CE Compliant Vane Axial Fan Installation and Operation

Owner's Manual - Original Instructions

PNEG-010CE

Version: 3.0

Date: 10-24-19

PNEG-010CE

Fan Check List

1. All wire connections.
2. Tip clearance on blade.
3. Fan blade torqued to torque specs.
4. Grill guard in place and tight.
5. Fuse in place, extra fuse provided.
6. Motor rotation correct.
7. Contactor engages properly.
8. Running amperage.
9. Vibration.
10. All fasteners tight.
11. Indicator light.
12. All decals and serial number tag.
13. Aesthetic appearance.
14. Manual.

Tester Signature: _____

Date: _____

Record in the space provided below the Model # and Serial # of this product. These numbers are found on the Model and Serial Tags located on the outside of the unit.

Model #: _____

Serial #: _____

Keep these numbers for future reference.

GSI GROUP

CE Declaration of Incorporation
EC MACHINERY DIRECTIVE 2006/42/EC

1004 East Illinois Street, Assumption, IL, 62510, USA

+1 217 226 4429

The GSI Group declares that

GSI Vane Axial Fans

Ref #	Description
AF-1.5-6G	Fan: 18" 1-1/2 HP 3 Phase 380V
AF-1.5-7G	Fan: 18" 1-1/2 HP 3 Phase 415V
AF-10-6G	Fan: 24" 10 HP 3 Phase 380V
AF-10-7G	Fan: 24" 10 HP 3 Phase 415V
AF-12-6G	Fan: 12" 1 HP 3 Phase 380V
AF-12-7G	Fan: 12" 1 HP 3 Phase 415V
AF-14-6G	Fan: 14" 1 HP 3 Phase 380V
AF-14-7G	Fan: 14" 1 HP 3 Phase 415V
AF-158-6G	Fan: 28" 15 HP 3 Phase 380V
AF-158-7G	Fan: 28" 15 HP 3 Phase 415V
AF-3-6G	Fan: 18" 3 HP 3 Phase 380V
AF-3-7G	Fan: 18" 3 HP 3 Phase 415V
AF-7-6G	Fan: 24" 7 HP 3 Phase 380V
AF-7-7G	Fan: 24" 7 HP 3 Phase 415V

Meet the following clauses of the Essential Requirements of the Machinery Directive 2006/42/EC.

1.1.2 and sub-clauses principles of safety integration

1.3.2 Risk of break-up during operation

1.3.7 Risk related to moving parts

1.3.8 Choice of protection against risks arising from moving parts

1.3.8.1 Moving transmission parts

1.3.8.2 Moving parts involved in the process *(Installer has responsibility to ensure complete compliance with this clause, as per manual.)*

1.3.9 Risks of uncontrolled movements

1.4 Required characteristics of guards and protective devices

1.4.1 General requirements

1.4.2 Special requirements for guards

1.4.2.1 Fixed guards

1.5.4 Errors of fitting

1.5.5 Extreme temperatures

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1.5.6 Fire

1.5.7 Explosion

1.5.8 Noise

1.5.9 Vibrations

1.5.13 Emissions of hazardous materials and substances

1.6 Maintenance

1.6.1 Machinery maintenance

1.6.4 Operator intervention

1.7 Information

1.7.1 Information and warnings on the machinery

1.7.1.1 Information and information devices

1.7.2 Warning of residual risks

1.7.4 Instructions

1.7.4.1 General principles for the drafting of instructions

1.7.4.2 Contents of the instructions but not inclusive of sub-clause (u)

1.7.4.3 Sales literature

This declaration applies only to the mechanical elements of the above machines and does not imply conformity by any other items of equipment fitted to or connected with the above machines. The equipment above must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of all relevant Directives, nor until these components have been assembled in the manner recommended in the manufacturers instructions.

Signed :

Name: F. G. Ward

Digitally signed by Frank Ward
DN: cn=Frank Ward, o=GSI EAME Kft, ou=GSI, email=fward@gsiag.com, c=GB
Date: 2019.11.13 09:43:02 Z

Date:

Contents

1. Introduction

READ THIS MANUAL carefully to learn how to properly use and install equipment. Failure to do so could result in personal injury or equipment damage.

INSPECT the shipment immediately upon arrival. The customer is responsible for ensuring that all quantities are correct. The customer should report and note any damage or shortage on the bill of lading to justify their claim to the transport company.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your equipment and should be easily accessible when needed.

This warranty provides you the assurance that the company will back its products when defects appear within the warranty period. In some circumstances, the company also provides field improvements, often without charge to the customer, even if the product is out of warranty. Should the equipment be abused, or modified to change its performance beyond the factory specifications, the warranty will become void and field improvements may be denied.

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Read and save these instructions.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001-4

Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

DANGER This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**

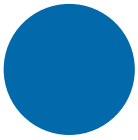
WARNING This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**

CAUTION This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**

NOTICE This symbol is used to address practices not related to personal injury.

This symbol indicates a general hazard.

This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.

ST-0002-1

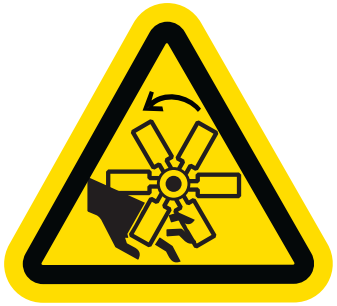
Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts.
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.

ST-0003-1

Keep Hands Away from Moving Parts

- Do not operate the fan with electrical or mechanical guards removed. Serious injury or death can result.
- Do not put hand or arm in fan. Rotating parts can crush and dismember.
- Do not put any kind of tool inside the fan to clear debris while the fan is operating. Damage to the equipment will result.
- Lock-out power source before making adjustments, cleaning or maintaining equipment.



ST-0020-2

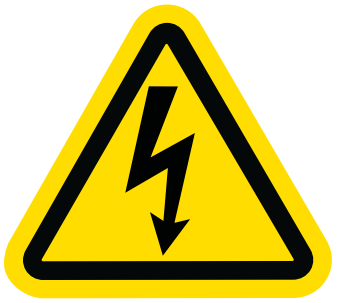
Lifting Hazard

- Single person lift can cause injury.
- Use a mechanical lifting device to lift or move the equipment during installation.

ST-0021-2

Install and Operate Electrical Equipment Properly

- Electrical controls must be installed by a qualified electrician and must meet the standards set by applicable local codes (National Electrical Code for the US, Canadian Electric Code, or EN60204 along with applicable European Directives for Europe).
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Make sure all equipment and bins are properly grounded.



ST-0075-1

Prevent Roof Damage Due to Vacuum Pressure

- Roof damage can result from excessive vacuum or internal pressure from fans or other air moving systems. The manufacturer does not warrant this type of roof damage.
- Adequate ventilation or “makeup air” devices should be provided for all powered air handling systems.
- The manufacturer does not recommend the use of downward flow systems (suction).
- Severe roof damage can result from any blockage of air passages.
- Operating fans during high humidity or cold weather conditions can cause air exhaust or intake ports to freeze.

ST-0028-2

Sharp Edge Hazard

- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment.

ST-0036-2

Handle and Use Equipment Properly

- Equipment is intended for the use of grain drying only. Any other use is a misuse of this equipment.
- The operating instructions in this manual pertain to the common cereal grains as indicated. When drying any other grain, contact GSI for additional recommendations.
- On LP fired units, set pressure regulator to avoid excessive gas pressure applied to the burner during ignition and operation. Do not exceed maximum recommended drying temperatures.
- Equipment has sharp edges that may cause serious injury. To avoid injury, handle sharp edges with caution and use proper protective clothing and equipment at all times.
- All guards must be in place before and during operation. Images of guards removed in this manual are for illustration purposes only.
- Use caution when working around high-speed fans, gas burners, augers and auxiliary conveyors which can start automatically.
- Keep hands, feet and clothing away from moving parts.
- Do not bypass any safety device or interlock.
- Do not enter the dryer or bin while it is operating.
- Do not operate in an area where combustible material will be drawn into the dryer.

ST-0029-2

Minimum Safety Requirements

Incorrect use of fans can be extremely dangerous. Rotating impellers and shafts can cause serious injury and kill.

