

# JOHNDEC

**CHEMICAL RESISTANT CENTRIFUGAL PLASTIC FANS**



Johndec Engineering Plastics  
Engineers of Thermoplastics & Chemical Handling

## **MAINTENANCE AND INSTALLATION MANUAL**

# MAINTENANCE AND INSTALLATION MANUAL

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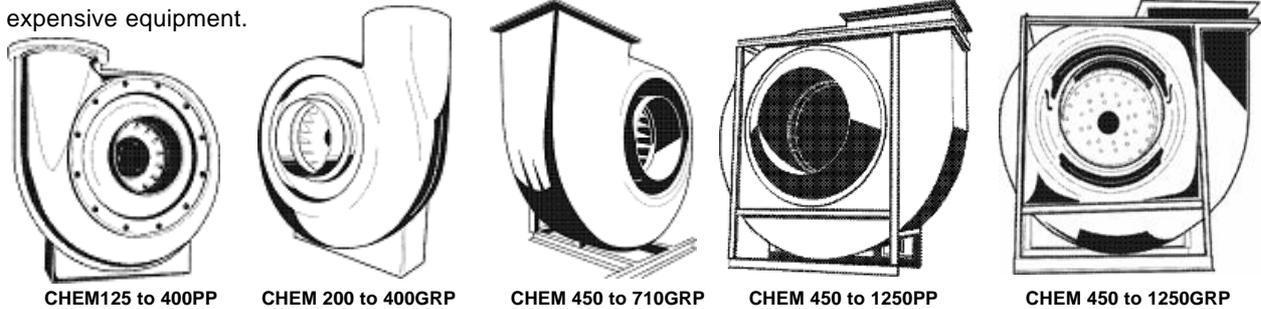
## GENERAL INFORMATION

This bulletin has been developed as a guide for installation of JOHNDEC plastic fans. The purchasers are to ensure for proper installation, maintenance and safety precautions. The instructions are not complete within themselves, but should be considered as supplementing good erection techniques.

It is generally advisable to have the installation and initial start up of the equipment supervised or checked by an experienced erection superintendent. If in doubt, the purchaser should contact JOHNDEC local representative for assistance.

## SAFETY PRECAUTIONS

The plastic fan, which you have purchased, is a rotating piece of equipment and can become a source of danger to life and can cause injury if not properly applied. The **maximum operating speed** for which this fan is designed should **not be exceeded**. Suitable guards should be placed over the inlets and outlets of the fans to prevent the entrance of **any loose material object**. The fan should be kept within a room or protective enclosure **isolate away** from people and expensive equipment.



Within the fan area, the temperature of the medium to be extracted must not exceed the following values

Type	Max. Temp.	Type	Max. Temp.
PVC fans	60 degree C	PP fans	80 degree C
GRP fans	100 degree C	PVDF fans	120 degree C

The plastic material used for the individual fans must be checked for its chemical resistance to the medium. Not every plastic material is resistant to every medium.

Personnel, who will operate this fan, or those who will perform maintenance thereon, should be warned of the potential hazards of the equipment. Strict adherence to installation instructions is the responsibility of the user and is necessary to the safe operation of this fan. Proper protection from electrical start of the fan during maintenance is required. A disconnect switch installed by qualified electrical contractor with means of installing a padlock to prevent operation of the fan switch is desirable. In addition, a disconnect switch should be located at the fan for use by personnel working on the fan

## RECEIVING

Examine the equipment and report immediately any damage or shortage. If installation, operating and maintenance instructions are provided, these should be handed as soon as possible to the appropriate persons.

## STORAGE

Protect fans against weather, excess heat, damp or dust. Particularly cover and protect bearings, shaft and motor. Inspect fan periodically and in the case of ball or roller bearings, rotate weekly to prevent damaging the races. Do not store near vibrating machinery or fan bearings might suffer damage of the same kind. Always store the right way up.

