FAN ENGINEERING
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MANUFACTURERS OF CENTRIFUGAL AND AXIAL INDUSTRIAL FANS

Installation, Operation & Maintenance Manual For Centrifugal Fans, Leaflet FE-0634

Personal Protection

For safety reasons maintenance personnel should wear personal protection equipment when attempting to maintain fans. People with long hair are advised to tuck hair back possibly into a cap.

Personal protection equipment should include the following:

- Safety glasses or goggles approved by local safety authority
- Protective shoes with steel toecaps and oil resistant soles
- Heavy gloves that can cope with sharp edges or exposure to hazardous chemicals. This is especially important when hazardous residues are present in fans.
- Breathing apparatus if toxic gases or vapours are expected to be present.
- Close fitting clothing

Do not wear:

- Rings
- Bracelets
- Necklaces
- Loose items of clothing

It is the responsibility of the maintenance personnel to determine that the lighting is sufficient for the work being performed. Additional portable lighting may be required as there are no lighting fixtures supplied with the fans.

Hazardous Materials

Fan Engineering (Midlands) Ltd. is not always made aware of the materials that may be handled with a fan and therefore cannot warn the user of these hazards. Because of this, the end user must identify the material hazards present and indicate this on the fan with a warning label. If there is risk of residual hazardous material being left in a fan if the gas or vapour being handled can accumulate as a deposit, all maintenance and operation personnel must be trained to handle such hazards before having access to the fan. Lubricants used on fan components could be hazardous if they contact someone’s eyes or are consumed. For additional general safety practices for air moving equipment, see AMCA Bulletin 410.

Installation

Shipping and Receiving

Fan Engineering (Midlands) Ltd. products are carefully constructed and inspected before shipment to insure the highest standards of quality and performance. Compare all components with the Delivery Note or Packing List to verify that the proper unit was received. Check each unit for any damage that may have occurred in transit. Any damage should be reported immediately to the carrier and the necessary damage report filed.

Handling

Handling of all air moving equipment should be conducted by trained personnel and be consistent with safe handling practices. Verify the lift capacity and operating condition of handling equipment. Maintain handling equipment to avoid serious personal injury. On most units, lifting lugs are fashioned to protect the fan and fan housing from damage. Secure lifting equipment to all provided lifting lugs to avoid instability while moving the equipment. Units shipped completely assembled may be lifted with slings and spreader bars. (Use well-padded chains, cables or nylon straps.) Never lift a fan by the inlet or discharge flange, shafting or drives, wheel or impeller, motor or motor base, or in any other manner that may bend or distort parts. Never lift with slings or timbers passed through the fan inlets.

Unit Storage

If fan installation is to be delayed, store the unit in an environmentally stable and protected area. Vibration should not exceed 0.051 mm peak – peak displacement at the storage site. The unit should be reasonably protected from any accidental impacts. Cover the fan to protect coatings and to prevent any foreign material or moisture from entering the inlet or discharge. Take care to protect the motor, drives and bearings. The following precautions should be taken during extended storage to ensure the equipment is not damaged:

• Extended storage requires weekly inspections. Rotate the fan wheel by hand to check for corrosion or damage to the unit and for debris within the fan, this also prevents brinelling of the bearings.

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

• The drives and belts should be removed if the fan is to be stored for a prolonged period. The drives should be labelled for service and stored in a dry place. Belts should be removed, coiled without kinks, placed in a heavy carton, and stored in a dry, well-ventilated place. To prevent belt deterioration, storage conditions should not exceed 30’C and 70% humidity. If belts show signs of deterioration, they should be replaced prior to start up.

• Motors should be stored in a clean, dry, vibration free location. The packaging should be opened up enough to allow air circulation around the motor. The winding temperature should be kept slightly above that of the surroundings to prevent condensation. This can be accomplished by energizing the internal heaters, if the motor is so equipped, or by using space heaters. If it is impossible to heat the windings, the motor should be wrapped tightly with a waterproof material that also encloses several bags of desiccant. Replace the desiccant regularly to prevent moisture problems. The motor rotor should also be rotated regularly (monthly) to assure the bearing parts are well greased.

Foundations and Supporting Structures
The best means of floor mounting a fan is on a well-designed, flat, level concrete foundation. The foundation should have a mass of at least three times that of the supported assembly. The foundation should extend 150mm beyond the outer dimensions of the fan and driver; however, it should be no more than twice the area required for the equipment. If it is made larger, the mass should be increased accordingly to resist rocking modes of vibration. J or T type anchor bolts using one size smaller than the nominal dimension of the base hole shall be used. Anchor bolts should be tied into the reinforcing bar of the foundation for the foundation. A pipe sleeve with a diameter of 2 to 21⁄2 times the anchor bolt diameter should be provided around the anchor bolt for final adjustment (see Figure 2).

