D2C
Designed to Customer

TOK

Highly Flexible Coupling Optimised
for Plug-in Connection

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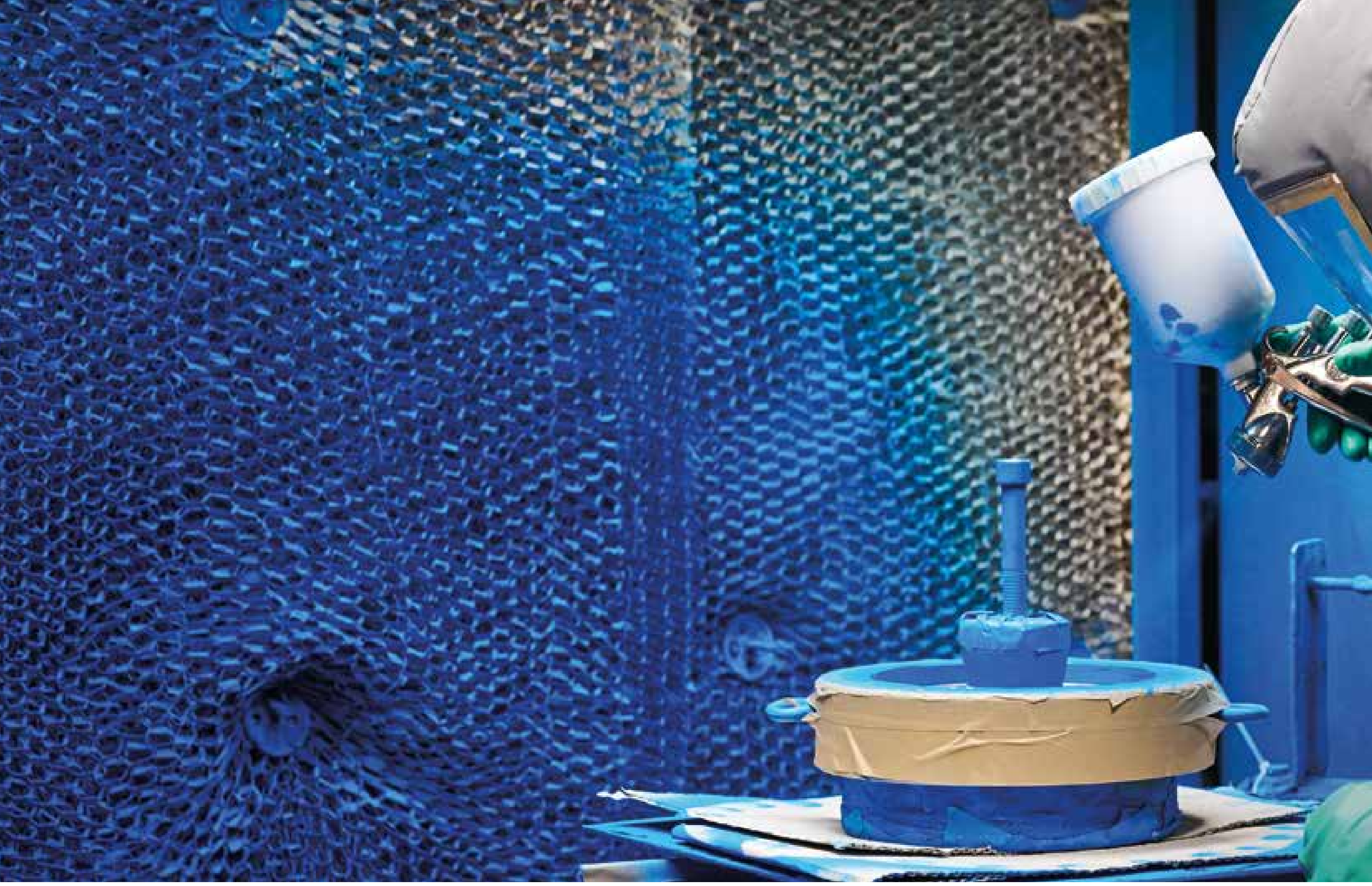
SIMPLY **POWERFUL.**



D2C – Designed to Customer

The guiding principle of Designed to Customer is the recipe for success behind REICH. In addition to the catalogue products, we supply our customers with couplings developed to their specific requirements. The designs are mainly based on modular components to provide effective and efficient customer solutions. The special nature of our close cooperation with our partners ranges from; consulting, development, design, manufacture and integration to existing environments, to customer-specific production, logistics concepts and after-sales service - worldwide.
This customer-oriented concept applies to both standard products and production in small batch sizes.

The company policy at REICH embraces, first and foremost, principles such as customer satisfaction, flexibility, quality, prompt delivery and adaptability to the requirements of our customers.

REICH provides you with not only a coupling, but a solution:
Designed to Customer – SIMPLY **POWERFUL.**

D2C
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TOK
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Coupling Information

TOK
General Technical Description

TOK
Highly Flexible Coupling Optimised for Plug-in Connection

The highly flexible TOK coupling has been specially designed for applications requiring extremely low torsional stiffness. Furthermore it is particularly well suited to the compensation of axial and radial displacements of flexibly mounted engines. The wide range of flexible coupling elements and adaptive designs provides standard solutions for a wide variety of different tasks. These can be complemented by specific customised designs on request.

