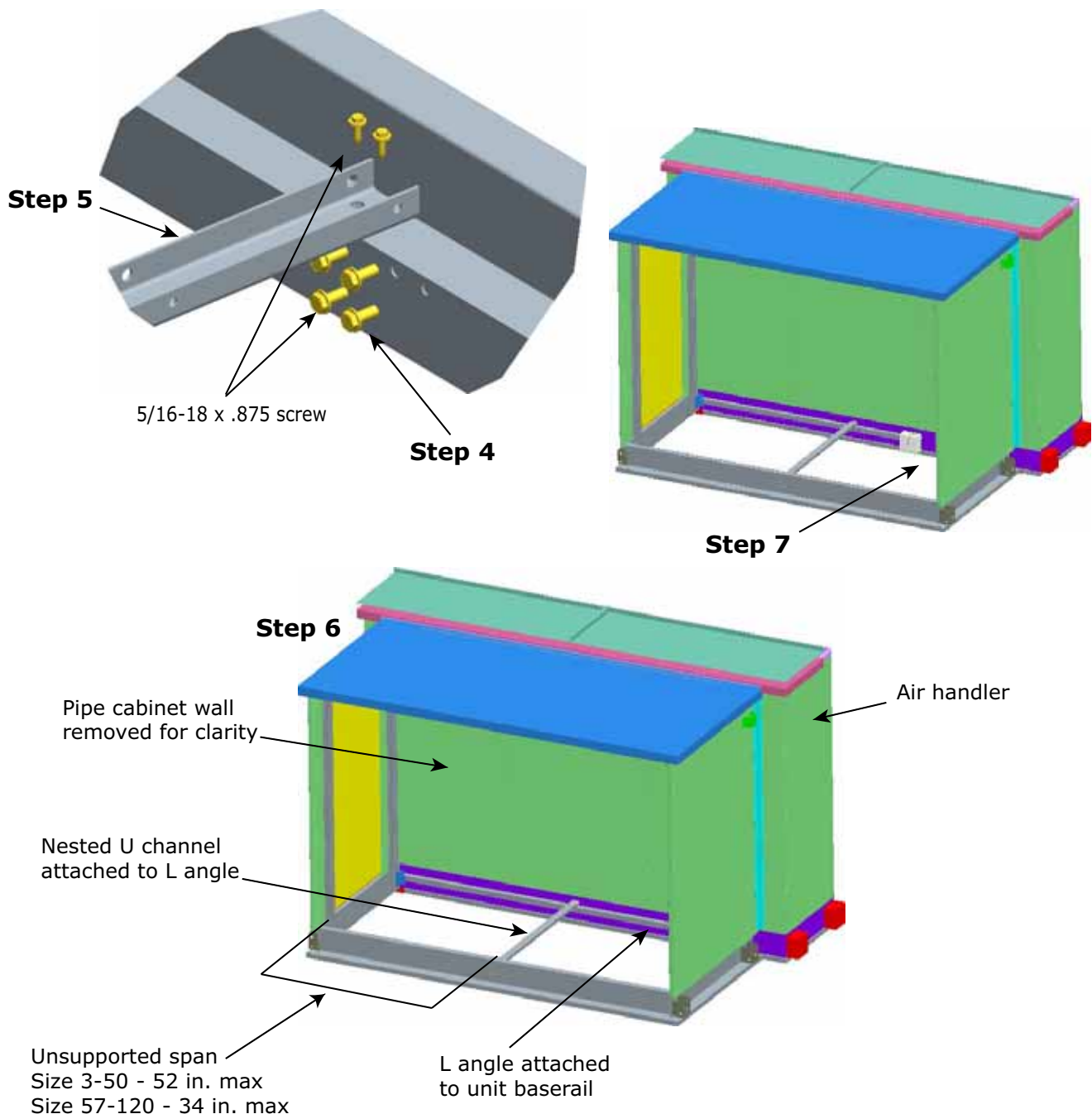
Figure 87. Pipe cabinet installation for hurricane applications



Component Installation Requirements

4. Attach the unit base L angle from the pipe cabinet to the unit base rail. See Step 4 in [Figure 88](#)
5. Attach a U channel to the unit base L angle. Make sure to clear any coil piping. Make sure to attach enough nested U channels to comply to the unsupported span. See Step 5 in [Figure 88](#).
6. Locate the pipe cabinet in place, and reinstall the U channel to the pipe base L angle and reinstall the top U channel to the nest (see Step 1, [Figure 87](#)).
7. When the L angle interferes with the unit base rail lifting lugs or splice plate, mark and cut L angle section to clear the component. If excess L angle is not needed for nested U channel, leave it off. See [Figure 88](#).

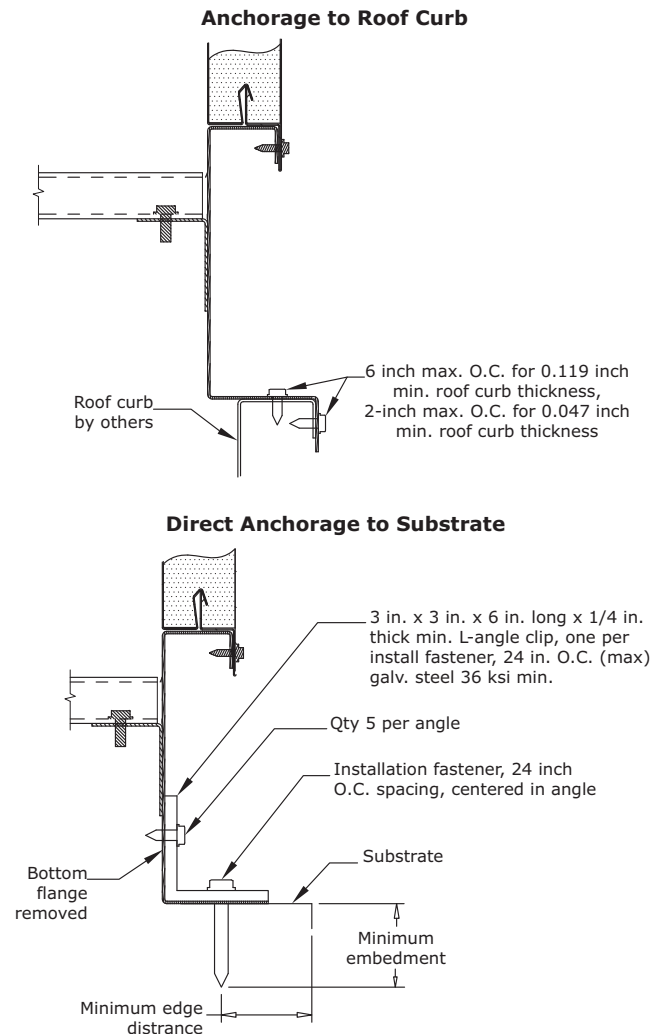
Figure 88. Pipe cabinet installation for hurricane applications



Component Installation Requirements

Pipe Cabinet Anchorage

Figure 89. Anchorage details for pipe cabinet (see Table 12 for minimums) for hurricane applications



Damper Section

Dampers are factory-installed and adjusted and can be found in mixing box/economizer sections. There are two damper blade configurations available: parallel-blade and opposed-blade.

Traq™ dampers are another type of damper available in mixing box sections. Traq dampers have only one blade configuration - opposed. They have two control applications available - standard Traq dampers and low-flow Traq dampers. Low-flow Traq dampers are always not linked and consist of two damper sets - one set for minimum outside air measurement and one set for economizing. Each will have its own VCM.

The air handler is available with factory-mounted controls or end devices. If the unit is not ordered with controls or end devices, it is the installer's responsibility to provide and install the damper actuators. Size the actuators according to Table 13.

Mixing section and economizer dampers are designed for the damper actuators to be direct coupled and installed in the air stream. If other provisions are required, modifications to the section will be the responsibility of the installing contractor.

Damper Torque Requirements

Table 13. Mixing box damper torque requirements (inch pound) at 1-inch w.g. air pressure drop

Unit Size	Parallel airfoil damper only	Opposed airfoil damper only	Standard Traq damper only	Low-flow minimum OA Traq damper only	Low-flow econ Traq damper only	Parallel airfoil damper linked to parallel airfoil damper	Opposed airfoil damper linked to opposed airfoil damper	Standard Traq linked to airfoil damper	Standard Traq linked to standard Traq damper
3	9.00	6.40	18.00	n/a	n/a	10.30	7.70	19.30	36.00
4	13.10	9.30	36.00	18.00	18.00	14.90	11.20	19.90	72.00
6	17.10	12.20	36.00	18.00	18.00	19.60	14.70	38.40	72.00
8	23.30	16.60	54.00	18.00	36.00	26.60	19.90	57.30	108.00
10	29.00	20.70	54.00	18.00	36.00	33.20	24.90	58.10	108.00
12	35.70	25.50	67.50	22.50	45.00	40.70	30.60	72.60	135.00
14	39.50	28.20	67.50	22.50	45.00	45.20	33.90	73.10	135.00
17	48.90	34.90	67.50	22.50	45.00	55.90	41.90	74.50	135.00
21	60.40	43.10	99.00	33.00	66.00	69.00	51.80	107.60	198.00
25	72.40	51.70	99.00	33.00	66.00	82.80	62.10	109.30	198.00
30	84.20	60.10	108.00	36.00	72.00	96.20	72.20	120.00	216.00
35	100.20	71.50	108.00	36.00	72.00	114.50	85.90	122.30	198.00
40	110.20	78.70	108.00	36.00	72.00	125.90	94.50	119.60	198.00
50	126.30	90.20	112.50	37.50	75.00	144.30	108.20	139.11	216.00
57	154.80	110.60	112.50	37.50	75.00	176.90	132.70	167.60	198.00
66	177.60	126.80	150.00	37.50	75.00	202.90	152.20	194.70	264.00
80	210.30	150.20	187.50	37.50	112.50	240.30	180.20	231.60	360.00
100	272.00	194.30	225.00	37.50	150.00	310.90	233.20	297.70	396.00
120	322.40	230.30	225.00	37.50	150.00	368.50	276.30	348.10	432.00

Table 14. Air-to-Air Plate Heat Exchanger Bypass Damper

Unit size	Damper dia (in)		Damper qty	Damper torque (in-lb)	Actuator torque (max) (in-lb)	Actuator qty	Linkage
	A	B					
3	25.00	24.03	1	20.90	42.00	1	No
4	37.50	24.03	1	31.30	42.00	1	No
6	37.50	29.78	1	38.80	180.00	1	No
8	44.00	29.78	1	45.50	180.00	1	No
10	55.00	35.53	1	67.90	180.00	1	No
12	60.00	35.53	1	74.00	180.00	1	No
14	65.50	35.53	1	80.80	180.00	1	No
17	65.50	24.03	2	109.30	180.00	1	Yes
21	73.50	24.03	2	122.70	180.00	1	Yes
25	73.50	29.78	2	152.00	180.00	1	Yes
30	87.00	29.78	2	179.90	180.00	1	Yes
35	93.50	29.78	2	193.40	180.00	2	Yes
40	106.00	29.78	2	219.20	180.00	2	Yes

Component Installation Requirements

Table 15. Air-to-Air Plate Heat Exchanger Frost Damper

Unit size	A	B	Damper qty	Damper torque (in-lb)	Actuator torque (max) (in-lb)	Actuator qty	Linkage
3	25.00	13.97	1	12.10	42.00	1	No
4	37.50	13.97	1	18.20	42.00	1	No
6	37.50	13.97	1	18.20	42.00	1	No
8	44.00	13.97	1	21.30	42.00	1	No
10	55.00	13.97	1	26.70	42.00	1	No
12	60.00	13.97	1	29.10	42.00	1	No
14	65.50	13.97	1	31.80	180.00	1	No
17	65.50	13.97	2	63.50	180.00	1	Yes
21	73.50	13.97	2	71.30	180.00	1	Yes
25	73.50	13.97	2	71.30	180.00	1	Yes
30	87.00	13.97	2	84.40	180.00	1	Yes
35	93.50	13.97	2	90.70	180.00	1	Yes
40	106.00	13.97	2	102.80	180.00	1	Yes
50	119.00	13.97	2	115.40	180.00	1	Yes

Table 16. Standard damper to low-flow Traq damper

Unit size	Damper dia (in)	Total damper qty	Low flow Traq damper qty	Linked Traq damper torque (in-lb.)	Damper torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty for linked damper	Actuator qty for linked Traq damper	Actuator qty for single low flow Traq damper	Face-to-face linkage	Linkage on face damper	Actuator total qty
6	13.00	2	1	18.00	17.15	42	1	1	1	No	No	3
8	13.00	3	1	36.00	23.26	42	1	1	1	No	Yes	3
10	13.00	3	1	36.00	29.03	180	1	1	1	No	Yes	3
12	16.00	3	1	45.00	35.65	180	1	1	1	No	Yes	3
14	16.00	3	1	45.00	39.54	180	1	1	1	No	Yes	3
17	16.00	3	1	45.00	48.89	180	1	1	1	No	Yes	3
21	20.00	3	1	66.00	60.39	180	1	1	1	No	Yes	3
25	20.00	3	1	66.00	72.43	180	1	1	1	No	Yes	3
30	24.00	3	1	72.00	84.19	180	1	1	1	No	Yes	3
35	24.00	3	1	72.00	100.16	180	1	1	1	No	Yes	3
40	24.00	3	1	72.00	110.19	180	1	1	1	No	Yes	3
50	28.00	3	1	75.00	126.29	180	1	1	1	No	Yes	3
57	28.00	3	1	75.00	154.80	180	1	1	1	No	Yes	3
66	28.00	4	1	112.50	177.56	180	1	1	1	No	Yes	3
80	28.00	5	1	150.00	210.27	180	2	1	1	No	Yes	4
100	28.00	6	1	187.50	272.04	180	2	2	1	No	Yes	5
120	28.00	6	1	187.50	322.40	180	2	2	1	No	Yes	5

Component Installation Requirements

Table 17. Standard Traq damper - low flow Traq damper

Unit size	Damper dia (in)	Damper qty per face	Damper torque (in-lb.)	Std Traq damper torque (in-lb.)	Linked low flow Traq damper torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty for linked Std Traq Damper	Actuator qty for linked low flow Traq damper	Actuator qty for single low flow Traq damper	Face-to-face linkage	Linkage on face	Total actuator qty
6	13.00	2	18.0	36.0	18.00	42	1	-	2	No	Yes	3
8	13.00	3	18.0	54.0	36.00	180	1	1	1	No	Yes	3
10	13.00	3	18.0	54.0	36.00	180	1	1	1	No	Yes	3
12	16.00	3	22.5	67.5	45.00	180	1	1	1	No	Yes	3
14	16.00	3	22.5	67.5	45.00	180	1	1	1	No	Yes	3
17	16.00	3	22.5	67.5	45.00	180	1	1	1	No	Yes	3
21	20.00	3	33.0	99.0	66.00	180	1	1	1	No	Yes	3
25	20.00	3	33.0	99.0	66.00	180	1	1	1	No	Yes	3
30	24.00	3	36.0	108.0	72.00	180	1	1	1	No	Yes	3
35	24.00	3	36.0	108.0	72.00	180	1	1	1	No	Yes	3
40	24.00	3	36.0	108.0	72.00	180	1	1	1	No	Yes	3
50	28.00	3	37.5	112.5	75.00	180	1	1	1	No	Yes	3
57	28.00	3	37.5	112.5	75.00	180	1	1	1	No	Yes	3
66	28.00	4	37.5	150.0	112.50	180	1	1	1	No	Yes	3
80	28.00	5	37.5	187.5	150.00	180	2	1	1	No	Yes	4
100	28.00	6	37.5	225.0	187.5	180	2	2	1	No	Yes	5
120	28.00	6	37.5	225.0	187.5	180	2	2	1	No	Yes	5

Table 18. Side Traq damper - standard flow mixing box

Unit size	Damper dia (in)	Damper qty	Damper torque (in-lb)	Total torque (in-lb)	Actuator torque (max) (in-lb)	Actuator qty	Face-to-face linkage	Linkage on face
3, 4, 6, 8	13.00	1	18.00	18.00	42.00	1	No	No
10, 12	16.00	1	22.50	22.50	42.00	1	No	No
14, 17	13.00	2	18.00	36.00	42.00	1	No	Yes
21, 22, 25, 26	16.00	2	22.50	45.00	180.00	1	No	Yes
30, 31, 35, 40	20.00	2	33.00	66.00	180.00	1	No	Yes
36, 41, 50, 57, 66	24.00	2	36.00	72.00	180.00	1	No	Yes
51, 58, 80	28.00	2	37.50	75.00	180.00	1	No	Yes
100	28.00	3	37.50	112.50	180.00	1	No	Yes
120	24.00	4	36.00	144.00	180.00	1	No	Yes

Component Installation Requirements

Table 19. Side Traq damper - standard flow diagonal economizer

Unit sizes	Damper dia (in)	Damper qty	Damper torque (in-lb.)	Total torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty	Face-to-face linkage	Linkage on face
3	13.00	1	18.00	18.00	42.00	1	No	No
4	13.00	2	18.00	36.00	42.00	2	No	No
6, 8	13.00	2	18.00	36.00	42.00	1	No	Yes
10, 12, 14	16.00	2	22.50	45.00	180.00	1	No	Yes
17	13.00	4	18.00	72.00	180.00	1	No	Yes
21	20.00	2	33.00	66.00	180.00	1	No	Yes
25	16.00	4	22.50	90.00	180.00	1	No	Yes
30	20.00	3	33.00	99.00	180.00	1	No	Yes
35	28.00	2	37.50	75.00	42.00	2	No	No
40	28.00	2	37.50	75.00	180.00	1	No	Yes
50	24.00	3	36.00	108.00	180.00	1	No	Yes
57	24.00	4	36.00	144.00	180.00	1	No	Yes
66	28.00	3	37.50	112.50	180.00	1	No	Yes
80	28.00	4	37.50	150.00	180.00	1	No	Yes
100, 120	28.00	5	37.50	187.50	180.00	2	No	Yes

Table 20. Single -Side Traq low flow mixing box

Unit size	Damper Dia (in)	Damper Qty	Damper Torque (in-lb.)	Low flow Traq Torque (in-lb.)	Remained Traq Torque (in-lb.)	Actuator qty for low flow Traq	Actuator qty for remained damper	Actuator total Qty	Face-to-face Linkage	Linkage on Face
14, 17	13.00	2	18.00	18.00	18.00	1	1	2	No	No
21, 22, 25, 26	16.00	2	22.50	22.50	22.50	1	1	2	No	No
30, 31, 35, 40	20.00	2	33.00	33.00	33.00	1	1	2	No	No
36, 41, 50, 57, 66	24.00	2	36.00	36.00	36.00	1	1	2	No	No
51, 58, 80	28.00	2	37.50	37.50	37.50	1	1	2	No	No
100	28.00	3	37.50	37.50	75.00	1	1	2	No	Yes
120	24.00	4	36.00	36.00	108.00	1	1	2	No	Yes

Table 21. Dual-side Traq low flow mixing box

Unit size	Damper dia (in)	Damper qty	Damper torque (in-lb)	Low-flow Traq torque (in-lb)	Remained Traq torque (in-lb)	Actuator qty for std Traq damper	Actuator qty for low-flow Traq damper	Actuator qty for single low-flow Traq	Actuator total qty	Face-to-face linkage	Linkage on face
3, 4, 6, 8	13.00	2	18.00	18.00	18.00	1	-	1	2	No	No
10, 12	16.00	2	22.50	22.50	22.50	1	-	1	2	No	No
14, 17	13.00	4	18.00	18.00	54.00	1	1	1	3	No	No
21, 22, 25, 26	16.00	4	22.50	22.50	67.50	1	1	1	3	No	No
30, 31, 35, 40	20.00	4	33.00	33.00	99.00	1	1	1	3	No	No
36, 41, 50, 57, 66	24.00	4	36.00	36.00	108.00	1	1	1	3	No	No
51, 58, 80	28.00	4	37.50	37.50	112.50	1	1	1	3	No	No
100	28.00	6	37.50	37.50	187.50	1	1	1	3	No	Yes
120	24.00	8	36.00	36.00	252.00	1	1	1	3	No	Yes

Component Installation Requirements

Table 22. Side Traq low-flow diagonal economizer

Unit size	Damper dia (in)	Damper qty	Damper torque (in-lb.)	Low flow Traq torque (in-lb.)	Remainder Traq torque (in-lb.)	Actuator qty for low flow Traq	Actuator qty for remainder damper	Actuator total qty	Face-to-face linkage	Linkage on face
6	13.00	2	18.00	18.00	18.00	1	1	2	No	No
8	13.00	2	18.00	18.00	18.00	1	1	2	No	No
10	16.00	2	22.50	22.50	22.50	1	1	2	No	No
12	16.00	2	22.50	22.50	22.50	1	1	2	No	No
14	16.00	2	22.50	22.50	22.50	1	1	2	No	No
17	13.00	4	18.00	18.00	54.00	1	1	2	No	Yes
21	20.00	2	33.00	33.00	33.00	1	1	2	No	No
25	16.00	4	22.50	22.50	67.50	1	1	2	No	Yes
30	20.00	3	33.00	33.00	66.00	1	1	2	No	Yes
35	28.00	2	37.50	37.50	37.50	1	1	2	No	No
40	28.00	2	37.50	37.50	37.50	1	1	2	No	No
50	24.00	3	36.00	36.00	72.00	1	1	2	No	Yes
57	24.00	4	36.00	36.00	108.00	1	1	2	No	Yes
66	28.00	3	37.50	37.50	75.00	1	1	2	No	Yes
80	28.00	4	37.50	37.50	112.50	1	1	2	No	Yes
100	28.00	5	37.50	37.50	150.00	1	1	2	No	Yes
120	28.00	5	37.50	37.50	150.00	1	1	2	No	Yes

Table 23. Side rectangle angle damper - 2000 fpm

Unit size	A (in)	B (in)	Damper qty	Torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty	Linkage
3	11.25	13.97	1	13.10	42.00	1	No
4	11.25	13.97	1	13.10	42.00	1	No
6	15.75	13.97	1	18.30	42.00	1	No
8	20.25	13.97	1	23.60	42.00	1	No
10	20.25	16.30	1	27.50	42.00	1	No
12	27.00	16.30	1	36.70	42.00	1	No
14	23.25	19.72	1	38.20	42.00	1	No
17	30.50	19.72	1	50.10	180.00	1	No
21	36.75	19.72	1	60.40	180.00	1	No
25	45.75	19.72	1	75.20	180.00	1	No
30	48.50	20.22	1	81.70	180.00	1	No
35	45.50	25.47	1	96.60	180.00	1	No
40	48.00	28.35	1	113.40	180.00	1	No
50	56.75	31.22	1	147.60	180.00	1	No
57	65.75	31.22	1	171.10	180.00	1	No
66	70.50	31.22	1	183.40	180.00	2	No
80	85.00	31.22	1	221.10	180.00	2	No
100	95.00	36.97	1	292.70	180.00	2	No
120	96.00	42.72	1	341.80	180.00	2	No



Component Installation Requirements

Table 24. Side rectangle damper per 1200 fpm - diagonal economizer with OA rectangular dampers

Unit size	A (in)	B (in)	Damper qty	Torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty	Linkage
3	12.50	13.97	1	14.60	42.00	1	No
4	13.75	19.72	1	22.60	42.00	1	No
6	18.75	19.72	1	30.80	42.00	1	No
8	24.25	19.72	1	39.90	42.00	1	No
10	23.50	25.47	1	49.90	180.00	1	No
12	29.00	25.47	1	61.60	180.00	1	No
14	26.00	31.22	1	67.60	180.00	1	No
17	32.00	31.22	1	83.30	180.00	1	No
21	40.00	31.22	1	104.10	180.00	1	No
25	48.00	31.22	1	124.90	180.00	1	No
30	47.00	36.97	1	144.80	180.00	1	No
35	48.00	42.72	1	170.90	180.00	1	No
40	48.00	48.47	1	193.90	180.00	2	No
50	57.75	48.47	1	233.30	180.00	2	No
57	67.50	48.47	1	272.60	180.00	2	No
66	69.50	28.35	2	277.10	180.00	2	Yes
80	83.00	28.35	2	330.90	180.00	2	Yes
100	95.25	31.22	2	418.20	180.00	3	Yes
120	95.00	36.97	2	493.90	180.00	3	Yes

Component Installation Requirements

Table 25. Short mixing box rectangle damper - top, back or bottom only

Unit size	A (in)	B (in)	Damper Qty	Torque (in-lb.)	Actuator Torque (max) (in-lb.)	Actuator qty	Linkage
3	13.00	8.22	1	5.20	42.00	1	No
4	19.75	8.22	1	7.90	42.00	1	No
6	27.00	8.22	1	10.80	42.00	1	No
8	35.00	8.22	1	14.00	42.00	1	No
10	43.75	8.22	1	17.50	180.00	1	No
12	32.00	13.97	1	21.70	180.00	1	No
14	60.00	8.22	1	24.00	180.00	1	No
17	43.50	13.97	1	29.50	180.00	1	No
21	53.75	13.97	1	36.50	180.00	1	No
25	64.50	13.97	1	43.80	180.00	1	No
30	55.00	19.72	1	52.70	180.00	1	No
35	64.00	19.72	1	61.40	180.00	1	No
40	56.50	25.47	1	70.00	180.00	1	No
50	68.00	25.47	1	84.20	180.00	1	No
57	66.00	31.22	1	100.20	180.00	1	No
66	58.50	19.72	2	112.20	180.00	1	No
80	54.25	25.47	2	134.30	180.00	1	No
100	65.25	25.47	2	161.60	180.00	1	No
120	66.00	31.22	2	200.30	180.00	2	No

Table 26. Damper torque per blade (inch-pounds)

Unit size	2 Deck Horizontal	2 Deck Vertical	3 Deck dual-actuator Horizontal	3 Deck dual-actuator Vertical	3 Deck single-actuator Horizontal	3 Deck single-actuator Vertical
6	7.10	5.50	7.50	5.80	32.50	25.00
8	7.10	5.50	7.50	5.80	32.50	25.00
10	8.00	6.20	8.60	6.60	32.50	25.00
12	8.00	6.20	8.60	6.60	32.50	25.00
14	8.00	6.20	8.60	6.60	32.50	25.00
17	8.00	6.20	8.60	6.60	32.50	25.00
21	9.90	7.50	11.50	8.70	32.50	25.00
25	9.90	7.50	11.50	8.70	32.50	25.00
30	9.90	7.50	11.50	8.70	32.50	25.00
35	19.80	15.20	31.50	24.40	32.50	25.00
40	19.80	15.20	31.50	24.40	32.50	25.00
50	19.80	15.20	31.50	24.40	32.50	25.00

Component Installation Requirements

Table 27. Energy recovery bypass opposed-blade damper

Unit size	A (in)	B (in)	Damper qty	Torque (in-lb.)	Actuator Torque (max) (in-lb.)	Actuator qty	Linkage
3 - 8	18.00	8.22	1	5.10	42.00	1	No
8 - 14	32.00	8.22	1	9.10	42.00	1	No
10 - 17	41.75	8.22	1	11.90	42.00	1	No
12 - 21	53.50	8.22	1	15.30	42.00	1	No
21 - 50	52.50	13.97	1	25.50	180.00	1	No
17, 21	61.50	8.22	1	17.60	42.00	1	No
21 - 30	66.00	8.22	1	18.80	42.00	1	No
25 - 50	65.00	13.97	1	31.50	180.00	1	No
21	70.00	8.22	1	20.00	42.00	1	No
35 - 50	84.50	13.97	1	41.00	180.00	1	No
35 - 50	75.00	13.97	1	36.40	180.00	1	No
40 - 50	102.00	13.97	1	49.50	180.00	1	No
50	113.00	13.97	1	54.80	180.00	1	No

Table 28. Exhaust fan damper torque

Unit size	A (in)	B (in)	Damper Qty	Torque (in-lb.)	Actuator Torque (max) (in-lb.)	Actuator qty	Linkage
3	19.83	13.97	1	13.50	42.00	1	No
4	32.33	13.97	1	22.00	42.00	1	No
6	32.33	13.97	1	22.00	42.00	1	No
8	38.83	13.97	1	26.40	180.00	1	No
10	49.83	13.97	1	33.80	180.00	1	No
12	54.83	13.97	1	37.20	180.00	1	No
14	60.33	13.97	1	41.00	180.00	1	No
17	60.33	13.97	1	41.00	180.00	1	No
21	68.33	13.97	1	46.40	180.00	1	No
25	68.33	13.97	1	46.40	180.00	1	No
30	81.83	13.97	1	55.60	180.00	1	No
35	40.88	19.72	2	78.40	180.00	2	No
40	30.42	19.72	3	87.50	180.00	3	No
50	34.75	19.72	3	99.90	180.00	3	No
57	34.75	19.72	3	99.90	180.00	3	No
66	39.75	31.22	3	181.00	180.00	3	No
80	38.42	31.22	3	174.90	180.00	3	No
100	43.09	31.22	3	196.20	180.00	3	No
120	52.25	31.22	3	237.90	180.00	3	No

