Bulletin 40-02-June 2013

M.K. Plastics CORPORATION
SERVING THE NEEDS OF MODERN INDUSTRY

DHK & DHK-NW
Centrifugal Fiberglass Fan

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Introduction
This bulletin contains the proper installation, operation and maintenance procedures for the standard DHK & DHK-NW Medium to High Pressure Centrifugal Fiberglass Fan, to ensure safe and trouble-free fan operation.

The M.K. Plastics catalog on the above corrosion resistant FRP fan, provides additional information describing the equipment, fan performance, available accessories, and specifications.

For additional safety information, refer to AMCA publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans.

For Information on special fan application requirements, contact M.K. Plastics corporate office at (514) 871-9999.

Receiving and Inspection
All M.K. Plastics fans are carefully inspected before leaving the factory. Compare all components with the bill of lading or packing list to verify that the proper unit was received. Check each unit for any damage that may have occurred in transit. Mishandled units can void the warranty provisions. If units are damaged in transit, it is the responsibility of the receiver to make all claims against the carrier. M.K. Plastics is not responsible for damages incurred during shipment.

WARNING
This unit has rotating parts. Safety precautions should be exercised at all times during installation, operation, and maintenance.
ALWAYS disconnect power prior to working on fan.

Handling
Fans are to be hoisted and moved by the lifting lugs provided on the fan (see Figure 1). Location of lugs & brackets varies by fan size and arrangement. Fans can also be hoisted with slings placed around the fan housing. When a single hoist is used, a "spreader" will keep the sling from slipping on the housing. Large units may have lifting lugs or holes which should be used only to stabilize the unit while using a sling to support the weight.

Chain or wire slings should be well-padded where they contact the fan as not to cause damage to the fiberglass surface. Fans should never be lifted by the shaft, fan housing, motor, belt guard, damper, weather hood, inlet & outlet flanges or any other accessories.

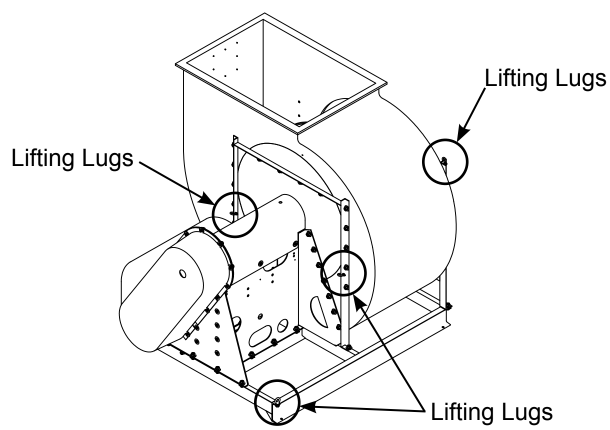


Figure 1.
Lifting Using the Lifting Lugs

Storage
If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the fan and accessories while in storage. M.K. Plastics will not be responsible for damage during storage.

Store in a dry, protected area being sure fan shaft, bearings and impeller are protected against dust and corrosion. If it is necessary to store outdoors or within a building under construction, special care must be taken to prevent moisture, dirt or dust accumulation. Coat the shaft with grease or rust preventative compound. Cover and seal bearings to prevent entrance of contaminants. Impeller should be rotated at least once a month to circulate the grease in bearings. If stored outdoors, cover completely with a tarp or heavy plastic wrap. Electrical connections and leads must be protected from moisture. Block impeller to prevent natural rotation. Do not allow material of any kind to be piled on top or inside of fan.

Pre-Installation

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

Inlet & Outlet Fan Installation

Efficient fan performance relies on the proper installation of inlet and discharge ducts. Installations with poor inlet or discharge configurations may result in reduced performance. Restricted or unstable flow at the fan inlet can cause pre rotation of incoming air or uneven loading of the fan wheel resulting in increased system losses and sound levels. Free discharge or turbulent flow in the discharge ductwork will also result in system losses. Make sure the following recommendations are followed.

Inlet Duct Turns

Installation of a duct turn or elbow too close to the fan inlet reduces fan performance. To achieve full fan performance, there should be at least three effective wheel diameters between duct turns or elbows and the fan inlet.

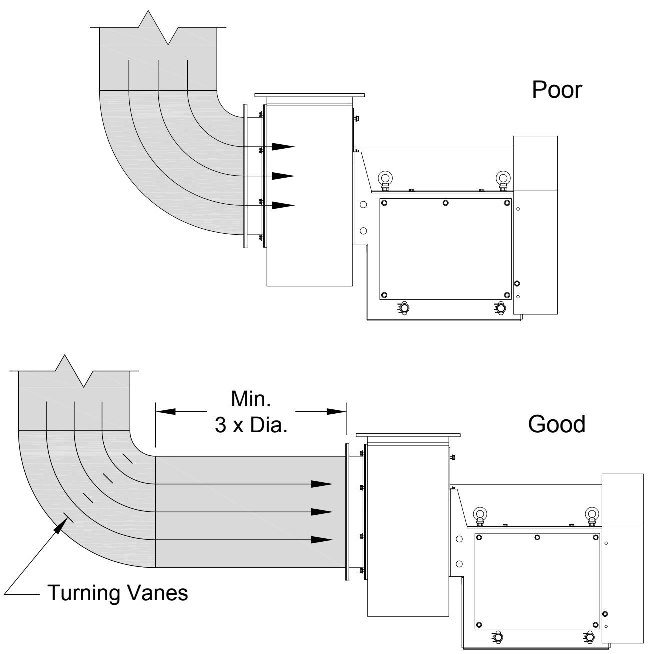


Figure 2 - Inlet Ducting

Inlet Spin

A common cause of reduced fan performance is inlet spin. To prevent this occurring, it is good practice to use turning vanes in the duct to reduce the effects.

