IM-1080
JANUARY 2025

INLINE FUME EXHAUST FANS

INSTALLATION, OPERATION & MAINTENANCE MANUAL

TFE and QFE

QIFE

TVIFE

REVIEW AMCA BULLETIN 410 PRIOR TO INSTALLATION

This manual has been prepared to guide the users of inline fume exhaust fans in the proper installation, operation and maintenance procedures to ensure maximum equipment life with trouble-free operation. For safe installation, start-up and operational life of this equipment, it is important that all involved with the equipment be well versed in proper fan safety practices and read this manual. It is the user's responsibility to make sure that all requirements of good safety practices and any applicable safety codes are strictly adhered to. Because of the wide variety of equipment covered in this manual, the instructions given here are general in nature. Additional product and engineering information is available at *www.tcf.com*.

SAFETY NOTICE

Refer to the safety section(s) in this manual prior to installing or servicing the fan. The most current version of this installation and maintenance manual can be found on our website at *www.tcf.com/resources/im-manuals*.

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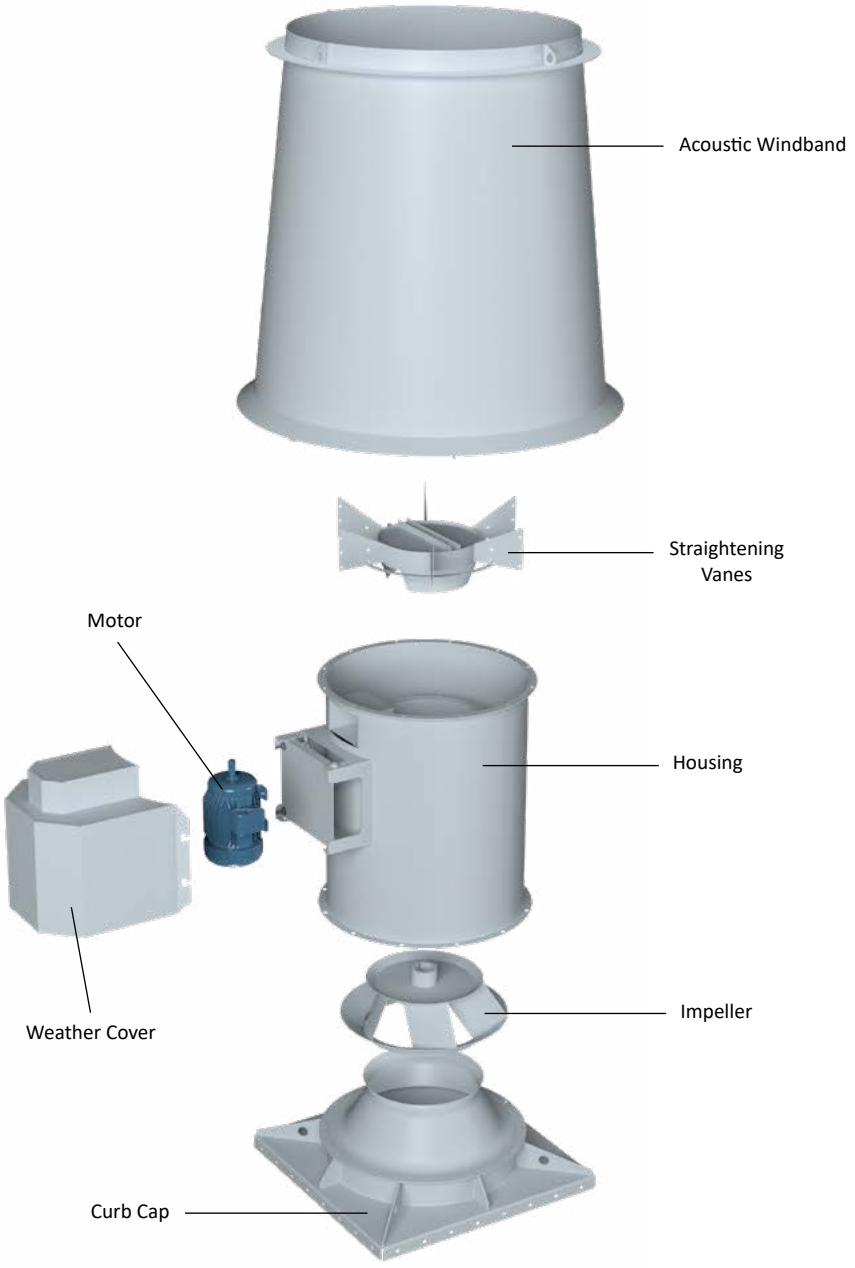
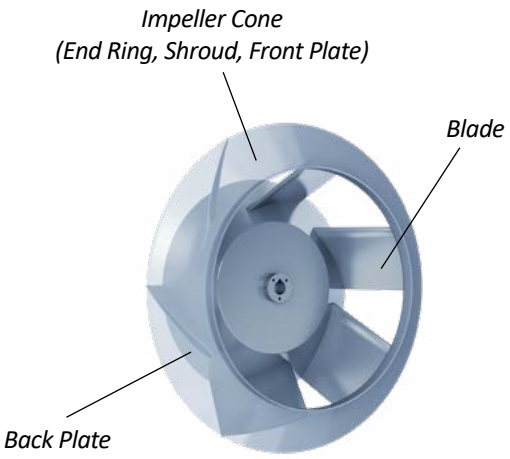
Exploded View and Impeller Nomenclature/Type





Mixed Flow Impeller
(Models QFE, QIFE and TVIFE)

Centrifugal Impeller
(Model TFE)

Receiving, Inspection & Unpacking

When the equipment is received all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Before accepting delivery, carefully inspect each carton or crate for visible shipping damage. If any damage is noticed, the carrier should make the proper notation on the delivery receipt acknowledging the damage. Make notations of all damage on all copies of the bill of lading and have all copies countersigned by the delivering carrier. The carrier should also fill out a Carrier Inspection Report. The factory Traffic Department should then be contacted. File claim for damage with the carrier. Physical damage to the unit after acceptance is not the responsibility of Twin City Fan Companies, Ltd.

Unpack each carton or crate and verify that all required parts and proper quantities of each item have been received. Refer to drawings for part descriptions. Report shortages or missing items to your local representative to arrange for replacement parts.
Due to availability of carriers and truck space, it is not possible to guarantee that all items will be shipped together. Verification of shipments must be limited to only those items on the bill of lading.

The unit nameplate must be checked to make sure the voltage agrees with the power supply available.

Safety & Hazard Warnings

For general safety practices for air moving equipment, see AMCA Bulletin 410. Twin City Fan offers many safety accessories. These safety devices include (but are not limited to) Firestat, inlet and discharge screens. The use and suitability of safety devices is the responsibility of the purchaser.

Facility related safety conditions include fans' accessibility and location. How easily can non-service personnel access the unit? Is the fan in a hazardous duty environment? Was the unit ordered for this duty? Other concerns must also be addressed. All fans should be powered through switches that are easily accessible to service personnel from the fan. Fan power must have the ability to be "locked out" by service personnel trained in lockout/tagout procedures per OSHA requirements (29CFR1910.147). When performing lockout, be aware of factors, such as building pressure and additional fans in the system that can influence unwanted fan rotation (wind milling). If you have any doubt about your ability to perform a task, seek a person qualified to do that task. Before any work is done on a fan, ensure that the fan is isolated from the electrical supply using a 'lockout/tagout system.'Note: A stationary, non-rotating fan does not mean that the fan is isolated from the electrical supply. A non-rotating fan could be subject to controls or other circuit protection devices that may start the fan without notice.

The following safety precautions should be followed, where applicable:

- Do not attempt to slow a rotating impeller even when it is isolated from the electrical supply. Fan impellers have a high inertia and injury could result from an attempt to stop it. It is recommended that the impeller is isolated by closing off the inlet or outlet to prevent wind-driven rotation. If an impeller is chocked to prevent rotation, ensure that the chocks are removed prior to start up.
- Wear appropriate personal protective equipment. This may include protective clothing, eye protection, ear protection, respiratory equipment, hand and foot protection when installing or servicing the fan.
- Always use caution when entering a fan's air path. High velocity airflow can cause you to lose your balance.
- Motor, bearings and drives can be hot, and similarly if the fan is subject to processes that are hot, the fan housing could be hot.
- Fans are often used to move hazardous materials that could be dangerous. Always wear protective clothing and take precautions not to inhale dust/gases. If hazardous chemical vapors are present, respiratory equipment may be required.
- Sharp edges – wear protective gloves when handling, installing or servicing a fan.
- Fans can operate at high decibel sound levels. Wear proper ear protection to protect from excessive noise levels.
- Access Doors – Do not open access doors when fan is in operation. The effects of suction and air pressure could result in injury.
- When working around pulleys and belts, keep hands away from pinch points. This pertains to when the fan is under or off power.

Throughout this manual, there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. Two signal words "WARNING" and "CAUTION" are used to indicate the severity of a hazard and are preceded by the safety alert symbol. It is the responsibility of all personnel involved in installation, operation and maintenance to fully understand the warning and caution procedures by which hazards are to be avoided.

