

Duo-Stack exhaust system

INSTALLATION - OPERATION - MAINTENANCE

SA-DUOSTACK-IOM-26 ISSUED 08/2026

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT



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contents

Note

This manual contains vital information for the proper installation and operation of the Generation I Duo-Stack. Carefully read the manual before installation or operation and follow all instructions. Save this manual for future reference.

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The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

Warning

Indicates presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.

Caution

Indicates presence of a hazard which will or can cause personal injury or property damage if ignored.

Note

Indicates special instructions on installation, operation or maintenance which are important but not related to personal injury hazards.

installation

Delivery and Inspection

All fans are factory tested to ensure proper balance, alignment, air delivery, correct motor load, and correct working of all moving parts.

Equipment is designed to be removed from truck with a crane.

Caution

A forklift should not be used to pick up equipment from underneath units as they could damage internal components and/or paint.

For an additional fee, Strobic Air Technologies can properly skid equipment for forklift removal, and/or crane yard storage can be provided, with written request prior to shipping.

Prior to Installation

- Inspect the equipment to determine if any damage has been incurred through mishandling during shipment. It is the customer's responsibility to notify the trucker immediately to claim for damages. Failure to properly notify trucker before signing off on reception of equipment will result in transfer of liability from trucking company to jobsite/parties responsible of equipment unloading.
- The name plate should be checked against the packing slip and job order for correctness. Some fans must be shipped in components due to trucker's height limitations. When this occurs and more than one fan of similar size are on the same project, carefully match and assemble components by the "line-up" tag (serial) numbers placed on each part.
- In order to maintain factory warranty, the local authorized Strobic Air Technologies representation must be present during installation.

Ensure the disconnect switch on the fans are bolted in place on the disconnect mount provided with the fan.

Note

It is not necessary to disconnect the wiring to the switch or motor in the terminal box, to do so will void the warranty.

installation

Storage or Downtime

Caution

If your fan is to sit idle for more than 30 consecutive days during start-up or shutdown, especially in extreme cold and icy weather care should be taken to hand spin to prevent “Peening” or “Brinelling” of the bearings.

If the fan is outside, exposed to the elements, care should be taken to step up this procedure. Under no circumstances should a fan be exposed to a hostile environment without adequate protection. Common sense should prevail. When fans are to be placed in service after an extended shutdown or delayed start-up (6-12 months depending on age of system), motors should be meggered before being returned to service with the motor manufacturer's start-up procedure. A minimum of 10 megaohms are recommended. In addition, all electrical connections should be checked for looseness and corrosion. The procedure for initial start-up should then be followed.

Installation

The Duo-Stack fan has been constructed in modules so it may be disassembled and installed in sections to minimize installation equipment requirements. Be sure all parts are aligned correctly per “line-up” tags and all gasketing is in place. (see customer inspection on page 4). Each fan ships with required mounting hardware and tube of caulk. These items are in a box typically located on the fan skid. An optional touch up paint kit, if purchased, is also in a box typically located on the fan skid.

Touch up paint kits are not available for customers outside of North America due to shipping restrictions. Contact factory if touch up paint is required and the factory will provide information for purchasing from a local supplier.

Once the fan is in place, before the power has been connected, check the alignment of the blade and inlet bell.

Warning

If power is already connected, be sure the power has been locked out.

Remove the fan housing access door and spin the blade by hand. Check that no foreign materials such as loose hardware are inside the housing. Check that the blade spins freely and does not rub the inlet bell. If the blade rubs the inlet bell, contact your local Strobic Air Technologies representative. Once the blade and the housing have been checked, bolt the access door back on to the housing before starting the fan. The access door has gasketing to ensure a proper seal. It is not necessary to caulk the access door.

Note

Any unauthorized modifications to equipment without Strobic Air Technologies prior approval will void warranty.

installation

DuoStack	Component Weights									Assembled Weight
	Nozzle Windband Assy	Motor			Blade	Motor Base	Fan Housing	Inlet Side Plate	Fan w/o Nozzle	Fan Total
		HP	RPM	Weight						Standard Nozzle
D18BI08N030I4	136	3	1800	99	53	79	94	32	377	513
D18BI08N250I2	136	25	3600	485	53	107	94	32	791	927
D18BI13N050I4	138	5	1800	110	53	79	94	32	388	526
D18BI13N250I2	138	25	3600	485	53	107	94	32	791	929
D18BI19N050I4	139	5	1800	110	53	79	94	32	388	527
D18BI19N250I2	139	25	3600	485	53	107	94	32	791	930
D20BI09N050I4	157	5	1800	110	61	104	125	34	454	611
D20BI09N400I2	157	40	3600	669	61	115	125	34	1024	1181
D20BI16N075I4	159	7.5	1800	179	61	110	125	34	529	688
D20BI16N400I2	159	40	3600	669	61	115	125	34	1024	1183
D20BI23N075I4	160	7.5	1800	179	61	110	125	34	529	689
D20BI23N400I2	160	40	3600	669	61	115	125	34	1024	1184
D22BI11N030I6	194	3	1200	110	69	105	154	43	501	695
D22BI11N100I4	194	10	1800	203	69	137	154	43	626	820
D22BI20N030I6	196	3	1200	110	69	105	154	43	501	697
D22BI20N100I4	196	10	1800	203	69	137	154	43	626	822
D22BI29N100I4	197	10	1800	203	69	137	154	43	626	823
D24BI14N050I6	227	5	1200	179	114	115	186	66	680	907
D24BI14N150I4	227	15	1800	315	114	157	186	66	858	1085
D24BI24N050I6	230	5	1200	179	114	115	186	66	680	910
D24BI24N150I4	230	15	1800	315	114	157	186	66	858	1088
D24BI35N150I4	232	15	1800	315	114	157	186	66	543	775
D27BC15N030I8	274	3	900	176	145	100	223	76	740	1014
D27BC15N075I6	274	7.5	1200	274	145	108	223	76	846	1120
D27BC15N200I4	274	20	1800	478	145	108	223	76	1050	1324
D27BC27N030I8	277	3	900	176	145	100	223	76	740	1017
D27BC27N075I6	277	7.5	1200	274	145	108	223	76	846	1123
D27BC27N200I4	277	20	1800	478	145	108	223	76	1050	1327
D27BC38N030I8	280	3	900	176	145	100	223	76	740	1020
D27BC38N075I6	280	7.5	1200	274	145	108	223	76	846	1126
D27BC38N200I4	280	20	1800	478	145	108	223	76	1050	1330
D30BC19N050I8	341	5	900	274	170	210	262	87	1023	1364
D30BC19N100I6	341	10	1200	293	170	210	262	87	1042	1383
D30BC19N300I4	341	30	1800	505	170	277	262	87	1321	1662
D30BC34N050I8	353	5	900	274	170	210	262	87	1023	1376
D30BC34N100I6	353	10	1200	293	170	210	262	87	1042	1395
D30BC34N300I4	353	30	1800	505	170	277	262	87	1321	1674
D30BC48N050I8	357	5	900	274	170	210	262	87	1023	1380
D30BC48N100I6	357	10	1200	293	170	210	262	87	1042	1399
D30BC48N300I4	357	30	1800	505	170	277	262	87	1321	1678
D33BC23N075I8	397	7.5	900	327	209	225	358	90	1229	1626
D33BC23N150I6	397	15	1200	443	209	275	358	90	1395	1792
D33BC23N500I4	397	50	1800	716	209	318	358	90	1711	2108

