

Fitting and Machining

ROTAFRIX® products have a proven track record of durability and operational reliability. Assuming the drive or the pulley guide system is correctly designed and properly fitted and machined, ROTAFRIX® is maintenance-free.

The following tips will help to fully exploit all the benefits of ROTAFRIX® in practice.

General Tips

The axes of the drive and driven shafts must be aligned such that they are parallel. Radial runout of the hubs must be avoided. If multiple friction rings, wheels or guide pulleys are mounted adjacent to each other, the shaft must be sufficiently stiff. Worn friction rings and guide pulleys must be replaced in sets.

Friction rings must be ground after fitting in applications which require operation to be as oscillation-free as possible and a high degree of rotational accuracy and in the case of friction rings fitted in sets. This balances out any production-related depth tolerances, while ensuring even loading on friction rings which are fitted in sets.

The depth of ROTAFRIX® friction rings can be turned or ground down to 80% of the friction ring depth, and the friction lining depth of standard finishes of ROTAFRIX® friction wheels to a minimum of $0.5 \cdot b_G$. This enables speed ratios to be accurately tuned to special applications.

ROTAFRIX® guide pulleys do not generally need to be ground. It is permitted, however, in the case of particularly smooth pulley systems.

Please see the "Machining" section for details.

Hubs

The prerequisite for ROTAFRIX® friction rings and guide pulleys being securely seated is that dimensionally accurate hubs finished to the correct specification are used.

The hub dimensions (p.7, Table 1 and p.11, Table 2) must match those specified for the relevant ROTAFRIX® friction rings and guide pulleys. Tolerances h 11 apply to the diameters of cylindrical hubs and js 12 for tapered hubs (Table 4).

Table 4

Hub Diameter Tolerance (dimensions in mm)

Hub Diameter d	Tolerance	
	h 11	js 12
< 80	-0.190	± 0.150
80 - 120	-0.220	± 0.175
> 120 - 180	-0.250	± 0.200
> 180 - 250	-0.290	± 0.230
> 250 - 315	-0.320	± 0.260
> 315 - 400	-0.360	± 0.285
> 400 - 500	-0.400	± 0.315
> 500 - 630	-0.430	-
> 630	-0.470	-

The hub surface should be finely machined (machining codett ▼▼, peak-to-valley height $R_z = 16-32 \mu\text{m}$ corresponding to $R_a = 3.2-6.3 \mu\text{m}$).

Excessive surface roughness prevents the required uniform sliding during pressfitting. The hub edges should have a $1 \times 45^\circ$ chamfer. Excessive chamfering, especially with narrow hubs, can have an adverse effect on the hub fit.

The hubs must be at least 4% wider than the nominal width of the friction rings. If the hub is too narrow, its edges cut into the base of the friction ring and destroy it. If two friction rings are to be pressed onto one hub, the hub width must be sized as if for two individual friction rings.

Hubs which are to be reused must be cleaned, and any dents and burrs on the hub edges must be eliminated before fitting the ring.

Tips for Fitting Friction Rings

Friction Rings with Cylindrical Base

Friction rings with a cylindrical base are press-fitted to the cylindrical hub with pretension using a hydraulic plate press. Despite the steel reinforcement, the friction ring is still sufficiently elastic that fitting can be carried out without difficulty if the following instructions are observed.

Supplementary Tools

Special supplementary tools are needed for the press-fitting process since the friction ring is not fitted directly but via a tapered expansion ring. To avoid deformation during fitting, a cylindrical press-fit ring is used which distributes the pressure evenly over the entire periphery of the ring and also prevents tilting.

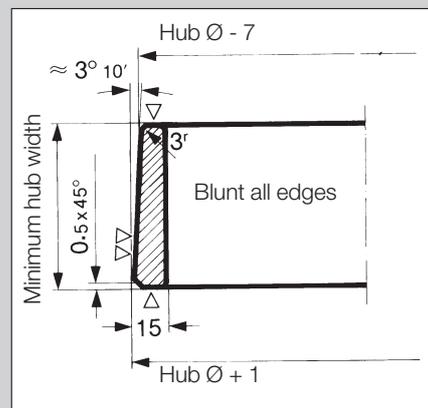


Fig. 6

Expansion ring

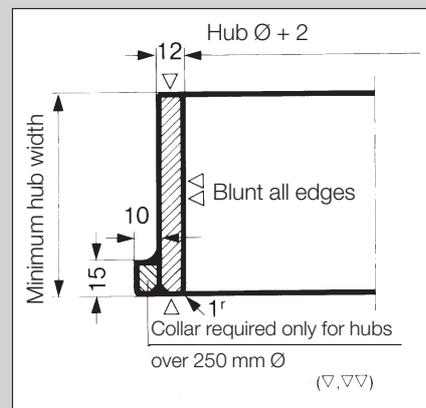


Fig. 7

Press-fit ring

The expansion ring should be manufactured as shown in Fig. 7. An expansion ring is unnecessary for small and narrow friction rings if the hub has highly chamfered edges.

The press-fit ring is shown in Fig. 8. The press-fit ring ideally has a collar for hubs of greater than 250 mm Ø. Press blocks must not be used instead of a press-fit ring.

The expansion ring and press-fit ring must only be used for the friction ring size they are built for. Any other use would damage the tools.

Fitting agent

When press-fitting friction rings, the fitting agent TIP TOP SE lubricant, art. no. 5930388, should be used, diluted with water in a ratio 1:5 in accordance with manufacturer specifications. Oils, greases or normal fitting paste for pneumatic tires may not be used.