Component Installation Requirements

Table 29. Energy recovery recirculation parallel-blade damper

Unit size	A (in)	B (in)	Damper qty	Torque (in-lb.)	Actuator torque (max) (in-lb.)	Actuator qty	Linkage
3	16.00	13.97	1	10.90	42.00	1	No
4	28.50	13.97	1	19.40	42.00	1	No
6	28.50	13.97	1	19.40	42.00	1	No
8	35.00	13.97	1	23.80	42.00	1	No
10	46.00	13.97	1	31.20	42.00	1	No
12	51.00	13.97	1	34.60	42.00	1	No
14	56.50	13.97	1	38.40	180.00	1	No
17	56.50	13.97	1	38.40	180.00	1	No
21	64.50	13.97	1	43.80	180.00	1	No
25	64.50	13.97	1	43.80	180.00	1	No
30	78.00	13.97	1	53.00	180.00	1	No
35	84.50	13.97	1	57.40	180.00	1	No
40	97.00	13.97	1	65.90	180.00	1	No
50	110.00	13.97	1	74.70	180.00	1	No

Table 30. Face damper torque requirements

Unit size	A (in)	B (in)	Damper Qty	Torque (in-lb)	Actuator torque (max) (in-lb.)	Actuator Qty
3	23.20	19.72	1	13.80	42.00	1
4	35.70	19.72	1	21.30	42.00	1
6	35.70	25.47	1	27.50	42.00	1
8	42.20	25.47	1	32.50	42.00	1
10	53.20	25.47	1	40.90	42.00	1
12	58.20	31.22	1	54.90	180.00	1
14	63.70	31.22	1	60.10	180.00	1
17	63.70	36.97	1	71.10	180.00	1
21	71.70	42.72	1	92.50	180.00	1
22	50.94	54.82	1	84.36	180.00	1
25	71.70	48.47	1	105.00	180.00	1
26	50.94	68.19	1	104.93	180.00	1
30	85.20	48.47	1	124.70	180.00	1
31	29.19	68.19	2	120.25	180.00	1
35	43.44	50.94	2	133.70	180.00	1
36	33.19	73.94	2	148.26	180.00	1
40	32.19	50.94	3	148.60	180.00	1
41	33.19	91.19	2	182.85	180.00	2
50	36.52	62.44	3	206.70	180.00	2
51	39.94	91.19	2	220.03	180.00	2
57	36.52	68.19	3	225.70	180.00	2
58	39.94	102.69	2	247.78	180.00	2
66	41.52	73.94	3	278.20	180.00	2
80	41.52	85.44	3	321.50	180.00	2
100	46.19	99.41	3	416.10	180.00	3
120	55.35	99.41	3	498.70	180.00	3

Component Installation Requirements

Table 31. Internal face-and-bypass damper torque requirements

Unit size	A (in)	B (in)	Damper Qty	Torque (in-lb)	Actuator torque (max) (in-lb.)	Actuator Qty
3	23.20	18.31	1	12.80	42.00	1
4	35.70	18.31	1	19.70	42.00	1
6	35.70	19.37	1	20.90	42.00	1
8	42.20	24.39	1	31.10	42.00	1
10	53.20	24.39	1	39.20	42.00	1
12	58.20	31.14	1	54.80	180.00	1
14	63.70	31.14	1	59.90	180.00	1
17	63.70	36.61	1	70.50	180.00	1
21	71.70	42.17	1	91.30	180.00	1
22	50.94	50.94	1	78.38	180.00	1
25	71.70	47.80	1	103.50	180.00	1
26	50.94	68.19	1	104.93	180.00	1
30	85.20	47.80	1	123.00	180.00	1
31	29.19	68.19	2	120.25	180.00	1
35	43.44	50.94	2	133.70	180.00	1
36	33.19	73.94	2	148.26	180.00	1
40	32.19	50.94	3	148.60	180.00	1
41	33.19	85.44	2	171.32	180.00	2
50	36.52	62.44	3	206.70	180.00	2
51	39.94	85.44	2	206.16	180.00	2
57	36.52	68.19	3	225.70	180.00	2
58	39.94	101.62	2	245.19	180.00	2
66	41.52	73.94	3	278.20	180.00	2
80	41.52	85.44	3	321.50	180.00	2
100	46.19	99.41	3	416.10	180.00	3
120	55.35	99.41	3	498.70	180.00	3

Table 32. External face-and-bypass damper torque requirements

Unit size	A (in)	B (in)	Damper Qty	Bypass Torque (in-lb)	Face Torque (in-lb.)	Torque (in-lb)	Actuator torque (max) (in-lb.)	Actuator Qty
3	19.83	13.97	1	8.40	13.80	22.20	42.00	1
4	32.33	13.97	1	13.60	21.30	34.90	42.00	1
6	32.33	13.97	1	13.60	27.50	41.10	42.00	1
8	38.83	13.97	1	16.40	32.50	48.90	180.00	1
10	49.83	13.97	1	21.00	40.90	62.00	180.00	1
12	54.83	13.97	1	23.10	54.90	78.00	180.00	1
14	60.33	13.97	1	25.50	60.10	85.50	180.00	1
17	60.33	13.97	1	25.50	71.10	96.60	180.00	1
21	68.33	13.97	1	28.80	92.50	121.40	180.00	1
22	49.83	13.97	1	21.03	84.36	105.39	180.00	1
25	68.33	13.97	1	28.80	105.00	133.80	180.00	1
26	49.83	19.72	1	29.69	104.93	134.61	180.00	1
30	81.83	13.97	1	34.50	124.70	159.30	180.00	1
31	60.33	19.72	1	35.94	120.25	156.19	180.00	1
35	41.17	13.97	2	34.70	133.70	168.40	180.00	1
36	68.33	19.72	1	40.71	148.26	188.96	180.00	2
40	27.61	13.97	3	35.00	148.6	183.50	180.00	2

Component Installation Requirements

Table 32. External face-and-bypass damper torque requirements

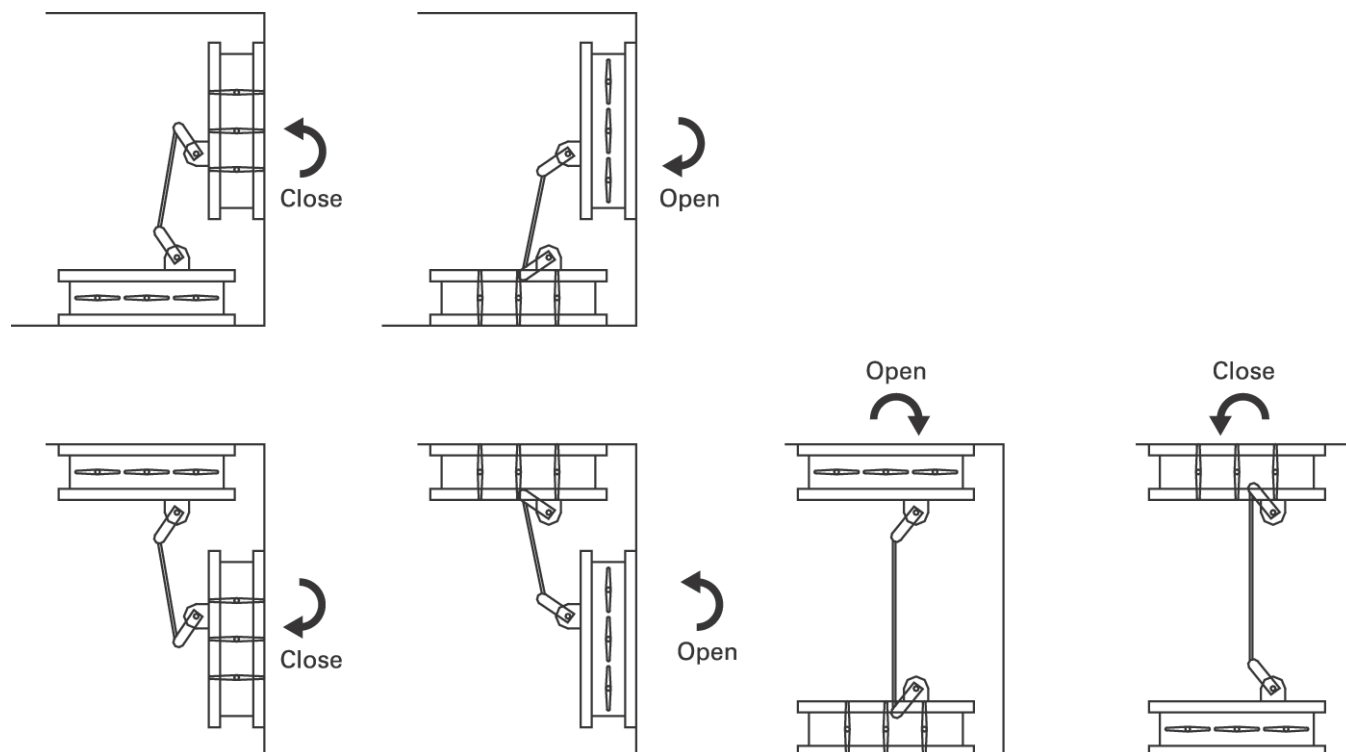
Unit size	A (in)	B (in)	Damper Qty	Bypass Torque (in-lb)	Face Torque (in-lb.)	Torque (in-lb)	Actuator torque (max) (in-lb.)	Actuator Qty
41	68.33	19.72	1	40.71	182.85	223.55	180.00	2
50	31.94	13.97	3	40.40	206.70	247.10	180.00	2
51	81.83	19.72	1	48.75	220.03	268.78	180.00	2
57	31.94	13.97	3	40.40	225.70	266.10	180.00	2
58	81.83	19.72	1	48.75	247.78	296.53	180.00	2
66	36.94	25.47	3	85.30	278.20	363.50	180.00	3
80	36.94	25.47	3	85.30	321.50	406.80	180.00	3
100	41.61	25.47	3	96.00	416.10	512.20	180.00	2
120	50.78	25.47	3	117.20	498.70	615.90	180.00	3

Opposed-Blade and Parallel-Blade Damper

Opposed-blade and parallel-blade airfoil dampers in unit sizes 3-120, as well as internal and external face-and-bypass sections, have centered dampers with an internal jack-shaft (see [Figure 90](#), [Figure 91](#) and [Figure 92](#)). A 95-degree actuator rotation gives a 90-degree blade travel.

Note: Damper blades should be checked for proper operation from full open to full closed position before unit start up. Damper blade positioning may have changed due to shipping and handling vibrations.

Figure 90. Typical mixing box configurations for unit sizes 3 to 120



Component Installation Requirements

Figure 91. Typical internal face-and-bypass configuration

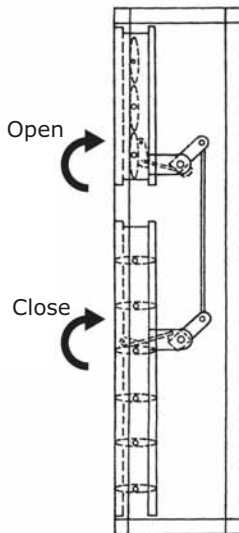
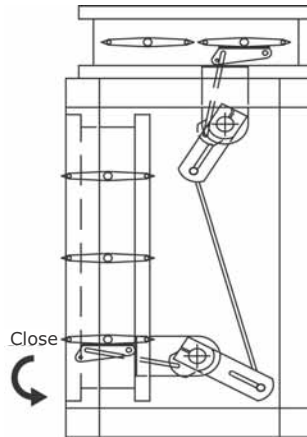


Figure 92. Typical external face-and-bypass configuration



Multizone Modules

Under certain operating conditions, condensation may form on the cold deck portion of the multizone damper section. To prevent this, insulate around the damper rods. Be sure the insulation does not affect damper operation.

Zone Damper Operators

Zone damper operators are available factory-mounted with factory-mounted controls or as a stand-alone end device. If not factory-provided, the contractor is responsible for providing these operators. In all cases, the damper operator should be connected to the drive rod.

Adjusting Zone Dampers

Zone dampers should be installed and adjusted prior to making duct connections, assuring proper setup of the damper zones:

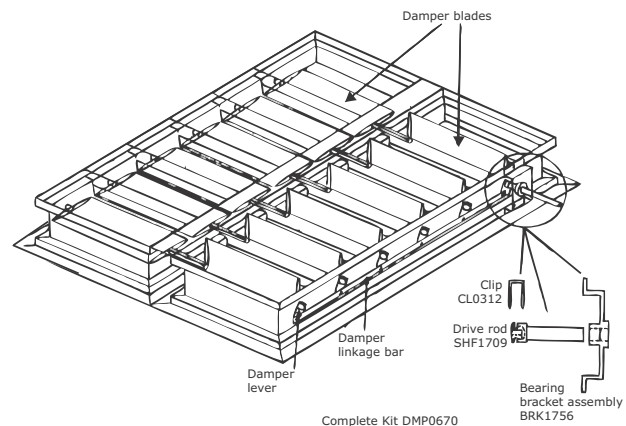
1. Check the damper blades to confirm they are not binding. The blade should rotate 90 degrees.
2. Determine the number of zones required. The zone damper is fitted with a linkage bar that connects all damper zones.
3. Select the number of damper segments required for the first zone.
4. Cut a section out of the damper linkage bar just after the last lever in that zone.

Note: It may be necessary to remove the damper linkage bar to cut it. To remove the linkage bar pry the "e" rings from the blade axles and remove the bar.

5. Repeat steps 3 and 4 for the remaining zones.
6. Attach the damper operator drive rod to one blade axle in each zone with the two-deck damper.
7. Use the self-drilling screws provided to mount the bearing bracket assembly (see [Figure 93](#)).

Note: The drive rod kits ship in a separate box, found in the fan module or the cold deck of the multizone module.

Figure 93. Setting the zone damper rods and damper linkage



Duct Connections

All duct connections to the air handlers should be installed in accordance with the standards of the National Fire Protection Association (NFPA):

- NFPA 90A for installing air conditioning and ventilating systems other than residence type.
- NFPA 90B for residence-type warm air heating and air-conditioning systems.

See unit submittal documentation for additional duct mounting information.

Fan Discharge Connections

To ensure the highest fan efficiency, duct turns and transitions must be made carefully, minimizing air friction losses and turbulence. Proper ductwork installation, as outlined by such organizations as Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), should be followed closely.

Indoor unit fan sections with rectangular or round openings should have flanged ductwork attached to bottom panel opening. When using lined ducts, the insulation should not obstruct the discharge opening. For plenum fan sections with bell mouth fittings, see ["Bell Mouth Discharge Connections"](#) on page 89.

Connections made directly to the discharge opening of a housed fan should have a minimum of three fan diameters of straight duct before any turns or transitions. The ductwork should be the same size as the fan discharge opening. The first turn of the connection should be in the same direction as the fan rotation as shown in [Figure 94](#). The air that the fan discharges into the duct is extremely turbulent and requires some length of duct to stabilize. Abrupt changes in ductwork directly off the fan discharge may adversely affect fan performance and acoustics.

Figure 94. Typical discharge ductwork recommendations

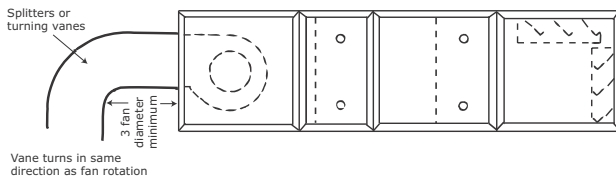


Figure 95. Typical section with duct flat/flange connection- uninsulated or externally insulated

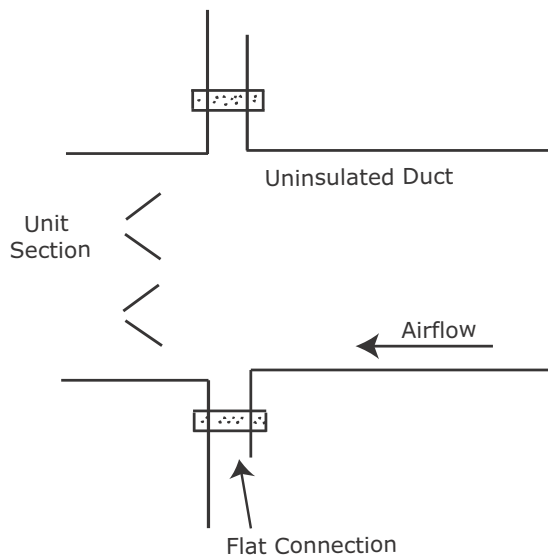
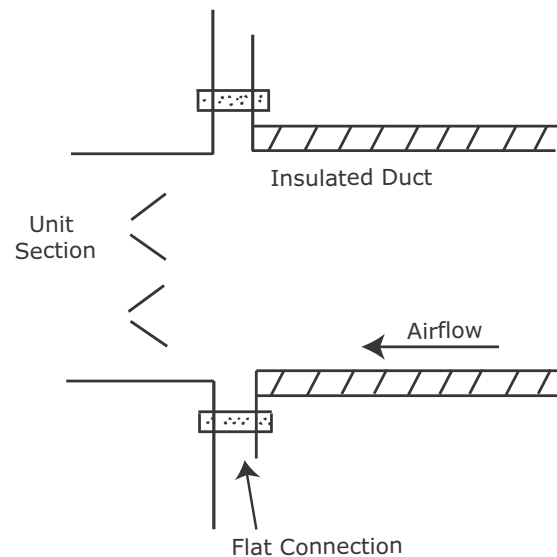


Figure 96. Typical section with duct flat/flange connection- internally insulated



Damper Connections

Standard damper sections include mixing sections, filter mixing sections, face dampers sections, internal face-and-bypass sections, and economizer sections. There are two damper blade configurations available - parallel-blade and opposed-blade. Traq™ dampers are another type of damper available in mixing box sections.

Ductwork attached to the standard damper sections should be sized to fit the opening of the damper. Duct opening dimensions are provided in the submittals. When using lined duct, ensure that the insulation does not obstruct the damper opening (see [Figure 95](#) and [Figure 96](#)).

Note: Damper blades should be checked for proper operation from full-open to full-closed position before unit start up. Damper blade positioning may have changed due to shipping and handling vibrations.

Component Installation Requirements

Bottom Opening Duct Installation

1. Install gasket to duct flange to ensure air tight seal.
2. Install duct into place underneath framed opening in unit base per [Figure 97](#). Refer to factory curb layout provided with unit submittals for duct size and location.

3. Bottom of unit base elevation is flush with duct opening in bottom of unit (see [Figure 98](#) and [Figure 99](#)).

Figure 97. Field-supplied duct connection to AHU bottom supply/return air opening

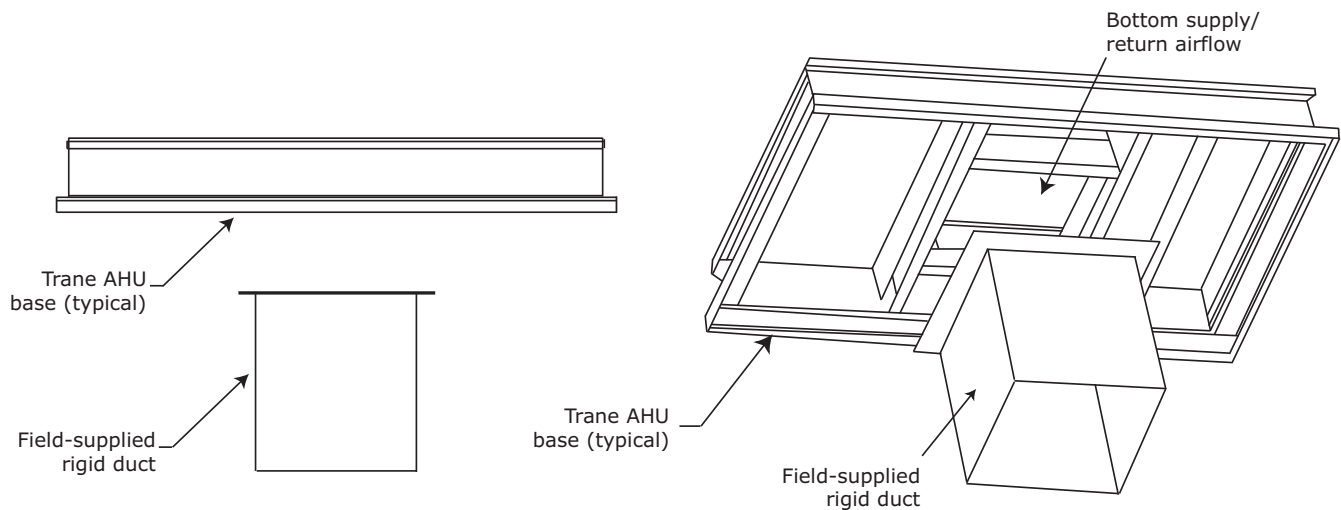


Figure 98. Field-supplied duct connection details - curb mount for outdoor units

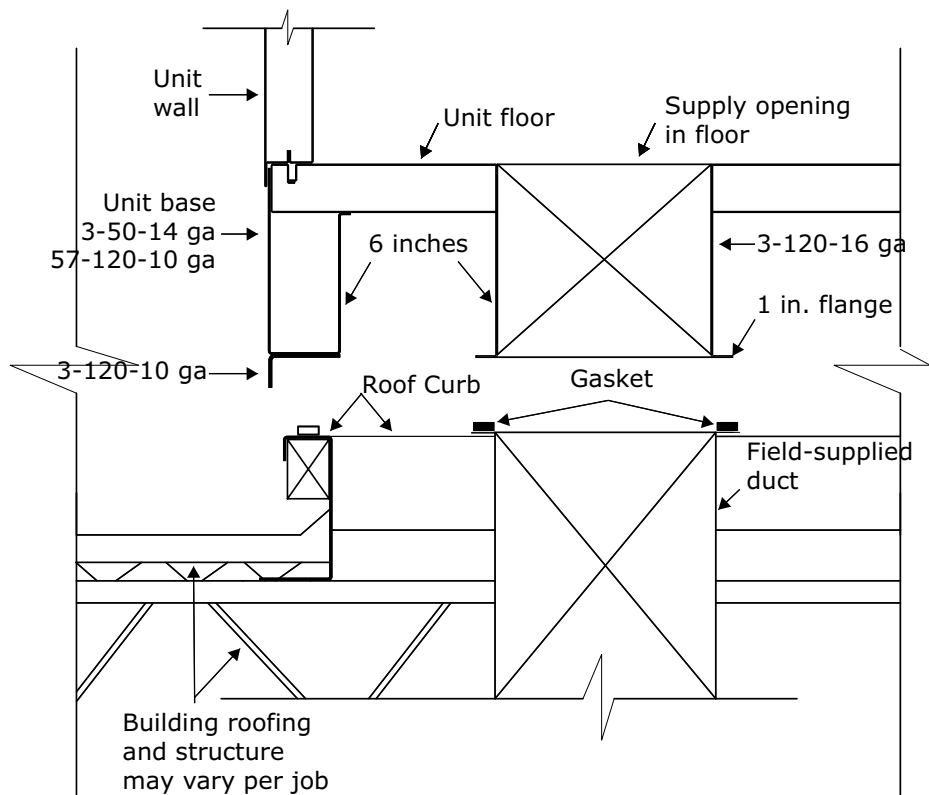
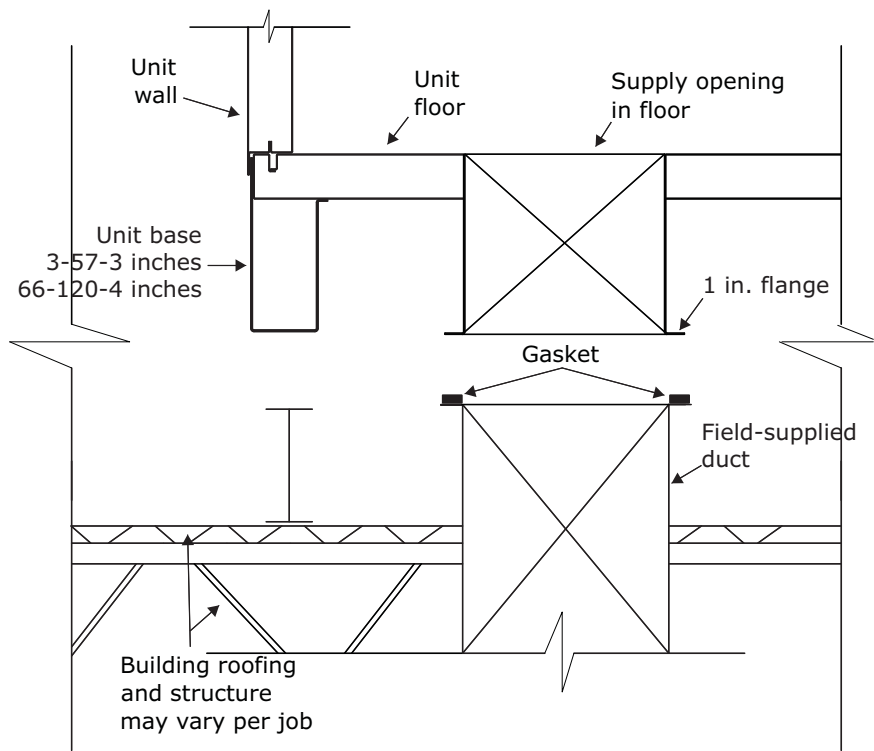


Figure 99. Field-supplied duct connection details - pier mount for outdoor units



Discharge Plenum Connections

Discharge plenum sections are available with or without openings. Sections with rectangular and round openings have a framed opening that can be used to secure the duct to the frames. If the duct is lined, it is important the insulation does not obstruct the opening of the section.

For a discharge plenum with field-cut openings, attach the duct to the side panel.

Bell Mouth Discharge Connections

Round duct connections to be fastened to plenum fan and discharge plenum sections with bell mouth discharge openings should be sized to attach to the casing or directly to the bell mouth fitting. Attachment to the casing requires the round duct diameter to be sized two inches larger than the nominal bell mouth outlet. An angle ring with a flat flange should be affixed to the round duct to secure the duct to the casing (see [Figure 100](#)). Attachment to the bell mouth fitting requires the duct and fitting to be insulated by the installing contractor up to the bell mouth radius to prevent condensation (see [Figure 101](#)). The bell mouth fitting extends through the casing by one inch.

