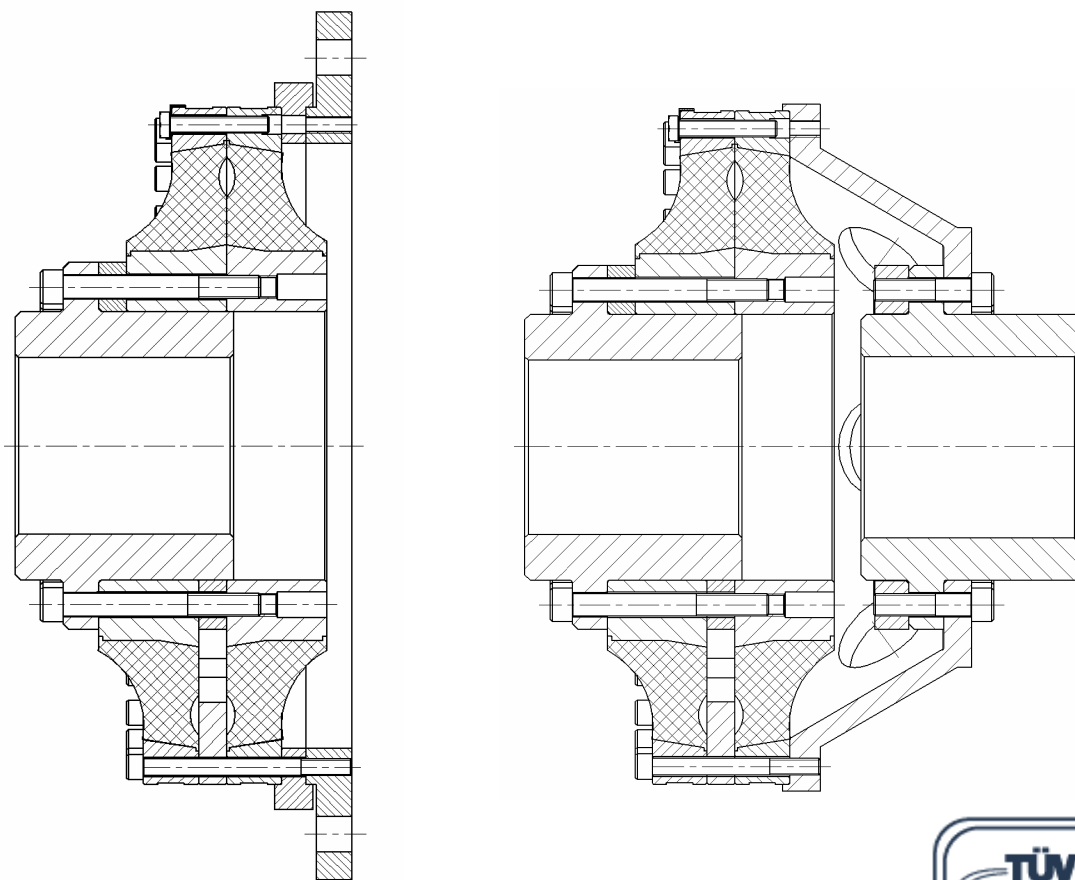


Operation Manual

Highly Flexible Shaft Coupling

HEK



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0. Safety and Information Symbols



Danger!

Danger of injury to personnel



Attention!

Follow instructions



This operating instruction does not include any information which can be presumed as basic knowledge for trained specialists and engine room staff.

