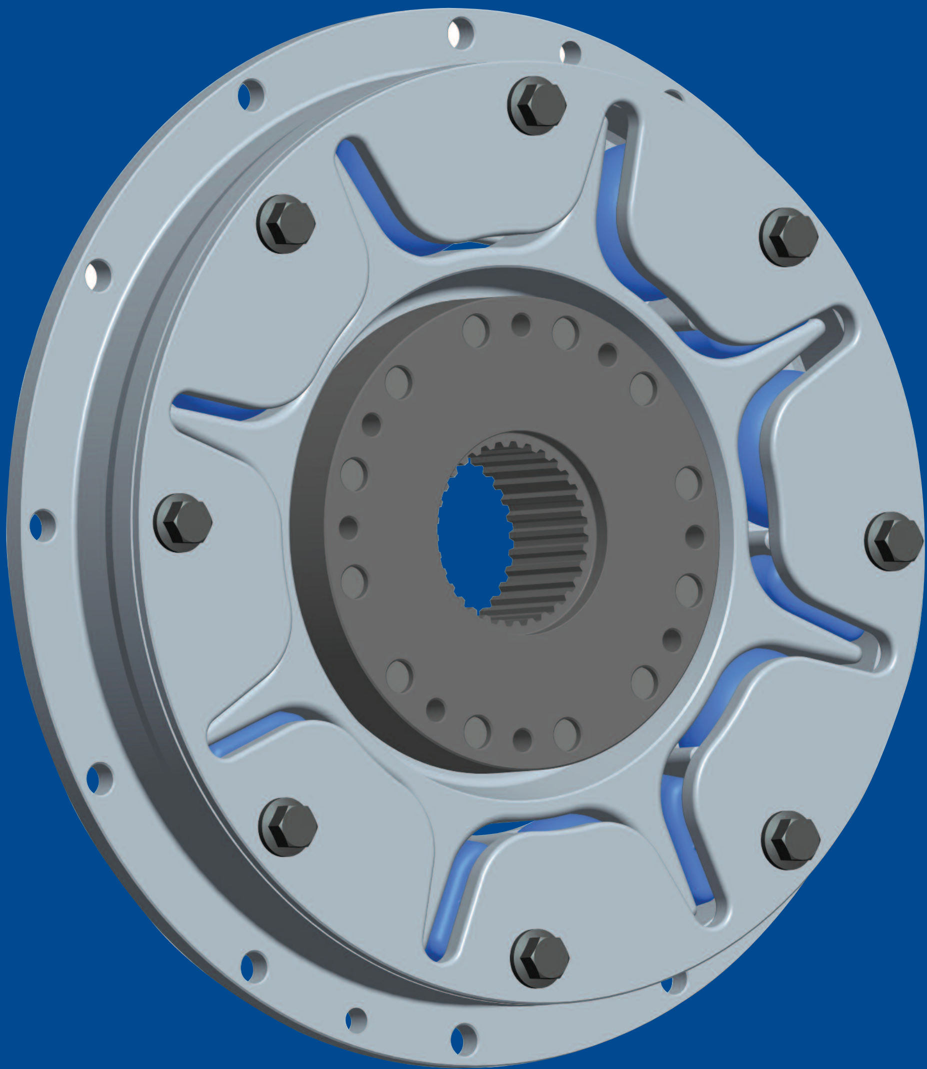
HTB-MP

Hi-Tec Marine Propulsion Couplings



RENOLD

Superior Coupling Technology

Introduction

Over 60 years of experience
Renold Hi-Tec Couplings has been a world leader in the design and manufacture of torsionally flexible couplings for over 60 years.

Commitment to Quality and the Environment
Having gained EN ISO 9001:2008, EN ISO 14001:2004 and EN ISO 18001:2007, Renold Hi Tec Couplings can demonstrate their commitment to quality, environment and occupational health and safety.

World Class Manufacturing
Continual investment is being made to apply the latest machining and tooling technology. The application of lean manufacturing techniques in an integrated cellular manufacturing environment establishes efficient working practices.

Engineering Support
The experienced engineers at Renold Hi-Tec Couplings are supported by substantial facilities to enable the ongoing test and development of product. This includes the capability for:

- Measurement of torsional stiffness up to 220 kNm
- Full scale axial and radial stiffness measurement
- Misalignment testing of couplings up to 2 metres diameter
- Static and dynamic balancing
- 3D solid model CAD
- Finite element analysis of both metal and rubber components

TVA Service
Our resident torsional analysts are able to provide a full Torsional Vibration Analysis service to investigate a customer's driveline and report on the system performance. This service, together with the facility for transient analysis, is available to anyone and is not subject to purchase of a Renold Hi-Tec product.

Marine Survey Society Approvals
Renold Hi-Tec Couplings work with all major marine survey societies to ensure their products meet the strict performance requirements.

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Health and Safety at Work

Customers are reminded that when purchasing Renold products, for use at work or otherwise, additional and up-to-date information, which is not possible to include in Renold publications, must be obtained from your local sales office, in relation to:

a) Guidance on individual product suitability, based on the various existing applications of the extensive range of Renold products.

b) Guidance on safe and proper use, provided that full disclosure is made of the precise details of the intended, or existing, application.

All relevant information must be passed on to the persons engaged in, likely to be affected by and those responsible for the use of the product.