Correct Use

1. The fan is for ventilating whole agricultural seeds and grains inside a grain bin or other grain store. Any other use is prohibited and may result in injury or equipment damage.
2. These fans are to be permanently installed and are not designed to be portable.
3. The outlet of the fan is supplied unguarded, being designed to be directly coupled to a transition duct, eliminating scope for personnel access. Never operate the fan with the outlet exposed.
4. If the fan is fitted to a duct into which personnel have access, the user has responsibility to supply and fit an outlet guard, which comprises the same part number as the inlet guard, available through GSI or your dealer.
5. The installer and operator have responsibility to ensure the final installation is in accordance with all the safety requirements outlined in this manual and fulfils the Essential Requirements of the Machinery Directive 2006/42/EC.
6. Never use the fan with any guards removed.
7. Never enter the grain bin or store unless the power supply to the fan and all other equipment is OFF, TAGGED and LOCKED. *(See Figure 2A.)*

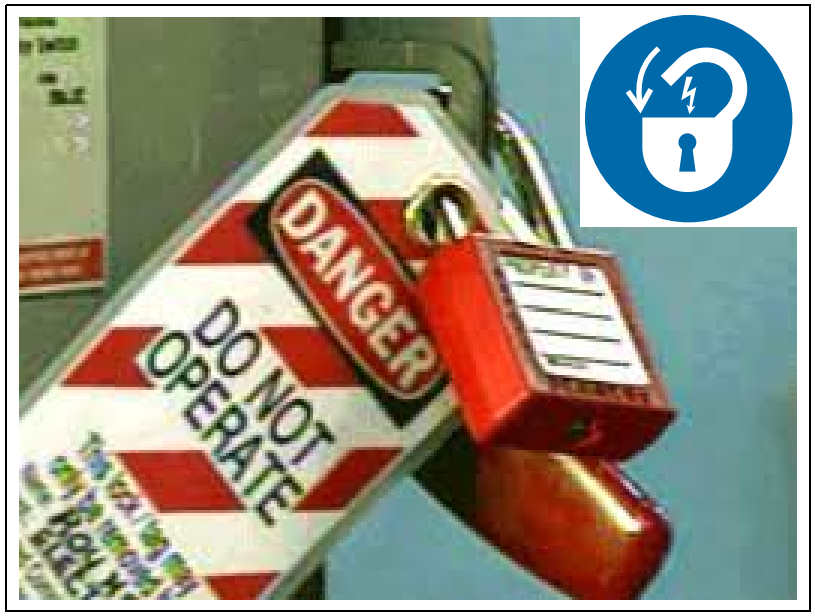


Figure 2A

8. Never allow an untrained person less or one less than 18 years old to operate the fan.
9. Never allow someone under the influence of alcohol or drugs to operate the equipment.
10. Never modify the fan from it's original specification.
11. The inlet to the fan generates suction. Never work around the inlet to the fan when it is running. Keep loose hair tied back and avoid loose clothing.

Electrical Safety Equipment

Please refer to *Chapter 5 on Page 23* for electrical control requirements.

1. All electrical installation and design must be carried out by a qualified electrical engineer and in accordance with EU Directives and standards and in accordance with local laws and codes.
2. The electrical supply must include a properly designed protective earth system (PE).
3. The motor must be connected to protective earth at the terminal provided.
4. The control system must include short circuit protection and over current protection.
5. It is recommended to provide earth leakage protection, such as residual current device (RCD) or residual current circuit breaker (RCCB) to provide automatic disconnection from the power in the event of a fault.

Sound

1. Sound levels generated by the fans can be harmful to hearing.
2. Never work around a fan whilst it is running.
3. If you need to be around the fan whilst it is running, wear suitable ear defenders.

Safe Maintenance

1. The fan must always be LOCKED off to prevent inadvertent re-start when undertaking any maintenance.
2. Even when off, the fan wheel can free-wheel under air movement from outside or other fans attached to the same air space. To prevent injury, use a piece of timber to choc the wheel.
3. Remove wheel choc and replace all guards before re-starting.

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

Date	*Employee Name*	*Supervisor Name*

ST-0007

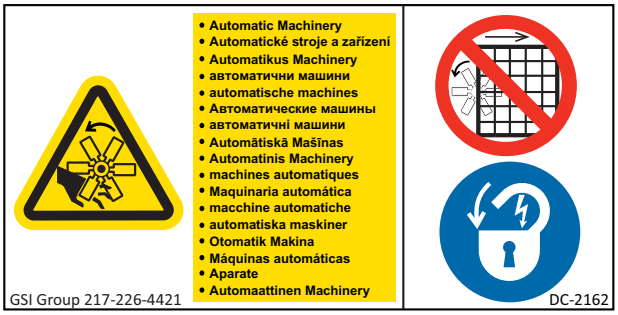
Below are the safety warning decals that should be fitted to the fan. These warn of residual risks and required safety measures and must remain intact, legible at all times. If any decals have become damaged or unreadable, please contact GSI or your dealer for free replacements.

International Decals

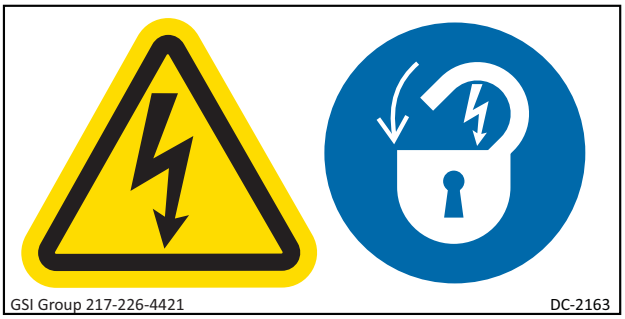
International, translated versions of the decals fitted to the equipment are available as part of the Language Pack that was supplied with the product. If you need further copies or a different language, please contact GSI or you dealer.

The international decals have been designed to be placed directly over the USA standard versions. Normally these will be factory fitted, but if you need to change them, please refer to the decal cross reference sheet, provided with the Language Pack and the decal locations given in the user's manual.