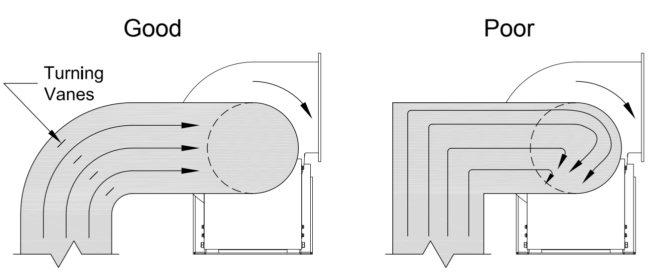


Figure 3 - Inlet Spin

Discharge Duct Turns

Where possible, allow minimum three duct diameters between turns or elbows and fan outlet. Fan performance is reduced when turns are made immediately off the fan discharge.

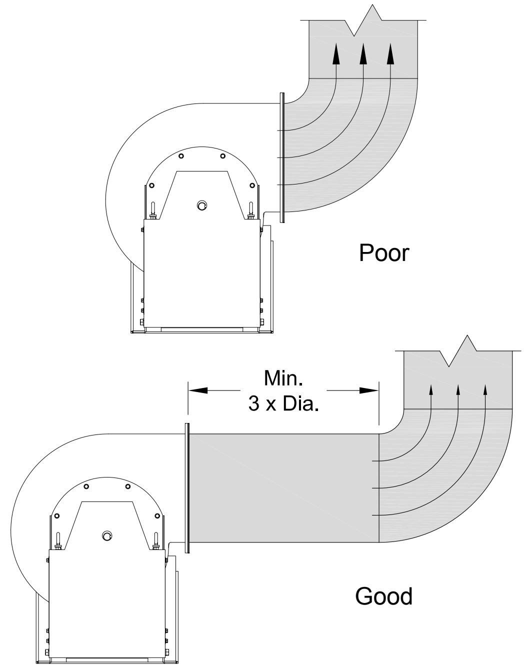


Figure 4 - Outlet Ducting

Free Discharge

Avoid a free discharge into the plenum. This will result in lost efficiency because it doesn't allow for a static regain.

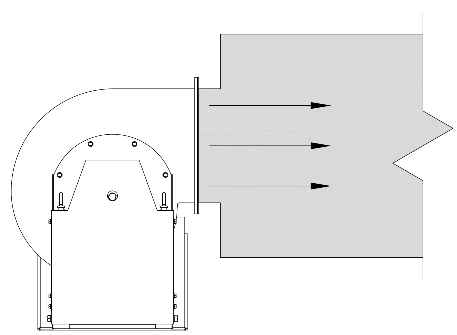


Figure 5 - Free Discharge

Fan Installation

Follow proper handling instructions given earlier.

- Move the fan to the final mounting position.
- Remove skid, crates, and packing materials carefully.
- If supplied, place vibration pads or isolation base on mounting bolts. Line up holes in fan base with bolts.
- Place fan on mounting structure. Carefully level utilizing shims as required at all mounting hole locations. Bolt down the unit.
- Any grout may now be used. Bolt the fan in position before applying grout. Do not depend upon grout to support rotating equipment.
- Continue with Operations Checklist.

Additional instructions may be given for some fan sizes, components and accessories in the submittal.

Isolation and Support Foundation

Essential to every DHK fan installation is a strong, level foundation. A correctly designed concrete foundation with a structural steel base or inertia base provides the best means of supporting floor mounted units. Any foundation size is determined by the fan arrangement, size, weight, motor weight, position or fan orientation and location of the installation. The weight of the foundation must be greater than the weight of the fan and its motor. Roof or floor structure supports should be per the structural engineer, in accordance with load requirements and applicable building codes.

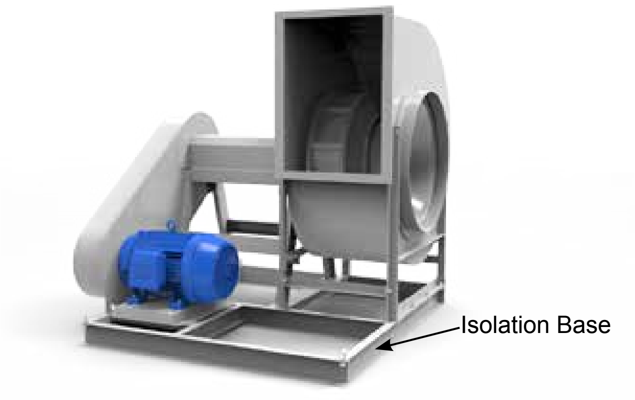


Figure 5 - Isolation (Unitary) Base

Vibration Isolators

To prevent vibration and noise from being transferred to the building, vibration isolators are recommended. Isolators should be located between the fan system and the support structure. M.K. Plastics supplies three main types of isolators for FRP fans:

- Floor Mounted Seismically Restrained Spring Isolators (1” to 4” deflection)
- Floor Mounted Non-Restrained Housed Spring Isolators (1” to 3” deflection)
- Floor Mounted Rubber-In-Shear Isolators (rubber mounts)

Refer to the M.K. Plastics submittal for isolator installation and adjustment instructions. In applications where seismic installation is required, refer to the M.K. Plastics submittal for further details.

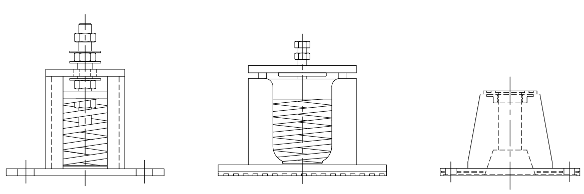


Figure 6
Vibration Isolators (Typical)

After the fan, isolation base, and isolators are installed, the entire assembly must be leveled. Position the level on the isolation base, not the fan shaft, for proper leveling. Additionally, the motor and fan shafts must be level and parallel relative to each other for proper alignment.

Wheel-Inlet Overlap

Efficient performance is achieved by having the correct wheel to inlet overlap and uniform radial gap. This should always be verified before initial start-up and if possible after the fan has been in operation for 24 hours.

The overlap is adjusted by loosening the wheel hub on the shaft and moving the wheel to the correct position - refer to Table 1. for values. A uniform radial gap (between the edge of wheel inlet and edge of inlet cone) is achieved by loosening the bolts on the inlet cone and centering it on the wheel. In both cases, a trim balance maybe required.