Nothing contained in this publication shall constitute a part of any contract, express or implied.

Product Performance

'The performance levels and tolerances of our product stated in this catalogue (including without limitation, serviceability, wearlife, resistance to fatigue, corrosion protection) have been verified in a programme of testing and quality control in accordance with Renold, Independent and or International standard recommendations.

No representation warranty or condition is given that our products shall meet the stated performance levels or tolerances for any given application outside the controlled environment required by such tests and customers must check the performance levels and tolerances for their own specific application and environment.

Guidance Notes

Whilst all reasonable care in compiling the information contained in this catalogue is taken, no responsibility is accepted for printing errors.

All information contained in this catalogue is subject to change after the date of publication.

Illustrations - The illustrations used in this catalogue represent the type of product described but the goods supplied may vary in some detail from those illustrated.

Specifications - The right is reserved to make modifications to design and dimensions as published in this catalogue to meet manufacturing conditions and developments in design and materials.

Renold - Products can be supplied by Renold companies or representatives around the world on the standard terms and conditions of sale of the company or representative from which the products are purchased.

Torsional Vibration Responsibility

The responsibility for ensuring the torsional compatibility of the system as a whole lies with the assembler of the drive train. Renold Hi-Tec Couplings cannot accept liability for gearbox noise, damage of the coupling, or for damage of other components of the drive caused by torsional vibration. Torsional vibration analysis can be made by the engine builders, survey societies, independent consultants or by Renold Hi-Tec Couplings.

Dimensional Responsibility

The responsibility for ensuring dimensional compatibility of the coupling lies with the assembler of the drive train. Renold Hi-Tec Couplings cannot accept liability for interference between the coupling and flywheel, and/or the gearbox or for damage caused by such interference.

HTB-MP Flexible Coupling

The HTB-MP range of flexible couplings is a second generation coupling derived from Renold Hi-Tec Couplings' existing HTB-GS range.

HTB-MP couplings have low weight and inertia yet retain the unrivalled quality expected of Renold Hi-Tec Couplings.

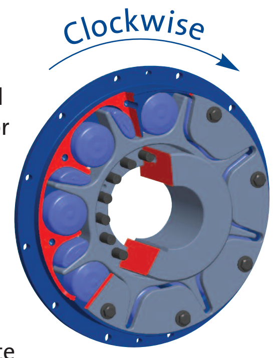
Failsafe Design

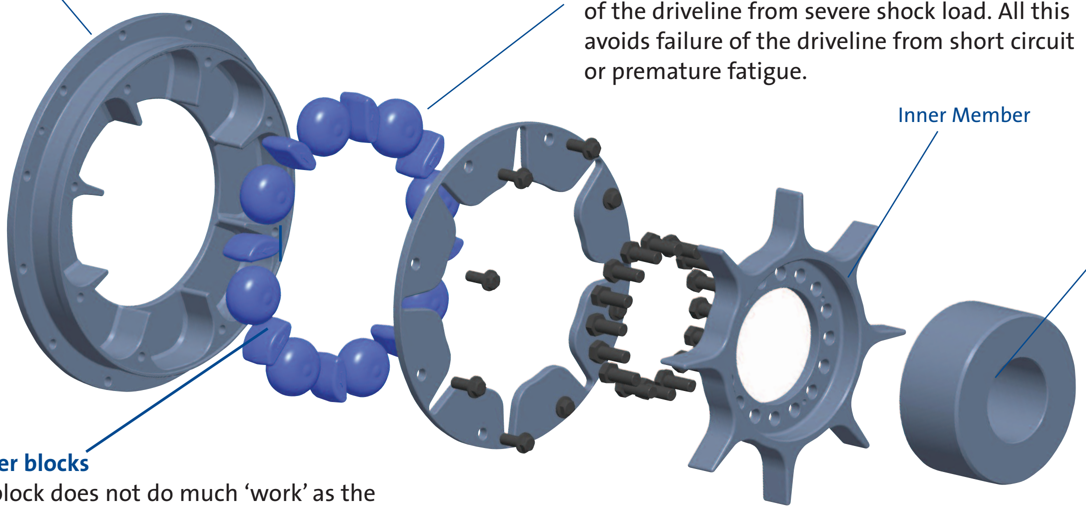
The intrinsically failsafe design ensures continuous operation of the driveline in the unlikely event of rubber damage.

Coupling rotation

The HTB-MP coupling is designed to operate in either a clockwise or anti-clockwise direction.

It is important, therefore, to establish which direction the coupling will operate at the specification stage. The coupling shown here is designed to operate in a clockwise direction.





Driving rubber blocks

The lead blocks carry all the torque and are selected to provide optimum control of resonant torsional vibration. They also provide protection of the driveline from severe shock load. All this avoids failure of the driveline from short circuit or premature fatigue.

Trailing rubber blocks

The trailing block does not do much 'work' as the HTB-MP coupling has been designed to operate in one direction. Therefore it is much smaller than the driving block which has enabled the overall size of the coupling to be reduced. The resulting decrease in weight and inertia decreases the bending moments on the drive shaft.