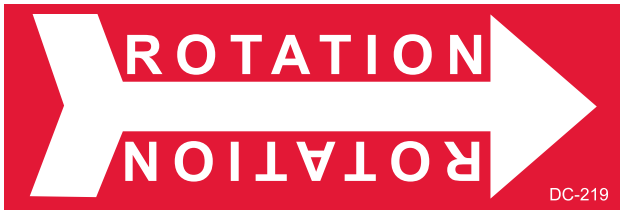
DC-2166



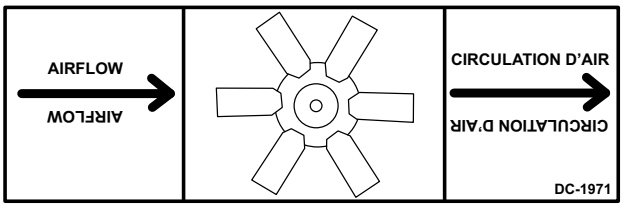
DC-2162



DC-2163



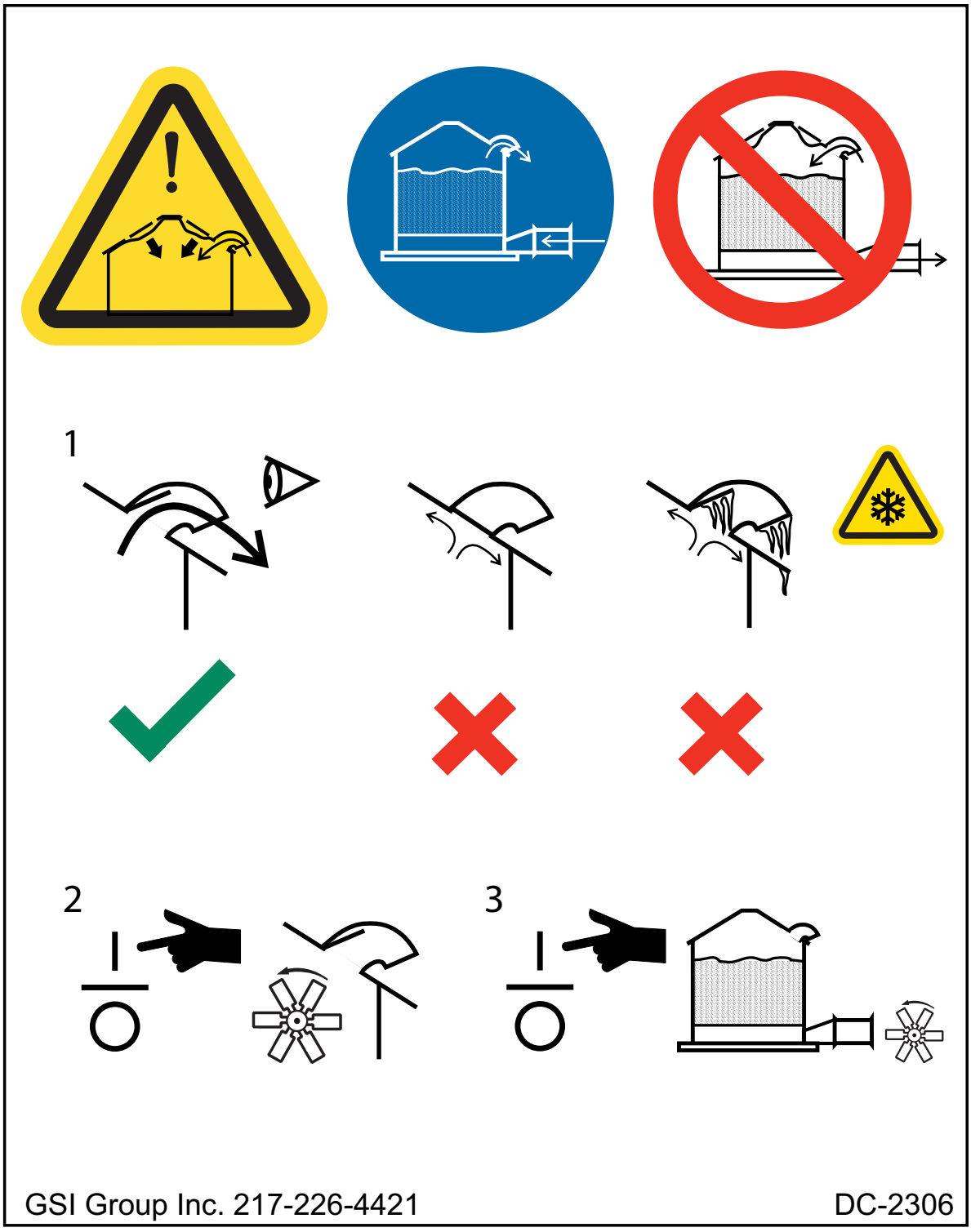
DC-219



DC-1971

Roof Damage Warning and Disclaimer

The manufacturer does not warrant any roof damage caused by excessive vacuum or internal pressure from fans or other air moving systems. Adequate ventilation and/or “makeup air” devices should be provided for all powered air handling systems. The manufacturer does not recommend the use of downward flow systems (suction). Severe roof damage can result from any blockage of air passages. Running fans during high humidity/cold weather conditions can cause air exhaust or intake ports to freeze.