WARNING: Used when serious injury or death MAY result from misuse or failure to follow specific instructions.

CAUTION: Used when minor or moderate injury or product / equipment damage MAY result from misuse or failure to follow specific instructions.

NOTICE: Indicates information considered important, but not hazard-related.

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Unit Storage

If fan installation is to be delayed, store the unit in an environmentally stable and protected area. During storage, the fan should not be subjected to vibration from external sources or bearing damage may occur. The unit should be reasonably protected from any accidental impacts. Cover the fan to protect coatings and to prevent any foreign material or moisture from entering the inlet or discharge. Take care to protect the motor, drives and bearings.

Extended storage requires monthly inspections. Check for corrosion or damage to the unit and for debris within the fan.

Bearings tend to take on moisture if the atmosphere in which they are stored is not at a constant temperature. To avoid corrosion, it is necessary to keep the bearings full of grease and to rotate them periodically. Even when full of grease, bearings will take on moisture, so it is necessary to purge the bearings with new grease to expel moisture every thirty days. It is recommended that the bearings be purged with grease while being rotated by hand. Do not use high pressure greasers as they may ruin the bearing seals. Remove old/excess grease and regrease the bearing in accordance with the bearing manufacturer's instructions.

The drives and belts should be removed if the fan is to be stored for a prolonged period. The drives should be labeled for service and stored in a dry place. Belts should be removed, coiled without kinks, placed in a heavy carton and stored in a dry, well-ventilated place. To prevent belt deterioration storage conditions should not exceed 85°F and 70% humidity. If belts show signs of deterioration, they should be replaced prior to startup.

Motors should be stored in a clean, dry, vibration-free location. The packaging should be opened up enough to allow air circulation around the motor. The winding temperature should be kept slightly above that of the surroundings to prevent condensation. This can be accomplished by energizing the internal heaters, if the motor is so equipped, or by using space heaters. If it is impossible to heat the windings, the motor should be wrapped tightly with a waterproof material that also encloses several bags of desiccant. Replace the desiccant regularly to prevent moisture problems. The motor rotor should also be rotated regularly (monthly) to assure the bearing parts are well greased. Shafts on motors equipped with shaft grounding rings must remain rust free. Failure to do so renders the grounding feature inoperative and may result in bearing failure under VFD operation. Consult the motor manufacturer for further detail on motor storage and start up after longer periods of storage. It may be necessary to regrease the bearings. If the fan's bearings or motor bearings have extended lubrication lines, it will be necessary to replace the grease by detaching from the motor/bearing and purging the line with new grease.

When the unit is removed from storage, all fan bearing grease should be purged and replenished with fresh grease as per the lubrication decal. The motor should be measured to verify that the resistance is still at a satisfactory level compared to the value recorded prior to storage.

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Handling

Handling of all air moving equipment should be conducted by trained personnel and be consistent with safe handling practices. Verify the lift capacity and operating condition of handling equipment. When using hoisting equipment, only qualified and trained personnel should operate the equipment.

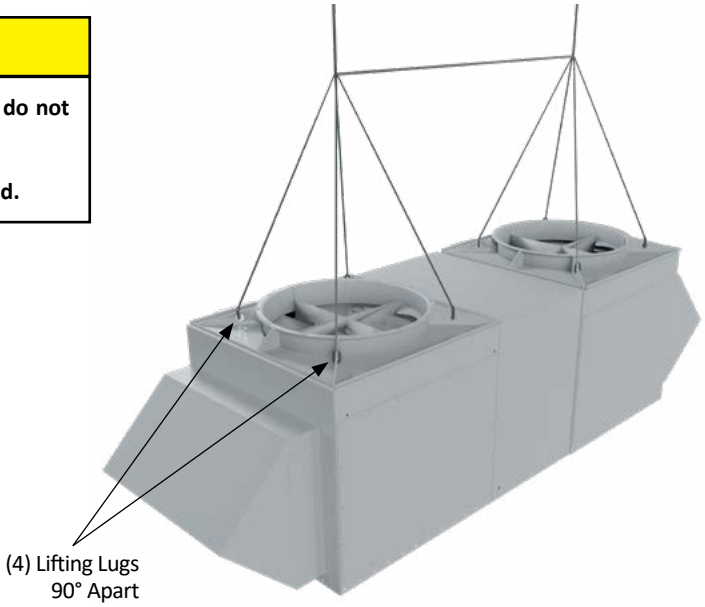
Units shipped completely assembled may be lifted with slings and spreader bars. (Use well-padded chains, cables or nylon straps, rated to lift the required weight.) On most units, lifting lugs are designed to protect the fan and fan housing from damage. Never lift a fan by the inlet or discharge flange, shafting or drives, impeller, motor or motor base, or in any other manner that may bend or distort parts. Never lift with slings or timbers passed through the fan inlets.

For fans provided without lifting lugs, use a forklift or pallet jack to handle the equipment. Consult a qualified person before lifting.

⚠ CAUTION

1. **Maintain handling equipment to avoid serious personal injury and do not stand under the load.**
2. **If supplied, only use the provided lifting lugs to lift the equipment.**
3. **Ensure that the lifting equipment is rated for the capacity to be lifted.**

Lifting lugs are provided on most units.



Mixing plenum boxes configured for multiple fans mounted on a common unit are modular in design and may be broken down into smaller segments for ease of installation and handling.

Partial or disassembled units require special handling. All parts should be handled in a method that protects the coatings and parts from damage. Components should be handled such that forces are not concentrated to avoid bending or distortion.

The housing should be lifted using suitably rated spreader bars and padded chains or straps. Do not distort housing or side plates when lifting.

The shaft and impeller assembly may be lifted using a hoist and a spreader with slings around the shaft at either side of the impeller. Use the spreader bar to ensure that the slings do not push against the sides of the impeller as this may distort the impeller. Take care not to damage the shaft where the impeller or bearings will be mounted. Never lift or support the assembly by the impeller. Always support the assembly by the shaft when lifting or storing (see the *Unit Storage* section). Do not support the shaft or the impeller on the housing sides. See the *Fan Installation* section for additional details.

Impellers shipped separately can be lifted by slings running between the blades or through the hub. Never lift the impeller by a single blade or single point. Do not to put a chain within the hub bore. Always transport impellers by lifting, do not roll the impeller as this can damage coatings and change the balance of the impeller.

⚠ CAUTION

1. **Bearing pedestals should be lifted using straps or padded chains. Under no circumstance should an attached or separated bearing pedestal be lifted by the shaft, bearings, drives, motor or impeller.**
2. **Note some rotor assemblies may have an off-center CoG and therefore a qualified person should be consulted before lifting.**

Bent shafting is a source of vibration and bearing failure, so be sure to handle the shaft with care. If the shaft is bent, replace the shaft. Any scratches on the shaft may be repaired with fine emery cloth or a stone. Remove only the displaced metal that forms a high point at the edge of the scratch.

General Installation

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and all applicable codes.

This equipment is to be installed by an experienced installation company and fully trained personnel.

The mechanical installation of the exhaust ventilator consists of making final connections between the unit and building services, duct connections.

⚠ CAUTION

Fan systems include rotating components and electrical devices. Proper care must be taken during installation and maintenance of all fan system components to protect personnel. This includes, but is not limited to the use of protective enclosures, guards, locking devices to stop rotating parts and electrical disconnect lock-outs. Refer to applicable local codes to ensure compliance for all protective devices.

Fans create a suction at the inlet. Care should be taken around the inlet of the fan, whether it is in operation or not. Make sure the inlet area is clear prior to energizing the system. This includes all personnel and loose, foreign objects.

Sheet metal parts, screws, clips and similar items inherently have sharp edges and it is necessary that the installer and service personnel exercise caution.

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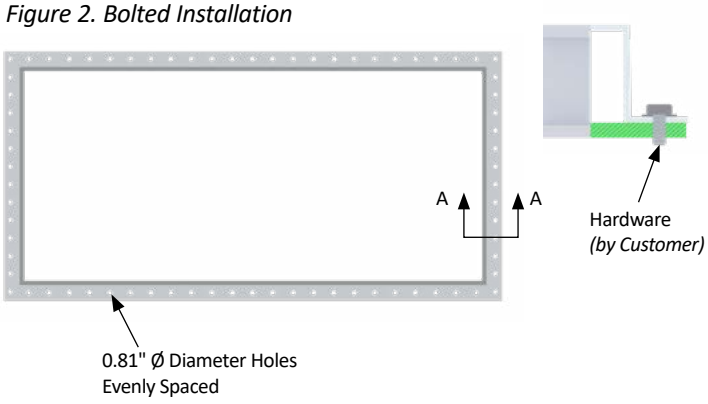
Roof Curb Installation

Roof curbs shall be installed and fully attached to structural support (by others), which is typically steel or concrete using 1/2" diameter bolts with 1-3/8" washers (by others).