Press-Fit Procedure (Fig. 8)

- Check hub (B) for correct size, degrease it and place it on press plate (A).
- Center the expansion ring (C) on the hub. If high quantities are to be fitted, it is recommended to center the expansion ring on the hub.
- Apply lubricant solution evenly to sliding surfaces of hubs, expansion ring and friction ring (D).
- Place friction ring on expansion ring.
- Place press-fit ring (E) centrally on friction ring. Check that press guides are plane-parallel.
- Lower press until friction ring is seated centrally on hub. The press must move in plane-parallel mode at a speed of < 35 mm/s and must move continuously, without interruption.

When press-fitting 2 or more friction rings onto a hub, proceed as follows:

- With 2 friction rings: press-fit from both sides
- With 3 or 4 friction rings: enlarge press-fit ring to multiple friction ring width and press-fit from both sides.

The force required for press-fitting depends on the diameter and width of the friction ring. Press-fitted friction rings should be left for a few hours before being machined or installed.

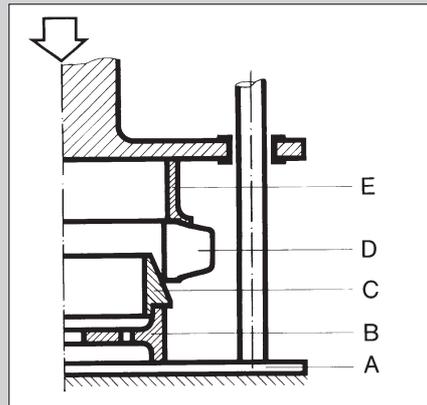


Fig. 8

Press-fitting

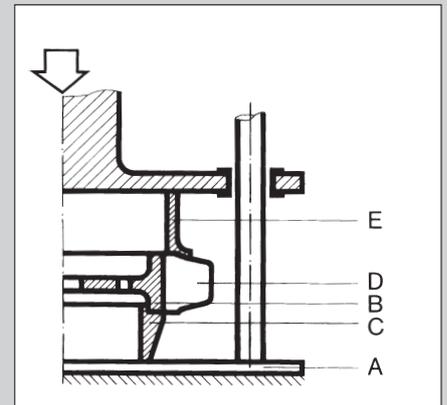


Fig. 9

Removal

Removal Procedure (Fig. 9)

- Place expansion ring (C) on press platen (A).
- Center hub (B) with firmly seated friction ring (D) on expansion ring.
- Center press-fit ring (E) on friction ring.
- Lower press.

When removing 2 or more friction rings from a hub, the friction ring width must be appropriately increased, as in the press-fit procedure. The force required to remove rings is about 2-3 x the press-fit force.

Once removed, friction rings must not be reused.

Friction Rings and Guide Pulleys with Tapered Base

Friction rings and guide pulleys with a tapered base are fitted using two hub halves. A firm fit of the friction ring is achieved by tightening the two hub halves against the conical seat of the friction ring or guide pulley (p.12, Fig. 5).

When fitting, it is important to ensure that the hub has a smooth finish and that the hub halves are directly contiguous after fitting.

Fitted friction rings or guide pulleys should be left for a few hours before being machined or installed.

Machining Friction Rings, Friction Wheels and Guide Pulleys

Material properties make it necessary to take certain special features into consideration when machining elastomer products. The following tips have proven helpful in actual practice.

Grinding

Grinding wheel: _____	Poralun grindstone, designation "60 H mmg" (for particularly fine surfaces "80 H mmg"), ceramically bonded
Circumferential speed: _____	Grindstone 28 - 32 m/s Friction ring 0.5 m/s Rotational direction: counterrotating
Feed: _____	Rough grinding 0.2 m/min Finish grinding 0.06 m/min
Advance: _____	Rough grinding 2.0 mm max Finish grinding 0.6 mm max
Cooling: _____	Air cooling or cooling with "Adroit S" at a ratio of 1 : 60
Grinding belt: _____	Grain "80 H"
Speed: _____	As indicated by manufacturer
Advance: _____	0.3 mm

Turning

Tool: _____	Thin, surface-ground spoon chisel
Circumferential speed: _____	= 4 m/s

The parts have to be ground after turning.

Important Tips

- ▶ Pay attention to temperature thresholds
When machining the metal parts of the hubs, it is important that the metal temperature does not exceed 100°C.
In grinding and turning operations the sustained temperature of the contact face should not exceed 70°C, with brief peaks of 80°C permitted.
- ▶ Use orbital reciprocal grinding
An orbital reciprocal grinding motion yields smooth surfaces.
Avoid end grinding.
- ▶ Grind with gentle pressure
With gentle pressure there is no danger of excessive heat buildup. The contact face tends to smear if excessive pressure is applied. Discontinue grinding if a smear forms.
Allow the elastomer lining to cool well before sprinkling talcum powder on the surface.
Then continue grinding, applying gentle pressure.
- ▶ Clean grinding wheel with compressed air
Cleaning the grinding wheel frequently ensures a uniform surface quality.

Storage, Cleaning

DIN 7716 contains general guidelines on the storage, cleaning and maintenance of rubber products.

Soiled ROTAFRIX® products can be cleaned using a glycerine-alcohol mixture (1 : 10). Solvents such as naphtha or benzene must not be used. The use of sharp objects is also not permitted.

Driving Wheel

ROTAFRIX® friction wheels are generally used as driving wheels since a rubber driving wheel achieves greater usable coefficients of friction than a steel driving wheel. Transmission ratios of up to $i = 1/7$ are feasible in practice. The transmissible power can be multiplied by configuring several rubber rolling contact gears on a common hub.

Counter wheel

The counter wheel must always be a little wider than the friction ring to avoid damaging the contact face and edge compression. The durability of the drive is improved if the surface roughness of the countergear is as low as possible.

Thermal Stress

The temperature of the elastomer lining should not exceed 70°C. Once the drive has been run in, brief peaks of up to 80°C are permitted. Constant temperatures above 70°C shorten the product life.