

# Centrifugal Fans

## Operators Manual



Special execution, intended for use in potentially explosive atmosphere (zone 22) in conformity with category 3 of group II, according to the European ATEX Directive 94/9/EC. The equipment has the following marking:



II 3 D c

## 1. INTRODUCTION

When you purchased your Kice heavy duty industrial fan, you bought an air mover that has proven to be the best design based on thousands of installations and years of proven reliability and operation.

We're proud of our products, and the people at Kice Industries who craft them. At Kice, we use high manufacturing standards and processes to produce the highest quality products, which have been a trademark of our organization for over 60 years.

Our product development work, driven by the requirements of our customers, has resulted in the present designs of the Kice Fans.

This owner's manual is intended as a guide for proper installation, operation and maintenance to keep your Kice fan operating safely and efficiently on the job. Service and spare parts information are also included for your benefit.

Sincerely,

Drew Kice, President  
Kice Industries, Inc.

### **WARRANTY**

The Company warrants the equipment manufactured by the Company to be free of defects in material and workmanship for a period of one year from the date of shipment. Kice agrees to repair or replace, at its option, any parts found to be defective in the opinion of the Company. Kice is not liable for any costs in connection with the removal, shipment or reinstallation of said parts. This warranty does not apply to abrasion, corrosion, erosion, misuse or abuse of the product. Assistance by Kice in system layout or selecting equipment does not imply Kice's responsibility.

Buyer agrees to look to the warranty, if any, of the manufacturer or supplier of equipment manufactured by others and supplied by Kice for any alleged defects in such equipment and for any damages or injuries caused thereby or as a result thereof. Where work is made to measurements or specifications furnished by the Buyer, Kice does not assume any responsibility for the accuracy of Buyer's specifications. Kice will not assume responsibility for alteration or repairs unless the same are made with written consent and approval of Kice Industries, Inc.

### **PURCHASER SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ELECTRICAL MANUFACTURER'S RECOMMENDATIONS, UNDERWRITERS CODE AND ALL SAFETY PRECAUTIONS.**

Kice extends no other warranty for any of its products other than the above express warranty and there are no other warranties, express or implied, including warranties of merchantability, fitness for a particular purpose, or otherwise which extend beyond the above limited express warranty. Kice and its dealers shall not in any event be liable for consequential or incidental damages, and the terms and conditions stated herein provide Buyer's sole and exclusive remedy. Any actions for breach of this agreement or warranty must be commenced within one year after the cause of action has occurred.

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### **IMPORTANT**

Write down the MODEL and SERIAL NUMBER of the Kice Industrial Fan, along with the same information for the auxiliary equipment. (Airlock valves, fans, speed reducers, motors, and sheaves size, type and any special modifications to standard).

For additional information, application assistance or special service, you should contact the factory. We'll need to know the MODEL and SERIAL NUMBER of your Kice Industrial Fan. For ready reference, please record this information and the date of delivery or installation and the date of delivery or installations on the lines below. See the General information section for the location of model and serial number.

MODEL \_\_\_\_\_

SERIAL NUMBER \_\_\_\_\_

Date of delivery or installation \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

## 2. GENERAL INFORMATION

### TO THE NEW OWNER

The purpose of this manual is to assist owners and operators in maintaining and operating the Kice Industrial Fans. Please read it carefully; information and instructions furnished can help you achieve years of dependable performance. Separate manuals are included for auxiliary equipment that makes up an air system, such as airlock valves, cyclones and fans. They contain additional information that may not be repeated in this manual. You are urged to read all manuals before attempting any operation or repair of the equipment in the system. If these manuals are not included in your owner's packet, contact our customer service department.

### USING THIS MANUAL

General operation, adjustment and maintenance guidelines are outlined for owners and operators of the Kice Industrial Fan. Operating conditions vary considerably and cannot be addressed individually. Through experience, however, operators should have no difficulty in developing good operating, safety and monitoring skills.

The term "**disconnect and lockout**" as used in this manual means that power to the equipment has been completely disconnected through the use of a "**Lockout and Tagout Procedures**".

Directions used in this manual, for example **RIGHT** or **LEFT**, **CLOCKWISE** or **COUNTERCLOCKWISE**, refer to directions when facing the drive side of the fan.

Photographs and illustrations were current at the time of printing, but subsequent production changes may cause your Kice fan to vary slightly in detail. Kice Industries, Inc., reserves the right to redesign and change the equipment as deemed necessary, without notification. If a change has been made to your Kice Industrial Fan that is not reflected in this owner's manual or the Illustrated Parts List, write or call Kice Industries, Inc., for current information and parts.

## MODEL AND SERIAL NUMBER

The model of the Kice Industrial Fan, serial number and date of manufacture can be found stamped on the metal identification plate located on the housing on the opposite side of the inlet.



## KICE INDUSTRIAL FAN PARTS AND SERVICE

Use original Kice Industrial Fan replacement parts only. These parts are available from Kice Industries, Inc. To obtain prompt, efficient service, always provide the following information when ordering parts:

1. Correct part description and number, as given in the Illustrated Parts Lists section of this manual.
2. Correct model number.
3. Correct serial number.

For assistance in service or ordering parts, contact the customer service department:

**Kice Industries, Inc.**  
**5500 Mill Heights Drive**  
**Park City, KS 67219-2358**  
**Phone: 316-744-7151; Fax: 316-744-7355**

**IMPORTANT:** Any unauthorized modification, alteration, or use of non-approved attachments or drive units voids the warranty and releases Kice Industries, Inc., from any liability arising from subsequent use of this equipment. Each type of Industrial Fan is designed to be used in a specific type of system. Using the Kice Industrial Fan for a purpose other than that for which it was designed could result in personal injury, as well as product or property damage.

Kice equipment is designed and built to provide years of operation. As with any equipment, the following rules are essential for trouble-free operation:

- Proper installation
- Regular maintenance
- Correct operation within original design parameters
- Proper application within a process

Failure to properly install, maintain or operate Kice equipment can result in a variety of problems, including but not limited to: poor equipment performance, decreased equipment life, equipment failure or dangerous operating conditions.

The Kice Industries product line includes a variety of equipment, all of which can be custom-made to suit your application. Your Kice equipment was chosen based on your specification of process, product, and your application requirements for capacity, operating conditions, operating parameters, etc. It is essential that your Kice equipment be installed, maintained and operated under the conditions for which it was originally designed and specified. Should your process needs change, please consult with Kice Industries prior to utilizing the equipment under different conditions.

### **MOTOR AND DRIVE PARTS AND SERVICE**

The motor and drive components are covered by the manufacturer's warranty. If there is a problem, check with the local supplier or service representative.

### 3. SAFETY PRECAUTIONS



This safety alert symbol is used on equipment, safety decals and in manuals to call your attention to an important safety message warning you of possible danger to your personal safety. When you see this symbol, be alert; your personal safety or the safety of other persons involved. Follow the instructions in the safety message.

#### HAZARD LEVELS

The following definitions for identifying hazard levels are:



**DANGER (RED)** – Danger is used to indicate the presence of a hazard that **WILL** cause **SEVERE** personal injury, death, or substantial property damage if the warning is ignored.



**WARNING (ORANGE)** – Warning is used to indicate the presence of a hazard that **CAN** cause **SEVERE** personal injury, death, or substantial property damage if the warning is ignored.



**CAUTION (YELLOW)** – Caution is used to indicate the presence of a hazard that **WILL** or **CAN** cause **MINOR** personal injury or property damage if the warning is ignored.



**WARNING:** All owners and operators should read this manual, or be instructed in safe operating and maintenance procedures, before attempting to uncrate, install, operate, adjust, or service this equipment.

#### SAFETY DECALS

The safety decals on the Industrial Fan should not be removed, covered over, painted, or otherwise become illegible. If this occurs, the decals should be replaced immediately. Contact our customer service department for replacements.

