

Startup/Commissioning of Horizontal Pumps with Graphite

for hot water

General

Graphite packings (99,9 % pure carbon) are being increasingly used in pumps handling hot water. Maximum effective service life, optimum protection of the shaft sleeve and maximum reduction of frequency of maintenance can be achieved by following these instructions for installation and startup.

Packed Gland Arrangements

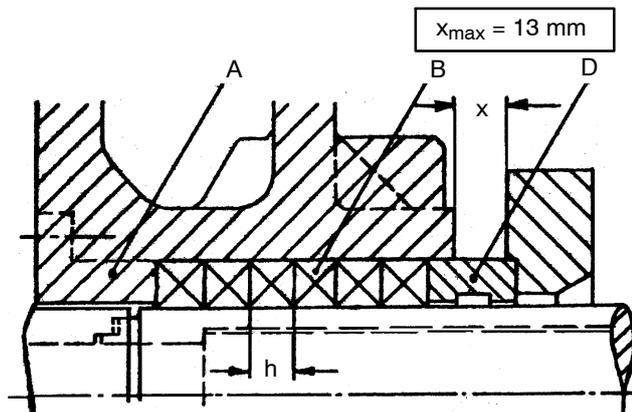


Fig. 1 Uncooled arrangement
Bearing bracket P 02a, P 03, P 04, UP02, UP03, UP04

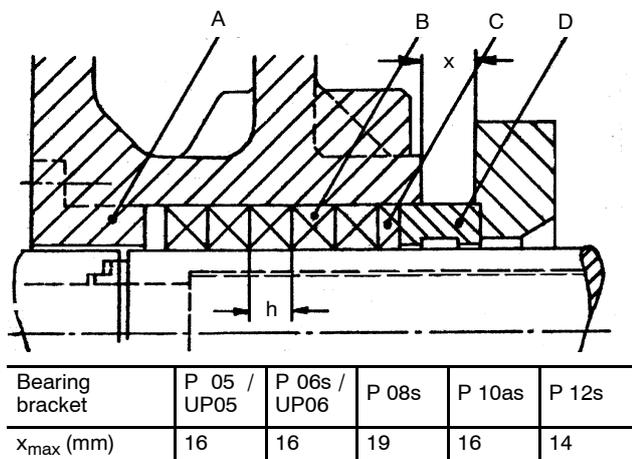


Fig. 2 Uncooled arrangement
Bearing bracket P 05, P 06s, P 08s, P 10as, P 12s
+UP05, UP06

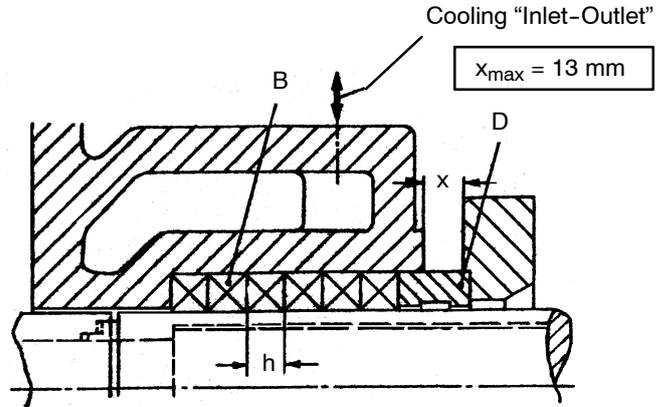


Fig. 3 Cooled arrangement
Bearing bracket P 02a, P 03, P 04, UP02, UP03, UP04

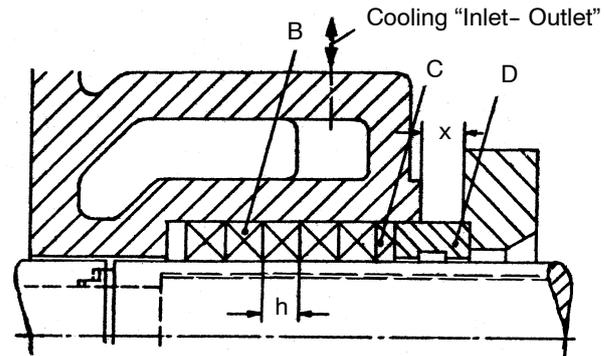


Fig. 4 Cooled arrangement
Bearing bracket P 05, P 06s, P 08s, P 10as, P 12s,
UP05, UP06