Airflow

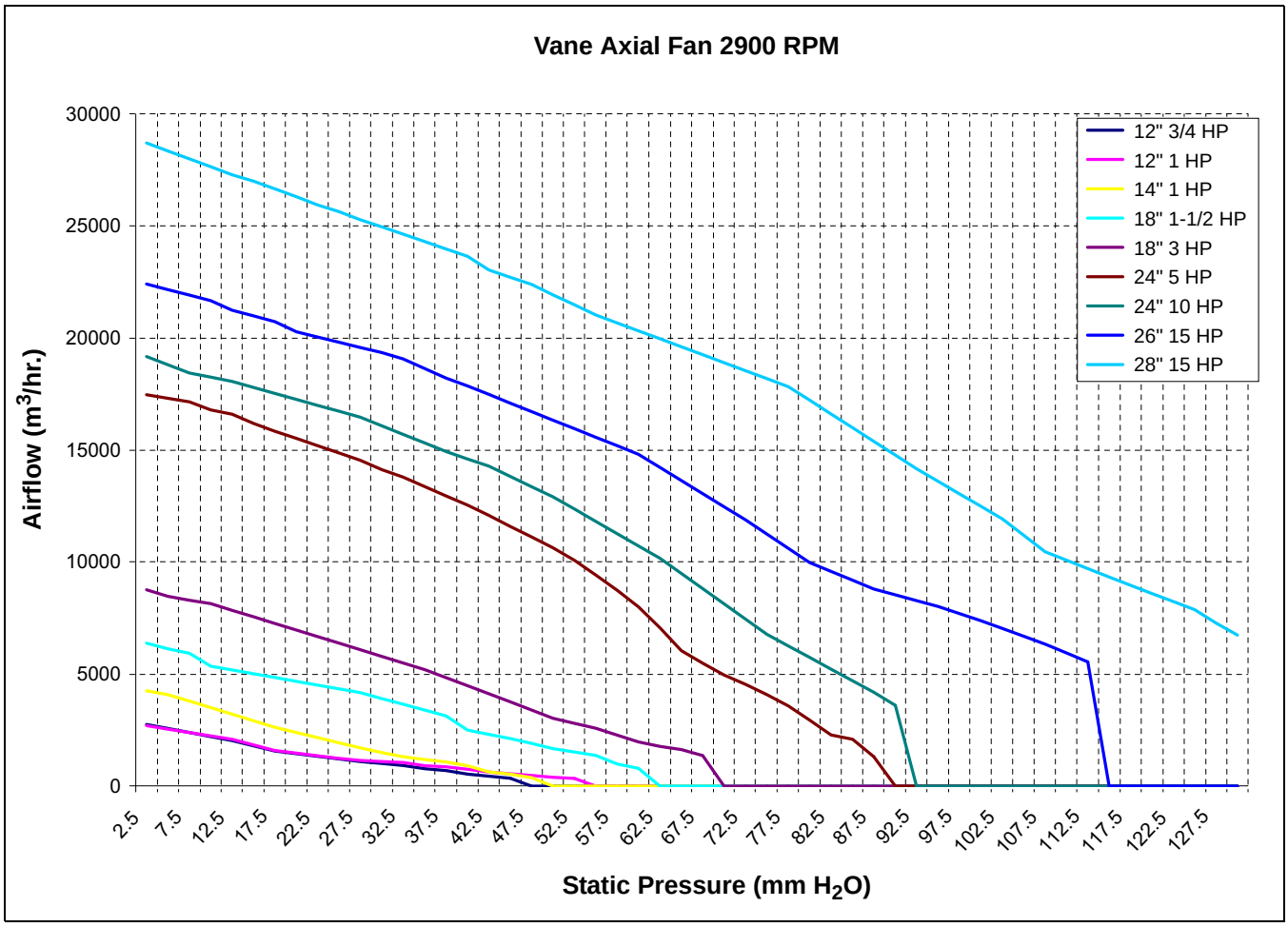


Figure 4A *Vane Axial Fan Performance*

Sound

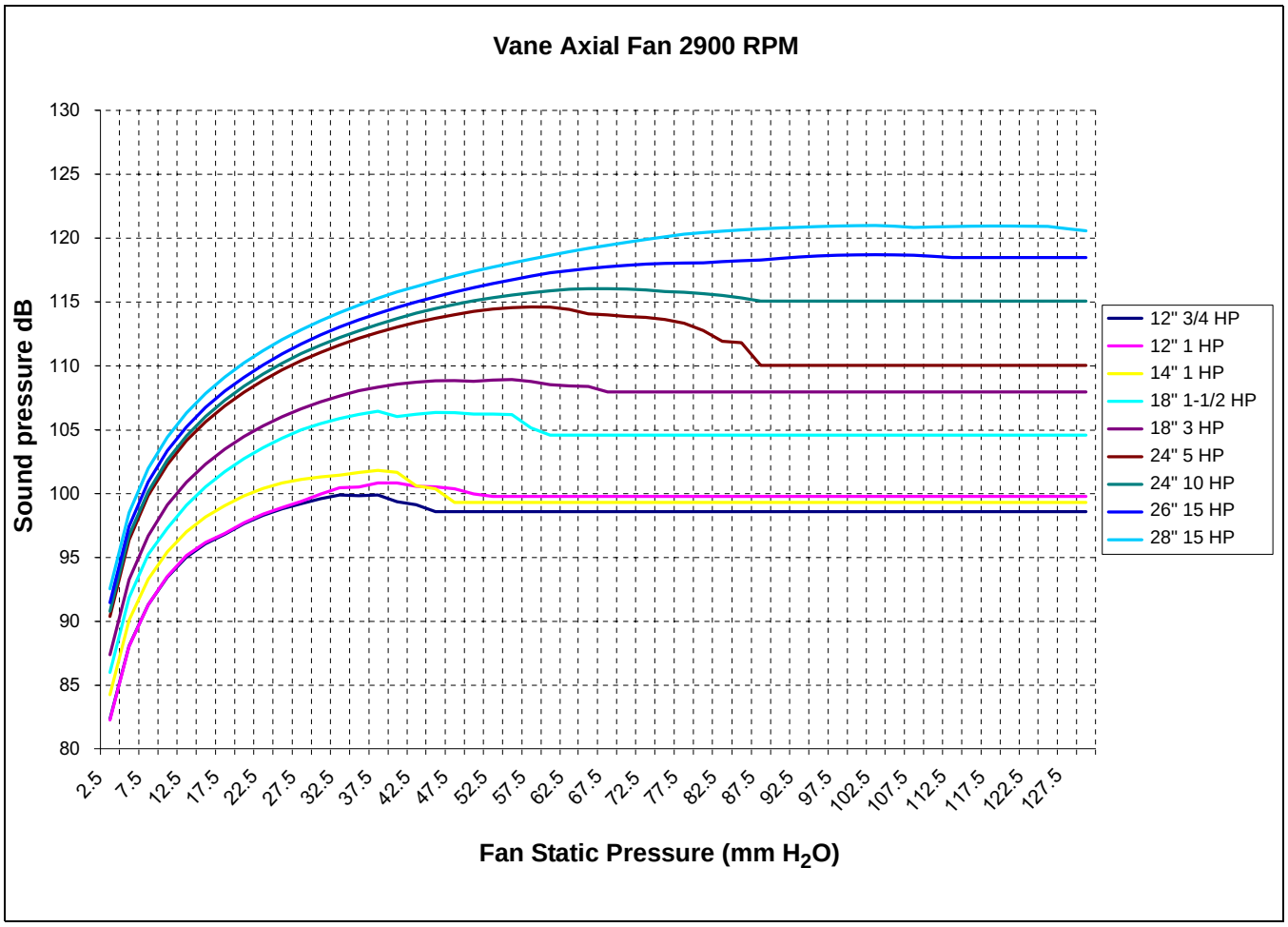


Figure 4B *Centrifugal Fan Sound Curves (Calculated with Open Outlet)*

Use the table *below* to determine the number of GSI roof vents (0.16 m^2 free area). Also minimum inlet area, for fans enclosed in a fan house:

Minimum GSI Roof Vents per Fan

Fan Model	Maximum Airflow (m^3/s)	Minimum Number of Roof Vents	Minimum Inlet Area (m^2)
12" 3/4 HP	0.77	1	0.1
12" 1 HP	0.75	1	0.1
14" 1 HP	1.19	2	0.2
18" 1-1/2 HP	1.78	3	0.3
18" 3 HP	2.44	4	0.4
24" 5 HP	4.86	7	0.7
24" 10 HP	5.33	7	0.7
26" 15 HP	6.23	8	0.8
28" 15 HP	7.98	10	1

Dimensions

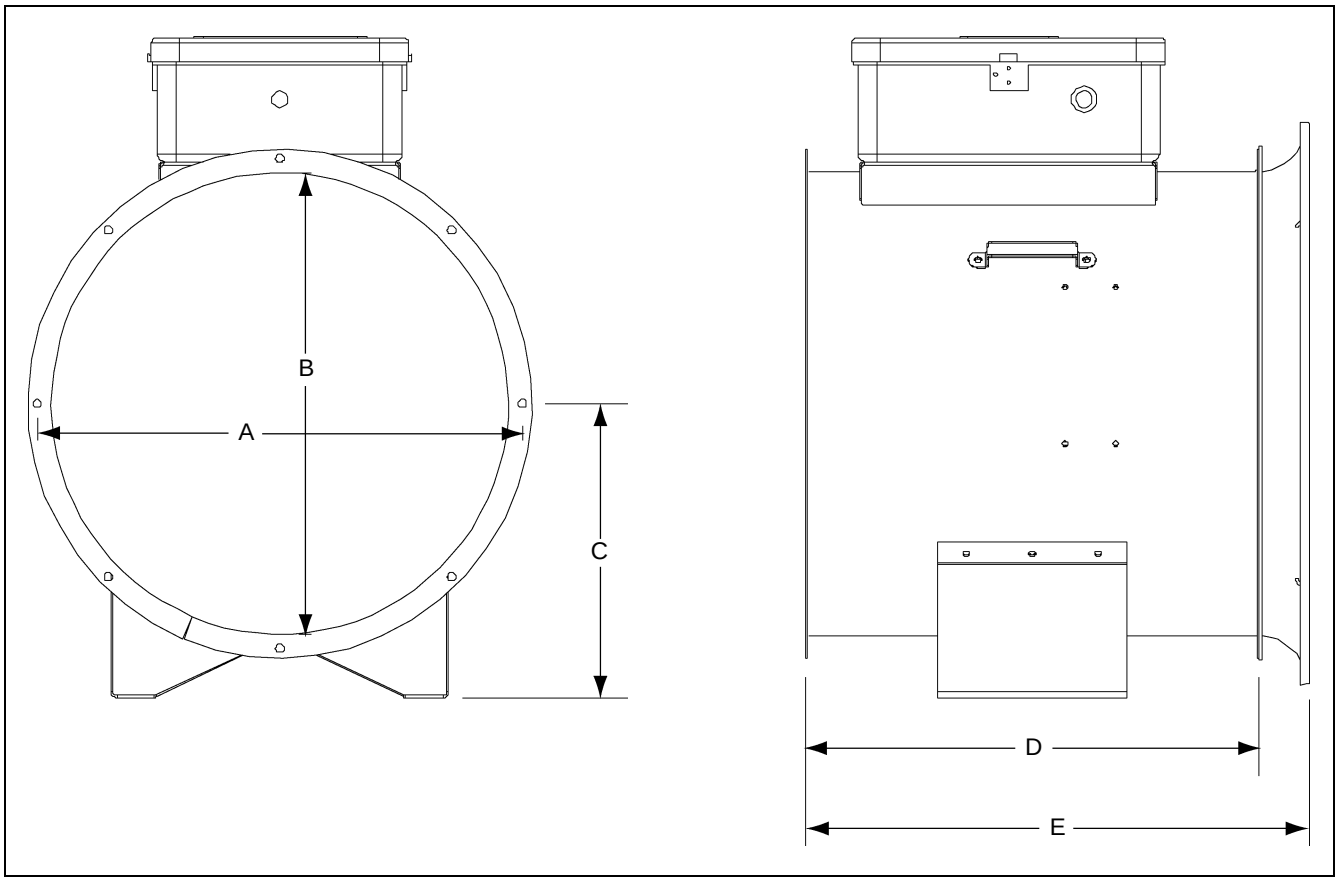
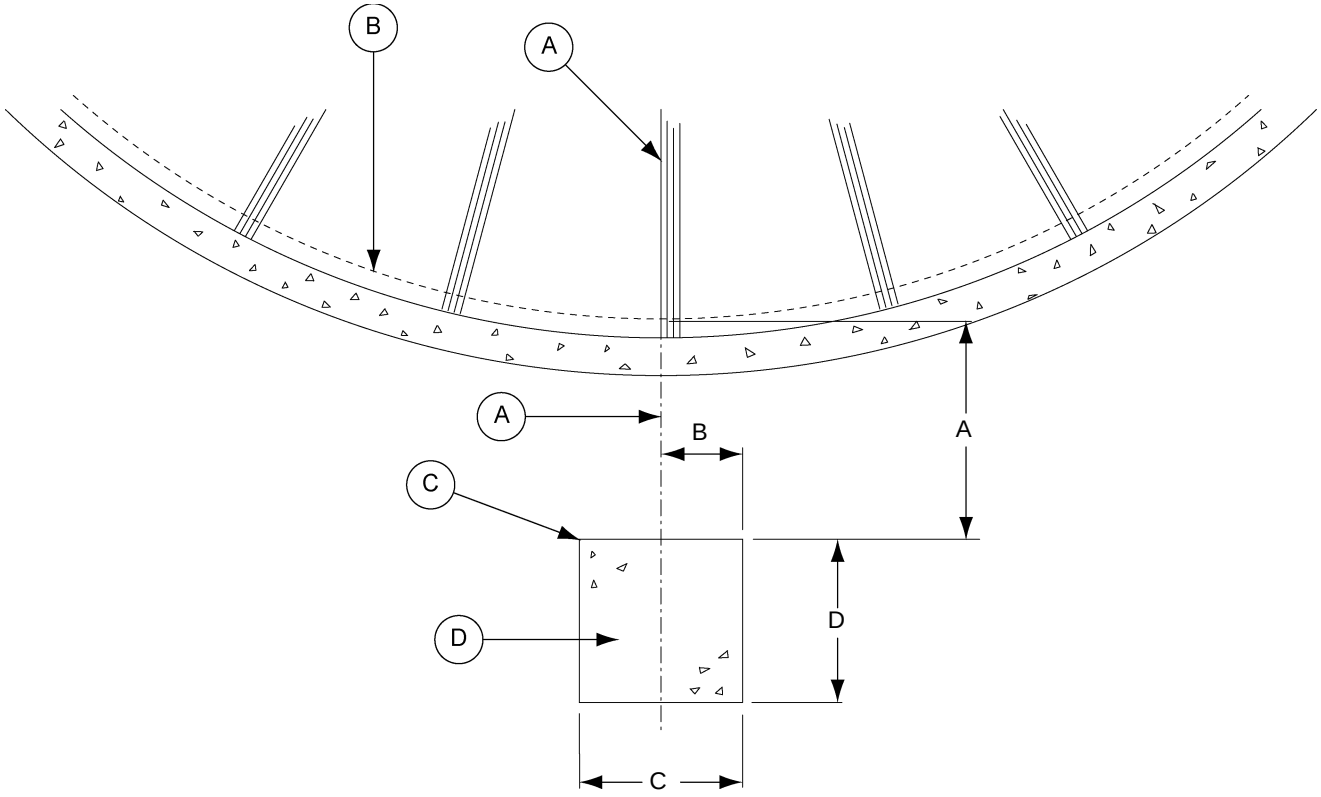