**ADDITIONAL SAFETY PRECAUTIONS**

1. Do not attempt to install, connect power to, operate or service your new fan without proper instruction and until you have been thoroughly trained in its use by your employer.
2. Do not attempt to work on, clean or service the fan, or open or remove any protective cover, guard, grate or maintenance panel until the POWER has been turned off and LOCKED OUT, and the fan rotor has come to a complete stop.
3. Do not manually override or electrically bypass any protective device.
4. Do not connect power to or operate the fan unless all moving parts are covered and all covers, guards, grates and maintenance panels are in place and securely fastened.
5. Do not abuse, overload, mistreat or misuse the fan or attempt to operate the fan if it is in need of service, lubrication, maintenance or repair.
6. Never place any part of your body near rotating members or moving parts of the fan.
7. If the fan is not equipped with factory supplied drive and guard, then all rotating members and moving parts must be completely enclosed before connecting power and before operation.
8. Free outlet of the product must be guaranteed at all times. Otherwise, blockage and severe damage may result, or a dangerous situation may occur.
9. If the fan is equipped with a maintenance panel or access door incorporating a Protective Interlocking Limit Switch (PLS), the PLS must be interlocked with all electrical controls. This is to prevent all motors or powered devices on the unit from being energized if any protective cover, guard, grate or maintenance panel is open or removed. Never attempt to manually override or electrically bypass a safety device. The interlock function of the PLS must be tested and logged daily by supervisory personnel.
10. The fan housing may have an inspection port which is fastened with captive hardware. In addition, the port has a device that keeps it open as long as it is not fastened down. The port may only be opened when the fan wheel is motionless and the repair switch is turned off.
11. Many fans are installed and wired to start automatically or be controlled from remote locations. Keep clear of all moving parts on industrial equipment at all times.
12. The fan must be equipped with a properly functioning Protective Interlocking Electrical Control Switch (PCS), a Padlockable Manual Power Lockout Switch, and with the other basic safety equipment listed above. On-Off, interlock and padlock functions of the PCS must be tested and logged daily by supervisory personnel.
13. It is the owner's and the employer's responsibility to adequately train the employee-operator in the proper and safe use of the equipment. Written safety programs and formal instruction are essential. All new employees must be made aware of company policies and operating rules, especially the established safety and health procedures. Refresher training of experienced employees in the potential hazards of the job is important. Up-to-date training records must be maintained at the job site.
14. Special attention must be devoted to outside contractors engaged to enter and perform work on equipment or in the workplace. Special care must be exercised to insure all such personnel are fully informed of the potential hazards and follow plant rules – with special emphasis on explosion proof electrical tools and cutting or welding in unsafe environments.
15. Keep the workplace cleaned up and free of dirt and dust at all times. Do not attempt to work on slippery or unsafe ladders or work platforms when maintenance or repair work is being performed on the fan.
16. The operator must ensure that adequate lighting conditions are provided at the location of equipment operation.
17. Do not climb on ladders or work on platforms unless maximum load rating is posted. Do not exceed maximum load ratings when installing or servicing the fan.
18. Never allow any kind of metal or other foreign objects to enter a fan while in operation. Examined raw materials (cleaned air) should be used through the machine to ensure proper and consistent operation.
19. To prevent human access while the equipment is operating, all fan inlet and discharge openings must be completely enclosed and remain enclosed until POWER IS TURNED OFF AND LOCKED OUT. Keep away from the moving parts of the fan during operation.
20. Kice fans must be operated at the airflow rates determined for the customer specific application(s). This is to insure that the fan will operate normally and under its maximum surface temperature rating.
21. Unless otherwise specified or designed per customer requirement, Kice fans are designed not to exceed a light dust load through the internal airstream.
22. Operate safely at all times. Use personal protective equipment when and where appropriate, such as hard hats, helmets, gloves, earplugs, dust masks, and eye protection devices. Keep personal protective equipment in good repair and convenient to the operator.
23. Drive components must be inspected and adjusted after transportation and periodically as required by operating conditions. Check sheaves and coupling alignment and spacing, V-belt tension, set screws, keys, fasteners, bearings, shafts and motor, as appropriate to job conditions.
24. High voltage and rotating parts can cause serious or fatal injury. Only qualified, trained, and experienced personnel should perform installation, operation and maintenance of electrical machinery. During installation and operation, make sure that the motor and the frame of the fan is effectively grounded in accordance with OSHA safety and health standards, the National Electric Code, local codes and EN ISO 60204-1 as required for the classified area.
25. Never stand under any kind of hoist or lifting mechanism, whether or not it is loaded or in operation. Never stand under or near a fan or component when it is being lifted.
26. Qualified personnel, before each use, must carefully inspect all lifting devices. Never use a lifting device to transport equipment. Never use a lifting device that is damaged, deteriorated, or in any way in need of repair.
27. All protective covers, guards, grates, maintenance panels, switches and warning decals must be kept in place and in good repair. Any equipment with a damaged, malfunctioning, defective, or missing protective device must be taken out of service until the protective device can be repaired or replaced.
28. Any device powered by air or hydraulic pressure must be equipped with a properly functioning Padlockable Manual Pressure Lockout and Internal Pressure Relief Valve (PRV).
29. Any equipment that is used in the processing of explosive materials in hazardous environments requires an evaluation on the part of the user and operator of proper and adequate monitoring equipment, dust control, explosion relief venting, and electrical equipment enclosures. Do not use your equipment in hazardous environments unless it has been properly equipped for the hazard.
30. It is ultimately the operator's responsibility to implement the above listed precautions and insure proper equipment use, maintenance and lubrication. Keep these instructions and list of warnings with your machine at all times.
31. It cannot be assumed that every acceptable safety procedure is contained herein or that abnormal or unusual circumstances may not warrant or require future or additional procedures.

**WORK SAFELY AT ALL TIMES**

## 4. RECEIVING, HANDLING AND INSTALLATION

### RECEIVING AND INSPECTION

Kice Industries, Inc., has prepared your new fan for shipment in accordance with the Uniform Freight Classification. It has been thoroughly inspected at the factory and, barring damage in transit, should be in excellent condition upon arrival.

The fan and accessories should be inspected upon receipt for any shipping damage or fan case deformation. Turn the fan wheel by hand to see that it rotates freely and does not bind. If dampers or shutters are provided, check these accessories for free operation of all moving parts.

When a carrier signs the Kice Industries, Inc., bill of lading, the **carrier accepts the responsibility** for any subsequent shortages or damage, evident or concealed, and **the purchaser must make any claim against the carrier**. Evident shortage or **damage should be noted on the carrier's delivery document** before signature of acceptance. Inspection by the carrier of damage, evident or concealed, must be requested. After inspection, issue a purchase order for necessary parts or arrange for return of the equipment to Kice Industries, Inc., for repair.

### HANDLING AND STORAGE

Kice fans are shipped completely assembled and skidded when size permits. These units may be handled and moved using good rigging techniques, being careful to avoid concentrated stresses that will distort any of the parts. Items or parts of the fan that are shipped knocked down will be clearly labeled for reassembly.

If the fan is not to be installed promptly, store it in a clean, dry location to prevent rust and corrosion of steel components. If outdoor storage is necessary, protection should be provided. Cover the inlet and outlet to prevent the accumulation of dirt and moisture inside the housing. Cover the motor with waterproof material. Refer to the Fan Maintenance section of this manual regarding bearings (Section 5) for further storage instructions.

Check dampers for free operation and lubricate moving parts prior to storage. Inspect the stored unit periodically. Rotate the wheel by hand every two weeks to redistribute the grease on internal bearing parts.

**Caution:** Use proper equipment when lifting or moving the fan. Make sure all persons and obstructions are clear from path and installation area.

## FAN INSTALLATION

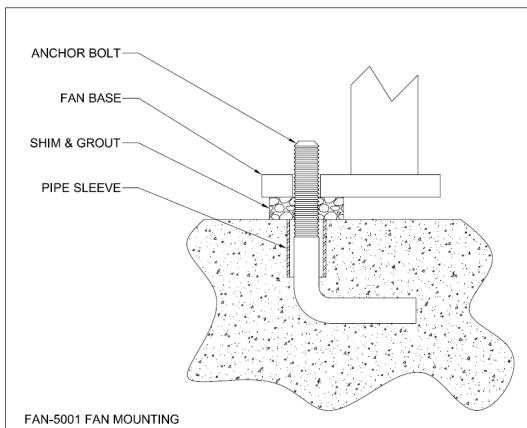
To insure proper operation, the unit must be adequately supported and properly installed. It is important that the fan is properly installed and maintained per the information in this manual so that material clearances maintained and potential ignition sources are minimized.