1. Structure

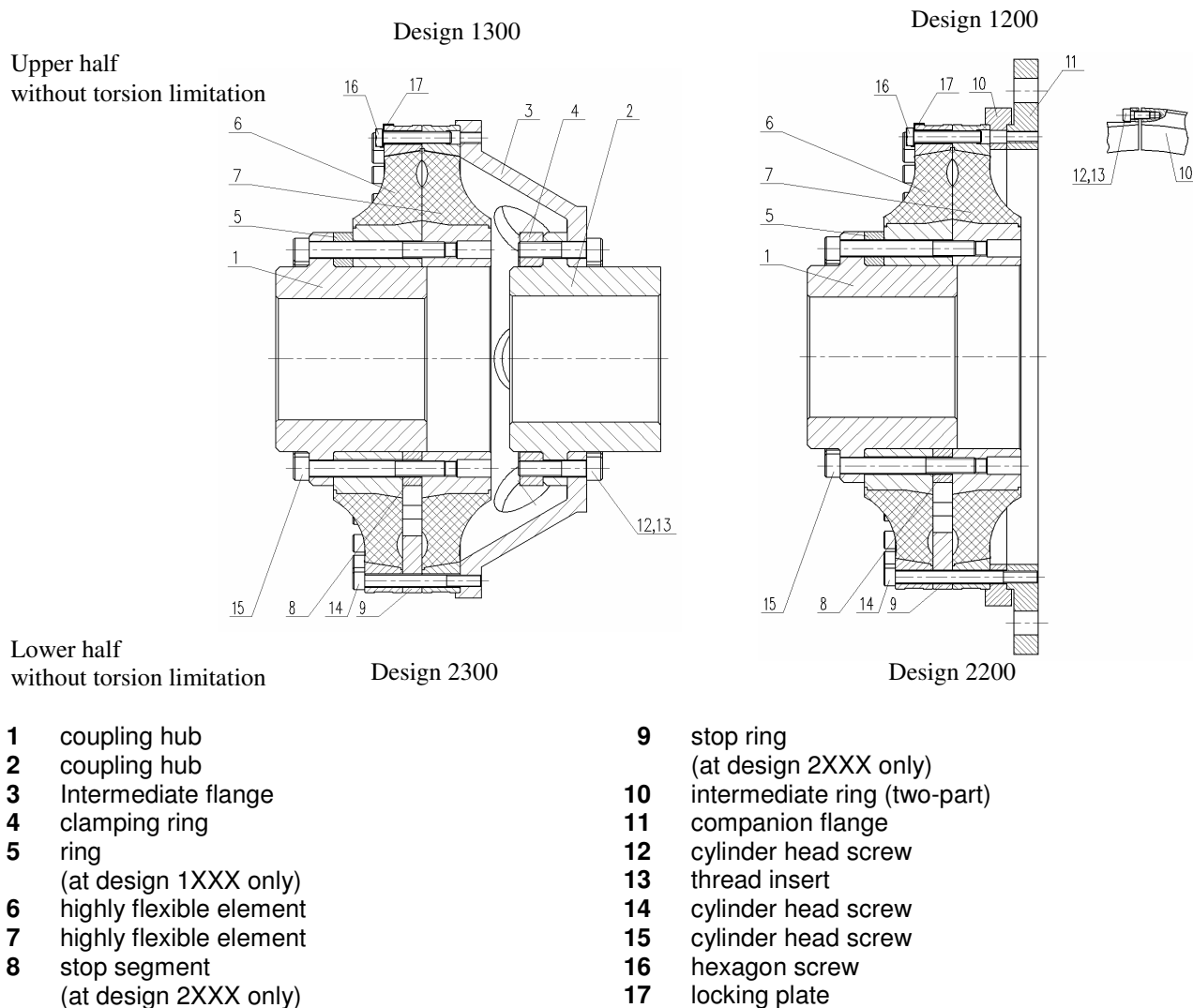


Figure 1 – Structure of highly flexible coupling

The highly flexible coupling HEK is a torsional flexible shaft coupling compensating axial, radial and angular displacements.

Because of the high torsional flexibility the coupling is first applied in drives endangered by torsional vibrations.

At the types 1300/2300 the highly flexible elements 6 and 7 are combined with the intermediate flange 3. In the borehole of the intermediate flange 3 the coupling hub 2 is bolted by means of the clamping ring 4. The coupling hub 1 with ring 5 is screwed in the boreholes of the highly flexible elements.