Figure 2. Bolted Installation

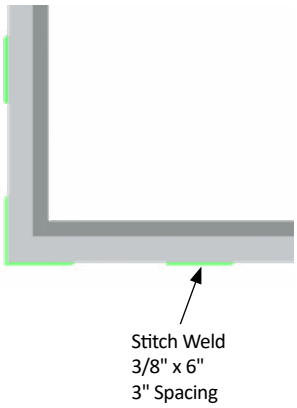


For attachment to structural steel, the curb can be continuously-welded or stitch-welded using 3/8" x 6" welds with a maximum of 3" spacing between welds. Welds should be evenly spaced along curb side and corners. See Figure 3.

⚠ CAUTION

Roof curbs should be square and level to ensure safe fan installation and proper sealing of gas stream to the fan.

Figure 3. Welded Installation



Fan Installation (refer to lifting/safety section)

All fan impellers are statically and dynamically balanced using state of the art equipment in the factory. Final trim balancing is performed on factory assembled fans, unless the specified electrical characteristics of the motor are outside the limits of the factory test equipment. If the motor and drives are supplied, the complete assembly is run tested and balanced. Infrequently, fans are supplied with unusual electrical characteristics and cannot be tested with the motor. In this situation the fans are run and balanced using a factory driver. Likewise, if motors and/or drives are not supplied, the fan is tested with the factory driver. Final balancing, at the buyer's expense, should be performed in the field after the motor and/or drives are installed. This service is available from TCF, otherwise this should be entrusted to a qualified technician.

Follow proper handling instructions as given earlier.

1. Move the fan to the final mounting position.
2. Remove skid, crates and packing materials carefully.
3. Place the fan on mounting structure. Carefully level the unit (checking the level on the shaft).
4. Check the alignment of the bearings. Shim or reposition the bearings if necessary.
5. Check alignment of sheaves on belt driven fans.
6. Check tension of belts to see if it is sufficient. Sheaves on belt driven fans are often provided with taper lock bushings. When tightening bushing bolts, proceed in a progressive manner to avoid cocking the tapered surfaces between the bushing and the sheave. Torque per tables below.

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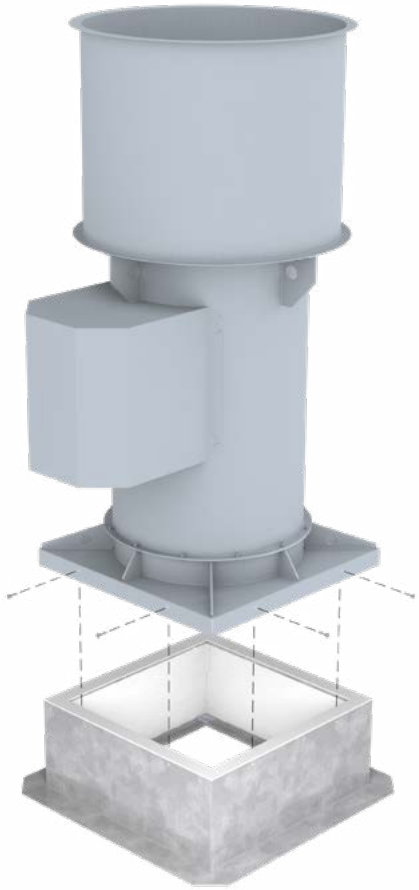
7. Check the tightness of the impeller on the shaft. Check the tightness of foundation bolts, motor bolts, sheaves and bearings. Make sure there is no rubbing or binding and that the impeller-inlet cone clearances and overlap are correct.
8. Check that bearings are fully lubricated and check the oil level in the static oil lube systems.
9. Install any accessories shipped loose from the factory.



Carefully level the fan on the foundation

Tightening Torque

SIZE	FASTENER - TIGHTENING TORQUE (Ft. Lbs.)		
	GRADE 2	GRADE 5	GRADE 8
#10	—	—	—
1/4-20	5.5	8	12
5/16-18	11	17	25
3/8-16	22	30	45
7/16-14	30	50	70
1/2-13	55	75	110
9/16-12	—	—	—
5/8-11	100	150	200
3/4-10	150	270	380
7/8-9	165	430	600
1-8	250	645	900
11/4-7	500	1120	1500

SIZE	TAPER BUSHINGS - TIGHTENING TORQUE (Ft. Lbs.)		
	SPLIT		QD
	IN IRON	IN ALUM. HUB	FOR DRIVE
#10	—	—	6
1/4-20	7.9	7.5	9
5/16-18	16	13	15
3/8-16	29	24	30
7/16-14	—	—	—
1/2-13	70	—	60
9/16-12	—	—	75
5/8-11	140	112	135
3/4-10	—	—	—
7/8-9	—	—	—
1-8	—	—	—
11/4-7	—	—	—

The above torque values are for nonlubricated fasteners and Browning Bushings. For bearing set screws, use manufacturer's recommendations. If other bushings are used, utilize bushing manufacturer's specifications.

Tolerance: +/- 5%
For impeller set screws use Grade 2 values.

Mixing Plenum Box Assembly and Installation

The modular plenum mixing boxes are designed to allow for easy installation and future expandability. Single mixing plenum boxes are fully assembled (less any dampers) to expedite installation. Depending on the size, multi-unit mixing boxes may or may not be assembled. When installing the mixing box(es), it is important to follow the guidelines for lifting and rigging on page 5.

When a single-unit mixing plenum box is installed, prepare the roof curb or mounting structure. Lay gasket material on the top edge of the roof curb. Lift mixing box onto curb and square (level) mixing box.

Depending on the air intake (side or bottom), the mixing box must be oriented to allow for direct duct connection into the mixing plenum box. Match drill roof curb to mixing plenum box. Attach mixing plenum box to roof curb using 3/8" diameter, 3" length slotted, hex washer head type F machine screws, stainless steel (by others).

For multi-unit configurations, some assembly may be required. There are at least two different assemblies in a multi-unit configuration. There is the mixing plenum box assembly and the mixing box spacer. See Figure 4. There will be one less spacer than the quantity of mixing plenum boxes.

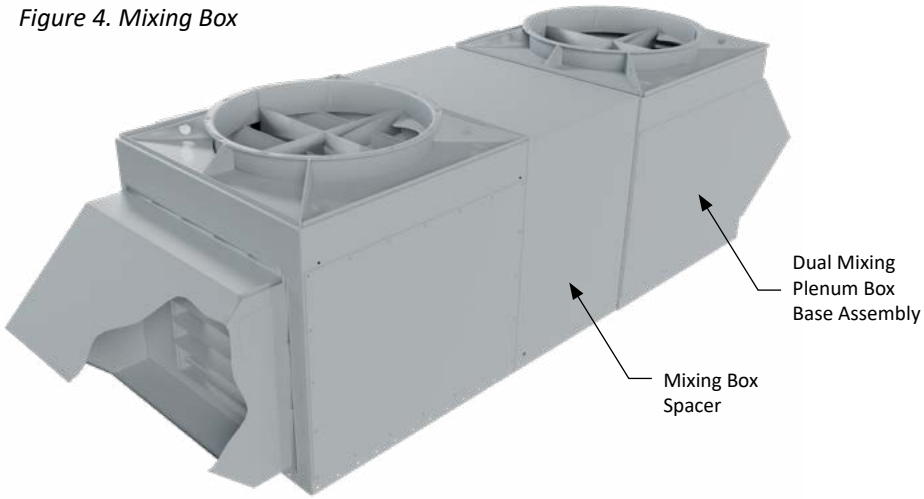
To assemble, space the mixing boxes a distance apart that is slightly more than the width of the spacer section. Utilize a gasket between the mixing box and the spacer section to provide a tight seal.

Install 316 stainless steel bolts to attach the spacer and the mixing box. Repeat as necessary for each section.

When the multi-unit mixing plenum box is assembled, rig the mixing box system into place in accordance with Figure 1 to avoid any damage.

Install mixing plenum box assembly onto a prepared (gasket material on mating surface) roof curb or mounting structure. Lay square (level) mixing box. Install lag bolts into the mixing plenum box to roof curb as indicated.

Figure 4. Mixing Box



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Fan Installation with Curb Cap ONLY (no mixing plenum box)

Securing the curb cap to the roof curb will be similar to attaching with a mixing box except the pre-drilled holes on the curb cap will be 13/16" diameter. Drill pilot holes on the roof curb using the curb cap as reference, then secure curb cap to the roof curb with 3/8" diameter, 3" length slotted, hex washer head type F machine screws, stainless steel (by others).

Fan and Windband Installation

- Follow proper handling instructions as provided earlier.
- Identify each fan and component and match the equipment up with the supplied customer drawing(s).
- Move the fan to the final mounting location.
- Remove skid, crates and packing materials carefully.
- For fans mounted directly to roof curb (supplied with a curb cap), place the fan on properly installed roof curb. Fans mounted on a mixing plenum box (supplied with mixing plenum box transition) require the installation of the mixing plenum box prior to installing fan.
- Fans shipped as a single unit shall be broken down into several parts. Install each item individually in the following order:
  1. Fan and curb cap onto the installed roof curb.
     -or-
     Fan and mixing plenum box transition onto installed mixing box.
  2. Stack extension, if in the scope of supply (TFE/QFE only)
  3. Windband

NOTICE

When installing the components, lifting lugs shall be utilized for safe installation. Lifting lugs are designed for the weight of the component they are welded to and should not be used to lift assemblies.