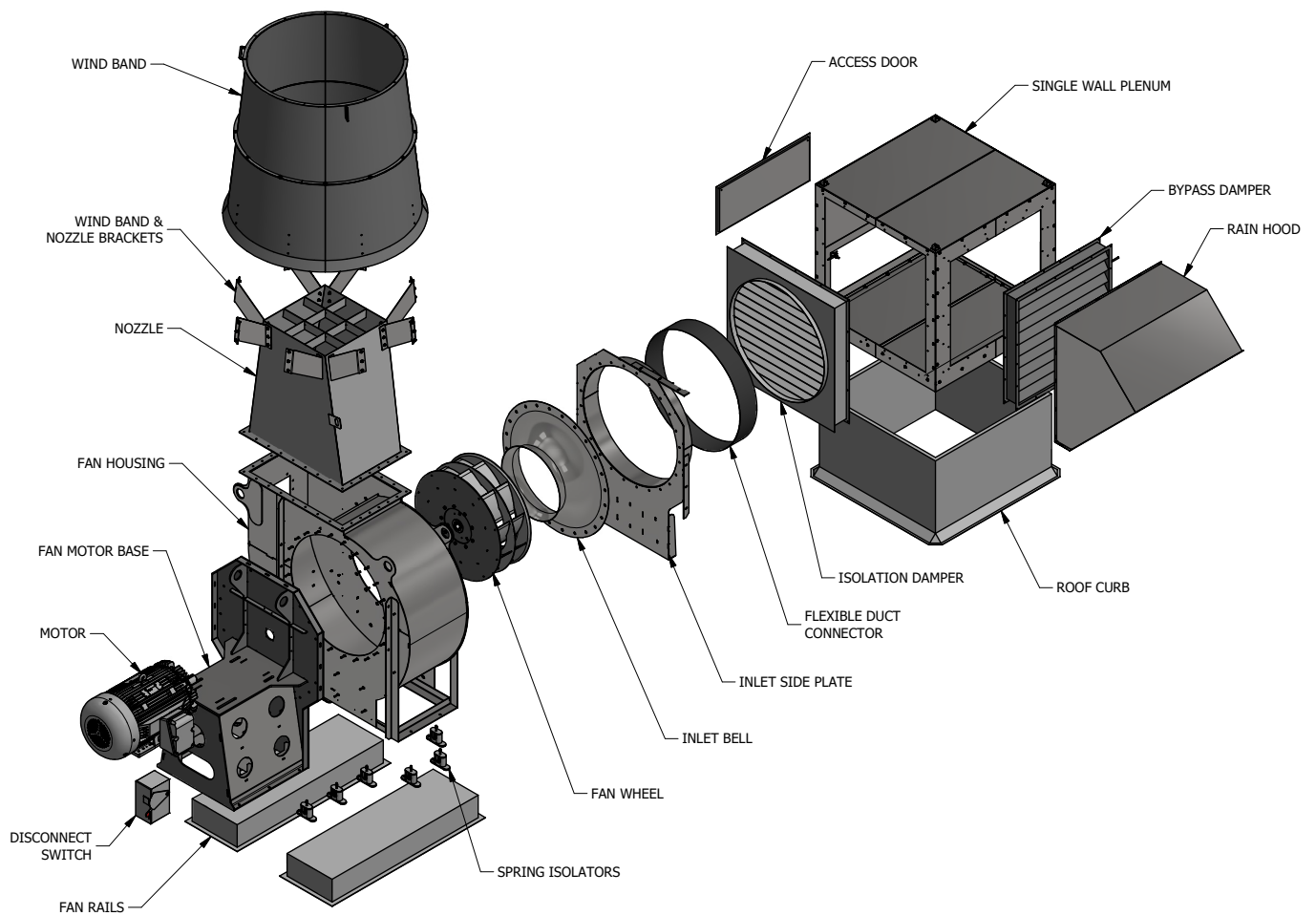
Table 1 — Component Weights

installation

DuoStack	Component Weights									Assembled Weight
	Nozzle Windband Assy	Motor			Blade	Motor Base	Fan Housing	Inlet Side Plate	Fan w/o Nozzle	Fan Total
		HP	RPM	Weight						Standard Nozzle
D33BC41N075I8	412	7.5	900	327	209	225	358	90	1229	1641
D33BC41N150I6	412	15	1200	443	209	275	358	90	1395	1807
D33BC41N500I4	412	50	1800	716	209	318	358	90	1711	2123
D33BC58N075I8	419	7.5	900	327	209	225	358	90	1229	1648
D33BC58N150I6	419	15	1200	443	209	275	358	90	1395	1814
D33BC58N500I4	419	50	1800	716	209	318	358	90	1711	2130
D36BC28N100I8	505	10	900	443	232	275	488	106	1564	2069
D36BC28N250I6	505	15	1200	443	232	275	488	106	1564	2069
D36BC28N750I4	505	75	1800	315	232	383	488	106	1544	2049
D36BC48N150I8	526	15	900	176	232	275	488	106	1297	1823
D36BC48N250I6	526	25	1200	651	232	320	488	106	1817	2343
D36BC48N750I4	526	75	1800	315	232	383	488	106	1544	2070
D36BC69N100I8	538	15	900	176	232	275	488	106	1297	1835
D36BC69N250I6	538	25	1200	651	232	320	488	106	1817	2355
D36BC69N750I4	538	75	1800	979	232	383	488	106	2208	2746
D40BC35N1250I4	542	125	1800	2500	375	1004	1072	211	5182	5724
D40BC35N200I8	542	20	900	620	375	800	1072	211	3098	3640
D40BC35N400I6	542	40	1200	811	375	900	1072	211	3389	3931
D40BC62N1250I4	570	125	1800	2500	375	1004	1072	211	5182	5752
D40BC62N200I8	570	20	900	620	375	800	1072	211	3098	3668
D40BC62N400I6	570	40	1200	811	375	900	1072	211	3389	3959
D40BC88N1250I4	585	125	1800	2500	375	1004	1072	211	5182	5767
D40BC88N200I8	585	20	900	620	375	800	1072	211	3098	3683
D40BC88N400I6	585	40	1200	811	375	900	1072	211	3389	3974
D44BC10N2000I4	695	200	1800	2500	485	1385	1274	244	5908	6603
D44BC10N300I8	695	30	900	807	485	1048	1274	244	3878	4573
D44BC10N600I6	695	60	1200	1313	485	1160	1274	244	4496	5191
D44BC43N2000I4	641	200	1800	2500	485	1385	1274	244	5908	6549
D44BC43N250I8	641	25	900	685	485	1100	1274	244	3808	4449
D44BC43N750I6	641	75	1200	1374	485	1160	1274	244	4557	5198
D44BC75N2000I4	676	200	1800	2500	485	1385	1274	244	5908	6584
D44BC75N300I8	676	30	900	807	485	1048	1274	244	3878	4554
D44BC75N600I6	676	60	1200	1313	485	1160	1274	244	4496	5172
D49BC12N1000I6	853	100	1200	2300	515	1182	1476	285	5778	6631
D49BC12N500I8	853	50	900	1259	515	1163	1476	285	4718	5571
D49BC52N1250I6	805	125	1200	2300	515	1182	1476	285	5778	6583
D49BC52N500I8	805	50	900	1259	515	1163	1476	285	4718	5523
D49BC90N1250I6	853	125	1200	2300	515	1182	1476	285	5778	6631
D49BC90N500I8	853	50	900	1259	515	1163	1476	285	4718	5571
D54BC11N100I8	982	100	900	2086	720	1400	1782	321	6329	7311
D54BC11N2000I6	982	200	1200	3820	720	1498	1782	321	8161	9143
D54BC15N2000I6	1012	200	1200	3820	720	1498	1782	321	8161	9173
D54BC15N750I8	1012	75	900	1786	720	1400	1782	321	6029	7041
D54BC63N2000I6	950	200	1200	3820	720	1498	1782	321	8161	9111
D54BC63N750I8	950	75	900	1786	720	1400	1782	321	6029	6979

Weights are subject to change without notice. Contact factory for Metric Equivalent Weights.

installation



Duo-Stack Plenum - Fan Exploded View

installation

Duo-Stack Mounting

Curbs

Curbs shall be a minimum of 14-gauge steel and anchored directly into the roof structure. The site structural engineer to determine site specific requirements for anchoring/supporting of equipment to building structure. For curbs provided by Strobic Air Technologies, the assembly instructions can be found attached to the curb.

Fan to Plenum

Each Duo-Stack plenum is equipped with an isolation damper with a round connection flange. The diameter of this round connection flange is the same as the diameter of the round mounting flange on the inlet side plate of the fan. The isolation damper and fan mounting flange are connected via a flexible duct connector. Ensure that proper support is provided to support the weight of your fan and plenum system. Ensure air leaks, if any, are properly sealed upon start-up. If the curb or structural base is not supplied by Strobic Air Technologies, consult the factory to avoid "soft base" vibration problems. Be sure the curb top or structural base is plumb and level to provide for proper drainage. The curb cap shall be appropriately lagged to the curb by means of 3/8" lag bolts or 1/4" bolts and nuts supplied by the contractor (heavier fasteners may be required by code in your area). Plenum and roof curbs need to be field drilled based off of your local requirements and touched up to prevent premature failure of coating/metal components. A 316 stainless steel fastener is recommended for corrosion resistance. See **Figure 1** through **Figure 7** for various base configurations.