A = gland ring (one piece)
B = packing ring (split) full width (h)
C = packing ring (split) half width (0.5 h)
D = stuffing box ring (one piece)
x = gap between casing cover and gland cover. **Do not exceed x_{max} when commissioning.**

Bearing bracket	P 02a / UP02	P 03 / UP03	P 04 / UP04	P 05 / UP05	P 06s / UP06	P 08s	P 10as	P 12s
Leakage rate in cm^3/min at $n = 1450$ 1/min	10	12	16	20	22	24	28	32
$n = 2900$ 1/min	20	24	26	30	40	-	-	-

Fig. 5 Leakage rate guide values for continuous operation for 10 - 20 bar pressure range

Fitting

1. Remove old packing rings and thoroughly clean stuffing box and shaft sleeve. Renew any damaged parts.
2. Insert split rings using the gland ring (D).
3. Joints should be staggered by 90°.
4. Fit specified number of rings (see Figs. 1-4) in sequence to finger pressure. Do not exceed the gap x_{max} given in figs. 1-4.
5. Fit gland cover, ensuring it is correctly positioned. Tighten gland nuts evenly to finger pressure.

Startup/Commissioning

General

Carry out all adjustment and maintenance work with pump at standstill.

Do not exceed the gap x_{max} between gland follower and casing cover specified in figs. 1-4.

The available leakage rate must be at least equal to the guide values in fig. 5 in all operating conditions on pump startup.

The face of the gland follower must always be central and at right angles to the shaft.

At hot water for bearing brackets P 02a, P 03, P 04, UP02, UP03, UP04

Startup

1. Switch on cooling system if specified.
2. Fill pump and check leakage. Leakage flowrate at standstill should be around 1000 cm³ per minute.
3. To shorten the "running-in" time, rotate the shaft about 30 times by hand until you can feel that the packing resistance has dropped.
4. Run the pump 4 or 5 times for about 5 seconds and check the gland leaks.
5. Switch the pump on and maintain high leakage rate. When maximum running temperature has been reached, wait about 5 minutes then carefully reduce leakage by tightening gland by one sixth of turn at 5 minute intervals until leakage rate specified in fig. 5 is achieved. Run pump for 2 hours at maximum temperature and observe leakage. If leakage stops, immediately turn pump off and repeat startup procedure.
6. During standstill, the gap between the shaft sleeve and the packing will increase as the pump cools down. Do not try to reduce the increase in leakage caused by this.

At hot water for bearing brackets P 05, P 06s, P 08s, P 10as, P 12s, UP05, UP06

Startup

1. to 3. as above.
4. Slacken the gland nuts and increase the gap x to approx. 4 mm (do not exceed x_{max}). The packing is pressed against the gland follower by the suction pressure. Run the pump 4 or 5 times for about 5 seconds and check the gland leaks.
5. to 6. as above.

Maintenance

If leakage is too high after prolonged operation, uniformly tighten up the gland nuts by one sixth of a turn.

Then check the leakage rate. If leakage stops, repeat the startup procedure.

If the gland cannot be tightened up further, fit an extra packing ring. Then repeat the startup procedure.

It is normally unnecessary to renew the complete packing.

To ensure maximum reliability and long service life we show below a list of possible faults and how to avoid them:

Possible Faults	Remedies
Incorrect dimensions due to faulty data	Quote precise gland dimensions and shaft size
Heavily scored shaft sleeve	Fit new sleeve; if this is not possible, allow a higher leakage rate
Gland cover askew causing uneven pressure on packing or shaft galling	Ensure gland cover is at right angles to the shaft
No cooling water	Ensure the specified jacket, shaft or gland cover cooling system is fitted
No leakage Packing too tight	Shut pump off. Release gland completely and repeat "running in" procedure as for new packing