Features

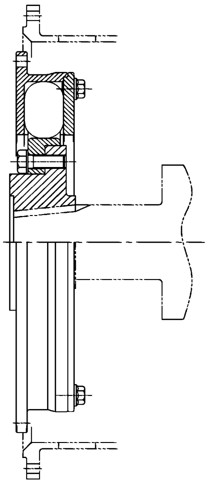
- The only component that is unique for clockwise and anti-clockwise rotation is the cover
- Unique blind assembly
- High temperature capability (up to 200˚C)
- Severe shock load protection
- Intrinsically fail safe
- Maintenance free

Benefits

- Interchangeable metal and rubber components for clockwise and anti-clockwise operation, except for the cover which ensures the correct direction of rotation.
- Allows easy assembly for applications in bell housing
- Allows operation in bell housing where ambient temperatures can be high
- Avoid failure of the driveline under short circuit and other transient conditions
- Ensuring continuous operation of the driveline in the unlikely event of rubber damage
- No lubrication or adjustment required resulting in low running costs

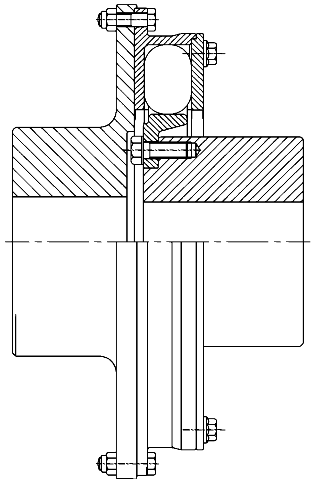
HTB-MP Design Variations and Features

Coupling to Suit Existing Hub



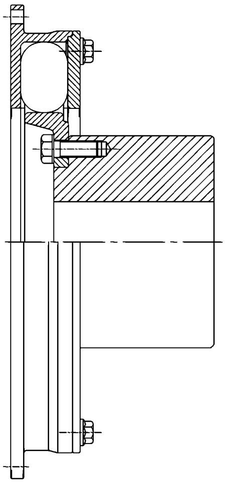
Existing hub fitment. Coupling inner member designed to suit existing hub design.

Shaft to Shaft Coupling



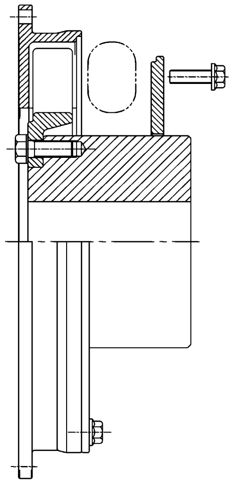
Shaft to Shaft Coupling. Designed for use on electric motor drives and power take off applications.

Reversed Inner Member Coupling



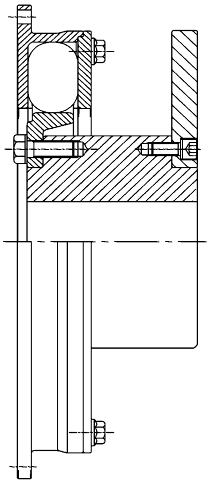
Coupling with reversed inner member to increase distance between flywheel face and shaft end.

Change Rubber Blocks



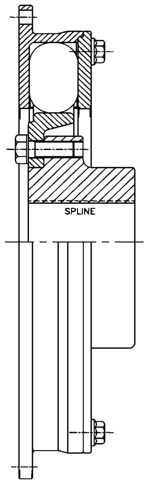
Removable cover to allow easy change of rubber blocks in situ.

Additional Inertia on Driven Side



Coupling with additional inertia on the inner mass

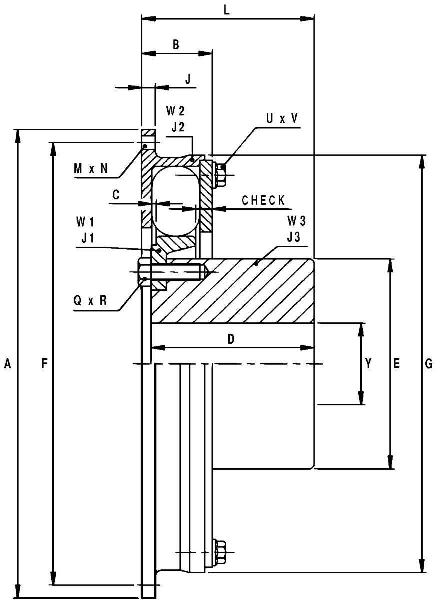
Coupling to Suit Splined Shaft



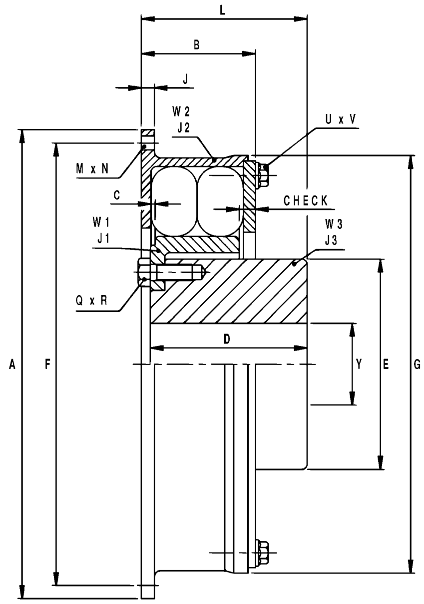
Coupling with limited end float for splined input shafts