Fan Housing Installation

1. Place supplied gasket around the perimeter of the mixing plenum box or roof curb.
2. Lower fan housing onto roof curb or mixing plenum box aligning the bolt holes on the two components. Allow for gasket to compress naturally prior to securing fan housing to the adjacent component.
3. Install 316 stainless steel hardware (provided) in all mounting holes. Use a commercially available anti-seizing compound formulated for 316 stainless steel to hardware. Carefully level the unit on the roof curb or mixing plenum box. Be careful not to force the fan to the mounting structure. This may cause misalignment, which may cause unsafe operating conditions, vibration and premature failure.
4. Check the alignment of the bearings. Shim or reposition the bearings if necessary.
5. Check face alignment of sheaves on belt driven fans. Check tension of belts to see if it is sufficient. Sheaves on belt driven fans are often provided with taper lock bushings. When tightening bushing bolts, proceed in a progressive manner to avoid cocking the tapered surfaces between the bushing and the sheave.
6. Check the tightness of the impeller on the shaft. Check the tightness of foundation bolts, motor bolts, sheaves and bearings. Make sure there is no rubbing or binding and that the impeller-inlet cone clearances and overlap are correct.

Stack Extension (QFE/TFE) Installation

1. Place supplied gasket around the perimeter of the fan outlet.
2. Lower the stack extension onto the fan housing aligning the bolt holes on the two components. Allow for gasket to compress naturally prior to securing fan housing to the adjacent component.
3. Install 316 stainless steel hardware (provided) in all mounting holes. Use a commercially available anti-seizing compound formulated for 316 stainless steel to hardware.

Windband Installation

1. Using the windband lifting lugs, raise the windband above the outlet of the fan assembly. Align the support brackets with the fan assembly discharge.
2. Using caution not to swing the windband, insert the 316 stainless steel mounting hardware (provided) coated with anti-seize compound to join the two components.

Drain Connection/Installation

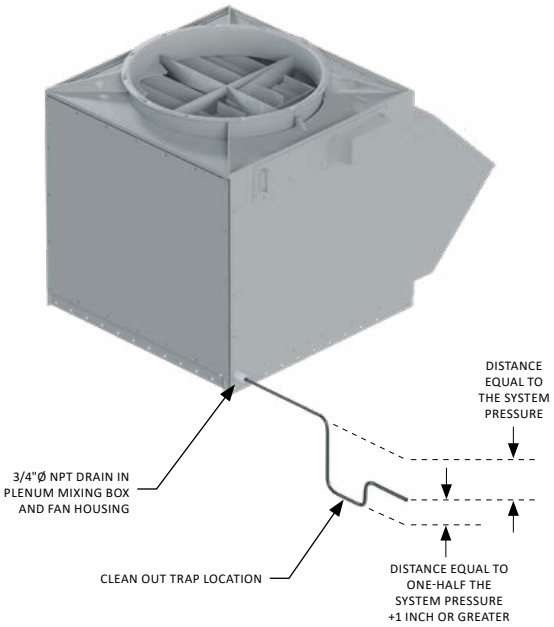
Each section of the plenum mixing box as well as the fan housing contains a 3/4" NPT drain pipe for connecting to drainage system to ensure safe routing of any liquid that may form in the system. Due to the potential of hazardous chemical contamination, proper disposal of liquids is required (by customer). See Figure 5.

Notes:

- A minimum of 1" of water must be placed in trap prior to start-up to create proper “lock” of system pressure.
- Drain should periodically be cleaned out for proper operation.

Figure 5. Drain

Close-Up of Drain



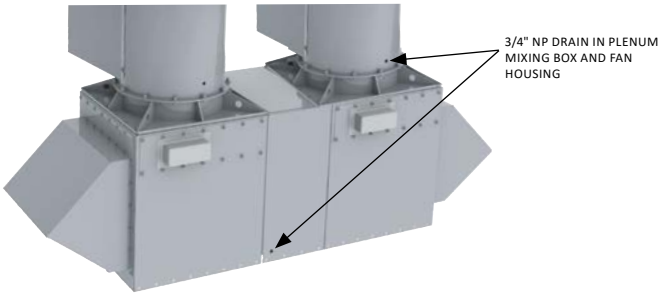
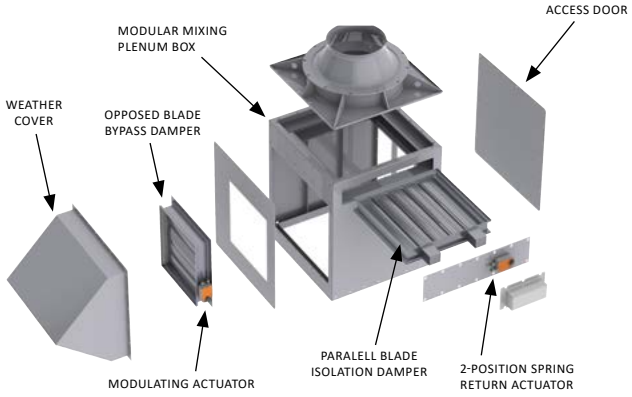
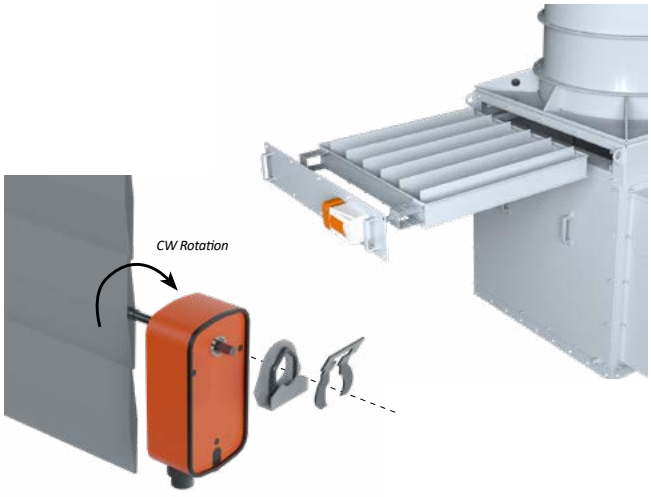


Figure 6. Damper and Actuator Assembly





Exploded View of Damper Actuator

Water Mitigation

Inline induced flow lab fans such as Model QIFE and Model TVIFE require water mitigation upstream from the fan to manage water that may enter a fan that is not in operation. For a bottom intake mixing box application, care must be taken by the engineer to design ductwork with drains to mitigate any water that may enter through the fan. A side intake mixing box, which allows the water to collect and drain from the mixing box before entering the ductwork, would be another solution. Less concern is required for Model TFE and Model QFE products. The outlet damper on the Model TFE and Model QFE is designed to prevent rain entry.

All lab fan selections should have an outlet velocity of at least 3000 feet per minute at the nozzle per ANSI Z9.5. This will ensure that no rain enters the system when the fans are running.

Damper and Actuator Installation

Access to the isolation damper is obtained through opening the slide out door on the side of the plenum. Remove bolts from face of slide out door and remove damper/door assembly for inspection and maintenance. The 2-Position spring return actuator is attached to the damper shaft through the slide out door in a NEMA 4 enclosure and can be removed with the damper/door assembly. Wiring is completed through knockouts in NEMA 4 enclosure around the actuator.

Access to bypass damper and modulating actuator for removal is obtained by removing the weather hood covering the damper. Damper is attached to plenum face with standard zip screws. An inspection door is available on the side of the weather cover for standard inspection and maintenance of the damper. Wiring for the modulating actuator is fed through the knockouts in the weather hood.

Electrical Connection

1. Connect supply wiring to the disconnect switch (non-fused standard). Check the wiring diagrams on the motor for connections.
2. The motor is factory set at the voltage marked on the fan nameplate. Check the line voltage with the nameplate voltage and wiring diagrams.
3. The main power wiring should be sized for the ampacity shown on the dataplate. Size wires in accordance with the ampacity tables in Article 310 of the National Electrical Code. If long wires are required, it may be necessary to increase wire size to prevent excessive voltage drop. Wires should be sized for a maximum of 3% voltage drop.

⚠ CAUTION

1. **Use copper conductors only.**
2. **Protect wiring from sharp edges. Leave some slack in the line to prevent damage.**

4. Disconnect switches are not fused. The power leads must be protected at the point of distribution in accordance with the fan dataplate.
5. On fans without a thermal protector integral to the motor (refer to unit or motor dataplate to determine if protector is present) a separate overload device is required. Refer to Sections 430-32 of the N.E.C. for sizing.
6. All units must be electrically grounded in accordance with local codes or, in the absence of local codes, with the latest edition of the National Electrical Code (ANSI/NFPA 70). A ground lug is provided as standard in the unit terminal box. Size grounding conductor in accordance with Table 250-95 of the National Electrical Code. DO NOT use the ground lug for connecting a neutral conductor.
7. Supply voltage to the power ventilator should not vary by more than 10% of the value indicated on the unit dataplate. Phase unbalance must not exceed 2%.