The mounting surface of the foundation should be smooth for good shim contact. When deciding the thickness of the foundation, approximately 25 to 40mm height should be allowed for shimming, grouting, levelling, washers, nuts, etc. If a structural steel base or platform is to be used, the structure must be designed for the weight of the fan, live loads imposed by rotation of the rotor and driver, and any external live loads. The structure should be designed to ensure that no natural frequency will occur within 30% of the fan speed. This is especially true if the structure supports more than one fan. Any ducting should have independent support. Do not use the fan to support ducting. The fan frame can be designed to carry some external loads. Consult the factory if this is a concern. Isolating the fan from ductwork with flex connections eliminates transmission of vibration. Fans handling hot gases require expansion joints at both the inlet and discharge to prevent excessive loads caused by thermal growth. Refer to AMCA Publication 201 for good practices in ductwork geometry and configuration. When possible, ductwork shall be located where there is least risk of personnel tripping, walking into or falling over the ductwork. If not possible, warnings shall identify this hazard.

Fans should be installed where they are readily accessible to maintenance personnel, so that such personnel are not required to stoop or crawl to access fans.

Fan Installation

Follow proper handling instructions as given earlier.
1. Move the fan to the final mounting position.
2. Remove skid, crates and packing materials carefully.
3. If vibration isolation is to be used, place isolation base on mounting bolts. Line up holes in fan base with bolts as indicated on the foundation plan of the customer submittal drawing.
4. Consult each specific fan’s submittal drawing for proper installation arrangement and mounting dimensions. Place the fan on mounting structure. Carefully level the unit (checking the level on the shaft) on the foundation and shim as necessary using stainless steel shims on both sides of each anchor bolt. Anchor bolts are to be pre-tensioned, check with bolt manufacturer for the proper
torque.
5. Check the alignment of the bearings. Shim or reposition the bearings if necessary. In many split housing roller bearings, the gap between the seal carrier and housing can be measured with a feeler gage. The variation in this gap should be less than half of the maximum gap measured. In roller bearings where this gap is not visible, alignment can be verified by verifying the bearing is square with the pedestal top
6. Check face alignment of sheaves on belt driven fans. Parallel alignment should be within 5mm per meter of centre distance. Angular Misalignment should be less than 1 degree. Check and record tension of belts to see if it is sufficient. Proper belt tension is specified on the

included datasheet. If belt tension needs adjustment, instructions on belt tensioning are given in the Drive Mounting section of this manual. Sheaves on belt driven fans are provided with taperlock bushings. When tightening bushing bolts, proceed in a progressive manner to avoid cocking the tapered surfaces between the bushing and the sheave.
7. Check alignment of factory mounted couplings, as they are subject to misalignment during shipment. Realign if necessary in accordance with the instructions, see coupling section of manual.
8. Make sure there is no rubbing or binding and that the wheel-inlet cone or wheel to fan housing clearances and overlap are correct.
9. Check the tightness of the wheel on the shaft. See taperlock data sheet. The measured torque should be recorded.
10. Check the tightness of foundation bolts, motor mounting bolts, and bearing mounting bolts.
11. Check that bearings are fully lubricated, see included datasheet.
12. Install any accessories shipped loose from the factory.

Guards and Enclosures

When advised of the need for guards fully complying with the machinery directive, Fan Engineering (Midlands) Ltd. will supply the guarding identified as being required. In most cases, Fan Engineering (Midlands) Ltd. is not aware of the end use and installation of the fan, which typically eliminates the need for more restrictive guarding to be compliant with EN 294 and EN 811. For this reason, the user is must verify that the final installation is compliant with EN 953, EN 294, and EN 811. This is especially true of plug and plenum fans. Specific items that should be considered include but are not limited to the following:
• *Outlet ducting / enclosure.* The ducting or enclosure must be compliant to the requirements of EN 953 and EN 294 and EN 811. This is not assured by Fan Engineering (Midlands) Ltd. Unless specifically notified by the end user at the time of the order.
• *Inlet guards.* Inlet guarding relies on the additional safety distance provided by inlet ducting or other enclosure increasing the safety distance to 850 mm or greater. This is because the installation usually eliminates the need for excessive guarding on the inlet of the fan. In addition, excessive guarding on the inlet of the fan would significantly deteriorate performance and is therefore not desirable.
• *Plug and Plenum fans.* These fans are intended for installation in a user supplied enclosure. Fan Engineering (Midlands) Ltd. rarely knows the details of the enclosure and therefore cannot provide guarding based on the needs of the final installation for these types of fans. The user must verify that the enclosure a plug or plenum fan is located in is compliant with EN 953 and EN 294 and EN 811.

Guards shall not be removed during fan operation as this could cause severe injury. Guards shall not be stood on or used to support any additional load.

