

Maintenance Guidelines

Machinery Reliability Programs

Luis F. Rizo, PE
4 Mates Way
Waterford, New York 12188-1165

Phone: 518-371-0683
Fax: 518-371-0683

<http://www.elfer.com>

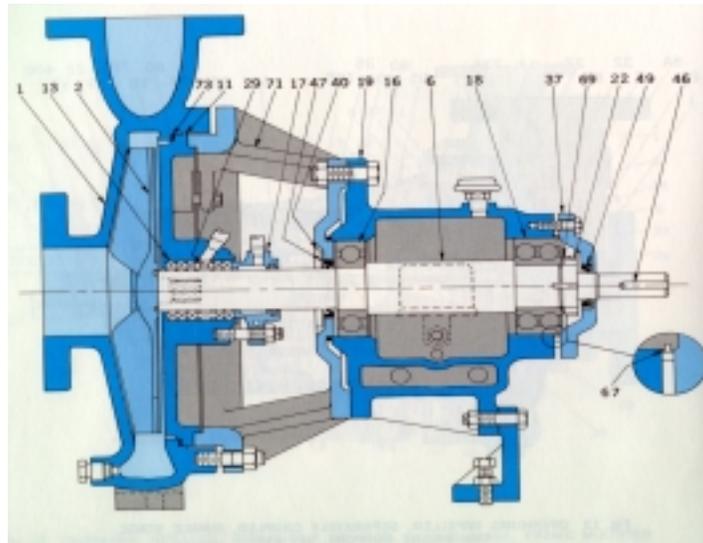
8.1 Centrifugal pumps fits and clearance checklist. Basic data

No:	Measurement	Tolerance
1.	Ball bearing inside diameter (I. D.) to shaft.	0.0001" to 0.0007" (0.003mm to 0.018mm) interference.
2.	Ball bearing outside diameter (O. D.) to housing.	0.0001" to 0.001" (0.003mm to 0.03mm) clearance.
3.	Sleeve to shaft.	0.001" to 0.0015" (0.03mm a 0.04mm) clearance.
4.	Impeller to shaft.	Metal to metal fit to 0.0005" (0.13mm) clearance.
Note: there are pumps such as horizontal, axial split pumps and multi-stage vertical pumps that have interference fits. Consult your OEM manual		
5. Throat bushing		
a)	Throat bushing to case.	0.002" to 0.003" (0.05mm a 0.08mm) interference.
b)	Throat bushing to shaft.	0.015" to 0.020" (0.40 a 0.51mm) clearance.
c)	The throat bushings on some vertical in-line pumps act as clearances.	intermediate bearings and require closer.
6. Impeller		
a)	Impeller ring to hub.	0.002" to 0.003" (0.05mm a 0.08mm) interference.
The impeller ring is normally doweled or spot in at least two places welded		
b)	Impeller ring to case ring clearance.	0.010" to 0.012" (0.254mm a 0.3mm) plus 0.001" (0.03mm) per in. (25.4mm) of impeller ring diameter up to a 12" (3,658mm) ring. Add 0.0005 (0.013mm) per inch (25.4mm) of ring diameter over 12" (3,658mm). For temp. $\geq 500^{\circ}$ (260°C) add 0.10" (2.54mm). Also add 0.005 (0.127mm) for galling materials (stainless steel).
c)	Renew impeller rings when clearance reaches twice original clearance.	
7. Case rings		
a)	Case rings are not to be bored out larger than 3% of original diameter.	
b)	Case ring to case.	0.002" to 0.003" (0.05mm a 0.08mm) interference.
The case ring is normally doweled or spot welded in at least two places.		
8.	Oil deflector to shaft.	0.002" to 0.003" (0.05mm a 0.08mm) clearance. Install "O" ring in the ID if possible.
9. Packing gland		
a)	Packing gland to shaft.	1/32" (0.8mm) clearance.
b)	Packing gland to stuffing box bore.	1/64" (0.016mm) clearance.
10. Lantern ring		
a)	Lantern ring to shaft.	0.015" to 0.020" (0.40mm a 0.51mm) clearance.
b)	Lantern ring to stuffing box.	0.005" to 0.010" (0.13mm a 0.25mm) clearance.
11.	Coupling to shaft.	Metal to metal to 0.0005 (0.013mm) clearance.

12.	Seal gland	
a)	Seal gland alignment boss to stuffing box.	0.002" to 0.004" (0.05mm a 0.10mm) clearance.
b)	Seal gland throttle bushing to shaft.	0.018" to 0.020" (0.5mm to 0.51mm) clearance, unless otherwise specified for hot pumps.
13.	Seal locking collar to shaft.	0.002" to 0.004" (0.05mm a 0.10mm) clearance
14.	Seal spring compression.	7/8" (22.2mm) long springs - 3/16"(4.8mm).
	"	" (12.5mm) long springs - 5/32"(4.0mm)
	Seal spring compression.	1/2"(12.7mm) short springs - 1/16" (1.6mm) unless otherwise specified by the manufacturer.
15.	Rotating and stationary seal rings.	Sealing surfaces to be flat within 3 Helium light bands
16.	Heads, case, suction cover, bearing housing to case alignments fits.	0.004" (0.01mm) maximum clearance. Use dial indicator and feeler gauges to correct fit-up and alignment.

Horizontal axial split case

1. Stationary parts fit case metal to metal to 0.004" (0.01mm) clearance.
2. Measure and inspect case fits for wear and corrosion. Repair by building up and re-machining.
3. All other repairs same as vertical radial split case pumps except: Case rings to be bored in a jig not chucked.
4. Align element in case with feeler gauges and dial indicator. Dowel bearing housing in place after alignment.
5. When cutting gaskets for horizontal split pumps, cut bolt hole openings on head and split gasket lengthwise. Cut the rest of the gasket on the case with all the slack in the boltholes pulled to the outside edges. Leave stuffing box gasket length long and trim after head has been set in place and tightened.



OVERHUNG IMPELLER, SEPARATELY COUPLED, SINGLE STAGE, FRAME MOUNTEDⁱ

1 Casing	18 Bearing, outboard	47 Seal, bearing cover, inboard
2 Impeller	19 Frame	49 Seal, bearing, cover, outboard
6 Shaft, pump	22 Locknut, bearing	67 Shim, frame liner
11 Cover, stuffing box	29 Ring, lantern	69 Lockwasher
13 Packing	37 Cover, bearing	71 Adapter
16 Bearing, inboard	40 Deflector	73 Gasket
17 Gland	46 Key, coupling	

ⁱ Courtesy of the Hydraulic Institute Standards.