HTB-MP Standard SAE Flywheel to Shaft

HTB-MP600 –HTB-MP1600 & HTB-MP4000



HTB-MP2240 – HTB-MP3200

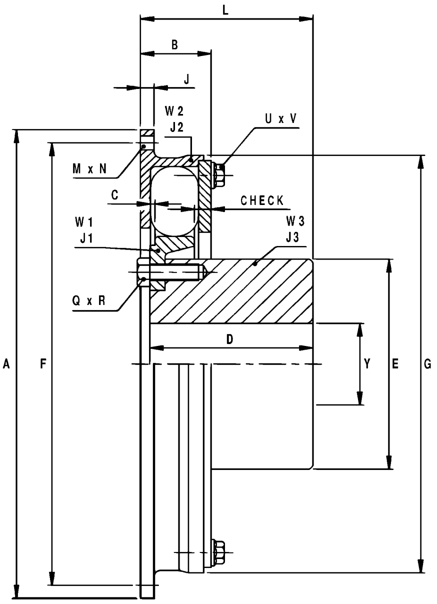


Dimensions, Weight, Inertia and Alignment

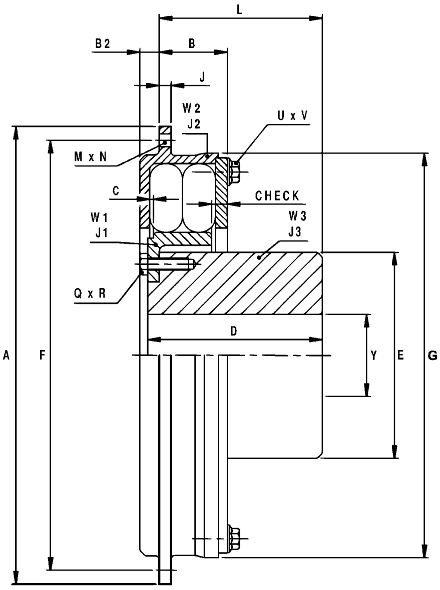
Coupling Size		600		1120		1600		2240		3200		4000	
		SAE8	SAE10	SAE10	SAE11.5	SAE11.5	SAE14	SAE10	SAE11.5	SAE11.5	SAE14	SAE14	SAE18
Dimensions [mm]	A	263.5	314.3	314.3	352.4	352.4	466.7	314.3	352.4	352.4	466.7	466.7	571.5
	B	41.5	41.5	47.5	47.5	50	50	80.5	80.5	83	83	67	67
	B2	-	-	-	-	-	-	-	-	-	-	-	-
	C	3	3	3	3	4	4	3	3	4	4	4	4
	D	75	75	85	85	100	100	85	85	100	100	112	112
	E	108	108	120	120	156	156	120	120	156	156	210	210
	F	177.8	295.3	295.3	333.4	333.4	438.15	295.3	333.4	333.4	438.2	438.2	542.9
	G	219	219	265	265	309	309	265	265	309	309	416	416
	J	10	10	10	10	10	10	10	10	10	10	12	12
	L	85.5	85.5	95.5	95.5	106	106	95.5	95.5	106	106	120	120
	M	6	8	8	16	16	16	8	16	16	16	16	12
	N	Ø10.5	Ø10.5	Ø10.5	Ø10.5	Ø10.5	Ø13.5	Ø10.5	Ø10.5	Ø10.5	Ø13.5	Ø13.5	Ø17
	Q	12	12	10	10	12	12	10	10	12	12	12	12
	R	M10	M10	M12	M12	M12	M12	M12	M12	M12	M12	M16	M16
	U	7	7	7	7	8	8	7	7	8	8	8	8
	V	M10	M10	M12	M12	M12	M12	M12	M12	M12	M12	M14	M14
	Y (MAX)	40	40	56	56	85	85	56	56	85	85	115	115
	Y (MIN)	25	25	30	30	40	40	30	30	40	40	50	50
	CHECK	10	10	10	10	13	13	10	10	13	13	16	16
Rubber Driving Elements	Per Cavity	1	1	1	1	1	1	2	2	2	2	1	1
	Per Coupling	7	7	7	7	8	8	14	14	16	16	8	8
Maximum Speed [rpm]		4500	4500	4500	4500	4500	4500	4000	4000	3500	3500	3000	2800
Weight [kg]	W1	1.207	1.207	3.89	3.89	3.20	3.20	7.72	7.72	10.42	10.42	7.55	7.55
	W2	5.57	7.27	10.5	11.9	11.14	16.58	15.29	16.67	19.41	25.14	25.15	32.76
	W3	4.54	4.54	6.77	6.77	13.50	13.50	6.77	6.77	13.56	13.56	27.54	27.54
Inertia [kg m²]	J1	0.0055	0.0055	0.029	0.029	0.028	0.028	0.040	0.040	0.119	0.119	0.128	0.128
	J2	0.0562	0.0915	0.145	0.187	0.213	0.444	0.207	0.248	0.352	0.594	0.859	1.372
	J3	0.0075	0.0075	0.013	0.013	0.043	0.043	0.013	0.013	0.043	0.043	0.156	0.156
Allowable Misalignment													
Radial [mm]	Align	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.4	0.4
	Max	1	1	1	1	1	1	1	1	1	1	1.5	1.5
Axial [mm]	Align	1	1	1	1	1	1	1	1	1	1	1	1
	Max	2	2	2	2	2	2	2	2	2	2	2.5	2.5
Conical [degree]		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