Maintenance

Any maintenance requiring the guards to be removed shall be performed while the fan is not operating. When restarting fan after maintenance, follow operation checklist for start-up of fan. Lockouts shall be used whenever unexpected energizing of the fan could cause a mechanical or electrical hazard.

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. If the motor is to be started after sitting for more than a week, the resistance of the motor windings to earth should be measured (at 500 V DC). If the resistance is less than 10 megohms, the motor should be dried until a resistance over 10 megohms is measured. Some smaller motors are lubricated for life.
Lubrication requirements are normally attached to the motor. Use the motor manufacturer's recommendations for re-lubrication. If this information is not available, the following schedule may be used. Motors less than 7.5 kw running about eight hours a day in a clean environment should be lubricated once every five years; motors 11 to 30 kw, 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. Note that motors typically use a different type of lubricant than fan shaft bearings.

Drive Maintenance

V-belt drives need periodic inspection, re-tensioning, and occasional belt replacement. Follow Table attached, for drive inspections and maintenance. Proper belt tension can be found on the included datasheet. A log should be kept with belt tension and replacement information
.

Bearing Maintenance

Proper lubrication of the fan drive bearings helps assure maximum bearing life. Bearings should be inspected at initial start-up and after the first 24 hours of operation and then inspected each time they are lubricated. Lubrication schedules for the included type of bearings are details on the attached data sheet. Consult the factory if in doubt of maximum speed for a particular bearing. Note that every installation is different and the frequency of re-lubrication 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 re-lubrication frequency on fans with vertical shafts.
Observation of the conditions of the grease expelled from the bearings at the time of re-lubrication is the best guide as to whether re-greasing 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 fan shaft bearings are filled with lithium-based grease before leaving the factory unless otherwise specified. 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. This is no reason for alarm unless it lasts over 48 hours or gets very hot (over 95°C). If bearings are exhibiting excessive vibration at any time or are running hotter than 95°C, the bearings should be inspected for proper lubrication, alignment, tightness of set screws, cap bolts, and collars, and inspected for signs of contamination in the lubricant.
The bearings or damaged bearing components shall be replaced if found faulty or showing signs of wear. When re-lubricating, use a sufficient amount of grease to purge
the seals. Rotate bearings by hand during re-lubrication.

Wheel and Shaft Maintenance
Inspect the shaft and wheel for dirt build-up, corrosion, and signs of excess stress or fatigue after one month of service. Future inspection interval shall be based on findings in this initial inspection. Clean the components. If any signs of damage, stress, or fatigue are present (deformation, cracks, excessively worn surfaces) the part shall be replaced. Any material build-up on rotating parts or parts that could contact rotating parts shall be cleaned. If the wheel is removed for any reason, make sure that it is securely attached to the shaft before restarting the fan. The wheel and shaft shall also be inspected any time excessive vibration is observed.

Structural Maintenance
All structural components or devices used to support or attach the fan to a structure should be checked at regular intervals. Vibration isolators, bolts, foundations, etc., are all subject to failure from corrosion, erosion, and other causes. Improper mounting can lead to poor operation characteristics or fan fatigue and failure. Check metallic components for corrosion, cracks, or other signs of stress. Replace any components showing any of these signs. Concrete should be checked to ensure the structural integrity of the foundation and repaired or replaced if any signs of damage are found. Where the fan is used to handle toxic gasses or vapours, the housing, and welds shall be inspected for signs of corrosion or cracking at regular intervals to assure no toxic gasses can escape. The condition of the coating shall be inspected as well to verify that bare parts of the fan are not exposed. All gaskets and ducting shall be inspected for signs of erosion as well. An initial inspection after one month of service shall be used to determine an appropriate inspection interval.

Fan Operation
Proper Use and Application
It is critical that fans are operated only as their design intended. Standard construction is designed for standard applications as defined below:
• Clean air – no solids, particles, or corrosive or abrasive gasses.
• Air stream temperatures between 40°C and -10°C with a maximum temperature fluctuation of 5°C per minute.
• Ambient temperatures shall not exceed 40°C for standard design fans.
• Constant speed operation.
Operating a fan in any of the following conditions could cause a safety hazard:
• Do not operate a fan in an environment that it was not designed for. This includes operating the fan in temperatures or with abrasive or corrosive vapours or chemicals or solid material (including fly ash) other than the fan was designed for. Operating at elevated temperatures or with abrasive or corrosive vapours requires special considerations that must be incorporated in the design, material selection, coating and maintenance of the fan.
• Do not operate a fan at a higher speed than the fan, drives, seals, bearings, or other components were designed for.
• Do not use variable rotational speed service without first consulting Fan Engineering (Midlands) Ltd
• Do not operate a fan without the bearings properly lubricated. Lubrication intervals are explained in corresponding maintenance sections of this manual.
• Do not operate a fan exhibiting increased vibration levels. Filter in readings should be 7.2 mm/s RMS or less measured on bearing blocks.

