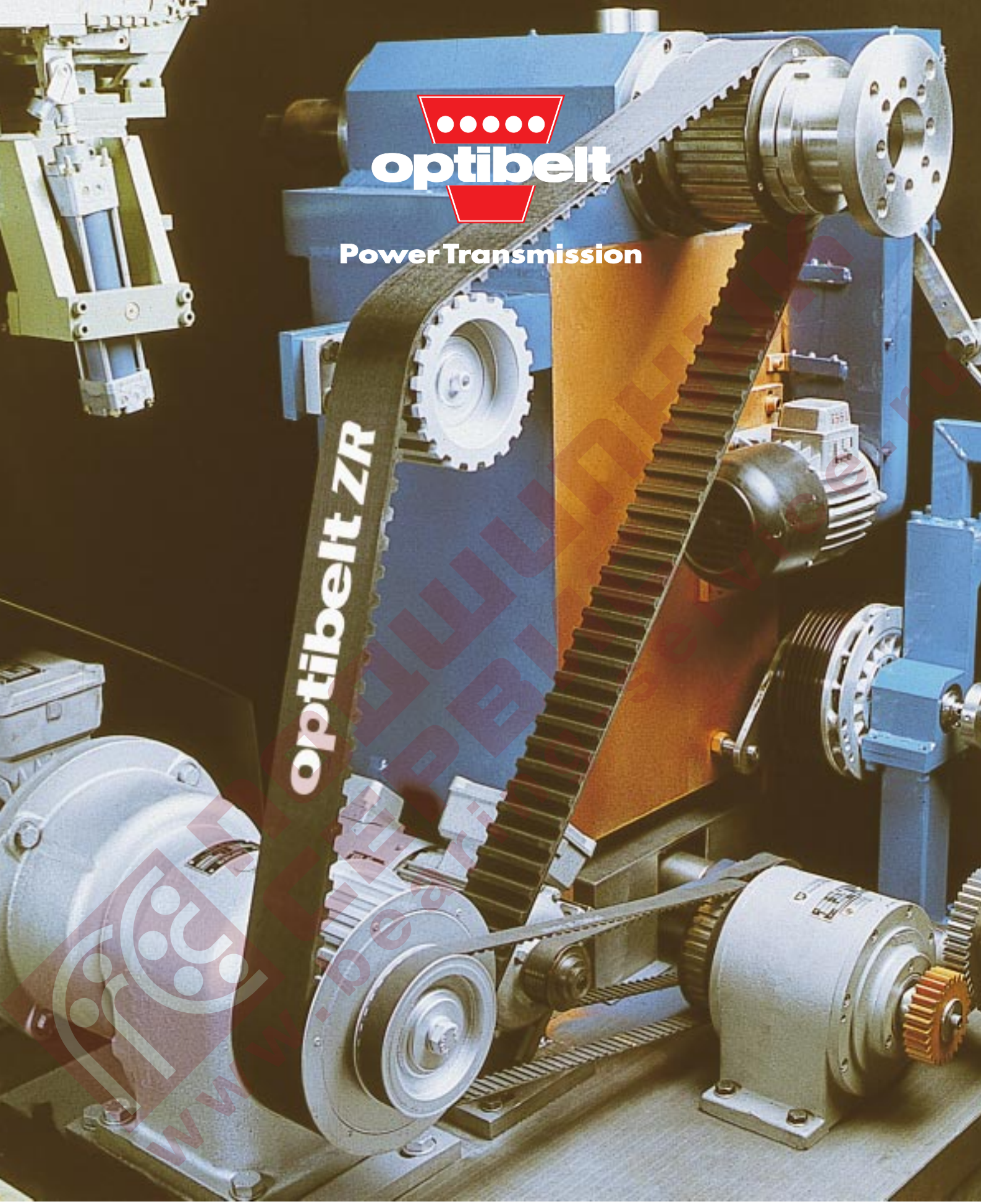

Technical Manual

for optibelt ZR Timing Belt Drives

4th editional

optibelt
Power Transmission

Technical Manual for optibelt ZR Timing Belts

Optibelt ZR Timing Belts enable slip-free, synchronised power transmission of up to several hundred kilowatts and are suitable for belts speeds of up to 80 m/s.

