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Installation and Operating Instruction for VULKAN VULASTIK-L couplings

Series 2800, 2801, 2810, 2811, 2830, 2831

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1 General safety instructions

1.1 Symbol for industrial safety



This symbol is added to all passages of this documentation concerning industrial safety and including a risk to people's life and limb. Please follow these instructions and handle with the utmost caution in these situations. Hand over all industrial safety instructions to other users as well.

1.2 Attention remark

Attention !

This "Attention!" remark is added to passages in this documentation which should be specially noted in order to stick to the guidelines, regulations, instructions and correct flow of work and to prevent any damages or destruction of the coupling.

1.3 Safety Regulations

A coupling shield has to be provided, according to the accident prevention regulations. According to EN 292, part 1 „Safety of Machines“, a shield against mechanical movements of machine parts (protection against accidental contact) is permissible, if a „usage according to the regulations“ is guaranteed during all working conditions. At the same time a good ventilation of the coupling has to be ensured (use of perforated plates). If the possibility of exceeding the permissible speed of the coupling, n_{kmax} , cannot be excluded completely, e. g. in case of an incident or because of a failure of the over-speed-trip in the system, the coupling shield has to be designed that possible coupling fragments cannot escape to the surrounding environment. For coupling applications in fast ships (Dynamically Supported Craft), the safety regulations of publication A373 of IMO (International Maritime Organisation) are valid. Dependant on the construction, these machine arrangements contain components with a high rotating energy. When the coupling runs outside of a casing, an external protecting device has to be provided to keep off possible coupling fragments in any case.

2 Generalities

The highly-flexible **VULASTIK-L** coupling is a torsionally flexible rubber coupling compensating radial, axial and angular displacements of the connected machines.

The torque transmission is guaranteed by the ring-shaped rubber elements which are loaded with turning thrust. The VULASTIK-L coupling series 2800 is especially suitable for the installation in gearbox bell housings or generator bell housings.

The coupling should be protected against the permanent effect of oil and against the radiation of heat.

The VULASTIK-L element is designed for use at ambient temperatures between -45°C up to $+90^{\circ}\text{C}$ (silicone elements from -45°C up to -120°C).

To reach a long service life, a sufficient ventilation cross section should be guaranteed. This especially refers to bell housing installations.

Basically, the connection surfaces of the coupling and the finish bores are preserved by Tectyl. Prior to installation of the coupling, these surfaces should be cleaned with conventional solvents.



Pay attention to wear protective clothes (gloves, safety glasses etc.) while working with solvents.

When the cleaned surfaces are completely dry, they must be greased slightly.

To guarantee faultless function and optimum use of the highly-flexible VULASTIK-L coupling, certain installation instructions have to be observed. First of all this means to tighten all screwed connections participating in the transmission of the torque with a torque spanner. The permissible tightening torques for the corresponding material quality are given by the manufacturers of the screws and are not allowed to be exceeded. The tightening torques for the fastening screws of the flexible elements (7) are given in the respective general drawing of the coupling.

3 Technical Data

For the valid technical data please look into the actual product information from catalogues or Internet-pages.

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4 Series and executions

VULASTIK-L couplings can be supplied in the following executions:

4.1 Series 2800 and 2801

- for connection of a SAE-flywheel with a shaft
- element replacement with displacement of the connected units
- series 2800 without torsional limit device
- series 2801 like 2800, however, with torsional limit device

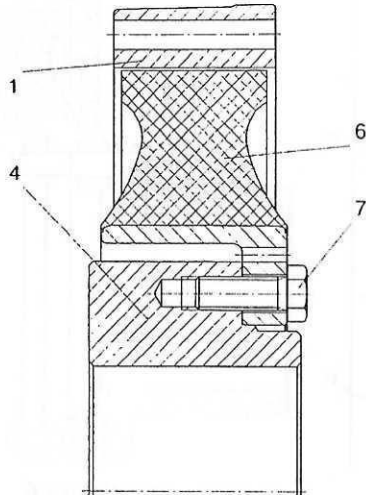


figure 1
2800

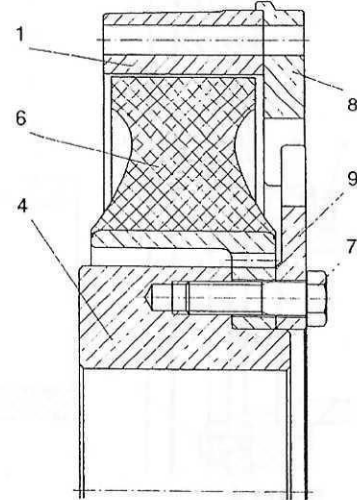


figure 2
2801

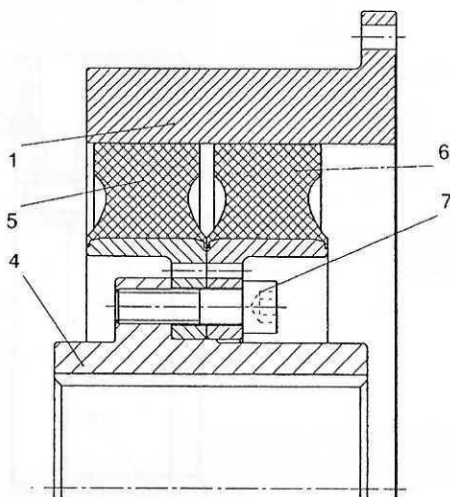


figure 3
2800 dual



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4.2 Series 2810 and 2811

- for connection of a SAE-flywheel with a shaft
- element replacement without displacement of the connected units
- series 2810 without torsional limit device
- series 2811 like 2810, however, with torsional limit device