• Do not operate the fan in stall.
• Do not operate the fan with replacement or added components that are not recommended by Fan Engineering (Midlands) Ltd

All of the above conditions could lead to mechanical failure causing safety hazards including exposure to ejected objects and toxic material or vapours.

Operation Checklist

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

Check fan mechanism components:
☐ Nuts, bolts, setscrews are tight.
☐ Mounting connections are properly made and tightened.
☐ Bearings are properly lubricated.
☐ Wheel, drives and fan surfaces are clean and tightened.
☐ Rotating assembly turns freely and does not rub.
☐ Drives on correct shafts, properly aligned, and properly tensioned.
☐ Check that no foreign objects are in the fan or ductwork.

Check fan electrical components:
☐ Motor is wired for proper supply voltage.
☐ Motor was properly sized for power of rotating assembly.
☐ Motor is properly grounded.
☐ All leads are properly insulated.
☐ Resistance between motor windings and earth is over 10 megohms
☐ Control equipment is functioning properly.

Trial “bump”:
☐ Turn on power just long enough to start assembly rotating.
☐ Check rotation for agreement with rotation arrow
☐ Listen for any unusual noise.

Run unit up to speed:
☐ Bearing temperatures are acceptable (95°C max) after one hours of operation.
☐ Check for excess levels of vibration. Filter in readings should be 7.2 mm/s RMS or less measured on bearing blocks.
☐ Check that motor current draw is not above the nameplate value.

After one day of operation:
☐ Check all nuts, bolts and setscrews and tighten if necessary.
☐ Readjust drive tension if necessary
☐ Bearing temperatures are acceptable (95°C max).
☐ Check for excess levels of vibration. Filter in readings should be 7.2 mm/s RMS or less measured on bearing blocks.

"ONE SHOT" TENSIONING

Fenner PB belts are Precision Built to ensure inherent length stability and matching during storage and on the drive. Over many years, the principle of "one-shot" tensioning has been verified by successful drives the world over.

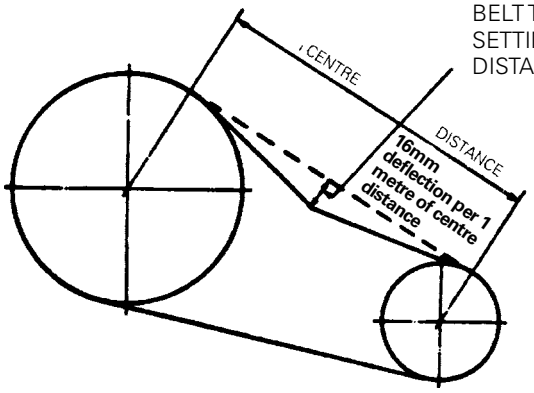
- Install the belts to be a snug fit around the pulleys.
- Spin the pulleys 3-4 revolutions to bed belts into the pulley grooves. (Note: if done manually, beware of finger entrapment between belts and pulleys)
- Tension the belts to the 1.25x setting forces from the table.
- Run the drive under load for 15-20 minutes.
- Stop the drive, check tension & reset to the basic value (standard V and wedge belts) if necessary.
  CRE Plus & Quattro Plus belts should be reset to the 1.25x value.

With a drive that is properly designed for the application there should be no need for further attention during the life of the belts.

For short centre distance drives where the deflection of the belt is too small to measure accurately it is recommended that both deflection and setting force be doubled.

Method of belt tensioning using Fenner Belt Tension Indicator

- Calculate the deflection in mm on a basis of 16mm per metre of centre distance. Centre distance (metres) x 16 = deflection (mm).
- Set the lower marker ring at the deflection distance required in mm on the lower scale.
- Set the upper marker ring against the bottom edge of the top tube.
- Place the belt tension indicator on top of the belt at the centre of span, and apply a force at right angles to the belt, deflecting it to the point where the lower marker ring is level with the top of an adjacent belt.
- Read off the setting force value indicated by the top edge of the upper marker ring.
- Compare this force to the kgf value shown in the table.
- If a Fenner Belt Tension Indicator is not available, a spring balance and rule will suffice.
- With banded belts (pages 68 and 69) use a bar across the band width to ensure even distribution of the force and DIVIDE the force measured by the number of belts in the band for comparison with the values in the table above. Alternatively, for the same deflection, use a setting force from the table above MULTIPLIED by the number of belts in the band.