All relevant information, as well as the method of drive design will be found in this Manual. Should any questions arise, please do not hesitate to avail yourself of the service provided by our Applications Engineering Division. This range from providing expert advice to computer-aided design and is free of charge.

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Power Transmission

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Power Transmission

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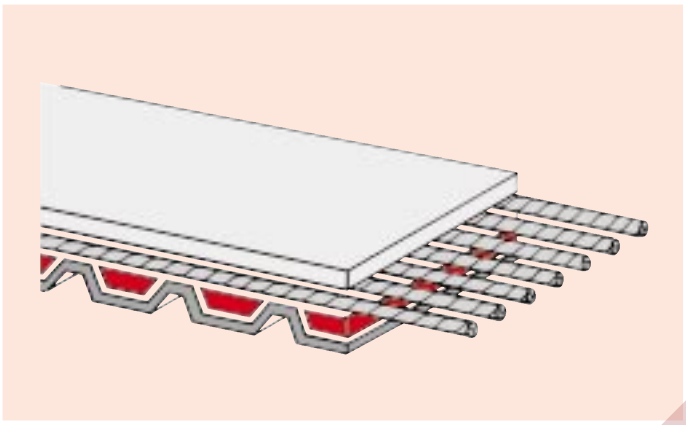
Power Transmission

Product Description

optibelt ZR timing belts to ISO specification 5296

Construction



Tension Cord

The tension cord is continuous, spirally wound, fibre glass. This material has a high tensile strength and is extremely flexible; its extremely low stretch is essential in this particular application.

The high specific tensile strength of the tension cord ensures that it has a small cross-section, so that the Optibelt ZR timing belt is very thin.

Top Surface

The tension cord is encased in a hardwearing and flexible top surface of highquality rubber compound. This protects the tension cord from oil, damp and friction and wear and tear.

This robust material is highly resistant to mineral oils, but not to vegetable and water soluble cooling and cutting oils.

Teeth

The teeth are made of a moderately hard, shear and wear resistant rubber compound bonded to the top surface to form a single mass. The shape and arrangement of the teeth are such that the pulley engages the belt teeth precisely and with minimum friction.

As long as 6 teeth or more are in mesh on the small pulley, their shear resistance is greater than tensile strength of the tension cord.

Fabric Cover

To reduce wear and tear, the tooth faces are covered in a tough, friction resistant fabric giving an effect similar to the surface hardening applied to gears. After an extended running period, the surface of this protective fabric, which has a very low coefficient of friction, acquires a polished surface which enhances belt life.

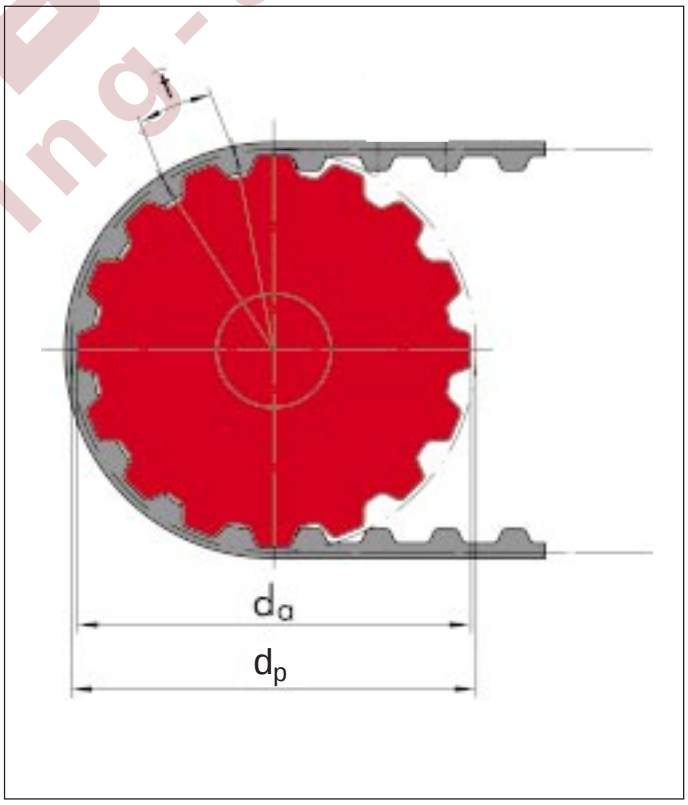
Tooth Pitch, Designations

Optibelt ZR timing belts are manufactured to ISO 5296 and toothed timing pulleys to ISO 5294. Both come in six standard sections.