Figure 4C

Fan Dimensions (mm)

Fan	12" 0.75 kW	12" 0.575 kW	14"	18" 1.1 kW/2.2 kW	24"	26"	28"
A	343	330	387	489	654	705	762
B	311	302	362	464	616	675	718
C	192	192	276	302	395	429	460
D	410	410	411	432/508	610	610	610
E	-	-	-	-	679	-	679

Fan Base Requirements



TR-4734
A = 500 mm for fans without heaters
A = 1120 mm for fans with heaters

TR-6918 and TR-6919
A = 813 mm for fans without heaters
A = 1423 mm for fans with heaters

TR-7048
A = 1143 mm for fans without heaters
A = 1753 mm for fans with heaters

All Transitions
B = 330 mm
C = 660 mm
D = 660 mm

Figure 5A *Fan Base Dimensions and Location per GSI Transition Duct (mm)*

Ref #	Description
A	Centerline of Bin
B	Bin Wall
C	Dimension from Sidewall
D	Fan Pad

Fan Placement

1. Fan base must be flat and level to ensure smooth fan operation.
2. To connect the fan to the bin, a steel transition duct is required. Consult GSI or your dealer for the correct duct for the fan and bin.
3. Remove packaging materials and inspect fan for any shipping damages. Report these at once to the shipper.
4. Check all fasteners on the fan to make sure they are tight. (Fasteners may loosen during shipment.)
5. Tighten any loose fasteners, check for proper clearance and re-tighten.
6. Check all electrical connections that may have loosened during shipment.
7. Rotate the fan wheel. Wheel should rotate freely and should not make contact with the housing sides or inlet cone.
8. Place fan in proper location on the fan pad. Attach fan to transition duct and seal connection with caulk.
9. Check all joints and seams around the lower part of the bin. Verify that these are well sealed to prevent air leakage from the bin plenum. Inspect the transition duct as well. Seal any leaks that may be present to prevent air losses that reduce fan efficiency.
10. Level fan front to back and left to right with a spirit level. The feet should be shimmed so that, when level, all feet touch the pad. Fans not resting on support legs may have excess vibration which can lead to premature wear and tear on fan components.
11. Do not fix the fan to the base. Fix only to the transition duct.

Electrical Installation

3 Phase Power Requirements

Motor Current Requirements (A)

Fan Power (kW) / Voltage (V)	0.56	0.75	1.13	1.50	2.25	3.75	7.50	11.25
380	1.2	1.6	2.3	3.1	4.6	7.6	15.2	22.8
400	1.1	1.5	2.2	2.9	4.4	7.3	14.5	21.7
415	1.1	1.4	2.1	2.8	4.2	7.0	14.0	20.9
440	1.0	1.4	2.0	2.7	4.0	6.6	13.2	19.7

NOTE: *The above table does not allow for motor starting currents.*

Electrical Control System

Fans are supplied without any controls. A correctly designed control system is required. In particular:

1. Fan motor starter to minimize starting currents. (Check when ordering fan that the motor supplied is suitable for the chosen method of starting.)
2. For service and maintenance purposes, the equipment can be locked out with no risk if inadvertent re-start.

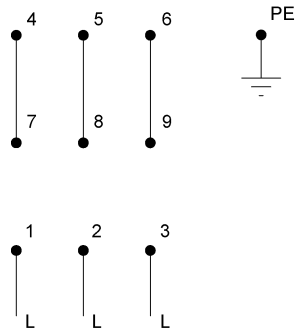
The following items are the minimum required when making electrical connections to the fan:

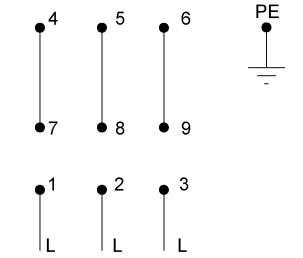
1. Main power supply with protective earth, over-current and short circuit protection.
2. Main electrical disconnect. 
   a. Wired to disconnect all electrical power to the fan and other associated equipment.
   b. Lockable.
3. Service disconnect. 
   a. Wired to break all electrical power to the fan motor.
   b. Lockable.
4. Emergency stop. 
   a. Wired to stop the fan motor (and any other associated equipment) immediately when pressed.
   b. Must remain engaged until manually disengaged.
5. Start/Stop controls. 
   a. Recessed start push button labelled 1.
   b. Non-recessed stop push button labelled 0.
   c. Motor starter, short circuit protection and motor overload.
   d. Control must be designed to default to OFF after a power interruption. (Eg: Self maintained relay.)
   e. The fan MUST NOT be able to immediately re-start following re-establishment of power.

NOTE: *Electrical controls located on the side of the bin will be subject to significant water due to run-off from the roof during rain. These controls should be rated for out door use (minimum IP65) and will also benefit from being covered to protect from direct water.*

Wiring Motor

1. The motor may be 3, 6, 9 or 12 wire, with wires bundled loose inside the connection box.
   NOTE: *3 and 9 wire motors cannot be started 'Star-Delta'.*
2. Each wire is individually numbered.
3. Refer to wiring schematic *below* provided inside the motor terminal box for correct wiring. This will depend on the chosen starting method.
4. Note that motors may be multi-voltage. Check motor rating plate for the required voltage.
5. Ensure the motor is correctly connected to the protective earth (PE) system with the power supply. The earth terminal is inside the motor connection box.
6. Make connections using connectors approved for use in the region, ensuring the connections are correct for the voltage and starting method.
7. Check the full load current for the motor at the supply frequency and voltage and set the motor overload relay at or below this value.