At the types 1200/2200 the highly flexible elements 6 and 7 are combined on the outside with the two-part intermediate ring 10 and with the companion flange 11. The coupling hub 1 is screwed in the borehole of the highly flexible elements.

At the types 2200 and 2300 a twisting limitation consisting of stop segment 8 and stop ring 9 is provided for between the highly flexible elements 6 and 7.

The flexible ring elements of the highly flexible couplings can be produced – depending on requirement – in the following rubber qualities:

Rubber quality W	(soft)
Rubber quality M	(medium)
Rubber quality H	(high damping)

The letter indicating the rubber quality appears behind the coupling size; afterwards the indication of the type is given, e.g.

HEK 200 M, type 1300

All details being missing in the general description of the standard for special types of the series HEK are described and explained in a supplementary sheet and /or in the general drawing.

2. Function

The torque is transmitted

- at the types 1300/2300 from the coupling hub 1 via the highly flexible elements 6, 7, and the intermediate flange 3 to the clutch hub 2
- at the types 1200/2200 from the coupling hub 1 via the highly flexible elements 6, 7, and the intermediate ring 10 to the companion flange 11.

In the process the flexible ring elements 6 and 7 are loaded in torsion. A special shaping and a special material composition of the highly flexible elements enable a great torsion angle.

3. General Information

The couplings are – with the exception of the rubber surfaces – provided with a prime coat on the outside.

Hub boreholes and flanging-surfaces are coated with rust protection wax.

The preservative over the rubber-metal combination of the elements must not be removed.

The flexible elements are to be protected against any influence of oil, fuel, paint, and the like.

3.1 Storage

The storage has to be carried out flat on the companion flange 11 or on the hub 2. With it the coupling has to be protected against atmospheric influences and direct solar irradiation.

Storage temperature: –55 to 80 °C.

3.2 Liability



The producer is not liable for damages, which are caused **from no vault of his**, by the following reasons:

- 1. the general and special information in this operation manual were not observed,**
- 2. the service conditions do not match the requested ones,**
- 3. there are any overloads;** e.g. by vibrations (work in critical speed range with exceeding of the permissible alternating torques); torque shocks, exceeding the permissible peak torques.

4. Mounting

4.1 *General description*



Concerning ships' propelling plants, the alignment can only be done while the ship is in water and has absolutely no contact to the ground at all.

To ease the mounting it is recommended to solidly install a crane rail in the engine room above the clutch.

A main condition for a faultless running of the coupling is an accurate alignment of the propelling plant. The maximal tolerances of this alignment are to be found in **table 1**.



These values are to be observed by all means to keep the additional forces by displacement as low as possible.

For the mounting the clutch is first of all dismantled, and the hub borehole is cleaned.

4.2 *Mounting of the coupling hubs*

Before fitting on the coupling hub 1 the screws 15 are to be inserted in the boreholes of the hub.

Before fitting on the coupling hub 2 the intermediate flange 3 is to be put off on the hub (type 1300/2300).

Before bringing up, the hubs are to be heated. Hereby the temperature should differ by 40° concerning shafts with conical seatings and 100° concerning shafts with cylindrical ones. This procedure prevents a blowing-on by shocks and hard impacts, furthermore, neighboured bearings and wheels are being saved.

4.3 Alignment of the coupling

After fitting on the coupling hubs 1 and 2 the alignment can be performed after the screwing on of the intermediate flange 3 to the coupling hub 2 by means of the clamping ring 4 (type 1300/2300).