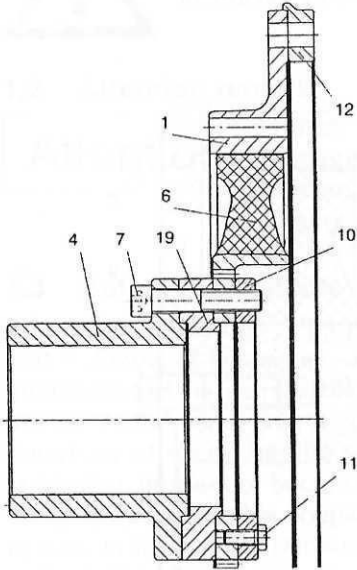


figure 4

2810 (sizes 14 – 19)

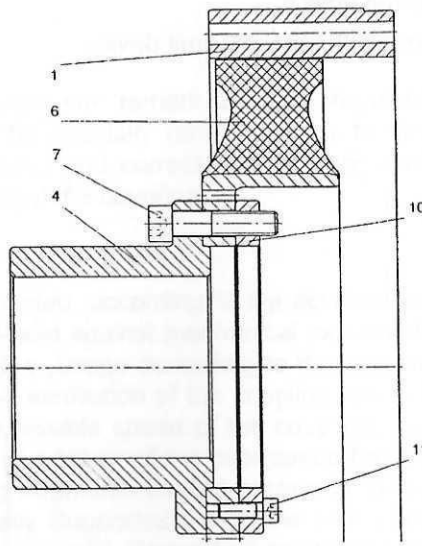


figure 5

2810 (sizes 22-43)

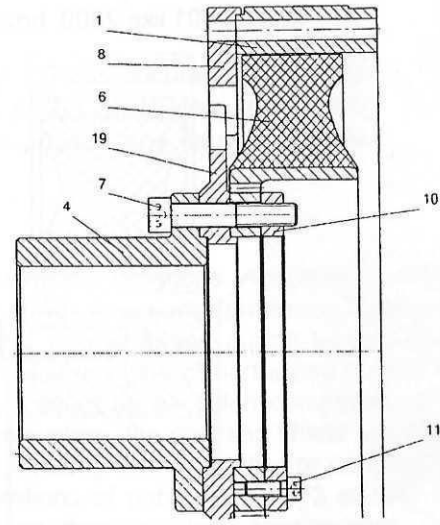


figure 6

2811

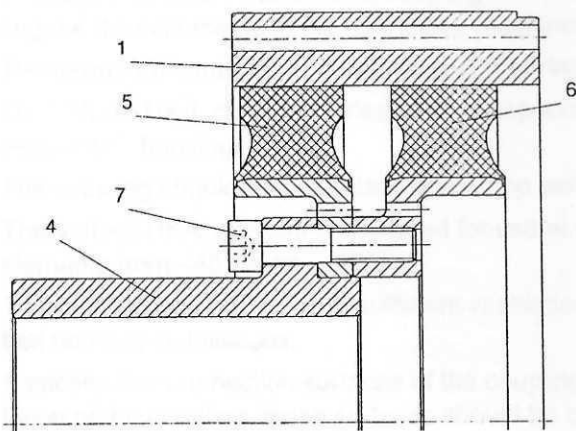


figure 7

2810 dual

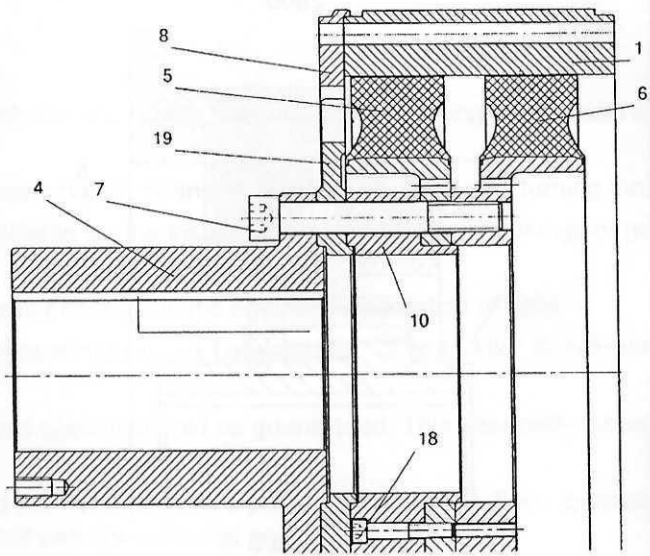


figure 8

2811 dual



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4.3 Series 2830 and 2831

- for connection of two shafts
- element replacement without displacement of the connected units
- series 2830 without torsional limit device
- series 2831 like 2830, however, with torsional limit device

