Application Notes

⚠Where rotating propeller shafts constitute a hazard, the operator must take suitable safety precautions, for example the correct clothing and cover. Information can be found in the UVV work material (VBG5).
Protection must be used to stop any possibility of component damage or fire risk resulting from the propeller shaft .

⚠No aggressive chemicals should be used for cleaning. When using a high pressure cleaner care should be taken not to aim the flow directly at the seals, which could result in damage through water and dirt getting into the bearing.

The rilsan coated parts should be protected from high temperatures, chemicals and mechanical impacts.
The propeller shafts supplied as complete assemblies have been carefully balanced; they correspond to quality class G16 to DIN ISO 1940, in exceptional cases G40.
The delivered propeller shaft should not be altered in any way without first consulting Klein, else the documented properties could no longer be guaranteed.

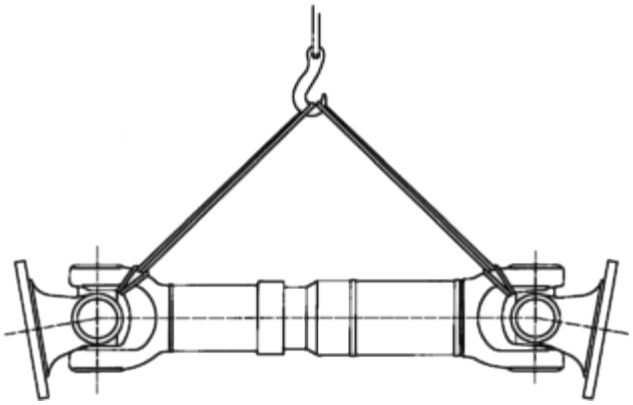
The propeller shaft should not be altered in any way after delivery unless acknowledged first by company Klein, by not doing so the documented properties of the shaft cannot be guaranteed.

1.1 Transport and Storage of Propeller Shafts

⚠The shafts should be transported and stored such that no rough impacts or collisions affect the cardan shaft and the tube is not damaged. This would reduce the balance quality.

⚠The shafts are best transported in horizontal position (Fig. 1). When transporting vertically, appropriate security must be supplied to ensure that the joint halves do not come apart.

Fig. 1:



⚠There is a risk of injury during transport and tilting of the joints. For crane transport, we recommend the use of plastic ropes or belts mounted as shown.

Do not turn propeller shafts in the joint using mounting levers else the bearing seals can be damaged and the lubricating nipples broken off.

The original KLEIN packing is intended only for dispatch and short term storage. The parts must be stored in the dry, protected from the weather.

Propeller shafts should preferably be stored in the horizontal position as this prevents the shafts tilting and avoids any damage. Do not place propeller shafts directly on the ground but where possible on wooden shelves. For long term storage, bright metal parts should be checked for corrosion and where applicable treated with corrosion protection oil.

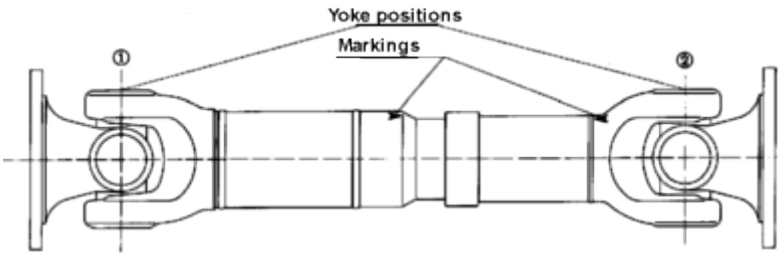
1.2 Installation of Propeller Shafts

⚠Before the propeller shaft is fitted, all flange surfaces must be thoroughly cleaned of corrosion-inhibiting oil, dirt and grease in order to ensure the necessary static friction coefficient for torque transmission.

⚠On no account may the welded balance plates be removed. Since the propshaft is always balanced with the tube and joints together as an integrated whole, the joints of different shafts may not be interchanged.

The yokes 1 and 2 (Fig. 2) must be located in specific positions with the respect to each other so that the uneven rotation induced by the first is canceled out by the second. The yokes must be in one plane, and only in very rare applications are they offset relative to one another by the precisely defined angle. The correct position in any one instance is shown by the arrow markings on the shaft tube. The shaft should always be assembled in such a way that the arrows point to each other. If it is incorrectly assembled, the second joint will compound the unevenness of the first, and the shaft will run noisily and with increased wear.

