



## Cyclone Collector

### 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

# INTRODUCTION

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When you purchased your Kice Cyclone, you obtained a high efficiency product cleaner of a proven 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 Cyclones.

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

Sincerely,

Drew Kice, President  
Kice Industries, Inc.

## **WARRANTY**

Limited Warranty and Limitations of Warranty: Kice warrants the equipment manufactured by Kice to be free of defects in material and workmanship for a period of one (1) year from the date of shipment. Kice agrees to repair or replace, at its discretion, any parts found to be defective in the opinion of Kice. 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, abuse or misuse 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 products manufactured by others and supplied by Kice for any alleged defects in such products 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 the written consent and approval of Kice.

## **BUYER 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 this agreement provides 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 Cyclone, along with the same information for the auxiliary equipment (i.e., fan, filter, airlock valve, etc.).

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

MODEL \_\_\_\_\_

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

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

# 1. GENERAL INFORMATION

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## TO THE NEW OWNER

The purpose of this manual is to assist owners and operators in maintaining and operating Kice Cyclone systems. Please read it carefully; information and instructions furnished can help you achieve years of dependable performance. Separate manuals are included for auxiliary equipment, such as airlock valves, fans, cyclones and filters. 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.

Along with high efficiency separation of particles, some fringe benefits are often obtained which add to the desirability of the Kice Cyclones. These benefits include:

1. Cooling of material, depending on particle size and temperature differential of air and stock.
2. Conveying of the liftings to the desired destination by the same air that lifts the fines from the stock
3. Virtually no operator or maintenance attention is required because of the simplicity of the unit. Once the air volume is adjusted to lift the desired particles, the unit will consistently remove the majority of these particles that are present in the incoming product.

General operation, adjustment and maintenance guidelines are outlined for owners and operators of Kice Cyclones. 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 disconnected through the use of a padlock, manual, power cutoff, or power lockout switch.

Directions used in this manual, for example RIGHT or LEFT, CLOCKWISE or COUNTERCLOCKWISE, refer to directions when facing the front (air inlet) side of the Cyclone or looking down in plan view.

Photographs and illustrations were current at the time of printing, but subsequent production revisions may cause your Cyclone 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 Cyclone that is not reflected in this owner's manual, please write or call Kice Industries, Inc., for current parts and information.

## GENERAL INFORMATION CONTINUED

### MODEL AND SERIAL NUMBER

The Kice Cyclone model and serial number can be found stamped on the metal identification plate located near the horizontal inlet of the Cyclone (just behind the air inlet flange).



Identification Plate Examples

### KICE CYCLONE PARTS AND SERVICES

Use original Kice Cyclone 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 model number
2. Correct serial number

For assistance in service or ordering parts, contact the customer service department at Kice Industries, Inc., 5500 Mill Heights Drive, Wichita, KS 67219-2358, Phone 316-744-7151, and Fax 316-744-7355.

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

### FOR MOTOR AND SPEED REDUCER PARTS AND SERVICE

Any motor or speed reducer associated with the Kice Cyclones is covered by the manufacturer's warranty. If there is a problem, check with the local supplier or service representative.

## 2. SAFETY PRECAUTIONS

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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 Cyclone 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.

## **SAFETY PRECAUTIONS CONTINUED**

### **ADDITIONAL CYCLONE SAFETY PRECAUTIONS**

1. Do not attempt to install, operate or service your new Cyclone without proper instruction and until you have been thoroughly trained in its use by your employer.
2. The unit must be lifted by a means with sufficient lifting capacity.
3. The cyclone is fully encapsulated if properly connected during installation.
4. Operate the cyclone (including upstream and downstream components) only after all pipes or hoses have been connected.
5. When installed, the unit must be separately grounded.
6. Do not manually override or electrically bypass any protective device.
7. If the Cyclone 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 associated with 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.
8. 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.
9. 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.
10. 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 Cyclone.
11. 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 Cyclone.
12. Never allow any kind of metal or other foreign objects to enter a Cyclone while in operation, unless the system is specifically designed as a wire or metal reclaim system.
13. The Kice Cyclone has no moving parts. Therefore, access into the machine is not restricted. However, in some installations, there is a machine discharging material from the Cyclone. The accessory machinery feeding and discharging the material may be dangerous to personnel working on or around the Cyclone.
14. Operate safely at all times. Use personal protective equipment when and where appropriate, such as hard hats, helmets, gloves, earplugs, and eye protection devices. Keep personal protective equipment in good repair and convenient to the operator.
15. When carrying out cleaning, service or maintenance activities a dust mask should be worn.
16. The operator of the cyclone must ensure that adequate lightning conditions are provided at the set-up location.
17. 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.
18. There is a separate ignition source analysis for the Cyclone, where all dangers concerning explosion protection are considered.

