Coupling selection

The ROTEX® coupling is selected in accordance with DIN 740 part 2. The coupling has to be dimensioned in a way that the permissible coupling load is not exceeded in any operating condition. For this purpose the actual loads have to be compared to the permissible parameters of the coupling.

1 **Drives without periodical torsional vibrations**
e. g. centrifugal pumps, fans, screw compressors, etc.
The coupling is selected taking into account the rated torques T_{KN} and maximum torque $T_{K\,max}$.

1.1 **Load produced by rated torque**

$$T_N\,[Nm] = 9550 \cdot \frac{P\,[kW]}{n\,[1/min]}$$

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

Taking into consideration the ambient temperature, the permissible rated torque T_{KN} of the coupling has to correspond at least to the rated torque T_N of the machine.

1.2 **Load produced by torque shocks**

$$T_{K\,max} \geq T_S \cdot S_z \cdot S_t + T_N \cdot S_t$$

The permissible maximum torque of the coupling has to correspond at least to the total of peak torque T_S and the rated torque T_N of the machine, taking into account the shock frequency Z and the ambient temperature.

Drive-sided shock
$T_S = T_{AS} \cdot M_A \cdot S_A$

Load-sided shock
$T_S = T_{LS} \cdot M_L \cdot S_L$

$$M_A = \frac{J_L}{J_A + J_L} \qquad M_L = \frac{J_A}{J_A + J_L}$$

This applies in case if the rated torque T_N of the machine is at the same time subject to shocks.

Knowing the mass distribution, shock direction and shock mode, the peak torque T_S can be calculated.

For drives with A. C.-motors with high masses on the load side we would recommend to calculate the peak driving torque with the help of our simulation programme.

2. **Drives with periodical torsional vibrations.** For drives subject to high torsional vibrations, e. g. diesel engines, piston compressors, piston pumps, generators, etc., it is necessary to perform a torsional vibration calculation to ensure a safe operation. If requested, we perform the torsional vibration calculation and the coupling selection in our company. For necessary details please see KTR standard 20004.

2.1 **Load produced by rated torque**

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

Taking into account the ambient temperature, the permissible rated torque T_{KN} of the coupling has to correspond at least to the rated torque T_N of the machine.

2.2 **Passing through the resonance range**

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

Taking into account the temperature, the peak torque T_S arising when the resonance range is run through must not exceed the maximum torque T_{Kmax} of the coupling.

2.3 **Load produced by vibratory torque shocks**

$$T_{KW} \geq T_W \cdot S_t$$

Taking into account the ambient temperature, the permissible vibratory torque T_{KW} of the coupling must not be exceeded by the highest periodical vibratory torque T_W with operating speed.

$$P_{KW} \geq P_W$$

For higher operating frequencies f > 10, the heat produced by damping in the elastomer part is considered as damping power P_W.

The permissible damping power P_{KW} of the coupling depends on the ambient temperature and must not be exceeded by the damping power produced.

Description	Symbol	Definition or explanation
Rated torque of coupling	T_{KN}	Torque that can continuously be transmitted over the entire permissible speed range
Maximum torque of coupling	$T_{K\,max}$	Torque that can be transmitted as dynamic load ≥ 10^5 times or 5 x 10^4 as vibratory load, respectively, during the entire operating life of the coupling
Vibratory torque of coupling	T_{KW}	Torque amplitude of the permissible periodical torque fluctuation with a frequency of 10 Hz and a basic load of T_{KN} or dynamic load up to T_{KN}, respectively
Damping power of coupling	P_{KW}	Permissible damping power with an ambient temperature of + 30 °C.
Rated torque of machine	T_N	Stationary rated torque on the coupling
Rated torque of driving side	T_{AN}	Rated torque of machine, calculated from rated power and rated speed
Rated torque of load side	T_{LN}	Maximum figure of the load torque calculated from power and speed
Peak torque of machine	T_S	Peak torque on the coupling
Peak torque on the driving side	T_{AS}	Peak torque with torque shock on the driving side, e. g. breakdown torque of the electric motor

Description	Symbol	Definition or explanation
Peak torque of load side	T_{LS}	Peak torque with torque shock on load side, e. g. braking
Vibratory torque of machine	T_W	Amplitude of the vibratory torque effective on the coupling
Damping power of the machine	P_W	Damping power which is effective on the coupling due to the load produced by the vibratory torque
Moment of inertia of driving side	J_A	Total of moments of inertia existing on the driving or load side referring to the coupling speed
Moment of inertia of load side	J_L	
Rotational inertia coefficient of driving side	M_A	Factor taking into account the mass distribution with shocks and vibrations produced on the driving or load side
Rotational inertia coefficient of load side	M_L	$M_A = \frac{J_L}{(J_A + J_L)}$ $\quad M_L = \frac{J_A}{(J_A + J_L)}$