Component Installation Requirements

Figure 100. Securing round duct to casing over bell mouth outlet

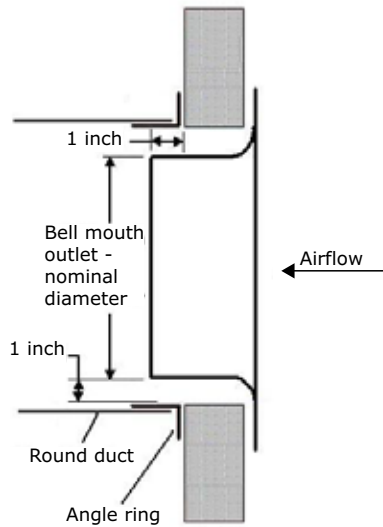
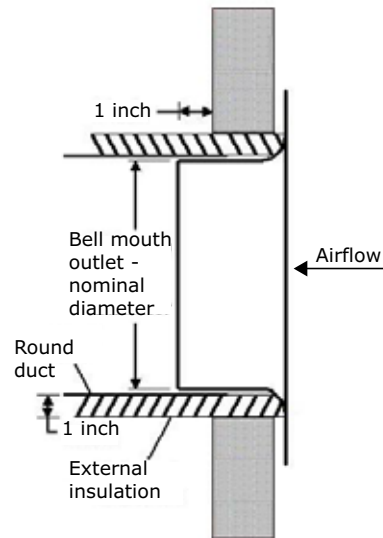


Figure 101. Securing round duct to bell mouth outlet

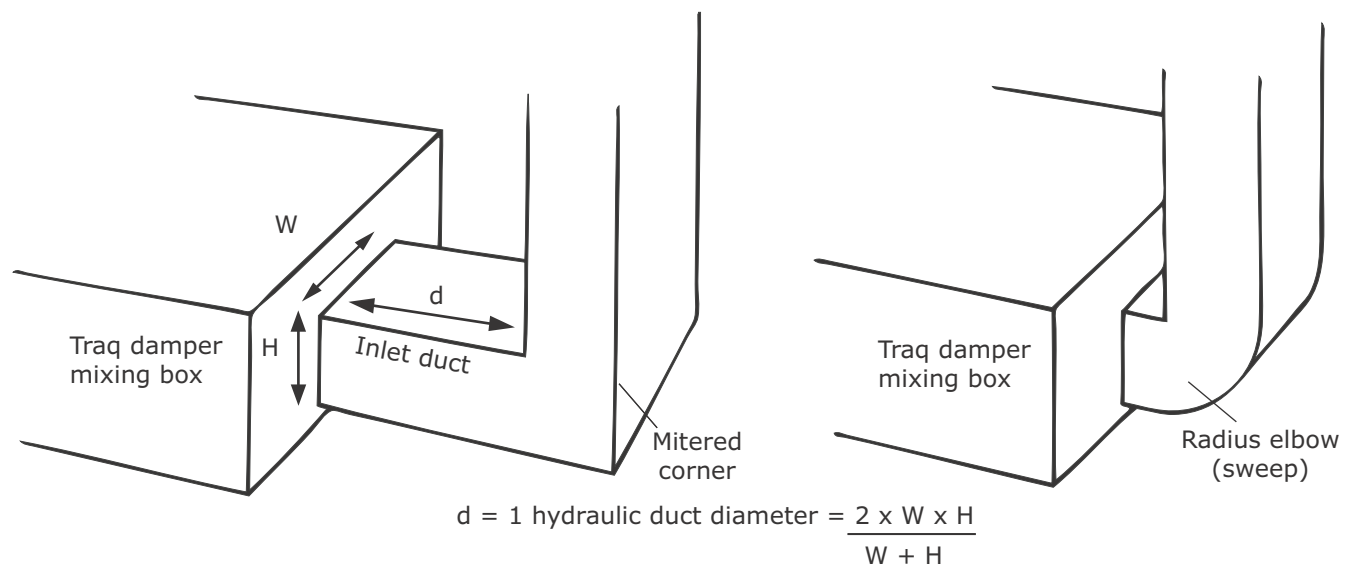


Traq Damper Connections

Size the duct connections to attach to the specified portion on the face of the mixing box that the duct connection completely covers all of the Traq damper.

For a mitered corner, provide one hydraulic duct diameter between the entering face of the Traq dampers and the duct turn. For a radius elbow, or sweep, place the elbow directly against the face of the Traq dampers (see [Figure 102](#)).

Figure 102. Traq damper duct connections



Component Installation Requirements

External Face-and-Bypass Connections

The external face-and-bypass damper sections will require a field-fabricated duct to direct the bypass air into the appropriate section. Duct sizing recommendations are listed in [Table 33](#).

When attaching a bypass duct to a downstream fan section or access section, the section will have a factory-provided opening. (see [Figure 103](#), [Figure 104](#), and [Figure 105](#).)

When bypassing into an access section, remove a panel. It is not necessary to cut an opening.

Table 33. Recommended bypass duct sizes (inches)

Unit size	H	W	L
3	16.00	20.00	14.00
4	18.00	33.00	16.00
6	18.00	33.00	16.00
8	18.00	39.00	16.00
10	18.00	50.00	16.00
12	22.00	55.00	20.00
14	22.00	61.00	20.00
17	22.00	61.00	20.00
21	28.00	69.00	26.00
22	45.00	50.50	31.13
25	28.00	69.00	26.00
26	47.00	50.50	33.13
30	28.00	82.00	26.00
31	47.00	61.00	33.13
35	45.00	80.00	36.00
36	47.50	69.00	40.13
40	45.00	93.00	36.00
41	55.50	69.00	40.13
50	45.00	106.00	36.00
51	55.50	82.00	40.13
57	47.00	106.00	40.00
58	55.50	82.00	52.13
66	48.00	121.00	40.00
80	56.00	121.00	48.00
100	56.00	135.00	48.00
120	56.00	162.00	48.00

Figure 103. External face-and-bypass with duct configuration designed to bypass air into a vertical fan section

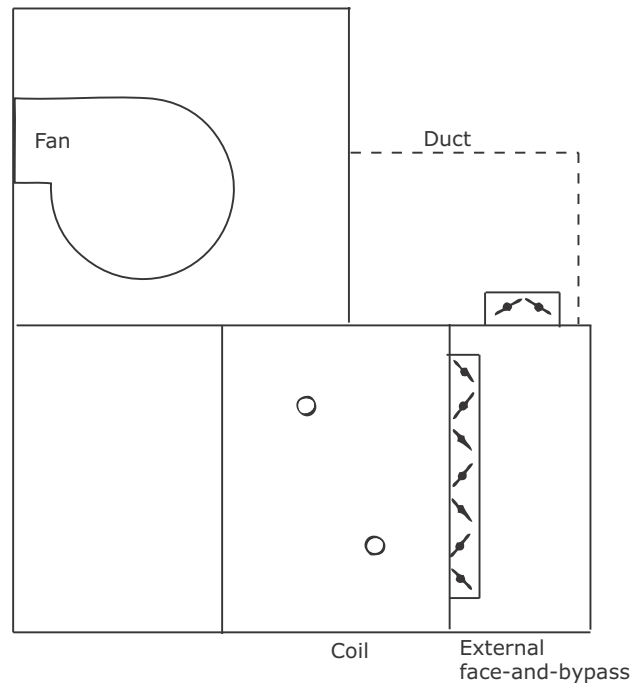
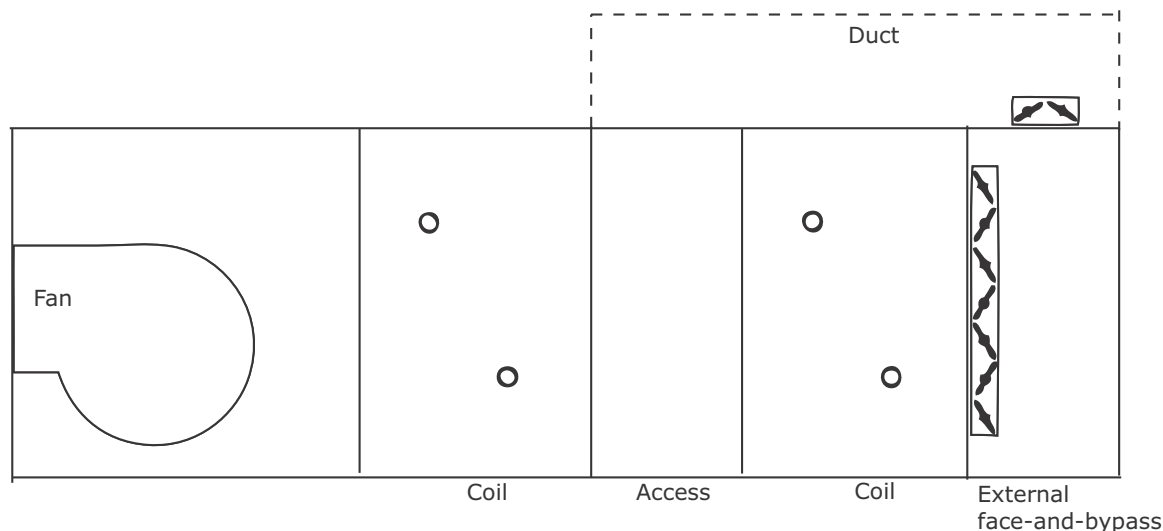
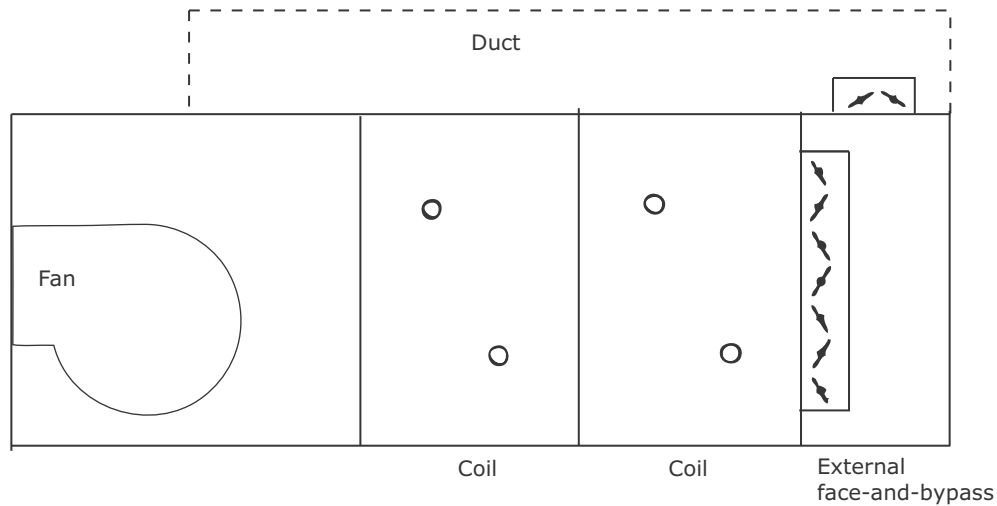


Figure 104. External face-and-bypass with duct configuration designed to bypass air around one coil



Component Installation Requirements

Figure 105. External face-and-bypass with duct configuration designed to bypass air into a horizontal fan section



Other Connections

Access, filter, and other sections may have open inlets with a 2-inch (sizes 3-120) panel frame for connecting the ductwork. If the duct is lined, it is important the insulation does not obstruct the opening of the section.

Figure 106. Typical duct flat/flange end of unit connection - uninsulated

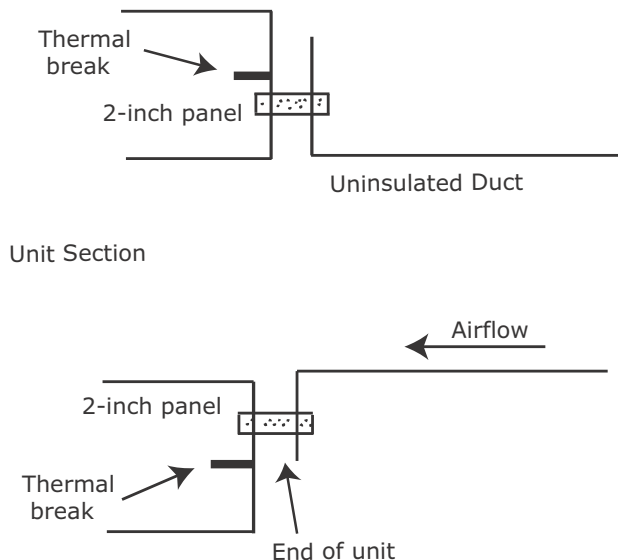
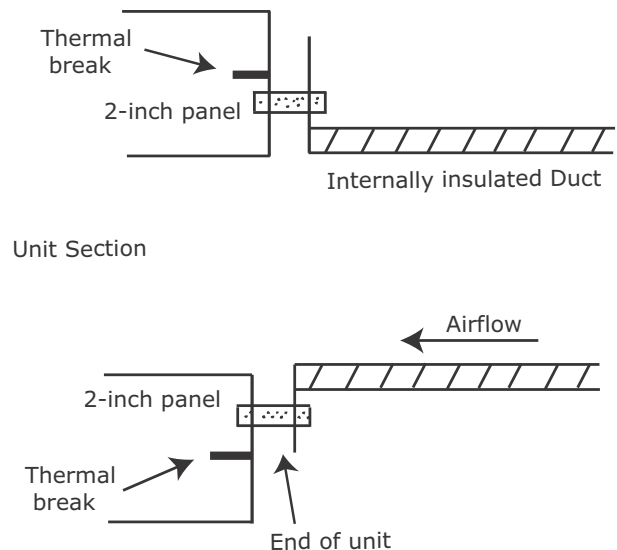


Figure 107. Typical duct flat/flange end of unit connection - insulated



Coil Piping and Connections

NOTICE:

Connection Leaks!

Use a backup wrench when attaching piping to coils with copper headers to prevent damage to the coil header. Do not use brass connectors because they distort easily and could cause connection leaks.

- When attaching the piping to the coil header, make the connection only tight enough to prevent leaks. Maximum recommended torque is 200 foot-pounds.
- Use pipe sealer on all thread connections.
- After completing the piping connections, seal around pipe from inner panel to outer panel.

Drain Pan Trapping

NOTICE:

Over Tightening!

Do not use Teflon-based products for any field connections because their high lubricity could allow connections to be over-tightened, resulting in damage to the coil header.

⚠ WARNING

No Step Surface!

Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury.

NOTICE:

Leakage!

Properly seal all penetrations in unit casing. Failure to seal penetrations from inner panel to outer panel could result in unconditioned air entering the module, and water infiltrating the insulation, resulting in equipment damage.

NOTICE:

Water Damage!

When more than one section has a drain pan, trap each section individually. Connecting all drains to a common line with only one trap can result in condensate retention and possible water damage to the air handler or adjoining space.

General Recommendations

Proper installation, piping, and trapping is necessary to ensure satisfactory coil operation and to prevent operational damage:

- Support all piping independently of the coils.
- Provide swing joints or flexible fittings on all connections that are adjacent to heating coils to absorb thermal expansion and contraction strains.
- If the coil was ordered with factory-mounted controls, install the control valves. The valves ship separately.

Note: The contractor is responsible for supplying the installation hardware.

- For best results, use a short pipe nipple on the coil headers prior to making any welded flange or welded elbow type connections.
- Extended drain and vent connections are provided as standard on D1 and D2 coils only. If extended drains and vents are required on other water coils, they must be field-installed or ordered as specials from the factory.
- Pipe coils counterflow to airflow.

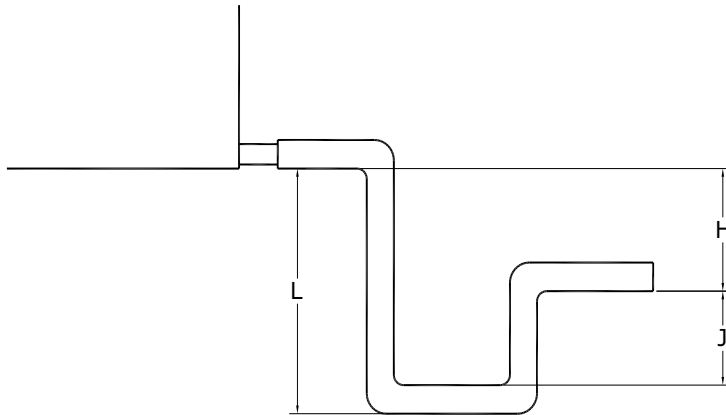
Threaded condensate drain connections are provided on only one side of the coil section. Pitch the connection lines horizontal or downward toward an open drain. Trane recommends installing a plug to facilitate cleaning of the trap. The drain connection sizes are:

Unit size	NPT (national pipe thread) external connection
3-31	1-inch
35-58	1 1/4 inch
66-120	1 1/2 inch

Figure 34 illustrates the proper trapping, piping, and operation of the trap. Use the formula under the figure to determine the correct minimum depth for the condensate trap. If a section has a drain pan for cleaning purposes only, it does not need a trap; however, a cap or shutoff valve should be installed on the drain connection. Only sections handling condensate, such as a cooling coil section or moisture eliminator section, require a trap.

Coil Piping and Connections

Table 34. Drain pan trapping for negative and positive pressure applications



Drain pan trapping for section under negative pressure

$L = H + J + \text{pipe diameter}$ where:
 $H = 1$ inch for each inch of negative pressure plus 1 inch
 $J = 1/2 H$

Drain pan trapping for section under positive pressure

$L = H + J + \text{pipe diameter}$ where:
 $H = 1/2$ inch (minimum)
 $J = 1/2$ inch plus the unit positive static pressure at coil discharge (loaded filters)

Steam Coil Piping

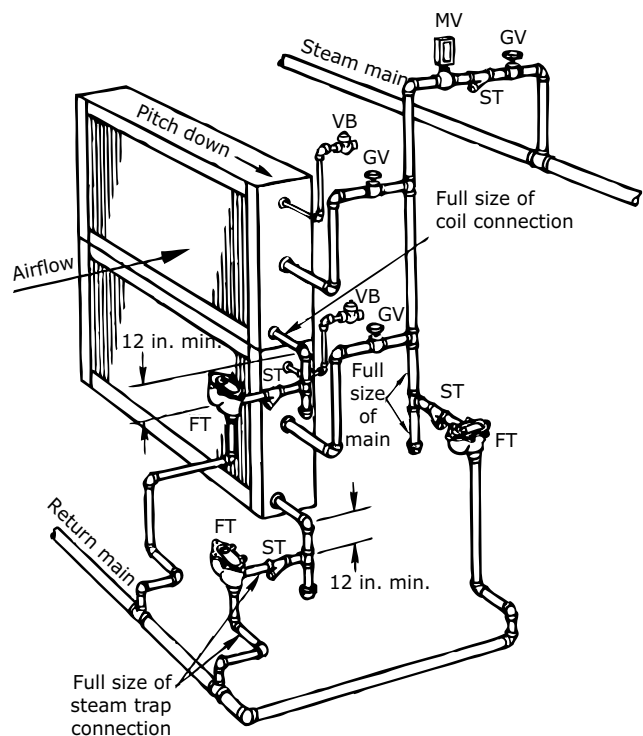
Air handlers fitted with steam coils have labeled holes for piping penetrations. [Figure 108](#) illustrates a typical steam coil piping configuration. See [Table 35](#) for the codes of system components in these figures.

The coil condensate return line must be piped full size of the condensate trap connection, except for a short nipple screwed directly into the coil header's condensate return tapping. Do not bush or reduce the coil return trapping size.

Table 35. Code of system components for piping figures

Code	System component
FT	Float and thermostatic steam trap
GV	Gate valve
OV	Automatic two-position (ON-OFF) control valve
VB	Vacuum breaker
ST	Strainer
AV	Automatic or manual air vent
MV	Modulating control valve

Figure 108. Typical piping for Type NS steam coils and horizontal tubes for horizontal airflow



NOTICE:**Breaker Cracking Pressure!**

The 1/2-inch NPT, 15 degree swing check valve vacuum breaker is recommended because other vacuum breakers, such as spring-loaded ball-check breakers, have cracking pressures as high as 1.25 inches Hg (17 inches of water). Vacuum breakers with fitting sizes smaller than 1/2 inch NPT are too small to relieve vacuum quick enough to ensure complete condensate drainage. Other types of swing check valve vacuum breakers are acceptable if the fittings size is not smaller than 1/2-inch NPT and the cracking pressure is not larger than 0.25 inches HG (3.5 inches of water). Failure to follow these instructions could result in equipment damage.

To prevent coil damage, complete the following recommendations:

- Install a 1/2-inch NPT, 15 degree swing check valve vacuum breaker with cracking pressure of 0.25 inches Hg (3.4 inches water) or lower at the top of the coil. This vacuum breaker should be installed as close to the coil as possible.
- For coil type NS, install the vacuum breaker in the unused condensate return tapping at the top of the coil.
- Vent the vacuum breaker line to atmosphere or connect it into the return main at the discharge side of the steam trap

Note: Vacuum breaker relief is mandatory when the coil is controlled by a modulating steam supply or automatic two position (ON-OFF) steam supply valve. Vacuum breaker relief is also recommended when face-and-bypass control is used.

NOTICE:**Coil Condensate!**

Condensate must flow freely from the coil at all times to prevent coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion. In all steam coil installations, the condensate return connections must be at the low point of the coil. Failure to follow these instructions could result in equipment damage.

Proper steam trap installation is necessary for satisfactory coil performance and service life. For steam trap installation:

1. Install the steam trap discharge 12 inches below the condensate return connection. Twelve inches provides sufficient hydrostatic head pressure to overcome trap losses and ensures complete condensate removal.
 - a. Use float and thermostatic traps with atmospheric pressure gravity condensate return, with automatic controls, or where the possibility of low-pressure supply steam exists. (Float and thermostatic traps are recommended because of gravity drain and continuous discharge operation.)
 - b. Use bucket traps only when the supply steam is not modulated and is 25 psig or higher.

Note: Trane steam coils require a minimum of 2 psi of pressure to assure even heat distribution.

2. Trap each coil separately to prevent holding up condensate in one or more of the coils.
3. Install strainers as close as possible to the inlet side of the trap.
4. If installing coils in series airflow, control each coil bank independently with an automatic steam-control valve. Size the traps for each coil using the capacity of the first coil in direction of airflow.
5. Use a modulating valve that has linear flow characteristics to obtain gradual modulation of the coil steam supply.

Note: Do not modulate systems with overhead or pressurized returns unless the condensate is drained by gravity into a receiver, vented to atmosphere, and returned to the condensate pump.

6. Pitch all supply and return steam piping down 1 inch for every 10 feet in the direction of the steam or condensate flow.

Note: Do not drain the steam mains or take-offs through the coils. Drain the mains ahead of the coils through a steam trap to the return line.

7. Ensure overhead returns have 1 psig of pressure at the steam trap discharge for every 2 feet of elevation for continuous condensate removal.

Water Coil Piping

Figure 109, and Figure 111 illustrate typical water coil piping configurations.

Type 5A, 5W, D1, W, UW, TT, P2, P4, and P8 water coils are self-venting only if the water velocity exceeds 1.5 feet per second (fps) in the coil tubes. Type D2, UA, UU, and WD water coils are self-venting only if the water velocity exceeds 2.5 fps in the coil tubes. See the unit submittals for coil water velocity. If the water velocity is below these minimums, vent the coil by one of the following methods:

1. Install an air vent in the top pipe plug tapping of the return header.
2. When the return line rises above the top of the coil, vent from the top of the return header horizontally to the return piping.

Note: TT coils are designed with larger than normal end tube sheet holes to allow for maximum expansion. Air leakage around tubes should be expected and handled by capping over coil ends or by sealing around tubes with a pliable sealant such as silicone.

Figure 109. Typical piping for type 5W one-row water coil

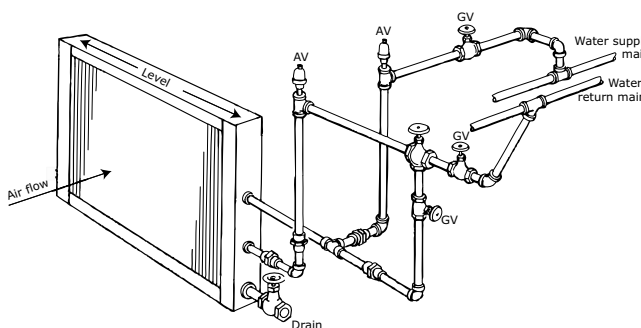


Figure 110. Typical piping for type 5A, 5W two-row, W 3- to 12-row, WD, D1, and D2 water coils

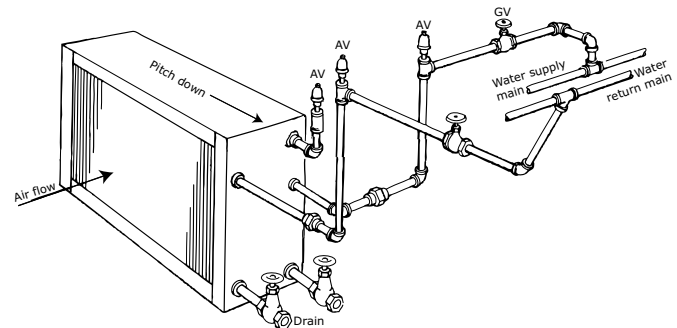
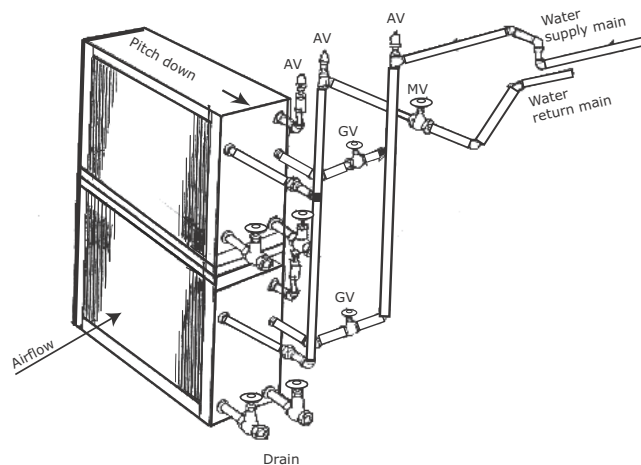


Figure 111. Typical piping for stacked water coils

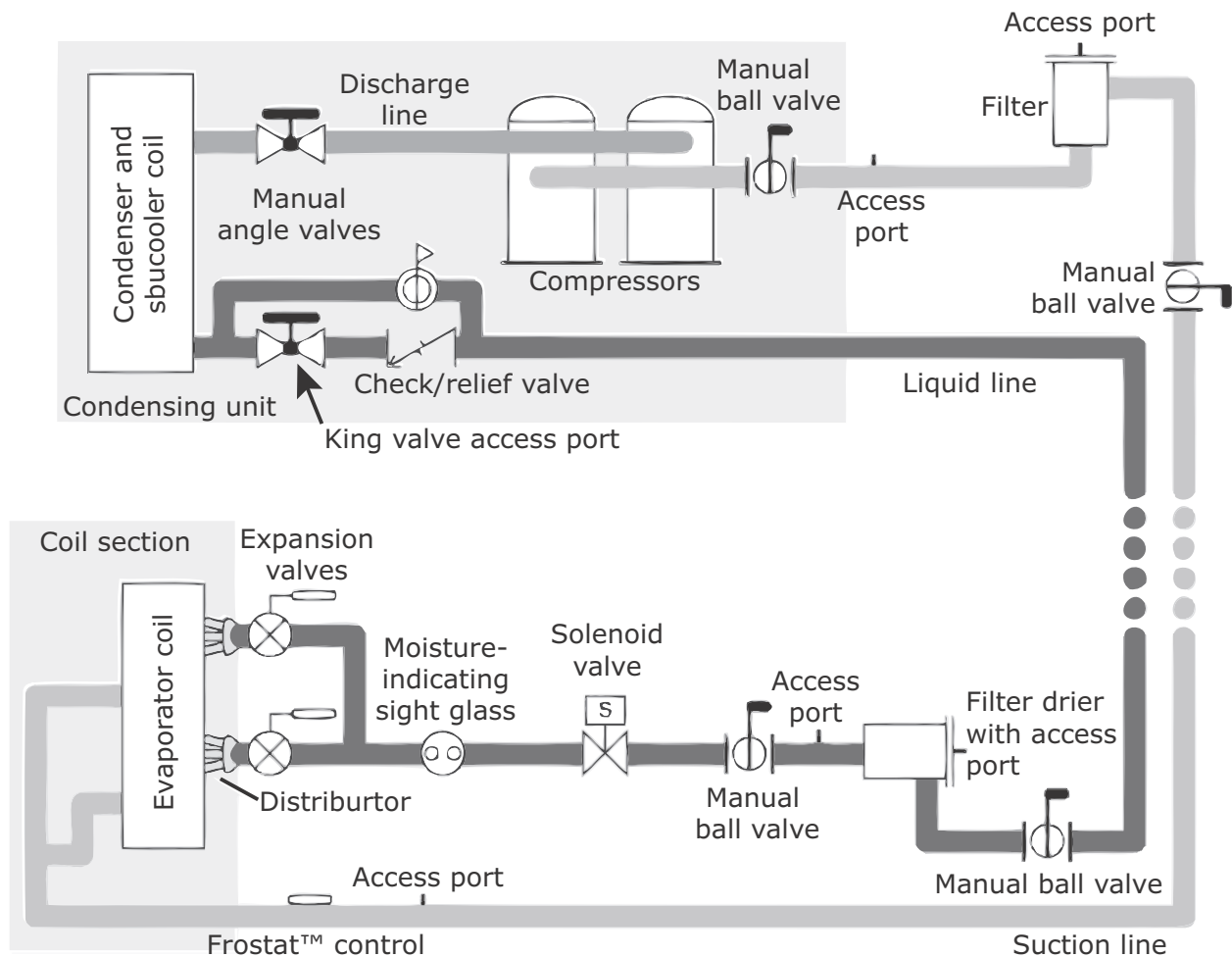


Refrigerant Coil Piping

Note: Refer to for information on handling refrigerants.

Figure 112 illustrates an example of a split-system component arrangement. Use it to determine the proper, relative sequence of the components in the refrigerant lines that connect the condensing unit to an evaporator coil. Refer to [“Field-Installed Evaporator Piping Examples,” p. 101](#) for more detailed schematics of evaporator piping.