After the receiving and inspection has been completed, install the unit with the following guidelines:

1. Installation of the fan (which may include the motor) is completed by the operator. When installing the equipment, please make sure that the moving parts on the inside of the equipment are not accessible.
2. Move the Kice Fan to the installation area using proper equipment with sufficient lifting capacity. The fan has locations where the equipment necessary for lifting the device can be attached. These will be the lifting lugs on the fan assembly frame and/or the feet of the fan assembly frame where it will be secured to a slab or support structure. Lifting the fan at any other point is hazardous and may compromise human safety as well as the structural integrity of the fan itself.
3. The fan is bolted to the floor (concrete slab) or support structure when installed. Follow the installation instructions listed later in this section that are applicable for the facility where the fan is to be installed (slab or structure mount).
4. Tighten all fasteners securely. The feet of the fan base must be securely anchored before setting the proper belt tension on units equipped with v-belt drives. Refer to the table of recommended hardware torque values in this manual (Section 8) when performing Kice Fan installation.
5. The fan, as well as any other parts and equipment, must be separately grounded when assembled to mitigate the risk of an electrostatic charge. If necessary, shaft grounding systems may be used.
6. To insure proper operation, all ductwork or stacks should be independently supported as excess weight may distort the fan housing and cause contact between moving parts. Ductwork should also be placed away from access routes and steps.
7. For proper operation, Kice fans should also be installed in such a manner as to provide normalized inlet airflow to minimize noise and resulting vibration which results from inlet air turbulence.
8. The unit should only be operated once it is properly connected and fully encapsulated. The fan wheel is built into the case and the case has two connections for the air inlet and air outlet.
9. If there is danger of vibration transfer to adjoining plant components, suitable compensators can be installed under the base as well as on the air inlet and outlet transitions. Where vibration isolators are used, consult Kice Industries, Inc., for proper location and adjustment.
10. When assembling the motor, coupling, and/or drives, exact alignment of the shafts must be ensured to eliminate failure modes as a safety risk. Follow the drive assembly and alignment instructions later in this section that are applicable to your fan.
11. The motor controls and starter can be mounted in any convenient location. Distance or location of the controller does not affect its performance.
12. Electrical conduit, junction tees, safety switches, motor starters and sometimes motors, are not furnished by Kice Industries, Inc. A local electrician familiar with industrial equipment and local codes should install the electrical items. Wiring from the controls to the motor and switches should be sized for the amperage rating on the electrical device. All electrical components must be in accordance with current guidelines and codes.
13. Some systems will have additional equipment to wire and check. All items must be checked to insure proper direction of rotation.
14. Test-run the fan. If any unusual noises or vibration occurs, disconnect and lock-out the power. Open the equipment, manually rotate the rotor and inspect for touching or rubbing. The fan outlet must remain free and clean at all times; otherwise dangerous operating conditions may occur, causing damage to equipment and/or personnel.
15. Reassemble items removed during inspection and remove lock-out for operation.

## SLAB MOUNTED UNITS

A correctly designed and level concrete foundation provides the best means of installing floor-mounted fans. The mass of the base must maintain the fan/driver alignment, absorb normal vibration, and resist lateral loads. The overall dimensions of the concrete base should extend at least six inches beyond the outline of the fan base. The weight of the slab should be two to three times the weight of the rotating assembly, including the motor. The foundation requires firmly anchored fasteners, such as the anchor bolts shown in Figure 2. Hammer drilled expansion fasteners can be used in less demanding applications.



Move the fan to the mounting location and lower it over the anchor bolts, leveling the fan with shims around the bolts. Fasten the fan securely. If grouting is used, shim the fan at least  $\frac{3}{4}$  inch from the concrete base (Figure 2).

## STRUCTURAL STEEL MOUNTED UNITS

When an elevated or suspended structural steel platform is used, it must have sufficient bracing to support the unit load and prevent side sway. The platform should be of welded construction to maintain permanent alignment of all members.

## V-BELT DRIVE

On arrangement #9, 9F and 9FB fans, the V-belt drive is normally factory installed. In some cases, the drive is removed to facilitate the installation of the fan or the customer provides the drive. The following procedure should be used to mount the V-belt drive.

## INSTALLATION

1. Remove all foreign material from the fan and motor shafts. Coat both shafts with machine oil for easier mounting. Mount the belt guard back plate at this time if it is not already in place.
2. Mount the sheaves onto the shafts, checking the sheave bores and bushings for nicks or burrs. Avoid using force. If resistance is encountered, lightly polish the shaft with crocus cloth until the sheave slides on freely. Tighten tapered bushing bolts sequentially so that equal torque is applied to each.
3. Adjust the motor on its base to a position closest to the fan shaft. Install the belts by working each one over the sheave grooves until all are in position. Never pry the belts into place. On Kice arrangement #9, 9F or 9FB fans, sufficient motor adjustment is provided for easy installation of the proper size belts.
4. Adjust the sheaves and the motor shaft angle so that the sheave faces are in the same plane. Check this by placing a straightedge across the face of the sheaves. Any gap between the straightedge and sheave faces indicates misalignment. Important: This method is only valid when the width of the surface between the belt edge and the sheave face is the same for both sheaves. When they are not equal, or when using adjustable pitch sheaves, adjust so that all belts are approximately equal tension. Both shafts should be at right angles to the center belt.

## BELT TENSIONING

1. Check belt tension with a tensioning gauge and adjust the tension using the motor rail adjustment screws. Excess tension shortens bearing life while insufficient tension shortens belt life, can have adverse effects on fan performance, and may cause vibration. The lowest allowable tension is that which prevents slippage under full load. Belts may slip during start-up, but slippage should stop as soon as the fan reaches full speed. For more precise tensioning methods, consult the drive manufacturer's literature.
2. Recheck setscrews, rotate the drive by hand and check for rubbing, and reattach the belt guard.
3. Belts tend to stretch somewhat after installation. Recheck tension after several days of operation. Check sheave alignment, as well as setscrew and/or bushing bolt tightness.

**COUPLING (DIRECT DRIVE)**

On arrangement #8 fans, the motor is direct coupled to the fan shaft. Coupling alignment should be checked after installation and prior to start-up. Alignment is set at the factory, but shipping, handling and installation can cause misalignment. Also, check for proper coupling lubrication. For details on lubrication and for alignment tolerances on the particular coupling supplied, see the manufacturer's installation and maintenance supplement in the shipping envelope.

**INSTALLATION**

1. Most Kice arrangement #8 fans are shipped with the direct drive coupling factory installed. In some cases however, either the motor is removed to facilitate the installation of the fan or the customer provides the motor. The following procedure should be used to install the coupling.
2. Remove all foreign material from the fan and motor shafts and coat both shafts with machine oil for easier mounting of the coupling halves.
3. Mount the coupling halves onto each shaft, setting the gap between the faces as specified by the coupling manufacturer. Avoid using force. If mounting difficulty is encountered, lightly polish the shaft with crocus cloth until the halves slide on freely.

**ALIGNMENT**

1. Align coupling to within manufacturer's limits for parallel and angular misalignment (see Figure 3 below). A dial indicator can also be used for alignment where greater precision is desired. Adjustments should be made by moving the motor to change the shaft angle, and by the use of foot shims to change the motor shaft height. Do not move the fan shaft or bearing.
2. When correctly aligned, install the flexible element and tighten all the fasteners associated with the coupling and the motor base.
3. Recheck the alignment and the gap after a short period of operation, and recheck the tightness of all the fasteners in the coupling assembly.

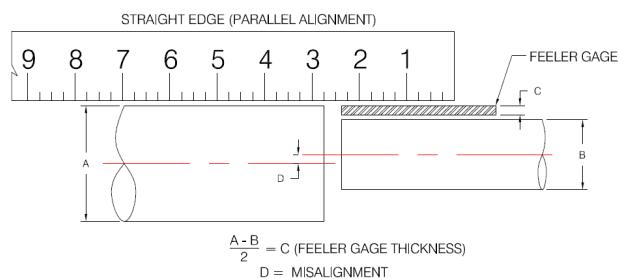


Figure 3

## FAN BALANCING AND OPERATING INFORMATION

Kice Industrial Fans are tested and adjusted before commissioning to validate design and operational requirements as a final quality assessment. Each rotor has been dynamically balanced during fabrication to conform to Kice vibration standards. Kice fan wheels are unique in that the wheel utilizes a hub with a split taper bushing to insure concentric placement on the shaft and to insure that the wheel will retain its balance (See the Fan Maintenance section for installation instructions).

It is not always practical for the manufacturer to perform a final assembly test run for vibration levels. Therefore, though the impeller may have been balanced by the manufacturer, the customer is not assured of a smooth-running assembled fan until the drive and/or driver are connected to the fan shaft and the unit is tested for start-up vibration. Kice also cannot be responsible for the effects of vibration of drive components added after factory test run and shipment.

### START-UP

Safe operation and maintenance includes the selection and use of appropriate safety accessories for the specific installation. This is the responsibility of the system designer and requires consideration of the equipment location and accessibility, as well as adjacent components. All safety accessories must be installed properly prior to start-up.

Safe operating speed is a function of air temperature and wheel design. Do not, under any circumstances, exceed the maximum safe fan speed published in the Kice Fan Performance bulletin, which is available from Kice Industries, Inc. Kice fan performance characteristic curves and fan speed guidelines can also be found on our website at <http://www.kice.com/Product-CentrifugalFans.html> .