Table 1: Belt sections and tooth pitch

Section	Tooth Pitch t (mm)	Tooth Pitch t (inches)
MXL	2.032	0.080 ($^{2}/_{25}$)
XL	5.080	0.200 ($^{1}/_{5}$)
L	9.525	0.375 ($^{3}/_{8}$)
H	12.700	0.500 ($^{1}/_{2}$)
XH	22.225	0.875 ($^{7}/_{8}$)
XXH	31.750	1.250 ($1^{1}/_{4}$)

Tooth pitch is the distance from the centre of one tooth to the centre of the next measured at the pitch line, which corresponds to the level of the tension cord. The pitch or datum diameter of the pulley is a theoretical dimension which lies outside the outer diameter.



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Product Description

optibelt ZR timing belts to ISO 5296

Nominal Dimensions

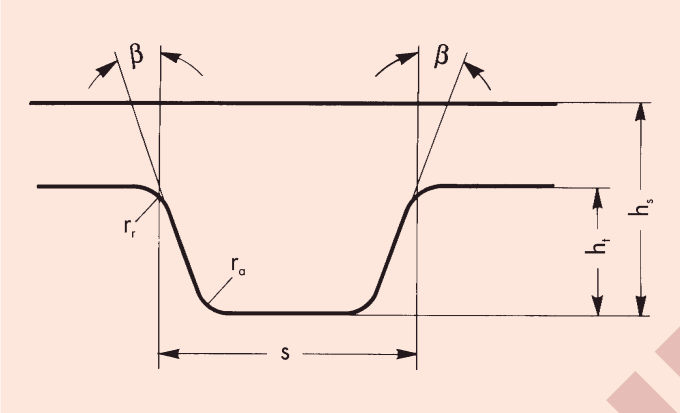

Table 2

Section	MXL	XL	L	H	XH	XXH
Tooth angle 2β (degree)	40°	50°	40°	40°	40°	40°
Tooth height h_t (mm)	0.51	1.27	1.91	2.29	6.35	9.53
Radius r_r (mm)	0.13	0.38	0.51	1.02	1.57	2.29
Radius r_a (mm)	0.13	0.38	0.51	1.02	1.19	1.52
Tooth width s (mm)	1.14	2.57	4.65	6.12	12.57	19.05
Overall belt thickness h_s (mm)	1.2	2.3	3.6	4.3	11.2	15.7

Table 3: Width tolerances for Optibelt ZR timing belts to ISO 5296

Section	Standard width		Permitted deviation of width for belt pitch lengths		
	Width	Designation	up to 838.20	between 838.20 mm and 1676.40 mm	over 1676.40 mm
	(mm)	B_c	(mm)	(mm)	(mm)
MXL	3.2 4.8 6.4	012 019 025	+ 0.5 – 0.6	—	—
XL	6.4 7.9 9.5	025 031 037	+ 0.5 – 0.6	+ 0.5 – 0.8	—
L	12.7 19.1 25.4	050 075 100	+ 0.8 – 0.8	+ 0.8 – 1.3	+ 0.8 – 1.2
H	19.1 25.4 38.1	075 100 150	+ 0.8 – 0.8	+ 0.8 – 1.3	+ 0.8 – 1.3
	50.8	200	+ 0.8 – 1.3	+ 1.3 – 1.3	+ 1.3 – 1.5
	76.2	300	+ 1.3 – 1.5	+ 1.5 – 1.5	+ 1.5 – 2.0
XH	50.8 76.2 101.6	200 300 400	+ 4.8 – 4.8	+ 4.8 – 4.8	+ 4.8 – 4.8
XXH	50.8 76.2 101.6 127.0	200 300 400 500	+ 4.8 – 4.8	+ 4.8 – 4.8	+ 4.8 – 4.8

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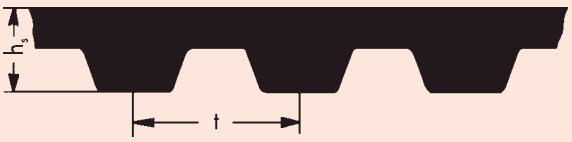
Standard Range

optibelt ZR Timing belts to ISO 5296



Type		MXL	XL	L	H	XH	XXH
h_s	(mm)	1.2	2.3	3.6	4.3	11.2	15.7
t	(mm)	2.032	5.08	9.525	12.7	22.225	31.75