The flexible element is designed to combine high torque transmission capacity and high displacement capacity with high speed capability. Its stiffness can be adapted to requirements by selecting different rubber qualities.

The extremely low torsional stiffness allows for a safe and over critical layout of the coupling. During start and stop operations, the resonance range is passed through quickly, and excellent de-coupling between the combustion engine and the driven machine is achieved over the entire operating speed range.

The TOK coupling enables direct connection between the engine and the driven machine and is capable of compensating for misalignments resulting from the flexible mounting without requiring any additional components. Restoring forces remain within the permissible limits despite good displacement capability, with a significant reduction in assembly effort and smooth running of the drive (noise reduction).

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Nominal torque to 720 Nm

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Advantages

The salient features and advantages of highly torsionally flexible TOK couplings:

- ➜ Direct connection to SAE J 620, adaptation to other flywheels on request
- ➜ Compensation of axial, radial and angular displacements
- ➜ Backlash-free and maintenance-free
- ➜ Can also be used for bell-house type
- ➜ Freely pluggable splined shaft for ease of assembly
- ➜ Various elastomers for adaptation to resonance condition and temperature (-40 °C to +120 °C)
- ➜ Linear torsional deflection characteristic

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Technical Layout

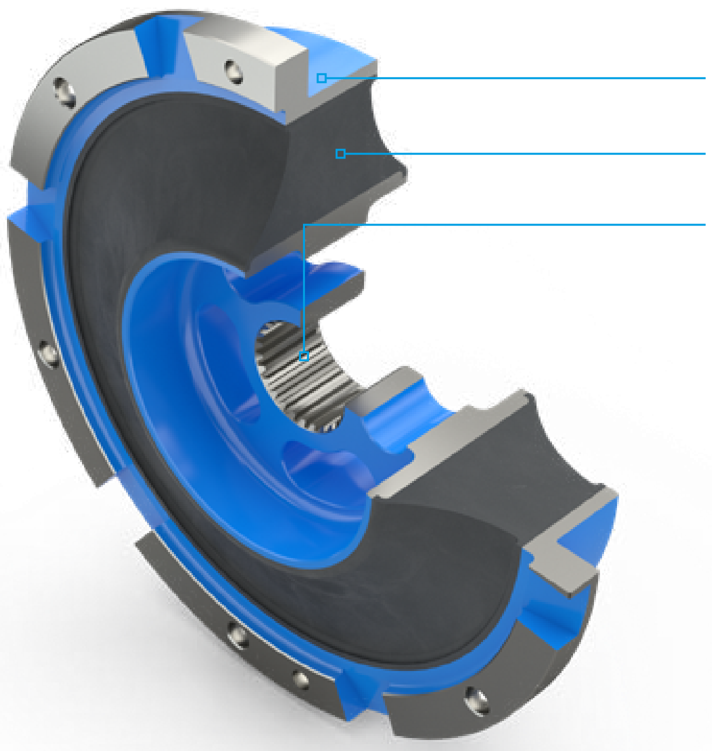
Design and Function

The highly flexible, torsionally optimised TOK couplings are specifically designed for use in flexibly mounted engine applications. Accordingly, both the coupling flange **(1)** and the coupling hub **(3)** of the standard types are designed to fit the standard engine and shaft connection dimensions.

Axial, radial and angular displacements are compensated for by a flexible element. The highly flexible coupling is designed as a rubber-metal connection between coupling flange **(1)**, rubber ring disc body **(2)** and coupling hub **(3)**.

When a torque acts on the drive side of the coupling, the flexibility of the rubber ring disc body enables relative twisting against the output side thus effectively de-coupling torsional vibrations.

TOK layout and materials



1 Coupling flange

2 Rubber body

3 Coupling hub with toothing

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Materials

Materials Overview

Part No.	Designation	Materials
1	Coupling flange	Steel
2	Rubber body	Rubber according to general technical data
3	Coupling hub	Spheroidal cast iron