HTB-MP Standard SAE Flywheel to Shaft

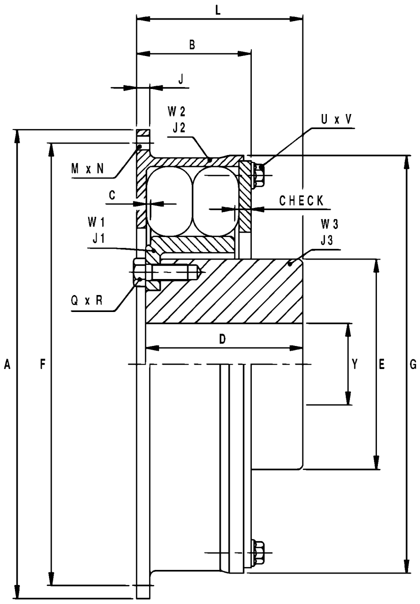
HTB-MP8000, 13300 & 20001



HTB-MP6001



HTB-MP16000 & 26600 - 53300



Dimensions, Weight, Inertia and Alignment

Coupling Size		6001		8000		13300	16000		20001	26600	40001	53300
		SAE14	SAE18	SAE18	SAE21	SAE21	SAE18	SAE21	SAE24	SAE21	SAE24	-
Dimensions [mm]	A	466.7	571.5	571.5	673.1	673.1	571.5	673.1	733.4	673.1	733.4	860.0
	B	69.5	69.5	84	84	103	141	141	116	173	213	215
	B2	20	20	-	-	-	-	-	-	-	-	-
	C	4	4	5	5	4	5	5	7	4	7	7
	D	128	128	194	194	166	194	194	278	236	278	276
	E	210	210	256	256	308	256	256	346	308	346	416
	F	438.15	542.92	542.92	641.35	641.35	542.92	641.35	692.2	641.35	692.2	820
	G	416	416	509	509	595	509	509	650	595	650	783
	J	12	12	16	16	20	16	16	20	20	20	22
	L	116	116	205	205	180	205	205	300	252	300	300
	M	16	12	12	24	24	24	24	24	36	36	32
	N	Ø13.5	Ø17	Ø17	Ø17	Ø17	Ø17	Ø17	Ø22	Ø17	Ø22	Ø21
	Q	16	16	12	12	16	12	12	12	12	24	16
	R	M16	M16	M20	M20	M24	M20	M20	M24	M24	M24	M24
	U	8	8	8	8	8	8	8	8	8	8	8
	V	M14	M14	M16	M16	M20	M16	M16	M20	M20	M24	M24
	Y (MAX)	115	115	150	150	170	150	150	215	170	215	220
	Y (MIN)	50	50	60	60	60	60	60	90	60	90	110
	CHECK	16	16	20	20	22	20	20	22	22	25	25
Rubber Driving Elements	Per Cavity	2	2	1	1	1	2	2	1	2	2	2
	Per Coupling	16	16	8	8	8	16	16	8	16	16	16
Maximum Speed [rpm]		3000	2800	2800	2500	2300	2800	2500	1850	1950	1850	1500
Weight [kg]	W1	11.54	11.54	15.37	15.37	29.18	32.02	32.02	36.1	54.91	68.97	103.21
	W2	29.71	37.28	45.56	57.15	77.39	62.51	74.1	103.5	105.04	147.31	213.48
	W3	31.78	31.78	46.55	46.55	74.87	49.01	49.01	185.9	121.83	185.72	277.64
Inertia $[kg\ m^2]$	J1	0.201	0.201	0.380	0.380	1.040	0.870	0.870	1.585	2.090	3.19	6.889
	J2	1.016	1.528	2.370	3.490	5.480	3.260	4.380	8.790	7.420	12.57	25.72
	J3											
Allowable Misalignment												
Radial [mm]	Align	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Max	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Axial [mm]	Align	1	1	1	1	1	1	1	1	1	1	1
	Max	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Conical [degree]		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

HTB-MP Technical Data

1.1 Torque Capacity - Diesel Engine Drives

The HTB-MP Coupling is selected on the "Nominal Torque T_{KN}" without service factors for Diesel Drive applications.

The full torque capacity of the coupling for transient vibration whilst passing through major criticals on run up, is published as the maximum torque T_{KMAX} .
($T_{KMAX} = 3 \times T_{KN}$).

There is additional torque capacity built within the coupling for short circuit and shock torques, which is 3 x T_{KMAX}.

The published "Vibratory Torque T_{KW}", relates to the amplitude of the permissible torque fluctuation. The vibratory torque values shown in the technical data are at the frequency of 10Hz. The allowable vibratory torque at higher or lower frequencies fe = $T_{KW} \sqrt{\frac{10Hz}{fe}}$

1.2 Measure of Acceptability

The measure of acceptability for coupling fitted with SM and NM rubber blocks is "Allowable Dissipated Heat at Ambient Temperature 30°C".

Couplings fitted with Si70 or Si75 rubber are unlikely to reach the maximum allowable temperature of 200°C unless in a high ambient temperature or subject to extreme levels of vibratory torque, however the vibratory torque must not exceed the rated values stated in the Technical Data. For couplings supplied to DNV survey the maximum allowable temperature is 150°C and maximum heat load for Si70 & Si75 is 70% of that stated in the technical data.