Type MXL

Belt designation	Pitch length (mm)	Number of teeth	Belt designation	Pitch length (mm)	Number of teeth	Belt designation	Pitch length (mm)	Number of teeth
360 MXL	91.44	45	816 MXL*	207.26	102	1360 MXL*	345.44	170
432 MXL*	109.73	54	824 MXL*	209.30	103	1400 MXL	355.60	175
440 MXL	111.76	55	840 MXL*	213.36	105	1440 MXL*	365.76	180
448 MXL*	113.79	56	848 MXL*	215.39	106	1472 MXL*	373.89	184
456 MXL*	115.82	57	856 MXL*	217.42	107	1520 MXL*	389.08	190
464 MXL*	117.86	58	864 MXL*	219.46	108	1560 MXL*	396.24	195
480 MXL	121.92	60	880 MXL	223.52	110	1600 MXL*	406.40	200
488 MXL*	123.95	61	896 MXL*	227.58	112	1768 MXL*	449.07	221
536 MXL*	136.14	67	904 MXL*	229.62	113	1800 MXL*	457.20	225
544 MXL*	138.18	68	912 MXL*	231.65	114	1888 MXL*	479.55	236
560 MXL*	142.24	70	920 MXL*	233.68	115	1984 MXL*	503.94	248
568 MXL*	144.27	71	960 MXL*	243.84	120	1992 MXL*	505.97	249
576 MXL*	146.30	72	976 MXL*	247.90	122	2008 MXL*	510.03	251
600 MXL*	152.40	75	984 MXL*	249.94	123	2048 MXL*	520.19	256
608 MXL*	154.43	76	1000 MXL*	254.00	125	2144 MXL*	544.58	268
632 MXL*	160.53	79	1008 MXL*	256.03	126	2240 MXL*	568.96	280
640 MXL	162.56	80	1040 MXL*	264.16	130	2280 MXL*	579.12	285
656 MXL*	166.62	82	1056 MXL*	268.22	132	2384 MXL*	605.54	298
664 MXL*	168.66	83	1072 MXL*	272.29	134	2480 MXL*	629.92	310
672 MXL*	170.69	84	1080 MXL*	274.32	135	2520 MXL*	640.08	315
680 MXL*	172.72	85	1112 MXL*	282.45	139	2680 MXL*	680.72	335
704 MXL*	178.82	88	1120 MXL	284.48	140	2776 MXL*	705.10	347
720 MXL*	182.88	90	1136 MXL*	288.54	142	2824 MXL*	717.30	353
736 MXL*	186.94	92	1176 MXL*	298.70	147	2880 MXL*	731.52	360
752 MXL*	191.01	94	1184 MXL*	300.74	148	2920 MXL*	741.68	365
760 MXL*	193.04	95	1200 MXL*	304.80	150	3200 MXL*	812.80	400
776 MXL*	197.10	97	1224 MXL*	310.90	153	3472 MXL*	881.89	434
784 MXL*	199.14	98	1272 MXL*	323.09	159	3624 MXL*	920.50	453
800 MXL*	203.20	100	1280 MXL*	325.12	160	3704 MXL*	940.82	463
808 MXL*	205.23	101	1320 MXL*	335.28	165	3984 MXL*	1011.94	498
						4040 MXL*	1026.16	505

Type XL

Belt designation	Pitch length (mm)	Number of teeth
60 XL	152.40	30
70 XL	177.80	35
80 XL	203.20	40
86 XL*	218.44	43
88 XL*	223.52	44
90 XL	228.60	45
92 XL*	233.68	46
94 XL*	238.76	47
96 XL*	243.84	48
100 XL	254.00	50
102 XL*	259.08	51
106 XL*	269.24	53
108 XL*	274.32	54
110 XL	279.40	55
112 XL*	284.48	56
116 XL*	294.64	58
118 XL*	299.72	59
120 XL	304.80	60
124 XL*	314.96	62
126 XL*	320.04	63
128 XL*	325.12	64
130 XL	330.20	65
134 XL*	340.36	67
136 XL*	345.44	68
138 XL*	350.52	69
140 XL	355.60	70
148 XL*	375.92	74
150 XL•	381.00	75
156 XL*	396.24	78
160 XL•	406.40	80

*** Non stock items. / The sizes marked with • are also available as double sided timing belts.**

Standard width / designation B_c

3.2 mm	**012**
4.8 mm	**019**
6.4 mm	**025**

Standard width / designation B_c

6.4 mm	**025**
7.9 mm	**031**
9.5 mm	**037**
12.7 mm	**050**
19.1 mm	**075**
25.4 mm	**100**

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Further sizes available on request.