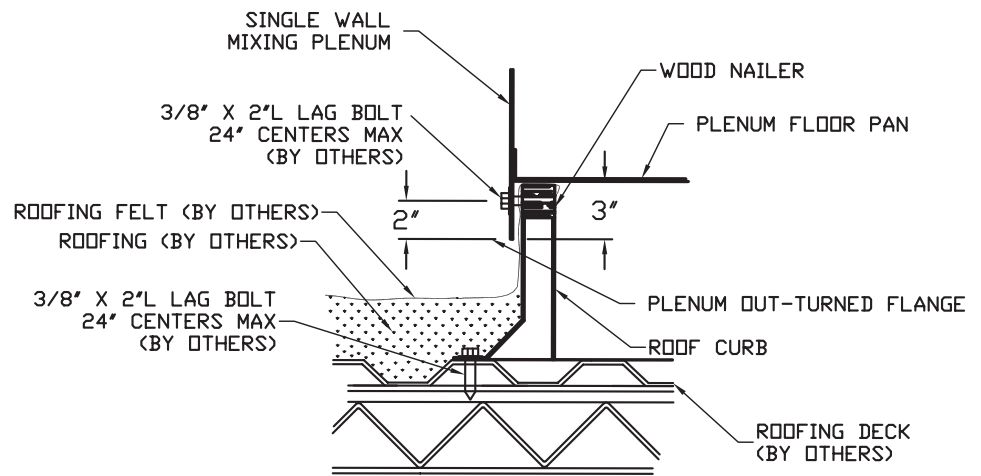


Figure 1 - Single Wall Plenum to Roof Curb

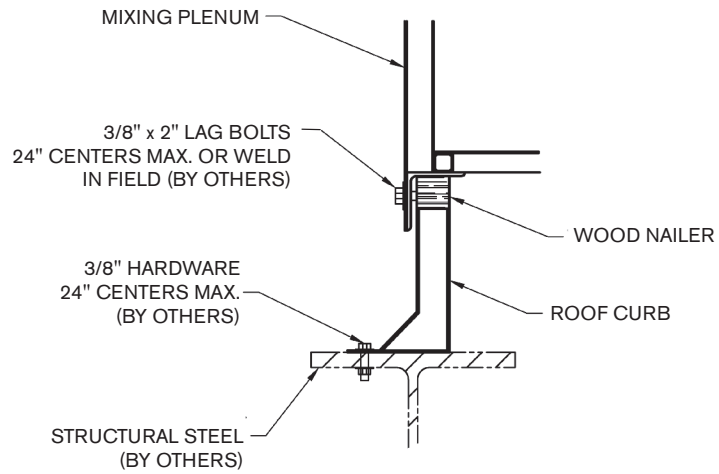


Figure 2 - Roof Curb to Structural Steel

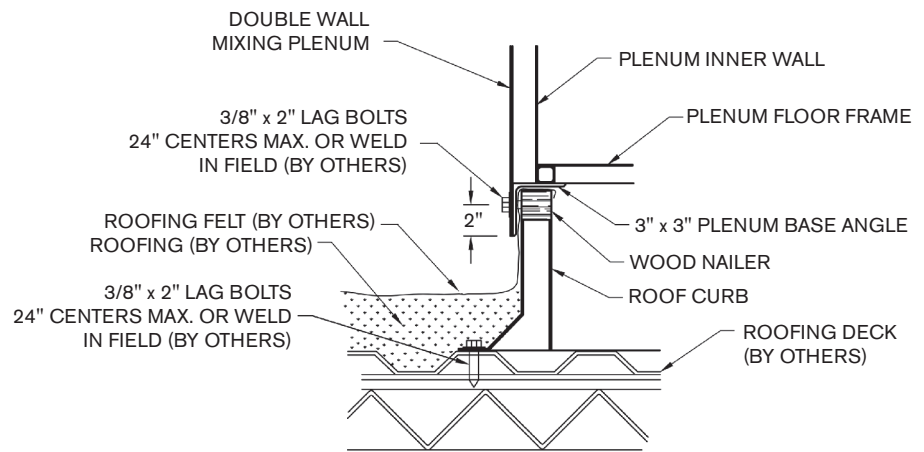


Figure 3 - Double Wall Plenum to Roof Curb

installation

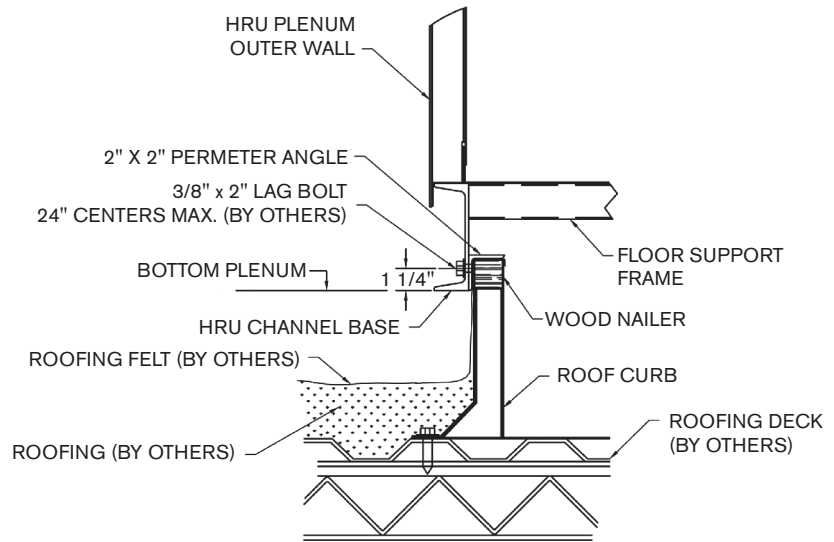


Figure 4 - HRU Plenum to Roof Curb

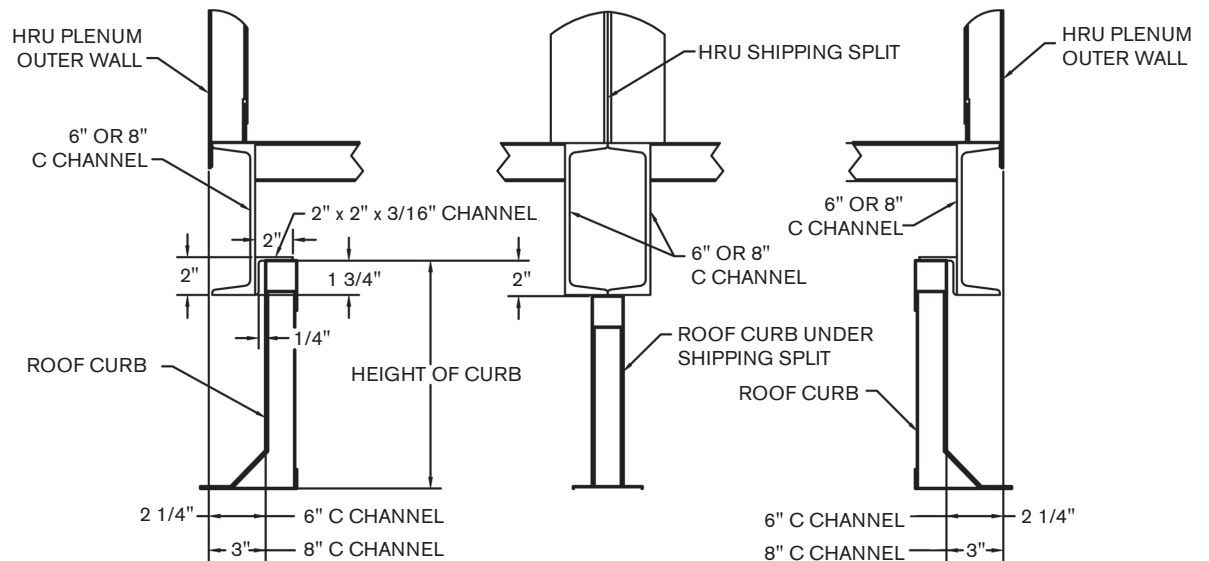


Figure 5 - HRU Plenum with Shipping Split On Roof Curb

installation

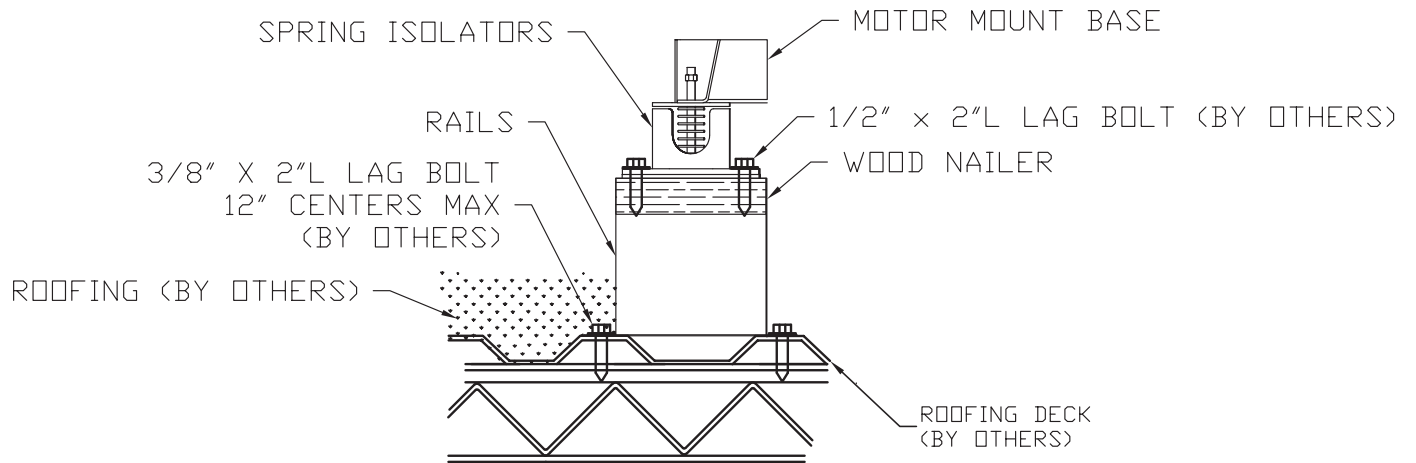


Figure 6 - Fan Rail to Roof Deck

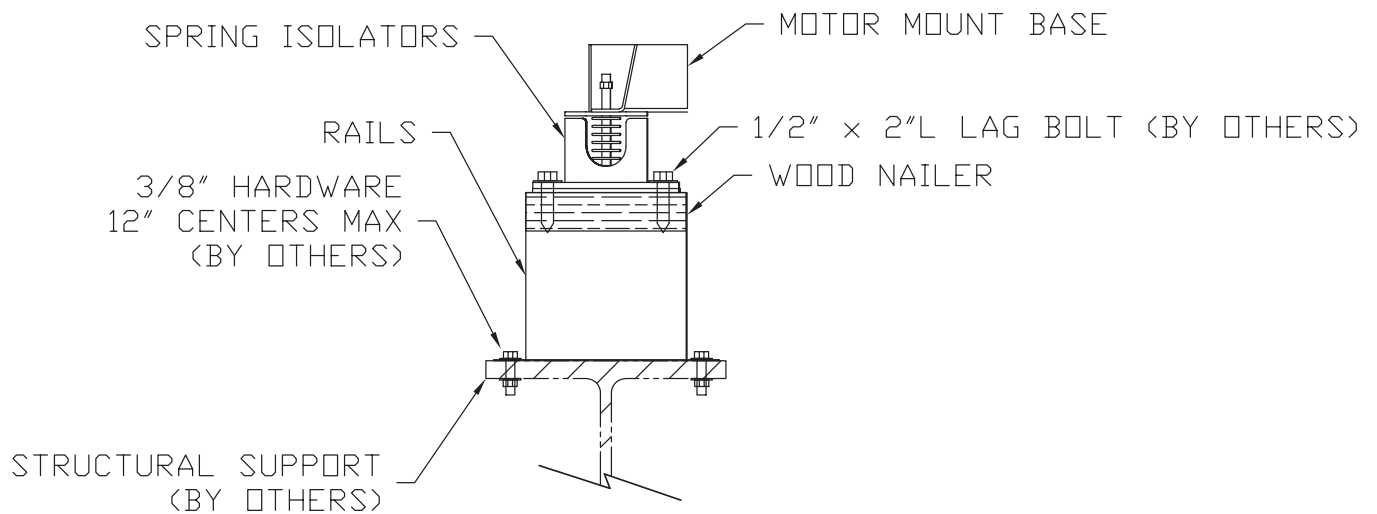


Figure 7 - Fan Rail to Structural Steel

installation

Lifting

See **Figure 8** through **Figure 14** for standard lifting methods of common Duo-Stack components.