### PROCEDURE

1. If Kice did not supply the drive components, verify with the manufacturer that the starting torque is adequate for the speed and inertia of the fan.
2. Inspect the installation prior to starting the fan. Check for any loose items or debris that could be drawn into the fan or dislodged by the fan discharge. Check the interior of the fan as well. Turn the wheel by hand to check for binding.
3. Check drive installation and belt tension.
4. Check the tightness of all setscrews, nuts and bolts. When furnished, tighten hub setscrews or bolts to the proper torque.
5. Install all remaining safety devices and guards. Verify that the supply voltage is correct and wire the motor. **“BUMP”** the starter to check for proper wheel rotation.
6. Test the unit for start-up vibration levels.
7. Use extreme caution when testing the fan with the ductwork disconnected. Apply power and check for unusual sounds or excessive vibration. If either exists, see the Troubleshooting section of this manual. To avoid motor overload, do not run the fan for more than a few seconds if the ductwork is not fully installed. On larger fans, the normal operating speed may not be attained without motor overload, unless the ductwork is attached. Check for correct fan speed and complete the installation. Ductwork and guards must be fully installed for safety.

If a problem is detected, **SHUT THE FAN DOWN IMMEDIATELY**. Lock out the electrical supply. Check carefully for the cause of the trouble and correct as necessary.

After a brief period of operation (even if the fan appears to be operating satisfactorily), shut down the fan, lock out the electrical supply and recheck the following items:

1. Check and tighten all hold-down (securing) fasteners on the feet of the fan base.
2. Spin the fan wheel by hand to see if rotation is free and does not bind or rub.
3. Inspect the fan wheel to see if it is rotating the proper way for the fan housing.
4. Check all setscrews tighten as necessary.
5. Check V-belt drive or coupling for alignment – check belt tension and adjust if necessary.
6. Check V-belt drive for proper sheave selection and placement (make sure the sheaves are not reversed).
7. Properly secure all safety guards.
8. Secure all access doors to the fan housing and the ductwork.

The fan may now be put into operation. However, during the first eight hours of operation, it should be periodically observed and checked for excessive vibration and noise. At this time, checks should also be performed on the motor input current and the motor and fan bearing temperatures to insure that they do not exceed the manufacturer's recommendations.

After eight hours of satisfactory operation, the fan should be shut down and the power locked out in order to check the following items and adjust if necessary:

1. Check and tighten all hold-down (securing) fasteners on the feet of the fan base.
2. Check all setscrews and tighten as necessary.
3. Check V-belt drive or coupling for alignment – check belt tension and adjust if necessary.
4. Properly secure all safety guards.

After twenty-four hours of satisfactory operation, the fan should be shut down and the power locked out in order to check belt tension and adjust if necessary.

## 5. FAN MAINTENANCE

Kice fans are manufactured to high standards with quality materials and components. Proper maintenance will ensure a long and trouble free service life.



**Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked out. In many cases, a fan wheel can windmill despite the removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.**

The key to good fan maintenance is regular and systematic inspection of all fan parts. Inspection frequency is determined by the severity of the application and local conditions. Strict adherence to an inspection schedule is essential. Regular fan maintenance should include the following:

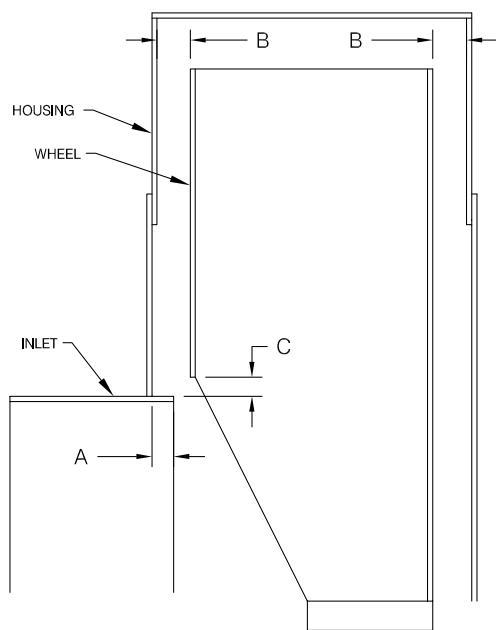
1. Regularly check all components that can corrode, and as a consequence result in contact between rotating parts and fixed parts.
2. Check the fan wheel for any wear or corrosion, as this can cause catastrophic failures. Check also for the buildup of material that can cause the wheel to be unbalanced, resulting in vibration, bearing wear and serious safety hazards. Clean or replace the wheel as required.

**NOTE: Shut the fan down immediately if there is any sudden increase in fan vibration, fan noise or visible deformation in the fan housing.**

3. Check the V-belt drive for proper alignment and tension (see V-belt Drive under Section 4 of this manual). If the belts are worn, replace them as a set, matched to within manufacturer's tolerances. Lubricate the coupling of direct-driven units and check for alignment (see Coupling under Section 4 of this manual).
4. Lubricate the fan bearings, but do not over lubricate (see Lubrication under this section for detailed specifications).
5. Hot surfaces and gaps between rotating parts must be regularly cleaned with a vacuum cleaner and/or an antistatic cloth so that dust cannot deposit on the housing and create a potential ignition source.
6. Felt shaft seals require no maintenance, although worn seals should be replaced. When lip-type shaft seals are provided, lubricate them with an anti-seize compound.
7. If the fan has different operating category classifications inside and out, the seals forming part of the housing need to be regularly inspected for damage and replaced if necessary.
8. When performing any fan maintenance, please refer to the table of recommended hardware torque specifications (Section 8) when re-assembling equipment. For wheel hub bolt torque recommendations, see the wheel hub bolt torque table in this section. All setscrews and bolts should be checked for tightness during maintenance activity.
9. When installing a new wheel or inlet section, the proper wheel to inlet clearance must be maintained (see Figures 4 and 5 for correct dimensions for full width wheels).
10. Any monitoring devices supplied with the fan (such as automated temperature and vibration monitoring systems), need to be regularly inspected.
11. See the Illustrated Parts List (Section 9) in this manual for a detailed replacement part listing.
12. Maintenance intervals for Kice Fans vary depending on the fan application. Please contact Kice Industries, Inc. for any further information regarding fan maintenance interval requirements.

FC Series Fans				FA Series Fans				
Fan Size	A	B	C	Fan Size	A	B	C	D
<b>FC 5</b>	1/2"	13/16"	3/8"	<b>FA 18</b>	7"	1/8"	4 7/8"	1 5/8"
<b>FC 7</b>	1/2"	9/16"	1/2"	<b>FA 22</b>	8 1/4"	1/8"	6 3/16"	1 3/4"
<b>FC 9</b>	1/2"	13/16"	9/16"	<b>FA 24</b>	9 1/4"	1/8"	7 5/16"	1"
<b>FC 11</b>	1/2"	3/4"	9/16"	<b>FA 27</b>	10 1/8"	1/8"	7 3/8"	2"
<b>FC 13</b>	1/2"	3/4"	9/16"	<b>FA 30</b>	11 1/4"	1/8"	8 5/16"	2 5/8"
<b>FC 15</b>	1/2"	13/16"	5/8"	<b>FA 33</b>	12 1/4"	1/8"	9 3/8"	2 7/8"
<b>FC 17</b>	1/2"	25/32"	11/16"	<b>FA 36</b>	13 3/8"	3/16"	10 5/16"	3 7/16"
<b>FC 19</b>	1/2"	25/32"	5/8"	<b>FA 40</b>	14 3/4"	3/16"	11 1/2"	3 11/16"
<b>FC 21</b>	1/2"	25/32"	5/8"	<b>FA 44</b>	16 1/4"	3/16"	12 13/16"	4 1/16"
<b>FC 23</b>	1/2"	25/32"	3/4"	<b>FA 49</b>	17 7/8"	3/16"	14 1/16"	4 1/2"
<b>FC 26</b>	1"	1 5/16"	13/16"	<b>FA 54</b>	19 3/4"	1/4"	15 11/16"	4 9/16"
<b>FC 29</b>	1"	1 13/16"	3/4"	<b>FA 60</b>	21 3/4"	1/4"	17 15/16"	4 1/16"
<b>FC 33</b>	2"	1 13/16"	13/16"	<b>FA 66</b>	24"	1/4"	19 1/2"	5"
<b>FC 37</b>	2"	1 7/8"	1"	<b>FA 73</b>	26 1/2"	1/4"	21 15/16"	4 13/16"
<b>FC 41</b>	2"	2 1/16"	1"					
<b>FC 45</b>	2"	2 1/8"	1"					