GSI Part #	Baldor Part #	Motor Power	380V 50 Hz Start Connections	380V 50 Hz Run Connections
FH-6980	AFM3529-M16	1 HP/0.75 kW	These motors cannot be started Star-Delta. Use other form of Soft Start or Direct-On-Line.	
FH-6258	AFM3532-M16B	3 HP/2.25 kW		
		5 HP/3.75 kW		
FH-6436	UCM713-M16B	7.5HP/5.63 kW		
FH-6584	37E831X884G1	15 HP/11.25 kW		
Swap any two (2) line connections to reverse motor direction.				

GSI Part #	Baldor Part #	Motor Power	415V 50 Hz Start Connections	415V 50 Hz Run Connections
F-7187	AFM3532-M16B	3 HP/2.25 kW	These motors cannot be started Star-Delta. Use other form of Soft Start or Direct-On-Line.	
FH-5650-7	37E831X884G1	15 HP/11.25 kW		
Swap any two (2) line connections to reverse motor direction.				

Final Check

Ensure the power to the fan is OFF, LOCKED and TAGGED before final checks.

Figure 5B

1. Check the fan wheel can rotate freely and maintains an even gap to the inlet cone.
2. Check to make sure all safety guards are in place and not damaged. Replace damaged parts.
3. Check to make sure all decals are visible and not damaged. Replace damaged decals.
4. Check to make sure all control boxes are closed and no wiring is exposed.
5. With all guards fitted, start the fan to check correct impeller rotation. Check against rotation decal on inlet side of fan. Fan should rotate counterclockwise when viewed through the inlet guard. To reverse rotation, switch any two (2) phases.

Start-Up

1. Start the fan and allow it to run, checking for smooth, quiet running.
2. Check each phase with a meter for correct phase voltage and equal phase current.
3. Voltage drop at the motor should be no greater than 5% of nominal voltage.
4. Check the fan legs remain all in contact with the base and the lock nuts are tight.

1. Where the fan is out of use for long periods, GSI recommend running it for 20 minutes per month to help reduce pre-harvest service issues.
2. Do not allow debris to build-up on the impeller. If required, with the power LOCKED OFF remove the inlet guard and cone and clean the impeller.
3. Check the impeller for cracks or damage. A damaged impeller can run out of balance and result in wider damage to the fan, motor and bearings.
4. Check the grille over the cooling fan to the motor to ensure it remains clear.

Lubrication and Bearings

Type of Annual Usage	1450 RPM - NEMA Frame Size			2900 RPM - NEMA Frame Size		
	Up to 280 incl.	Over 280 to 360 incl.	Over 360	Up to 280 incl.	Over 280 to 360 incl.	Over 360
Continuous Normal Duty*	9500 Hrs	7400 Hrs	3500 Hrs	3600 Hrs	2200 Hrs	2200 Hrs
Continuous Severe Duty**	4750 Hrs	3700 Hrs	1750 Hrs	1800 Hrs	1100 Hrs	1100 Hrs
Seasonal Service Motor (Idle 6 Months)	Grease at the beginning of season and then follow the interval above.					

- Use suitable high temperature roller bearing grease.
- Clean all grease fittings.

Fan Blade Removal and Installation

Always disconnect and lock out power before working on or around fan.

The fan blade is secured to the motor shaft by the use of a taper-lock bushing, motor shaft key and cap screws. The size, quantity and torque of cap screws required will depend on the model of the fan.

Although the taper-lock method of retaining the blade onto the motor shaft is very simple and obvious, it is essential that the following points be read carefully and fully understood, as improper installation can result in serious or fatal injury caused by a loose, fast flying blade.

<u>THREADED BUSHING HOLES:</u> The threaded holes within the bushing are provided for disassembly purposes only. Do not attempt to use these holes for re-assembly, as they will not allow the parts to become locked onto the shaft, thereby causing an extremely hazardous operating condition.

<u>CLEARANCE HOLES:</u> When re-assembling parts, the cap screws must be installed through the UNTAPPED CLEARANCE HOLES to cause the blade to be pulled forward onto the tapered bushing, thus locking the parts securely onto the motor shaft. Refer to Page 29 (under installation section) for assembly details.

Removing the Fan Blade Assembly

1. Lock out and tagout the main power to make sure the dryer cannot be started during servicing.
2. Remove the grill guard.
3. If there is a safety washer present, remove the bolt, lock washer and safety washer.
4. Remove the bolts from the unthreaded holes of the bushing. Do not use these bolts for bushing removal.
5. Using an allen wrench, undo the set screw (if present) and remove the key from the keyway.
6. Install grade 5 or stronger bolts into the threaded holes in the bushing and gradually apply torque to each bolt to loosen the bushing.
7. Remove the bushing and fan blade assembly.

Installing the Fan Blade Assembly

1. Clean the motor shaft, key, bushing and the bore of the hub with a non-residual cleaner, such as brake parts cleaner or electric parts cleaner. It is important that these mating surfaces be clean and dry and no grease or oil is present. The parts must be assembled dry for maximum friction.

Do not use any lubricant or thread locking compound during installation. The use of such products will cause improper bolt torque and will crack the fan hub.

2. Insert bolts into bushing holes and ensure the shoulder portion of the bolt is NOT protruding the hole.
3. Install the fan blade assembly onto the motor shaft.
4. Align the keyway in the bushing with the key and slide the bushing onto the motor shaft.

   NOTE: *Do not use excessive force to drive the bushing onto the shaft.*

5. Align bushing and hub keyways with the key. Bushing should be flush with the end of the motor shaft.
6. Loosely install the bolts through the unthreaded holes in the bushing into the threaded holes of the hub.
7. Find the applicable torque for the bushing in the chart *on Page 28*. The bushing type is etched into the face of the bushing.
8. Torque the bushing gradually to evenly seat it inside the hub and onto the motor shaft. Set the torque wrench to 1/3 of the required torque setting and tighten each bolt in a circular pattern three (3) times. Increase the torque setting on the wrench to 2/3 of the required torque and tighten each bolt in a circular pattern three (3) times. Increase the setting on the torque wrench to the final required torque setting and tighten each bolt in a circular pattern three (3) times.
9. If there is a safety washer present, install the washer, lock washer and bolt.
10. Turn the fan blade assembly by hand to make sure there is freedom of movement and uniform clearance around the inlet.
11. Install the grill guard and turn ON the main power source.

Installing the Fan Blade Assembly (Continued)

12. Operate the fan for 30 minutes.
13. Stop the fan and lock out and tagout the main power to make sure the dryer cannot be started during servicing.
14. Remove the grill guard and re-tighten the bolts in a circular pattern one time at the final required torque setting.
15. Install the grill guard and turn ON the main power source.