⚠ WARNING

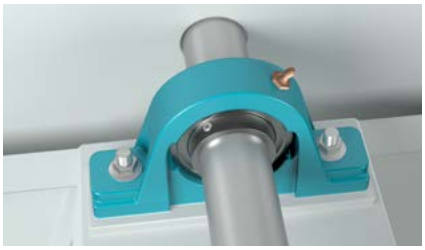
Failure of motor due to operation on improper line voltage or with excessive phase unbalance constitutes product abuse and may cause severe damage to the unit's electrical components.

Bearing Installation (refer to safety section)

This section gives some general instructions on bearing installation. If bearings are to be field installed, the specific installation manual for the bearings will be provided and should be followed carefully. If provided, check the assembly drawings and bearing manufacturer's instructions for location of the fixed and expansion bearings. The positions of these bearings cannot be interchanged. Always follow the bearing manufacturer's instructions.

Solid Pillow Block

1. Lightly lubricate the bearing bore and slide bearing into the proper position on the shaft. Sling the rotor assembly into place and loosely bolt the bearings in place.
2. When bearings are in place, shim appropriately and torque the base bolts using values from the *Tightening Torque* table. Tighten the collar set screws to manufacturer's specification. The set screws on both bearings should be aligned with one another. If the bearing has an adapter mount, hand tighten the locknut to establish the "zero" point. Next, tighten the number of turns per the instructions furnished with the bearing. Rotate by hand to be sure the bearings and shaft rotate freely.
3. Ensure the expansion bearing is centered within its housing. If bearings need to forced onto the shaft then apply force on the inner race/collar only (does not apply to adapter mount.) If an expansion bearing has been supplied, it should not be bolted to the pedestal until the fixed bearing has been bolted and locked. After locking the expansion bearing to the shaft, position the pillow block to allow for axial expansion, approximately centered in the pillow block, then bolt to the pedestal.
4. Unless the user orders differently, bearings are lubricated in the factory with a lithium complex, NLGI grade 2 grease. **Refer to the bearing lubrication schedule below.**



Solid Pillow Block Bearings

Safety & Bearing Lubrication Instructions

WARNING

1. **This equipment must not be operated without proper guarding of all moving parts. While performing maintenance be sure remote power switches are locked off. See installation manual for recommended safety practices.**
2. **Before starting: Check all set screws for tightness and rotate impeller by hand to make sure it has not moved in transit.**

Fans with Unit Roller Bearings

Relubrication Schedule (Weeks)* Spherical Roller Bearing - Solid Pillow Blocks									
Shaft DIA	Speed (RPM)								
	500	1000	1500	2000	2500	3000	3500	4000	4500
1/2" thru 1 7/16" (13 – 35)	6	4	4	2	1	1	1	1	0.5
1 11/16" thru 2 3/16" (40 – 55)	4	2	1.5	1	0.5	0.5	0.5	0.5	0.5
2 7/16" thru 3 7/16" (60 – 85)	3	1.5	1	0.5	0.5	0.25	0.5	–	–
3 15/16" thru 4 15/16" (100 – 125)	2.5	1	0.5	0.25	–	–	–	–	–

*Suggested lubrication interval under continuous operation in adverse loading or with elevated temperatures. For operation less than 24 hours per day or under ideal conditions, lubrication frequency may be reduced. Relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on condition of purged grease. Hours of operation, temperature and surrounding conditions will affect the relubrication frequency required.

1. Lubricate with a high quality NLGI No. 2 lithium-base grease having rust inhibitors and antioxidant additives, and a minimum oil viscosity of 500 SUS at 100°F (38°C). Some greases having these properties are:
   Shell - Gadus S2 V100 2 — Mobil - Ronex MP
   Mobil - Mobilith SHC100 — Mobil - Mobilith SHC220
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.
3. Any lubrication requirements noted on the general assembly drawing supersede requirements found here.

Fans with Ball Bearings

Relubrication Schedule (Weeks)* Ball Bearing Pillow Blocks									
Shaft DIA	Speed (RPM)								
	500	1000	1500	2000	2500	3000	3500	4000	4500
1/2" thru 1 11/16" (13 – 45)	6	6	5	3	3	2	2	2	1
1 15/16" thru 2 7/16" (50 – 60)	6	5	4	2	2	1	1	1	1
2 11/16" thru 2 15/16" (65 – 75)	5	4	3	2	1	1	1	–	–
3 7/16" thru 3 15/16" (90 – 100)	4	3	2	1	1	–	–	–	–

*Suggested lubrication interval under continuous operation in adverse loading or with elevated temperatures. For operation less than 24 hours per day or under ideal conditions, lubrication frequency may be reduced. Relubricate while running, if safety permits, until some purging occurs at seals. Adjust lubrication frequency depending on condition of purged grease. Hours of operation, temperature and surrounding conditions will affect the relubrication frequency required.

1. Lubricate with a high quality NLGI No. 2 lithium-base grease having rust inhibitors and antioxidant additives, and a minimum oil viscosity of 500 SUS at 100°F (38°C). Some greases having these properties are:
   Shell - Gadus S2 V100 2 — Mobil - Ronex MP
   Mobil - Mobilith SHC100 — Mobil - Mobilith SHC220
2. Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.
3. Any lubrication requirements noted on the general assembly drawing supersede requirements found here.

Drive Mounting
(refer to safety section)

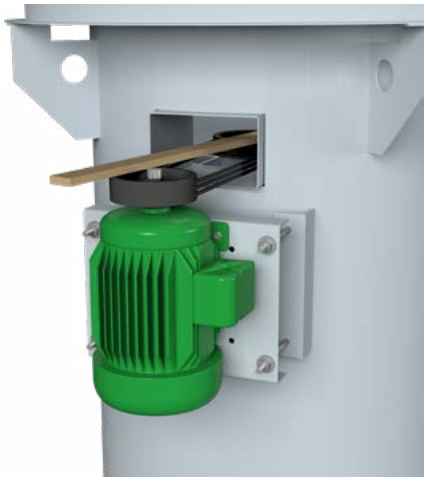
Mount drives as follows:

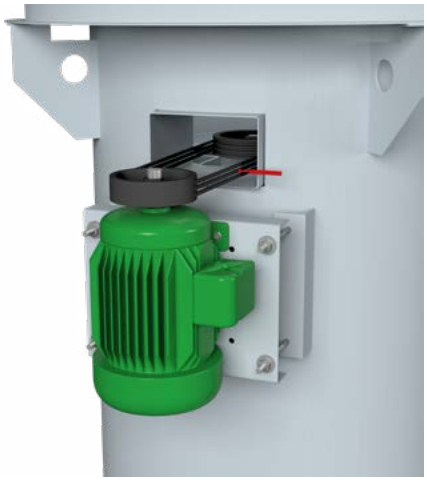
1. Slip (do not pound) proper sheave onto corresponding shaft. Most drives utilize tapered bushings. Draw the bushing up evenly tightening in steps. To minimize bearing loading, mount sheaves as close to bearings as possible. It is preferable to use alignment tools that align the grooves of the sheave.
2. Laser alignment is common. The mechanic must be familiar with the alignment tool he is using. Otherwise, align sheaves with straightedge extended along sheaves, just making contact in two places on outside perimeters of both sheaves. This “four-point” alignment may also be checked with a string tied to the shaft behind one of the sheaves. The string is then pulled taut over the faces of the sheaves to check the alignment at the four points at the outside perimeters. Each sheave should be rotated about one-half revolution during this check to look for excessive runout or a bent shaft. Unless there is a bent shaft, runout can be corrected by adjustments to the bolt torque of the taper bushing.
3. Install and tighten the belts. Run the drive for a few minutes to seat the belts. When fitting the belts, slide the motor in to fit the belts on. Do not use a pry bar, as this may damage the belt cords. Tighten the belts to the proper tension. Ideal tension is just enough tension so that the belts do not slip under peak load or acceleration. Many drives are provided with tensioning data, which identifies the load to apply at the center of the span and the allowable deflection from this force. A belt tension gauge is recommended for precise tensioning.
4. After initial installation of belts, recheck belt tension again after a few days of operation to adjust belt tension. (New belts require a break-in period of operation.)

Click To View Our
Sheave Installation Video

WARNING

When working around belts and pulleys, keep hands away from pinch points.