Figure 4



FA Series Fans

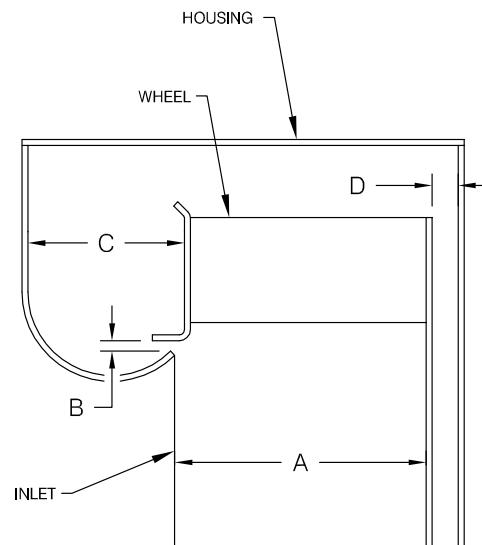


Figure 5

Fan Size	A	B	C	Fan Size	A	B	C	D
<b>FC 5</b>	1/2"	13/16"	3/8"	<b>FA 18</b>	7"	1/8"	4 7/8"	1 5/8"
<b>FC 7</b>	1/2"	9/16"	1/2"	<b>FA 22</b>	8 1/4"	1/8"	6 3/16"	1 3/4"
<b>FC 9</b>	1/2"	13/16"	9/16"	<b>FA 24</b>	9 1/4"	1/8"	7 5/16"	1"
<b>FC 11</b>	1/2"	3/4"	9/16"	<b>FA 27</b>	10 1/8"	1/8"	7 3/8"	2"
<b>FC 13</b>	1/2"	3/4"	9/16"	<b>FA 30</b>	11 1/4"	1/8"	8 5/16"	2 5/8"
<b>FC 15</b>	1/2"	13/16"	5/8"	<b>FA 33</b>	12 1/4"	1/8"	9 3/8"	2 7/8"
<b>FC 17</b>	1/2"	25/32"	11/16"	<b>FA 36</b>	13 3/8"	3/16"	10 5/16"	3 7/16"
<b>FC 19</b>	1/2"	25/32"	5/8"	<b>FA 40</b>	14 3/4"	3/16"	11 1/2"	3 11/16"
<b>FC 21</b>	1/2"	25/32"	5/8"	<b>FA 44</b>	16 1/4"	3/16"	12 13/16"	4 1/16"
<b>FC 23</b>	1/2"	25/32"	3/4"	<b>FA 49</b>	17 7/8"	3/16"	14 1/16"	4 1/2"
<b>FC 26</b>	1"	1 5/16"	13/16"	<b>FA 54</b>	19 3/4"	1/4"	15 11/16"	4 9/16"
<b>FC 29</b>	1"	1 13/16"	3/4"	<b>FA 60</b>	21 3/4"	1/4"	17 15/16"	4 1/16"
<b>FC 33</b>	2"	1 13/16"	13/16"	<b>FA 66</b>	24"	1/4"	19 1/2"	5"
<b>FC 37</b>	2"	1 7/8"	1"	<b>FA 73</b>	26 1/2"	1/4"	21 15/16"	4 13/16"
<b>FC 41</b>	2"	2 1/16"	1"					
<b>FC 45</b>	2"	2 1/8"	1"					

Bushing Size	Bolt Size	Torque
HP1	3 ea. 5/16 x 1	192 in.lbs.
Q1 & Q2	3 ea. 3/8 x 1 1/4	348 in.lbs.
R19 & R26	3 ea. 3/8 x 1 3/4	348 in.lbs.
U33 & U41	3 ea. 5/8 x 2 3/4	1680 in.lbs.

Figure 6

Installation of a Kice fan wheel is different than most other fans because of the hub design. The Kice fan wheel uses a hub with a split taper bushing to insure accurate placement on the shaft. Using a taper hub and bushing insures that the fan wheel will be centered and the balance is the same as when it left the factory.

Check the hub and bushing and remove all foreign material from the fan shaft, the hub and the bushing. Inspect the surfaces and edges to insure that there are no burrs. Clean the machined surfaces of any grit or dirt and coat with a light film of oil. Place the fan wheel onto the shaft inside the housing. Slide the bushing onto the shaft and into the hub. Slide the wheel forward on the bushing and insert the bolts through the bushing flange into the three tapped holes in the hub. Check the wheel clearances inside the housing (see Figures 4 and 5).

Tighten each bolt in turn and then use a torque wrench to set each bolt to the proper torque (see Figure 6). To insure that the bushing and hub are properly seated, tap the fan wheel with a hammer and then retighten the bolts with a torque wrench. In most instances, the bolts will tighten another few degrees. Rotate the wheel and listen for any rubbing sound between the wheel and housing.

## BEARINGS

Any stored bearing can be damaged by condensation caused by temperature variations. Therefore, Kice fan bearings are filled with grease at the factory to exclude air and moisture. Such protection is adequate for shipment and subsequent immediate installation.

For long term or outdoor storage, mounted bearings should be re-greased and wrapped with plastic for protection. Rotate the fan wheel by hand at least every two weeks to redistribute grease on the internal bearing parts. Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution in purging, as excessive pressure can damage seals. Rotate the shaft while slowly adding grease.

## BEARING OPERATION

Verify that bearing setscrew torque is 25in.-lbs. prior to start up. Since bearings are completely filled with grease at the factory, they may run at an elevated temperature during initial operation. Surface temperatures may reach 180 degrees Fahrenheit and grease may bleed from the bearing seals. This is normal and no attempt should be made to replace lost grease. Bearing surface temperatures will decrease when the internal grease quantity reaches a normal operating level. Lubrication should follow recommended schedule.

**NOTE: Split pillow block bearings are fixed to the shaft with tapered sleeves and generally do not have setscrews.**

## BEARING LUBRICATION

Bearings should be lubricated with good quality lithium-based grease conforming to NLGI Grade 2 consistency.

Example is: Mobil – Mobilux EP2

Do not use “high temperature” greases, as many are not formulated for the high speeds associated with fan bearings.

Add grease to the bearing while running the fan or rotating the shaft by hand. Be sure all guards are in place if lubrication is performed while the fan is operating. Add just enough grease to cause a slight purging at the seals. Do not over lubricate.

**NOTE: Regular lubrication is critical to bearing life. Please refer to the bearing manual supplied for proper lubrication schedules. Please contact Kice for additional copies if needed.**

## 6. TROUBLESHOOTING GUIDE

Problem	Probable Cause/Suggested Remedies
<b>Excessive Vibration</b>  A common complaint regarding industrial fans is “excessive vibration”. Kice Industries, Inc., is careful to ensure that each fan is precisely balanced prior to shipment; however, there are many other causes for fan vibration, including:	1. Loose mounting bolts, setscrews, bearings or couplings 2. Misalignment or excessive wear of couplings or bearings 3. Misaligned or unbalanced motor 4. Bent shaft due to mishandling or material impact 5. Accumulation of foreign material on wheel 6. Excessive wear or erosion of the wheel 7. Excessive system pressure or restriction of airflow due to closed dampers 8. Inadequate structural support, mounting procedures or material 9. Externally transmitted vibration
<b>Inadequate Performance</b>	1. Fan wheel rotating in the wrong direction or installed backwards on the shaft 2. Fan wheel running too slow (drive sheaves incorrectly mounted as a slow down drive instead of speed up drive) 3. Wheel not properly centered relative to the fan inlet 4. Damaged or incorrectly installed cutoff sheet or diverter 5. Poor system design, closed dampers, air leaks, clogged filters or coils 6. Obstructions or sharp elbows near the fan inlet 7. Sharp deflection of air stream at the fan outlet
<b>Excessive Noise</b>	1. Fan operating near “stall” condition due to incorrect system design or installation 2. Vibration originating elsewhere in the system 3. System resonance or pulsation (type of cavitation) 4. Improper location or orientation of fan intake and discharge 5. Nearby sound reflecting off surfaces 6. Inadequate or faulty design of fan structural supports 7. Loose accessories or components 8. Loose V-belt drive or worn sheaves 9. Worn bearings
<b>Premature component Failure</b>	1. Prolonged or major vibration 2. Inadequate or improper maintenance 3. Abrasive or corrosive elements in the air stream or surrounding environment 4. Misalignment or physical damage to rotating components or bearings 5. Bearing failure from incorrect or contaminated lubricant or grounding through the bearing while arc welding 6. Excessive fan speed 7. Extreme ambient or air stream temperatures

## 7. SPECIAL ATEX INFORMATION

The following has been prepared in reference to EU directive 2014/34/EU, so that Kice Fans applied in locations under this directive may meet the requirements specified. **This is valid only for Arrangement 8 series fans.** Other requirements and EU directives may be applicable to fans falling within the scope of this standard. This includes, but is not limited to, DIN EN 14986 and DIN EN 13463-1, which are also referenced below.