## UNLOADING AND HANDLING

The JOHNDEC plastic fans are designed with sufficient strength for operating conditions. Do not drop or jar. For safe lifting purposes, **two standard holes** are specially designed for hoisting. **Do not lift a fan by the shaft, motor or impeller**. Care must be exercised in handling the equipment during installation to prevent damage or distortion, which will seriously affect operation

## FOUNDATIONS & DUCT CONNECTION

All essential dimensions are on the fan assembly drawing and should be studied carefully. This fan is a rotating piece of machinery and should be mounted on a rigid and substantial foundation. All fans should be mounted on **VIBRATION** damping devices. Anti-vibration mountings should be selected in consultation with the manufacturer. This ensures smoother operation and longer service life.

Installation should locate as near as possible to main supporting columns structural beams, or walls. Make sure that when the bolts are fully tightened the fan structure is not strained. Check with spirit level that the fan shaft is horizontal where this is applicable.

Effective anti-vibration requires **flexible duct** connections and **flexible electrical conduit**. These flexible sleeves or

connectors, must be chemical resistance, are use to connect ducting to the fan suction (inlet) and fan thrust sides (outlet). Fan **housing should not support heavy ducting** except by prior arrangement with the manufacturer.

### **BELTS AND DRIVE**

Electric motors and other driving equipment must be properly aligned and mounted on the flat base free from distortion. Slide rails must be positioned so that sufficient allowance is made for adjustment of drive center and changing of belts. Before fitting a pulley, the bore, the shaft and taper bush must be thoroughly cleaned.

Alignment of belts and pulleys is important and must be checked in all planes

- 1) Align the sheaves carefully to avoid axial thrust on the bearing.
- 2) Adjust the belt tension to just prevent slippage when the motor is running at full load. Excessive belt tensions will cause unnecessary loading on the bearing.
- 3) On high inertia load applications, belts may be tightened to prevent squealing and slipping during acceleration. Generally, belts should be allowed to slip during acceleration to avoid the possibility of overloading the motor bearing.
- 4) It is essential that all the belts be practically of the same length, as one or two belts longer than the rest will mean that the remainders must carry the entire load. A slight variation is permissible as this will work itself out after a few days and the motor can be tightened by moving it along the slide rails.
- 5) They should be re-tighten after the fan has been running for a few days (36hrs) and periodically checked for tension.

The V-belt drives, which connect the driving mechanism to the fan, create potential DANGER to the personnel and suitable guards should be provided. Bearing assemblies should be covered so that no rotating element can snag clothing or skin. Any open sheaves, pulleys, belts and other similar transmission device should be enclosed by guards.

### **WIRING AND GROUNDING**

- 1) Electric starting equipment should include fuses; overload and under-voltage protection selected to suit starting time and full load current and should conform fully to local electrical regulations.
- 2) Stators winding connections should be made according to the connection diagram shown on the nameplate or in accordance with the wiring diagram attached inside the terminal box.
- 3) Cables used should be capable of carrying the full load current of motor. Terminal screw should be properly tightened.

### **BEFORE STARTING UP OF FAN**

Before starting the motor for the first time, check that the wiring, fusing and grounding have been made properly. Check also the insulation resistance, power supply and mechanical freedom of the motor.

### **NOTE:**

Had the motor been stored for a long time, check the stators winding insulation resistance with 500 V DC Megger before installation. If the resistance has dropped below 10 Mega ohms, dry up the motor in an ambient air temperature of 85 degrees C and continue the process until the resistance increases again.

Assuming that the equipment has been enclosed, properly installed and that a check has been made for tightness of all hardware and mounting bolts, the plastic fan will be ready to operate after some final safety checks to prevent injury to personnel or damage to equipment.

- 1) Check the fan and motor nameplate for voltage and frequency values.
- 2) Check the motor connections with the connection diagrams.
- 3) Check the bearing alignment, proper lubrication, tolerance, locking collars tight, cleanliness, burrs, or corrosion, and water connections and cooling, if required.
- 4) Check keys and wheel set screws for tightness. Check foundation bolts for tightness.
- 5) Check housing, impeller and duct work for extraneous and debris. Secure all access doors.
- 6) Check wheel position for proper clearance at inlet.
- 7) Turn wheel over by hand, if possible, to see that it rotates freely without hitting the housing.
- 8) Shaft motion may exhibit some resistance in the beginning due to the tight chemical resistance seals but this must be regarded as normal.
- 9) Cover the outlet flange by means of a board to lessen starting load on the driver. The inlet should be left open unless Inlet Volume Control or Damper is available.