The **adjustment of the drive side and of the output side of the clutch is carried out according to figure 2.**

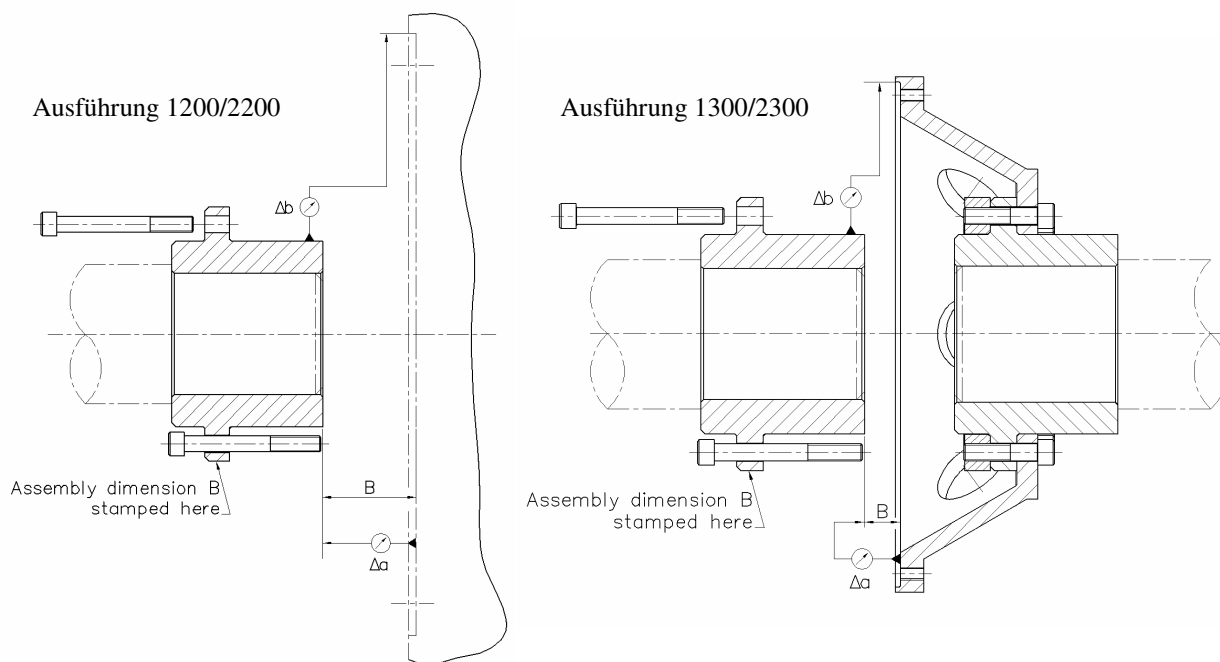


Figure 2 – Alignment

If possible, the input and the output flange should be turned simultaneously and measured at the same points during the control of the alignment. Owing to this action, the measured values keep unaffected by possible true or plan running errors.



Principally the **shafts** are to be **turned only in one direction when they are aligned**, since they can be shifted insignificantly on account of the bearing clearance when the direction of the rotation is changed. Thus errors of the determination of the angular displacement are avoided.

Connecting the coupling with shafts having a large overhang is not permitted. Slight overhang has to be equalized by roller blocks during the alignment.

Besides the control of true running and front running errors, the installation length shown on drawing or in corresponding annex has to be controlled, as well. For the permitted tolerances of the installation length B and the alignment deviations see **table 1**.

4.4 Permissible alignment errors



When aligning the installation **displacements**, which could **develop during the work** have to be taken into consideration (preliminary compensation).

Coupling size	HEK 70 to HEK 100	HEK 110 To HEK 140	HEK 150 To HEK 200	HEK 220 to HEK 330
Alignment error Δa	0,2	0,25	0,3	0,4
Alignment error Δb	0,15	0,2	0,25	0,3
Tolerance for B	+0,3	+0,4	+0,5	+0,6

Table 2 – Permissible alignment errors in mm

Adjustment errors Δa , Δb are to measure with dial gauge from the drive side to the out-put side.

A re-alignment is recommended when the double value of the permissible alignment errors Δa and Δb is reached.

For the checking dimension c (↗ figure 3) the same tolerances are permissible as for the dimension B.

The values of the checking dimension c are taken from the mounting drawing or corresponding annex.