### CENTRIFUGAL FAN CATEGORIES AND REQUIREMENTS

Fan Model	CE	ATEX
Arrangement 8	2006/42/EC	2014/34/EU
Arrangement 9	2006/42/EC	None
Arrangement 9F	2006/42/EC	None

Below is a summary of relation between categories and gas/dust zones.

ATEX Fan Category	Designed for Gas Zone	Designed for Dust Zone
1	0	20
2	1	21
3	2	22

The design chosen by Kice Industries for certification corresponds to categories 2 and 3 of the ATEX normalization. These cover gas zones 1 and 2 and dust zones 21 and 22. Specifically, Kice Fans are designed for Category 2 use internal to the fan and Category 3 external to the fan.

Kice Fans are intended for use in areas in which explosive atmospheres caused by air/dusts mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for a short period only.

When installing any electric or non-electric equipment on the Fan, be sure that all those components are suitable for being operated in zone 22, meaning they must fulfil the ATEX-requirements for Group II category 3D equipment.

Potentially dangerous situation during installation and initial start-up	Measures that must be applied by the user during installation and initial start-up
Sparking in the event of transport accidents.	The fan or the components of the fan must not be dropped during transport - not only because of the risk of personal injury but also due to the risk of sparks being produced.
Welding as a source of sparks.	Welding is not permitted in zones 0, 1 or 2. Bolted connections must be used instead.
Use of non-explosion protected tools when dismantling or assembling the fan.	Only explosion-protected, non-sparking tools must be used when dismantling or assembling the fan.
Build-up of electrostatic charges at all non-earthing (non-grounded) enclosure parts.	During on-site installation, an external grounding wire must be connected to the fans.

All components provided by the customer must be ATEX certified, category 3D (or better) suitable for use in explosion Zone 22. This includes but may not be limited to; the motor, the clutch and/or the motor coupling. The vibration sensor to be installed by the manufacturer of the overall plant must be certified at least according to 3GD ATEX, Zone 22. All service and maintenance activity for these components must be performed according to the recommendations of the OEM manufacturer.

The motor bearings must also be replaced according to the instructions of the manufacturer of the motor for use in Zone 22 (cat. 3 fans).

When installing parts inside the fan housing, hardware (nuts and bolts) must be secured with a low to medium strength thread locking compound such as Loctite®.

A zone 20 environment inside the fan must be prevented. Unless otherwise specified, the fan may only be used with filtered air (air that has passed a bag filter) to prevent a zone 20 environment inside the fan. The fan may be used as specified per the customer application (i.e. cyclone only in the case of no/low dust emission media) to prevent the zone 20 environment.

## **ELECTRICAL REQUIREMENTS**

The motor must be equipped with a PTC resistor so that it will be shut down in case of an overload situation.

Construction of the control system must be done under consideration of EN ISO 13849-1.

Electrical components must be mounted by EMC skilled specialists.

The operator or manufacturer of the facility must install an Emergency Stop circuit near the equipment, which is capable of turning off the machine immediately and securely under consideration of EN 13850. The safety circuit “EMERGENCY STOP button > safety relay > safe shut down of the drive motor (e.g. by means of motor protection switch)” must at least have performance level PL r=c according to EN ISO 13849-1.

During installation, an electrical repair switch must be installed in order to disconnect the motor, on all poles, from the power supply for service and maintenance activities to eliminate any personnel hazard. The safety circuit “repair switch > safe shutting down of the drive motor (e.g. by means of motor protection switch)” must at least have performance level PL r=c according to EN ISO 13849-1.

## **MATERIAL PAIRINGS FOR CONSTRUCTION**

Acceptable spark resistant material pairings are according to EN 14986. Naval Brass (CuZn39Sn) is preferred for Carbon and Stainless construction due to its relative resistance to tarnishing compared to Copper.

The spark resistant material must be applied to inlet cones and shaft seals, as well as linings inside belt and coupling guards of an anti-spark design. Steps shall be taken to ensure that no flying rust particles or flakes can be deposited on surfaces that may come into contact with each other. The material will be applied according to the clearance information which follows in this section. Please contact Kice Industries, Inc. for more details and diagrams pertaining to the application of the material.

## **LININGS**

If the inlet cone is not made from 100% Copper or Naval Brass, the lining must be welded or riveted into the main material.

The lining shall have a minimum thickness as indicated in the following table so that it may withstand impact or abrasion for an appreciable time.

Motor Power kW (hp)	Minimum Thickness mm (in)
≤ 11 (14.75)	2 (0.0787)
11 < X ≤ 90 (120.69)	3 (0.1181)
90 < X ≤ 250	4 (0.1575)
> 250 (335.25)	5 (0.1969)

## **VIBRATION LEVELS AND BALANCING**

Balancing levels will be to G 6.3 at minimum, though Kice fan rotors are dynamically balanced per ISO 14694:2003 grade BV-3 or better (ref. ISO 1940/1 G2.5).

Kice fan assemblies are manufactured to achieve vibration levels per ISO 14694:2003 or better (ref. ANSI 2.19/1975). According to EN ISO 14694, vibration levels should not exceed 4.5 mm/s (0.1772 in/s) if motor power is < 7.5 kW (10hp) and 7.1 mm/s (0.2795 in/s) if motor power is > 7.5 kW (10hp).

Though the impeller may have been balanced by the manufacturer, the customer is not assured of a smooth-running assembled fan until the drive and/or driver are connected to the fan shaft and the unit is tested for start-up vibration levels (per ISO 14694:2003(E), 9, 16).

## **GROUNDING (EARTHING) OF CONDUCTING PARTS**

It is normally sufficient to ground the static parts of the fan. If necessary, shaft grounding systems may be used.

## **MOTORS, SURFACE, AND FLUID TEMPERATURES**

Motors must be ATEX certified

Overheating protection can be fitted if necessary, and will be a proposed option for customers.

**It is the responsibility of the user to determine - according to the nature of the gas, mist or dust in their system - the appropriate temperature class for the fan so that the maximum surface temperature in the following table is never exceeded.**

Temperature Class	Maximum Surface Temperature
T1	450 C / 842 F
T2	300 C / 572 F
T3	200 C / 392 F
T4	135 C / 275 F
T5	100 C / 212 F
T6	85 C / 185 F

It is recommended that the fluid temperature itself never exceed 85 C, however the standard Kice Fan design will accommodate fluid temperatures up to 121 C (250 F). Above this temperature, design options can be utilized in Kice Fans to accommodate temperatures up to 260 C (500 F).

In applications involving high pressure fans, heating of the gas inside the fan due to compression will need to be considered and verified by calculation per customer application.

The temperature category outside the fan as well as inside depends on the temperature of the transported medium. Specifically, the temperature class (maximum outside surface temperature of housing) of the fan depends on the temperature of the gas flow inside the machine. The outside temperature of the fan housing is maximum at "T of gas flow inside" + "10K".

## **CASINGS**

For motor power exceeding 11kW, the fan casing has to be of fully welded construction, which is done on all Kice centrifugal ATEX and non-ATEX fans. In the event of a split casing, or for the inlet, outlet and all other joints and gaps, the fan enclosure will be sealed with a suitable sealing material, or provided with gaskets.

To facilitate fan maintenance, all fans dedicated to dust applications can be equipped with an inspection door. It will be bolted on the casing with an appropriate sealing material. Fans can also be inspected by the removal of the ductwork.

## **IMPELLERS**

Impellers must be of a fully welded type. Fans are tested in compliance with EN 14986:2007 for construction, per the application category indicated in ISO 14694:2003 with respect to fan vibration and balancing.

The fan blade configuration will also be appropriate to the air transport requirement to avoid any attachment of dust under normal conditions.

## **IMPELLER - SHAFT ATTACHMENT**

Only positive locking is accepted over 15kW. The impeller will be fixed onto the shaft with a locking device or a tapped shaft with a locking screw and washer. This connection must be regularly checked for firm seating in the scope of service activities.

**CLEARANCES BETWEEN ROTATING ELEMENTS AND FAN CASING**

The minimum clearance between rotating components such as the impeller and fixed housing shall be at least 1% of the relevant contact diameters (diameter of rotating part where it contacts the stationary part) of the finished component, but shall not be less than 2mm (.079 in.) in the axial or radial directions, nor need be more than 20mm (.79 in.). This is done to minimize potential ignition sources. See also the fan diagrams in above maintenance section.