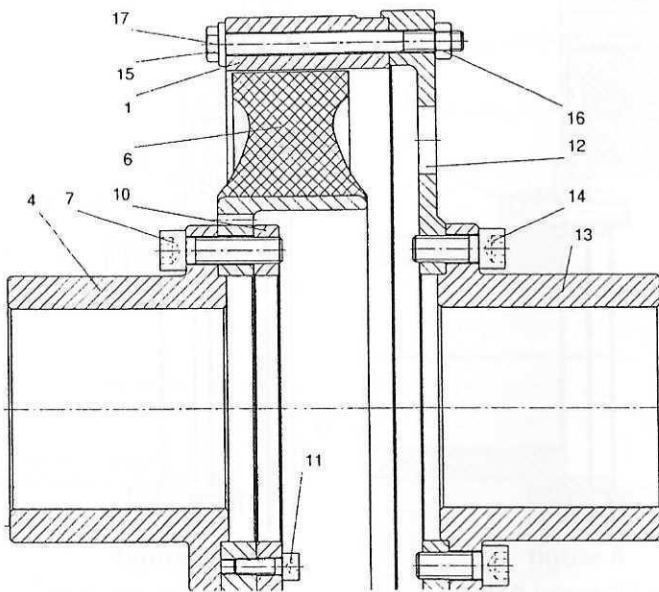


figure 9
2830

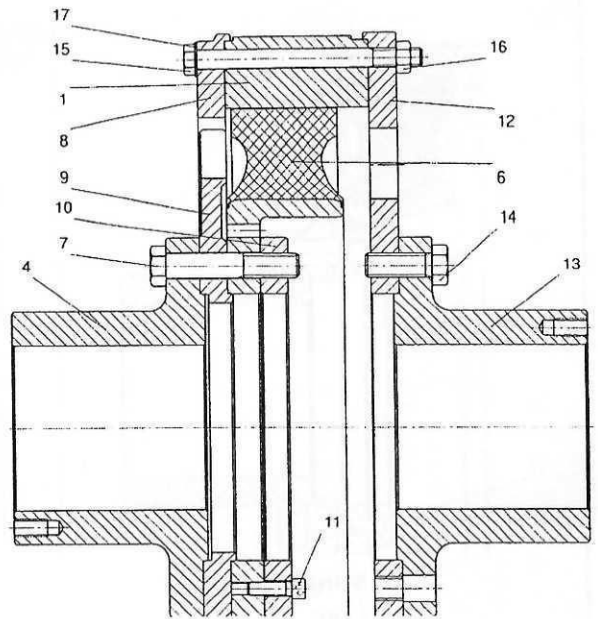


figure 10
2831

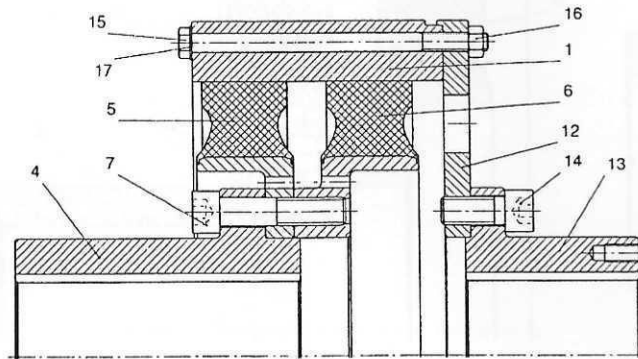


figure 11
2830 dual

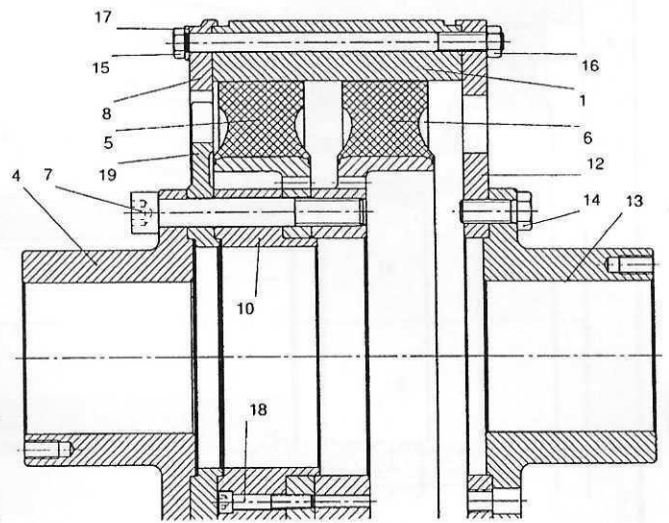


figure 12
2831 dual



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5 Torsional limit device

The VULASTIK-L coupling series 2801, 2811, 2831 is delivered with a torsional limit device. This torsional limit device allows emergency operation up to 25% of the engine nominal torque.