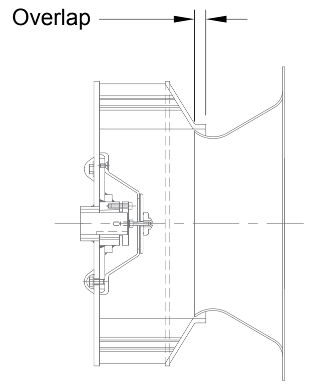


Figure 7
Wheel/Inlet Overlap

Size	Overlap
1225	7/16”
1500	5/8”
1825	3/4”
2225	15/16”
2450	1”
2700	1-1/16”
3000	1-5/16”
3300	1-3/8”
3650	1-1/2”
4025	1-5/8”
4450	1-13/16”
4900	2”
5425	2-1/8”
6000	2-3/8”

Table 1
Wheel/Inlet Overlap

Drive Maintenance and Installation

V-belt drives need periodic inspection, retensioning, and occasional belt replacement. When inspecting drives, look for dirt buildup, burrs or obstructions that can cause premature belt or drive replacement. If burrs are found, use fine emery cloth or a stone to remove them. Be careful that dust does not enter the bearings. Check sheaves for wear. Excessive slippage of belts on sheaves can cause wear and vibration. Replace worn sheaves with new ones. Carefully align sheaves to avoid premature sheave failure.

Belt tension is determined by the sound the belts make when the fan is first started. Belts will produce a loud squeal which dissipates after the fan is operating at full capacity. If the belt tension is too tight or too loose, lost efficiency and possible damage can occur. The proper tension for operating a V-belt is the lowest tension at which the belts will not slip at peak load conditions. For initial tensioning, the proper belt deflection half-way between pulley centers is 1/60” for each inch of belt span.

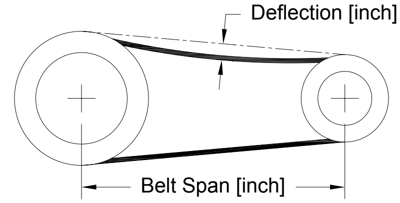


Figure 8 - Belt Tension

Refer to the following procedure for belt tensioning -

1. Loosen motor plate adjustment bolts and move motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
2. Adjust the motor plate until proper tension is reached. For proper tension, a deflection of approximately 1/60” per inch of center distance should be obtained by firmly pressing the belt. Refer to Figure 8.
3. Lock the motor plate adjustment nuts in place.
4. Ensure pulleys are properly aligned.

When replacing belts, replace the entire set. After initial replacement and tensioning, recheck belt tension after a few days. New belts require a break-in period. Never use belt dressing on any belts.

Drive Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft. Fig. 9 illustrates correct and incorrect pulley alignment.

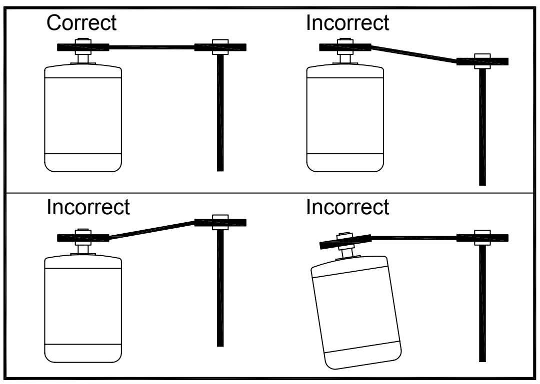


Figure 9 - Pulley Alignment

A recommended method of inspecting the pulley alignment is shown in Figure 10. With the shorter leg of a carpenter’s square or other straight edge lying along the case of the motor, adjust the position of the motor pulley (or the motor) until the longer leg of the square is parallel to the belt.

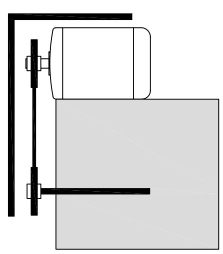


Figure 10

Motor Maintenance

The three basic rules of motor maintenance are:

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

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

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

Wheel and Shaft Maintenance

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

Arrangement 8 Shaft Flexible Couplings

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. Check for misalignment between the coupling halves. Parallel and angular misalignment and separation gap are shown in Figure 11. Refer to coupling manufacturer’s installation instructions for allowable misalignment and separation gap tolerances. When correcting for misalignment using shims, the shims should only be located under the motor. Do not place shims under the shaft bearings. A dial indicator or laser can be used for alignment where greater precision is required. After aligning procedure, check for tightness of all coupling component pieces and ensure that they are clean from dirt and debris.

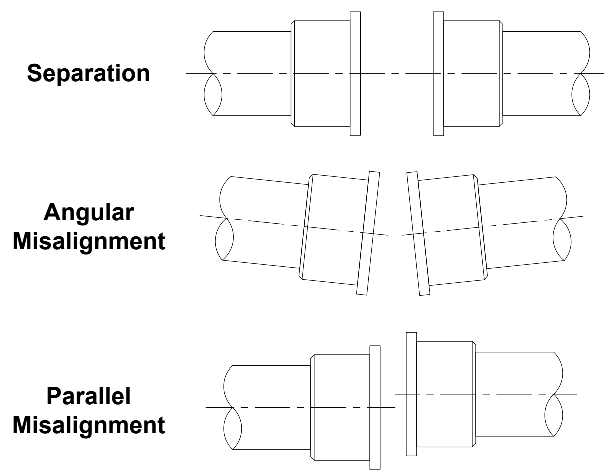


Figure 11 - Flexible Couplings

Drainage Detail

All DHK fans come as standard with outlet drains due to the possibility of water or condensation that may occur. Proper disposal of water must occur by connection of drain outlet to a drainage system (by others). Piping must have adequate pitch for proper runoff and be supported (if needed) to prevent the possibility of sagging and overflow. The trap should be filled before start-up.