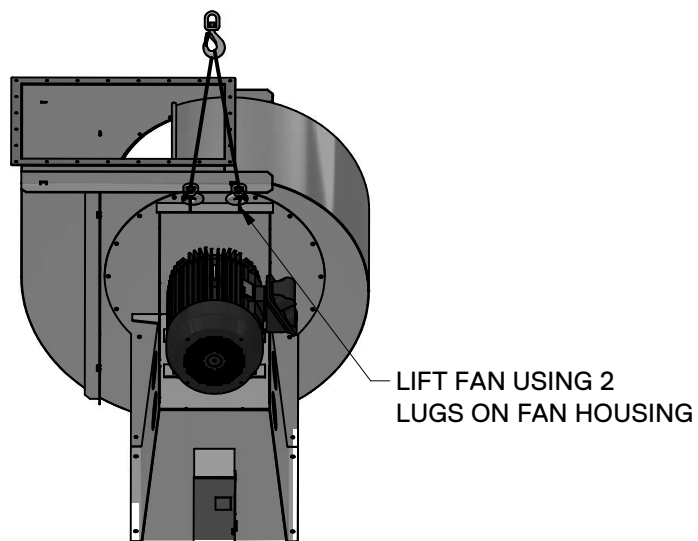


Figure 8 - Fan Housing Lifting Points

installation

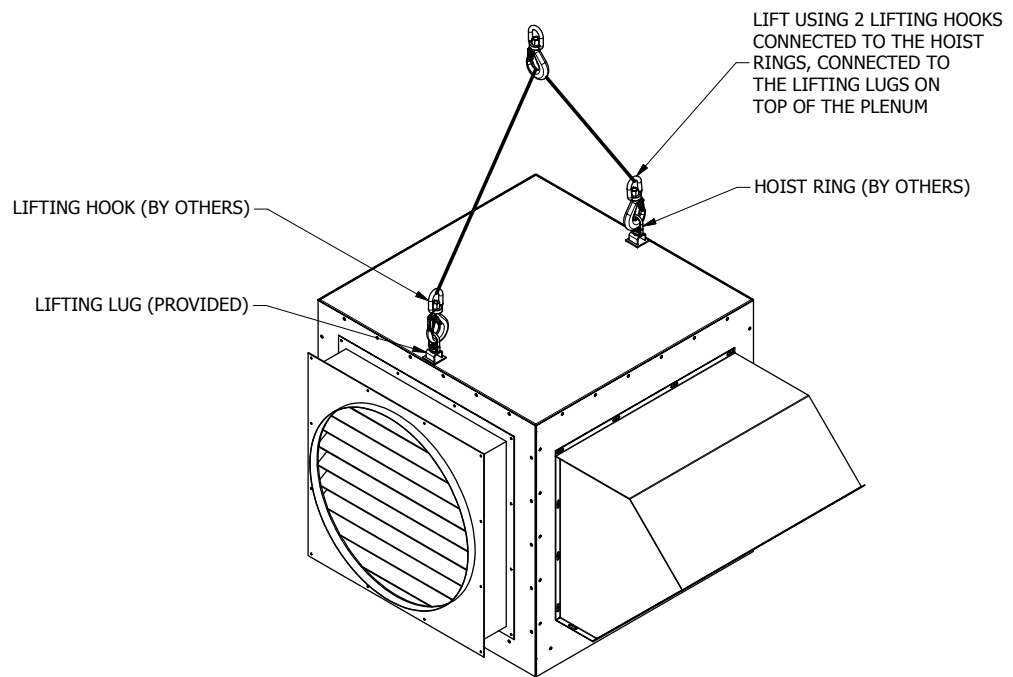


Figure 9 - Single Fan Plenum Lifting Points for Fan Size 300 and Smaller

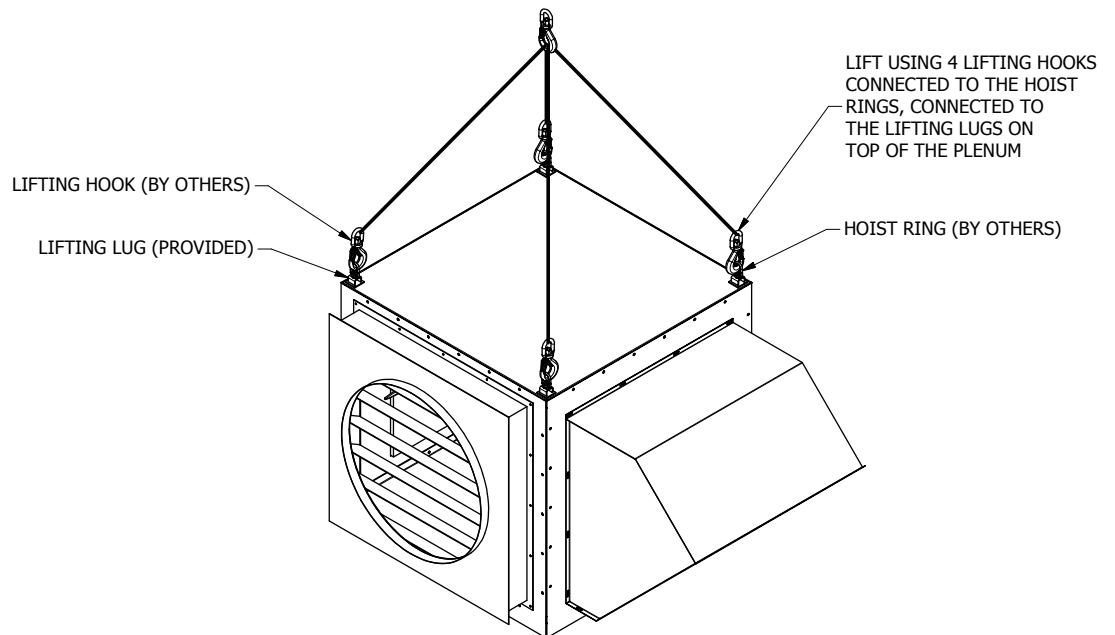


Figure 10 - Single Fan Plenum Lifting Points for Fan Size 330 and Larger

installation

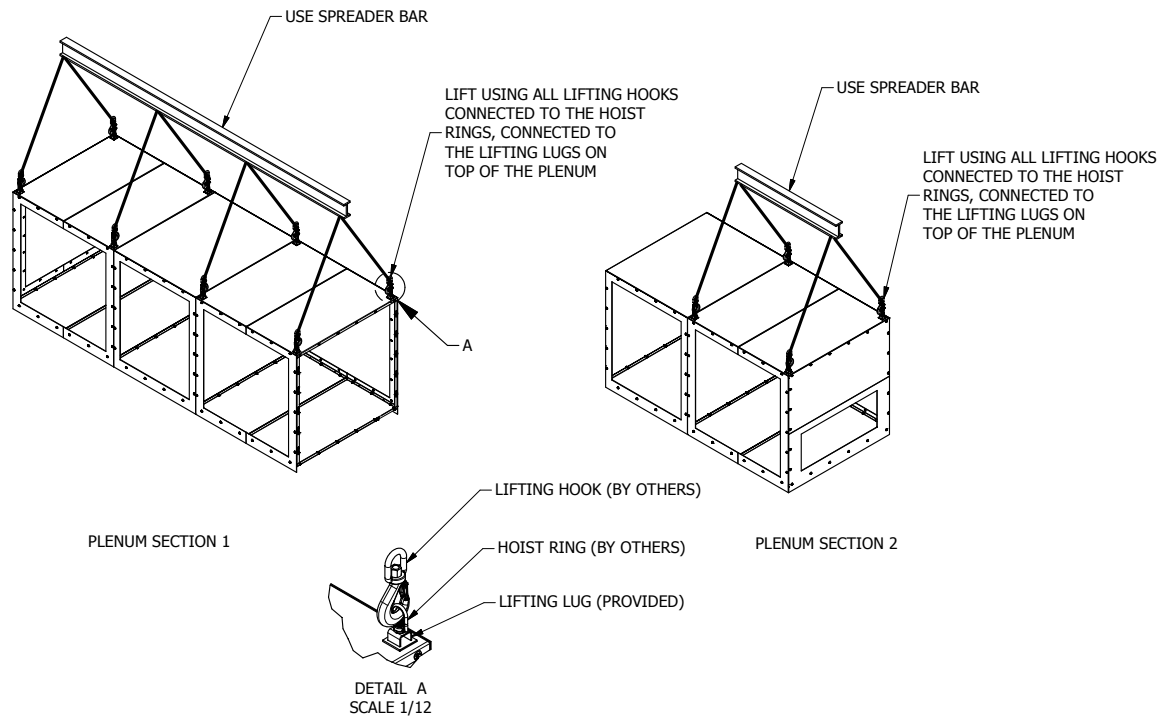


Figure 11 - Single Wall Multiple Fan Plenum Lifting Points

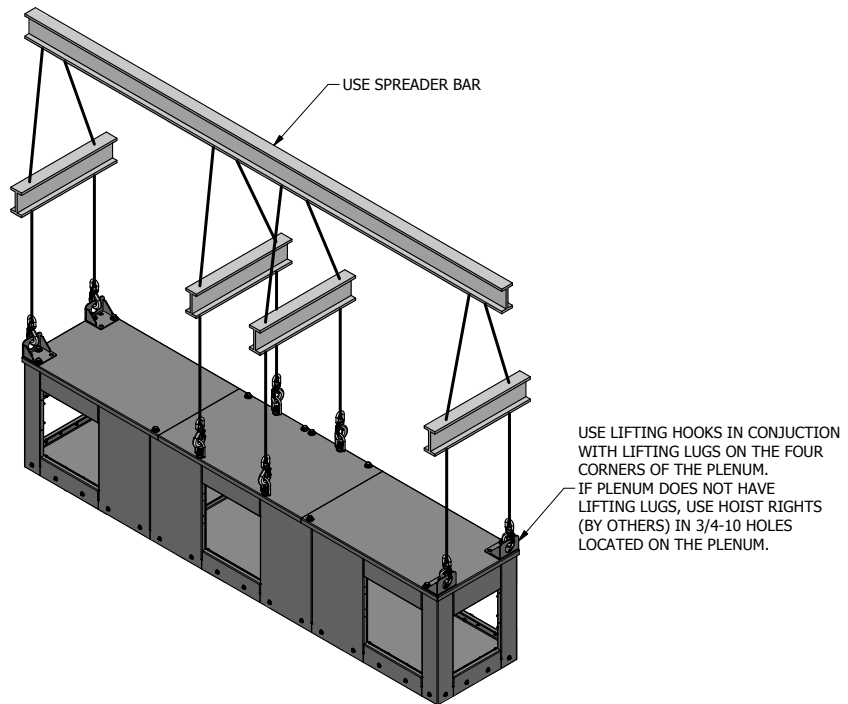


Figure 12 - Double Wall Multiple Fan Plenum Lifting Points

installation

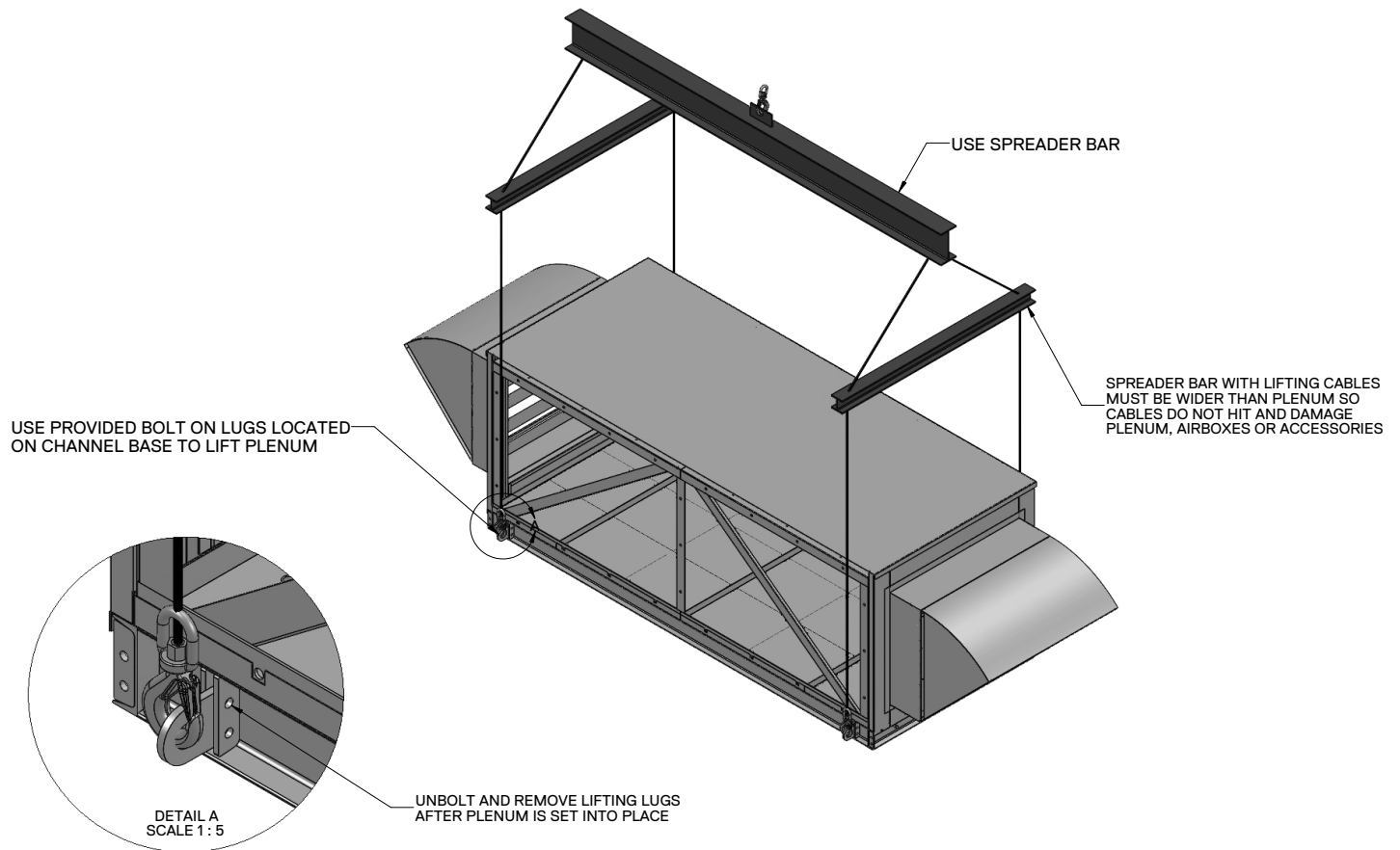


Figure 13 - HRU Plenum Lifting Points

installation

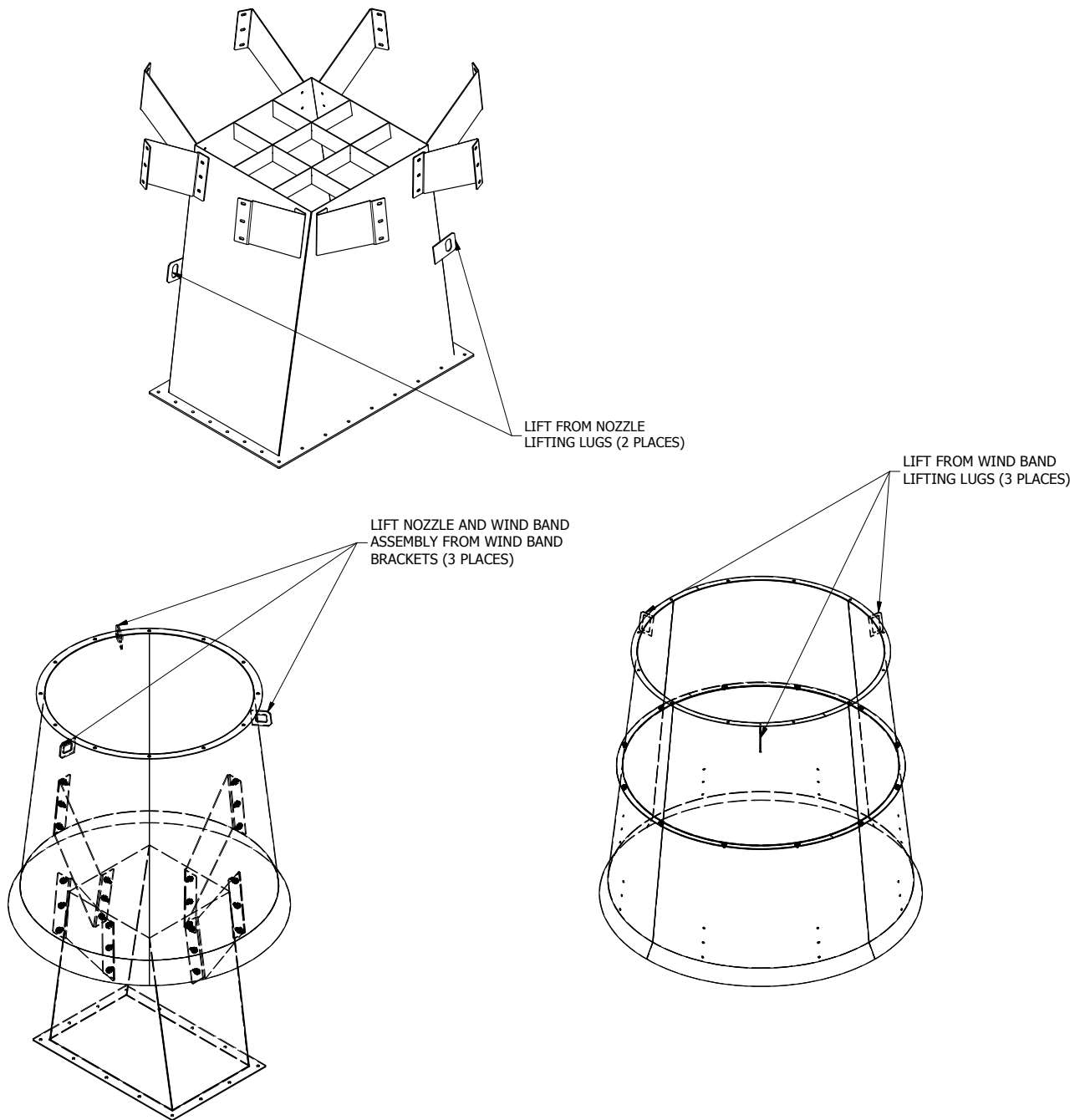


Figure 14 - Nozzle and Wind Band Lifting Points

installation

Assembly

See **Figure 15** through **Figure 18** for standard assembly instructions.