- 10) "Bump" with driver, check for rotation in proper direction.

Another potential hazard is the ability of the fan to suck loose material as well as air. Loose material in the air stream can be a projectile. Suitable guards should be placed over the inlets and outlets of the fans to prevent the entrance of clothing or flesh into the rotation parts.

#### STARTING UP OF FAN

- 1) Allow unit to reach full speed, then shut down. During this short period check for vibration or any unusual noise. If any are observed, locate the cause and correct. Do not operate until cause has been corrected.
- 2) Lock the power source in "OFF" position
- 3) Recheck for tightness of hold down bolts, all set screws and keys, pulley and tighten if necessary. Initial start up has a tendency to relieve the tightness of nuts, bolts and set screws.
- 4) Assuming the fan operates satisfactorily, the run in period should be at least eight hours. Bearing should be observed a minimum of once each hour during the first eight hours of operation. Friction may cause bearings to heat-up. There need be no concern if the bare hand can be held on the bearing for five seconds.
- 5) When the motor has been operated under load for a short period of time, check that the operating current tally with the name-plate current
- 6) Any access door in the housing should not be opened when the fan is in operation.
- 7) Re-check the belts tension after 24 hours and 1 week.

#### FAN MAINTENANCE

To insure long life and trouble free service, a frequent and regular check of all lubricants in bearings and couplings should be made. Sleeve bearings should be drained, flushed and refilled with clean oil after the first month and each six-months thereafter.

Inspection of parts for wear should be made at regular intervals but not less than three times each year.

Should excessive noise or vibration develop, check the following possibilities:

- 1) Build up of dirt or foreign matter on the wheel
- 2) Bolts on bearings housings and driver loose.
- 3) V-belt drives improperly aligned, belts must have proper tension.
- 4) Pulleys must be balanced and accurately bored to suit fan and motor shafts diameter
- 5) Check bearing clearance and alignment
- 6) Check coupling alignment
- 7) Check wheel for tightness on the shaft
- 8) Has foreign matter entered fan, causing damage to wheel, shaft and bearing.
- 9) Is the vibration coming from a source other than the fan?
- 10) Stop the fan and determine if the vibration still exists.
- 11) Disconnect the driver from the fan and operate it by itself to determine if it produces vibration.
- 12) Is there a proper clearance between the wheel and inlets?
- 13) The housing inlet cover on the suction side must be removed with a screwdriver to permit cleaning of those parts.

#### FAN BEARINGS

One of the important features in the successful operation of a fan is its bearings and lubrication.

- 1) CHEM125 to CHEM400 flanged bearings are provided with permanently lubricated deep groove ball bearings with single row and do maintenance.
- 2) Plummer block units with cast housing (CHEM450 to CHEM710) are provided with SKF self-aligning Y-bearing or equivalent are self-lubricated at the factory with special ball bearing grease for 3,000 - 4,000 operating hours to allow run-in and to avoid unnecessarily increase of bearing temperature. Therefore these bearing must be **fully re-greased** after 3 to 4 months operation.
- 3) SNH-Plummer block housings (CHEM800 to CHEM1250 and all CHEM LS series) for bearing with adapter sleeve or equivalent self-aligning roller bearings housing are lubricated at the factory must only be filled to approximately 1/3 with special roller bearing grease for first 36 hours to allow run-in and to avoid unnecessarily increase of bearing temperature. Therefore these bearing must be



**fully re-greased at site by maintenance contractor** after installation and commissioning.

- 4) It is advisable to clean the bearings with gasoline prior to refilling. Excessive filling will unnecessarily increase bearing temperature, which should not exceed 80 degrees C.
- 5) Trained personnel shall only carry out bearing maintenance
- 6) Lubrication intervals depend on the speed of the motors and will vary between approximately 1000 hours for 2 pole (2800/3600RPM) motors to approximately 3000 hours for 4~8 pole (750~1750RPM) motors, based on correctly fitted bearings, no overload, running under good, clean conditions and under normal ambient temperatures.
- 7) The grease recommended is SKF LGWA2 or E class Alvania 3. High temperature above 120 degrees C, range -35/+135 degrees C, can withstand peak temperatures of +220 degrees C. Heavy load, Rust inhibiting properties, Water resistance, suitable for very high speed, low torque and friction.