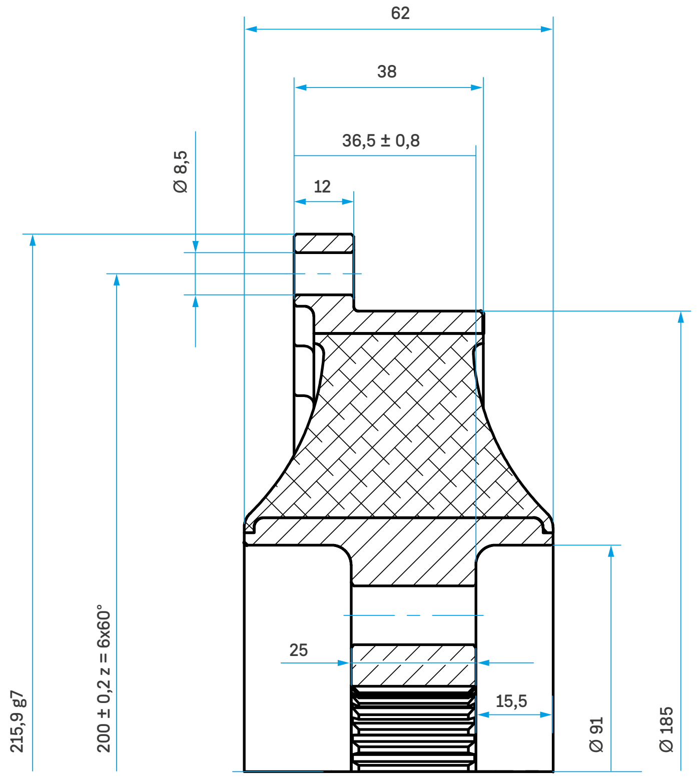
Technical Note

The technical data applies only to the complete coupling or the corresponding coupling elements. It is the customer's/user's responsibility to ensure there are no inadmissible loads acting on any of the components. In particular, existing connections, e.g. bolted connections, must be checked with regard to the torques to be transmitted. If necessary, further measures, such as additional reinforcement with pins, may be necessary. It is the customer's/user's responsibility to make sure the dimensioning of the shaft and keyed or other connection, e.g. shrinking or clamping connection, is correct. All components that can rust are protected against corrosion as standard.

REICH have an extensive range of couplings and coupling systems to cover nearly every drive configuration. Customized solutions can be developed and manufactured even in small batches or as prototypes. In addition calculation programs are available for all necessary dimensioning.

TOK

General Technical Data



Standard Type

Coupling size	Nominal torque	Maximum torque	Continuous fatigue torque	Dynamic torsional stiffness 1)	Mass	Moments of inertia		Maximum speed	Maximum permissible misalignment 2) continuous/short-term		
									Axial	Radial	Angular
	T_{KN}	$T_{K\,max}$	$T_{KW\,(10\,Hz)}$	$C_{T\,dyn}$	m	J_1	J_2	n_{max}	ΔK_a	ΔK_r	ΔK_w
	[Nm]	[Nm]	[Nm]	[Nm/rad]	[kg]	[kgm^2]	[kgm^2]	[min^{-1}]	[mm]	[mm]	[°]
TOK 176	720	1800	240	1200	3.4	0.015	0.004	6500	2.5/7	2/5	0.6/2

1) Standard rubber element version, relative damping ψ = 0.5; alternative versions on request

2) Data for rotational speed 1 500 min^{-1}, values for other speeds on request

Recommendation: For installation, align each direction of displacement to a maximum 20% of each Δ K; in operation the sum of all Δ K-parts must remain < 100%

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Selection of the Coupling Size

The coupling size, for use in combustion engines, is designed and selected with a view to torsional vibration. A general safety factor of S = 1.3 - 1.5 should be applied for TOK couplings for a preliminary selection according to the engine torque T_{AN}.
The coupling size selection should be verified for the permissible coupling load by a torsional vibration analysis, which will be conducted by us on request.

When using a TOK coupling in drives with large torque absorption fluctuations of the driven machine, an additional safety factor should be applied. Take care not to operate the system constantly at resonance frequency in order to avoid damage to the coupling and the aggregates. Further information on torsional vibration analysis and the operation of highly flexible TOK couplings is available on request.

In selecting the coupling size the following should be satisfied:

The **nominal torque of the coupling T_{KN}** must be taken into account at every temperature and operating load of the coupling, whilst observing the service factors S (e.g: temperature factor S_t) shall be at least equal to the maximum nominal torque on the drive side T_{AN}; the temperature in the immediate vicinity of the coupling must be taken into account.

$$T_{KN} \geq T_{AN} \cdot S_t$$

The **nominal torque on the drive side T_{AN}** is calculated with the driving power P_{AN} and the coupling speed n_{AN}.

$$T_{AN}\,[Nm] = 9550 \frac{P_{AN}\,[kW]}{n_{AN}\,[min^{-1}]}$$

The **temperature factor S_t** allows for the decreasing load capacity of the coupling when affected by elevated ambient temperatures in the vicinity of the coupling.

Temperature t	60 °C	70 °C	80 °C	>80 °C
S_t	1.25	1.4	1.6	on request

The **maximum torque capacity of the coupling, $T_{K\,max}$** shall be at least equal to the highest torque T_{max} encountered in operation while taking the temperature factor S_t into account.

$$T_{K\,max} \geq T_{max} \cdot S_t$$

A continuous torsional vibration analysis to verify the coupling selection should confirm that the permissible **continuous fatigue torque T_{KW}** is at least equal to the highest fatigue torque T_W under reversing stresses encountered throughout the operating speed range while taking into account the temperature and frequency.

$$T_{KW\,(10\,Hz)} \geq T_W \cdot S_t \cdot S_f$$

The **frequency factor S_f** allows for the frequency dependence of the permissible continuous fatigue torque under reversing stresses $T_{KW\,(10\,Hz)}$ with an operating frequency f_x.

$$S_f = \sqrt{\frac{f_x}{10}}$$

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Notes

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Industrial solutions:

- Power generation
- Mobile applications
- Test benches
- Pumps & compressors
- Industry
- Ship & port engineering

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