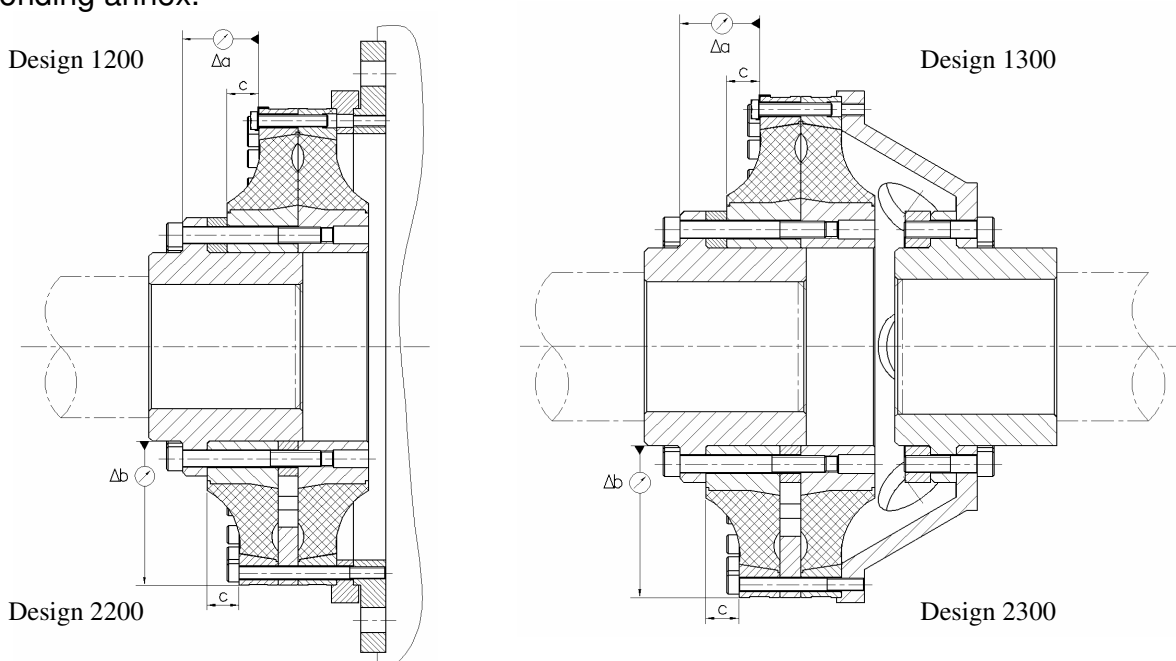


Figure 3 – Check of the alignment at mounted coupling

4.5 Mounting of the coupling

After alignment of the drive side and the output drive side the assembly of the other individual parts is carried out in the following order:

Step of assembly	Type			
	1300	2300	1200	2200
Detach intermediate flange 3 from hub 2.	x	x		
Push ring 5 on hub 1. Through the loss of the twisting limitation the compensation of the measurement is accomplished hereby.	x		x	
Mount highly flexible element 6 radially. If the space circumstances need it, put in already the screws 14 and 16 with locking plate 17 in the boreholes of the element	x	x	x	x
Mount stop segment 8 and stop ring 9 radially. The symmetrical arrangement of the twisting limitation (dimension x) and the 0-mark on all individual parts are to be observed		x		x
Mount SPIROFLEX-element 7 radially.	x	x		
Combine highly flexible element 7 with companion flange 11 and mount them together radially Preassemble companion flange 11 with two screws at the counterflange			x	x
Tighten screws 15 (tightening torques see point 4.6)	x	x	x	x
Prestress highly flexible elements with the screws 16 (two hexagon screws) ^{*1} . Fasten the screws by means of locking plate 17.	x	x	x	x
Screw intermediate flange 3 at coupling hub 2 with the screws 12 by means of clamping ring 4 (tightening torques see point 4.6)	x	x		
Mount two-part intermediate ring 10 radially and screw it with the screws 12. The two screws used for the preassembly of part 11 are to be removed previously.			x	x
Tighten the screws 14 (tightening torques see point 4.6) The concentric run of the parts 6, 7, and 9 to each other is to be observed.	x	x	x	x
Screw companion flange 11 with the counterflange			x	x
Alignment check according to figure 3	x	x	x	x

^{*1} If the elements split after the prestressing at the positions displaced by 90° to the prestressing screws, the external rings of the elements have to be canted angularly for assembling the first half of the two-part intermediate ring.