Figure 112. Example of placement for split-system components



Kit with sensor - X13790452010 SEN-01212
 Kit with switch - X13100429010 THT 02442

Liquid Lines

Line Sizing

Properly sizing the liquid line is critical to a successful split-system application. The selected tube diameter must provide at least 5°F [2.7°C] of subcooling at the expansion valve throughout the operating envelope. Increasing the size of the liquid line will not increase the available subcooling.

Routing

Install the liquid line with a slight slope in the direction of flow so that it can be routed with the suction line. Minimize tube bends and reducers because these items tend to increase pressure drop and to reduce subcooling at the expansion valve. Liquid line receivers, other than those that are factory-installed, are not recommended.

Insulation

The liquid line is generally warmer than the surrounding air, so it does not require insulation. In fact, heat loss from the liquid line improves system capacity because it provides additional subcooling. However, if the liquid line is routed through a high-temperature area, such as an attic or a mechanical room, insulation would be required.

Components

Liquid-line refrigerant components necessary for a successful job include a filter drier, access port, solenoid valve, moisture-indicating sight glass, expansion valve(s), and ball shutoff valves. [Figure 112](#) illustrates the proper sequence for positioning them in the liquid line. Position the components as close to the evaporator as possible.

- **Filter drier.** There is no substitute for cleanliness during system installation. The filter drier prevents residual contaminants, introduced during installation, from entering the expansion valve and solenoid valve.
- **Access port.** The access port allows the unit to be charged with liquid refrigerant and is used to determine subcooling. This port is usually a Schraeder® valve with a core.
- **Solenoid valve.** In split systems, solenoid valves isolate the refrigerant from the evaporator during off cycles; under certain conditions, they may also trim the amount of active evaporator as compressors unload. Generally, the “trim” solenoid valve is unnecessary for VAV comfort-cooling applications, and is only required for constant-volume applications when dehumidification is a concern.
In split systems with microchannel heat exchanger condensers (MCHE), solenoid valves isolate the refrigerant from the evaporator during the off cycles. Trim solenoids cannot be used with MCHE.

Note: Trane condensing units with MCHE no longer employ pump-down, but isolation solenoids are required. The suggested solenoid uses a 120-volt

service and requires code-compliant wiring to the condensing unit.

- **Moisture-indicating sight glass.** Be sure to install one moisture-indicating sight glass in the main liquid line. The only value of the sight glass is its moisture indication ability. Use actual measurements of temperature and pressure—not the sight glass—to determine subcooling and whether the system is properly charged. The moisture indicator/sight glass must be sized to match the size of the liquid line at the thermal expansion valve.

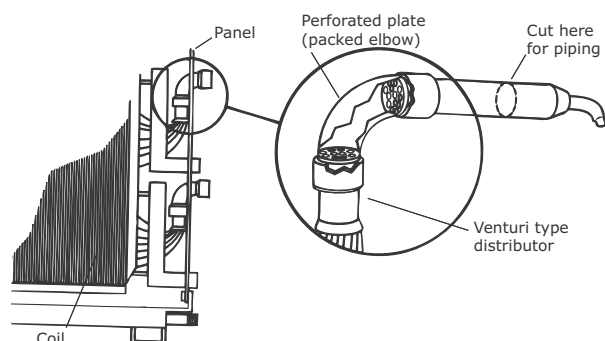
NOTICE:

Valve Damage!

Disassemble the thermal expansion valve before completing the brazing connections. If necessary, wrap the valve in a cool, wet cloth while brazing. Failure to protect the valve from high temperatures could result in damage to internal components.

- **Thermal expansion valve.** The expansion valve is the throttling device that meters the refrigerant into the evaporator coil. Metering too much refrigerant floods the compressor; metering too little elevates the compressor temperature. Choosing the correct size and type of expansion valve is critical to assure it will correctly meter refrigerant into the evaporator coil throughout the entire operating envelope of the system. *Correct refrigerant distribution into the coil requires an expansion valve for each distributor.* The thermal expansion valve must be selected for proper size and capacity. The size of the expansion valve should cover the full range of loadings. Check that the valve will successfully operate at the lightest load condition. For improved modulation, choose expansion valves with balanced port construction and external equalization. Cut the process tube and cap assembly from the liquid connection as shown in [Figure 113](#) and install the expansion valve directly to the liquid connections.

Figure 113. Type F refrigerant coil with packed elbow



- **Ball shutoff valves.** Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

Suction Lines

Line sizing

Proper line sizing is required to guarantee the oil returns to the compressor throughout the system's operating envelope. At the same time, the line must be sized so that the pressure drop does not excessively affect capacity or efficiency. To accomplish both objectives, it may be necessary to use two different line diameters: one for the horizontal run and for the vertical drops, and another for the vertical lifts (risers).

Routing

To prevent residual or condensed refrigerant from "free-flowing" toward the compressor during the off cycle, install the suction line so it slopes by $\frac{1}{4}$ inch to 1 inch per 10 feet of run toward the evaporator.

When the application includes a suction riser, oil must be forced to travel the height of the riser. Riser traps are unnecessary in the suction line. They will add pressure drop. Double risers must not be used. They not only add pressure drop, but can hold great amounts of oil - oil better used in the compressor.

Note: If a suction riser is properly sized, oil will return to the compressor regardless of whether a trap is present. If a suction riser is oversized, adding a trap will not restore proper oil entrainment.

Avoid Underground Refrigerant Lines

Refrigerant condensation during the off cycle, installation debris inside the line (including condensed ambient moisture), service access, and abrasion/corrosion can quickly impair reliability.

Insulation

Any heat that transfers from the surrounding air to the cooler suction lines increases the load on the condenser

(reducing the system's air-conditioning capacity) and promotes condensate formation. After operating the system and testing all fittings and joints to verify that the system is leak-free, insulate suction lines to prevent heat gain and unwanted condensation.

Components

Installing the suction line requires field installation of these components: a filter, access port, and a Froststat™ control when the refrigerant coil is used with Trane condensing units. Position them as close to the compressor as possible.

Note: Placement of the Froststat control is illustrated in Figure 112 on page 97.

- **Filter.** The suction filter prevents contaminants, introduced during installation, from entering the compressor. For this reason, the suction filter should be the replaceable-core type, *and* a clean core should be installed after the system is cleaned up.
- **Access port.** The access port is used to determine suction pressure. This port is usually a Schraeder valve with a core.
- **Froststat™ coil frost protection.** The Froststat control is the preferred method for protecting evaporator coils from freezing when the refrigerant coil is used with Trane condensing units. It senses the suction-line temperature and temporarily disables mechanical cooling if it detects frost conditions. The control is mechanically attached to the outside of the refrigerant line, near the evaporator, and wired to the unit control panel.
- **Ball shutoff valve.** Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

Expansion Valves

Expansion valves meter refrigerant into the evaporator under controlled conditions. If there is too much refrigerant, the refrigerant will not completely vaporize and the remaining liquid will slug the compressor. If there is too little refrigerant, there may not be enough cooling for the compressor.

Expansion valve requirements vary based on condensing unit design. Consult the product literature for the condensing unit to be used for proper valve selection.



Hot Gas Bypass

Many years ago, hot gas bypass (HGBP) was successfully added to HVAC systems to correct a number of operational problems. Hoping to avoid such problems altogether, it eventually became common practice for designers to specify hot gas bypass in new systems. Unfortunately, the practice often degraded rather than improved reliability.

Hot gas bypass increases the minimum refrigerant charge; it also inflates the first cost of the system. Besides adding more paths for potential refrigerant leaks, hot gas bypass increases the likelihood of refrigerant distribution problems. Finally, hot gas bypass uses excessive amounts of energy by preventing the compressors from cycling with fluctuating loads.

Trane now has many years of experience in the successful use of equipment *without hot gas bypass* in commercial comfort-cooling applications. To prevent evaporator freeze-up, Trane equipment typically includes Froststat™ coil frost protection.

Like hot gas bypass, the Froststat system protects the coil from freezing, but it does so by turning off compressors when a sensor detects the formation of frost on the evaporator coil. The compressor is released to operate when the coil temperature rises a few degrees above the frost threshold. The Froststat control strategy reduces the overall energy consumption of the system while maintaining system control.

Systems should be designed to avoid HGBP whenever possible. For more information about HGBP, refer to the *Engineers Newsletter*, "Hot Gas Bypass – Blessing or a Curse?" (ADM-APN007-EN).

Remodel, Retrofit, or Replacement

Inevitably, older condensing units and evaporator systems will need to be replaced or retrofitted. Due to the phase-out of many of these older refrigerants, the major components for those older units or systems may no longer be available. The only option will be to convert the system to R-410A, POE oil, and R-410A components.

When upgrading an existing refrigerant split system due to remodel, retrofit, or replacement, the entire system must be reviewed for compatibility with R-410A and POE oil. Each and every part of the split HVAC system **MUST** be compatible with the properties of R-410A refrigerant and POE oil. In addition, ensure the existing electrical service is adequate for the product being installed.

⚠ WARNING

R-410A Refrigerant under Higher Pressure than R-22!

Failure to use proper equipment or components as described below, could result in equipment failing and possibly exploding, which could result in death, serious injury, or equipment damage. The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.

Every part of an existing split system needs to be analyzed to determine if it can be reused in an R-410A and POE oil system:

- R-22 condensing units will not work with R-410A; they must be replaced.
- Most older evaporator coils were not pressure- and cycle-rated for R-410A pressures. If they weren't, they will need to be replaced. If they were properly pressure-rated for R-410A, existing coils must be modeled to determine if they will meet capacity requirements, are properly circuited, have correctly sized distributor tubes, and employ acceptable distributors and orifices.
- The required R-410A line sizes may be different than the existing line sizes. The lines need to be re-sized and compared to existing lines for reusability.
- Suction lines 2-5/8 OD and smaller of type L copper are suitable for use with R-410A. Suction lines 3-1/8 OD must use type K or thicker wall.
- Discharge lines, liquid lines, heat pump vapor lines, and hot gas bypass lines 1-3/8 OD and smaller of type L copper are suitable for use with R-410A. These same lines sized at 1-5/8 OD or 2-1/8 OD must use type K or thicker wall.
- Expansion valves need to be reselected. Expansion valves are refrigerant specific.
- Any gasket or o-ring should be replaced. Shrinkage of the original seal may occur after an HFC conversion, potentially causing a refrigerant leak. Components commonly affected are Schraeder cores, solenoid valves, ball valves, and flange seals. But *all* external seals in contact with refrigerant should be viewed as potential leak sources after a retrofit.
- All other valves, filters, valve packing, pressure controls, and refrigeration accessories must be researched through their manufacturer for compatibility with the pressures of an R-410A system, and for their compatibility with the newer POE oil.

- For the best performance and operation, the original mineral oil should be removed from the components of the system that are not being replaced. Any component of the system that is suspected of trapping oil (piping, traps, and coil), should be dismantled, drained, and reassembled. After all components have been drained, the amount of residual mineral oil will have a negligible effect on performance and reliability.

NOTICE:

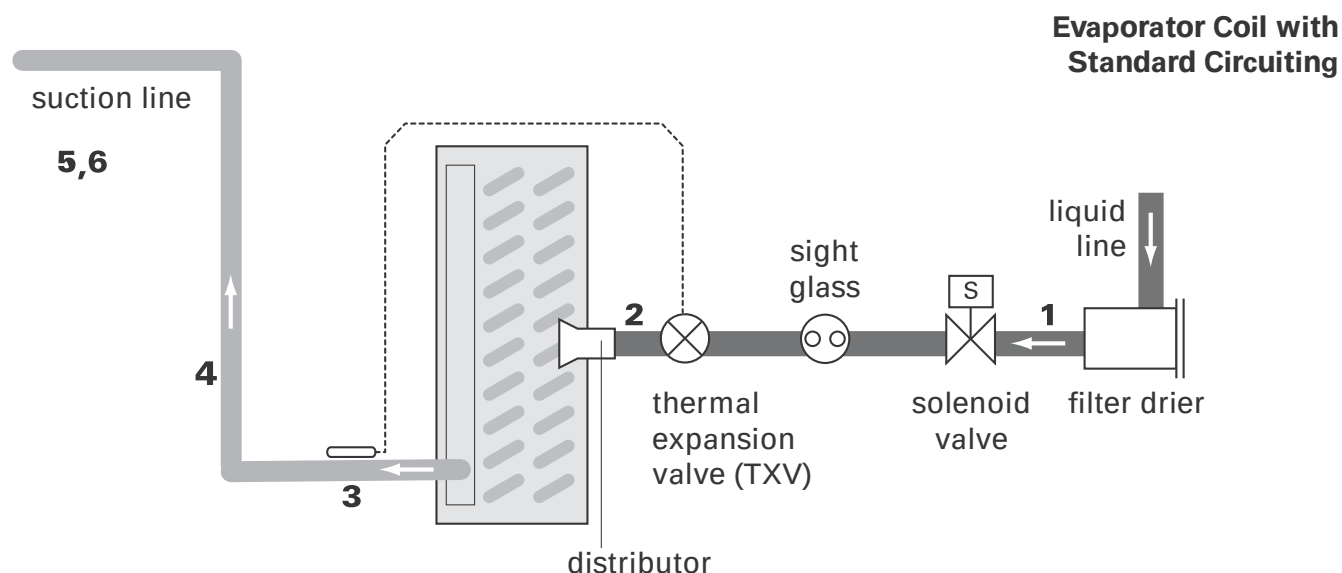
Compressor Damage!

POE oil is hygroscopic – it absorbs water directly from the air. This water is nearly impossible to remove from the compressor oil and can cause compressor failures. For this reason, the system should not be open for longer than necessary, dry nitrogen should flow in the system while brazing, and only new containers of oil should be used for service and maintenance.

All Codes take precedence over anything written here.

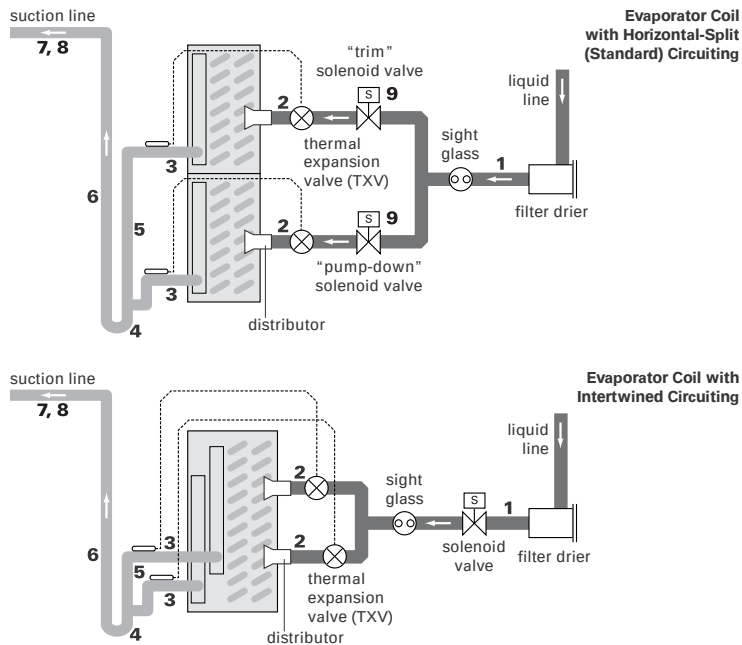
Field-Installed Evaporator Piping Examples

Figure 114. Single-circuit condensing unit: evaporator coil with one distributor



- Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
- Provide one expansion valve per distributor.
- Slightly pitch the outlet line from the suction header toward the suction riser—that is, 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
- Use the tube diameter recommended in the condensing unit application manual for a vertical rise. Ensure that the top of the riser is higher than the evaporator coil.
- Pitch the suction line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
- Insulate the suction line.

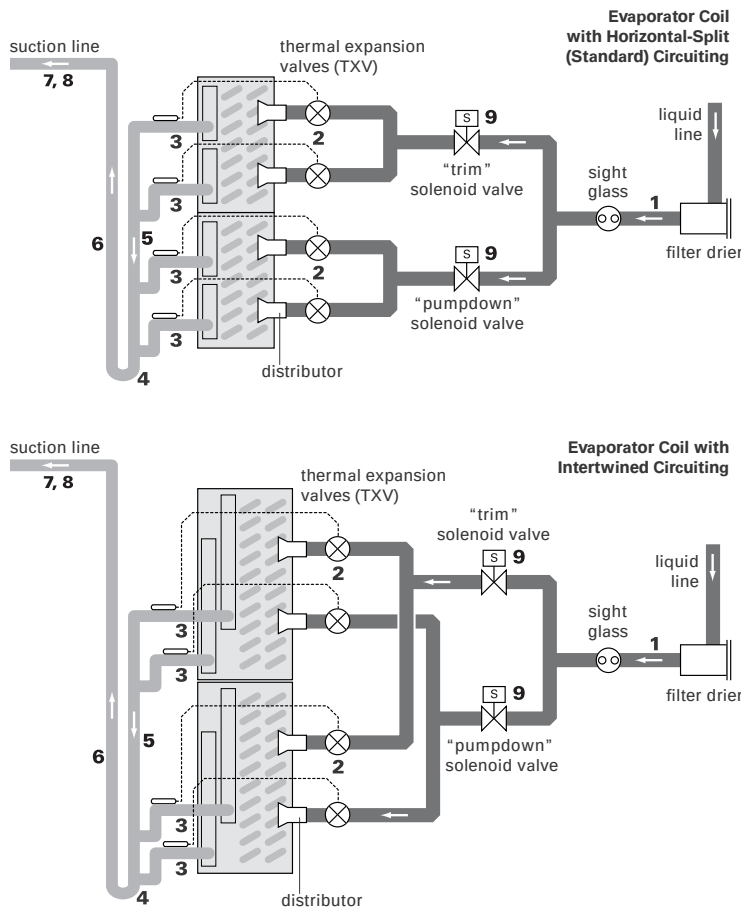
Figure 115. Single-circuit condensing unit: evaporator coil with two distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection. Use a double-elbow configuration to isolate the TXV bulb from other suction headers.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward.
5. Use the “horizontal” tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Assure the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. Only use a “trim” solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the “pumpdown” solenoid valve) between the liquid-line filter drier and the sight glass.

Note: Due to reduced coil volume in condensing units with microchannel heat exchanger condenser, do not use trim solenoid valves for these units.

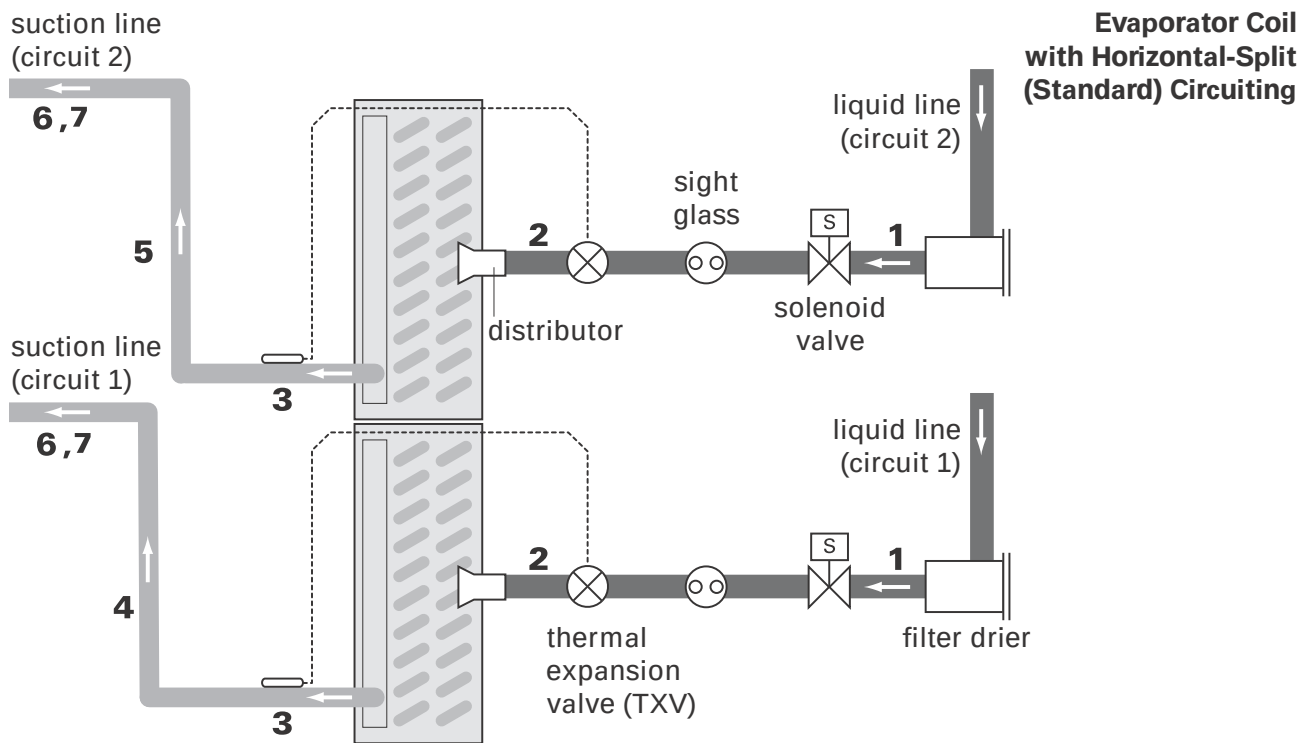
Figure 116. Single-Circuit Condensing Unit: Evaporator Coil with Four Distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use the double-elbow configuration to isolate the TXV bulb from other suction headers.
5. Use the “horizontal” tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Ensure that the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. Only use a “trim” solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the “pumpdown” solenoid valve) between the liquid-line filter drier and the sight glass.

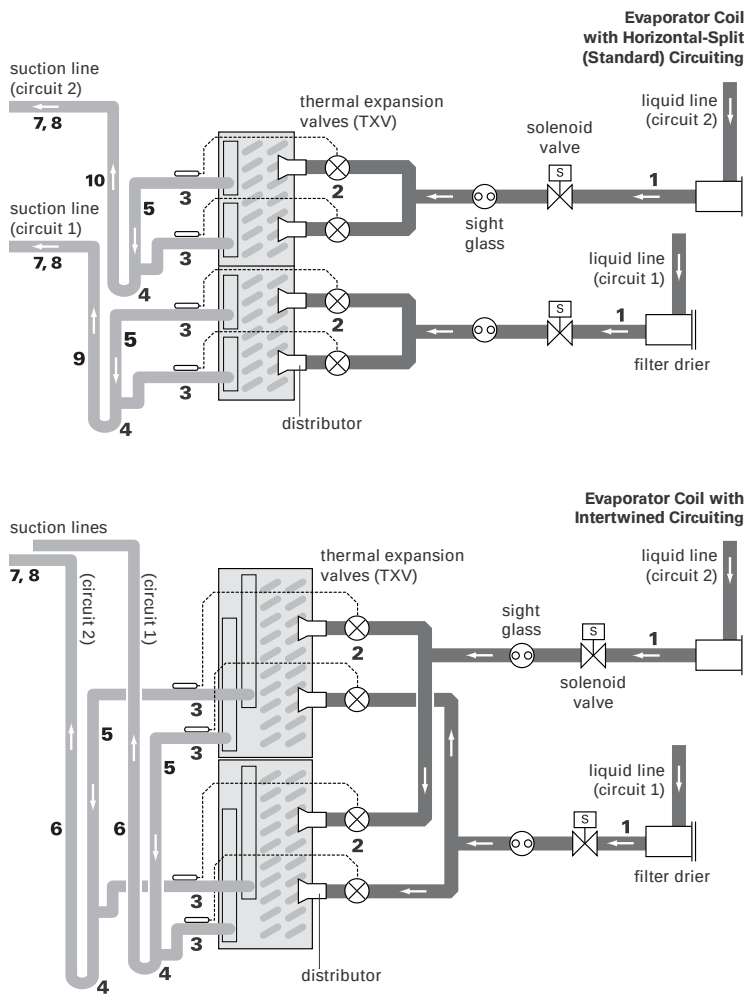
Note: Due to reduced coil volume in condensing units with microchannel heat exchanger condenser, do not use trim solenoid valves for these units.

Figure 117. Dual-circuit condensing unit: evaporator coil with two distributors



1. Pitch the liquid lines slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
5. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
6. Pitch the suction lines slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
7. Insulate the suction lines.

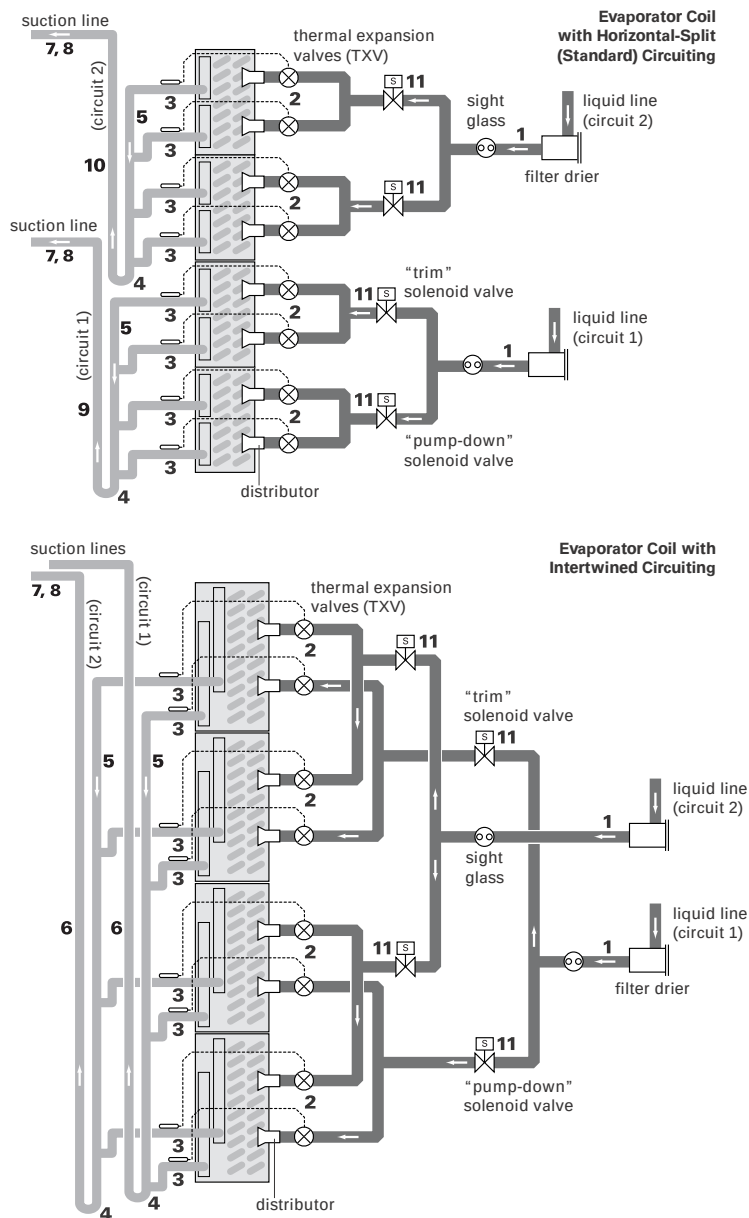
Figure 118. Dual-circuit condensing unit: evaporator coil with four distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use the double-elbow configuration to isolate the TXV bulb from other suction headers.
5. Use the “horizontal” tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Ensure that the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
10. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.

Coil Piping and Connections

Figure 119. Dual-circuit condensing unit: evaporator coil with eight distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. This looks like a trap, but is actually due to the requirement that the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use the double-elbow configuration to isolate the TXV bulb from other suction headers.
5. Use the “horizontal” tube diameter as specified in the condensing unit application manual.
6. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual. Ensure that the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
10. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended for a vertical rise as specified in the condensing unit application manual.
11. Only use a “trim” solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the “pumpdown” solenoid valve) between the liquid-line filter drier and the sight glass.

Note: Due to reduced coil volume in condensing units with microchannel heat exchanger condenser, do not use trim solenoid valves for these units.

Humidifier Piping and Connections

These instructions cover the piping installation for Trane's building steam humidifier panel and atmospheric steam humidifier panel. The humidifier panel shall arrive installed in the unit air cabinet.

Units with a humidifier panel to be used with building (boiler) steam will also receive the following piping accessories shipped direct from the humidifier vendor to the jobsite address.