During emergency operation the system has to run under conditions that no hammering should occur between the emergency-run cams.

The elements should be replaced as soon as possible.

After a break of the VULASTIK-L element and installation of a torsional limit device it is required to replace the element as well as the cam ring, the limit ring and the fastening screws.

Attention ! With respect to the assembly of the torsional limit device, special attention should be paid that the cams are staggered by 90° towards each other.

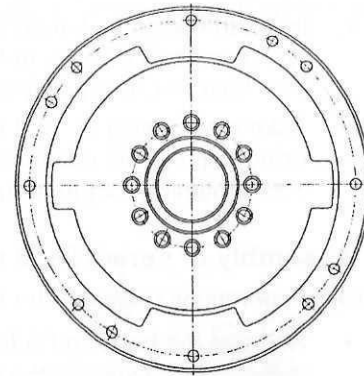


figure 13

6 Assembly of the coupling



During transportation, please pay attention to a sufficient carrying force of the lifting devices. Only use approved transportation elements. Fix the transportation elements thoroughly.

Attention ! While lifting the flexible element, pay attention not to damage the flexible element and the add-on pieces.

The VULASTIK-L coupling is dispatched by VULKAN in the assembled condition (executions with oil-fitted hubs in the preassembled condition).

6.1 Assembly of bell-housing applications, series 2800 a. 2801

Sequence of operations (please refer to figure 1, figure 2, figure 3):

- Remove the housing (1) from the coupling and attach it to the engine flywheel using suitable connection elements and the washers noted in the drawing.
The tightening torque required for the chosen screw quality is to be kept.
Series 2801: Place the limit ring (8) between housing (1) and engine flywheel.
- Release the connecting elements (7) and pull the flexible element (6) – for dual couplings (5, 6) – from the hub.
Series 2801: Remove the cam ring (9) as well.
- Push the hub (4) onto the shaft end using a method meeting a modern engineering practice.
The assembly of the hub with oil-pressure unit is described separately.
- Screw up the flexible element (6) – for dual couplings (5, 6) – with the hub (4) using the connecting elements (7). The tightening torque required for the chosen screw quality is given on the drawing.
Series 2801: Place the cam ring (9) against the flexible element (6) on the face.
- Join engine and machine and attach them to the engine housing using suitable connecting elements, so that the element tothing (6) is in alignment with the tothing gaps of the housing (1).
- Attention !** Concerning series 2801: In addition, please pay attention that the cams are staggered by 90° towards each other (please refer to paragraph 5 „Torsional limit device“).

6.2 Assembly of free-standing applications

6.2.1 Assembly of series 2810, sizes 1410-1910

Sequence of operations (please refer to figure 4):

- Remove housing (1) and spacer ring (12) from the coupling.
- Release the connecting elements (7) and pull the flexible element (6) and – if required – the spacer ring (19) from the hub.
- Push the hub (4) onto the shaft end using a method meeting modern engineering practice.
Deposit the housing (1) on the hub (4).

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The alignment of the system and the alignment control are described separately.
The assembly of the hub with oil-pressure unit is described separately.

- Insert the flexible element (6) and spacer ring (19) between hub (4) and engine flywheel and screw up these parts with the hub (4) using the connecting elements (7). The tightening torque required for the chosen screw quality is given on the drawing.
- Take the housing (1) and the spacer ring (12) from the hub (4) and fix them to the engine flywheel using appropriate connecting elements and the washers noted in the drawing.
The tightening torque required for the chosen screw quality is to be kept.

6.2.2 Assembly of series 2810 u. 2811, sizes 2210-4310

Sequence of operations (please refer to figure 5 figure 6, figure 7, figure 8):

- Remove the housing (1) from the coupling.
Series 2811: Remove the limit ring (8) as well.
- Release the connecting elements (7) and pull the flexible element (6) – for dual coupling (5, 6) – from the hub.
Series 2811: Remove the cam ring (19) as well.
- Push the hub (4) onto the shaft end using a method meeting modern engineering practice.
Deposit the housing (1) – with respect to series 2811 the limit ring (8) as well – on the hub (4).
The alignment of the system and the alignment control are described separately.
The assembly of the hub with oil-pressure unit is described separately.
- Insert the flexible element (6) – for dual couplings (5, 6) - between hub (4) and engine flywheel and screw up these parts with the hub (4) using the connecting elements (7). The tightening torque required for the chosen screw quality is given on the drawing.
Series 2811: Place the cam ring (19) between hub (4) and flexible element (6).
- Take the housing (1) from the hub (4) and fix these parts to the engine flywheel using appropriate connecting elements and the washers noted in the drawing.
The tightening torque required for the chosen screw quality is to be kept.
- **Attention !** Concerning series 2811: Place the limit ring (8) against the housing (1) on the face.
In addition, please pay attention that the cams are displaced by 90° towards each other (please refer to paragraph 5 „Torsional limit device“).