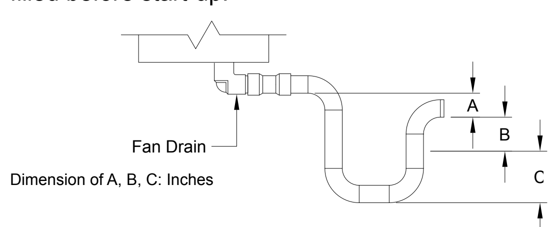


Figure 12 - Drainage Detail

A: Must be greater than system static pressure.
B: Must be greater than 1/2 of the system static pressure.
C: 1” water seal.

Relubrication Schedule [Months]						
Speed [rpm]	**500**	**1000**	**1500**	**2000**	**2500**	**3000**
Size						
	For Bearings With No Grease Fittings					
1225	Relubrication is not required. Bearings are factory charged with the correct amount of grease and do not require further grease charge.					
1500						
1825						
2225						
	For Bearings With Grease Fittings					
1225	6	6	5	3	3	2
1500	6	6	5	3	3	2
1825	6	6	5	3	3	2
2225	6	6	5	3	3	-
2450	6	4	4	3-1/2	2-1/2	-
2700	6	4	4	3-1/2	2-1/2	-
3000	5	4	3	2-1/2	-	-
3300	5	4	3	2-1/2	-	-
3650	5	4	3	-	-	-
4025	5	4	2-1/2	-	-	-
4450	4-1/2	3-1/2	2-1/2	-	-	-
4900	4-1/2	3-1/2	-	-	-	-
5425	4-1/2	3-1/2	-	-	-	-
6000	4-1/2	3-1/2	-	-	-	-

Table 2 - Relubrication Schedule [Months]

Fan Bearing Lubrication

Proper lubrication of the fan drive bearings helps assure maximum bearing life. DHK fans come with three types of fan bearings:

1. Self-Lube pillow block ball bearings (1225-2225), which do not require re-greasing. No grease fittings.
2. Air Handling Heavy Duty ball bearing pillow blocks (1225-2225), which do require re-greasing. With grease fittings - see schedule on Table 2.
3. Spherical split pillow block bearings (2450-6000), which do require re-greasing through a grease fitting on the outer housing and should be lubricated by the schedule, Table 2.

However, every installation is different and the frequency of relubrication should be adjusted accordingly. On high moisture applications, the lubrication frequency may need to be doubled or tripled to adequately protect the bearings. Double the relubrication frequency on fans with vertical shafts.

Observation of the conditions of the grease expelled from the bearings at the time of relubrication is the best guide as to whether regreasing intervals and amount of grease added should be altered.

Greases are made with different bases. There are synthetic base greases, lithium base, sodium base, etc. Avoid mixing greases with different bases. They could be incompatible and result in rapid deterioration or breakdown of the grease. All bearings are filled with a lithium-based grease before leaving the factory. When the fans are started, the bearings may discharge excess grease through the seals for a short period of time. Do not replace the initial discharge because leakage will cease when the excess grease has worked out. Sometimes the bearings have a tendency to run hotter during this period. There is no reason for alarm unless it lasts over 48 hours or gets very hot (over 200°F). When relubricating, use a sufficient amount of grease to purge the seals. Rotate bearings by hand during relubrication.

Table 2 is for shaft bearings on belt drive and direct drive arrangement #8 fans, motor bearing lubrication should be per the motor manufacturers instructions.

Suggested initial greasing interval - remove bearing cap and observe condition of used grease after lubricating. Adjust lubrication frequency as needed. Hours of operation, temperature, and surrounding conditions will affect the relubrication frequency required. '*If bearings need to be re packed, remove old grease, pack bearing full and fill housing reservoirs on both sides of bearing to bottom of shaft.*'

Lubricate with a multipurpose roller bearing NLGI No. 2 having rust inhibitors and antioxidant additives, and a minimum oil viscosity of 500 SSU at 100ºF. Some greases having these properties are:

1. Shell - Alvania No. 2 Mobil
2. Mobilith AW2/Mobilith SHC100
3. Texaco - Premium RB2
4. American - Rykon Premium 2

Lubricate bearings prior to extended shutdown or storage and rotate shaft monthly to aid corrosion protection.

Fan Bearing Replacement

Figure 13
Split Pillow Block

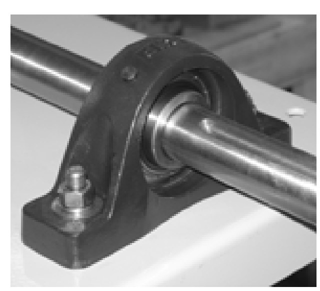


Figure 14
Solid Pillow Block

Removal of Wheel, Shaft & Bearings -

1. Mark the position on the shaft of both bearing races, setscrews (if applicable) and the wheel and sheave. If you are replacing the shaft as well, these marks will give you reference.
2. Mark the location and orientation of the inlet cone and sleeve to the casing and remove, this will give you access to the wheel. Remove the drive sheave from the shaft
3. Start wheel removal by unscrewing the front protective cap and then the nut, washers and threaded stud assembly that holds the cap to the fan shaft. The exposed bushing has hex screws that secure the bushing to the shaft; they are situated on the front face of the bushing. Unscrew the hex screws, remove and screw back into the other exposed holes of the bushing. By doing this you are pushing the bushing out. Remove and then use a 2-jaw puller to extract the bushing if needed. When the bushing is out, the wheel and hub assembly can now be removed from the fan shaft. Note: DHK 1225 to 1500 sizes do not have bushings, the wheel is held in place to the shaft with the threaded rod assembly only.
4. Unbolt the bearing housing hold-down bolts and remove the shaft and bearings as one unit. Keep any existing shims in place.
5. Unbolt the top housing section and remove the bearing assemblies from the shaft. A suitable puller may be required, or tap on the bearing with a wood block and hammer to remove. If the bearings are attached with set screws, unscrew and slide the assembly off as one piece.
6. If the existing shaft is being used, check the shaft for nicks, burrs and damage. Remove any anti-corrosion coating with a suitable degreaser and wipe clean.