#### **CLEANING AND REPLACING BEARINGS**

When dismantling the housing, the bearings should be cleaned of old grease by washing with a grease-dissolving solvent.

In the event of bearing replacements, the bearing fitted should be of the same size as that shown on the nameplate. The bearing should be an easy and smooth fit in the housing and on the shaft. Care must be taken to ensure that the contacting surfaces are parallel, otherwise damage may result.

#### **MOTOR**

##### MOTOR AND TEMPERATURE RISE

Standard motors have a unity service factor. Temperature rise of class B insulation motors' (TEFC) stator windings, measured by resistance method, should not exceed 80 degrees C, at the ambient temperature of 40 degrees C.

Permissible temperature rise (measured by resistance method) for other classes of insulation motors are: -

INSULATION CLASS PERMISSIBLE TEMP. RISE (DEGREE C)

A	60
E	75
F	100
H	125

#### **MOTOR MAINTENANCE**

Normal maintenance consists of inspection, cleaning and lubrication at regular intervals.

Efficient operation of a motor depends heavily on correct installation and regular maintenance.

During the first few months of service, careful observance of the new motor in the following areas may help prevent service breakdown.

##### MOTOR MECHANICAL MAINTENANCE

- 1) Ensure that all external cables are adequately cleaned and secured and that there is no evidence of chafing.
- 2) Check that all terminals are clean and tight.
- 3) Ensure that all bearings are not overheated and that the motor runs smoothly and quietly. Also ensure that these are in good conditions and are lubricated properly.
- 4) Check that fixing bolts and/or slide rails, pulleys, couplings, etc. are securely fixed.
- 5) Ensure that there is no mechanical obstruction to prevent rotation.
- 6) Keep the motor free from oil, dirt and dust. Do not allow tools, oil cans, pieces of rags, etc. to lie around or on the motor.

##### MOTOR ELECTRICAL MAINTENANCE

- 1) Ensure that all windings are not overheated.
- 2) Compare the actual load current with the full-load current given on the nameplate to ensure that the motor is not excessively overloaded.
- 3) Ensure that the phases are balanced, i.e., no single-phasing defects are present.

#### WARNING:

Prior to any mechanical maintenance procedures, disconnect all power sources to the motor and its accessories.

#### **ROUTINE MOTOR INSPECTIONS**

- 1) Check the motor's mechanical connections every three to six months, as well as conductor connections, and the resistance of winding insulation coatings.
- 2) Hold a general inspection as indicated above, recommended at three yearly intervals for motor operation in normal service conditions.
- 3) Following an inspection or repair, give the motor a test run to check its specifications against an objective

standard.

**GREASING**

- 1) Wipe the hand-operated grease gun fittings and the regions around the motor and bearing fitting clean.
- 2) Remove the Relief Plug and free the Relief hole of any hardened grease.
- 3) Add grease with the motor or bearing stationary until new grease is expelled through the relief hole (or grease discharge port).
- 4) Run the motor for about ten minutes with the relief plug removed to expel excess grease.
- 5) Clean and replace the relief plug.

**WARNING:**

Do not allow any grit to enter with the grease, as this will ruin the bearing.

Do not over-grease or under-grease, as the former will cause unnecessary over-heating of the bearings while the latter will cause running trouble.