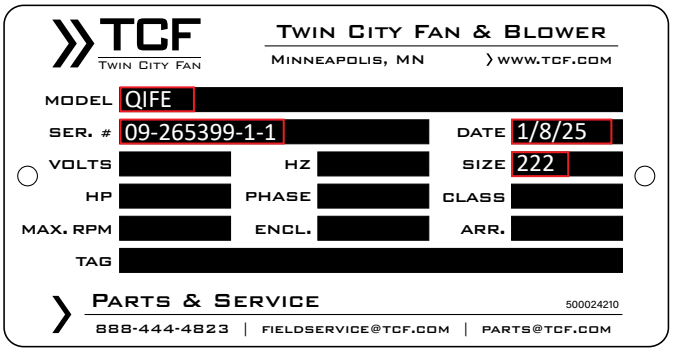
CAUTION

Placing fan sheave on motor can overspeed impeller and cause structural failure.

Serial Number & Fan Type

The serial number and fan type can be found on our permanent nameplate of the fan.

TCF
Twin City Fan



Check, Test & Start Procedure

WARNING

1. **Electric shock hazard. Could cause severe injury or death. Failure to bond the frame of this equipment to the building electrical ground by use of the grounding terminal provided or other acceptable means may result in electrical shock. Disconnect electric power before servicing equipment. Service to be performed only by qualified personnel. Make sure power is turned off and locked in the OFF position.**
2. **Rotation is critical. If allowed to operate in the wrong direction, the motor will overload and burn out.**
3. **Especially check three-phase units for rotation. For three-phase, rotation can be changed by interchanging any two of the three line leads. If the unit is checked on temporary wiring, it should be rechecked when permanently installed. Motor burn-out or tripped overload protection devices are usually the result of wrong rotation.**

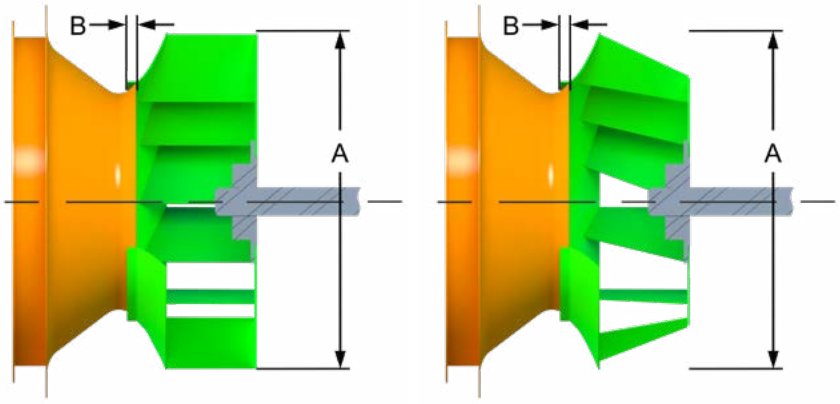
1. Check to verify that the impeller is free to rotate.
2. For optimum fan performance make sure that the impeller to inlet venturi gap or overlap is maintained. See table in *Impeller Placement* section.
3. Verify that supply voltage on the line side of disconnect agrees with voltage on fan data plate and is within the 10% utilization voltage.

NOTICE

The fan was balanced at the factory to be within stringent vibration levels before shipment. However, there are several things that may cause vibration, such as rough handling in shipment and installation, weak foundations and alignments.

4. Apply power to unit and check rotation of impeller with the directional arrow on the unit.
5. Electrical Input Check: Perform check of fan ampere draw and verify that motor nameplate amps are not exceeded. Take into account the service factor range if motor is nameplated above a 1.0 service factor.
6. Fan RPM should be checked and verified with a tachometer.
7. Units with Speed Control (Direct Drive): Verify that speed controller gives desired operating range of RPM. If minimum speed value is not desired, it may be adjusted.

Impeller Placement



FAN SIZE	TFE		QFE, QIFE, TVIFE		
	A	B	A	B MIN.	B MAX.
90	–	–	12.25	0.25	0.38
122	12.25	0.31	15.00	0.31	0.44
135	–	–	16.50	0.38	0.50
150	15.00	0.38	18.25	0.44	0.56
182	18.25	0.56	20.00	0.50	0.63
200	20.00	0.63	22.25	0.56	0.69
222	22.25	0.69	24.50	0.63	0.75
245	24.50	0.75	27.00	0.69	0.88
270	27.00	0.88	30.00	0.75	0.97
300	30.00	0.97	33.00	0.88	1.06
330	33.00	1.06	36.50	0.75	0.94
365	36.50	0.94	40.25	0.81	1.03
402	40.25	1.03	44.50	0.88	1.13
445	44.50	1.13	49.00	1.00	1.25
490	49.00	1.25	54.25	1.13	1.38
542	54.25	1.38	60.00	1.25	1.56

Maintenance (refer to safety section)

Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations and experienced with this type of equipment. Preventive maintenance is the best way to avoid unnecessary expense and inconvenience. Start-up and routine maintenance should cover the following items:

a. Tighten all set screws, bolts and wire connections.

b. Check belt tension and sheaves for wear.

c. Lubricate fan bearings (see tables below).

d. Cleaning of unit, impeller and damper (if present).

All motors containing ball bearings are permanently lubricated from the factory. No additional maintenance is required.

CAUTION

1. **Sharp edges and screws are a potential injury hazard. Avoid them.**
2. **Greases of different soap bases (lithium, sodium, etc.) may not be compatible when mixed. Prevent such intermixing by completely purging the bearing of old greases.**

WARNING

Hazardous moving parts. Unit may contain protected fan motor that may start automatically and cause injury. Allow time for reset. Disconnect power before servicing.

Suggested Fan Bearing Greasing Intervals

INTERVAL (MONTHS)	TYPE OF SERVICE
12 to 18	Infrequent operation or light duty in clean atmosphere.
6 to 12	8 to 16 hrs./day in clean, relatively dry atmosphere.
3 to 6	12 to 24 hrs./day, heavy duty or if moisture is present.
1 to 3	Heavy duty in dirty, dusty locations; high ambient temperatures; moisture laden atmosphere; vibration.

Grease Manufacturers

MANUFACTURER	GREASE (NLGI #2)
Shell	Gadus S2 V100 2 or equivalent
Exxon/Mobil	Ronex MP

1. Before performing any maintenance on the fan, be sure power is turned off and locked in the OFF position at the service entrance.
2. Ventilators should be carefully checked at least once a year. For critical or rugged applications, a routine check every two or three months is suggested.
3. All motors supplied with Twin City Fan ventilators carry a one-year limited warranty from date of shipment. For repairs within the warranty period, the motor must be taken to the motor manufacturer's authorized service dealer. Contact your representative for additional warranty details.
4. A periodic motor check should consist of spinning the motor shaft with the power off to be sure the motor turns freely and the bearings run smoothly. The belt on belt driven units should be removed from the motor sheave.
5. When removing or installing a belt, do not force the belt over the sheave. Loosen the motor mount so that the belt can be easily slipped over the sheave.
6. The belt on belt driven units should be removed and carefully checked for glazing, cracks, ply separation or irregular wear. A small irregularity in the contact surface of the belt will result in noisy operation. If any of these defects are apparent, the belt should be replaced. Check the sheaves also for chipping, dents or rough surfaces that could damage the belt.
7. The correct belt tension is important. Too tight of a belt will result in excess bearing pressure on the motor bearings and shaft pillow blocks and may also overload the motor. Too loose of a belt will result in slippage, which will quickly "burn" out belts. A belt should feel "live" when thumped, approximately ¼" belt deflection (3 to 5 lb.) when subject to finger pressure at midpoint between sheaves.
8. The belt alignment should also be checked to be sure the belt is running perpendicularly to the rotating shafts. Fan and motor shafts must be parallel. Improper alignment will result in excessive belt wear.
9. Check sheave set screws to ensure tightness. Proper keys must be in keyways.
10. Do not readjust fan RPM. If sheaves are replaced, use only sheaves of identical size and type.
11. If unit is to be left idle for an extended period, it is recommended that belts be removed and stored in a cool, dry place to avoid premature belt failure.

Maintenance (continued)

12. The standard pillow block bearings on belt driven ventilators are factory lubricated and are provided with external grease fittings. Lubrication annually is recommended or more frequently if needed (see Greasing Intervals table).

    It is recommended to add fresh grease at start-up, but do not over-grease. Use only 1 or 2 shots of a recommended lubricant with a hand gun in most cases (see Grease Manufacturers table). Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits.

    The most frequent causes of bearing failure are not greasing often enough, using an excessive quantity of grease or using incompatible greases. Excessive vibration, especially if the bearing is not rotating, will also cause bearings to fail. Bearings must also be protected from water and moisture to avoid internal corrosion.
13. During the first few months of operation it is recommended that the bearing set screws be checked periodically to ensure that they are tight.
14. The rotating impeller requires particular attention since materials in the air being handled can build up on the blades to cause destructive vibration or weaken the structure of the impeller by corroding and/or eroding the blade metal. Regular inspection and corrective action at intervals determined by the severity of each application are essential to good service life and safety.

Motor Maintenance

The three basic rules of motor maintenance are:

1. Keep the motor clean.
2. Keep the motor dry.
3. Keep the motor properly lubricated.

Blow dust off periodically (with low pressure air) to prevent motor from overheating.