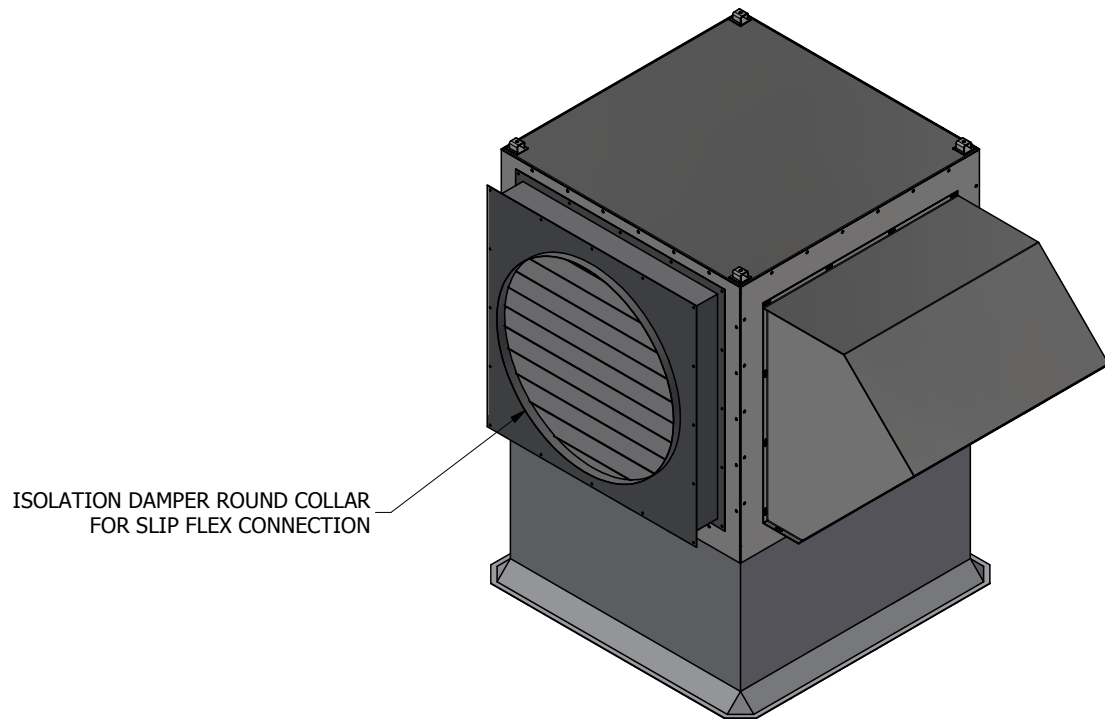


Figure 15 - Installation of Fan to Double Wall Plenum

installation

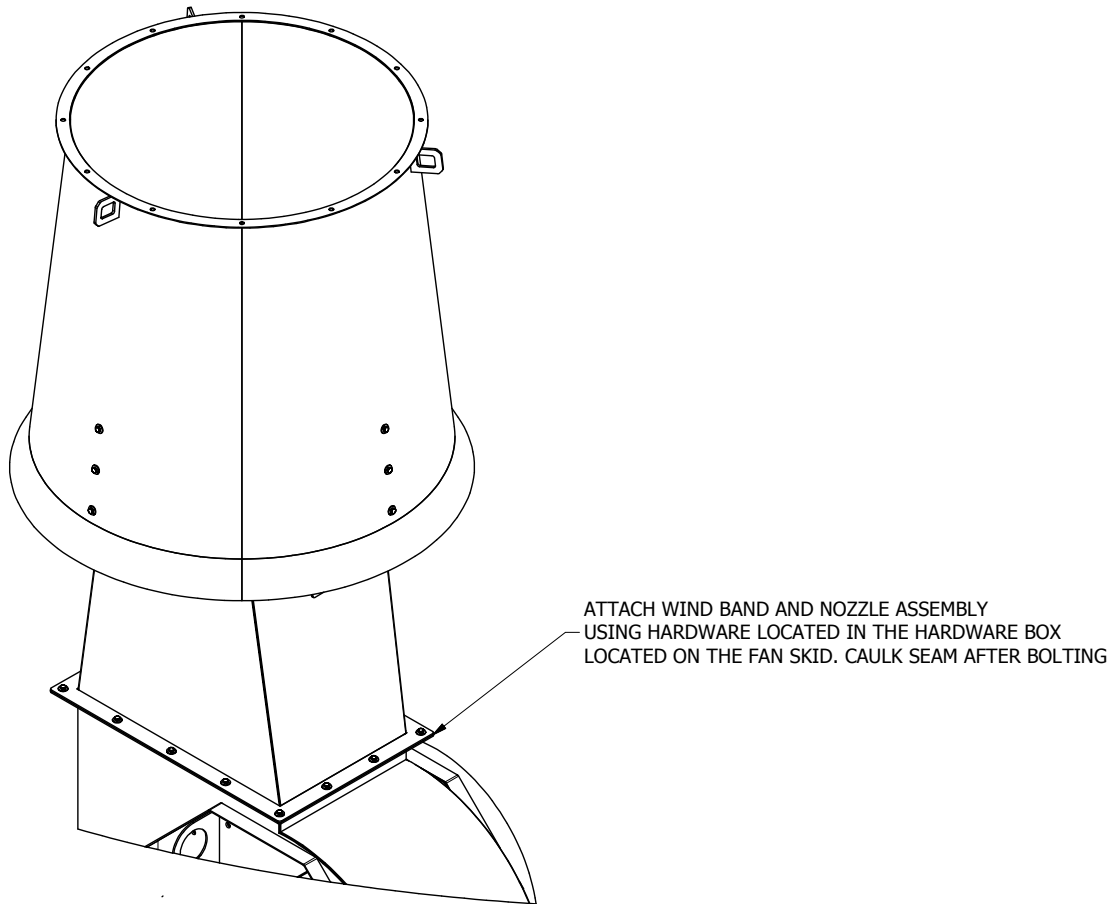


Figure 16 - Installation of Nozzle to Fan

installation

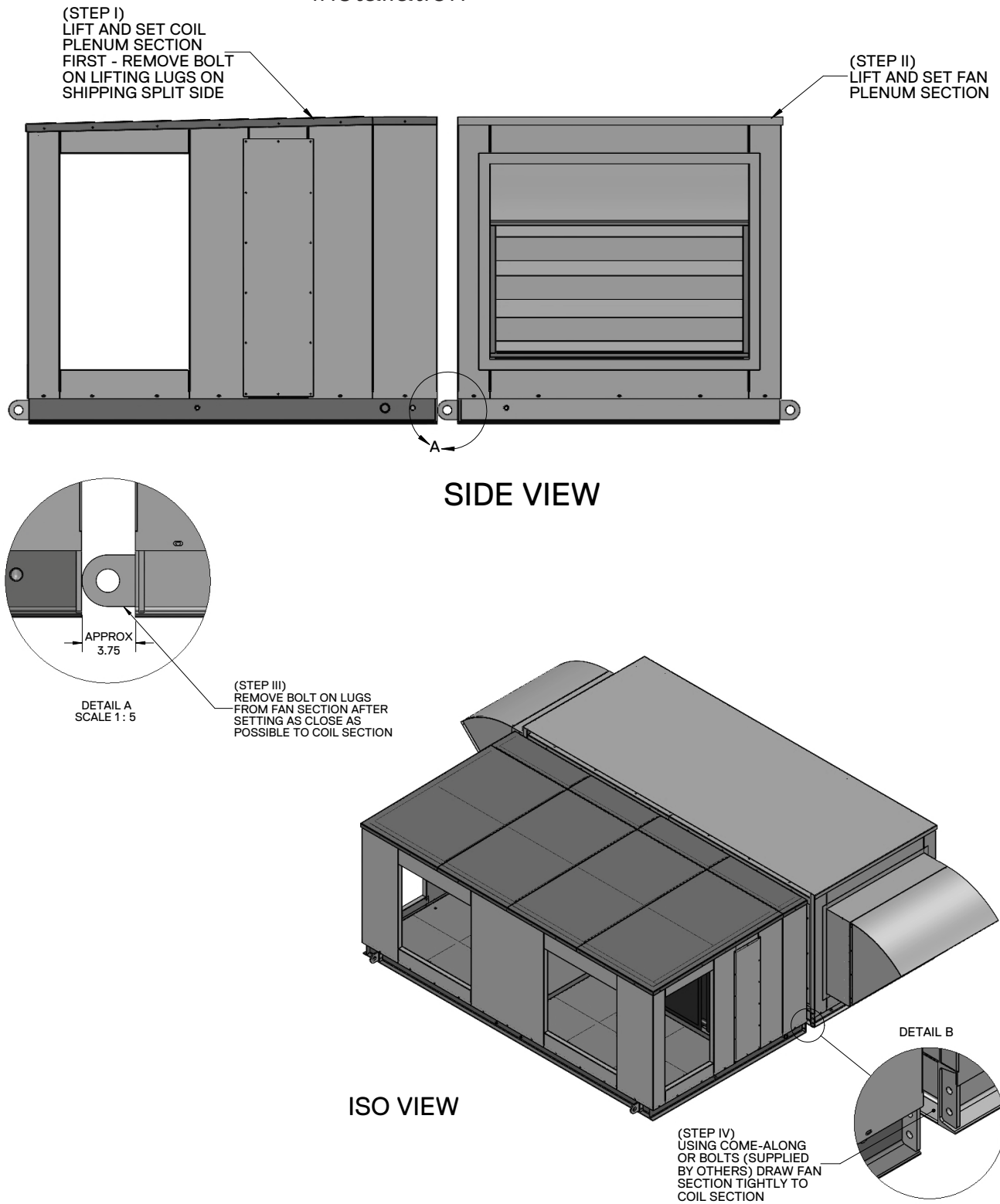
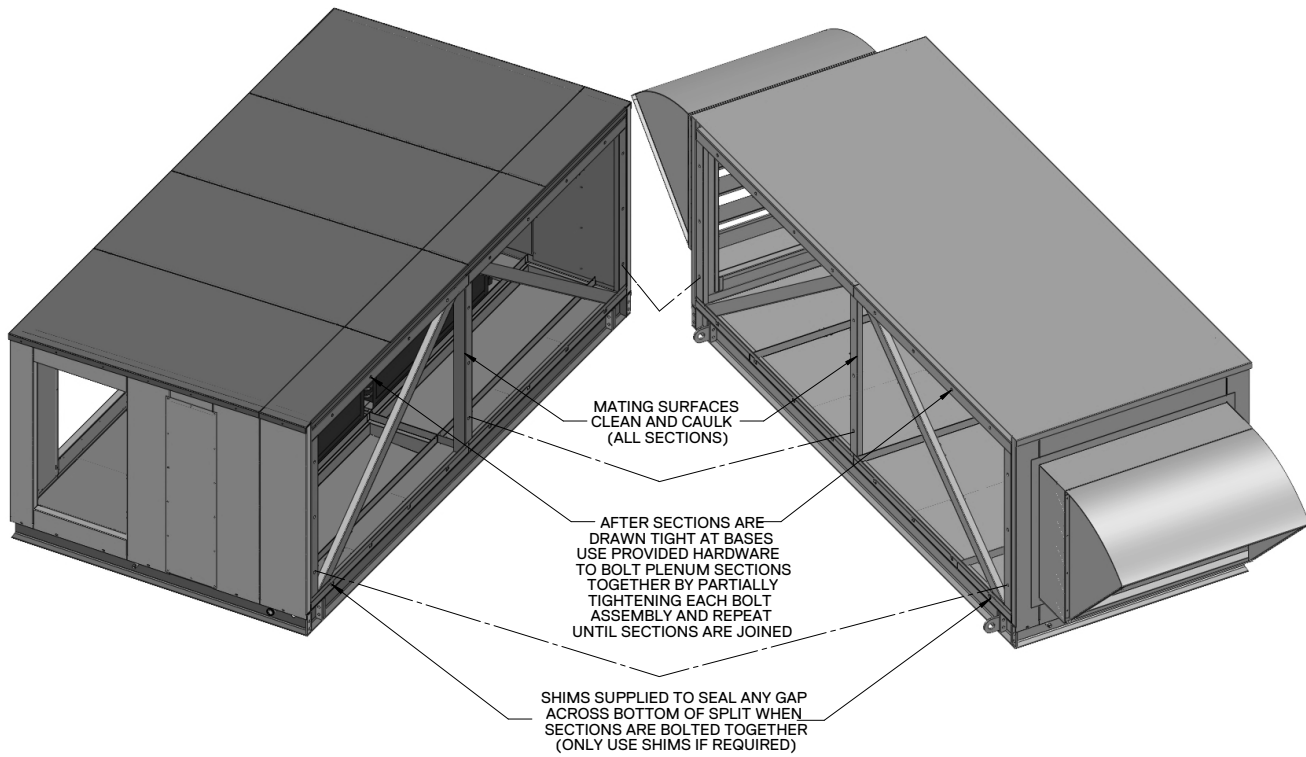