Shaft seals are not subject to this provision.

**BEARINGS**

Bearings will be fixed by a reliable and positive locking method. (Note: Bearings must be replaced after 40,000 hrs. of operation)

**ARRANGEMENTS**

Direct Drive: The preferred arrangement, whatever the zone classification.

Direct Drive Guard: Brass lining or protection will be fitted inside the guard to prevent any spark with the drive clutch and/or coupling.

**MARKINGS**

The nameplate shall be fixed permanently to the fan and indicate: Name and address of the manufacturer, date of construction, designation or type of fan, serial or identification number, the CE mark and classification markings.



Inside: II 2D Ex h IIIB T85 °C Db 5 °C ≤ Tamb ≤ 35 °C

Outside: II 3D Ex h IIIB T85 °C Dc 5 °C ≤ Tamb ≤ 35 °C

Technical File No. 244/16

## 8. TORQUE VALUES FOR MAINTENANCE AND INSTALLATION

Recommended U.S. BOLT TORQUE*								
		SAE Grade 5	SAE Grade 5	SAE Grade 8	SAE Grade 8	Socket head cap screw	Socket head cap screw	
Bolt Dia.	Thread Size	Ib - ft	N - m	Ib - ft	N - m	Ib - ft	N - m	
1/4	20	8.4	11	12	16	11	15	
5/16	18	17	24	25	33	23	31	
3/8	16	31	42	44	59	41	55	
7/16	14	49	67	70	95	65	59	
1/2	13	74	100	110	140	100	140	
9/16	12	100	140	150	210	140	200	
5/8	11	140	190	210	290	200	270	
3/4	10	240	330	380	510	350	480	
7/8	9	390	520	610	820	570	770	
1	8	570	780	910	1100	850	1200	
1-1/8	7	790	1100	1300	1700			
1-1/4	7	1100	1500	1800	2500			
1-3/8	6	1500	2000	2400	3200			
1-1/2	6	1900	2600	3200	4300			
1-5/8	5.5	2400	3300	4300	5900			
1-3/4	5	3000	4100	5000	6800			
2	4.5	4500	6100	7500	10000			

\*Values above are approximations; consult with the manufacturer for torque data.  
Significant variation may exist within the same grade and size between manufacturers.

## 9. ILLUSTRATED PARTS LISTS

### REPLACEMENT PARTS

It is recommended that only Kice manufactured and/or supplied replacement parts be used. Kice fan parts are built to be fully compatible with the original fan, using specific alloys and tolerances. These parts carry a standard Kice warranty.

When ordering replacement parts, specify the part name, Kice fan serial number, fan model, fan size, type, configuration (viewed from the drive side), and bearing size or shaft size. Most of this information is on the metal nameplate attached to the fan housing or cheek plate.

Example:

Part required: wheel

Kice serial number: 100515

Fan model: FC19W32 Arr. #9FB

Configuration: Motor right of fan shaft, clockwise rotation, vertical up blast

Bearings: Dodge Grip Tight P2B-GTMAH-207

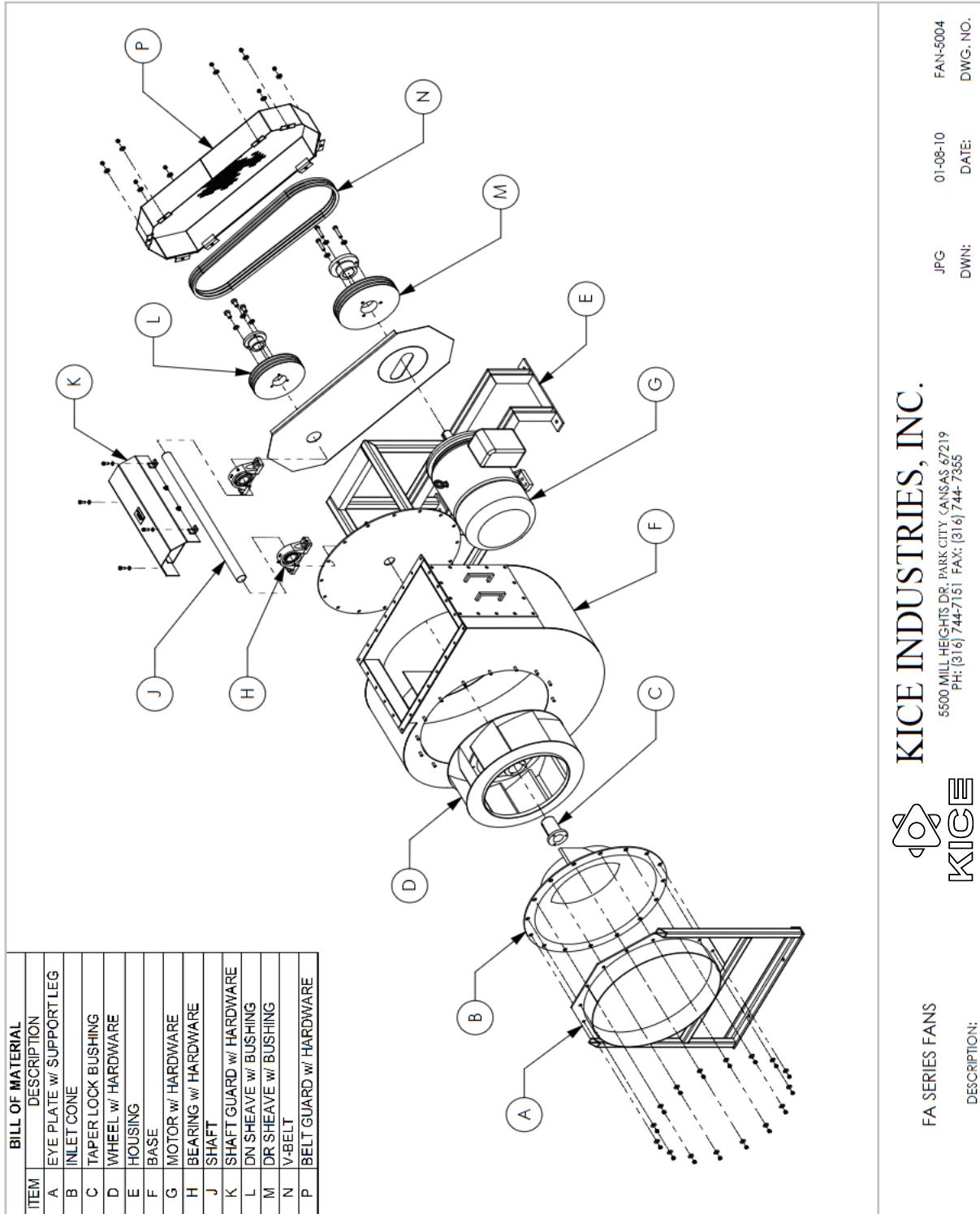
Suggested replacement parts include:

wheel

Components parts:

damper, shaft, 2 ea. bearings and the inlet and outlet isolation sleeves

BILL OF MATERIAL	
ITEM	DESCRIPTION
A	EYE PLATE w/ SUPPORT LEG
B	TAPER LOCK BUSHING
C	WHEEL w/ HARDWARE
D	HOUSING
E	BASE
F	MOTOR w/ HARDWARE
G	BEARING w/ HARDWARE
H	SHAFT
J	SHAFT GUARD w/ HARDWARE
K	DN SHEAVE w/ BUSHING
L	DR SHEAVE w/ BUSHING
M	V-BELT
N	BELT GUARD w/ HARDWARE



FA SERIES FANS  
**KICE**  
 DESCRIPTION:

**KICE INDUSTRIES, INC.**

FAN-5004  
 DWG. NO.