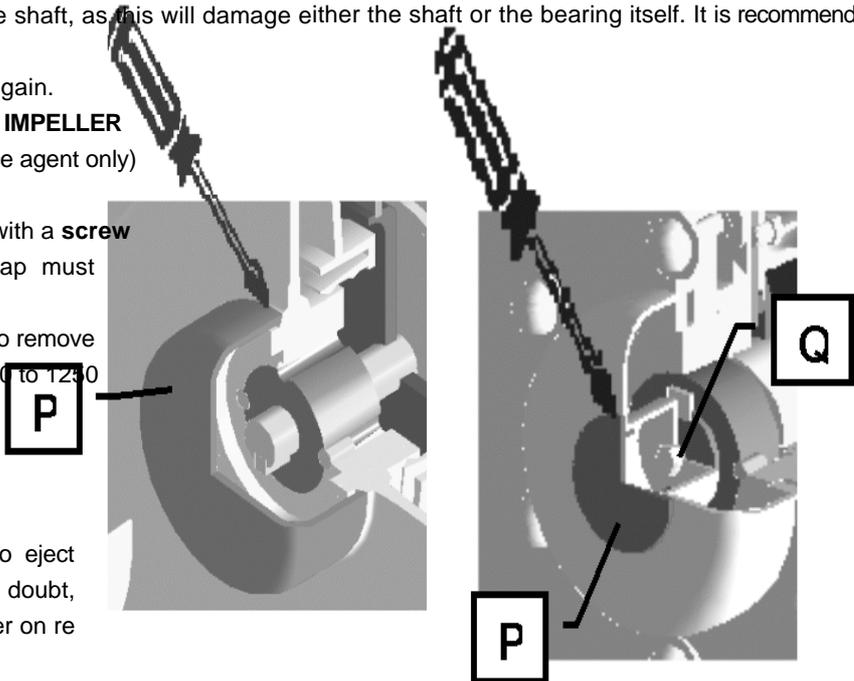
Bearings should not be driven off the shaft, as this will damage either the shaft or the bearing itself. It is recommended that bearings once removed should not be used again.

**TO REMOVE AND TO RE-INSTALL IMPELLER**

(To be carried out by CHEMCO service agent only)

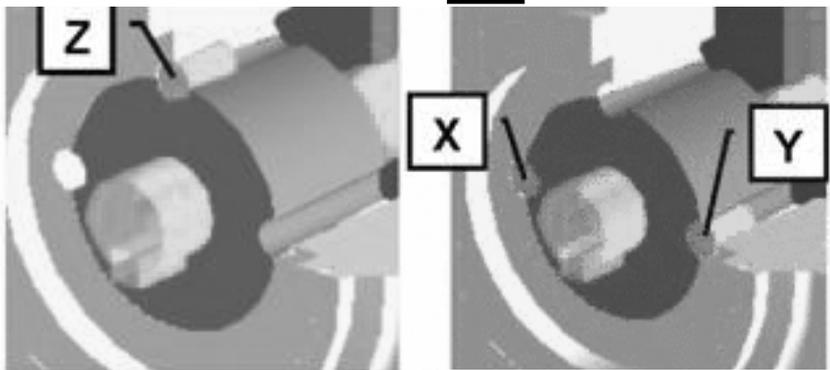
To Remove "Hub Cover"

- a) Carefully remove the "cap" (P) with a **screw-driver**. Dented or damaged Cap must be replaced.
- b) Loosen the Stainless Steel bolt to remove the "Hub cover" (Q). (CHEM 450 to 1250 only)



To unlock / loosen the Taper Bush

- a) Loosen the 2 setscrews (X&Y) with Allen keys.
- b) Use one of the setscrews (Z), to eject the bush to loose position. If in doubt, check with taper bush supplier on removing taper bush.

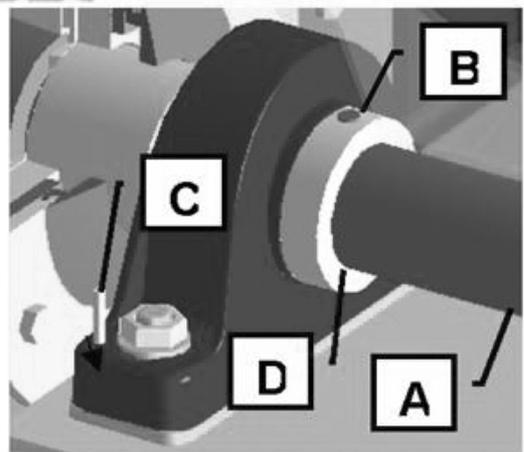


To lock / tighten the Taper Bush

- a) Ensure all surfaces are properly cleaned
- b) REMOVE the ejecting setscrew (Z).
- c) With the other setscrew (X&Y), lock it properly but allow shaft to protrude a correct depth for "Hub Cover" sitting (CHEM 450 to 1250). TIGHTEN the setscrews (X&Y) to lock the Shaft and Taper Bush. If in doubt, check with taper bush supplier on tightening taper bush