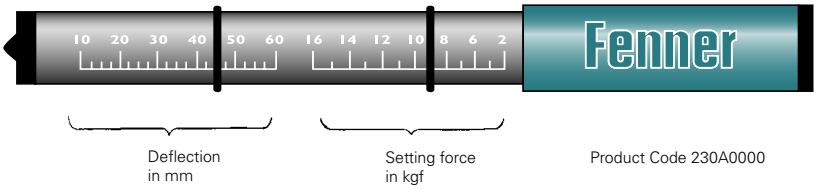
BELT TENSION INDICATOR APPLIES SETTING FORCE AT MID CENTRE DISTANCE

The setting forces below are designed to cover a wide range of drives. A precise setting force for individual applications can be calculated. Please consult your local Authorised Distributor or use the 'Fenner Select' design software at www.fptgroup.com

SETTING FORCES

Belt Section	Setting force to deflect belt 16 mm per metre of span				
	Small pulley diameter (mm)	Basic setting forces Newtons (N)	kilograms (kgf)	1.25 x setting forces Newtons (N)	kilograms (kgf)
SPZ	56 to 71	16	1.6	20	2.0
	75 to 90	18	1.8	22	2.2
	95 to 125	20	2.0	25	2.5
XPZ & QXPZ	over 125	22	2.2	28	2.8
SPA	80 to 100	22	2.2	28	2.8
	106 to 140	30	3.0	38	3.9
	150 to 200	36	3.7	45	4.6
XPA & QXPA	over 200	40	4.0	50	5.1
SPB	112 to 160	40	4.0	50	5.1
	170 to 224	50	5.1	62	6.3
	236 to 355	62	6.3	77	7.9
XPB& QXPB	over 355	65	6.6	81	8.3
SPC	224 to 250	70	7.1	87	8.9
	265 to 355	92	9.4	115	12.0
& QXPC	over 375	115	12.0	144	15.0
8V	335 & above	150	15.0	190	19.0
Z	56 to 100	5 to 7.5	0.5 to 0.8		
A (& HA banded)	80 to 140	10 to 15	1.0 to 1.5		
B	125 to 200	20 to 30	2.0 to 3.1		
C	200 to 400	40 to 60	4.1 to 6.1		
D	355 to 600	70 to 105	7.1 to 10.7		

FENNER BELT TENSION INDICATOR



Deflection in mm — Setting force in kgf — Product Code 230A0000

NOTES:

For single belt drives a straight edge should be placed across the two pulleys to act as a datum for measuring the amount of deflection.

If the measured force falls within the values given, the drive should be satisfactory. A measured force below the basic value indicates under-tensioning.

A new drive should be tensioned to the 1.25x value to allow for the normal drop in tension during the running-in period.

After the drive has been running for 15–20 minutes, under load the tension should be checked and re-adjusted, if necessary.

TROUBLE SHOOTING

Small radial cracks on belt side and base

Generally caused by slippage due to insufficient belt tension, but excessive heat and/or chemical fumes can also cause the same problem.

Belt swelling or softening

Caused by excessive contamination by oil, certain cutting fluids, water or rubber solvent.

Whip during running

Often caused by incorrect tensioning, particularly on long centre drives. If a slightly higher (or lower) tension does not cure the problem there may be a critical vibration frequency in the system which requires re-design or use of banded belts. Consult your local Authorised Distributor Technical Services.

Pulleys

Pulley groove wear can cause rapid belt failure. Check grooves for wear with a Fenner groove gauge.

Installation and Operaton of Wedge & V-Belt Drives

Although comparatively old in principle today's belt drive is an extremely efficient method of transmitting power between prime mover and machinery.

It owes its present high performance standards to many years of research and development by engineers and technologists, leading to significant refinements in materials and processes.

To derive maximum benefit from such advances it is important that the simple installation and operation procedures set out here are closely followed. Making these routines standard practice will ensure optimum performance and long, trouble-free life from Fenner belt drives.

INSTALLATION

PULLEYS

Before assembling the drive, check the pulley grooves are free from scores or sharp edges, and all dimensions conform to the relevant standard.

Drive installation is straightforward with Taper Lock – but follow all steps on the installation leaflet provided with every Taper Lock bush.

ALIGNMENT

Good alignment of pulleys is important to avoid belt flank wear. The diagrams opposite show some of the common alignment faults.

Pulley misalignment should not exceed 1/2 ^{0} angular and 10mm / metre drive centre distance, axial.

A laser alignment device is available, which facilitates quick, easy and accurate pulley alignment - consult your local Authorised Distributor.

BELT INSTALLATION

When the pulleys have been correctly positioned on the shafts, the belts can be installed to complete the drive.

The drive centre distance should be reduced prior to the installation of the belts so that they may be fitted without the use of force. Under no circumstances must belts be prised into the grooves. Belts and pulley grooves can easily be damaged by using sharp tools to stretch the belts over the pulley rim.

The installation allowance given in the table opposite is the minimum recommended reduction in centre distance for the various belt sections and lengths to allow for correct fitting.

The take-up allowance given in the same table should be added on to the calculated centre distance to allow for belt stretch/bedding in.