6.2.3 Assembly of series 2830 a. 2831

Sequence of operations (please refer to figure 9, figure 10, figure 11, figure 12):

- Release connecting elements (15, 16, 17).
- Remove the housing (1) from the coupling.
Series 2831: Remove the limit ring (8) as well.
- Release connecting elements (7) and pull the flexible element (6) – for dual couplings (5, 6) – from the hub.
Series 2831: Remove the cam ring (19) as well.
- Push the hub (4) onto the shaft end using a method meeting modern engineering practice.
Deposit the housing (1) – with respect to series 2831 the limit ring (8) as well – on the hub (4).
The assembly of the hub with oil-pressure unit is described separately.
- Release the connecting elements (14) and separate the plate flange (12) from the hub (13).
- Push the hub (13) onto the shaft end using a method meeting modern engineering practice.
The alignment of the system and the alignment control are described separately.
The assembly of the hub with oil-pressure unit is described separately.
- Assemble the plate flange (12) to the hub (13) using the connecting elements (14).
- Insert the flexible element (6) – for dual couplings (5, 6) - between hub (4) and plate flange (12) and screw it up with the hub (4) using the connecting elements (7) and with the plate flange (12) using the connecting elements (15, 16, 17). The tightening torque required for the chosen screw quality is given on the drawing.
Series 2831: Place the cam ring (19) between hub (4) and flexible element (6).
- Take the housing (1) from the hub (4) and fix them to the engine flywheel using appropriate connecting elements and the washers noted on the drawing.
The tightening torque required for the chosen screw quality is to be kept.



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- Attention !** Concerning series 2831: Place the limit ring (8) against the housing (1) on the face. In addition, please pay attention that the cams are displaced by 90° towards each other (please refer to paragraph „Torsional limit device“).

7 Couplings with hubs for an oil-pressure unit

7.1 Mounting of the hub

Before the assembly it is required to check the interfaces from the cone surfaces and the oil keyways with respect to edges. The fitting can be controlled by applying a thin layer of blue grease and by pressing the parts together.

Then clean and dry the cone surface.

In order to determine the push-up distance, the hub must be pushed onto the shaft.

Do not assemble the parts firmly. The push-up distance is calculated from the point where the conical surfaces are closely contiguous without exerting any pressure.

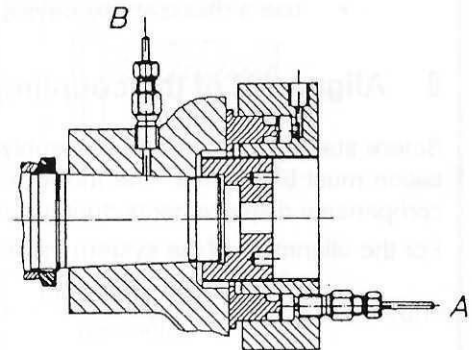
In order to determine the reference dimension, the edge of the hub and the hydraulic nut are used.

In order to determine the reference dimension, the edge of the hub and the hydraulic nut are used.

Before the installation, the cone surface is coated with SAE-10 oil (viscosity approx. 20 cSt at 50°C).

After having attached the hydraulic nut, the hydraulic supply can be connected. The push-up dimension including tolerance is marked on the front surface of the hub.

After the connection to the hydraulic supply, pressure is given on connection A in order to push-up the hub and on connection B in order to expand the hub.



Attention ! The hub should be positioned without any interruption. The push-up pressure (connection A) for the hydraulic nut depends on the hub's diameter of the part to be pressed on.

After having pressed the part in the correct position, the expanding pressure has to be reduced slowly, whereas the push-up pressure has to be kept in order to get the oil distributed (approx. 30 minutes).

Attention ! The push-up pressure has to be maintained all the time, while the expanding pressure is reducing, so that the part will keep its position.

A waiting time of 24 hours is required before the oil-pressure unit can be loaded with the full nominal speed of the engine.

This is necessary to ensure that the oil has completely dropped off from the mounted hub.



Oil under high pressure can cause injuries. While working with high-pressure oil systems, take care for an adequate protection equipment. High-pressure oil should not come in contact with the skin.

After the hub has been installed, the alignment control can be carried out:


7.2 Disassembly of the hub

The hydraulic nut is installed same as for the assembly and put under pressure. The nut thread has to be completely screwed on the shaft journal.



The mounted parts are under high pressure and can cause injuries when pulling them off. The hydraulic nut serves as stop to hold the part to be disassembled. For the disassembly, the hub has to be expanded, i. e. oil-pressure has to be given on connection B.

The hub releases abruptly from the shaft journal by oil-pressure on connection B and simultaneous reduction of the oil-pressure at connection A.