Figure 17 - HRU Multiple Plenum Section Assembly

installation



**ISO VIEW - SECTIONS SHOWN
APART TO VIEW SHIPPING SPLITS**

** AS SITE CONDITIONS CAN VARY
FROM MANUFACTURING CONDITIONS
AND DUE TO SHIPPING, AT TIMES
MATING HOLES IN SHIPPING SPLITS
MAY REQUIRE REAMING TO LINE UP **

Figure 18 - HRU Plenum Shipping Split Assembly

installation

Hardware

Hardware Sizes			
Model Prefix	Nozzle to Fan	Brackets: Nozzle Connection	Brackets: Wind Band Connection
D18	3/8" x 1 1/4" (10x)	3/8" X 1 1/4" (12x)	3/8" X 1 1/4" (12x)
D20	3/8" x 1 1/4" (12x)	3/8" X 1 1/4" (12x)	3/8" X 1 1/4" (12x)
D22	3/8" x 1 1/4" (14x)	3/8" X 1 1/4" (12x)	3/8" X 1 1/4" (12x)
D24	3/8" x 1 1/4" (14x)	3/8" X 1 1/4" (12x)	3/8" X 1 1/4" (12x)
D27	3/8" x 1 1/4" (14x)	3/8" X 1 1/4" (12x)	3/8" X 1 1/4" (12x)
D30	3/8" x 1 1/4" (16x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D33	3/8" x 1 1/4" (24x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D36	3/8" x 1 1/4" (24x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D40	1/2" x 1 3/4" (28x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D44	1/2" x 1 3/4" (30x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D49	1/2" x 1 3/4" (32x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)
D54	1/2" x 1 3/4" (36x)	3/8" X 1 1/4" (24x)	3/8" X 1 1/4" (24x)

Fiberglass Nozzle Bolt Torque

Recommended torque values for stainless steel hardware when fastening a fiberglass nozzle to the fan flange:

Table 2 – Fastener Torque Values	
bolt size	in·lb _f
1/4-20	50
5/16-18	75
3/8-16	120

⚠ Caution

Exceeding the given values by as little as 15% in some cases can cause minor cracking to occur around the nozzle flange and surrounding joints. Cracking and stress become more pronounced with further torque application.

Torque all hardware in steps to avoid damaging equipment. Start with one bolt and torque to 50% of full capacity. Work around unit until every bolt is at 50% total capacity. Repeat process at 75% and finally full torque rating.

installation

Standard Bolt Torque

Recommended torque values for stainless steel hardware when fastening metal flanges:

Table 3 – Fastener Torque Values		
bolt size	in·lb _f	ft·lb _f
1/4-20	79	7
5/16-18	138	12
3/8-16	120	10
1/2-13	542	45
5/8-11	1160	97
3/4-10	1582	132

Flange Sealing

Fully caulk the outside edge of all the flanges with silicone caulk provided. See **Figure 19**.

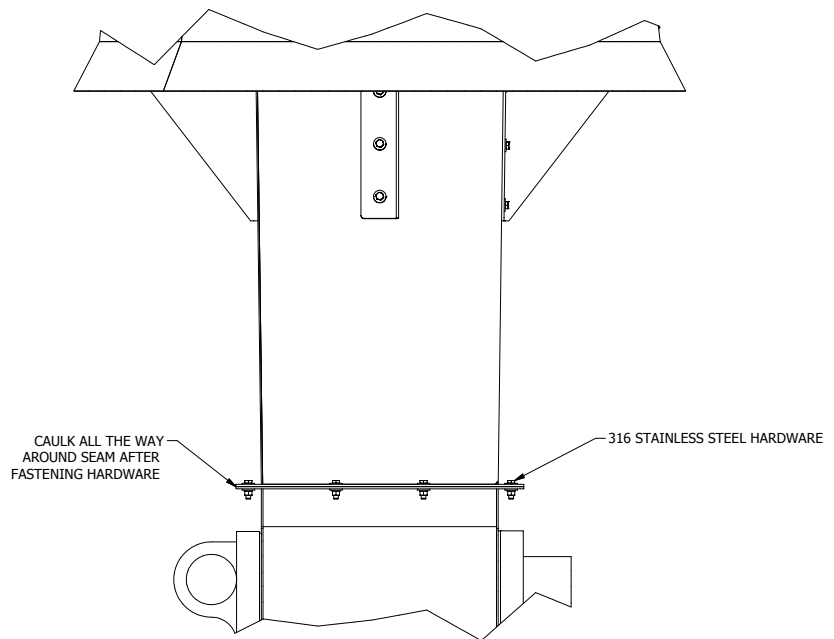


Figure 19 - Nozzle to Fan Discharge Detail

installation

Motor Connection

Unless specified differently, the motor on your fan has been wired to a NEMA 3R disconnect switch mounted on the side of the fan housing. Check the fan nameplate for proper voltage and amperage. If fans are stored for an extended period of time (180 days or more), all connections should be checked for looseness and corrosion.

Isolation and Bypass Dampers

Actuate the dampers slowly at start-up to observe they are free of binding and to ensure they open fully and close tightly. Adjust linkage accordingly.

External Wiring

This equipment must be installed with remote motor-overload protection. When connecting to a circuit protected by fuses, use time-delay fuses. Starting and overload control devices must be matched to motor rating. Follow the control manufacturer's instructions to make proper installation and connections.

Connect electrical power supply to conform to National Electrical Code and any local regulations. Line voltage and wire capacity must match motor rating stamped on the nameplate.

Actuator

For pneumatic actuator, see separate instructions by manufacturer. Electrical schematics for typical actuators are shown on **Figure 20** and **Figure 21** (Isolation Actuator) and **Figure 22** (Bypass Actuator).

installation

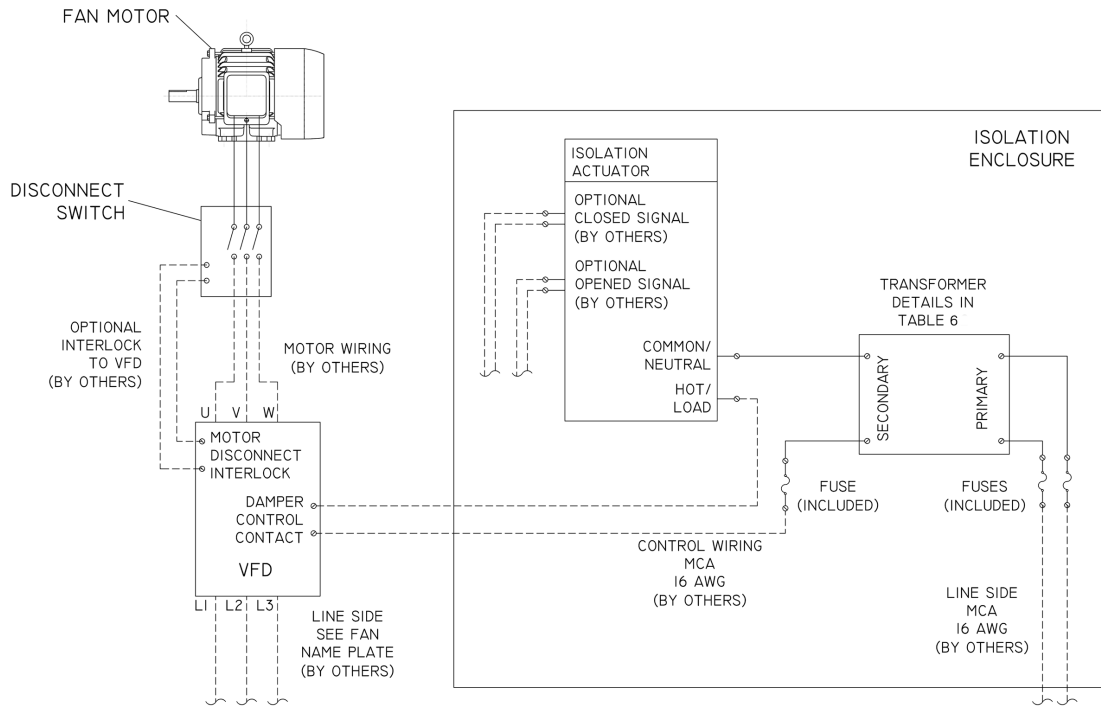


Figure 20 - Motor, VFD and Isolation Actuator Wiring Diagram

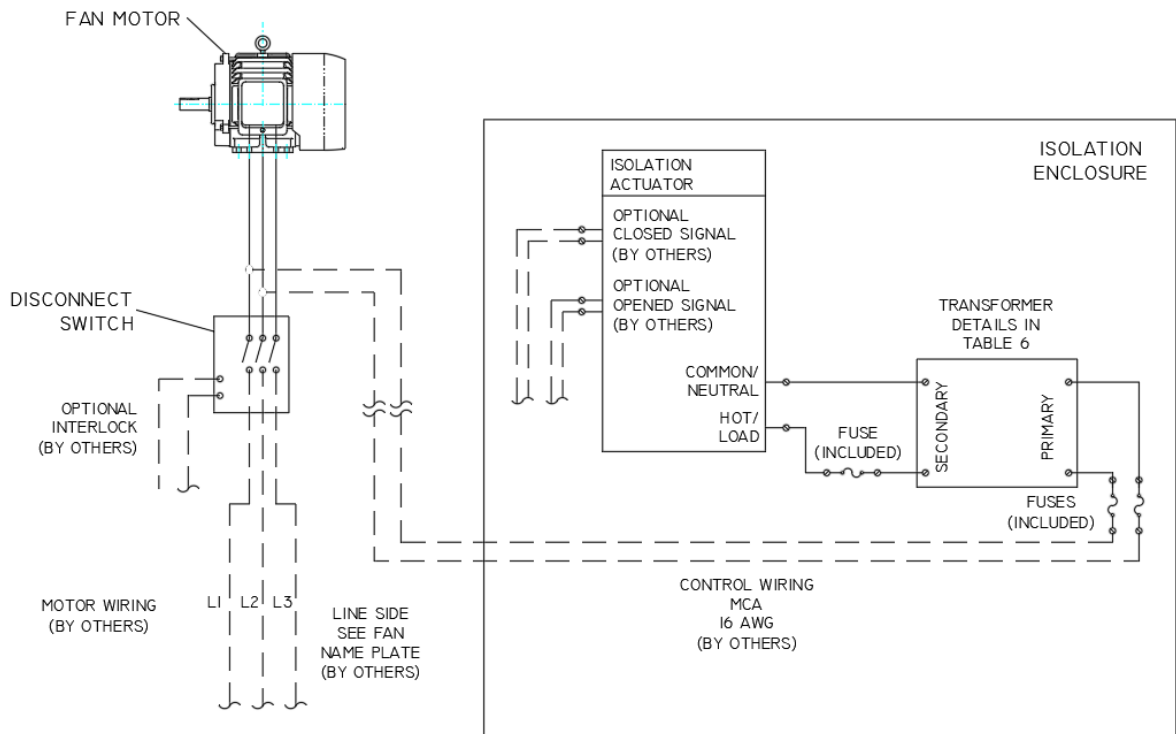


Figure 21 - Motor and Isolation Actuator Wiring Diagram

installation

Table 4 — Isolation Actuator Specifications

Model	Voltage	Torque in-lb	Run Time Open / Close	Power Consumption	Fuse	Hot / Load	Common / Neutral	Ground	Opened Signal	Closed Signal
NFBUP-S	24-240 VAC 24-125 VDC	90	75 sec / 15 sec	6 VA < 1 20 9 VA > 1 20	0.5 A 0.1 A	Black (2)	White (1)	n/a	S4-Common	S1-Common
AFBUP-S	24-240 VAC 24-125 VDC	180		7 VA < 120 18 VA > 120	0.5 A 0.1 A			n/a	S5-NC S6-NO	S2-NC S3-NO
EFB24-S	24 VAC 24 VDC	270		16 VA	0.75 A	Red (2)	Black (1)	n/a	0.5 A 250 VAC	0.5 A 250 VAC
EFB120-S	100/140 VAC	270		21 VA	0.1 A	Black (2)	White (1)	n/a		
GGD121.1U	24 VAC	142	15 sec	160 VA	10 A	Red	Black	Green	n/a	n/a
GGD221.1U	115 VAC	142			2 A	Black	White	Green		
GGD321.1U	230 VAC	142			1 A	Brown	Blue	Green		