GUARDS

Where guards are necessary it is desirable to use mesh materials to permit adequate ventilation.

Guards should be generously sized to allow for incidental belt flap.

TENSIONING PULLEYS

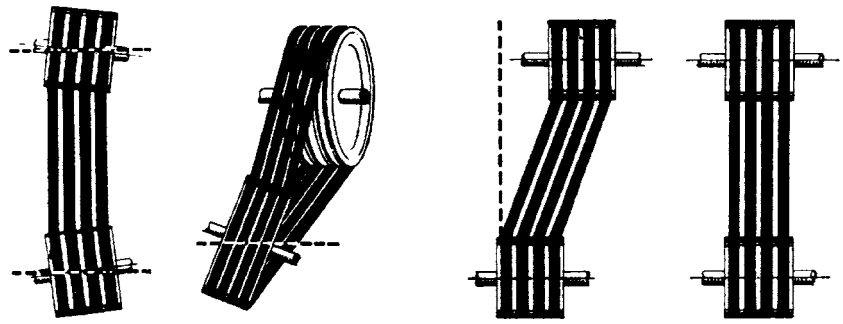
If tensioning (jockey) pulleys are to be used on wedge belt drives, they must be grooved pulleys working on the inside of the drive, preferably on the slack side. The pulley should be positioned as close as possible to the large pulley. Flat tensioning pulleys, bearing on the outside of the drive are permissible only with V and not with wedge belts. They should be positioned within one third of the centre distance from the small pulley.

The tensioning pulley must have at least the same diameter as the small pulley of the drive.

Tensioning pulley movemement must allow for passing the belts over the outside diameter of one of the drive pulleys on installation, and should also allow for belt stretch/bedding in.

The modern wedge belt drive is a highly efficient power transmission medium, but optimum performance will not be achieved without correct tension and alignment.

1 Angular misalignment
2 Composite misalignment
3 Axial misalignment
4 Correct installation - both shafts and pulleys are parallel and in alignment.



INSTALLATION AND TAKE-UP ALLOWANCE

Belt Pitch Length (mm)	Installation Allowances					Take -up (mm)
	SPZ Z	SPA A	SPB B	SPC C	8V D	
410 to 530	20					5
530 to 840		25	30			10
850 to 1160				50		15
1170 to 1500						20
1510 to 1830						25
1840 to 2170						30
2180 to 2830					65	40
2840 to 3500						50
3520 to 4160						60
4170 to 5140						70
5220 to 6150						85
6180 to 7500						105
7600 to 8500						125
8880 to 10170						145
10600 to 12500						175

TAPER LOCK

All Fenner V and wedge belt pulleys use Taper Lock shaft fixing.

Detailed instructions for fitting and dismounting Taper Lock products are included with Taper Lock bushes.

TO INSTALL

1. After ensuring that the mating tapered surfaces, bore and shaft are completely clean and free from oil or dirt, insert bush in hub so that holes line up.
2. Sparingly oil thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub, shown thus ◎ in diagram.
3. If a key is to be fitted place it in the shaft keyway before fitting the bush. It is essential that it is a parallel key and side fitting only and has TOP CLEARANCE.
4. Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will nip the shaft first and then hub will be slightly drawn on to the brush.
5. Using a hexagon wrench tighten screws gradually and alternately to torque shown in table below.
6. Hammer against large-end of bush, using a block or sleeve to prevent damage. (This will ensure that the bush is seated squarely in the bore.) Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.
7. After drive has been running under load for a short time stop and check tightness of screws.
8. Fill empty holes with grease to exclude dirt.

INSERT BUSH

INSERT SCREWS AND LOCATE ON SHAFT

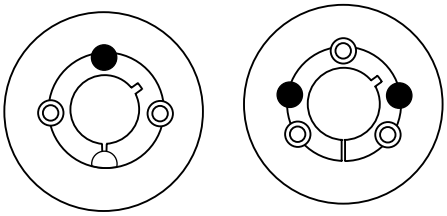
TIGHTEN SCREWS FINGER TIGHT

TIGHTEN SCREWS ALTERNATELY

REMOVAL

TO REMOVE

1. Slacken all screws by several turns, remove one or two according to number of removal holes shown thus ● in diagram. Insert screws into removal holes after oiling thread and under head of cap screws.
2. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.
3. Remove assembly from shaft.