Motor Lubrication Schedule

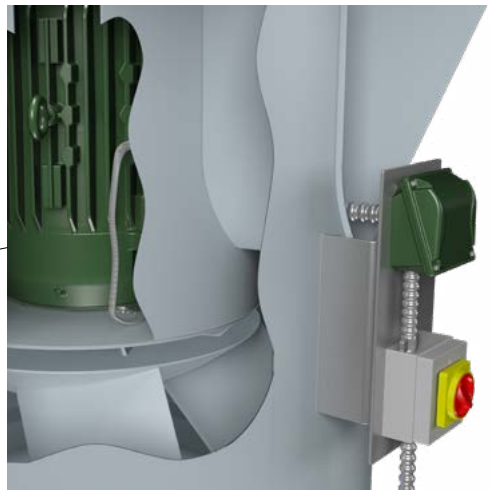
Motors Less than 10HP Running 8 Hrs/Day (clean environments)	Motors Between 15-40HP (clean environments)	Motors Running 24/7 or if in dirty/dusty environments
Lube every 5 Years	Lube every 3 years	Divide the service interval by 4

Do not over lubricate.

Some smaller motors are lubricated for life. Lubrication requirements are normally attached to the motor. Use the motor manufacturer's recommendations for relubrication. Often motor lubricants are not the same as the fan bearings. If this information is not available, the Motor Lubrication Schedule may be used. Motors less than 10 HP running about eight hours a day in a clean environment should be lubricated once every five years; motors 15 to 40 HP, every three years. For motors in dusty or dirty environments or running 24 hours a day: divide the service interval by 4. Do not over lubricate.

Shaft grounding rings are recommended for some VFD applications. If the motor is equipped with a shaft grounding ring a yearly inspection for wear and shaft corrosion is recommended. Replace the ring if it is making minimal contact with the shaft. If corrosion is present, treat the shaft with colloidal silver per the ring manufacturer's instructions.

Motor Grounding Detail (TVIFE Only)



Close-up of motor, grounded and wired to the motor junction box and disconnect switch (optional).

Fan Bearing Maintenance (refer to safety section)

Proper lubrication of the fan drive bearings helps assure maximum bearing life. All fans are equipped with decals indicating the recommended relubrication intervals for normal operating conditions. **Refer to the Safety & Bearing Lubrication Instructions section for the lubrication schedule.** Note that all speeds shown do not apply to all shaft sizes in that group. Consult the factory if in doubt of maximum speed for a particular bearing. Note that every installation is different and the frequency of relubrication should be adjusted accordingly. On high moisture applications, the lubrication frequency may need to be doubled or tripled to adequately protect the bearings. Double the relubrication frequency on fans with vertical shafts. Observation of the conditions of the grease expelled from the bearings at the time of relubrication is the best guide as to whether regreasing intervals and mount of grease added should be altered.

Greases are made with different bases. There are synthetic base greases, lithium base, sodium base, polyurea, etc. Avoid mixing greases with different bases. They could be incompatible and result in rapid deterioration or breakdown of the grease. The lubrication sticker identifies a list of acceptable lubricants. All bearings are filled with a lithium complex grease before leaving the factory. When the fans are started, the bearings may discharge excess grease through the labrinth seals for a short period of time. Do not replace the initial discharge because leakage will cease when the excess grease has worked out. Sometimes the bearings have a tendency to run hotter during this period. This is no reason for alarm unless it lasts over 48 hours or temperatures exceed 200°F. When relubricating, use a sufficient amount of grease to purge the seals. Rotate bearings by hand during relubrication. If extended lubrication lines are fitted, lubricate the bearings while the fan is operating if it is safe to do so.

Impeller and Shaft Maintenance (refer to safety section)

Periodically inspect the shaft and impeller for dirt buildup, corrosion and signs of excess stress or fatigue. Clean the components. If the impeller is removed for any reason, make sure that it is securely attached to the shaft before restarting the fan.

Structural Maintenance (refer to safety section)

All structural components or devices used to support or attach the fan to a structure should be checked at regular intervals. Vibration isolators, bolts, foundations, etc., are all subject to failure from corrosion, erosion and other causes. Improper mounting can lead to poor operation characteristics or fan fatigue and failure. Check metallic components for corrosion, cracks or other signs of stress. Concrete should be checked to insure the structural integrity of the foundation.

Duct Connections

(refer to safety section)

The fan support structure is normally not designed to carry loads imposed by the weight of ducts, silencers, stacks, etc. Supporting these loads on the fan can cause housing distortion and may cause performance or vibration problems. Use of flexible connections is recommended for all fans and imperative when using vibration isolation or handling high temperature gases.

TCF
Twin City Fan

Drive Maintenance (refer to safety section)

V-belt drives need periodic inspection, retensioning and occasional belt replacement. When inspecting drives, look for dirt buildup, burrs or obstructions that can cause premature belt or drive replacement. If burrs are found, use fine emery cloth or a stone to remove them. Be careful that dust does not enter the bearings.

WARNING

When working around belts and pulleys, keep hands away from pinch points.

Check sheaves for wear. Excessive slippage of belts on sheaves can cause wear and vibration. Replace worn sheaves with new ones. Carefully align sheaves to avoid premature sheave failure. If fraying or other wear is observed to be mostly on one side of the belts, the drives may be misaligned. Realign and reinstall new belts. Tighten sheave bolts (or set screws if appropriate).

When replacing belts, replace the entire set. Never use belt dressing on any belts, as it may cause belt wear.

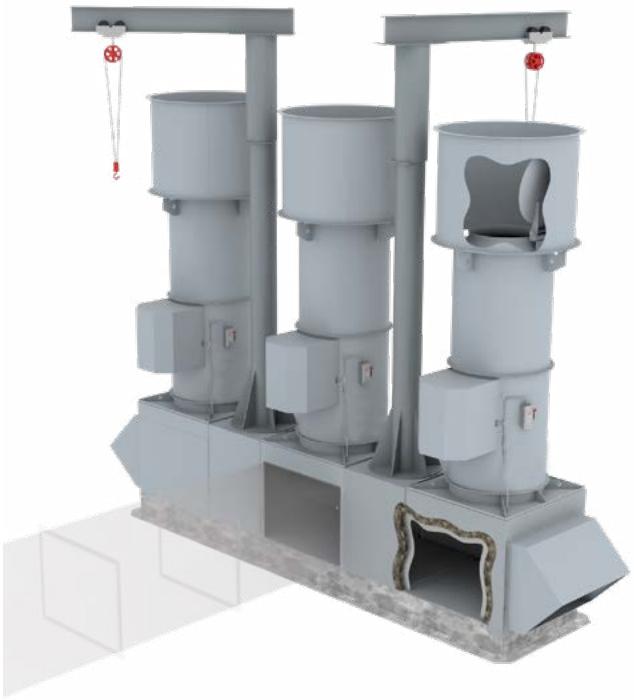
Motor Change-Out and Jib Crane

Designed to handle the weight of the heaviest individual component. The mount is connected to the specially reinforced mixing box spacer mixing box structure. Single and double mixing boxes receive one (1) jib crane. 3x1 and 4x1 configurations receive two (2) jib cranes.

WARNING

Be aware of your surroundings as fan components can be heavy.

Motor Change-Out Procedure (Direct Drive Fans)
Twin City Fan Model TVIFE is available with a portable jib crane option for use in removing the motor. The jib crane mounts directly to a fabricated base that is built into the mixing plenum box. When using a jib crane verify that it is not being used to lift loads that are greater than its design capacity.



To remove the motor:
Attach the jib crane to the mounting bracket on the mixing plenum box, verify that all attachments are properly tightened and that there are no cracks and no damage on the crane or mounting bracket.

Position the jib crane above the windband of the fan and rig the crane cable to the lifting brackets on the windband itself. Wind in cable until all lines are taught. Remove all bolts securing the windband to the fan assembly itself. Lift the windband off of the fan assembly and lower it to the roof top.

Position the jib crane above the fan housing and again rig the crane cable to the lifting brackets on the fan housing and tighten the cable. Remove all bolts holding the fan housing to mounting bracket on the mixing box or curb cap. Lift the fan housing and lower it to the roof top. Loosen and remove impeller from motor shaft. Loosen and remove bolts holding motor to fan housing and remove motor.

Install new motor:
Attach motor to fan housing, make sure all bolts are sufficiently tightened. Attach impeller to motor shaft and tighten. Using jib crane, lift impeller and housing assembly by mounting brackets back onto mixing box/curb cap. Carefully lower housing assembly onto box. Verify impeller and funnel are overlapping correctly. Bolt housing assembly to mixing plenum box/ curb cap. Lift windband by lifting lugs and align with bolt holes on top of fan assembly. Bolt windband to fan assembly.

TCF Twin City Fan

Troubleshooting Guidelines

Use current safety practices when investigating fan or system performance problems. General safe practices and performance troubleshooting guidelines can be found in AMCA Publications 410 and 202, respectively. Fan application and field measurement procedures can be found in AMCA Publications 201 and 203.

Below is a list of possible areas to check when air or sound values do not match expectations. Most fan problems can be pinpointed to one of these common causes.