- Inverted bucket steam trap (to be used to drip steam supply to control valve)
- Control valve
- In-line Y strainer (to be used prior to the control valve)
- Float and thermostatic steam trap (for condensate drainage of header, two required)

Units with a humidifier panel to be used with atmospheric distribution of steam generated by electric or steam-to-steam humidifiers (steam generating) are not supplied with piping accessories. Piping will be determined by requirement of field-provided steam generator.

All accessories listed above will be on the packing slip. Report any shortages immediately. If accessories have been damaged in transit, notify Trane and file claim with the transportation company. If your order covers more than one package, segregate complete assembly. Equipment tagging will be the same as shown on the packing list.

All piping accessories should be installed in accordance with all applicable building, plumbing, and electrical codes.

Condensate discharged from the humidifier separator/header is essentially atmospheric pressure. Thus condensate must be discharged to a drain or pumped. On many applications, an attempt to lift condensate even a few inches will lead to potential flooding or spitting problems from the multiple tube bank. Avoid master trapping the two connections to one steam trap. If traps discharge into a common return, install check valves (low opening pressure) on the outlet of each trap.

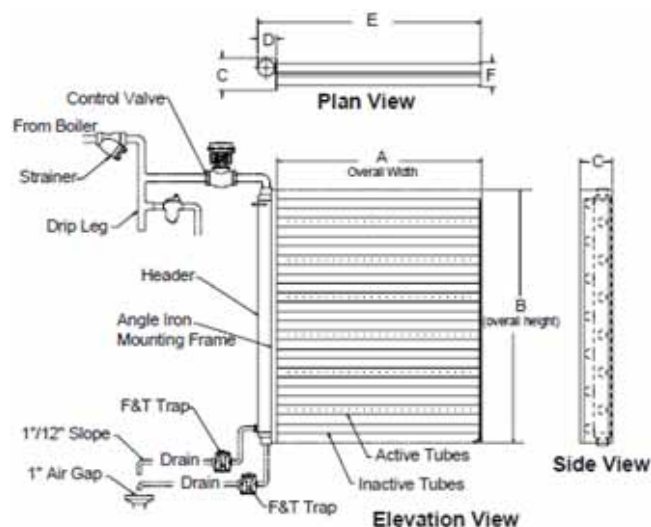
Supplying quality steam (not wet) to the humidifier panel is an important component for proper operation. Care must be taken that the main supply header is dripped sufficiently as well as the runout piping to the control valve and header. The entire system must be designed and hooked up to prevent accumulation of condensate at any point. The following recommendations will help to ensure this.

Use drip legs and traps at all low spots or natural drainage points such as:

- Ahead of risers
- End of mains
- Ahead of expansion joints or bends
- Ahead of valves or regulators

Install drip legs and drain traps even where there are no natural drainage points.

Figure 120. Building (boiler) steam panel piping



Installation - Electrical

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

Units intended for indoor use are available with starters or variable-frequency drives (VFDs) that are externally mounted in an enclosure or internally mounted in a recessed cabinet. Units intended for outdoor use are only available with internally mounted starters or VFDs. A typical internally mounted VFD is shown in [Figure 121](#). A typical externally mounted VFD is shown in [Figure 122](#).

Figure 121. Internally mounted VFD



Figure 122. Externally mounted VFD



Typical wiring schematics for VFDs and starters are shown in [Figure 128](#) and [Figure 129](#), respectively. Unit specific wiring schematics are shipped with each unit.

All units with starters or VFDs that have direct-digital controllers (DDCs) are provided with line voltage to 24 Vac power transformers as shown in [Figure 123](#). When provided, the line voltage to 24 Vac transformers are factory wired to the supply fan power feed. All units with factory-mounted controllers, and no starters or VFDs, are provided with 120 Vac to 24 Vac control transformers, as shown in [Figure 125](#), and require a separate 120V field connection. As with starters or VFDs, units intended for indoor use are available with DDCs mounted internally (see [Figure 123](#)) or externally (see [Figure 124](#) and [Figure 125](#)), while units intended for outdoor use are only available with internally mounted DDCs.

In units with 24Vac LED marine lights, the lights are wired together to a single switch located in the controls interface module. [Figure 124](#) shows a typical mounting of the controls interface module with an externally mounted controller. When DDCs are provided, the lighting circuit is powered from the DDC power feed and does not require a separate power source. When marine lights are provided without DDCs, the lighting circuit requires a separate 120V field connection that powers the lights through a 120V to 24Vac power transformer.

A mounted GFCI receptacle is provided for all units that have DDCs or marine lights. The receptacle is mounted in the controls interface module (see [Figure 124](#)) with the unit light switch. The receptacle requires a separate 120V power feed.

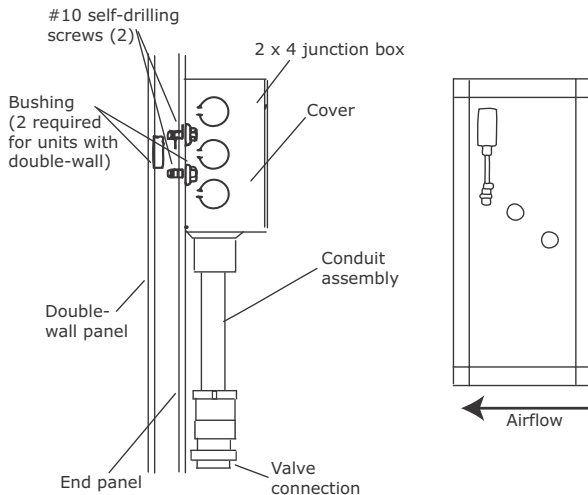
Figure 123. Internal controller

Figure 124. External mounted controller

Figure 125. External controller


Field installed DDC control devices:

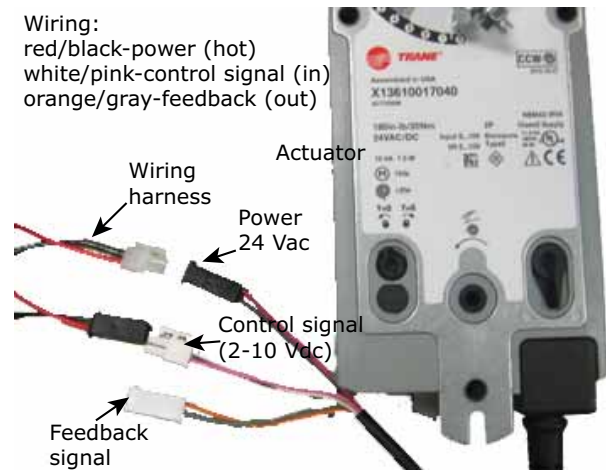
- Install outside-air sensor and space sensor, if ordered.
- Connect control valves, if ordered, to the valve jack provided as part of the unit wiring harness. The valve jack is typically located at the air-leaving side of the coil connection inside the casing panel. For valve junction box mounting and wiring detail, see [Figure 126](#).

Figure 126. Junction box for valve wiring


Quick Connects

The actuators, factory-mounted or field-supplied, are separately wired and controlled by a direct-digital controller or other building logic. [Figure 127](#) illustrates the typical quick connect scheme.

Note: With units that require splits to be assembled that have high voltage quick connects, use electrical tape to bind the quick connections together to avoid poor connections or intermittent connection from vibrations.

Figure 127. Typical quick connects with wiring.


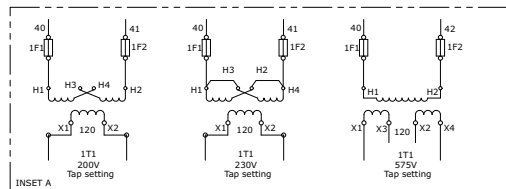
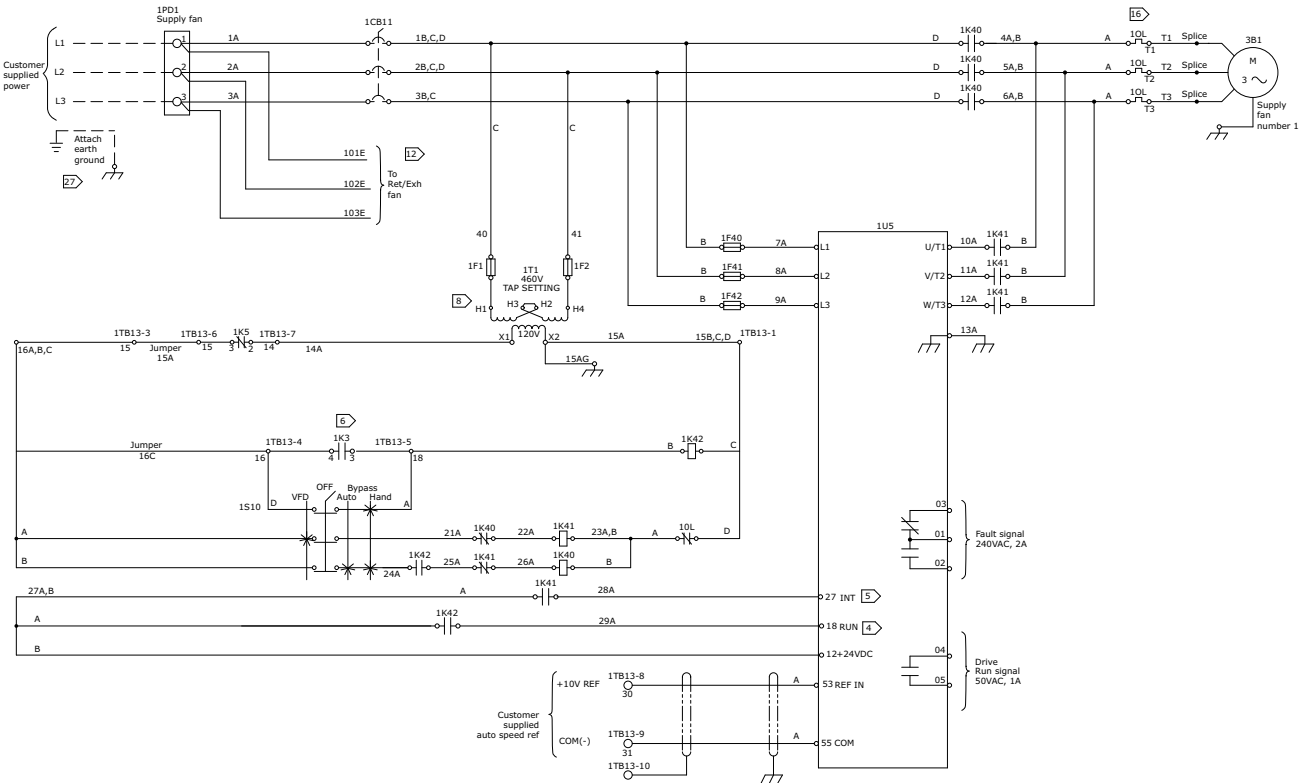
If the unit does not include a factory-mounted starter, wiring to the unit fan motor must be provided by the installer and must comply with all national and local electrical codes. The installer must also furnish a service disconnect switch in compliance with national and local electrical codes.

Fan motors require motor overload protective devices that are rated or selected in compliance with the National Electric Code (NEC) or Canadian Electric Code. Specific unit and motor connection diagrams are provided on the starter/VFD if Trane-provided, or refer to the motor nameplate.

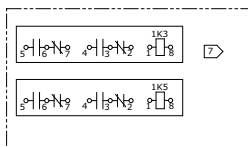
If wiring directly to the motor, a flexible connection at the motor to permit fan belt adjustment should be provided. Fractional horsepower motors may be factory connected to a terminal box on the unit. If this construction is provided, the installer should complete field wiring to this connection box. For a typical high voltage wiring schematic, see [Figure 128](#).

Note: Properly seal all penetrations in unit casing. Failure to seal penetrations from inner panel to outer panel could result in unconditioned air entering the unit.

Figure 128. Typical VFD wiring schematic



Bussman Class Y Drive Fuse Part No.			
AFC Fuse	Voltage	HP	Part No.
200/230	200/230	1.1, 5	JIN-10
		2	JIN-15
		3	JIN-20
		5	JIN-25
		7.5	JIS-30
		10	JIN-50
		15	JIN-60
		20	JIN-80
		25, 30	JIN-125
		40	FWH-150B
460	460	50	FWH-200B
		1.1, 5	JIS-5
		2, 3	JIS-10
		5	JIS-20
		7.5	JIS-25
		10	JIS-30
		15, 20	JIS-40
		25	JIS-50
		30	JIS-60
		40	JIS-80
575	575	50	JIS-100
		60	JIS-125
		75	FWH-150B
		100	FWH-200B
		125	FWH-250B
		1.1, 5	JIS-3
		2, 3	JIS-6
		5, 7.5	JIS-10
		10	JIS-15
		15	JIS-20



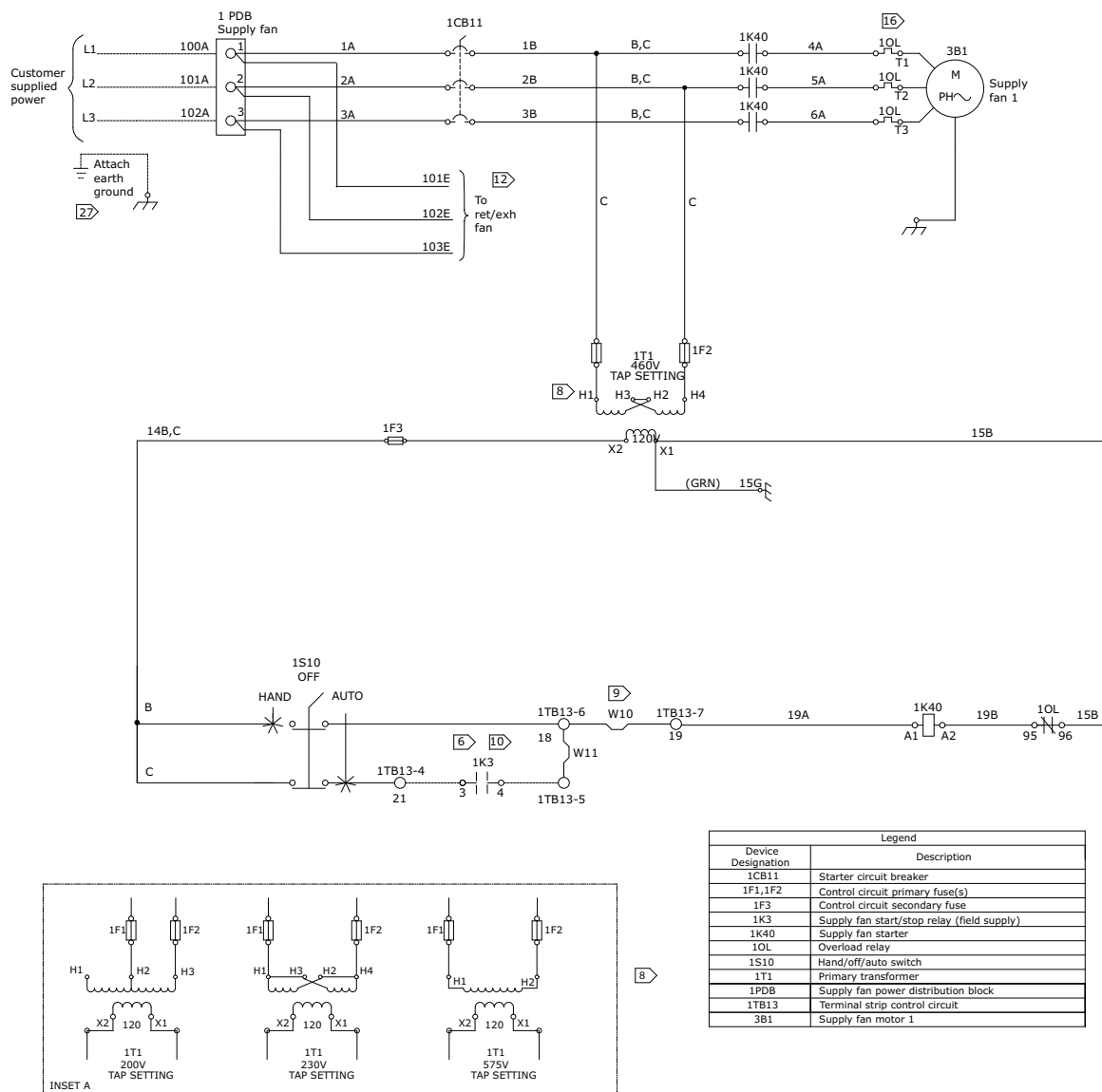
Fuse Rating (AMPS) - 600V Class LP-CC Time Delay				
Primary Transformer Fuses				
Line Voltage	Item	MFR.	MFR. Part NO.	Danfoss NO.
200	1F1, 1F2	Bussman	FNQ-R-1.25	34046200
230	1F1, 1F2	Bussman	FNQ-R-1.25	34046200
460	1F1, 1F2	Bussman	FNQ-R-0.50	34046300
575	1F1, 1F2	Bussman	FNQ-R-0.50	34053600

Device Prefix Location Code	
Area	Location
1	High voltage panel
2	Low voltage panel (Unit schematic)
3	Air handler section

Legend	
Device Designation	Description
1CB11	VFD circuit breaker
1F1, 1F2	Control circuit primary fuse(s)
1F40, 1F41, 1F42	AFC fuse(s)
1K3	Supply fan start/stop relay
1K5	Supply fan low limit relay
1K40	Bypass contactor
1K41	Isolation contactor
1K42	Run permissive relay
1OL	Overload relay
1S10	VFD/OFF/Bypass Auto/Bypass hand switch
1T1	Primary transformer
IPD1	Supply fan power distribution block
1T13	Terminal strip control circuit
1U5	Drive controller (AFC)
3B1	Supply fan motor

- Notes:
- Dashed lines indicate recommended field wiring by others. Phantom lines indicate control option. Ref. Control panel schematic for specific detail.
 - All field wiring must be in accordance with the National Electrical Code (NEC), state and local requirements. Other countries applicable national and/or local requirements shall apply. Field conductors shall have insulation rating not less than 600V copper conductors only.
 - The minimum circuit ampacity, the maximum fuse size, and disconnect size are calculated based on the inverter input line currents per article 430-2 of the National Electrical Code.
 - Program terminal 18 as run.
 - Program terminal 27 inv. coasting stop.
 - Closes to run auto mode or bypass auto for option VFD or starter.
 - Relay(s)—contacts: silver-cadmium oxide: 1/6 hp 5 amp @ 120V AC, 1/3 hp 5 amp @ 240V AC. See 24V schematic diagram for coil connections and actual quantity of transformer relays.
 - Control transformer shown for 460V primary. For 200 or 230V or 575V refer to Inset A.
 - If unit has shipping splits wiring will terminate to module at each shipping split.
 - The overload relay trip setting must be adjusted to correspond with the motor full load current as shown on the motor nameplate.
 - Attach ground or equipment ground.

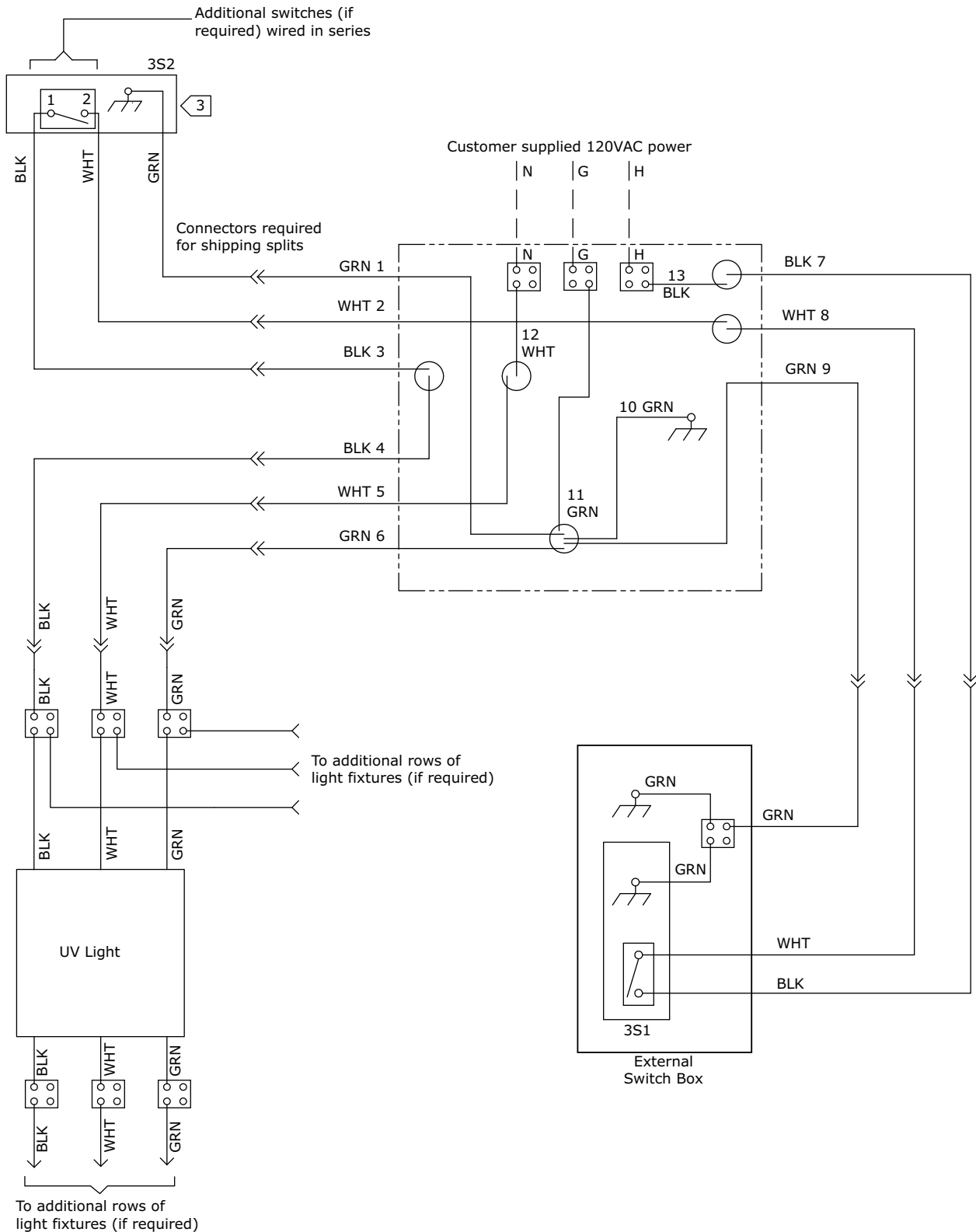
Figure 129. Typical starter wiring schematic



Notes:

- Dashed lines indicate recommended field wiring by others. Phantom lines indicate control option. Ref. Control panel schematic for specific detail.
- All field wiring must be in accordance with the National Electrical Code (NEC), state and local requirements. Other countries applicable national and/or local requirements shall apply. Field conductors shall have insulation rating not less than 600V copper conductors only.
- The minimum circuit ampacity, the maximum fuse size, and disconnect size are calculated based on the inverter input line currents per article 430-2 of the National Electrical Code.
- Closes to run auto mode or bypass auto for option VFD or starter.
- Control transformer shown for 460V primary. For 200 or 230V or 575V refer to Inset A.
- Remove jumper and install field safety contact.
- Field supplied contacts.
- If unit has shipping splits wiring will terminate to module at each shipping split.
- The overload relay trip setting must be adjusted to correspond with the motor full load current as shown on the motor nameplate.
- Attach ground or equipment ground.

Figure 130. Typical UV light schematic



The diagram illustrates the wiring for a 2TB4 transformer. It shows two main power sources: Dedicated GFCI customer supplied power (115V) and Custom supplied power (115V). The transformer has terminals for L5, L6, G, H, and N. The wiring includes a 3GFR1 cable and a 27-inch ground connection. The transformer is connected to a 2T3 115V primary circuit and a 2T4 115V secondary circuit. The primary circuit has terminals H1, H2, H3, and H4, and is connected to a 24V primary lighting circuit with fuses 2F73 and 2F74. The secondary circuit has terminals H1, H2, H3, and H4, and is connected to a 24V secondary lighting circuit with fuses 2F75 and 2F76.

Lighting Transformer Fuses		
Fuse	Voltage	P/N
2F73 to 2F76	24	MDL-3-2/10-R (Bussmann)

To primary lighting circuit

To secondary lighting circuit

Lighting Transformer Fuses		
Fuse	Voltage	P/N
2F73 to 2F76	24	MDL-3-2/10-R (Bussmann)

Legend	
Device Designation	Description
2TP4	Terminal block GFCI/lighting circuits
2T3	Primary lighting transformer
2T4	Secondary lighting transformer
3GFR1	Ground fault receptacle

Device Prefix Location Code	
Area	Location
1	High voltage panel
2	Low voltage panel (unit schematic)
3	Air handler section

- Notes:
- 1 Dashed lines indicate recommended field wiring by others. Phantom lines indicate control options. Ref. Control panel schematic for specific detail.
 - 2 All field wiring must be in accordance with the National Electrical Code (NEC), state and local requirements. Other countries applicable national and/or local requirements shall apply. Field conductors shall have insulation rating not less than 600V copper conductors only.
 - 3 The minimum circuit ampacity, the maximum fuse size, and disconnect size are calculated based on the inverter input line currents per Article 430-2 of the National Electrical Code.

27 Attach ground or equipment ground.



Controls Interface

The portable operator display is used for temporary connection to and operation of Trane UC600 controller. With the portable operator display, you can monitor data, change setpoints, monitor alarms, and override points. The portable operator display includes a 10 ft (3 m) cable with connector that is stored in the storage compartment of the carrying bag. The cable cannot be disconnected from the operator display. Keep this document with the portable operator display for access to calibration and cleaning instructions.

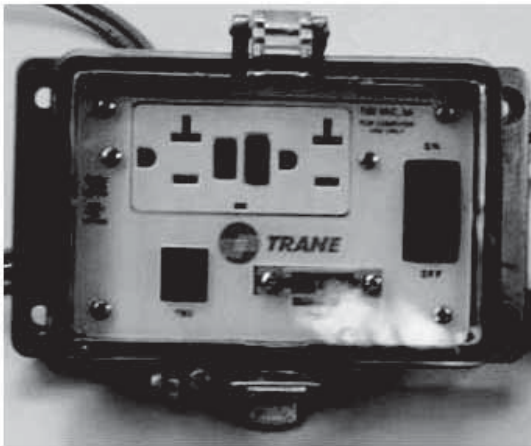
Note: The portable operator display is not used for timeclock scheduling. To provide scheduling you must use a Tracer Summit system.

Connecting the operator display

To connect the portable operator display:

1. Locate the factory-provided service module (see [Figure 132](#)).
2. Attach the operator-display cable to the operator-display connector on the service module. The operator display receives power from the controller and turns on automatically when it is connected.

Figure 132. Service module



Setting up the operator display

NOTICE:

Water Damage!

To clean the operator display, use a cloth dampened with commercial liquid glass cleaner. Spraying water or cleaner directly on the screen could result in equipment damage.

This section shows how to calibrate the operator display touch screen and how to adjust the brightness and contrast. To set up the operator display screens and security, see the *Tracer TD7 Display for the Tracer UC600 Programmable Controller Installation, Operation, and Maintenance* guide (BAS-SVX50C-EN).

Calibrating the operator display

To calibrate the operator display:

1. On the home screen, press Setup. The Setup menu appears.
2. Page down to view the next screen.
3. Press Calibrate Touch Screen. A calibration screen appears.

NOTICE:

Equipment Damage!

Do not allow the operator display to come in contact with sharp objects. This could result in equipment damage.

4. Touch the target using a small, pliable, blunt object, such as a pencil eraser or your finger. Hold until the beeping stops. A second calibration screen appears.
5. Again, touch the target with the object. Hold until the beeping stops. The Advanced Selection screen appears.
6. Press Home. The home screen appears.

Adjusting brightness and contrast

To adjust the brightness and contrast of the operator display:

1. On the home screen, press Setup. The Setup menu appears.
2. Page down to view the next screen.
3. Press the Adjust Brightness and Contrast buttons. The Brightness and Contrast screen appears.
4. To increase the brightness, press the buttons along the top row, in sequence, from left to right. To decrease the brightness, press the buttons from right to left.

Note: Contrast adjustment is not available on all computer display models.

5. To increase the contrast, press the buttons along the bottom row, in sequence, from left to right. To decrease the contrast, press the buttons from right to left.
6. Press Home. The home screen appears.

External communications port

Units with a factory-provided DDC controller can include a service module (see [Figure 132](#)) with an external communications port when purchased. Both the operator display and Rover service tool can be connected without shutting off the unit through the external communications port. Open the cover plate on the service module and plug into the RJ-11 port for the operator display or the RS 485 port for the Rover service tool. This enables continuous operation of the air handler without disruption to the operating conditions of the unit. When servicing of the unit is complete, close the cover plate on the service module to eliminate any air leakage path.