**WORK SAFELY AT ALL TIMES**

### 3. CYCLONE INFORMATION AND OPERATING INSTRUCTIONS

#### RECEIVING AND INSPECTION

Kice Industries, Inc. has prepared your new Cyclone 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 Kice Cyclone and accessory equipment should be inspected upon receipt for any shipping damage. 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 **any claim must be made against the carrier by the purchaser**. 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.

#### CYCLONE HANDLING AND STORAGE

Kice cyclones 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 cyclones that are shipped separately (knocked down) will be clearly labeled for reassembly.

If the cyclone 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 inlets and outlets to prevent the accumulation of dirt and moisture inside the housing. Refer to the cyclone maintenance section of this manual regarding any further storage instructions.

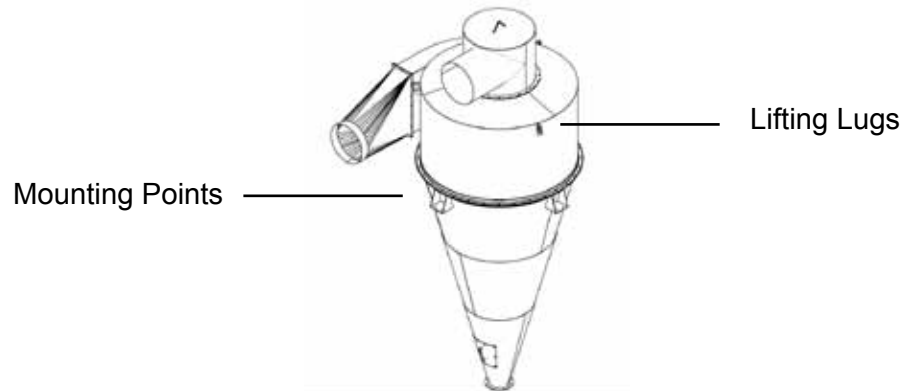


## CYCLONE INFORMATION AND OPERATING INSTRUCTIONS CONTINUED

### CYCLONE INSTALLATION

To ensure appropriate cyclone operation, the unit must be adequately supported and properly installed.

**After unpacking and inspection has been completed, install the Cyclone with the following guidelines:**



The Cyclone has locations where the equipment necessary for lifting the device can be attached. These will be the lifting lugs and/or the frame mounts of the cyclone where it will be attached to a support structure (see figure above).

Lifting the cyclone at any other point is hazardous and may compromise human safety as well as the structural integrity of cyclone itself.

The cyclone must be lifted by a means with sufficient lifting capacity.

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

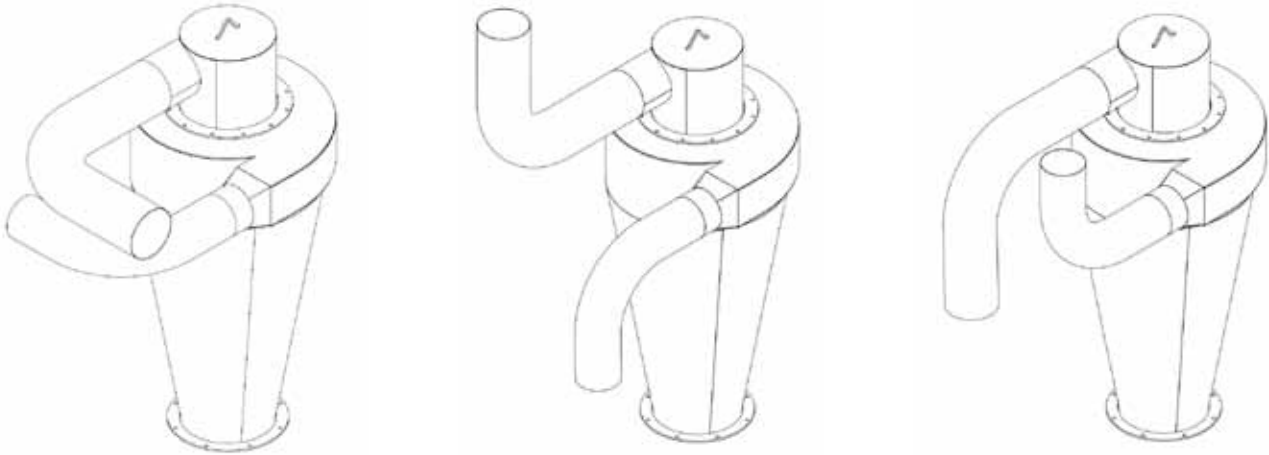
Kice Cyclones may be supported in two different ways. Smaller cyclones may be designed to be supported by the duct work or machinery connected to them, but most are designed with frame mounts in order to be supported by an additional structure or framework (see figure above). The unit should only be mounted on a structure designed to support it. The cyclone must be separately grounded, and installed on steel construction intended for this purpose. Product inlet or outlet transitions are not designed to support the weight of accessory equipment such as an airlock valve. If the unit is installed outdoors, cross bracing from the angle iron frame may be required for wind loading connections. The Cyclone should be installed in a level position, to prevent material from flowing to one side of the unit, thereby ensuring proper and efficient operation. Remove all foreign material before fully enclosing and operating the cyclone.