Bearing Replacement [Split Housing Bearings With Adapter Sleeves] -

1. Split pillow block bearings come in kits with bearings, adapter sleeve, locknut, lock washer and fixing rings for the rear fixed bearing. NOTE: replacement bearings will be shipped temporarily assembled on a shaft.
2. Remove the top half of the bearing housing to expose the bearing seat.
3. Place the lower half of the bearing housings in position on the stand and tighten the fixing bolts.
4. Spherical split pillow block bearings use synthetic rubber seals that come in split (half) sections. One half should be inserted into the lower bearing housing on both sides and some grease applied prior to the bearing assembly.
5. Place the bearings in the lower half of the housings with the larger sides of the bores facing towards the shaft ends.
6. Slide the adapter sleeves through the bearings, ensuring that the threads are facing each other.
7. Install the lock washers on the adapter sleeves with inner prong of washer in a slot on the adapter sleeve. Install the locknut on both bearings with the chamfered face facing the bearing, but do not tighten.
8. Slide shaft through both bearing assemblies. If the bearing locks to the shaft, tap gently on the adapter sleeve to loosen.
9. To hold the shaft in place during wheel mounting, clamp the sheave end of the shaft to the edge of the stand.
10. Install the wheel and bushing on the shaft. Install the inlet cone in its original location. Position the wheel correctly by moving the shaft axially in the bearing assemblies.
11. Install fixing rings on the rear bearing (closest to sheave). Move shaft axially so that the fixing ring may be inserted between housing shoulder and bearing outer ring.
12. Tighten locknuts to fasten the bearings to the shaft, using a spanner. While tightening, regularly measure the internal bearing clearance between the most vertical unloaded roller and outer ring with a feeler blade. When required clearance is obtained (check table), tighten locknut until the closest washer tab meets a slot on the locknut.
13. Fill the lower housings with grease until the rollers are covered.
14. Carefully align the top part of the housing with the dowel pins and tighten bolts, ensuring that the upper seals are in place. Make sure that the split housing is paired only with its original top half, as these parts are not interchangeable from one housing to another.

Bearing Replacement [Closed Housing Bearings With Setscrews] -

1. Making sure that the set screws are not protruding from the inner bearing rings, slide the bearings directly onto the shaft. If using an old shaft, make sure the bearings are not mounted on a worn section. Tapping the inner ring face with a soft driver might be required.
2. The outer ring of the bearing is spherical and swivels in the housing to compensate for misalignment. Secure the housing to the stand with the fixing bolts, but do not fully tighten.
3. Install the wheel on the shaft. Install the inlet cone in its original location. Position the wheel correctly by moving the shaft axially in the bearing assemblies.
4. Tighten the setscrews on the bearings to secure the shaft. Refer to torque chart on Page 7.
5. Rotate the shaft by hand to allow the bearing outer rings to find their center of free movement.

Test Run -

1. Re-install the sheave and adjust the belt tension.
2. Test run and retighten all setscrews and fixing bolts; trim balance as necessary.

Changing Shaft Speed

All belt driven fans with motors up to and including 5 HP are equipped with variable pitch pulleys. To change the fan speed, perform the following:

1. Loosen setscrew on driver (motor) pulley and remove key, if equipped.
2. If the pulley has multiple grooves, all must be adjusted to the same width.
3. After adjustment, inspect for proper belt tension.
4. To reduce speed, open the pulley in order that the belt rides deeper in the groove (smaller pitch diameter).
5. To increase speed, close the pulley so that the belt rides higher in the groove (larger pitch diameters). Make sure the maximum fan RPM and motor HP is not reached.

Size	Pillow Block Bearing	Set Screw / Bearing Cap Bolt Torque	Mounting Bolt	304 SS Bolt Torque	316 SS Bolt Torque
1225	RHP, MP1	60 in-lbs	3/8-16UNC, 1.75L	236 in-lbs	247 in-lbs
1500	RHP, MP1	60 in-lbs	3/8-16UNC, 1.75L	236 in-lbs	247 in-lbs
1825	RHP, MP1-7/16	110 in-lbs	1/2-13UNC, 2.25L	517 in-lbs	542 in-lbs
2225	RHP, MP1-7/16	110 in-lbs	1/2-13UNC, 2.25L	517 in-lbs	542 in-lbs
2450	NSK,SNN,1-11/16	389 in-lbs	1/2-13UNC, 1.75L	517 in-lbs	542 in-lbs
2700	NSK,SNN,1-11/16	389 in-lbs	1/2-13UNC, 2.25L	517 in-lbs	542 in-lbs
3000	NSK,SNN,2-3/16	673 in-lbs	5/8-11UNC, 2.5 L	1110 in-lbs	1160 in-lbs
3300	NSK,SNN,2-3/16	673 in-lbs	5/8-11UNC, 2.5 L	1110 in-lbs	1160 in-lbs
3650	NSK,SNN,2-3/16	673 in-lbs	5/8-11UNC, 2.5 L	1110 in-lbs	1160 in-lbs
4025	NSK,SNN,2-7/16	673 in-lbs	5/8-11UNC, 2.75L	1110 in-lbs	1160 in-lbs
4450	NSK,SNN,2-15/16	1682 in-lbs	3/4-10UNC, 3 L	1530 in-lbs	1582 in-lbs
4900	NSK,SNN,2-15/16	1682 in-lbs	3/4-10UNC, 3 L	1530 in-lbs	1582 in-lbs
5425	NSK,SNN,3-7/16	3275 in-lbs	1-8UNC, 3.75L	3400 in-lbs	3595 in-lbs
6000	NSK,SNN,3-7/16	3275 in-lbs	1-8UNC, 3.75L	3400 in-lbs	3595 in-lbs

Table 3 - Fan Bearing Torque

Tapered Bushing	Cap Screw	Torque
QT	1/4-20UNC	108 in-lbs
JA	No.10-24UNC	60 in-lbs
SH-SDS-SD	1/4-20UNC	108 in-lbs
SK	5/16-18UNC	180 in-lbs
SF	3/8-16UNC	360 in-lbs
E	1/2-13UNC	720 in-lbs
F	9/16-12UNC	1320 in-lbs
J	5/8-11UNC	1620 in-lbs
M	3/4-10UNC	2700 in-lbs
N	7/8-9UNC	3600 in-lbs
P	1-8UNC	5400 in-lbs
W	1-1/8-7UNC	7200 in-lbs
S	1-1/4-7UNC	9000 in-lbs