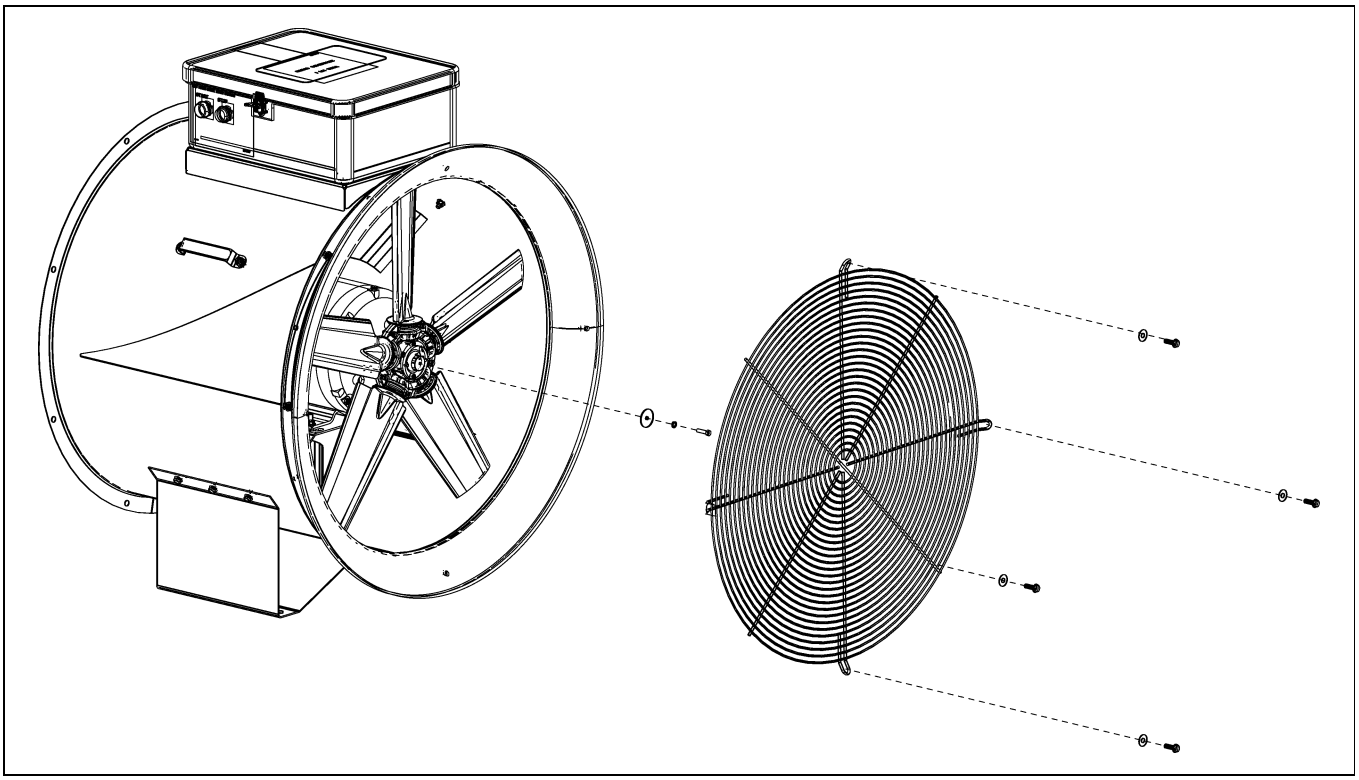


Figure 6A *Vane Axial Fan*

CAUTION ***Do not exceed the torque specifications listed on the bushing bolt torque chart. Exceeding the recommended torque will crack the fan hub.***

Bushing	Bolt Thread	Bolt Torque (Nm)
JA	864 mm	6.75
G	514 mm	8.10
H	514 mm	8.10
SH	514 mm	10.80
SD	514 mm	12.15
SDS	514 mm	12.15

Bushing	Bolt Thread	Bolt Torque (Nm)
P-1	465 mm	17.55
SK	465 mm	20.25
SF	416 mm	31.05
Q-1	416 mm	39.15
R-1	416 mm	39.15

Installing the Fan Blade Assembly (Continued)

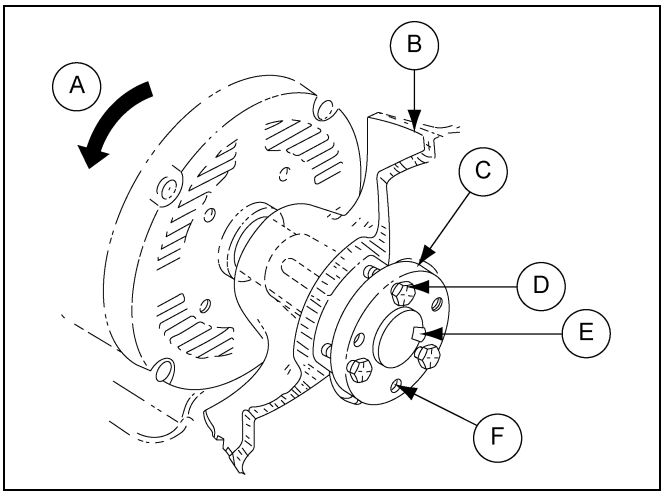


Figure 6B *Cutaway Drawing of Typical Propeller Installation*

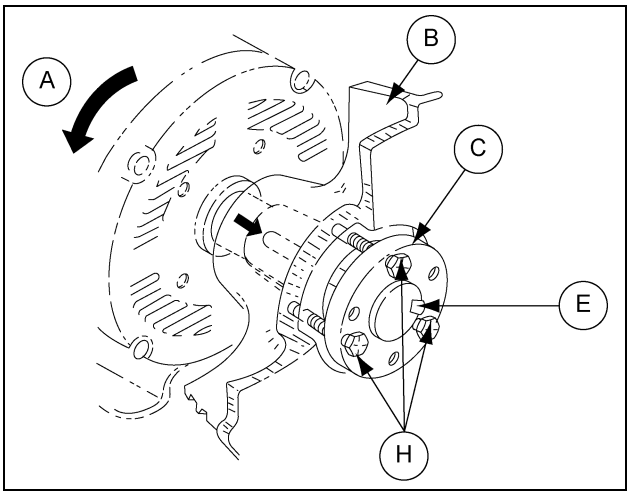


Figure 6D *Cap Screw Arrangement for Resassembly*

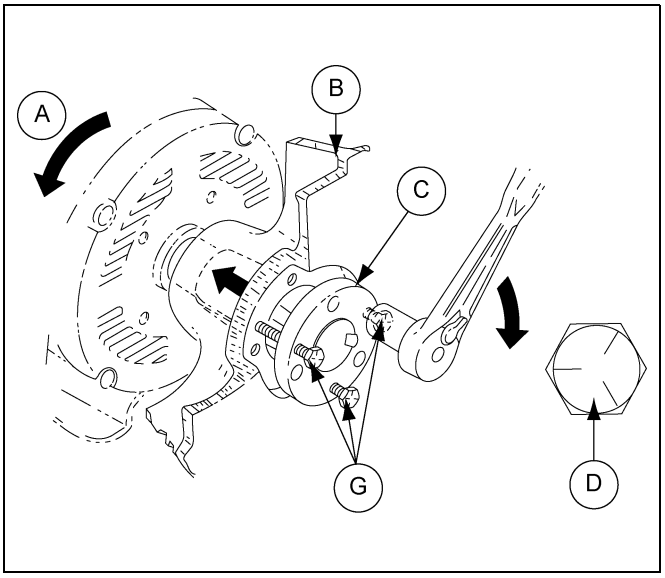


Figure 6C *Cap Screw Arrangement for Disassembly*

Ref #	Description
A	Rotation
B	Propeller
C	Taper-Lock Bushing
D	Cap Screw (Grade 5)
E	Key
F	Threaded Holes in Bushing
G	Cap screws installed into threaded holes to force propeller off bushing.
H	Cap screws installed through clearance holes of bushing. (See text *on Page 28* for proper torque.)

Fan Blade Inspection and Maintenance

Pre-season inspections should be done on the fan blade to look for the following:

1. Any debris (stalks, bees wings, mud, insects and insect nests) accumulated on the surfaces of the fan blade. Remove these items as they will likely disrupt airflow over the fan airfoils and can potentially cause vibration problems.
2. Inspect the fan blade for any broken, cracked or loose parts. Blade should NOT be operated with broken or loose parts. Contact dealer for determination of the repairs required.

Do not attempt to pull the flange of the bushing flush with the blade hub. A clearance of 3 mm to 6 mm must be maintained between bushing flange and blade hub surface. Blade will loosen and cause damage or injury.