REMOVAL HOLES ●

Bush size		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
Screw tightening torque (Nm)		5.6	5.6	20	20	20	30	50	90	90	115	115	170	170	190	190	270	270
	qty	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
Screw details	size (BSW)	1/4"	1/4"	3/8"	3/8"	3/8"	7/16"	1/2"	5/8"	5/8"	1/2"	1/2"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"
	Hex. socket size (mm)	3	3	5	5	5	6	6	8	8	10	10	12	12	14	14	14	14
Large end dia. (mm)		35.0	38.0	47.5	57.0	57.0	70.0	85.5	108	108	127	127	146	146	162	162	178	178
Bush length (mm)		22.3	22.3	25.4	25.4	38.1	31.8	44.5	50.8	76.2	63.5	89.0	76.2	102	89.0	114	102	127
Approx mass (kg)		0.1	0.1	0.2	0.3	0.5	0.7	1.5	2.7	3.6	3.8	5.0	5.6	7.7	7.5	10.0	11.1	14.0

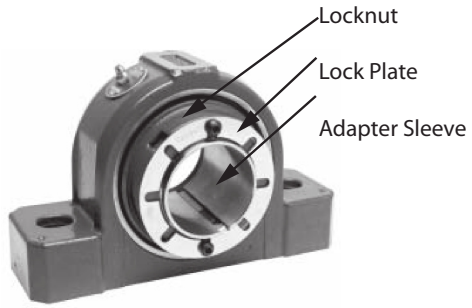
Instruction Manual for Adapter Mounted Dodge® ISN Unitized Spherical Roller Bearings

These instructions must be read thoroughly before installation or operation.

Warning: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

INSPECTION

Inspect shaft to ensure it is smooth, straight, clean and within commercial tolerances.



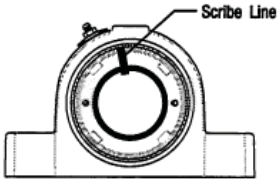
MOUNTING

Installation of the Non-Expansion Unit

1. Remove lock plate located on the face of the lock nut.
2. Turn locknut counter clockwise until bearing will freely slide onto the shaft.
3. Slide bearing to the desired position on the shaft.

NOTE: All weight must be removed from the bearing when obtaining the “Zero Reference Point”.

4. The “Zero Reference Point” is defi ned as the point when the clearance between the adapter sleeve, shaft, and bearing bore has been removed.
   a. To reach the “ZERO Reference Point” rotate locknut clockwise, using both hands, as tightly as possible. When mounting bearings with shaft sizes 90mm and larger the following TEST must be performed. As a test to insure you have reached the “ZERO Reference Point” tap on the O.D. of the nut with a hammer and attempt to rotate the nut using both hands. If the nut will not rotate then you have reached the “ZERO Reference Point” and you should proceed to step 5. If you can rotate the nut using both hands, then you have not reached the “ZERO Reference Point”, and should repeat step 4a until “ZERO Reference Point” is obtained.



5. Scribe a line through the locknut face and adapter face.
6. Using a Spanner or Drift and Hammer, rotate locknut clockwise by the number of turns shown in Table 1.
7. Slide lock plate over shaft and align tang of lock plate with slot in adapter sleeve.
8. TIGHTEN NOT LOOSEN locknut until lock plate slots overlap the two threaded holes on the locknut face.
9. Insert and tighten button head screws to locknut face.
10. Bolt down pillow block on to the structure.

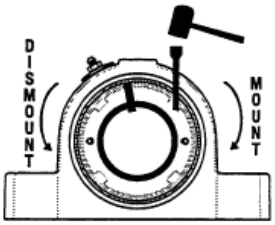


Table 1 - Locknut Rotation from “Zero Reference Point”

Shaft Size		Locknut Rotation		
mm	inch	Basic Bearing No.	Turns	Degrees
30 to 35	1-1/8 to 1-1/2	22208K	3/4 to 7/8	280 ± 25
40	1-5/8 to 1-3/4	22209K	7/8 to 1	330 ± 25
45 to 50	1-7/8 to 2	22210K	7/8 to 1	330 ± 25
55	2-3/16 to 2-1/4	22211K	1 to 1-1/4	405 ± 40
60	2-3/8 to 2-1/2	22213K	1 to 1-1/4	405 ± 40
65 to 75	2-11/16 to 3	22215K	1 to 1-1/4	405 ± 40
80 to 85	3-3/16 to 3-1/2	22218K	1-1/4 to 1-1/2	495 ± 40
90 to 100	3-11/16 to 4	22220K	1-1/4 to 1-1/2	495 ± 40
110	4-7/16 to 4-1/2	22222K	1-1/8 to 1-3/8	450 ± 40
115 to 125	4-15/16 to 5	22226K	1-3/8 to 1-5/8	540 ± 40
135	5-7/16 to 5-1/2	22228K	1-3/8 to 1-5/8	540 ± 40
140	5-15/16 to 6	22232K	1 to 1-1/4	405 ± 40

Installation of the Expansion Unit

1. Remove lock plate located on the face of the locknut.
2. Turn locknut counter clockwise until bearing will freely slide onto the shaft.
   a. If Locknut Facing Outboard: Align housing mounting holes with substructure mounting holes and snug bolts. Push insert as far as possible in the direction of the fi xed bearing.
   b. If Locknut Facing Non-Expansion Bearing:
   Align housing mounting holes with substructure mounting holes and snug bolts. Position Expansion bearing insert in center of housing.
   (Note: This is necessary because in the process of mounting, the bearing is being drawn toward the locknut.)