Place a bead of caulking (or any provided gasket material) to seal the inlet and outlet points of the cyclone during installation.

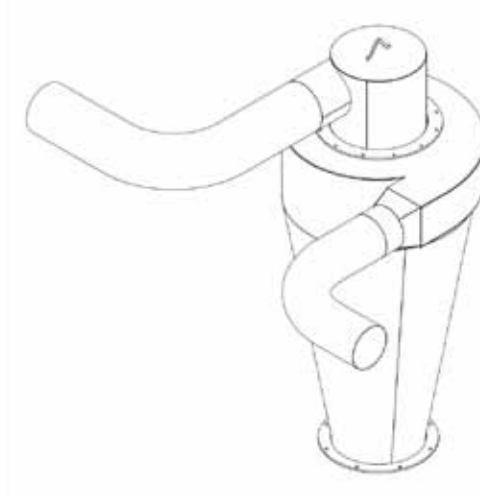
Proper installation of the cyclone also includes assembling the duct work and required machinery to the cyclone, fully enclosing it for quality operation. The unit should only be operated once it is properly connected and fully encapsulated. All duct work or stacks should be independently supported as excess weight may distort the cyclone assembly, causing improper airflow which may affect the efficiency of the unit, and all subsequent points in the system.

## CYCLONE INFORMATION AND OPERATING INSTRUCTIONS CONTINUED

NOTE: To ensure proper operation and optimum cyclone efficiency, inlet and outlet ductwork design is critical. The ductwork should have a length of straight section from the inlet and outlet of the cyclone that is at least five times the diameter of the duct. If this not possible, elbows in the ductwork should be oriented in a manner that refrains from countering the air rotation inside the cyclone. This will help maintain efficiency. Some acceptable examples include:



An unacceptable example would include:



Also to ensure proper rotation, verify the cyclone outlet is opposite the inlet on the cyclone body as shown in the above figures.

## CYCLONE INFORMATION AND OPERATING INSTRUCTIONS CONTINUED

### GENERAL OPERATING INFORMATION

The Kice Cyclone classifies dry particles on the basis of terminal velocity. It can make precise separations of particles having differences in terminal velocities. A particle having a lower terminal velocity will be picked up by air moving at a lower velocity than will a particle having a higher terminal velocity

As the airflow is increased, particles having higher and higher terminal velocities are removed. The system should be designed with sufficient fan capacity so that the operator is able to remove more material than required. Fine-tuning the system can be accomplished by adjusting the airflow by use of a damper to that which corresponds to or exceeds the terminal velocity of all of the particles that are desired to be removed from the product stream.

Since the terminal velocity of a particle is influenced by, not only the size of the particle, but also its shape and density, there are instances where small dense particles are lifted at the same airflow as large winged particles. Separation of these particles that have the same terminal velocity, but different size and shape, can be improved by a Kice Multi-Aspiration system, or by sifting (screening). The flow and arrangement of the equipment must be determined by the operator for each product and for each system on an individual basis.

### AIR VOLUME

The air volume required for the Cyclone for a specific material is determined by testing or experience, and is engineered into the system by the designer. After installation, the air volume is fine tuned by observing the material as the air volume is varied by adjusting the damper provided with the fan.

## 4. START-UP PROCEDURE

1. Insure that all personnel are clear of any moving pieces of equipment.
2. Start the motors on the Cyclone accessory equipment, such as fans, filters and airlock valves.
3. Start any conveying equipment mounted beneath the discharge of the Cyclone.
4. Start the material feeding into the system.
5. Begin opening the fan damper until excessive material (that has a higher terminal velocity than the material slated to be removed) is detected in the output stream. The determination of what material is to be removed will be made by the system operator.
6. Slightly decrease the airflow by slowly closing the fan damper and lock the damper in place at the optimum setting.