Browning Taper-Lock
Bushing Bolt Tightening Torque

Bushing Size	Hex Bolt Size	Torque (Nm)
H	1/4"-20 x 3/4"	10.7
P	5/16"-18 x 1"	21.7

Fan Motor Removal and Installation

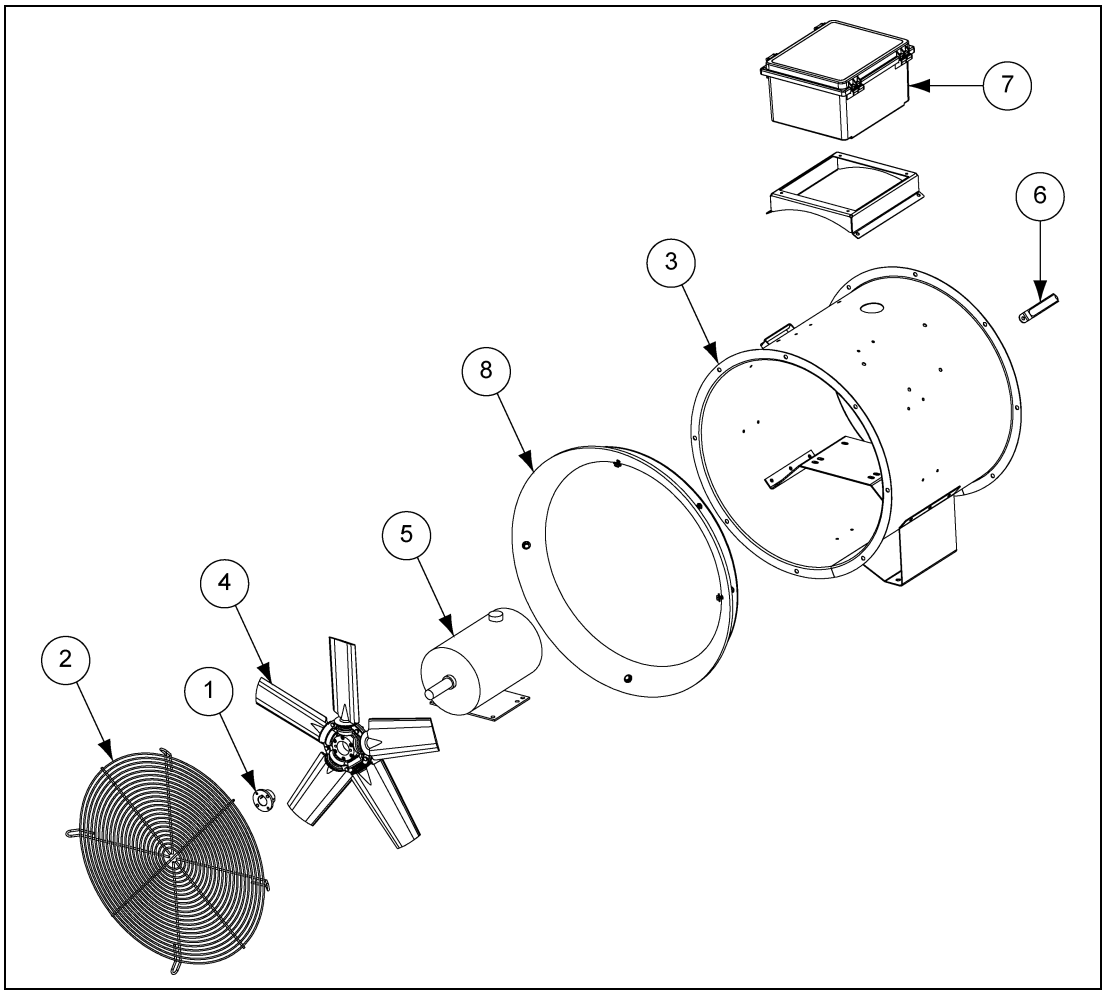
In the event of motor failure, remove the motor, as described and take it to the nearest Authorized Service Station. AUTHORIZED SERVICE STATIONS ARE THE ONLY PLACES THAT CAN PROVIDE MOTOR WARRANTY. Motor service and repair at other places will be at owner's expense. If service station determines motor failure to be caused by faulty material or workmanship, repair will be under warranty when within the warranty period. Motor failure because of external causes will result in a charge to the owner for repair.

1. LOCK OUT THE MAIN POWER SUPPLY, then remove fan guard, venturi and blade as outlined earlier.
2. Open motor junction box cover and disconnect the motor lead wires from within the box.

   NOTE: *Tag or otherwise identify wires for ease of re-assembly.*
3. Remove motor mount bolts. If there are any shims between the motor and its base, note their locations so they can be properly installed during re-assembly.
4. Disconnect the motor end of the motor conduit, if required, then carefully pull conduit and wires through hole in the motor junction box. Remove motor. If motor requires service, take it to an Authorized Service Station.
5. To re-install motor, slide onto motor base plate and replace shims (if required) between motor and base plate. Re-install motor mount bolts and washers and fully tighten them at this time. Re-install conduit and wires and carefully remake all electrical wiring connections.

   NOTE: *Make sure to install and tighten the blade in accordance with earlier instructions.*

Vane Axial Fan Parts



Vane Axial Fan Parts List

Ref #	Part #							Description
	AF-12-*G	AF-14-*G	AF-1.5-*G	AF-3-*G	AF-7-*G	AF-10-*G	AF-158-*G	
1	FH-5536	FH-5536	FH-5535	FH-3660	F-7199	F-7199	F-7199	Split Taper Bushing
2	F-7177	F-7178	F-7179	F-7179	014-1042-2-W	014-1042-2-W	014-1043-0-W	Grill Guard
3	F-7225	F-7230	F-7248	F-7248	F-7330	F-7330	F-7332	Fan Housing
4	F-7252	F-7301	F-7254	F-7255	F-6920	F-6921	F-6923	Blade Assembly
5	FH-6980	FH-6980	FH-5539	FH-6258	FH-6436	FH-6436	FH-6584	380V 3 PH Motor
5	N/A	N/A	N/A	F-7187	F-7397	F-7397	FH-5650-7	415V 3 PH Motor
6	PR-331	PR-331	PR-331	PR-331	PR-331	PR-331	PR-331	Handle
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Junction Enclosure
7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Control Enclosure
8	N/A	N/A	N/A	N/A	F-7316	F-7316	F-7317	Venturi
Weight (kg)	23	25	35	45	80	102	89	

NOTES

Limited Warranty - N.A. Grain Products

The GSI Group, LLC. (“GSI”) warrants products which it manufactures, to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months from the date of shipment (or, if shipped by vessel, 14 months from the date of arrival at the port of discharge). If, in GSI’s sole judgment, a product is found to have a defect in materials and/or workmanship, GSI will, at its own option and expense, repair or replace the product or refund the purchase price. This Limited Warranty is subject to extension and other terms as set forth below.

Warranty Enhancements:

The warranty period for the following products is enhanced as shown below and is in lieu of (and not in addition to) the above stated warranty period. (Warranty Period is from date of shipment.)

	Product	Warranty Period
Storage	Grain Bin Structural Design • Roof, doors, platforms and walk arounds • Flooring (when installed using GSI specified floor support system for that floor) • Hopper tanks	5 Years
Conditioning	Dryer Structural Design - (Tower, Portable and TopDry) • Includes (frame, portable dryer screens, ladders, access doors and platforms)	5 Years
	All other Dryer parts including: • Electrical (controls, sensors, switches and internal wiring)	2 Years
	Bullseye Controllers	2 Years
Material Handling	Bucket Elevators Structural Design	5 Years
	Towers Structural Design	5 Years
	Catwalks Structural Design	5 Years
	Accessories (stairs, ladders and platforms) Structural Design	5 Years

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH HEREIN; SPECIFICALLY, GSI DISCLAIMS ANY AND ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) ANY PRODUCT MANUFACTURED OR SOLD BY GSI, OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

The sole and exclusive remedy for any claimant is set forth in this Limited Warranty and shall not exceed the amount paid for the product purchased. This Warranty only covers the value of the warranted parts and equipment, and does not cover labor charges for removing or installing defective parts, shipping charges with respect to such parts, any applicable sales or other taxes, or any other charges or expenses not specified in this Warranty. GSI shall not be liable for any other direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. Expenses incurred by or on behalf of a claimant without prior written authorization from the GSI warranty department shall not be reimbursed. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor. Prior to installation, the end-user bears all responsibility to comply with federal, state and local codes which apply to the location and installation of the products.

This Limited Warranty extends solely to products sold by GSI and does not cover any parts, components or materials used in conjunction with the product, that are not sold by GSI. GSI assumes no responsibility for claims resulting from construction defects, unauthorized modifications, corrosion or other cosmetic issues caused by storage, application or environmental conditions. Modifications to products not specifically delineated in the manual accompanying the product at initial sale will void all warranties. This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained.

Notice Procedure:

In order to make a valid warranty claim a written notice of the claim must be submitted, using the RMA form, within 60 days of discovery of a warrantable nonconformance. The RMA form is found on the OneGSI portal.

Service Parts:

GSI warrants, subject to all other conditions described in this Warranty, Service Parts which it manufactures for a period of 12 months from the date of purchase unless specified in Enhancements above.

(Limited Warranty - N.A. Grain Products_ revised 19 October 2018)

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

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CN-339125