1.3 Transient Torques

Prediction of transient torques in marine drives can be complex. Normal installations are well provided for by selecting couplings based on the "Nominal Torque T_{KN}". Transients, such as start up and clutch manoeuvre, are usually within the "Maximum Torque T_{KMAX}" for the coupling.

Care needs to be taken in the design of couplings with shaft brakes, to ensure coupling torques are not increased by severe deceleration.

Sudden torque applications of propulsion devices such as thrusters or waterjets, need to be considered when designing the coupling connection.

2.0 Stiffness Properties

The Renold Hi-Tec Coupling remains fully flexible under all torque conditions. The HTB-MP series is a non-bonded type operating with the Rubber-in-Compression principle.

2.1 Axial Stiffness

When subject to axial misalignment, the coupling will have an axial resistance which gradually reduces due to the effect of vibratory torque.

The axial stiffness of the coupling is torque dependent, and variation is as shown in the technical data on page 10.

2.2 Radial Stiffness

The radial stiffness of the coupling is torque dependent, and is as shown in the technical data on page 10.

2.3 Torsional Stiffness

The torsional stiffness of the coupling is dependent upon applied torque and temperature as shown in the technical data on page 10.

2.4 Prediction of the System Torsional Vibration Characteristics

An adequate prediction of the system's torsional vibration characteristics can be made by the following method:

2.4.1 Use the torsional stiffness as shown in the technical data, which is based upon data measured at a 30˚C ambient temperature.

2.4.2 Repeat the calculation 2.4.1, but using the maximum temperature correction factor St_{100} (St_{200} for Si70 & Si75 rubber), and dynamic magnifier correction factor, M_{100} (M_{200} for Si70 & Si75 rubber), for the selected rubber. Use tables on page 9 to adjust values for both torsional stiffness and dynamic magnifier. ie. $CT_{100} = C_{Tdyn} \times St_{100}$

2.4.3 Review calculations 2.4.1 and 2.4.2 and if the speed range is clear of criticals which do not exceed the allowable heat dissipation value as published in the catalogue, then the coupling is considered suitable for the application with respect to the torsional vibration characteristics. If there is a critical in the speed range, then actual temperature of the coupling will need to be calculated at this speed.

HTB-MP Technical Data

Rubber Grade	$Temp_{max}$ °C	S_t
Si70	200	$St_{200} = 0.90$
Si75	200	$St_{200} = 0.90$
NM45	100	$St_{100} = 0.90$
SM50	100	$St_{100} = 0.85$
SM60	100	$St_{100} = 0.75$
SM70	100	$St_{100} = 0.63$
SM80	100	$St_{100} = 0.58$
Si70 is considered "standard"		

Rubber Grade	Dynamic Magnifier at 30°C (M_{30})	Dynamic Magnifier at 100°C (M_{100})
Si70	7.5	$M_{200} = 8.3$
Si75	7.5	$M_{200} = 8.3$
NM45	15	16.7
SM50	10	11.8
SM60	8	10.7
SM70	6	9.5
SM80	4	6.9
Si70 is considered "standard"		

2.5 Prediction of the actual coupling temperature and torsional stiffness

2.5.1 Use the torsional stiffness as published in the catalogue, this is based upon data measured at 30˚C and the dynamic magnifier at 30˚C. (M_{30})

2.5.2 Compare the synthesis value of the calculated heat load in the coupling (P_K) at the speed of interest, to the "Allowable Heat Dissipation" (P_{KW}).

The coupling temperature rise

$$°C = Temp_{coup} = \left(\frac{P_K}{P_{KW}}\right) \times 70 \text{ (170 for Si70 \& Si75 rubber)}$$

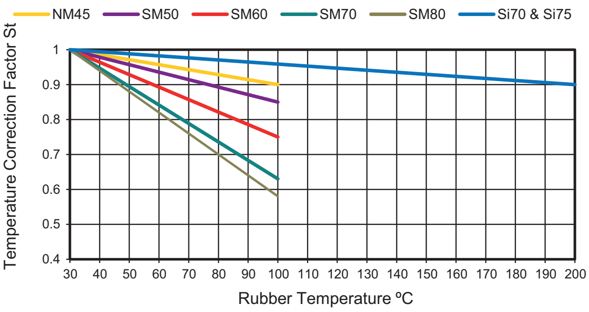
The coupling temperature = ϑ

$$\vartheta = Temp_{coup} + \text{Ambient Temp.}$$

2.5.3 Calculate the temperature correction factor, St, from 2.6 (if the coupling temperature > 100˚C (200˚C for Si70 & Si75 rubber), then use St_{100} (St_{200} for Si70 & Si75 rubber). Calculate the dynamic Magnifier as per 2.7. Repeat the calculation with the new value of coupling stiffness and dynamic magnifier.

2.5.4 Calculate the coupling temperature as per 2.5. Repeat calculation until the coupling temperature agrees with the correction factors for torsional stiffness and dynamic magnifier used in the calculation.