Start-Up

Pre-Startup Checklist

Once the air handler has been assembled and installed, attention must be directed to individual components for proper operation. Before operating the unit, complete the pre-startup checklist.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

General Checks

- Ensure the unit has been installed level.
- Ensure supply-air and return-air ducts have been connected.
- Ensure damper operator motors and connecting linkage have been installed.
- Verify damper operation and linkage alignment.
- Check that air filters are in place and positioned properly.
- Remove any debris from the unit interior.
- Remove all foreign material from the drain pan and check drain pan opening and condensate line for obstructions.
- Close and secure all unit access doors.
- If differential pressure switch is provided on filter rack, adjust per system requirements.
- Inspect electrical connections to the unit and unit controllers.
 - Connections should be clean and secure.
 - Compare the actual wiring with the unit diagrams.
 - Reference the appropriate controller manual for more details about starting units with factory-mounted controls.
- Check piping and valves for leaks. Open or close the valves to check for proper operation. Drain lines should be open.
- Leave this manual with the unit.

Fan-Related Checks

- If the unit is *not* externally isolated, ensure that the fan isolator tie-down bolts have been removed. See [“Fan Isolation” section on page 65](#) for more information.
- Rotate all fan wheels manually to confirm they turn freely in the proper direction.
- Check fan shaft bearings, fan wheel, and drive sheave set screws for proper torque settings (see [Table 39 on page 121](#).
 - Fan sheaves should be tight and aligned.
- Check fan drive belt tension. See [“Tension the Fan Belt” section on page 119](#).
- Inspect fan motor and bearings for proper lubrication, if necessary. See [“Fan Bearing Lubrication,” p. 143](#).

Coil-Related Checks

NOTICE:

Proper Water Treatment!

The use of untreated or improperly treated water in coils could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

- Ensure coil and condensate drain piping connections are complete.
- Check the piping and valves for leaks.
 - Open or close the valves to check operation.
 - The drain lines should be open.
- If unit has a refrigerant coil, ensure that it has been charged and leak-tested according to the instructions provided with the condenser equipment. Adjust the superheat setting.
- Remove all foreign material from the drain pan and check the pan opening and condensate line for obstructions.
- For steam coils, slowly turn the steam on full for at least 10 minutes before opening the fresh air intake on units with fresh air dampers.

Motor-Related Checks

- Locate installation manual from the motor manufacturer for the specific motor installed. This can be found by contacting the motor manufacturer's representative. The motor manufacturer's recommendations take precedence for all matters related to the start-up and routine maintenance of the motor.
- Check the motor lubrication for moisture and rust.
 - Remove and clean grease plugs to inspect.
 - If moisture is present, consult an authorized repair shop for bearing inspection/replacement. This may require removal and transport of motor.
 - If no moisture is present, refer to the motor manufacturer's lubrication recommendations for proper lubrication.
 - The motor manufacturer may recommend lubricating the motor as part of their routine start-up instructions.
- Check motor winding. An acceptable winding resistance reading is from 6 meg-ohms to infinity. If reading is less than 5 mega-ohms, the winding should be dried out in an oven or by a blower.
- Inspect the entire motor for rust and corrosion.
- Bump-start the unit and confirm the fan wheel rotates properly, as indicated by the rotation arrow located on the fan housing.

Note: For motor warranty needs, contact your local Trane sales office.

Unit Operation

⚠ WARNING

Rotating Components!

During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks. Failure to follow all safety precautions could result in rotating components cutting and slashing technician which could result in death or serious injury.

⚠ WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Before complete start-up, bump-start the unit and confirm the fan wheel rotates properly, as indicated by the rotation arrow located on the fan housing.

After initial startup:

- Calculate the motor voltage imbalance, notifying the power company to correct unacceptable imbalances.
- Periodically check the fan belt tension.

Calculate Motor Voltage Imbalance

After startup, measure the motor voltage and amperage on all phases to ensure proper operation. The readings should fall within the range given on the motor nameplate. The maximum allowable voltage imbalance is 2 percent.

Voltage imbalance is defined as 100 times the sum of the deviation of the three voltages from the average, divided by twice the average voltage. For example, if the three measured voltages are 221, 230 and 227, the average voltage would be 226 volts. The percent of voltage imbalance is then calculated.

$$\text{Voltage imbalance} = \frac{100A}{2 \times \text{AvgVoltage}}$$

where:

$$A = (226 - 221) + (230 - 226) + (227 - 226)$$

$$\text{Voltage imbalance} = 2.2\% \text{ (not acceptable)}$$

In the example, 2.2 percent imbalance is not acceptable and the power company should be notified to correct it.

VFD Programming Parameters

Units shipped with an optional variable frequency drive (VFD) are preset and run-tested at the Trane factory. If a problem with a VFD occurs, ensure that the programmed parameters listed in [Table 37](#) have been set. If trouble still persist after verifying factory parameters are correct, call Trane Drive Technical Support at 1-877-872-6363. Have the unit serial number from the drive available for the technical support representative. The technician will determine if drive can be repaired or needs to be replaced.

Table 36. Trane TR150 Switching Frequency

Horsepower	Voltage	Max KHz	Trane Setting
0.5 - 15	208/230	16	16
20-60	208/230	12	12
0.5 - 30	460	16	16
40 - 125	460	12	12
0.5 - 10	575	12	12
15 - 125	575	8	8

⚠ WARNING
Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

Table 37. Trane TR150 VFD Programming Parameters

Parameter # TR150	Description	Factory Default	Trane Setting
0-03	Region	International	North American
1-03	Torque Characteristics	Auto Energy Optim. VT	Auto Energy Optim. VT [3]for Belt-Drive Fans Variable Torque [1]for Direct-Drive Fans
1-20	Motor Power	Depends on unit	Set Based on Motor Nameplate
1-22	Motor Voltage	Depends on unit	Set Based on Motor Nameplate
1-24	Motor Current	Depends on unit	Set Based on Motor Nameplate
1-25	Rated Motor Speed	Depends on unit	Set Based on Motor Nameplate
1-71	Start Delay	0.0 Sec	2 Sec
1-73	Flying Start	Disabled	Enable
1-90	Motor Thermal Protection	ETR Trip 1 [4]	ETR Trip 1 [4]
3-02	Minimum Reference	Application dependant	0 Hz
3-03	Maximum Reference	60Hz	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.
3-15	Terminal 53 Analog Input	Analog Input 53	Analog Input 53
3-41	Ramp-up Time	Application dependant	30 Sec
3-42	Ramp-down Time	Application dependant	30 Sec
4-12	Output Freq Low Limit	Application dependant	20 Hz
4-14	Output Freq High Limit	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.	60 or the Value of Maximum Inverter Frequency (Hz) on nameplate if fan is direct drive.
4-18	Current Limit	Application dependant	110%
4-19	Max Output Frequency	Application dependant	65 Hz or 120 Hz for Direct Drive Fan
5-12	Terminal 27 Digital Input	No Operation	Coast Inverse
5-40	Function Relay	No Operation	Relay 1 Active No Alarm [160] Relay 2 Active Motor Running [5]
6-14	Terminal 53 Low Ref Feedback	0.0 Hz	20 Hz
6-15	Terminal 53 High Ref Feedback	Application dependant	60 or the Value of Maximum Inverter Frequency (Hz) on Nameplate if fan is direct drive.
14-01	Switching Frequency	5.0 kHz	Set to Max for HP (see Table 36)
14-20	Reset Mode	Manual Reset	Automatic Reset x 5

Tension the Fan Belt

NOTICE:

Belt Tension! (2 of 2)

Do not over-tension belts. Excessive belt tension will reduce fan and motor bearing life, accelerate belt wear and possibly cause shaft failure. Under tensioning belts is the primary cause of premature belt failure. Belts should not squeal at startup. Recheck belt tension after 8 hours, 24 hours, and 100 hours of operation and monthly thereafter.

Proper belt tension is required to ensure maximum bearing and drive component life and is based on motor horsepower requirement. A label located on the bearing support on the drive side of the unit lists all drive parts, the proper belt tension, and deflection for that tension for the specific drive (Figure 133).

If the drive is changed from the original, proper belt tension can be estimated using Table 38.

The correct operation tension for a V-belt drive is the lowest tension at which the belts will not slip under the peak load conditions. It may be necessary, however, to increase the tension of some drives to reduce excessive belt flopping or to reduce excessive startup squealing.

Figure 133. Tension drive belt label

Browning	V-BELT DRIVE KIT	1627373
	MODULE 0400	
PURCHASE ORD. NUMBER B24597-061 H5D073B A		
CUSTOMER'S KIT # H5D073B A-012-0400		
MTR HP.= 10.0		
FAN RPM = 1458 CD = 9.4 AT 3.00 TRN OPN		
TENSION INFO - 3.86 LB., 0.14 IN.		
DRIVE'S BELTS - B40		
MOTOR SHEAVE - 2VP75X 1 3/8		
MOTOR BUSHING - NONE REQUIRED		
FAN SHEAVE - 2B5V80		
FAN BUSHING - B 1 7/16		

Check the fan belt tension at least three times during the first days of operation because there is a rapid decrease in tension until the belt settles in. To measure belt tension, use a belt tensiometer (see Figure 134). Determine actual deflection by depressing one belt with the belt tensiometer and measuring the deflection relative to the other belts or to belt line (see Figure 135). Adjust the belt tension to the correct pounds force and tighten all bolts to the proper torque. See Table 52.

Figure 134. Belt tensiometer

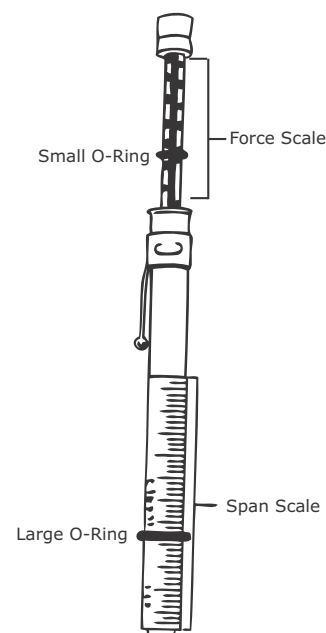


Figure 135. Belt tension measurement

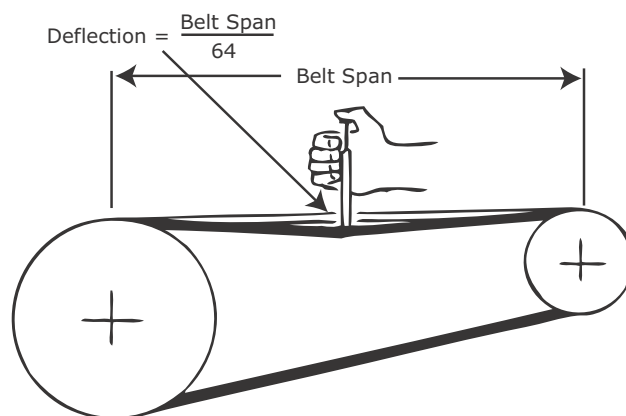


Table 38. Typical sheave diameter and deflection force

Cross section	Smallest sheave diameter range (in.)	Speed (rpm) range	Belt Deflection Force (lbs)			
			Super gripbelts and unnotched gripbands		Gripnotch belts and notched gripbands	
			Used belt	New belt	Used belt	New belt
A, AX	3.0–3.6	1,000–2,500	3.7	5.5	4.1	6.4
		2,501–4,000	2.8	4.2	3.4	5.0
	3.8–4.8	1,000–2,500	4.5	6.8	5.0	7.4
		2,501–4,000	3.8	5.7	4.3	6.4
	5.0–7.0	1,000–2,500	5.4	8.0	5.7	9.4
		2,501–4,000	4.7	7.0	5.1	7.6
B, BX	3.4–4.2	860–2,500	n/a	n/a	4.9	7.2
		2,501–4,000	n/a	n/a	4.2	6.2
	4.4–5.6	860–2,500	5.3	7.9	7.1	10.5
		2,501–4,000	4.5	6.7	7.1	9.1
	5.8–8.6	860–2,500	6.3	9.4	8.5	12.6
		2,501–4,000	6.0	8.9	7.3	10.9
C, CX	7.0–9.0	500–1,740	11.5	17.0	14.7	21.8
		1,741–3,000	9.4	13.8	11.9	17.5
	9.5–16.0	500–1,740	14.1	21.0	15.9	23.5
		1,741–3,000	12.5	18.5	14.6	21.6
D	12.0–16.0	200–850	24.9	37.0	n/a	n/a
		851–1,500	21.2	31.3	n/a	n/a
	18.0–20.0	200–850	30.4	45.2	n/a	n/a
		851–1,500	25.6	38.0	n/a	n/a
3V, 3VX	2.2–2.4	1,000–2,500	n/a	n/a	3.3	4.9
		2,501–4,000	n/a	n/a	2.9	4.3
	2.65–3.65	1,000–2,500	3.6	5.1	4.2	6.2
		2,501–4,000	3.0	4.4	3.8	5.6
	4.12–6.90	1,000–2,500	4.9	7.3	5.3	7.9
		2,501–4,000	4.4	6.6	4.9	7.3
5V, 5VX	4.4–6.7	500–1,749	n/a	n/a	10.2	15.2
		1,750–3,000	n/a	n/a	8.8	13.2
		3,001–4,000	n/a	n/a	5.6	8.5
	7.1–10.9	500–1,749	12.7	18.9	14.8	22.1
		1,750–3,000	11.2	16.7	13.7	20.1
	11.8–16.0	500–1,749	15.5	23.4	17.1	25.5
1,750–3,000		14.6	21.8	16.8	25.0	
8V	12.5–17.0	200–850	33.0	49.3	n/a	n/a
		851–1,500	26.8	39.9	n/a	n/a
	18.0–22.4	200–850	39.6	59.2	n/a	n/a
		851–1,500	35.3	52.7	n/a	n/a

Determine Fan Speed

Fan speed can be determined using a strobe-type tachometer, or revolution counter.

Check unit vibration if the fan speed is changed more than five percent from the original designed speed, or if parts such as shafts, fan wheels, bearings, or other drive components are replaced. Do not exceed the maximum fan speed.

Pay particular attention to any vibration, noise, or overheating of the motor and fan bearings; however, note that bearings may run warm during break in.

WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to measure the speed of rotating components. Have a qualified licensed service individual who has been properly trained in handling exposed rotating components perform these tasks. Failure to follow all safety precautions when exposed to rotating components could result in death or serious injury.

Align Fan and Motor Sheaves

Align the fan and motor sheaves using a straightedge. The straightedge must be long enough to span the distance between the outside edges of the sheaves. When the sheaves are aligned, the straightedge will touch both sheaves at points A through D (see [Figure 136](#)) to confirm the shaft is parallel. For uneven width sheaves, place a string in the center groove of both sheaves and pull tight. Adjust the sheaves and tighten the sheave set screws to the proper torque given in [Table 39](#).

Check Multiple Belts

Tighten the belts slightly and rotate the drive several times.

On multiple belt drives, ensure the force of deflection is approximately the same on each belt by pushing each belt in an equal distance at a point halfway from each sheave (see [Figure 136](#)). If this force is not the same for each belt, the motor and fan shaft are not parallel. Realign as required. After realignment, tighten the belts again to the standard belt tensioning specifications. If the force is still not the same for all belts, the belts or sheaves are worn and must be replaced.

Figure 136. Proper drive alignment

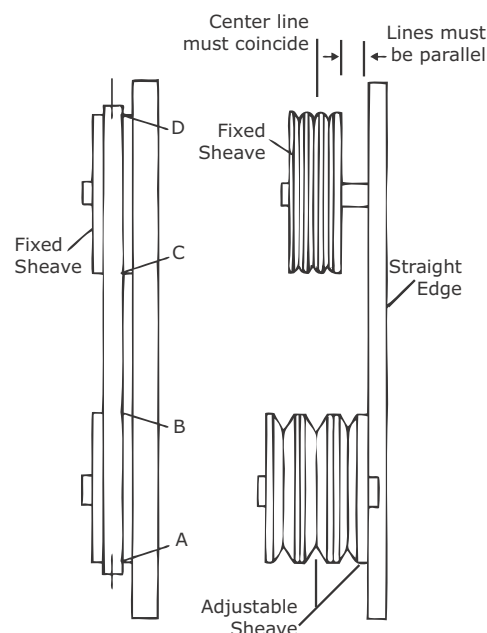


Table 39. Set screw torque settings (inches)

Screw Size	Hex Key	Square Head	Hex Head	Torque (in.-lb.)	Torque (ft.-lb.)
1/4	1/8	3/8	7/16	66-90	5.5-7.5
5/16	5/32	1/2	1/2	126-164	10.5-13.7
3/8	3/16	9/16	9/16	228-300	19.0-25.0
7/15	7/32	5/8	5/8	348-450	29.0-37.5
1/2	1/4	3/4	3/4	504-650	42.0-54.2
5/8	5/16	15/16	15/16	1290-1390	107.0-116.0
#10	3/32	-	-	28-40	2.3-3.3

Airflow Measuring Systems

Traq™ Dampers

Traq dampers are low-leak dampers that modulate and measure airflow. Each Traq damper section is supplied with a factory-mounted ventilation control module (VCM) on the interior of the mixing box section. The VCM has an input terminal for power and an output terminal for air velocity (see [Figure 137](#)). A direct-digital controller controls the factory-mounted and wired actuators.

Figure 137. Traq damper terminal connections

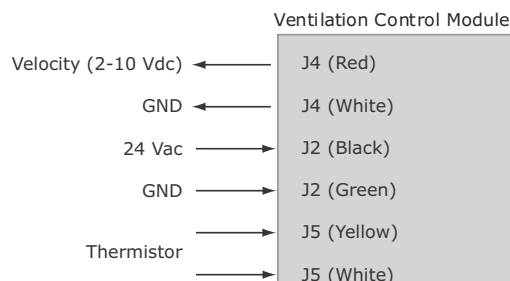
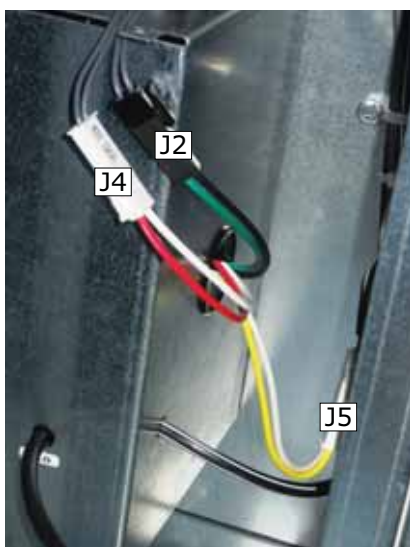


Figure 138. Traq damper terminal connections


VCM (Transducer) Calibration. The VCM has an auto-zero function that recalibrates the transducer once every minute. When troubleshooting, allow for the recalibration time before making any measurements.

Input Power. The only input the VCM needs is the 24 Vac power connected to the J2 plug (green and black wires).

Output Velocity Signal. The 2 to 10 Vdc linear output signal from the VCM represents air velocity. This voltage can be converted to represent airflow (cfm or L/s) using the formula below and [Table 40](#).

$$\text{Airflow} = k (\text{cfm @ 10V}) \left[\frac{(\text{volts} - 2)}{8} \right]$$

or

$$\text{Airflow} = k (\text{L/s @ 10V}) \left[\frac{(\text{volts} - 2)}{8} \right]$$

For example, if the VCM on a size 30 air handler at sea level ($k=1$) has a 10-volt signal, it would represent 24,492 cfm (11,559 L/s) through the Traq damper. If the voltage were 6 volts, airflow through the Traq damper would be 12,246 cfm (5779 L/s).

Table 40. Altitude adjustment factors

Sea level = 1.0	
Elevation (feet)	k
1000	0.982
2000	0.964
3000	0.949
4000	0.930
5000	0.914
6000	0.897
7000	0.876
8000	0.860
9000	0.846
10,000	0.825

Table 41. In [Table 42](#) through [Figure 49](#), the cfm at 10Vdc is a calculated value based on area and peak velocity. In certain situations, it can be advantageous to raise the velocity of air through the remaining Traq dampers by closing off one or more dampers in the unit. The cfm at 10Vdc can be recalculated based on the proportion of remaining Traq dampers or by multiplying the remaining area of dampers by peak velocity. Calculations are based on VCM voltage versus airflow at sea level.

Table 42. Back or top inlet standard Traq damper-air mixing and indoor economizer section

Unit Size	Part Number	Traq Damper Size (inches)	Quantity	Peak Velocity (fpm)	Total Area (ft ²)	CFM @ 10VDC Peak Velocity	L/s @ 10VDC Peak Velocity
3	495100860001	13	1	2475	0.92	2279	1076
4, 6	495100860001	13	2	2475	1.84	4559	2151
8, 10	495100860001	13	3	2475	2.76	6838	3227
12, 14, 17	495100870001	16	3	2475	4.19	10,365	4891
21, 25	495100890001	20	3	2600	6.54	17,012	8028
22, 26	495100870001	16	4	2475	5.58	13,820	6525
30, 35, 40	495100880001	24	3	2600	9.42	24,492	11,558
31	495100890001	20	4	2600	8.72	22,682	10,708
36, 41	495100880001	24	3	2600	9.42	24,492	11,563
50, 57	495100900001	28	3	2600	12.83	33,358	15,742
51, 58	495100900001	28	3	2600	12.82	33,337	15,738
66	495100900001	28	4	2600	17.10	44,460	20,981
80	495100900001	28	5	2600	21.38	55,588	26,232
100, 120	495100900001	28	6	2600	25.66	66,716	31,483

Table 43. Back or top inlet low-flow Traq damper-air mixing and indoor economizer sections

Unit Size	Part Number	Traq Damper Size (in)	Damper Type	Qty	Peak Velocity (fpm)	Total Area (ft ²)	CFM @ 10VDC Peak Velocity	L/s @ 10VDC Peak Velocity
4	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
6	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
8, 10	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
12, 14, 17	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1630
21, 25	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2676
22, 26	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1631
30, 35, 40	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3853
31	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2677
36, 41	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3854
50, 57	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244
51, 58	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5246
66	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244
80	495100900001	28	Min. Outside Air	2	2600	8.54	22,224	10,488
100	495100900001	28	Min. Outside Air	2	2600	8.54	22,224	10,488
120	495100900001	28	Min. Outside Air	2	2600	8.54	22,224	10,488

Table 44. Mixing box Traq damper inlet - single-side standard flow

Unit size	Part number	Traq damper size (in)	Qty	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@ 10VDC peak velocity
3, 4, 6, 8	495100860001	13	1	2475	0.92	2279	1076
10, 12	495100870001	16	1	2475	1.40	3455	1631
14, 17	495100860001	13	2	2475	1.84	4559	2152
21, 22, 25, 26	495100870001	16	2	2475	2.79	6910	3262
30, 31, 35, 40	495100890001	20	2	2600	4.36	11,341	5354
36, 41, 50, 57, 66	495100880001	24	2	2600	6.28	16,328	7708
51, 58, 80	495100900001	28	2	2600	8.59	22,225	10,492
100	495100900001	28	3	2600	12.82	33,337	15,738
120	495100880001	24	4	2600	12.56	32,656	15,417

Table 45. Mixing box Traq damper inlet - single-side low flow

Unit size	Part number	Traq damper size (in)	Damper type	Qty	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@ 10VDC peak velocity
14, 17	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
21, 22, 25, 26	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1631
30, 31, 35, 40	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2677
36, 41, 50, 57, 66	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3854
51, 58, 80	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5246
100	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5246
120	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3854

Table 46. Mixing box Traq damper inlet - dual-side standard flow

Unit size	Part number	Traq damper size (in)	Qty	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@ 10VDC peak velocity
3, 4, 6, 8	495100860001	13	2	2475	1.84	4559	2152
10, 12	495100870001	16	2	2475	2.79	6910	3262
14, 17	495100860001	13	4	2475	3.68	9118	4305
21, 22, 25, 26	495100870001	16	4	2475	5.58	13,820	6525
30, 31, 35, 40	495100890001	20	4	2600	8.72	22,682	10,708
36, 41, 50, 57, 66	495100880001	24	4	2600	12.56	32,656	15,417
51, 58, 80	495100900001	28	4	2600	17.10	44,450	20,985
100	495100900001	28	6	2600	25.64	66,674	31,477
120	495100880001	24	8	2600	25.12	65,312	30,834

Table 47. Mixing box Traq damper inlet - dual-side low-flow

Unit size	Part number	Traq damper size (in)	Damper type	Qty	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@ 10VDC peak velocity
3, 4, 6, 8	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
10, 12	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1631
14, 17	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
21, 22, 25, 26	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1631
30, 31, 35, 40	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2677
36, 41, 50, 57, 66	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3854
51, 58, 80	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5246
100	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5246
120	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3854

Table 48. Side inlet standard Traq dampers - diagonal economizer section

Unit size	Part number	Traq damper size (in)	Quantity	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@10VDC peak velocity
3	495100860001	13	1	2475	0.92	2279	1076
4, 6, 8	495100860001	13	2	2475	1.84	4559	2151
10, 12, 14	495100870001	16	2	2475	2.79	6905	3259
17	495100860001	13	4	2475	3.68	9118	4303
21	495100890001	20	2	2600	4.36	11,341	5352
25	495100870001	16	4	2475	5.58	13,820	6522
30	495100890001	20	3	2600	6.54	17,012	8028
35, 40	495100900001	28	2	2600	8.55	22,224	10,488
50	495100880001	24	3	2600	9.42	24,492	11,558
57	495100880001	24	4	2600	12.56	32,656	15,410
66	495100900001	28	3	2600	12.82	33,336	15,731
80	495100900001	28	4	2600	17.10	44,448	20,975
100, 120	495100900001	28	5	2600	21.37	55,561	26,219

Table 49. Side inlet low-flow Traq dampers - diagonal economizer section

Unit size	Part number	Traq damper size (in)	Damper type	Qty	Peak velocity (fpm)	Total area (ft ²)	CFM@10VDC peak velocity	L/s@ 10VDC peak velocity
4	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
6	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
8	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
10	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1630
12	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1630
14	495100870001	16	Min. Outside Air	1	2475	1.40	3455	1630
17	495100860001	13	Min. Outside Air	1	2475	0.92	2279	1076
21	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2676
25	495100870001	16	Min. Outside Air	1	2600	1.40	3630	1713
30	495100890001	20	Min. Outside Air	1	2600	2.18	5671	2676
35, 40	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244
50	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3853
57	495100880001	24	Min. Outside Air	1	2600	3.14	8164	3853
66	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244
80	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244
100, 120	495100900001	28	Min. Outside Air	1	2600	4.27	11,112	5244



Trane utilizes AMCA certification for airflow measuring stations. Trane certifies that the Traq damper herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 611 and comply with the requirements of the AMCA Certified Ratings Program.

The certification program provides the engineer and owner assurance that manufacturer-published performance ratings for airflow measurement stations are accurate and repeatable. Trane Traq dampers are certified with the integral ventilation control module which converts differential pressure to an electronic signal for control.

Refer to Performance Climate Changer Air Handler catalog CLCH-PRC015-EN for Traq damper testing and rating information.

Fan Inlet Airflow Measuring System

A fan inlet airflow measuring system is available on many centrifugal and plenum fans. Each system comes with a differential pressure transmitter. The minimum diameter is connected to the LO port of the transmitter and the reference pressure point is connected to (or actually is) the HI port of the transmitter.

Figure 139. Fan inlet airflow measuring system





Start-Up

Wiring

The transmitter requires 24VDC power on terminals 1 (+) and 2 (ground) of the transmitter. When the airflow measurement system is ordered with a factory-mounted UC600 controller, the 24 VDC power will be supplied.

In the absence of a factory-provided UC600 controller, the installing contractor must ensure the transmitter has 24VDC power.

Note: Ensure that the transmitter has a separate power source.

Transmitter Sizing

The Trane specification requires that the flow meter option have a total accuracy of 5 percent. The total accuracy is a combination of:

- how accurately the flow meter itself is in sensing airflow
- how accurately the transmitter senses the differential pressure
- how accurately the controller translates the signal from the transmitter to a differential pressure.

Selecting the proper transmitter is critical in order to get accurate airflow measurements. How accurately the transmitter senses the differential pressure is dependent on:

- the pressure range selected
- accuracy of the selected transmitter

Trane air handlers use either a 0-20 inch or a 0-40 inch range transmitter as standard. To sufficiently cover VAV turndown on the smallest fans with the above range, a transmitter with an accuracy of 0.25 percent (full scale) is used as standard. If a field-provided transmitter with a lower accuracy is selected, the range should be chosen closer to the actual, maximum pressure differential expected for the application.