Note: All weight must be removed from the bearing when obtaining the “Zero Reference Point”.

3. Follow steps 4 through 10 found under the Installation of the Non-Expansion Unit.

WARNING: Because of the possible danger to persons(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Baldor Electric Company nor are the responsibility of Baldor Electric Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

DISMOUNTING

1. Remove weight from bearing via slings or jacks.
2. Remove mounting bolts from bearing.
3. Remove button head screws and lock plate from locknut.
4. Rotate locknut counter clockwise until bearing freely slides from the shaft.

FIELD CONVERSION OF A NON-EXPANSION BEARING INTO AN EXPANSION BEARING

Move snap ring, opposite the collar side, to the outermost snap ring groove. Remove Non-Expansion nameplate and re-label as an Expansion bearing.

GREASE LUBRICATION

DODGE ISN bearings are pre-packed with a NLGI #2 Lithium Complex grease. For re-lubrication, select a grease that is compatible with a #2 Lithium Complex grease. Relubricate in accordance with Table 2.

Table 2 Re-Lubrication Intervals (in Months)
(Based on 12 hours per day, 150° F (66° C) Max

SHAFT SIZE		RPM								
mm	inch	250	500	750	1000	1250	1500	2000	2500	>3000
30 to 35	1-1/8 to 1-1/2	4	3	2	2	1	0.5	0.25	0.25	0.25
40	1-5/8 to 1-3/4	4	3	2	2	1	0.5	0.25	0.25	0.25
45 to 50	1-7/8 to 2	4	3	2	2	1	0.5	0.25	0.25	0.25
55	2-3/16 -2-1/4	3.5	2.5	1.5	1	0.5	0.5	0.25	0.25	0.25
60	2-3/8 to 2-1/2	3	2	1.5	1	0.5	0.25	0.25	0.25	0.25
65 to 75	2-11/16 to 3	3	2	1.5	1	0.5	0.25	0.25	0.25	--
80 to 85	3-3/16 to 3-1/2	2.5	1.5	1	0.5	0.25	0.25	0.25	--	--
90 to 100	3-11/16 to 4	2	1.5	1	0.5	0.25	0.25	--	--	--
110	4-7/16 to 4-1/2	2	1.5	1	0.5	0.25	--	--	--	--
115 to 125	4-15/16 to 5	1.5	1	0.5	0.25	--	--	--	--	--
135	5-7/16 to 5-1/2	1.5	1	0.5	0.25	--	--	--	--	--
140	5-15/16 to 6	1	1	0.5	0.25	--	--	--	--	--

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MN3014 (Replaces 499315)

07/01/09

FENNER TYRE COUPLINGS - INSTALLATION

INSTALLATION INSTRUCTIONS

Note : Satisfactory performance depends on correct installation and maintenance. All instructions in this manual must therefore be followed carefully.

1. Thoroughly clean all components, paying particular attention to the removal of the protective coating in the bore of the flanges.

2. Fit flanges to the shafts placing the external clamp rings on the shafts. (Where Taperlock flanges are used, see separate fitting instructions supplied with the Taper Lock Bushes). Locate flanges so that dimension M2 is obtained (see paragraph 3). Flanges with internal clamping rings should then have the clamping rings fitted, engaging only two or three of the threads of the screws at this time.

3. Bring shafts into line until dimension M2 is obtained (table 5). If shaft end float is to occur, locate the shafts at mid-position of end float when checking dimension M2. Note that shaft ends may project beyond the faces of the flanges if required. In this event, allow sufficient space between shaft ends for end float and misalignment. Flanges should be fitted flush with the end of the shaft when used with Mill-Motor flanges.

4. Check parallel alignment by laying a straight edge across the flanges at several positions around the circumference. Check angular alignment by measuring gap between flanges at several positions around the circumference. It is desirable to align the coupling as accurately as possible, particularly on high speed applications.

5. Open out tyre and fit over coupling flanges ensuring that the tyre beads seat properly on the flanges and/or clamping rings. To ensure proper seating, it may be necessary to strike the outside diameter of the tyre with a small mallet. When seated, there should be a gap between the ends of the tyre as shown in table 6.

TABLE 6

COUPLING SIZE	F40 TO F60	F70 TO F120	F140	F160 TO F180	F200 TO F250
Tyre Gap in mm.	2	3	5	6.5	8

6. Tighten clamping ring screws alternately and evenly (half turn at a time) working round each flange untill the required screw torque is achieved.