2.6 Temperature Correction Factor



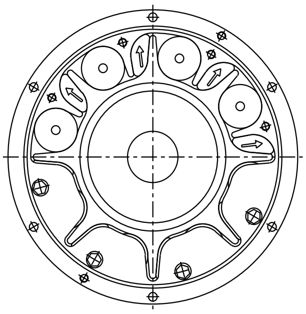
2.7 Dynamic Magnifier Correction Factor

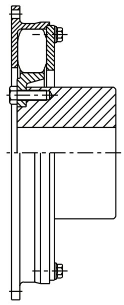
The Dynamic Magnifier of the rubber is subject to temperature variation in the same way as the torsional stiffness.

$$M_T = \frac{M_{30}}{S_t} \qquad \psi_T = \psi_{30} \times S_t$$

Rubber Grade	Dynamic Magnifier (M_{30})	Relative Damping ψ_{30}
Si70	7.5	0.83
Si75	7.5	0.83
NM45	15	0.42
SM50	10	0.63
SM60	8	0.78
SM70	6	1.05
SM80	4	1.57
Si70 is considered "standard"		

HTB-MP Technical Data





COUPLING SIZE-		600	1120	1600	2240	3200	8000	4000	6001	13300	16000	20001	26600	40001	53300
Nominal Torque T_{KN}	(kNm)	0.6	1.12	1.6	2.24	3.2	4	6	8	13.3	16	20	26.7	40	53.3
Maximum Torque T_{Kmax}	(kNm)	1.8	3.36	4.8	6.72	9.6	12	18	24	40	48	60	80	120	160
Vibratory Torque T_{KW}	(kNm)	0.2	0.37	0.5	0.74	0.8	1.3	2.0	2.7	4.4	5.3	6.7	8.9	13.3	17.8
10% Nominal Torque	Si70	0.0018	0.0033	0.010	0.007	0.020	0.027	0.039	0.049	0.088	0.098	0.456	0.176	0.911	0.381
	Si75	0.0022	0.0040	0.012	0.008	0.023	0.032	0.047	0.059	0.106	0.117	0.547	0.211	1.093	0.457
	NM45	0.0030	0.0056	0.016	0.011	0.031	0.043	0.063	0.078	0.141	0.156	0.729	0.281	1.458	0.610
	SM50	0.0036	0.0067	0.018	0.013	0.036	0.050	0.073	0.091	0.164	0.182	0.850	0.328	1.701	0.711
	SM60	0.0042	0.0078	0.022	0.016	0.044	0.061	0.089	0.111	0.199	0.221	1.032	0.399	2.065	0.864
	SM70	0.0072	0.0134	0.036	0.027	0.073	0.100	0.146	0.182	0.328	0.365	1.701	0.657	3.401	1.422
	SM80	0.0108	0.0201	0.055	0.040	0.111	0.152	0.221	0.277	0.498	0.554	2.581	0.996	5.162	2.159
25% Nominal Torque	Si70	0.0048	0.0089	0.014	0.018	0.028	0.035	0.054	0.067	0.121	0.134	0.251	0.240	0.503	0.519
	Si75	0.0057	0.0107	0.017	0.021	0.033	0.042	0.065	0.080	0.145	0.161	0.302	0.288	0.603	0.623
	NM45	0.0072	0.0134	0.019	0.027	0.038	0.048	0.074	0.092	0.166	0.185	0.346	0.330	0.691	0.714
	SM50	0.0072	0.0134	0.020	0.027	0.039	0.050	0.077	0.095	0.172	0.192	0.358	0.342	0.716	0.740
	SM60	0.0078	0.0145	0.021	0.029	0.043	0.055	0.084	0.103	0.187	0.208	0.390	0.372	0.779	0.805
	SM70	0.0120	0.0223	0.033	0.045	0.066	0.084	0.128	0.158	0.287	0.319	0.597	0.570	1.194	1.233
	SM80	0.0149	0.0279	0.042	0.056	0.084	0.106	0.163	0.201	0.365	0.407	0.760	0.726	1.521	1.570
50% Nominal Torque	Si70	0.0131	0.025	0.031	0.049	0.061	0.079	0.121	0.148	0.265	0.295	0.408	0.528	0.815	1.151
	Si75	0.0158	0.029	0.037	0.059	0.073	0.095	0.145	0.177	0.318	0.354	0.489	0.634	0.978	1.382
	NM45	0.0143	0.027	0.033	0.054	0.066	0.085	0.130	0.159	0.284	0.317	0.438	0.567	0.876	1.237
	SM50	0.0149	0.028	0.035	0.056	0.070	0.090	0.139	0.169	0.302	0.337	0.466	0.604	0.931	1.316
	SM60	0.0167	0.031	0.039	0.062	0.077	0.100	0.154	0.187	0.335	0.374	0.516	0.669	1.032	1.458
	SM70	0.0227	0.042	0.053	0.085	0.106	0.137	0.210	0.256	0.459	0.512	0.706	0.916	1.413	1.996
	SM80	0.0305	0.057	0.071	0.114	0.143	0.185	0.283	0.344	0.617	0.689	0.951	1.233	1.902	2.686
75% Nominal Torque	Si70	0.0257	0.048	0.055	0.096	0.110	0.139	0.208	0.262	0.470	0.526	0.660	0.941	1.319	2.045
	Si75	0.0308	0.058	0.066	0.115	0.131	0.167	0.249	0.315	0.564	0.631	0.791	1.129	1.583	2.454
	NM45	0.0227	0.042	0.048	0.085	0.097	0.123	0.183	0.232	0.415	0.464	0.582	0.830	1.165	1.806
	SM50	0.0251	0.047	0.053	0.094	0.107	0.136	0.202	0.256	0.458	0.513	0.643	0.918	1.287	1.995
	SM60	0.0299	0.056	0.064	0.112	0.128	0.163	0.243	0.307	0.550	0.615	0.772	1.101	1.544	2.395
	SM70	0.0376	0.070	0.080	0.141	0.159	0.202	0.302	0.381	0.683	0.764	0.959	1.367	1.917	2.973
	SM80	0.0568	0.106	0.120	0.212	0.241	0.306	0.457	0.577	1.034	1.156	1.451	2.069	2.902	4.500
100% Nominal Torque	Si70	0.0442	0.083	0.094	0.165	0.187	0.224	0.334	0.423	0.757	0.845	1.059	1.513	2.119	3.290
	Si75	0.0531	0.099	0.112	0.198	0.225	0.269	0.401	0.507	0.908	1.014	1.271	1.816	2.542	3.948
	NM45	0.0323	0.060	0.072	0.120	0.145	0.173	0.258	0.327	0.585	0.653	0.819	1.170	1.638	2.544
	SM50	0.0376	0.070	0.084	0.141	0.168	0.201	0.299	0.379	0.678	0.756	0.949	1.355	1.897	2.947
	SM60	0.0478	0.089	0.106	0.178	0.212	0.254	0.379	0.480	0.858	0.958	1.202	1.717	2.403	3.732
	SM70	0.0556	0.104	0.124	0.207	0.247	0.296	0.441	0.558	0.998	1.114	1.398	1.997	2.795	4.341
	SM80	0.0926	0.173	0.206	0.346	0.412	0.493	0.735	0.930	1.665	1.858	2.330	3.329	4.661	7.239
Allowable	Si70 & Si75	390	500	575	628	863	800	1015	980	1200	1535	1100	1900	2070	2400
Heat	NM45	120	160	185	206	278	285	345	400	515	560	430	715	645	1000
Loading	SM50	120	160	185	206	278	285	345	400	515	560	430	715	645	1000
@ 30ºC [W] P_{KW}	SM60	120	160	185	206	278	285	345	400	515	560	430	715	645	1000
	SM70	130	170	195	212	293	305	375	425	545	600	467	765	700	1080
	SM80	140	180	205	228	308	325	400	465	600	665	500	845	750	1200
Radial Stiffness (1)															
No Load [N/mm]	Si70	450	635	774	1271	1549	1041	1562	1321	1558	2643	2042	3115	4085	4117
@ T_{KN} [N/mm]	Si70	6320	8931	10888	17861	21776	14639	21960	18588	21906	37175	28728	43812	57456	57902
Axial Stiffness (1)															
No Load [N/mm]	Si70	1153	1628	1911	4511	5382	2562	4903	3325	3967	9255	5863	10972	14958	14460
@ T_{KN} [N/mm]	Si70	4358	6155	7224	17059	20353	9690	18540	12573	15005	34996	22169	41490	56562	54681