**TO REMOVE THE PILLOW BLOCK OR FAN SHAFT**

- a) Remove the fan impeller and carefully place in safe location to avoid damage.
- b) Apply "thinner" to the shaft (A) to dilute and clean the black epoxy paint near the drive end. (CHEM 450 to 1250 only). Polish if necessary.
- c) Apply "de-bonded" on both the bearing setscrew (B). Unscrew the ring (CHEM 450 to 710 only).
- d) Remove locating Pins (C) and loosen the front and back Pillow blocks bolts and nuts. Marking on (D) may be necessary to



identify the front and back Pillow block position

- e) Slide and remove both the pillow blocks. Front pillow block toward the impeller side and the other toward the drive side.

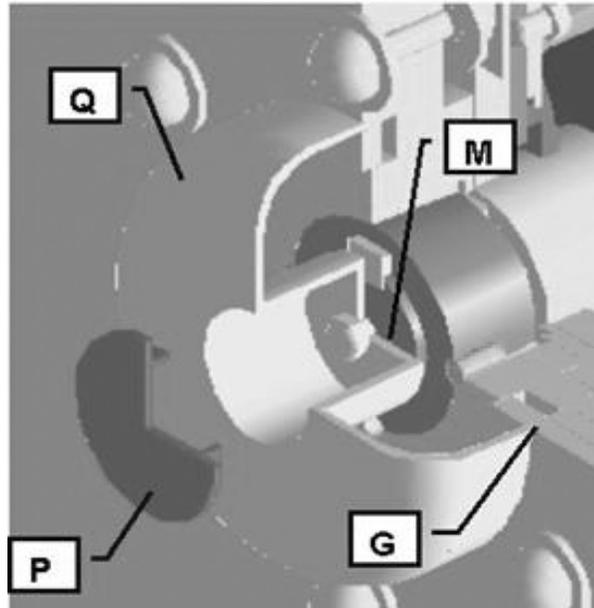
To replace the Pillow Blocks and Fan shaft in Position.

- a) Ensure the Steel Pedestal, Plastic Shims, Pillow Blocks, bearing and shaft are properly cleaned.
- b) Slide the front and back Pillow Blocks onto the shaft in correct position (D) as marked.
- c) Place the plastic shims (if any) on the steel pedestal. Use the locating pins (C) secure the pillow block onto the pedestal and loosely secure them with bolts and nuts.
- d) If using the original shaft (A), tighten the bearing locking ring & setscrew (B) to the shaft locating holes. If using new shaft, locating hole need to be mark and drill at correct position and tighten with setscrew. Later to apply a layer of **quick dry glue** to the top of the set -screws.

**TO RE-PLUG THE “HUB COVER” AND “CAP”**

**(CHEM400 to CHEM1250 only)**

- a) Re-check the “Hub Cover” sit correctly on the shaft end with maximum **1-mm** gap (M).
- b) Impeller groove (G) must be properly cleaned and filled with **sealant** .
- c) Place the “Cover” (Q) and tighten with a Stainless steel blot and spring washer.
- d) Ensure surfaces are cleaned and “Cap” (P) **is not damaged** (Replace as necessary). Plug in the “Cap” with a thumb push.



**Standards Spare Parts - Bearing**

Model	Shaft Dia (mm)	Bearing Replacement Model No.
CHEM 125 to 250	24	Flange bearing block c/w 6305-2RS1
CHEM 250 to 400	28	Flange bearing block c/w 6206-2RS1
CHEM 450 to 560	45	SY 45 WM c/w rubber seal (2RS1)
CHEM 630 to 710	60	SY 60 WM c/w rubber seal (2RS1)
CHEM 800 to 1000	70	SNH516 –70 mm, 22216EK, H316, TSN516G, 2 x FRB12.5/140
CHEM 1120 to 1250	80	SNH518 – 80 mm, 22218EK, H318, TSN518G, 2 x FRB12.5/160

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