Table 5 — Bypass Actuator Specifications

Model	Voltage	Torque in-lb	Run Time 90 Degrees	Power Consumption	Fuse	Hot / Load	Common / Neutral	Ground	Command	Feedback
AMB24-SR	24-240 VAC 24-125 VDC	180	150 sec	5 VA	0.25 A	Red (2)	Black (1)	n/a	White (3) 2-10 VDC	Orange (5) 2-10 VDC
GKB24-SR	24-240 VAC 24-125 VDC	360	150 sec	21 VA	1.5 A					

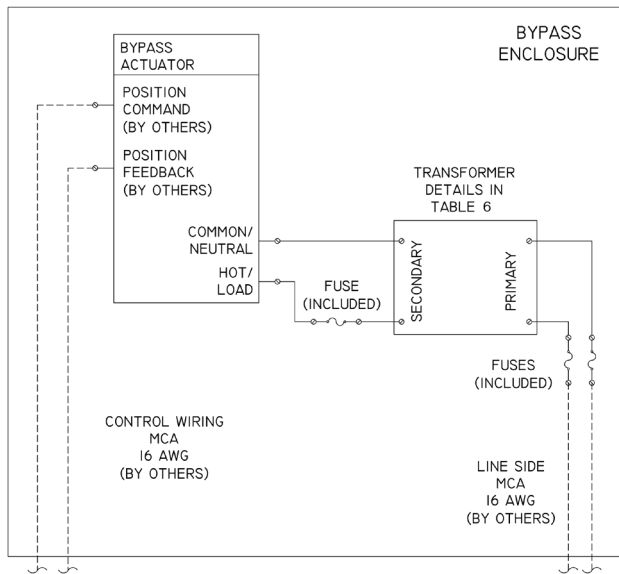


Figure 22 - Bypass Actuator Wiring Diagram

Table 6 — Transformer Details

Model	Primary		Secondary		Jumper 1		Jumper 2	
C050E1B	120		24		H1	H3	H2	H4
	H1	H4	X1	X2				
	240		24					
C050E4W	H1	H4	X1	X2	H2	H3	n/a	n/a
	600		24					
	H1	H2	X1	X2				
C050E5E	575		23					
	H1	H2	X1	X2				
	550		22					
E050TE	H1	H2	X1	X2				
	440/460/480		110/115/120					
	H1	H4	X1	X3				
E050TE	220/230/240		110/115/120					
	H2	H4	X1	X3				
	200/208		110/115/120					
E050TE	H3	H4	X1	X3				
	440/460/480		23/24/25					
	H1	H3	X2	X3				
E050TE	220/230/240		23/24/25					
	H1	H3	X2	X3				
	200/208		23/24/25					
E050TE	H1	H3	X2	X3				
	480		24					
	H1	H4	X1	X2				
E050TE	415		24					
	H1	H4	X1	X2				
	400		24					
E050TE	H1	H4	X1	X2				
	380		24					
	H1	H4	X1	X2				
E050TE	277		24					
	H1	H4	X1	X2				
	240		24					
E050TE	H1	H4	X1	X2				
	230		24					
	H1	H4	X1	X2				
E050TE	220		24					
	H1	H4	X1	X2				
	208		24					
E050TE	H1	H4	X1	X2				
	200		24					
	H1	H4	X1	X2				

installation

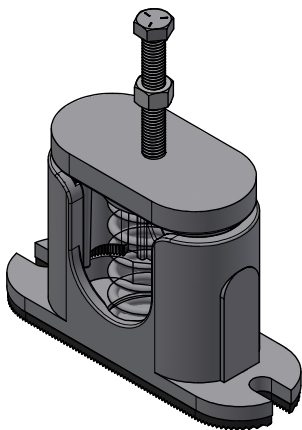
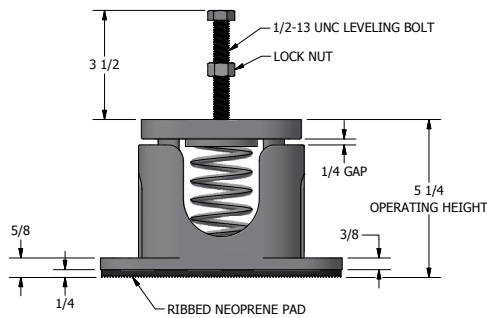
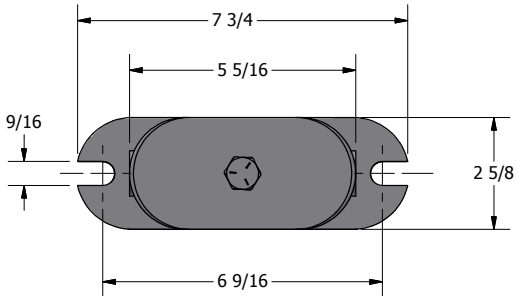
Vibration Isolation

The Duo-Stack fan systems are sold with spring isolators sized specifically to the weight of the fan. Refer to figure... for mounting details.

The type of isolators that are used on Duo-Stack fan systems are housed spring isolators. These type of isolators have the spring assembled inside a cast aluminum upper and lower housing. The lower housing includes a neoprene non-skid base to help prevent lateral motion. Each color spring has a specific load capacity. Springs are sized to the specific fan by the engineering team.

Mounting Springs Installation Instructions:

1. Place the spring isolators on the fan rails with the required spacing so the spring isolators line up with the mounting holes on the Duo-Stack fan base and inlet side plate. Using 1/2" 316 stainless steel hardware, bolt the spring isolators to the fan rails through slots in the base of the spring isolator.
2. Remove the leveling bolts with locking nuts from the spring isolator. Line up the holes from the Duo-Stack fan unit base and inlet side plate and place the unit on the spring isolators. The added weight of the fan unit will cause the spring isolator unit to compress. It's possible that one or more upper spring housings will rest on the lower housings.
3. Insert the leveling bolts with locking nuts back into the spring isolators through the fan base and inlet side plate mounting holes. Initially, thread the leveling bolt into the upper housing by hand. The upper housing of the spring isolator has tapped holes for the leveling bolt.
4. Using a wrench, screw the leveling bolt clockwise into the upper housing of each spring isolator. When screwing in the leveling bolts, only perform one turn of the leveling bolt at a time. This will ensure the fan system remains level during the installation procedure. Perform this procedure on each leveling bolt until there is at least 1/4" of space between the upper and lower housing of the spring isolator.
5. Once there is adequate clearance between the upper and lower housing of the spring isolator, lock the fan unit in place by turning the locking nut on the leveling bolt until it is fully pressed against the fan base/inlet side plate.



operation

Initial Start

After installation is completed, but before fan is put in regular service, make an initial start as follows:

- Hand turn the impeller to determine that the motor has not shifted in shipment and/or erection. The impeller should turn freely, should not touch other fan components and should be free of foreign materials.
- Check that motor, starting and control device connections agree with wiring diagrams.
- Check that voltage, phase, and frequency of line circuit (power supply) agree with fan nameplate.
- Check that all bolts on your fan supports are tight, and that no objects are left in the fan housing.
- Check motor service record and tag accompanying motor to be certain that bearings have been properly lubricated. When shipped from the factory, the bearings have been lubricated to give six (6) months satisfactory service except for sealed ball bearings which are lubricated for life and require no maintenance.
- Momentarily energize the motor to check for proper rotation. The fan should be rotating clockwise from an overhead view, as indicated by arrow markings on the fan nameplate.

Caution

Fans running in a reverse rotation can cause the fan motor to run into the service factor due to overamping thus the possibility of the circuit breaker tripping.

- If motor is three-phase, reverse rotation (if required) by interchanging any two of the three power leads. If two-phase, interchange stator leads of either phase, being careful not to change leads from one phase to the other. If motor is single-phase, refer to the instructions on the motor nameplate.
- While the fan is running, check the mixing box, air box, inlet connections and fan/nozzle flanges for air flow leaks and make appropriate repairs/adjustments. Check with the factory if any leaks cannot be stopped.
- Turn off fan and open access door on mixing box to observe proper full closure of isolation dampers. Make appropriate damper linkage adjustments. If adjustments are not easily implemented, consult the factory. If “fan staging” or a “stand-by fan” is employed, observe that the isolation damper under the “off” fan is fully closed while the other fans are in operation, and that no reverse windmilling is occurring. Make appropriate adjustments to the damper linkage. Consult factory for linkage adjustment procedure. To determine if the fan is rotating in the correct direction, remove the access door from the fan housing to observe the rotation direction.
- Check the bypass dampers for proper operation. Be sure end switches are connected to the controls, when applicable.

operation

⚠ Caution

Repeated trial starts can overheat the motor (particularly for across the line starting) or increase the resistance of external starting equipment. If repeated trial starts are made, allow sufficient time between trials to permit heat to be dissipated from windings or external resistance and prevent overheating. Starting currents are several times running currents, and heating varies as the square of the current.

Note

Due to the utilization super premium efficiency motors the electrical circuit may see a large in-rush of current (approximately 19 times the FLA) for the first 1/2 to 1 cycle of the motor starting. For circuits that experience this condition we recommend the circuit breakers' Instantaneous Trip Setting be set to higher levels to mitigate against any nuisance trips.

Variable Frequency Drive

It is recommended that a start-up service technician from the drive manufacturer be employed. The full load amperage of the drive may differ from that of the motor. The lower limit of the electrical equipment should be observed.

As a rule of thumb, the motor lead lengths to the VFD should not exceed 200 feet on a 200/230/380/415/460V system, and 100 feet at 575V. Noise can be amplified by lead length which can result in voltage spikes. If the motor is to be run above 60Hz, close attention needs to be paid to the current in relation to the full load amperage (FLA) of the motor. Even though the motors can maintain constant horsepower up to 90Hz, the torque capability of the motor will begin to drop off linearly to the increase of the speed. Therefore, if the torque drops off and the motor is expected to put out its rated horsepower, the current will start to increase linearly with the speed in order to meet the demand of the load. If the current increases higher than the rated FLA of the VFD, the VFD will begin to "trip-out" on an overload/over current condition. See specific drive manufacturer's installation, operation, and maintenance manual for exact running condition details.

Motor shaft grounding kits or insulated motor bearings should be employed when using VFDs for motors above 5 hp. Without such protection, static charges can build up and arc, which may cause motor bearing failure.

operation

Sequence of Operation - Staging & Bypass without VFD

The following is a recommended sequence of operation for multiple Duo-Stack fans mounted on a common system.

Caution

Before starting the system, ensure that all bypass dampers are fully open and all isolation dampers are fully closed. Failure to open the bypass dampers could result in excessive pressure in the system and may result in damage to ductwork or other system components. Failure to close all isolation dampers could result in excessive bypass into the system. This condition may also result in windmilling of non-energized fans which could result in damage to the fans.

System Startup and Increasing System Demand:

- Energize the first fan. At the same time, send a signal to the isolation damper actuator to begin opening the damper.
- After the fan has achieved full speed and the isolation damper is fully open, begin to close the bypass dampers as required in order to increase the system pressure to the design set point.
- As the system demand increases, (an) additional fan(s) may be required. The fans should be started one at a time. As each additional fan is energized, the isolation damper to that fan should begin to open. Opening the isolation damper of a fan before it is energized could make system control unstable.

Decreasing System Demand:

- As the system demand decreases, the controls should open the bypass dampers to increase bypass flow.
- When the bypass dampers reach the full open position and more turndown is required in the system, deenergize one fan. At the same time, close the isolation damper for this fan. Allow time for the system to stabilize before starting or stopping additional fans.

In addition to the above comments, the sequence of the fans should be varied so that all fans operate approximately equal hours. It is recommended that the fans should be sequenced so that any fan does not remain idle for more than thirty (30) consecutive days.