(1) Radial and axial stiffness values for other grades are available on request.

Gears and Coupling Product Range

Gear Units

The Renold gearbox range is diverse, covering worm gears, helical and bevel helical drives and mechanical variable speed. Renold is expert in package drives and special bespoke engineered solutions, working closely with customers to fulfil their specific application requirements, including: mass transit, materials handling, power generation.

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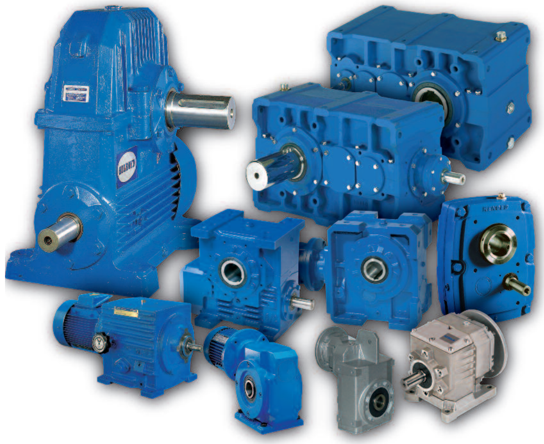

Cardiff Couplings

Renold Couplings manufactures specialist and industrial couplings. These include, Hydrastart fluid couplings, Gearflex gear couplings, Renoldflex torsionally rigid couplings and elastomeric couplings that include the Pinflex and Crownpin pin and bush couplings and the Discflex coupling range. Popular industrial products include the Spiderflex, Tyreflex and Chainflex couplings.
This wide and varied portfolio offers torque transmission capability from 107 Nm through to 4,747,000 Nm. Renold Couplings has the coupling solution for a wide range of demanding applications

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Hi-Tec Couplings

Renold Hi-Tec Couplings product range is comprised of both rubber in compression and rubber in shear couplings for damping and tuning torsional vibrations in power drive lines, they have been developed over 60 years to satisfy industry needs for the complete range of diesel and electronic motor drives. Our design capability and innovation is recognised by customers around the world and is utilised in customising couplings to meet customer's specific requirements. Renold Hi-Tec Couplings deliver the durability, reliability and long life that customers demand.

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