The transmitter outputs a signal that represents the differential pressure which is used to calculate airflow. To adequately calculate and display the airflow for the smaller fans, ensure that the analog input is programmed with enough decimal places to sufficiently represent the pressure differential being measured. For instance, Rover should be used to increase the number of decimal places being used (to a maximum of 4) on an MP-580/581 controller in lieu of the default zero.

Note that the adjustment of the "Zero" and "Span" controls on the transmitter itself are not required at time of installation. The transmitter is factory-calibrated to the range selected and cannot be significantly adjusted to "tighten" the range closer to the pressure being read for the given application. The adjustments are primarily provided to account for any drift that may occur over time.

Transmitter Calibration

The transmitter is factory-calibrated to a specific pressure range with either a 0-20 inch or 0-40 inch w.g. range being used in most cases. To check calibration and to adjust if necessary, consult the transmitter manufacturer or the factory for specific procedures.

The transmitter outputs a linear, 2-10 VDC signal representing a differential pressure measurement. With this measurement, the airflow through the fan can be calculated using the following equation:

$$CFM = K * \text{SQRT}(DP)$$

Where:

CFM = Airflow (ft³/min.) assuming a standard air density of 0.075 lbm/ft³.

K = A constant factor that is unique for each fan. See ["Constant Factor K" section on page 127](#) for more information.

DP = Differential pressure (inches w.g.) being measured by the transmitter.

Significant differences in elevation and/or temperature will affect the density of air. For air at a constant, non-standard density, a field-obtained K factor can be used. Alternatively, the following equation can be used to continuously correct the equation above:

$$ACFM = CFM * \text{SQRT}(0.075/\rho)$$

Where:

ACFM = Actual airflow (ft³/min.) corrected for non-standard air density.

ρ = Density (lbm/ft³) of the air at the inlet to the fan.

Note: Alternative units, including SI, can be used in place of the IP units above although the K-factor must be converted appropriately.

Constant Factor K

The constant factor K is unique for each fan and is primarily a function of the area and other geometric properties of the fan inlet. Pre-engineered factors are available from the factory for fan types where the airflow

measurement system is available. See [Table 50](#) for single-fan K factors. For a multiple-fan system, the constant factor K may need to be adjusted depending on how many transmitters are supplied.

Table 50. Constant K Factors

Fan Size (inches) / Type	Fan Class	Fan Name	K-Factor
9 BC	Class I	9 BA	935.00
9 BC	Class II	9 BB	868.20
10 BC	Class I	10 BA	1072.50
10 BC	Class II	10 BB	1072.50
12 AF	Class I	12 AA	2337.50
12 AF	Class II	12 AB	2237.30
15 AF	Class I	15 AA	3873.60
15 AF	Class II	15 AB	3873.60
18 AF	Class I	18 AA	4675.00
18 AF	Class II	18 AB	4675.00
20 AF	Class I	20 AA	5843.70
20 AF	Class II	20 AB	5119.90
22 AF	Class I	22 AA	7513.40
22 AF	Class II	22 AB	6624.10
25 AF	Class I	25 AA	9683.90
25 AF	Class II	25 AB	8891.10
28 AF	Class I	28 AA	12,856.20
28 AF	Class II	28 AB	11,795.00
32 AF	Class I	32 AA	16,295.60
32 AF	Class II	32 AB	16,295.60
36 AF	Class I	36 AA	19,701.70
36 AF	Class II	36 AB	19,367.80
40 AF ¹	Class I	40 AA	23,374.90
40 AF ²	Class II	40 AA	25,378.40
40 AF ¹	Class I	40 AB	22,974.20
40 AF ²	Class II	40 AB	25,044.50
44 AF	Class I	44 AA	30,113.00
44 AF	Class II	44 AA	30,113.00
49 AF	Class I	49 AB	37,470.00
49 AF	Class II	49 AB	37,470.00
20 FC	Class I	20 FA	7300.00
20 FC	Class II	20 FB	7203.90
22 FC	Class I	22 FA	9081.90
22 FC	Class II	22 FB	8793.10
25 FC	Class I	25 FA	12,030.00
25 FC	Class II	25 FB	11,700.00
28 FC	Class I	28 FA	14,450.00
28 FC	Class II	28 FB	14,036.00

Note: ¹To be used for fan rpm < 700 or cfm < 25,500. ²To be used for fan rpm > 700 or cfm > 25,500.

Table 50. Constant K Factors

Fan Size (inches) / Type	Fan Class	Fan Name	K-Factor
32 FC	Class I	32 FA	20,400.00
32 FC	Class II	32 FB	20,150.00
36 FC	Class I	36 FA	28,049.90
36 FC	Class II	36 FB	27,549.00
40 FC	Class I	40 FA	39,236.40
40 FC	Class II	40 FB	38,067.70
10 BC belt-drive plenum	Class I or II	10 PA or 10 PB	563.00
11 BC belt-drive plenum	Class I or II	11PA or 11 PB	703.00
12 AF belt-drive plenum	Class I or II	12PA or 12 PB	1168.70
14 AF belt-drive plenum	Class I or II	14PA or 14 PB	1536.10
16 AF belt-drive plenum	Class I or II	16PA or 16 PB	1870.00
18 AF belt-drive plenum	Class I or II	18PA or 18 PB	2270.70
20 AF belt-drive plenum	Class I or II	20PA or 20 PB	2905.20
22 AF belt-drive plenum	Class I or II	22PA or 22 PB	3673.20
25 AF belt-drive plenum	Class I or II	25PA or 25 PB	4608.20
28 AF belt-drive plenum	Class I or II	28 PA or 28 PB	6277.80
32 AF belt-drive plenum	Class I or II	32 PA or 32 PB	7847.30
36 AF belt-drive plenum	Class I or II	36 PA or 36 PB	10017.80
40 AF belt-drive plenum	Class I or II	40 PA or 40 PB	13,023.10
44 AF belt-drive plenum	Class I or II	44 PA or 44 PB	14,692.80
49 AF belt-drive plenum	Class I or II	49 PA or 49 PB	18,299.20
55 AF belt-drive plenum	Class I or II	55 PA or 55 PB	23,901.00
63 AF belt-drive plenum	Class I or II	63 PA or 63 PB	31,135.00
10.50 AF direct-drive plenum	Class II	10 NF or 10 NW	630.00
12 AF direct-drive plenum	Class II	12 NR or NF	839.00
13.50 AF direct-drive plenum	Class II	13 NR or 13 NF	952.00
15 AF direct-drive plenum	Class II	15 NR or 15 NF	1139.00
16 AF direct-drive plenum	Class II	16 NR or NF	1361.00
18 AF direct-drive plenum	Class II	18 NR or 18 NF	1673.00
20 AF direct-drive plenum	Class II	20 NR or 20 NF	1942.00
22 AF direct-drive plenum	Class II	22 NR, 22 NF, or 22 NW	2454.00
24 AF direct-drive plenum	Class II	24 NR, 24 NF, or 24 NW	3010.00
27 AF direct-drive plenum	Class II	27 NR or 27 NF	3701.00
30 AF direct-drive plenum	Class II	30 NR or 30 NF	4620.00
22 AF stacked direct-drive plenum	Class II	22 SF or 22 SW	2849.00
24.50 AF stacked direct-drive plenum	Class II	24 SF or 24 SW	4765.00

Note: (1) to be used for fan rpm < 700 or cfm < 25,500. (2) to be used for fan rpm > 700 or cfm > 25,500

When a single transmitter is supplied in a multiple fan system, one or more fans will be brought back to the transmitter as a manifold and the airflow will represent the total airflow for the system. As a result, the factor should be adjusted as follows:

$$K = N * K\text{-Factor from Table 50}$$

Where:

K = The final factor to be used for controller programming.

N = The number of active* fans in the system.

*If a fan fails in a multiple fan system where only one transmitter is being supplied, and if the remaining fans will continue to be used, the factor should be reduced accordingly. Additionally, if the inactive fan was included in the manifold back to the transmitter, the tubes from the inactive fan should be temporarily removed and replaced with tubes from an active fan (or simply plugged).

When a transmitter is supplied for each fan, the factor does not need to be adjusted. The resulting airflow will represent single-fan airflow. At the controller level, the individual airflows should be summed to get the total airflow. If a field-provided K-factor is to be used (see below), the measured airflow for the system should be

divided by the number of active fans to get a single-fan K-factor.

Field-obtained factors can provide maximum accuracy. To obtain the factor in the field, measure the differential pressure output from the transmitter while measuring the airflow through the system. Once these two values have been measured, simply solve for K using the following equation:

$$K = \text{ACFM} / \text{SQRT}(\text{DP})$$

Where:

K = Field-provided constant factor.

ACFM = Actual airflow (ft³/min.) being measured at the air density being measured.

DP = Differential pressure (inches w.g.) being measured by the transmitter.

Maintenance

For a typical HVAC environment - especially with upstream filtration - there should be little to no required maintenance. In extreme cases or for mishaps (bearing grease in the taps for example), the flow meter is easily cleanable. The fan inlet airflow measuring system is extremely simple: a few pressure taps, a few fittings, and some tubing. Although unlikely, if any tap were to get clogged, simply disconnect each side of the transmitter and blast air in a reverse direction through the system.

Energy Wheel Startup

⚠ WARNING

Toxic Hazards with Exhaust Air!

Do not use an energy wheel in an application where the exhaust air is contaminated with harmful toxins or biohazards. Using an energy wheel could displace vast quantity of contaminated air which could result in asphyxiation and poisoning. Failure to follow this instruction could result in death or serious injury.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

NOTICE:

Equipment Damage!

Exceeding the recommended airflow can result in damage to equipment. Trane is not responsible for equipment damage resulting from exceeding recommendations.

Do not exceed the maximum rated airflow for the wheel. The pressure drop across the wheel is not to exceed 1.25 inches w.g.

1. Set diameter seals. See ["Seal Adjustment" on page 141.](#)
2. Turn the energy wheel clockwise (as viewed from the pulley side) by hand to verify that the wheel turns freely through its full rotation.
3. Confirm that all wheel segments are fully engaged in the wheel frame and that segment retainers are completely fastened (see [Figure 140](#)).
4. With hands and objects away from moving parts, activate the wheel and confirm the wheel rotation. The correct rotation direction is clockwise as viewed from the pulley side.
5. Start and stop the wheel several times to confirm seal adjustment and proper belt tracking on the wheel rim. The correct belt tracking is approximately a quarter inch from the outer edge of the rim (see [Figure 141](#)).
6. If the wheel has difficulty starting, turn off the power and inspect for excessive interference between the wheel surface and the four diameter seals. To correct, loosen the diameter seal adjusting screws and back the diameter seals away from the surface of the wheel. Apply power to confirm that the wheel rotates freely. Readjust and tighten the seals according to instructions in ["Seal Adjustment" on page 141.](#)
7. Damper actuators (if so equipped): Stroke the actuators to observe full open and full closure of dampers. Adjust the actuator and/or linkage to prevent "over-stroking" so excessive pressure is not placed on the damper at the full open or full closed position.

Figure 140. Completely fasten segment retainers



Figure 141. Confirm proper belt tracking on the wheel rim



External Insulating Requirements

The following areas should be specifically addressed, as applicable:

- Supply and return water piping connections
- Supply and return refrigerant piping connections
- Condensate drain lines and connections
- Outdoor-air-intake duct connections
- Discharge duct connections
- Special requirements for low-temperature-air systems

Routine Maintenance

⚠ WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.

⚠ WARNING

Rotating Components!

The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel. Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

Maintenance Checklist

Table 51. Maintenance Checklist

Frequency	Maintenance
After 48 hours of operation	For belt-drive fans, the belts have acquired their permanent set. Readjust but do not overtighten. See "Tension the Fan Belt," p. 119 for more information.
Every week	Observe unit weekly for any change in running condition and unusual noise.
Every month	• Clean or replace air filters if clogged or dirty; coat permanent filters with oil after cleaning; change bag filters when pressure drop is 1 in. wg. See "Air Filters" on page 132 for more information. • Belt-drive fans - relubricate fan bearings if necessary. See "Fan Bearing Lubrication" on page 143 for more information. • Belt-drive fans - check and adjust fan belt tension. See "Tension the Fan Belt," p. 119 for more information.
Every three to six months	• Belt-drive fans - check fan bearing grease line connections. Lines should be tight to the bearings. • Check motor bracket torque. See Table 52, p. 143 for torque requirements. • Belt-drive fans - check bearing bolt torque and bearing setscrew torque. See Table 52, p. 143 for torque requirements. • Belt-drive fans - align fan and motor sheaves. Tighten sheave set screws to the proper torque. See "Align Fan and Motor Sheaves," p. 121 for more information. • Inspect and clean drain pans. See "Coils" on page 132 for more information. • Tighten electrical connections. • Inspect coils for dirt build-up. See "Coils" on page 132 for more information.
Every year	• Inspect the unit casing for corrosion. If damage is found, clean and repaint. • Clean the fan wheels and shaft. See "Coils" on page 132 for more information. • Inspect and clean drain pans. • Check damper linkages, set screws, and blade adjustment. Clean, but do not lubricate, the nylon damper rod bushings. • Clean damper operators. • Inspect electrical components and insulation. • Inspect wiring for damage. • Rotate the fan wheel and check for obstructions. The wheel should not rub. Adjust the center if necessary. • Lubricate motor bearings in accordance with motor manufacturer's recommendations (see "Motor Bearing Lubrication" on page 143 for more information). • Check condition of gasketing and insulation around unit, door and dampers. • Examine flex connections for cracks or leaks. Repair or replace damaged material.

Air Filters

WARNING

Rotating Components!

The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel. Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

Throwaway Filters

To replace throwaway filters, install new filters with the directional arrows pointing in the direction of airflow.

Note: Bag and cartridge filters must have an airtight seal to prevent air bypass. If using filters not supplied by Trane, apply foam gasketing to the vertical edges of the filter.

Permanent Filters

To clean permanent filters:

1. Disconnect all electrical power to the unit.
2. Wash the filter under a stream of water to remove dirt and lint.
3. Remove oil from the filter with a wash of mild alkali solution.
4. Rinse the filter in clean, hot water and allow to dry.
5. Coat both sides of the filter by immersing or spraying it with Air Maze Filter Kote W or an equivalent.
6. Allow to drain and dry for about 12 hours.
7. Reinstall the filter.

Note: It may be preferable to keep extra, clean filters to replace the dirty filters to minimize unit downtime for filter maintenance.

Cartridge or Bag Filters

To replace cartridge or bag filters:

1. Disconnect all electrical power to the unit.
2. Remove the dirty filters from their installed position.
3. Keeping the new bag filters folded, slide each filter into the filter rack, pushing them tightly against the unit.

Note: The pleats should be in the vertical position.

4. If using the optional pre-filters, replace them on the appropriate filter rack.
5. Close and secure the access door.

Coils

All coils should be kept clean to maintain maximum performance.

Steam and Water Coils

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

To clean steam and water coils:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, use a soft brush to remove loose debris from both sides of the coil.
3. Install a block-off to prevent spray from going through the coil and into a dry section of the unit and/or system ductwork.
4. Mix a high-quality coil cleaning detergent with water according to the manufacturer's instructions.

Note: If the detergent is strongly alkaline after mixing (PH 8.5 or higher), it must contain an inhibitor. Follow the cleaning solution manufacturer's instructions regarding the use of the product.

5. Place the mixed solution in a garden pump-up sprayer or high-pressure sprayer. If a high pressure sprayer is to be used:
 - Maintain minimum nozzle spray angle of 15 degrees.
 - Spray perpendicular to the coil face.
 - Keep the nozzle at least 6 inches from the coil.
 - Do not exceed 600 psi.

6. Spray the leaving air side of the coil first, then the entering air side.
7. Thoroughly rinse both sides of the coil and the drain pan with cool, clean water.
8. Repeat steps 6 and 7 as necessary.
9. Straighten any coil fins that may have been damaged during the cleaning process.
10. Confirm the drain line is open following the cleaning process.
11. Allow the unit to dry thoroughly before putting it back into service.
12. Replace all panels and parts and restore electrical power to the unit.
13. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials.

Refrigerant Coils

WARNING

Hazardous Pressures!

Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil. Failure to follow these safety precautions could result in coil bursting, which could result in death or serious injury.

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, use a soft brush to remove loose debris from both sides of the coil.
3. Install a block-off to prevent spray from going through the coil and into a dry section of the unit and/or system ductwork.
4. Mix a high-quality coil cleaning detergent with water according to the manufacturer's instructions.

Note: If the detergent is strongly alkaline after mixing (PH 8.5 or higher), it must contain an inhibitor. Follow the cleaning solution manufacturer's instructions regarding the use of the product.

5. Place the mixed solution in a garden pump-up sprayer or high-pressure sprayer. If a high pressure sprayer is to be used:
 - Maintain minimum nozzle spray angle of 15 degrees.
 - Spray perpendicular to the coil face.
 - Keep the nozzle at least 6 inches from the coil.
 - Do *not* exceed 600 psi.
6. Spray the leaving air side of the coil first, then the entering air side.
7. Thoroughly rinse both sides of the coil and the drain pan with cool, clean water.
8. Repeat steps 6 and 7 as necessary.
9. Straighten any coil fins damaged during the cleaning process.
10. Confirm the drain line is open following the cleaning process.
11. Allow the unit to dry thoroughly before putting it back into service.
12. Replace all panels and parts and restore electrical power to the unit.
13. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Coil Winterization

Water coil winterization procedures consist primarily of draining water from the coil before the heating season. Trane recommends flushing the coil with glycol if coils will be exposed to temperatures below 35 degrees.

To clean refrigerant coils:

NOTICE:**Coil Freeze-up!**

Drain and vent coils when not in use. Trane recommends glycol protection in all possible freezing applications. Use a glycol approved for use with commercial cooling and heating systems and copper tube coils. Failure to do so could result in equipment damage.

Install field-fitted drains and vents to permit winterization of coils not in use and to assist in evacuating air from the water system during startup. If draining is questionable because of dirt or scale deposits inside the coil, fill the coil with glycol before the heating season begins.

Individual coil types determine how to properly winterize the coil. To determine the coil type find the "Service Model No of Coil" on the coil section nameplate. The coil type is designated by the second and third digits on that model number. For example, if the model number begins with "DUWB," the coil type is UW; if the model number begins with "DW0B," the coil type is W.

Note: On many unit sizes, there are multiple coils in the coil section. Be sure to winterize all coils in a given coil section.

To winterize type D1, D2, WL, LL, UA, UW, UU, W, P2, P4, P8, WD, 5D, and 5W coils:

1. Remove the vent and drain plugs.
2. Blow the coil out as completely as possible with compressed air.
3. Fill and drain the coil several times with full strength glycol so that it mixes thoroughly with the water retained in the coil.
4. Drain the coil out as completely as possible.
5. To ensure no water remains in the coil, do not replace the vent and drain plugs until the coils are put back into service.

Note: Use care in removing header plugs from Type P2, P4, and P8 coils. Over-torquing may result in twisted tubes.

Moisture Purge Cycle

By its very nature, any HVAC unit with a cooling coil serves as a dehumidifier, reducing the surrounding air's ability to hold water vapor as its temperature falls. This normally doesn't present a problem when the unit is running. However, when the fan stops, water vapor condenses on the cold metal surfaces inside the air handler and remains there until the air warms sufficiently to re-evaporate it. This damp, dark environment—though temporary—can encourage the growth of mold, mildew, and other microbial contaminants.

Providing a moisture purge cycle 15 to 30 minutes after shutdown disperses the cold, humid air inside the air-

handling system more evenly throughout the building. This four-step cycle:

- Closes the outdoor air dampers.
- Turns off the cooling coil.
- Opens any variable-air-volume terminals connected to the air handler.
- Operates the supply fan for 10 to 15 minutes.

Air movement discourages water condensation and hastens re-evaporation of any condensate that does happen to form. This simple preventative measure effectively combats microbial growth and curbs moisture-related deterioration of air-handling components.

Cleaning Non-Porous Surfaces**⚠ WARNING****Hazardous Voltage!**

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

If microbial growth on a non-porous insulating surface (closed cell insulation or sheet metal surface) is observed:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, use a brush for sheet metal surfaces or a soft sponge on a foil face or closed cell foam surface to mechanically remove the microbial growth.

Note: Be careful not to damage the non-porous surface of the insulation.

3. Install a block-off to prevent spray from going into a dry section of the unit and/or system ductwork.
4. Thoroughly clean the contaminated area(s) with an EPA-approved sanitizer specifically designed for HVAC use.
5. Rinse the affected surfaces thoroughly with fresh water and a fresh sponge to prevent potential corrosion of the drain pan and drain line

6. Repeat steps 4 and 5 as necessary.
7. Confirm the drain line is open following the cleaning process.
8. Allow the unit to dry thoroughly before putting it back into service.
9. Replace all panels and parts and restore electrical power to the unit.
10. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Cleaning Porous Surfaces

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

To clean a porous insulating surface (fiberglass insulation):

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, use a vacuum device with a HEPA filter (99.97 percent efficient at 0.3 micron particles) to remove the accumulated dirt and organic matter.
Note: Be careful not to tear the insulation surface or edges.
3. Confirm the drain line is open following the cleaning process.
4. Allow the unit to dry thoroughly before putting it back into service.
5. Replace all panels and parts and restore electrical power to the unit.
6. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Drain Pans

WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

WARNING

No Step Surface!

Do not walk on the sheet metal drain pan. Walking on the drain pan could cause the supporting metal to collapse, resulting in the operator/technician to fall. Failure to follow this recommendation could result in death or serious injury.

The condensate drain pan and drain line must be checked to assure the condensate drains as designed. This inspection should occur a minimum of every six months or more often as dictated by operating experience.

If evidence of standing water or condensate overflow exists, identify and remedy the cause immediately. Refer to ["Troubleshooting" on page 145](#) for possible causes and solutions.

To clean drain pans:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, remove any standing water.
3. Scrape solid matter off of the drain pan.
4. Vacuum the drain pan with a vacuum device that uses high-efficiency particulate arrestance (HEPA) filters with a minimum efficiency of 99.97 percent at 0.3 micron particle size.
5. Thoroughly clean any contaminated area(s) with a mild bleach and water solution or an EPA-approved sanitizer specifically designed for HVAC use.
6. Immediately rinse the affected surfaces thoroughly with fresh water and a fresh sponge to prevent potential corrosion of metal surfaces.
7. Allow the unit to dry completely before putting it back into service.



Routine Maintenance

8. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

CDQ Desiccant Wheels

Please reference CDQ-SVX01A-EN Installation Operation Maintenance manual for instructions.

Energy Wheels

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE:

Equipment Damage!

Do not use acid based cleaners, aromatic solvents, steam or temperatures in excess of 170°F to prevent damage to internal components. Trane assumes no responsibility for equipment damage caused by cleaning solutions or steam.

NOTICE:

Reduced Airflow!

Accumulated dirt and debris may result in reduced airflow and/or increased pressure drop across the energy wheel. Increased pressure drop can result in permanent damage to the energy wheel. Trane is not responsible for equipment-only-damage caused by debris.

Cleaning the Energy Wheel

Disconnect all electrical power, then use a vacuum or brush to remove accumulated material from the face of the wheel. Examine the energy wheel monthly for material build-up on the wheel.

If more aggressive cleaning is needed, segment removal may be required.

1. Wash the segments or the wheel in a five-percent solution of non-acid-base coil cleaner (part no. CHM00021 at your local Trane parts center) or in a alkaline detergent and warm water.
2. Soak the segments in the solution until grease, oil, and tar deposits are loosened.
3. Before removing the cleaner, rapidly run your fingers across the surface of the segments to separate the polymer strips for better cleaning actions.

4. Rinse the dirty solution from the segments and remove excess water before re-installing the segments in the wheel. Note that some permanent staining of the desiccant may remain but is not harmful to performance.

Cleaning Frequency

In reasonably clean office or school buildings, cleaning with coil cleaner solution may not be required for several years. If the energy wheel is exposed to air streams containing, for example, high levels of occupant tobacco smoke, cooking facility exhaust air, or oil-based aerosols found in machine shop areas, annual cleaning may be required to remove these contaminants and restore performance.

High maintenance applications like these may benefit from keeping a spare set of clean segments on hand. This allows for rapid change-out of clean segments with minimal downtime. The dirty segments can then be cleaned at a convenient time.

Segment Removal/Replacement

Segment Removal (for wheel cfm 900-15,000)

For unit sizes 3 to 8, the energy wheel module is equipped with only *one* access panel and the entire energy wheel cassette slides out through the door for maintenance. For unit sizes 10 to 50, the energy wheel module is equipped with *four* access doors and the wheel segments are removable. Wheel segments are secured to the wheel frame by a segment retainer, which pivots on the wheel rim and is held in place by a segment retaining catch.

1. Disconnect all electrical power.
2. Unlock the two segment retainer brackets, one on each side of the selected segment opening (see [Figure 142](#)).
3. Remove the segment from the wheel frame. It may be necessary to *gently* pry the segment out of the wheel with a screwdriver.
4. Pull the segment up and out of the wheel frame (see [Figure 143](#)).
5. Close any open segment retainers prior to rotating the wheel. Failure to close any retainer may damage the retainer, seals, or segments.
6. Slowly rotate the wheel by hand 180 degrees and repeat the process to remove the second segment.
7. Rotate the wheel 90 degrees by hand and remove the third segment.
8. Rotate the wheel 180 degrees by hand and remove the fourth segment. Rotating the wheel in this manner keeps the wheel balanced while removing the segments.
9. Continue this procedure to remove all the segments.

Segment Replacement (for wheel cfm 900-15,000)

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Disconnect all electrical power.
2. Unlock the two segment retainers, one for each side of the selected segment opening (see [Figure 142](#)).
3. With the embedded stiffener facing the motor side, insert the nose of the segment between the hub plates (see [Figure 144](#)).
4. Holding the segment by the two outer corners, press the segment toward the center of the wheel and inward against the spoke flanges. If hand pressure does not fully seat the segment, insert the flat tip of a screwdriver between the wheel rim and outer corners of the segment and apply downward force while guiding the segment into place.
5. Close and latch each segment retainer under the segment retaining catch.
6. Slowly rotate the wheel 180 degrees by hand. Install the second segment opposite the first for counterbalance.
7. Rotate the two installed segments 90 degrees by hand to balance the wheel while the third segment is installed.
8. Rotate the wheel 180 degrees by hand to install the fourth segment opposite the third.
9. Repeat this sequence with the remaining four segments.

Replacing the segments with a spare set can be accomplished more quickly. Remove the dirty segment, replace it with a clean segment, then move to the next segment. The 180/90/180-degree rotation procedure is not necessary.

Figure 142. Unlock the segment retainers



Figure 143. Pull the segment up and out of the wheel frame to remove



Figure 144. Insert nose of segment between hub plates to install



Routine Maintenance

Segment Removal (for wheel cfm 17,500 and higher)

For energy wheel applications requiring 17,500 cfm and higher, wheel segments with satellite sections are used (see [Figure 145](#)).

Removal Procedure for Outer Segments

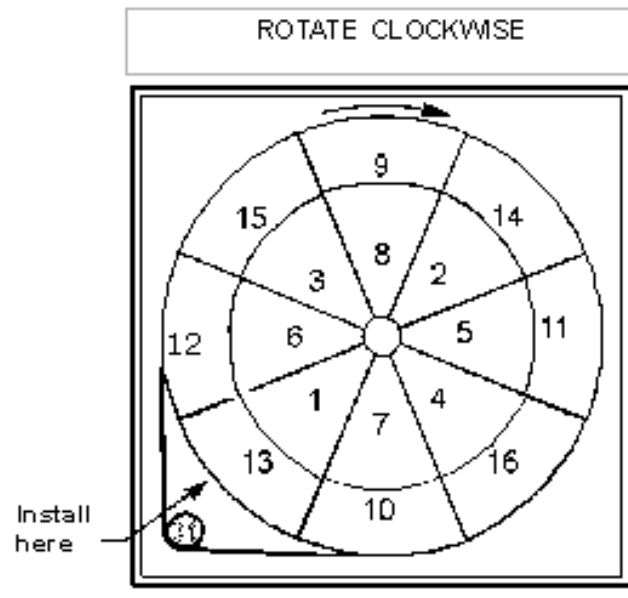
⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Note: Install and remove all segments at location indicated by arrow in [Figure 145](#).