MSK Bushing	Cap Screw	Torque
H	1/4 x 3/4	95 in-lbs
P	5/16 x1	192 in-lbs
Q	3/8 x 1-1/4	348 in-lbs
R	3/8 x 1-3/4	348 in-lbs
S	1/2 x 2-1/4	840 in-lbs
U	5/8 x 2-3/4	1680 in-lbs
W	3/4 x 3	3000 in-lbs

Bushing Tightening for Aluminum Hub		
P1-P3	5/16-18 UNC	80 in-lbs
Q1-Q3	3/8-16 UNC	143 in-lbs

Table 4 - Bushing and Pulley Torque

Grounding Straps

Static Grounding Strap

Figure 15
Grounding Strap

If supplied with a Graphite Liner, a grounding strap is provided on the bottom of the scroll housing for the removal of static electricity. This strap must be connected to the building electrical grounding circuit or the roof steel structure. If an Aegis shaft grounding ring is supplied on the motor, the motor support stand should also be grounded.

Operational Checklist

Final Installation

- [ ] Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in Tables 3 & 4.
- [ ] Inspect for correct voltage with voltmeter.
- [ ] Ensure all accessories are installed.

Pre-Start Checks

- [ ] Shut off all primary and secondary power sources.
- [ ] Ensure fasteners and setscrews are tightened.
- [ ] Inspect belt tension and pulley alignment.
- [ ] Inspect motor wiring.
- [ ] Ensure belt touches only the pulleys.
- [ ] Ensure fan and ductwork are clean and free of debris.
- [ ] Inspect wheel-to-inlet clearance.
- [ ] Close and secure all access doors.
- [ ] Restore power to the fan.

Start Up

Turn the fan on. In variable speed units, set the fan to its lowest speed and inspect for the following:

- [ ] Direction of rotation.
- [ ] Excessive vibration.
- [ ] Unusual noise.
- [ ] Bearing noise.
- [ ] Improper belt alignment or tension (listen for squealing).
- [ ] Improper motor amperage or voltage.

If a problem is discovered, immediately shut the fan off. Lock out all electrical power and check for the cause of the trouble. See Troubleshooting.

Inspection

Inspection of the fan should be conducted at the first **30 minute, 8 hour and 24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect.

- [ ] 30 Minute Interval: Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.
- [ ] 8 Hour Interval: Inspect belt alignment and tension. Adjust and tighten as necessary.
- [ ] 24 Hour Interval & 30 Days: Inspect belt tension. Adjust and tighten as necessary.

General Fan Maintenance

WARNING
Disconnect and secure to the 'Off' position all electrical power to the fan prior to inspection and servicing. Failure to comply with this safety precaution could result in serious injury or death.

Once the unit has been put into operation, a routine maintenance schedule should be set up to accomplish the following:

1. Lubrication of bearings and motor.
2. Wheel, housing, bolts and set screws on the entire fan should be checked for tightness.
3. Any dirt accumulation on the wheel or in the housing should be removed to prevent unbalance and possible damage.
4. Isolation bases should be checked for freedom of movement and the bolts for tightness. Springs should be checked for breaks and fatigue. Rubber isolators should be checked for deterioration.
5. Inspect fan impeller and housing looking for fatigue, corrosion or wear.
6. Check V-belt drives on a regular basis for wear, tension, alignment and dirt accumulation.
7. If drive belts have been replaced, new belts will stretch. Belt tension needs to be checked & adjusted after 1 week, and again after 30 days of operation. Refer to Figure 8. on Page 3 for details.

Troubleshooting

Excessive Noise or Vibration

- Damaged wheel.
- Wheel rubbing inlet; adjust wheel or inlet cone.
- Verify wheel balance, rebalance if necessary.
- Belts misaligned.
- Belts too loose; worn or oily belts.
- Loose fasteners.
- Speed too high.
- Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.
- Bearing collars or hardware loose.
- Bearings need lubrication or replacement.
- Debris in impeller; clean all dirt off wheel, check wheel balance and rebalance if necessary.
- Fan surge.
- Check alignment of shaft and motor drives.

Low Volume or Pressure

- Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.
- Poor fan inlet or outlet conditions. There should be a straight clear duct at the inlet or outlet.
- Improper wheel alignment.
- Check duct system, see Page 2. For recommendations.

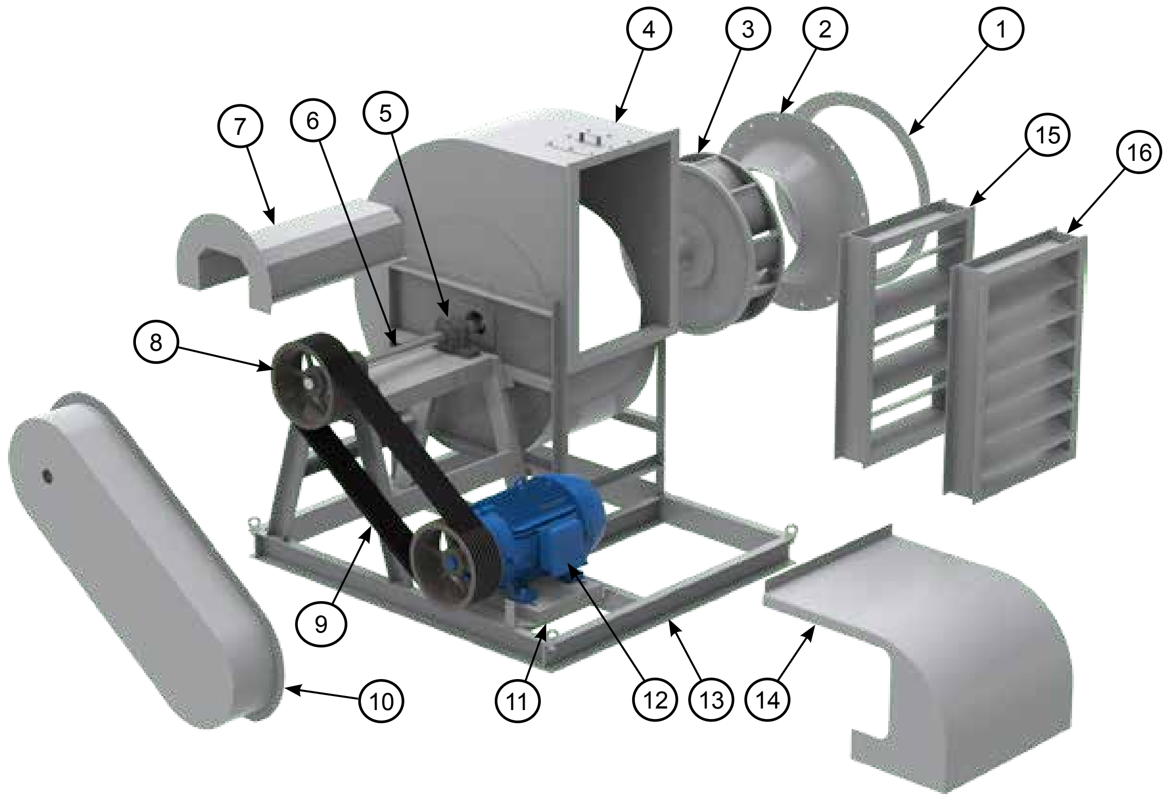
Motor Problems (Overheating)