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The part to be removed releases suddenly, if the oil-pressure at connection A is reduced down to zero. Therefore pay attention to the correct assembly of the hydraulic nut.

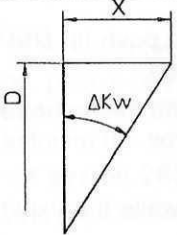
In case that the hub does not release, the disassembly process has to be repeated with the following changes:

- increase the oil-pressure at connection B
- let the hub remain under pressure for an hour
- heat the hub
- use a disassembly device

8 Alignment of the coupling

Before starting the coupling assembly, the drive system has to be aligned. Only couplings in free-standing application must be aligned. The more exact the system is aligned, the more reserves are given for the coupling to compensate displacements during operation.

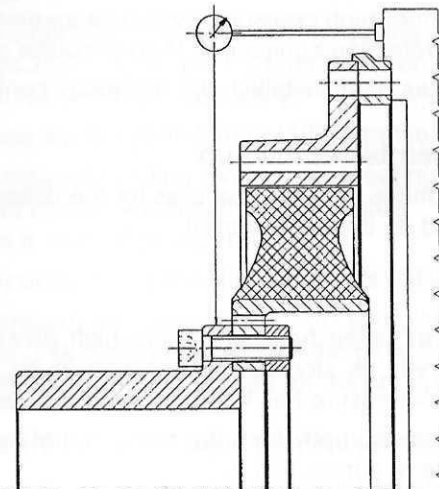
For the alignment of the system the following alignment tolerances are to be kept.

radial alignment tolerance (flexible mounted)	axial alignment tolerance	angular alignment tolerance
$\Delta K_r =$ size 14 – 19: $\pm 0,1$ [mm] size 22 – 34: $\pm 0,2$ [mm] size 40 – 43: $\pm 0,35$ [mm]	$\Delta K_a =$ ± 1 [mm]	$\Delta K_w =$ ± 0.05 [°]
	The permissible gap X resulting from the angle is to be calculated from the angle tolerances ΔK_w and the reference diameter D: $X = \frac{D}{2} \cdot \tan(\Delta K_w)$	

The alignment tolerances must be suitable for the warmed up application under running conditions.

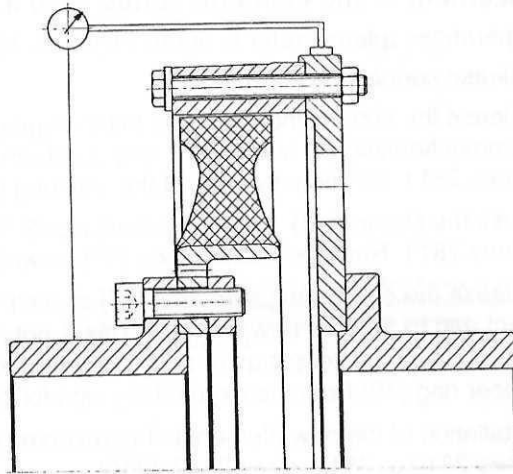
After the coupling has been installed into the system according to the installation and operating instruction delivered with the coupling, we recommend to check the alignment by measuring with a dial gauge over one revolution in order to determine the radial and angular deviations.

With respect to series 2800, 2801, 2810, 2811 a machined surface at the flywheel or at the flywheel housing serves as reference surface.



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Concerning series 2830, 2831 it is measured from hub to hub (please refer to the figure).



9 Commissioning and Safety Regulations

After completion of the assembly, the drive system is ready for operation, as far as the coupling is concerned.

Attention !

We would like to point out that before first operation you have to make sure that all installation aid devices have been removed from the VULASTIK-L coupling.

10 Replacement of the VULASTIK-L elements

Attention !

In case of a replacement of the elements, only original VULKAN elements with coordinated technical data, approved by the classification societies, must be used!

10.1 Replacement of the element in bell-housing applications, series 2800 a. 2801

The VULASTIK-L element can be exchanged by displacing the units.

Sequence of operations (please refer to figure 1, figure 2, figure 3):

- Release the screwed connection of the system components and separate the units
- Release connecting elements (7).
- Pull the flexible element (6) – for dual couplings (5, 6) – from the hub (4).
Series 2801: Remove the cam ring (9) as well.
- Installation of a new element in the reversed order (please refer to chapter 6.1 Assembly of bell-housing applications, series 2800 a. 2801)

10.2 Replacement of the element in free-standing applications

The VULASTIK-L element can be replaced without having to displace the units.