Figure 145. Install and remove segments in the order shown



1. Disconnect all electrical power.
2. Align outer segment with wheel drive pulley. Secure pulley and belt with vise grip to prevent rotation (see [Figure 146](#)).

Figure 146. Secure pulley and belt with vise grip to prevent wheel rotation.



3. Insert flat tipped screwdriver between rim and segment retainer latch. Rotate screwdriver to release latch from under catch.
4. Rotate latch 90 degrees from rim. Remove forked segment retainers.
5. Insert screwdriver tip between corners of segment and spoke. Gently pry ends of segment part way out. Grasp one end of segment and lift straight out.
6. Remove vise grip. Repeat steps 1 through 5 for each segment in the order shown in [Figure 145](#).

Removal Procedure for Inner Segments

Remove inner segments in the order shown in [Figure 145](#) as follows:

1. Align inner segment with wheel drive pulley. Secure pulley and belt with vise grip to prevent rotation (see [Figure 146](#)).
2. Support segment with one hand while removing 1/4-20 flat head retaining screw in hub with 5/32 inch Allen wrench.
3. With weight of segment resting on lower spoke, carefully slide segment out from between hub plates.
4. Being careful to balance segment on lower spoke with one hand, grasp nose of segment with other hand and remove from wheel.
5. Reinsert 1/4-20 screws in segment nose bracket to avoid loss.
6. Remove vise grip. Repeat steps 1 through 5 for each segment in the order shown in [Figure 145](#).

Segment Replacement (for wheel cfm 17,500 and higher)

Installation Procedure for Inner Segments

Note: Note: Install and remove all segments at location indicated by arrow in [Figure 145](#).

1. Rotate the wheel clockwise to align the center of a spoke opening with the pulley. Secure pulley and belt with vise grip to prevent wheel rotation (see [Figure 146](#)).
2. Remove 1/4-20 flat head screw from segment nose bracket.
3. Center and rest segment on lower spoke. Slide segment on spoke until nose bracket contacts stop in hub plate. Insert screw and tighten until screw is firmly seated (see [Figure 147](#)).
4. Holding wheel to prevent rotation, remove vise grip. Rotate wheel clockwise to install segments in the order shown in [Figure 145](#).
5. Secure pulley. Repeat steps 2 through 4 until all inner segments are installed.

Installation Procedure for Outer Segments

1. Align segment opening with pulley. Secure pulley and belt with vise grip to prevent rotation (see [Figure 146](#)).
2. Rotate outer segment retainer latch, located at end of spokes, 90 degrees from rim and remove two forked outer segment retainers.
3. Install outer segment by starting lower end in position and pressing straight in against four corners. Sharp rap with heel of hand will assist entry when needed (see [Figure 148](#)). Note: Only reinstall segment retainer between adjacent installed segments.
4. Rotate both retainer latches to closed position to prevent interference with bearing support beam while rotating wheel by hand.
5. Repeat steps 1 through 4 in the order shown in [Figure 145](#) until all outer segments are in place. Make certain all retainer latches are latched in place under catch

Figure 147. Slide segment on spoke until contacts stop in hub plate.



Figure 148. Install outer segment by starting lower end in position and pressing straight in



Cleaning the Energy Wheel Motor

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electrical power, then use a vacuum cleaner and brush to remove accumulated material from the energy wheel motor. The use of spray aerosol cleaners is not recommended. Examine the motor monthly for debris accumulation.

Routine Maintenance

Cleaning the Module

1. Disconnect all electrical power.
2. Use a vacuum cleaner to remove dust and debris from the module surfaces.
3. If needed, use a detergent solution to remove grease, oil, or other stubborn deposits from module surfaces. Follow the manufacturer's instructions regarding use of the product.
4. Rinse any cleaning product thoroughly from the module walls. The use of a water stream from a garden hose or high pressure washer is *not* recommended. Saturation of the wall panel insulation with potential microbial growth or damage to the energy wheel could occur.
5. Examine the module monthly for material build-up on the wall surfaces.

Bearing and Motor Lubrication

The wheel drive motor and wheel support shaft bearings are permanently lubricated and no further lubrication is necessary.

Energy Wheel Drive Belt Adjustment

The drive belt is a urethane stretch belt designed to provide constant tension throughout the life of the belt. No periodic adjustment is required. Inspect the belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately, with no visible slippage, when power is applied.

Energy Wheel Service and Repair

⚠ CAUTION

Sharp Edges!

The service procedure described in this document involves working around sharp edges. To avoid being cut, technicians **MUST** put on all necessary Personal Protective Equipment (PPE), including gloves and arm guards. Failure to follow recommendations could result in minor to moderate injury.

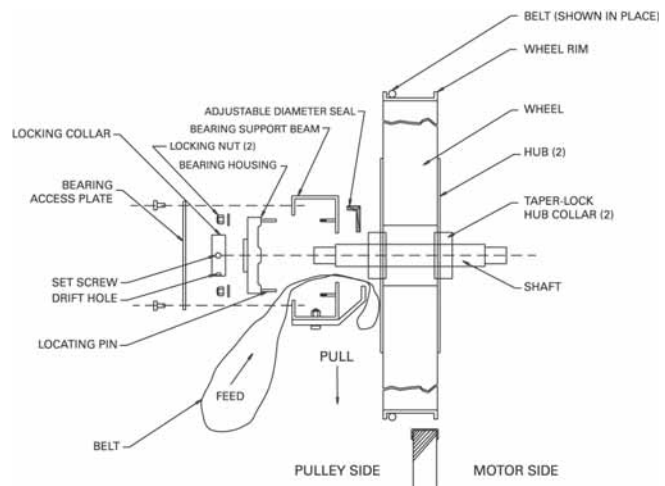
Bearing/Drive Belt Replacement

For sizes 10 to 50

Bearing removal on the pulley side of the wheel is required to remove and replace the drive belt for unit sizes 10 to 50. Bearing removal is discussed first in this procedure.

1. Disconnect all electrical power.
2. Obtain access to the pulley side bearing access plate.
3. Remove the two bearing access plate retaining screws and the access plate.
4. Using a hexagonal wrench, loosen the set screw in the bearing locking collar.
5. Using a light hammer and a drift placed in the drift pin hole in the collar, tap the collar in the opposite direction of wheel rotation to unlock it.
6. Remove the collar.
7. Using a socket wrench with an extension, remove the two nuts that secure the bearing housing to the bearing support beam.
8. Slide the bearing from the shaft. Note that slight hand pressure against the wheel rim will lift the weight of wheel from the inner race of the bearing to assist in its removal and installation. The use of a bearing puller may be required.
9. Using a wrench, remove the diameter seal retaining screws or hub seal retaining screws and remove the diameter seals or hub seals from the bearing beam. See [Figure 149](#) for an exploded view of the shaft, bearings, belt, etc.

Figure 149. For belt replacement, loop the trailing end of the belt over the shaft (shown with diameter seals removed).



10. Remove the old belt. Form a small loop of belt and pass it through the hole in the bearing support beam.
11. Grasp the belt at the wheel hub and pull the entire belt down.
12. Loop the trailing end of the belt over the shaft. [Figure 149](#) shows the belt partially through the opening.
13. Re-install the bearing onto the wheel shaft, being careful to engage the two locating pins into the holes in the bearing support beam.
14. Secure the bearing with two self-locking nuts.
15. Install the belt around the wheel and pulley according to the instructions provided with the belt.
16. Re-install the diameter seals or hub seal and tighten the retaining screws.
17. Adjust the seals according to the procedure in "[Seal Adjustment](#)" on page 141.

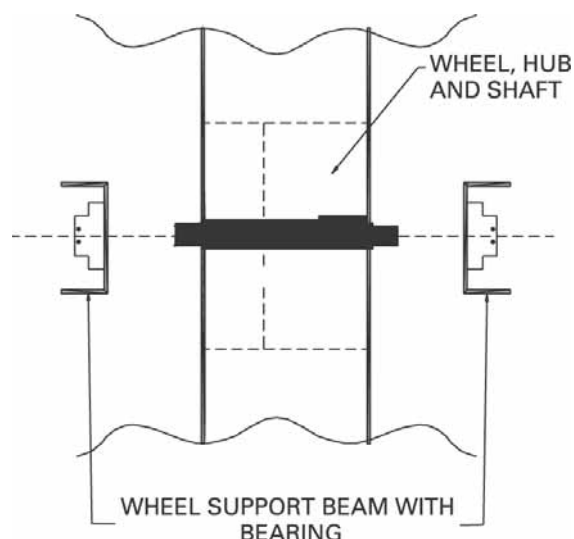
18. Rotate the wheel in a clockwise direction to confirm that it rotates freely with slight drag on seals.
19. Re-install the bearing locking collar.
20. Rotate the collar by hand in the direction of wheel rotation.
21. Lock the collar in position by tapping the drift pin hole with a hammer and drift.
22. Secure the collar in position by tightening the set screw.
23. Re-install the bearing access cover.
24. Apply power to the wheel and ensure that the wheel rotates freely without interference.

For sizes 3 to 8

Bearing removal is not required on slide-out cassettes, unit sizes 3 to 8. These belts may be replaced by temporarily dismounting and rotating the pulley side bearing beam to allow the new belt to be installed on the wheel rim.

1. Disconnect electrical power to the energy wheel.
2. Remove the access panel.
3. Disconnect all controls wiring.
4. Slide the entire cassette assembly out of the module.
5. Loosen the two set screws on the wheel support beam bearings, one on each side of wheel.
6. Remove the belt from the pulley and temporarily position it around the rim.
7. Remove the pulley side wheel support beam with the bearing.
8. Pull the wheel with the shaft straight out of the motor side wheel support beam and bearing (see [Figure 150](#)). Do not disassemble the bearings from the beam unless they require replacement. Handle the wheel with care to avoid distorting the wheel

Figure 150. Unit sizes 3 to 8 bearing assembly

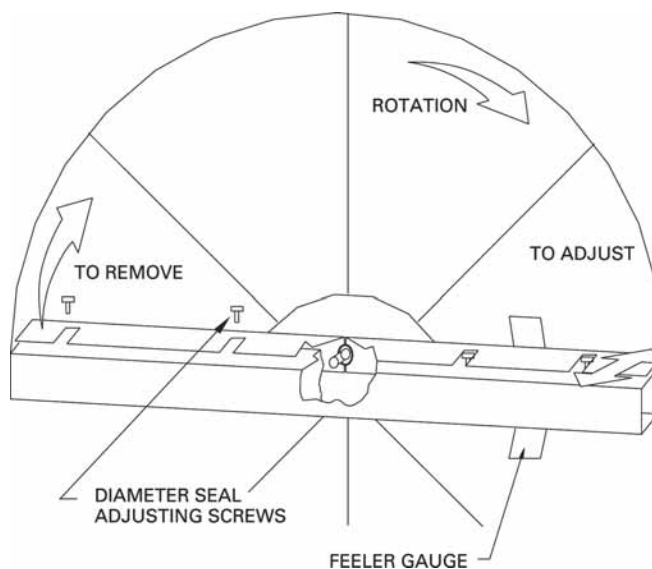


9. Reverse the removal procedure to re-install. Check to ensure that the wheel remains in the center of the seal plate opening.

Seal Adjustment

1. Loosen the diameter seal adjustment screws and back the seals away from the wheel surface (see [Figure 151](#)).

Figure 151. To adjust seal, loosen screws, back seals away from wheel surface. Seal seen from bottom section.



1. Rotate the wheel clockwise until two opposing spokes are hidden behind the bearing support beam.
2. Using a folded piece of paper as a feeler gauge, position the paper between the wheel surface and the diameter seals.
3. Adjust the seals toward the wheel surface until slight friction on the paper feeler gauge is felt when the gauge is moved along the length of the spoke.
4. Check the adjustment through a full rotation of the wheel.
5. Retighten the adjusting screws and recheck the clearance with the paper feeler gauge.

Drive Motor and Pulley Replacement

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

1. Disconnect all electrical power.
2. Remove the belt from the pulley and temporarily position it around the wheel rim.
3. Measure and record the distance from the inner edge of the pulley to the mounting wall.
4. Loosen the set screw in the wheel drive pulley using an Allen wrench and remove the pulley from the motor drive shaft.
5. While supporting the weight of the drive motor in one hand, loosen and remove the four mounting bolts.
6. Install a replacement motor with the hardware kit supplied.
7. Install the pulley and adjust it to the distance recorded in the previous step.
8. Tighten the set screw to the drive shaft.
9. Stretch the belt over the pulley and engage it in the groove.

Fans

⚠ WARNING

Rotating Components!

The following procedure involves working with rotating components. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/ tagout procedures to ensure the power can not be inadvertently energized. Secure rotor to ensure rotor cannot freewheel. Failure to secure rotor or disconnect power before servicing could result in rotating components cutting and slashing technician which could result in death or serious injury.

Inspecting and Cleaning Fans

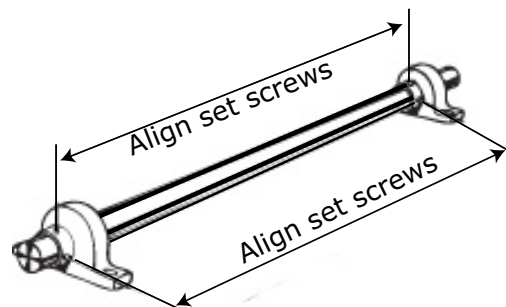
Fan sections of air handlers should be inspected every six months at a minimum or more frequently if operating experience dictates. If evidence of microbial growth (mold) is found, identify and remedy the cause immediately. Refer to ["Troubleshooting" on page 145](#) for possible causes and solutions. To clean the fan section:

1. Disconnect all electrical power to the unit.
2. Wearing the appropriate personal protective equipment, remove any contamination.
3. Vacuum the section with a vacuum device that uses high-efficiency particulate arrestance (HEPA) filters with a minimum efficiency of 99.97 percent at 0.3 micron particle size.
4. Thoroughly clean any contaminated area(s) with a mild bleach and water solution or an EPA-approved sanitizer specifically designed for HVAC use.
5. Immediately rinse the affected surfaces thoroughly with fresh water and a fresh sponge to prevent potential corrosion of metal surfaces.
6. Allow the unit to dry completely before putting it back into service.
7. Be careful any contaminated material does not contact other areas of the unit or building. Properly dispose of all contaminated materials and cleaning solution.

Bearing Set Screw Alignment

Align bearing set screws for belt-drive fans as illustrated in [Figure 152](#). See [Table 39](#) for set screw torque measurements.

Figure 152. Alignment



Torque Requirements

Refer to [Table 52](#) for minimum torque of motor mounting and bearings bolts. Refer to [Table 39, p. 121](#) for minimum setscrew torque.

Table 52. Minimum hex head bolt torque in lb.-ft. (Grade 5 bolts)

Size (inches)	Thread Designation	Minimum Torque
1/4-20	UNC	6
1/4-28	UNF	7
65/16-18	UNC	14
5/16-24	UNF	16
3/8-16	UNC	24
3/8-24	UNF	28
7/16-14	UNC	42
7/16-20	UNF	45
1/2-13	UNC	69
1/2-20	UNF	83
9/16-12	UNC	99
9/16-18	UNF	118
5/8-11	UNC	150
5/8-18	UNF	176
3/4-10	UNC	254
3/4-16	UNF	301
7/8-9	UNC	358
7/8-14	UNF	422
1-8	UNC	500
1-14	UNF	602

Note: Soft metric conversions are not acceptable for screw and hex sizes.

Fan Bearing Lubrication

NOTICE:

Bearing Failure!

Do not mix greases with different bases within the bearing. Mixing grease within the bearing could result in premature bearing failure.

For belt-drive fans, the grease used in electric motor bearings is usually not compatible with the grease used in fan bearings. Never mix the two grease types! See [Table 53](#) for compatible greases and [Table 54](#) for maximum grease capacity.

Note: Lubricate the motor bearing according to the motor manufacturer's recommendations and use the manufacturer-recommended grease. See "Motor Bearing Lubrication" on page 143.

Table 53. Compatible Greases

Type
Texaco Multi Fak 2
Shell Alvania 2
Mobil 532
Chevron Dura-Lith 2
Exxon Beacon
Keystone 84H

Table 54. Fan bearing maximum grease capacity

Shaft size (inches)	Capacity (fluid ounce)
1/2 - 3/4	1/7
7/8 - 1 3/16	3/8
1 1/4 - 1 1/2	5/8
1 11/16 - 1 15/16	7/8
2 - 2 7/16	1 1/4
2 1/2 - 2 15/16	2

- Fan bearings without lubrication lines are sealed bearings. Re-lubrication is not required.
- Fan bearings equipped with lubrication lines should be lubricated with a lithium-based grease that conforms to NLGI No. 2 for consistency.

Motor Bearing Lubrication

Obtain an operation and maintenance manual from the motor manufacturer for the specific motor installed. The motor manufacturer's recommendations take precedence for all matters related to the start-up and routine maintenance of the motor.

Motor grease fittings have been removed from factory-installed motors in compliance with UL regulations. Motor bearings require periodic maintenance throughout their life. Many different styles of motors come as standard selections, so please obtain the motor IOM and use the manufacturer-recommended grease.

Fan Motor Inspection

Inspect fan motors periodically for excessive vibration or temperature. Operating conditions will vary the frequency of inspection and lubrication. Motor lubrication instructions are on the motor tag or nameplate. If for some reason these instructions are not available, contact the motor manufacturer. Some motor manufacturers may not provide oil tubes on motors with permanently sealed bearings.

Ultraviolet (UV) Light Maintenance

The intensity of the ultraviolet energy emitted from the ultraviolet bulbs is dependent on the cleanliness and age of the bulb. The surface of the bulb should be kept as clean as possible for optimum intensity. Depending on the filtration level of the HVAC system and the general hygiene of the building, periodic cleaning may be necessary. Before attempting any maintenance procedures, always follow all warnings and cautions as detailed in this maintenance section.

WARNING

Hazardous Voltage and Exposure to Ultraviolet Radiation!

This product contains components that emit high-intensity ultraviolet (UV-C) radiation which can be harmful to unprotected eyes and skin. To avoid injury, disconnect all electrical power, including remote disconnects, and make sure the UV lights are off before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in burns or electrocution which could result in death or serious injury.

WARNING

Hazardous Mercury Vapors!

If large numbers of UV bulbs are broken, an appropriate respirator, as described in OSHA 1910.134, **MUST** be worn to prevent inhalation of mercury vapors. Mercury vapors are toxic and inhaling them could result in poisoning and suffocation. Failure to follow this recommendation could result in death or serious injury.

CAUTION

Broken Glass!

Bulbs are fragile and can be easily broken. To avoid getting cut, always use cloth gloves and eye protection when handling, cleaning or replacing these bulbs. Bulbs may break if dropped or handled improperly. Refer to the MSDS sheet from the bulb manufacturer for additional safety information. Failure to handle bulbs properly could result in minor to moderate injury.

Cleaning the Bulbs

Note: If bulbs are found to be broken, see the proper warning and cautions below regarding broken bulbs and hazardous vapors.

1. Disconnect all electrical power to the unit and the ultraviolet bulbs.

2. Wearing soft cloth gloves and safety glasses, use two hands and firmly grasp the bulb at each end.
3. Rotate the bulb 90 degrees in either direction and move bulb away from the fixture and out of unit.
4. Wipe down each bulb with a clean cloth and alcohol. Avoid touching the bulb with bare hands as skin oils can accelerate future glass soiling and degrade the bulb performance.
5. Carefully return the bulb to the fixture and rotate it 90 degrees in either direction until it is firmly secured.
6. Close and latch all unit panels and reenergize power to the lights.

Replacing the Bulbs

Ultraviolet bulbs should be replaced annually if operated continuously or after 9,000 hours of use if operated intermittently. Replacement bulbs must be the specific size and wattage as originally supplied from the factory.

Note: Although the lights may continue to generate a characteristic blue glow beyond 9,000 operating hours, the ultraviolet radiation emitted by the bulbs degrades over time and will no longer provide the intended benefit.

1. Disconnect power to the HVAC unit and the ultraviolet bulbs. SEE WARNING ABOVE.
2. Wearing soft cloth gloves and safety glasses, use two hands and firmly grasp the bulb at each end.
3. Rotate the bulb 90 degrees in either direction and move bulb away from the fixture and out of unit.
4. Carefully install a new replacement bulb in the fixture and rotate it 90 degrees in either direction until it is firmly secured.
5. If broken bulbs are found or if you are required to dispose of used bulbs, the proper warning and cautions must be followed.
6. Always use cloth gloves and suitable eye protection when cleaning or replacing these bulbs. Bulbs may break if dropped or handled improperly.

Disposal of Bulbs

UV bulbs, like fluorescent bulbs, contain mercury, which is a regulated hazardous waste. The disposal requirements for hazardous wastes are determined by local, state and federal guidelines. Check all regulations before disposing of bulbs to assure you have met all requirements.

Refer to the MSDS sheet from the bulb manufacturer for additional disposal, handling and safety information.

After replacing bulbs, close and latch all unit panels and reenergize power to the lights.

Troubleshooting

This section is intended to be used as a diagnostic aid only. For detailed repair procedures, contact your local Trane service representative.

⚠ WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.

Table 55. Air handler troubleshooting recommendations

Symptom	Probable Cause	Recommended Action
Bearing is excessively hot	First start after relubrication (Grease distribution)	Allow machine to cool down and restart.
	Over-lubrication	Clean surface of grease and purge.
	Over tensioned belts	Adjust belt tension.
	No lubricant	Apply lubricant. Check bearings for damage.
Motor fails to start	Misaligned bearing	Correct alignment. Check shaft level.
	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker.
	Overload trip	Check and reset overload.
	Improper wiring or connections	Check wiring with diagram supplied on unit.
	Improper current supply	Compare actual supply power with motor nameplate recommendations. Contact power company for adjustments.
Motor stalls	Mechanical failure	Check that motor and drive rotate freely. Check bearing lubricant.
	Open phase	Check line for an open phase.
	Overloaded motor	Reduce load or replace with larger motor.
Excessive vibration	Low line voltage	Check across AC line. Correct voltage if possible.
	Poor alignment	Align bearing set screws (see Table 39, p. 121). Loosen and retighten bearing set screws.
	Shipping spacers not removed	Remove shipping spacers and/or bolts (see "Fan Isolation," p. 65).
	Over tensioned belts	Adjust belt tension.
Motor runs and then dies down	Misaligned drive	Align drive.
	Partial loss of line voltage	Check for loose connections. Determine adequacy of main power supply.
Motor does not come up to speed	Starter shorts when motor warms up	Replace starter.
	Low voltage at motor terminals	Check across AC line and correct voltage loss if possible.
	Line wiring to motor too small	Replace with larger sized wiring.
Motor overheats	Overloaded motor	Reduce load or replace with a larger motor.
	Motor fan is clogged with dirt preventing proper ventilation	Remove fan cover, clean fan and replace cover.
Excessive motor noise	Motor mounting bolts loose	Tighten motor mounting bolts.
	Rigid coupling connections	Replace with flexible connections.
	Worn motor bearings	Replace bearings and seals.
	Fan rubbing on fan cover	Remove interference in motor fan housing.
Rapid motor bearing wear	Excessive overhung load due to overtensioned drive	Check belt tension and overhung load.
	Excessive overhung load due to a small diameter motor sheave	Replace sheave with larger one.
Loose fan belt	Motor is poorly positioned	Adjust belt tension.
	Worn or damaged belt	Replace belt or belt set. Check sheave alignment.
	Worn sheaves	Replace sheaves.

Troubleshooting

Table 55. Air handler troubleshooting recommendations

Symptom	Probable Cause	Recommended Action
Short belt life	Worn sheaves	Replace sheaves.
	Misaligned belt	Realign drive with MVP sheave set at mean pitch diameter.
	Grease or oil on belts	Check for leaky bearings. Clean belts and sheaves.
	Belt slipping	Improper belt tension. Adjust tension.
	Belts rubbing	Remove obstruction or realign drive for clearance.
Bearing noise	Poor alignment	Loosen bearing set screws and realign (see "Align Fan and Motor Sheaves," p. 121)
	Failed bearing	Replace bearing.
	Inadequate lubrication	Replace bearing.
Low water coil capacity	Incorrect airflow	Check fan operating condition.
	Incorrect water flow	Inspect the water pumps and valves for proper operation and check the lines for obstructions.
	Incorrect water temperature	Adjust the chiller or boiler to provide the proper water temperature.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 93).
	Dirty fin surface	Clean the fin surface (see the "Coils" section on page 132).
Low refrigerant coil capacity	Incorrect glycol mixture	Verify glycol mixture and adjust if necessary.
	Incorrect airflow	Check fan operating condition.
	Expansion valve is not operating properly or is sized incorrectly	Check sensing bulb temperature. Verify valve operation. Verify proper valve size.
	Incorrect refrigerant charge	Verify refrigerant charge and adjust if necessary.
	Condensing unit failure	Verify condensing unit operation.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 93).
	Clogged refrigerant line filter	Change filter core.
	Failure of suction/liquid line components	Verify component operation
	Dirty fin surface	Clean the fin surface (see the "Coils" section on page 132). Do not use steam to clean refrigerant coils.
	Fin frosting	Verify defrost cycle operation. Verify froststat operation. Verify refrigerant charge.
Low steam coil capacity	Incorrect airflow	Check fan operating condition.
	Coil is piped incorrectly	Verify coil piping (see "Coil Piping and Connections," p. 93).
	Incorrect steam pressure	Verify steam pressure and adjust if necessary.
	Excessive steam superheat	Check steam superheat. Steam superheat should not exceed 50°F.
	Failure of steam line/condensate return components	Verify component operation
	Boiler failure	Verify boiler operation
	Dirty fin surface	Clean the fin surface (see the "Coils" section on page 132).
Drain pan is overflowing	Plugged Drain Line	Clean drain line
	Unit not level	Level unit
	Improper trap design	Design trap per unit installation instructions
Standing water in drain pan	Improper trap design	Design trap per unit installation instructions
	Unit not level	Level unit
	Plugged drain line	Clean drain line
Wet interior	Coil face velocity too high	Reduce fan speed
	Improper trap design	Design trap per unit installation instructions
	Drain pan leaks/overflows	Repair leaks
	Condensation on surfaces	Insulate surfaces
Excess dirt in unit	Missing filters	Replace filters
	Filter bypass	Reduce filter bypass by ensuring all blockoffs are in place.
Microbial growth (mold) inside air handler	Standing water in drain pan	See "Standing water in drain pan" above

Table 55. Air handler troubleshooting recommendations

Symptom	Probable Cause	Recommended Action
Energy wheel will not rotate	Motor is not running	The fuse or circuit breaker may be blown or open. Check the breaker/fuse box and replace. There may be a loss of incoming power. Attempt to trace the power loss back to its source and correct. The motor may have failed. Check for power at the motor terminals. If present, disconnect the belt from the motor pulley and see if the motor runs without a load. If it still doesn't run, replace the motor. The motor may have failed because it is connected to a variable frequency drive. Disconnect the VFD and run the motor on 60 Hz power only.
	Excessive friction at the seals	Re-adjust the diameter seals. See "Seal Adjustment" on page 141.
	Energy wheel frame or spokes are bent or warped	Inspect the wheel, locate the bent section, and straighten the section or replace the frame.
	During winter operation, excessive frost/ice forms in the heat transfer media	Disconnect power to the wheel motor, adjust outside air dampers shut and let the wheel thaw. After the initial section thaws, rotate the wheel 90 degrees by hand until the "new" section rotates into the warm exhaust air stream. Continue this procedure until the wheel is completely thawed.
	Drive belt is broken	Inspect visually. Replace the drive belt.
	Wheel main shaft bearing is seized	Replace the seized bearing.
Loss of energy wheel capacity	Wheel is not rotating	See above
	Wheel is rotating too slowly	Belt is stretched, slipping. Replace the belt. Ice forms on the wheel; thaw per above. Seized bearing on the main shaft; replace the bearing. Excessive friction in seals; adjust.
	Energy transfer surface is contaminated	Clean the energy transfer surfaces. Consider purchasing a second set of energy transfer segments for continuous operation while cleaning. Replace the energy transfer segments if they are severely contaminated and cannot be cleaned. Consider adding a contaminate filter before (upstream) the energy wheel.
	Frost/ice forms on heat transfer surfaces	Thaw the wheel surfaces per procedure above. Consider adding outside air preheat.
	Worn diameter seals in energy wheel	Adjust wheel airflow so that the pressure drop across the wheel is less than 1.25 inches wg.
	Seal adjusted too tight	Adjust seals. See "Seal Adjustment" on page 141.



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