- Motor improperly wired.
- Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or belt drive assembly.
- High horsepower; resize the ductwork. Check proper operation of face and bypass dampers. Check filters and access doors.
- Cooling air diverted or blocked.
- Improper inlet clearance.
- Incorrect fan speed.
- Incorrect voltage.

Bearing Problems (Overheating)

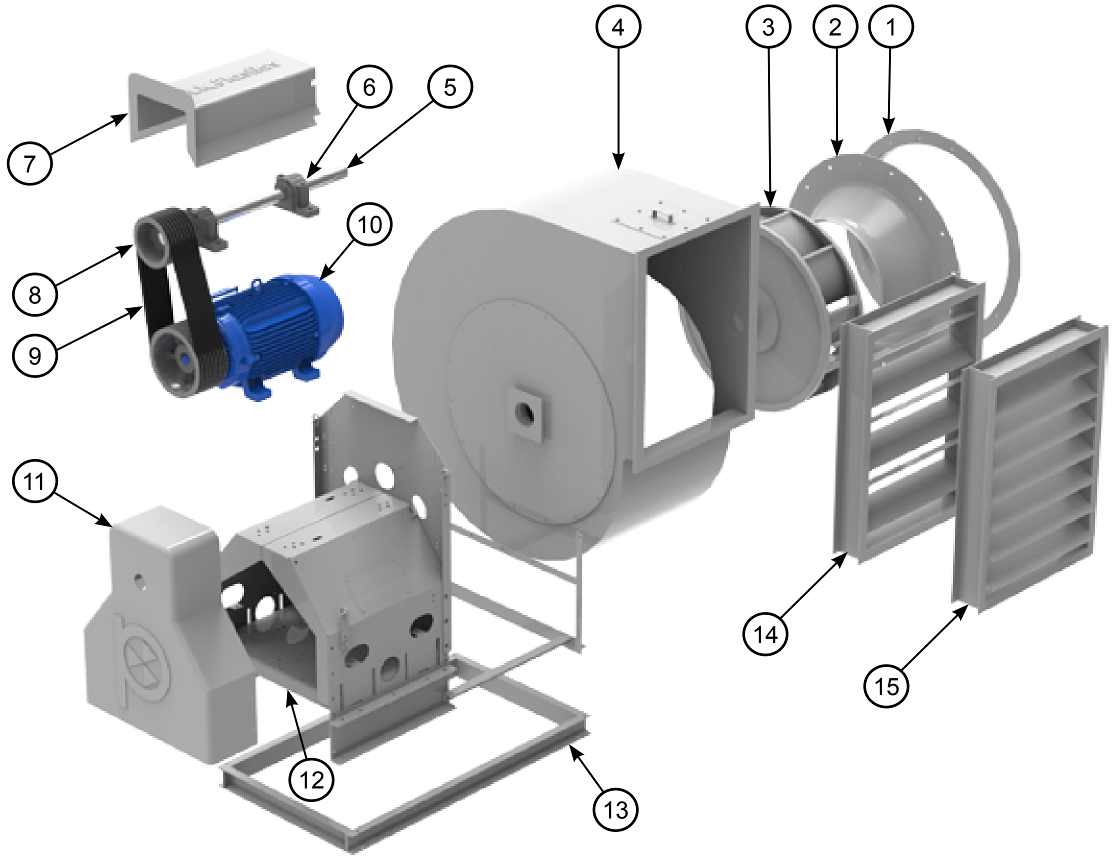
- Improper bearing lubrication; check for excessive or insufficient grease in bearings.
- Excessive belt tension.
- Check for bent shaft.
- Align bearings.

DHK - Parts List - Belt Drive (Arrangement #1)