## 5. CYCLONE MAINTENANCE

There are no moving parts in the Kice Cyclone to wear out or malfunction, so no lubrication or periodic servicing is required. Kice Cyclones are designed and built in a manner such that all wall thicknesses are sufficient to the point that danger due to wear and tear can be excluded. However, elbows, fans and separators in the system are subject to the normal wear expected in any system handling comparable stocks, so equipment must be examined regularly for signs of wear and damage. Painted surfaces must be cleaned by means of vacuuming and with an anti-static cloth. If heavy machine components must be dismantled to carry out service and maintenance activities, suitable lifting equipment must be used. Use the proper hardware torque values listed at the end of this manual for all maintenance and installation activity.

## 5. CYCLONE MAINTENANCE CONTINUED

1. The cyclone inlet, barrel and cone for signs of wear and damage.
2. The cyclone door & connections (if equipped) for a proper seal.
3. The proper function of the rotary airlock valve attached to the cyclone, to verify that material is adequately removed to maintain cyclone efficiency. The airlock may need to be inspected for signs of wear (see rotary airlock manual).
4. Material buildup inside the cyclone which may affect function and efficiency.

Painted surfaces must be cleaned by means of vacuuming and with an anti-static cloth.

As a means to verify or troubleshoot cyclone efficiency, air volume can be measured and checked against the air system specifications as well.

If heavy machine components must be dismantled to carry out service and maintenance activities, suitable lifting equipment must be used. Use the proper hardware torque values listed at the end of this manual for all maintenance and installation activity.

## 6. SPECIAL ATEX INFORMATION

The Cyclone is 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 cyclone, be sure that all those components are suitable for being operated in zone 22, meaning they must fulfill the ATEX-requirements for Group II category 3D equipment.*

<b><i>Potentially dangerous situation during installation and initial start up</i></b>	<b><i>Measures that must be applied by the user during installation and initial start up</i></b>
Sparking in the event of transport accidents.	The cyclone or the components of the cyclone 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 cyclone.	Only explosion-protected, non-sparking tools must be used when dismantling or assembling the cyclone.
Build-up of electrostatic charges at all non-earthed (non-grounded) enclosure parts	During on-site installation, an external grounding wire must be connected to the cyclone.

## 7. TORQUE VALUES FOR MAINTENANCE AND INSTALLATION

<b>Recommended U.S. BOLT TORQUE</b> <i>Coarse thread only</i>							
		SAE Grade 5	SAE Grade 5	SAE Grade 8	SAE Grade 8	Socket head cap screw	Socket head cap screw
Bolt Dia.	Thread Size	lb - ft	N - m	lb - ft	N - m	lb - 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	88
1/2	13	74	100	110	140	100	135
9/16	12	100	140	150	210	140	190
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	1150
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.

## 8. ADDITIONAL EQUIPMENT FROM KICE INDUSTRIES, INC.

### **CENTRIFUGAL FANS - FANS FOR EVERY INDUSTRIAL NEED**

Kice fans are durable – built to run around the clock and the calendar, consistently delivering high performance under tough conditions. Four series of versatile workhorse fans are available, including fans and pressure vacuum service operating at both normal and high-pressure differentials.

### **BAGHOUSE FILTERS - FULL LINE OF FILTERS/COLLECTORS FOR INDOOR OR OUTDOOR USE**

Five series of high-ratio filters cover most every type of application. They are available in round, square and modular design for capacity, in a large range of sizes. Kice offers an unexcelled selection of filtering materials.

### **POSITIVE DISPLACEMENT BLOWERS - AIR POWERED UNITS FOR PNEUMATIC CONVEYING SYSTEMS**

Kice manufactures a quality line of positive displacement air pump power units. They utilize either positive or negative air pressure to convey materials through a pneumatic system. Pressures, motor sizes and options are matched to your system requirements. A full range of Kice fabricated accessories is available.

### **MULTI-ASPIRATORS - COVERS WIDE RANGE OF INDUSTRIAL APPLICATIONS**

Kice has developed a line of aspirators for use in the feed and grain, plastics powder/bulk solids industries in a wide range of sizes and capacities. Models include the Multi-Aspirator, the Portable Aspirator and the Mini-Aspirator. Applications include cleaning, testing, separation, and sizing.

### **DUST DUCT - DUCTWORK AND FITTING STANDARDS**

System of pre-engineered piping standards developed especially for air pollution and dust control. Catalog numbering system simplifies design and ordering. Equipment is of solid, sanitary construction, with a smooth aerodynamic design.

### **ROTARY AIRLOCKS - WORLD'S MOST COMPLETE LINE OF ROTARY AIRLOCKS**

Kice builds nearly 100 basic types of airlocks, with thousands of variations available to fit most any pneumatic conveying requirement. Special designs are available for handling difficult materials, high temperatures and high positive and negative pressures. A wide range of capacities is available in both drop-thru and injector series.



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