10.2.1 Replacement of the element, series 2810, sizes 1410-1910

Sequence of operations (please refer to figure 4):

- Release connecting elements (7).
- Release the connecting elements to the engine flywheel.
Remove housing (1) and spacer ring (12) from the flywheel and deposit them on the hub (4).
- Press the element (6) from the flywheel.
- Remove the spacer ring (19).
- Remove the element (6).
- Release connecting elements (11) and remove the intermediate ring (10) from the element (6) and attach it to the new element.
- Installation of the new element in the reversed order (please refer to chapter 6.2.1 Assembly of series 2810, sizes 1410-1910)



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10.2.2 Replacement of the element, series 2810 a. 2811, sizes 2210-4310

Sequence of operations (please refer to figure 5 figure 6, figure 7, figure 8):

- Release connecting elements (7).
- Release the connecting elements to the engine flywheel.
Remove housing (1) and spacer ring (12) from the flywheel and desposit them on the hub (4).
Series 2811: additionally deposit the limit ring (8).
- Press the element (6) – for dual couplings (5, 6) – towards the flywheel and remove it.
Series 2811: Remove the cam ring (19) as well.
- Release the connecting elements (11) as well and remove the intermediate ring (10) from the element and fix it to the new element. This is not applicable for dual couplings of series 2830.
Concerning dual couplings of series 2831: Release connecting elements (18) and remove the spacer ring (10) from the element (5). and fix it to the new element.
- Installation of the new element in the reversed order (please refer to chapter 6.2.2 Assembly of series 2810 u. 2811, sizes 2210-4310)

10.2.3 Replacement of the element, series 2830 a. 2831

Sequence of operations (please refer to figure 9, figure 10, figure 11, figure 12):

- Release connecting elements (7).
- Release connecting elements (15, 16, 17) .
Remove the housing (1) from the plate flange (12) and deposit it on the hub.
Series 2831: additionally deposit the limit ring (8).
- Press the element (6) – for dual couplings (5, 6) – towards the plate flange (12) and remove it.
Series 2831: additionally remove the cam ring (19).
- Release connecting elements (11) and remove the intermediate ring (10) from the element (6) and attach it to the new element. This is not applicable for series 2830.
Concerning dual couplings of series 2831: Release connecting elements (18) and remove the spacer ring (10) from the element (5) and attach it to the new element.
- Installation of the new element in the reversed order (please refer to chapter 6.2.3 Assembly of series 2830 a. 2831)

11 Guarantee

On behalf of the classification societies we herewith give the following instruction:

The torsional vibration behaviour of the driving system has been checked and approved by the classification society. The expected and satisfactory behaviour is guaranteed only, provided that all components comply to the values, the torsional vibration calculation is based upon. With respect to the coupling, this means to exactly keep to the dynamic stiffness and damping. In case of a replacement of the elements, only original VULKAN elements with coordinated technical data, approved by the classification societies, must be used!

12 Maintenance

Under normal circumstances, the highly-flexible VULASTIK-L coupling does not require maintenance. In many cases, however, the highly-flexible VULASTIK-L coupling is an indicator for malfunctions in the system. In case of unusual events, e. g. propeller contact, misfiring operation, short circuit, faulty synchronization or emergency shutdown, we recommend a check of the flexible element.

In addition, an annual check of the flexible part and for free-standing applications a alignment control should be carried out.

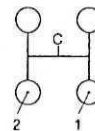
If cracks should be found during the visual inspection at the VULASTIK-L element, the element has to be removed.

The element should be replaced after approx. 15000 operating hours or 10 years resp.



Titel	Installation and Operating Instruction		Theme	Vulastik-L 2800,-01,-10,-11,-30,-31	
Responsibility	Authoring	Checked and released	Document	E&W Vulastik-L 2800 2801 2810 2811 2830 2831 english-Version001.doc	
	22.04.2003	22.04.2003	Version:	001	
TB 20	A. Mehlan	T. Schoppe	Page:	11/11	