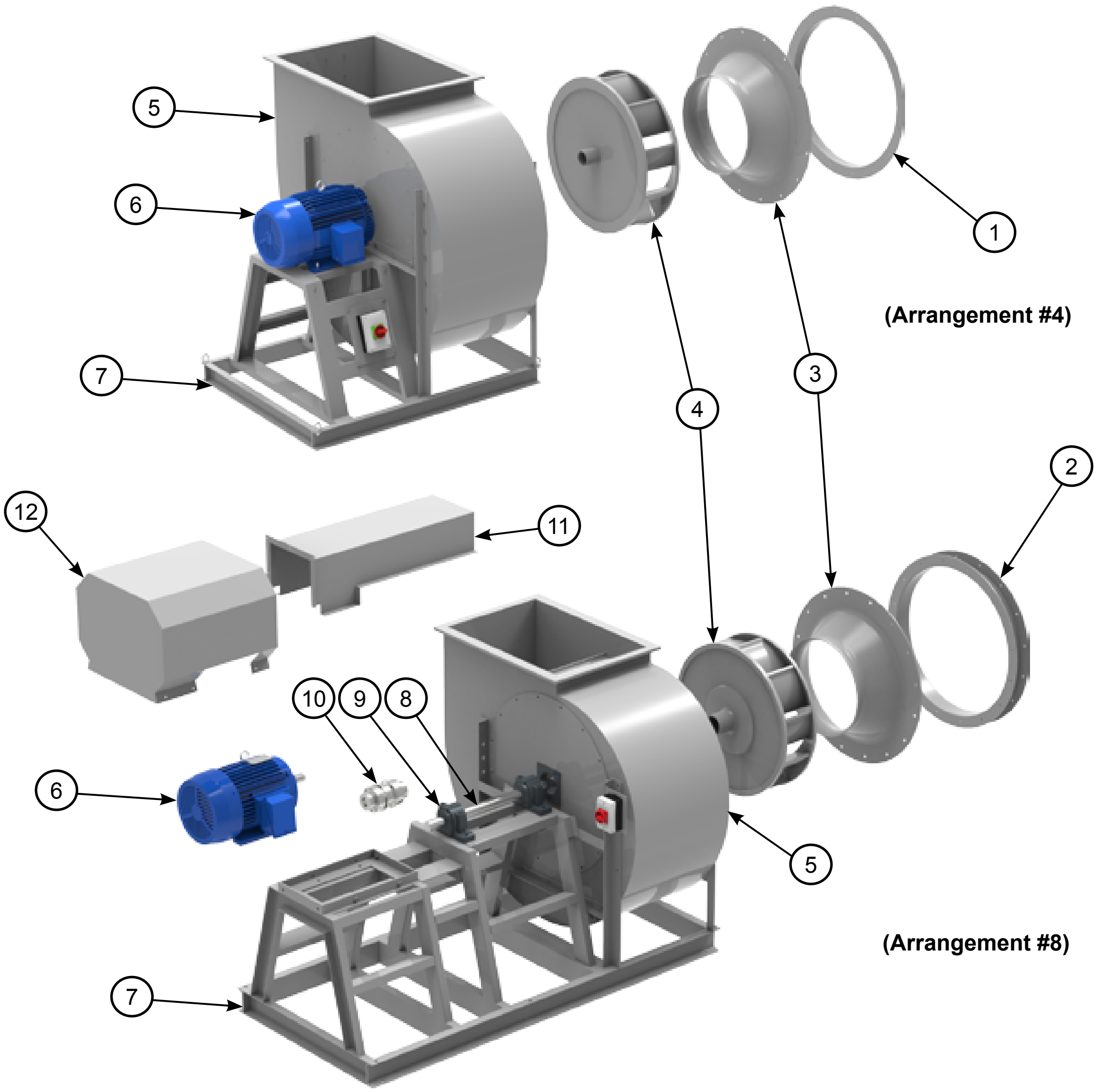
Item No.	Item Description
1	Inlet Sleeve
2	Inlet cone
3	Impeller
4	Fan Casing
5	Bearing
6	Shaft
7	Shaft / Bearing Guard
8	Pulleys
9	Belts
10	Belt Guard
11	Motor Base
12	Motor
13	Unitary Base (Standard)
14	Motor Cover (Optional)
15	Control Damper
16	Gravity Backdraft Damper

DHK - Parts List - Belt Drive (Arrangement #10)



Item No.	Item Description
1	Inlet Sleeve
2	Inlet cone
3	Impeller
4	Fan Casing
5	Shaft
6	Bearing
7	Shaft / Bearing Guard
8	Pulleys
9	Belts
10	Motor
11	Belt Guard
12	Motor Base
13	Unitary Base (Optional)
14	Control Damper
15	Gravity Backdraft Damper

DHK - Parts List - Direct Drive



Item No.	Item Description
1	Inlet Sleeve
2	Companion Flange
3	Inlet Cone
4	Impeller
5	Fan Casing
6	Motor
7	Unitary Base (Standard)
8	Shaft / Bearing Guard
9	Bearings
10	Coupling
11	Shaft Guard
12	Motor Cover (Optional)

Warranty

M.K. Plastics will not be responsible for damage to equipment or materials through improper installation, storage, improper servicing, or through attempts to operate it in excess of its rated capacity or recommended use, intentional or otherwise. We will not be responsible for consequential damage.

Based on the fact that M.K. Plastics has no direct control over the actual handling and use of its products in the field, M.K. Plastics does not assume any liability for any loss to the customer or any personnel or any physical damages that are claimed by anyone due to a failure or cause attributed to the use of its products. In no event shall M.K. Plastics be responsible for consequential damages of any such defective material or workmanship, including but not limited to the buyer's loss of material or profit, increase expense of operation, downtime or reconstruction of the work and in no event shall M.K. Plastics obligation under this warranty exceed the original contract price of the defective item.

M.K. Plastics warrants its equipment, products and parts, to be free from defects in workmanship and material under normal use and service for one (1) year after delivery to the first user. Our obligation under this warranty being limited to repairing or replacing, at our option, without cost at our factory any part, or parts which shall, within such warranty period, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been defective.

M.K. Plastics will not be responsible for the cost of removal of a defective product or parts or the installation of a replaced product or parts, or for costs due for its removal, crating or shipping.

On account of variables including but not limited to, vibration, system noise characteristics, motor overloading or change in voltage condition, the specifics of customer application of equipment or other system conditions, M.K. Plastics does not expressly warrant its equipment for any specific purpose.

The customer and its agents are responsible for the selection and application of M.K. Plastics products, including their fitness for the purpose and performance intended. Consequently, the customer on behalf of its agents assumes all liability related to the use/misuse, application and selection of the M.K. Plastics Products.

Bulletin 40-02-June 2013

M.K.Plastics CORPORATION
SERVING THE NEEDS OF MODERN INDUSTRY

4955 de Courtrai Ave., Montréal, Québec, H3W 1A6 • TEL: (514) 871-9999
Trimex Building, Route 11, Mooers, N.Y., 12958 • TEL: (888) 278-9988
FAX: (514) 871-1753
Email: mkfans@mkplastics.com