Fig. 2:



The propeller shafts should be fitted with the spline protected from dirt and moisture as much as possible. As a rule, this means fitting them in the position shown in Figure 3 with the spline seal pointing downwards so that any splashed water runs away from the splined section.

Fig. 3:

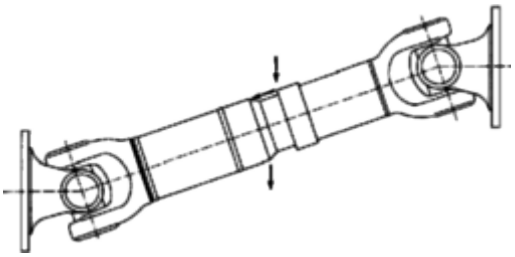
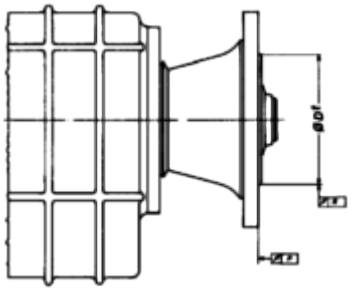


Fig. 4:



The high standard of balance of the shaft is only of advantage if the two connecting flanges to which the propeller shaft is fitted run truly flat and concentrically. In addition, the radial bearing clearance and the clearance between the centring boss of the connecting flange and the flange fitting should be small.

Guide values for permissible flatness and concentricity runout and fit sizes for connecting flanges and their centring bosses of diameter D (Fig. 4).

Shaft speed n [rpm]	Flatness runout P [mm]	Concentricity runout R [mm]	Fit size t
500	0,1	0,1	h8
1500	0,07	0,07	h7
3000	0,05	0,05	h6
5000	0,03	0,03	j6

A high precision measuring flange may be used to test cross-toothed flanges.

To avoid difficulties when fitting the propeller shafts, the following tolerances must be observed as regards the bolt holres in the flanges:

Hole circle ±0,1 mm
Hole circle pitchg ±0,05 mm
Hole diameter C 12

The torque is transmitted by friction, by titled keys, or by toothing. The positive connections mean, that the flange diameters can be smaller.

In order to keep the coefficient of friction as high as possible with friction connections, the flanges must be clean and free from grease. The surface quality should not exceed a peak-to-valley height of 25 µm.

For the bolted joint the bolts must be of strength class 10.9 and the nuts 10. They must be tightened up even cross-wise with a torque spanner as set out in the table below.

Bolt	Tightening Torque [Nm] (Thread lightly oiled)
M 5	8,5
M 6	14,0

M 8	35,0
M 10	70,0
M 12	120,0
M 14	190,0
M 16	295,0

Because of the large tightening torque, the connection flanges must have a sufficient strength (at least 700 N/mm^2).

The bolts can mainly be inserted from the joint side (see data sheets).

All shafts are filled with grease on delivery and need no greasing on first installation. After lengthy storage however the shafts should be lubricated again before commissioning.

When paint spraying the propeller shafts, it should be ensured that the area, in which the profile or seal lies is protected from paint, together with the lubricating nipples.

Further notes on installation, maintenance, transport etc. are given in our leaflet TB 486.

1.3 Transport and Storage of Double Jointed Shafts

Transport and storage should always be done in such a manner, that the input and output shafts, the yokes and the universal joints are not subjected to any severe knocks or blows.

⚠The shafts are best transported on pallets or in crates. If the input or output shafts are tilted, there is a **danger of injuries** due to crushing. The original KLEIN-packing is only intended for shipping and for short term storage. Storage must be in rooms protected from the weather.

Double jointed shafts are best stored horizontally, as this prevents the shafts from tilting and from being damaged from the outset. Shafts should never be stored directly on the floor, but on wooden shelving. If storage is for prolonged period, the bright metal parts should be inspected for corrosion and treated with corrosion-inhibiting oil.

1.4 Installation of Double Jointed Shafts

Before the double jointed shaft is fitted into the axle, any protective layer applied for transport purposes or any protective caps on the input and output shafts must be removed.

Clean the double jointed shaft of corrosion-inhibiting oil, dirt and grease.

The splines on the input and output shafts must be checked for cleanliness and to ensure that they are not damaged. The bearing and sealing surfaces must be similarly checked.

The position and location of the double jointed shaft in the axle is determined by the vehicle design.

All double jointed shafts are lubricated before despatch and do not need to be lubricated when fitted for the first time. After prolonged storage, however, it is recommended to relubricate the spider bearings if provision is made for this.

When spray painting the joint, make sure that the grease nipple is protected against paint.