SI-System		
	J	m
	kgm ²	kg
1	3.27	35.5
2	1.77	86.4

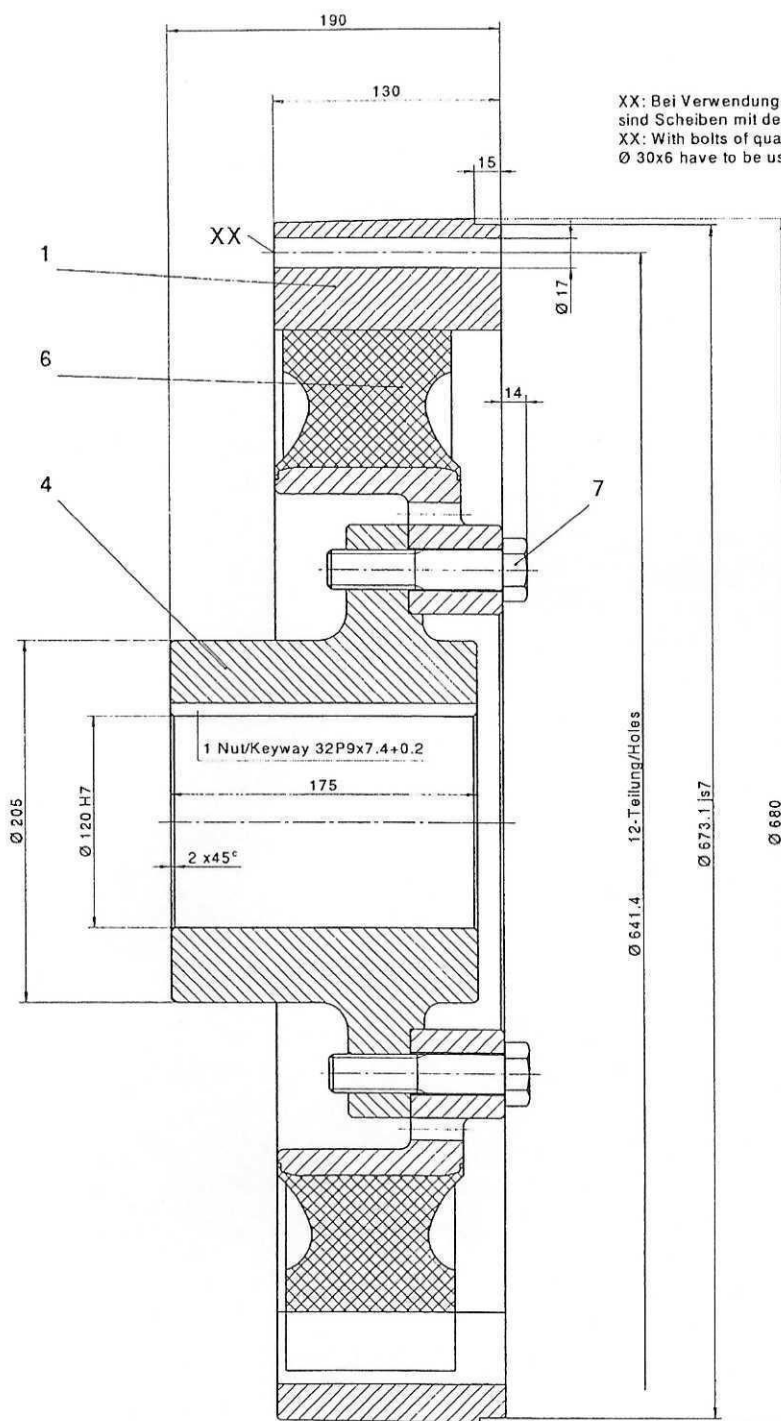


XX: Bei Verwendung von Schrauben der Güteklasse 10.9 sind Scheiben mit den Abmessungen Ø 30x6 unterzulegen.
XX: With bolts of quality 10.9, washers with diameter Ø 30x6 have to be used.

Anzugsmoment
Tightening torque
POS. 7 = 480.0 + 50.0 Nm

Schrauben bzw. Muttern mit Motorenöl eingesetzt.
Bolts and nuts installed with lubricating oil.

Hinweis: Zentrierung und Lochkreis nur im eingebauten Zustand messbar.
Please note: Centering and pitch circle can be measured in installed condition only.



Stückliste Nr.:
partlist no:
1X4011S159
1X4011R159

Stückliste Nr.:
partlist no:
1X40110159
1X40120159
1X40130159
1X40140159
1X40180159

Bei Abnahme durch eine Klassifikationsgesellschaft sind die Anschlussverbindungen den Vorschriften entsprechend auszuführen.

When required to classification societies the connections must be designed to meet the respective classification rules.

FILM	ZUST	ÄNDERUNG	DATUM	NAMEN
1		Stückliste überarbeitet	03.01.2002	Bren

"SCHUTZVERMERK NACH DIN 34 BEACHTEN"			
FORM UND LAGE TOLERANZEN NACH EN 7 31	PROFILNACHMACHUNG NACH EN 10 100	MASSTAB 1:2 (DIN A2)	GEWICHT
ALLGEMEINE TOLERANZEN NACH ISO 2769-01	ZEICHNUNG	WERKSTOFF	ROHTEIL NR.
DATUM	NAMEN	BENENNUNG	
REANB 08.10.1998	Kindov	Hochel. VULASTIK-L-	
GEPR. 03.01.2002	Brennink	Kupplung Baugr. 4010	
WDRM		ZEICHNUNGSNUMMER	BLATT
		1X40100159	BL
VULKAN		Ers. für	Ers. durch
44523 HERNE		7	

Echtfirma

VULKAN: PRODUKTIONSSTÜCKLISTE

Datum : 11.06.03 07:09
Seite : 1
gedruckt von: strickli

Fert.-Art. 1X40130159
VULASTIK-L
Zeichnung 1X40100159

Bearbeiter: breniene
Datum : 02.01.2002

Info:

Pos	Menge	Artikel	Bezeichnung	Abmessungen	Material	Bemerkung
1	1	3X4000020M-B	HOUSING	FM 680X 556 X130	G-ALSi7Mg-T64	
4	1	4X4005041M	HUB	FM 335X 120 X175	C45N	
6	1	2X4013A003	VUL-L-ELEMENT	4013		
7	16	7000022100-C	HEXAGON BOLT	M 22 X100	8.8	931M