For this a screw 12 can be used by screwing it in the junction flange (if necessary use a washer).

For canting angularly an assembling iron can be used.

Valid for types 1200 and 2200 only!

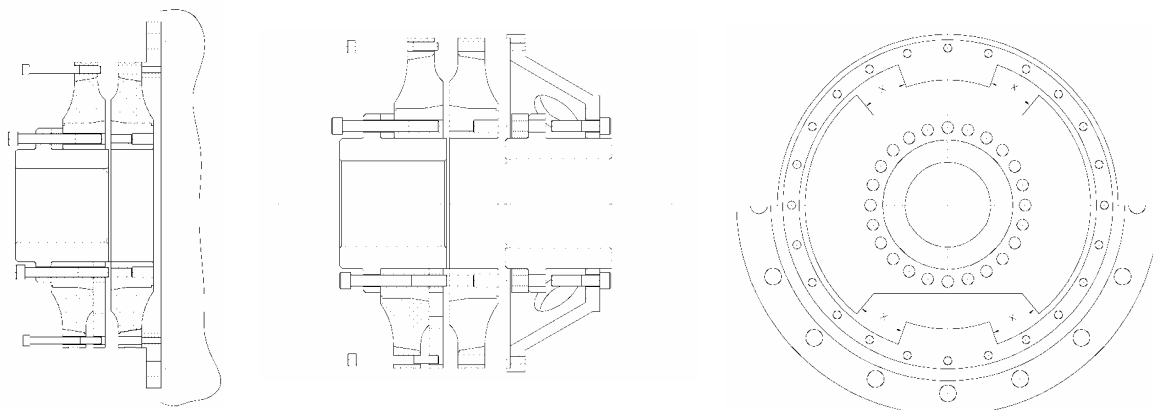


Bild 4 – Mounting of coupling

4.6 Tightening torques

Screw quality 8.8 is used for the screws 12, 14, 15. The following values are valid for dry mounting and turning by help of torque wrench only:

Thread	M 8	M10	M12	M14	M16	M20	M24	M30	M36	M42
Tightening torque [Nm]	21,5	43	75	120	180	365	630	1240	2170	3460

Before operating the coupling all screw joints are to be prestressed with the given tightening torque.

5. Commissioning

After mounting occurred according to point 4 the coupling is ready for use. Having done the final check of the coupling possibly existing floor plates in its area have to be arranged thus that a check of the coupling is possible at any time without further problems. The clutch is to get a **protective casing** providing that projecting parts (e.g. screw heads) can not be touched while the coupling is working. This casing has to be designed thus that a **localization of heat cannot arise** and the **elastic ring elements are protected against oil contact**.

The maximum permissible ambient temperature must not exceed 70°C. Sufficient ventilation has to be provided for.

After about 10 hours of full-load operation all screws at the coupling are to be checked and, if required, tightened up.

6. Maintenance

The clutch is maintenance-free.

An annual adjustment check and a visual check at the highly flexible elements are recommended.

The highly flexible elements do not underlie only a flexible deformation while operating, they are also plastically deformed with rising time of operation.

A so-called residual torsion angle appears. This residual torsion angle represents the change of the position of the external ring to the internal ring at load=0.

This plastic deformation does not for the moment influence the flexibility.

When the residual torsion angle reaches the value of the nominal torsion angle the rubber elements are to be exchanged.

	Rubber quality		
	H	M	W
nominal torsion angle [°]	6,5	10	15

7. Emergency operation

At couplings with twisting limitation (type 2300/2200) an emergency operation with flawed highly flexible elements is possible in a restricted degree, yet in those cases you have to take care that no critical speed ranges of the engine are run.

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