The above sequence is recommended for multiple fan systems utilizing bypass dampers. For fan systems using variable frequency drives, a similar approach can be taken. However, additional steps are required to ensure that all operating fans are running at the same speed and the outlet velocity of the system does not fall below safety/design requirements.

maintenance

Safety Alert

This unit has been shipped in new and clean condition. However, the equipment is designed to handle fumes from a research laboratory hood or other unknown source. These fumes may be hazardous to your health. Therefore, we recommend that you:

Do not open any access doors on a fan or mixing box without first consulting your Facilities Safety Officer. Special cleaning procedures may be necessary prior to working on the internal components of this unit.

Warning

Without knowledge of the composition of the fumes exhausted through this unit, Strobic Air Technologies makes no general recommendation as to the cleaning procedure to be used. We are willing to consult with the Facilities Safety Officer and offer suggestions based on our field experience.

Internal Drainage System

Duo-Stack fans come equipped with a drain coupling located at the bottom of the fan housing. This coupling is an NPT thread that comes plugged from the factory. This drain coupling should be checked periodically for possible clogging, especially when the fan is off. Should excessive pooling of water occur inside the fan housing, it may be necessary to install an external drain (p-trap) on the factory installed NPT thread. For Duo-Stack fans sizes 180 through 360, a 3/4" NPT welded in coupling is used. For Duo-Stack fan sizes 360 through 540, a 1-1/2" NPT welded in coupling is used.

Weep holes are also located in the mixing box/plenum. These holes should also be checked periodically for possible clogging, especially when the fan is off. Figure 23 details the recommended construction for a p-trap drain if required by site.

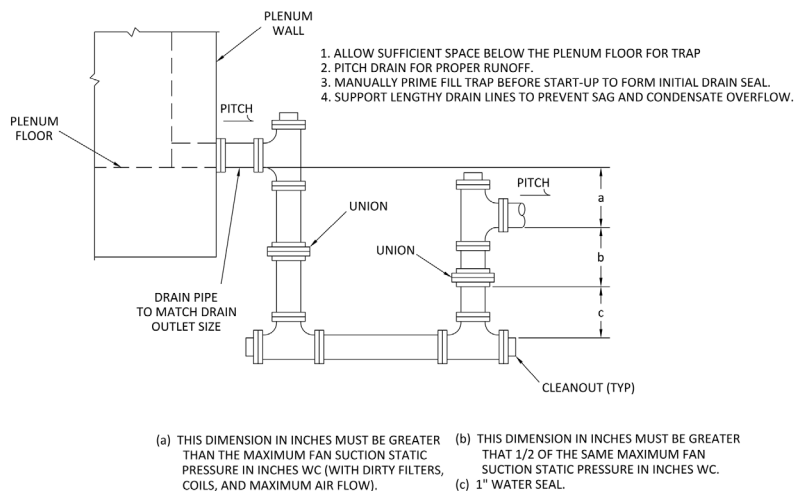


Figure 23 - Recommended Duo-Stack P-Trap Drain for Double Wall and HRU Plenums

maintenance

Regular Motor Maintenance

Strobic Air fan maintenance is limited primarily to the motor. Each motor should be inspected at regular intervals. The frequency and thoroughness will depend on the amount of operation, nature of service, and the environment. The motor exterior should be kept free of oil, dust, water, and chemicals. For fan-cooled motors, it is particularly important to keep the air intake opening free of foreign material. Do not block air outlet.

Motors will have the grease leads extended to the fan housing near the disconnect switch. For standard applications, the motor bearing should be lubricated with polyurea grease, such as Mobil Polyrex EM, as recommended by the motor manufacturer. For most general applications where the nature of service and environment is not severe, we recommend two (2) ounces of grease be supplied on each bearing in accordance with the following schedule:

Motor Lubrication Schedule*	
900 rpm fan speed	every 1 1/2 years
1200 rpm fan speed	every 1 1/2 years
1800 rpm fan speed	every 1 1/2 years

* May vary with motor manufacturer's requirements, consult motor manufacturer's instructions.

Note

The fan nameplate will show direct drive operating speeds and/or the actual motor speed. If there is difficulty with locating a proper acceptable equal to this grease or the specific grease mentioned above, please do not hesitate to consult the factory or your local agent.

It is important to remember that standard duty grease could cause shortened life to these bearings if used in lieu of the above-mentioned grease or it's equal. It is not necessary to open any access doors or remove any unit components to grease the motor bearings. We recommend a grease gun be used, with a flexible nozzle, capable of being pressed onto a zerk type fitting.

Impeller Cleaning

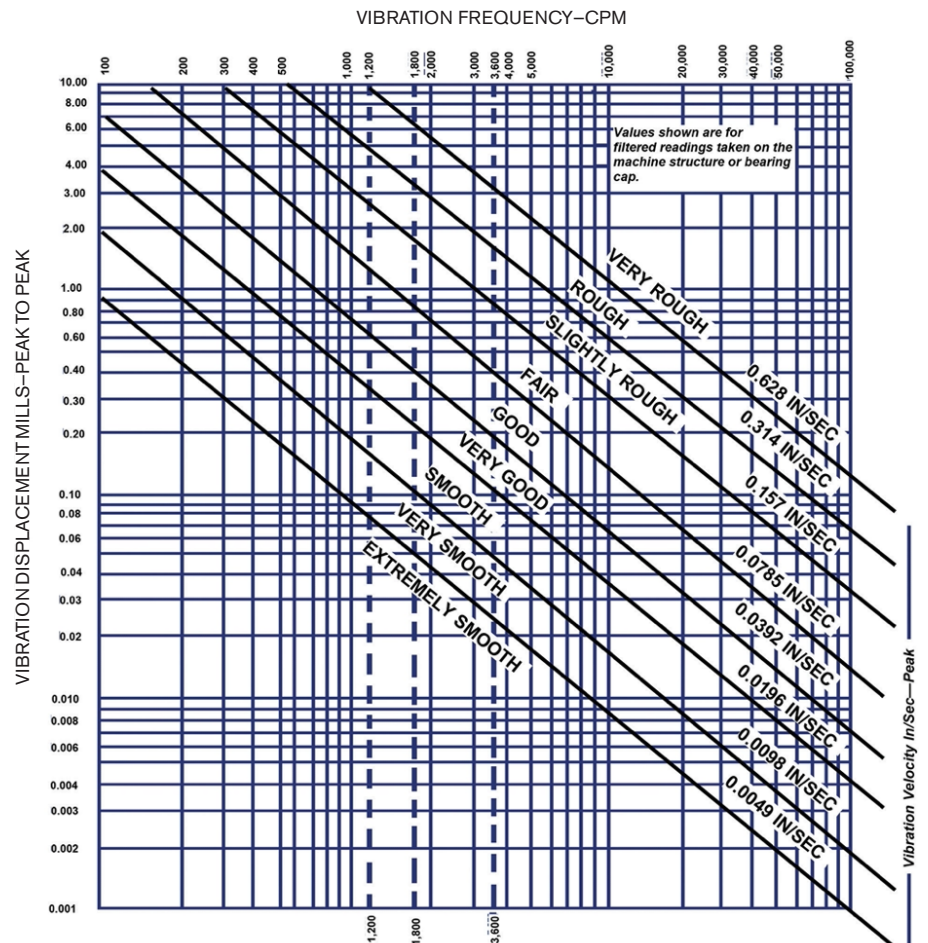
Regular cleaning of the impeller is essential to maintain proper balance. The frequency of this cleaning depends upon the application. An improper balance condition due to accumulated dirt on your impeller can cause an overloaded condition in your motor or unnecessary vibration resulting in loose mountings, bad bearings, or broken blades and housing. Duo-Stack fans come equipped with an access door on the fan housing. Remove this fan housing to access the impeller for regular cleaning.

maintenance

Vibration Monitoring

We recommend that the fan be monitored for vibration on a periodic or continual basis. Periodic checks by portable vibration equipment are recommended for non-critical installations with minimal system effects. The lubrication schedule could serve as a timely vibration monitoring schedule. A significant change in vibration levels will serve as notice for scheduling preventive maintenance.

Continuous vibration monitoring can best be accomplished by installing analog vibration sensors on the fan motor. These sensors can be connected to the SAFE Controller or BMS system and can provide both a warning system (remote indicator light) and a trip-out system in case of bearing failure. This system is recommended for critical installations or where adverse system effects are present. For commercial installations, we recommend a warning setting of “slightly rough” for a period of twenty (20) seconds, and a trip-out setting of “rough” for a period of five (5) seconds, as shown on the “General Machinery Vibration Severity Chart”.



maintenance

Motor Replacement

The following are the standard instructions as recommended by Strobic Air Technologies for the rare event when a motor change of a Duo-Stack fan is required. These guidelines utilize standard lifting, rigging, and assembly procedures.

Warning

Isolate the electrical power supply with use of the disconnect switch and lockout device. Disconnect the electric supply between the fan motor and disconnect switch.

- Remove hardware on inlet bell and remove inlet bell.
- Attach properly rated crane or lift to housing face using a swivel D-shackle, remove housing hardware on motor side, and remove the housing. **Do not lift or move housing using the cross pipe with hooks.**
- Use wheel puller holes to remove wheel hardware.
- Remove wheel carefully to avoid shaft damage. Use properly rated lifting straps with properly rated crane to support the weight of the fan wheel by dropping the straps through the discharge of the fan. This requires the removal of the wind band and nozzle assembly.
- Loosen bolts on damaged or defective motor.
- Attach properly rated crane or lift to the motor lift points.
- Remove hardware on motor base, remove motor and position replacement about 1/8" above the housing.
- Align hardware (nuts are on top of the motor bracket).
- Lower motor and tighten hardware to specs using a torque wrench.
- Mount the fan wheel and reinsert the key stock.
- Replace housing and ensure the inlet bell is correctly positioned, reference Table 7 for correct depth.
- Tighten housing hardware, inlet bell hardware, and remount your fan.

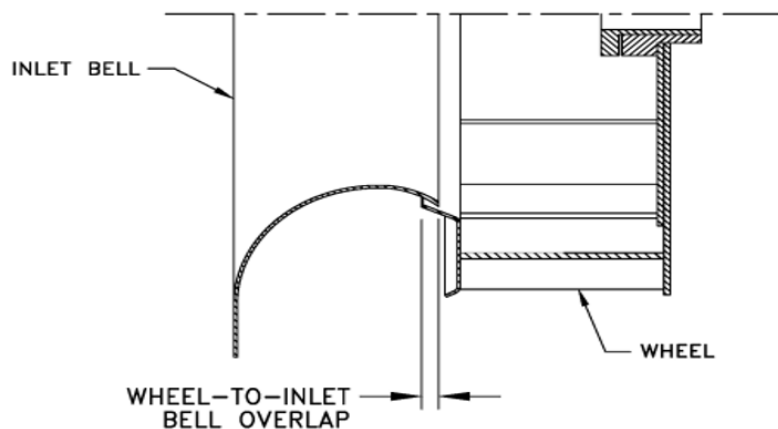


Figure 22 - Wheel-to-Inlet Bell Overlap, CPF & HDBI Fans

maintenance

Table 7 — Wheel to Inlet Bell Overlap

Fan Size	Overlap (in.)
120	1/8
130	1/8
150	5/16
160	5/16
180	5/16
200	5/16
220	5/16
240	3/8
270	7/16
300	1/2
330	9/16
360	5/8
400	11/16
440	3/4
490	13/16
540	7/8

Table 8 — Fastener Torque Specifications

Set Screw Diameter (in.)	Hex Size Across Flats (SAE Allen Wrench)	Torque (in. lbs.)	Torque (ft. lbs.)	Torque (in. lbs.)	Torque (ft. lbs.)
		Alloy Steel		Stainless Steel	
1/4-20	1/8	87	-	70	-
5/16-18	5/32	165	-	130	-
3/8-16	3/16	290	24	230	19
7/16-14	7/32	430	36	340	28
1/2-13	1/4	620	52	500	42
5/8-11	5/16	1,325	110	980	82
3/4-10	3/8	2,400	200	1,700	142
7/8-9	1/2	3,600	300	3,000	250
1-8	9/16	5,000	417	4,000	333
1-1/8-7	9/16	7,200	600	5,600	467
1-1/4-7	5/8	9,600	800	7,700	642
1-3/8-6	5/8	9,600	800	7,700	642
1-1/2-6	3/4	11,320	943	9,100	758

Duo-Stack

USER MANUAL

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