01-08-10  
 DATE:

5500 MILL HEIGHTS DR, PARK CITY, KS 67219  
 PH: (316) 744-7151 FAX: (316) 744-7355

JPG  
 DWG.:

**BILL OF MATERIAL**

ITEM	DESCRIPTION
A	EYE PLATE w/ SUPPORT LEG
B	TAPE LOCK BUSHING
C	WHEEL w/ HARDWARE
D	HOUSING
E	BASE
F	MOTOR w/ HARDWARE
G	SPARK RESISTANT EYE PLATE
H	SHAFT
J	SHAFT GUARD w/ BEARINGS
K	SPARK RESISTANT CHEEK PLATE
L	COUPLING GUARD w/ COUPLING
M	WHEEL RETAINING WASHER

**KICE INDUSTRIES, INC.**

**KICE**

FC #8 SERIES FANS

DESCRIPTION: FC #8 SERIES FANS

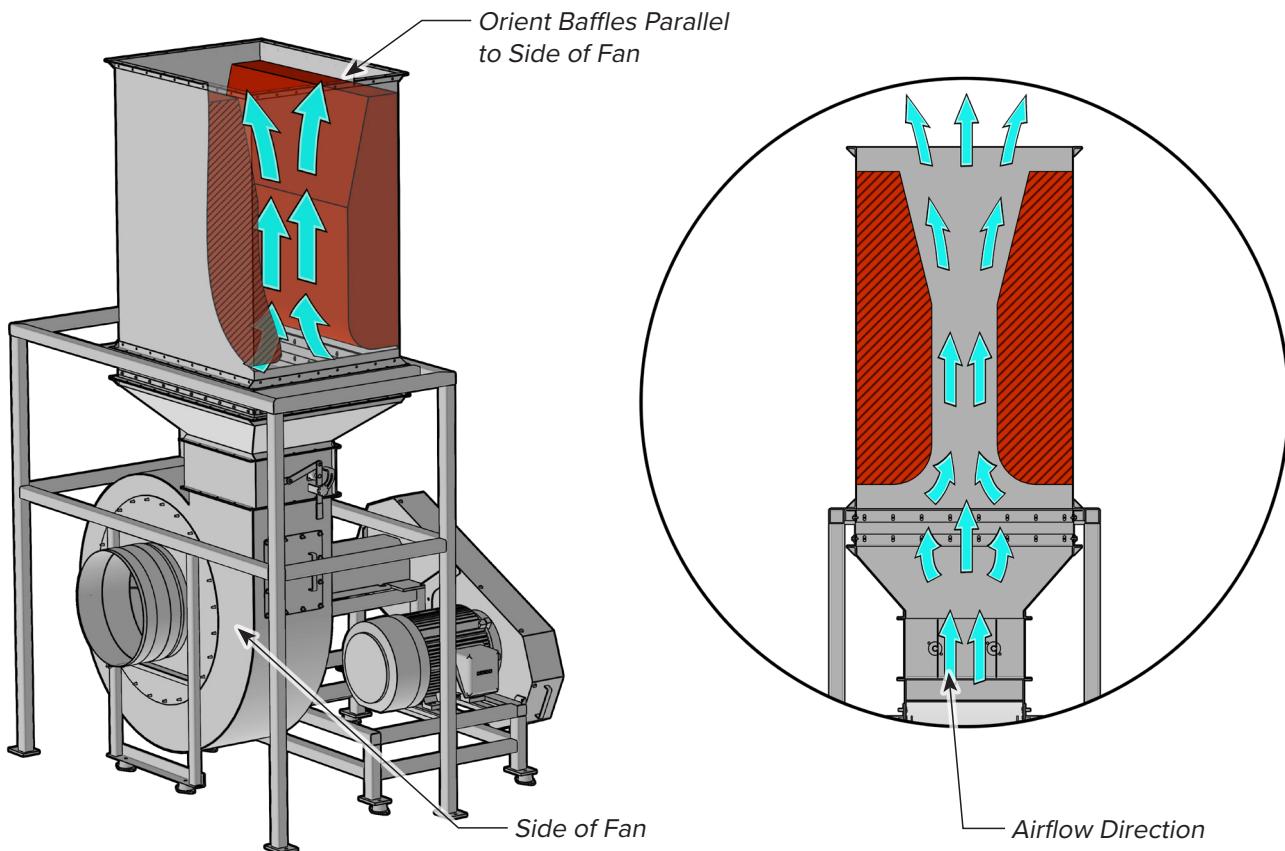
5500 MILL HEIGHTS DR. PARK CITY KANSAS 67219  
PH: (316) 744-7151 FAX: (316) 744-7355

JBR 01-09-18 FAN-5006  
DWN: DATE: DWG. NO.

## Installation Instructions



**WARNING** – Reference the equipment manual and necessary safety information prior to installing or performing maintenance on any equipment.



When installing the fan silencer it is important to note the direction of the air flow and orientation of the acoustic baffles relative to the fan housing. The air should flow through the smooth, rounded end of the baffles and out the wider, angled end of the baffle. The baffles should also be oriented to be parallel with the sides of the fan housing.

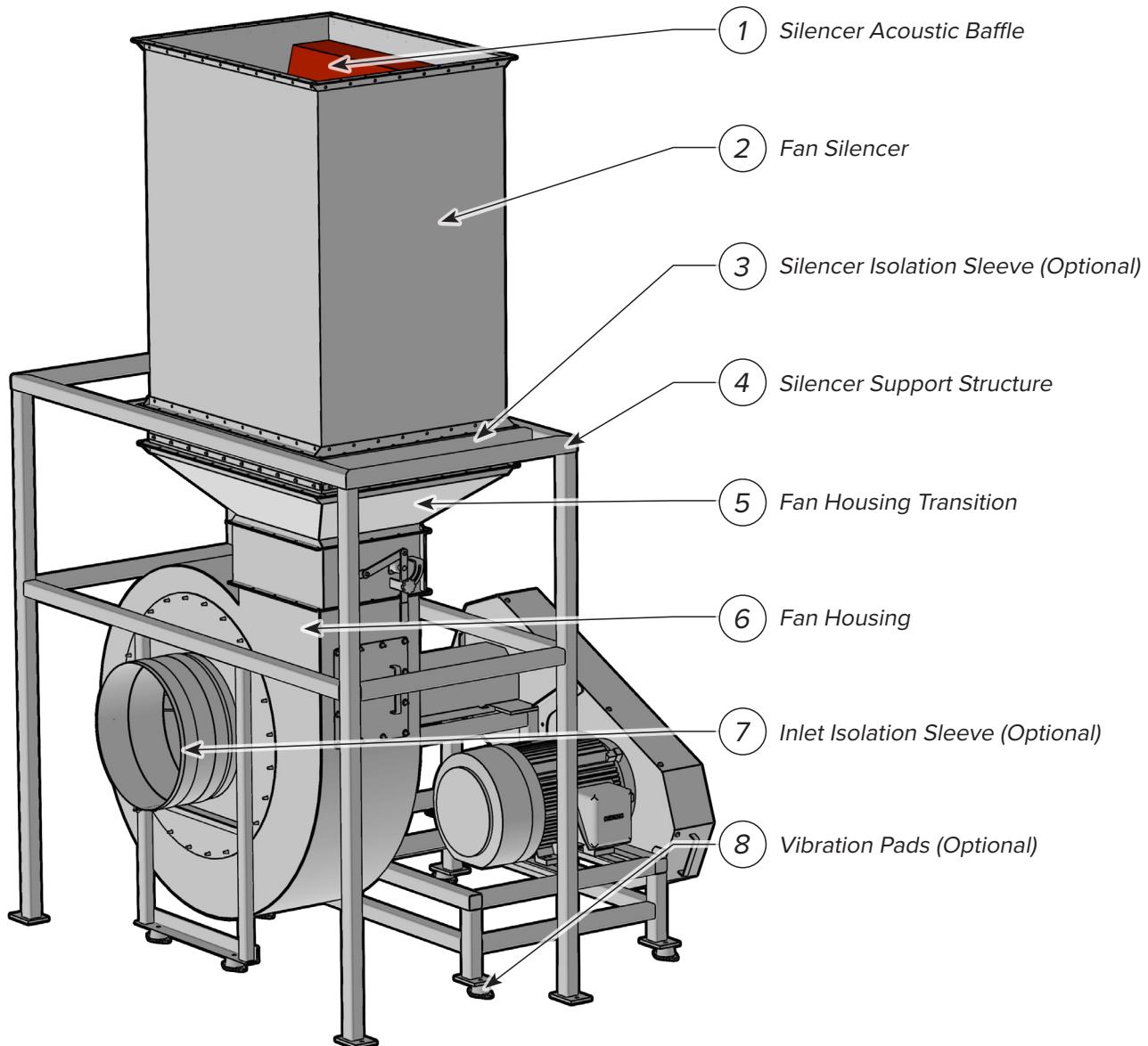


**WARNING** – If the silencer is installed with the air flow going in the wrong direction or the baffles are not oriented properly with the fan housing the silencer may be damaged during operation.

The silencer should be supported independently from the fan housing – reference item 4.

The silencer is not intended to support ductwork. Consult with Kice if additional ductwork is connected to silencer.

If the fan base is installed with vibration pads (item 8), then an isolation sleeve (item 3) should be installed between the fan housing transition (item 5) and the fan silencer (item 2), and on the fan inlet (item 7).



For questions or additional assistance, please contact the Customer Service or Quick Ship Department.

**Kice Industries, Inc.**  
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Toll Free: 877-289-5432  
Main Phone: 316-744-7151



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