Air Capacity Problems

1. Resistance of the system is not at design rating. If resistance is lower than expected, both airflow and horsepower may be up. If resistance is higher than anticipated, air volume will be down.
2. Fan speed is not at design speed.
3. Air density is not at the design value. Also check air performance measurement techniques/procedures.
4. Devices for air modulation are closed or plugged. Also check filters.
5. Impeller mounted improperly or is rotating in reverse.
6. Parts of the system or fan have been damaged or need cleaning.

Noise Problems

1. Air performance is incorrect and the fan is not at design point of operation. Fan is being forced to operate in an unstable flow region near peak or to the left of the peak of the curve.
2. Bearing failure. Check bearings (lubrication).
3. Supply voltage high or inconsistent supply frequency. Adjustable frequency controllers can generate motor noise.
4. Objects that are installed in a high velocity airstream can generate noise. This includes flow sensors, turning vanes, etc.
5. Poor fan inlet conditions.
6. Acoustics or sound measurement procedure incorrect.

Vibration Problems

1. Misalignment of drive components. Check belt or coupling.
2. Poor foundation or mounting structure (resonances).
3. Foreign material attached to rotating components.
4. Damaged rotating components (bearings, shaft, fan, impeller, sheaves).
5. Broken, loose or missing set screws.
6. Loose bolts.
7. Vibration transmitted by another source.
8. Water accumulating in airfoil blades.
9. Fan is operating in stall or unstable flow region.

Vibration Guidelines

Condition	Fan Application Category	Rigidly Mounted mm/s (in./s)	Flexibly Mounted mm/s (in./s)
Start-up	BV-3	6.4 (0.25)	8.8 (0.35)
	BV-4	4.1 (0.16)	6.4 (0.25)
Alarm	BV-3	10.2 (0.40)	16.5 (0.65)
	BV-4	6.4 (0.25)	10.2 (0.40)
Shutdown	BV-3	12.7 (0.50)	17.8 (0.70)
	BV-4	10.2 (0.40)	15.2 (0.60)

Values shown are peak velocity, mm/s (inches/s), Filter out. Table taken from ANSI/AMCA Standard 204-05, Table 6.3. AMCA defines BV-3 for applications up to 400 HP; BV-4 for applications over 400 HP.

NOTICE

Most fans manufactured by Twin City Fan & Blower are factory balanced prior to shipment. Certain high horsepower, large or unusual voltage fans, may not be run as an assembly due to power constraints, however the rotors have been dynamically balanced. Installation variables, handling and movement of the fan during shipment may cause the rotating assembly to shift. Balance should be checked once the fan is installed. If a final trim balance is required, it is the end user's responsibility to bring the fan back to factory specifications. Final trim balancing is not the responsibility of Twin City Fan & Blower. Refer to the *Vibration Guidelines* table below.

Motor Problems

1. Incorrect wiring.
2. Speed of fan too high.
3. Parts improperly installed; binding.
4. Bearings improperly lubricated.
5. WR^2 capability of motor too low for application.
6. Protection devices may be improperly sized.
7. VFD compatible electrically? Effective shaft grounding?
8. Is cabling and grounding correct?

Drive Problems

1. Belts improperly tensioned.
2. Drive alignment is poor. Check belt or coupling.

Bearing Problems

Generally speaking, Twin City Fan uses three types of bearings:

1. Ball bearing with set screw lock.
2. Spherical roller bearings with set screw lock.
3. Spherical roller bearings with adapter lock/taper lock feature to attach them to the shaft.

Ball Bearings – These are self-aligning bearings and should present no alignment problems with one exception: i.e., on Sealmaster bearings there is a pin beneath the grease fitting that prevents the bearings outer race from rotating. Should this pin jam, the bearing loses its alignment feature. Common failure causes are (1) set screws loosening and shaft turning within the bearing and (2) crowned bearing supports. Loosen one bolt and measure the clearance between the pillow block and the support. Add shim to compensate.

Spherical Roller Bearings with Set Screw Lock – The self-aligning characteristic of these bearings are inherent in the spherical roller design. The closer that these bearings are to perfect alignment, the cooler they will operate. Common failure causes are the same as with ball bearings, mainly set screws loosening and crowned bearing supports.

Spherical Roller Bearings with Adapter Lock – Again, the self-aligning feature is inherent in the spherical design. Good alignment results in a cooler operating bearing. The faster the bearing operates the more critical this becomes. A common cause of failure is improper installation practice. Removing too much clearance from the bearing can result in preloading the bearing, resulting in premature failure; and removing not enough can result in the shaft rotating within the bearing. Properly tightened, this method of attaching a bearing to a shaft is second only to a press fit. Crowned bearing supports can also preload these bearings and should be checked by loosening one side of the bearing and checking for clearance.

Troubleshooting Guidelines (continued)

Lubrication – The major cause of bearing failure is contamination of grease, insufficient grease or incompatibility of grease. If a fan is to be stored for any length of time at the job site, the bearings immediately should be filled with grease while rotating the shaft and then the bearings should be regreased and rotated monthly. This will prevent moisture, which condenses within the bearing, from corroding the raceways. Most greases used on fan pillow blocks are lithium base. Use the greases shown on the bearing decal. Do not mix the bases without completely purging out the initial grease.

Initially, follow the lubrication instruction on the side of the fan. The frequency of lubrication should be adjusted depending on the condition of the old grease being purged. This is the responsibility of the user. If the grease is dirty, the lubrication frequency should be more often.

a. Noise – If a bearing is increasing in noise intensity and/or vibration, it will probably result in failure.
b. Temperature – If a bearing temperature begins to gradually rise, it will generally result in failure. A bearing can operate up to 200° and operate satisfactorily if the temperature remains constant and the bearing receives adequate lubrication. Remember that a roller bearing under the same load and speed will be somewhat more noisy and run warmer than a ball bearing. This is normal.

Rough handling and/or dropping a fan can result in brinelling the bearing. This appears as a clicking noise at first, then gradually worsens until failure.

When replacing a bearing, always align the bearings first, then bolt the pillow blocks to their support, rotate the shaft, fasten the bearings to it. If the bearing is fastened to the shaft first, tightening the pillow block bolts may bind the shaft and preload the bearings.

TCF
TWIN CITY FAN

Installation/Start-up Checklist

Become familiar with the equipment by looking at the fan assembly drawing for special instructions and accessories.

Initial Fan Check

- ☐ Inspect fan for damage
- ☐ Check foundation, prepare for shims
- ☐ Level the fan
- ☐ Check bolt tightness
- ☐ Check to see if the fan is distorted by the foundation and/or ductwork
  Note: Applies to direct or isolation mount.
- ☐ Check fan interior for debris and standing water

Fan Impeller

- ☐ Impeller clearance checked
- ☐ Impeller overlap checked
- ☐ Fasteners tight
- ☐ Impeller rotates freely

Springs (if equipped)

- ☐ Springs adjusted properly
- ☐ Flex joints allow movement
- ☐ Electrical conduit allows movement

Bearings

- ☐ Bearings aligned
- ☐ Bearings greased
  Note: Rotate while greasing
- ☐ Set screws tight (if equipped)

Lube Lines

- ☐ Lube lines have been charged with grease prior to connecting to bearings

V-Belts (if equipped)

- ☐ V-belt drives aligned
- ☐ Sheaves retightened
- ☐ Belt tension correct
- ☐ Motor bolts retightened

Couplings (if equipped)

- ☐ Coupling aligned
- ☐ Coupling gap checked
- ☐ Coupling lubricated

Accessories

- ☐ Guards installed correctly, do not rub
- ☐ VIV/damper rotates freely (if equipped)
- ☐ Other accessories per drawing

WARNING

Verify that proper safety precautions have been followed. Electrical power must be locked off.

Electrical Components

- ☐ Motor wired for proper voltage and starter
- ☐ Motor grounded
- ☐ Appropriate starter and heaters
- ☐ Leads are properly insulated
- ☐ Accessories wired per instructions supplied

Energize

- ☐ Energize motor long enough to start assembly rotating, shut down
- ☐ Verify direction of impeller rotation, rewire if necessary *Note: Refer to Impeller Rotation section*
- ☐ Run the fan up to speed
- ☐ Check for excess vibration and listen for unusual noise. Refer to the *Vibration Guidelines* table in the *Troubleshooting Guidelines* section for vibration limits.
- ☐ Proceed to grout
- ☐ Bearing temperatures should stabilize after a few hours. Less than 200°F
  Note: Use sense of smell to identify possible electrical, belt issues.

After one Week

- ☐ Verify bolt tightness
- ☐ Verify belt tension and adjust as necessary

NOTICE

Always observe site specific and regulatory safety precautions.

Serial Number: _____

Completed By: _____

Date Completed: _____

TCF Twin City Fan

Fan Maintenance Log

Model Number_____

Serial Number _____

Date	Completed Maintenance	Performed By	Comments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5959 Trenton Lane N | Minneapolis, MN 55442 | Phone: 763-551-7600 | Fax: 763-551-7601