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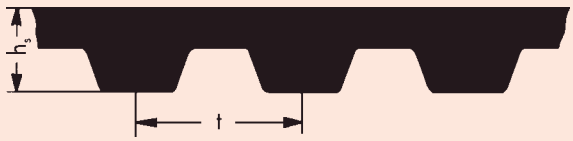
Standard Range

optibelt *ZR* Timing belts to ISO 5296



Type	MXL	XL	L	H	XH	XXH
h_s (mm)	1.2	2.3	3.6	4.3	11.2	15.7
t (mm)	2.032	5.08	9.525	12.7	22.225	31.75

Type XL

Belt designation	Pitch length (mm)	Number of teeth	Belt designation	Pitch length (mm)	Number of teeth
162 XL*	411.48	81	306 XL*	777.24	153
168 XL*	426.72	84	310 XL•	787.40	155
170 XL•	431.80	85	316 XL	802.64	158
174 XL*	441.96	87	322 XL	817.88	161
176 XL*	447.04	88	330 XL	838.20	165
178 XL*	452.12	89	340 XL*	863.60	170
180 XL•	457.20	90	344 XL*	873.76	172
182 XL*	462.28	91	350 XL*	889.00	175
184 XL*	467.36	92	380 XL*	965.20	190
188 XL*	477.52	94	382 XL*	970.28	191
190 XL•	482.60	95	388 XL*	985.52	194
192 XL*	487.68	96	390 XL	990.60	195
196 XL*	497.84	98	392 XL*	995.68	196
200 XL•	508.00	100	412 XL*	1046.48	206
210 XL•	533.40	105	414 XL*	1051.56	207
220 XL•	558.80	110	438 XL*	1112.52	219
230 XL•	584.20	115	460 XL*	1168.40	230
240 XL•	609.60	120	498 XL*	1264.92	249
244 XL*	619.76	122	506 XL*	1285.24	253
248 XL*	629.92	124	514 XL*	1305.56	257
250 XL•	635.00	125	580 XL*	1473.20	290
260 XL•	660.40	130	630 XL*	1600.20	315
270 XL	685.80	135			
272 XL*	690.88	136			
274 XL*	695.96	137			
280 XL•	711.20	140			
286 XL*	726.44	143			
290 XL	736.60	145			
296 XL*	751.84	148			
300 XL•	762.00	150			

Type L

Belt designation	Pitch length (mm)	Number of teeth
109 L	276.23	29
124 L	314.30	33
150 L•	381.00	40
169 L•	429.26	45
187 L•	476.20	50
210 L•	533.40	56
225 L•	571.50	60
236 L	600.08	63
240 L•	609.60	64
255 L•	647.70	68
270 L•	685.80	72
285 L•	723.90	76
300 L•	762.00	80
322 L•	819.10	86
345 L•	876.30	92
367 L•	933.40	98
390 L•	990.60	104
405 L	1028.70	108
420 L•	1066.80	112
450 L•	1143.00	120
454 L	1152.53	121
480 L•	1219.20	128
510 L•	1295.40	136
540 L•	1371.60	144
600 L•	1524.00	160
660 L	1676.40	176

*** Non stock items. / The sizes marked with • are also available as double sided timing belts.**

Standard width	designation B_c
6.4 mm	**025**
7.9 mm	**031**
9.5 mm	**037**
12.7 mm	**050**
19.1 mm	**075**
25.4 mm	**100**

Standard width	designation B_c
12.7 mm	**050**
19.1 mm	**075**
25.4 mm	**100**
38.1 mm	**150**
50.8 mm	**200**
76.2 mm	**300**

Further sizes available on request.

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Standard Range

optibelt *ZR* Timing belts to ISO 5296

Type	D-XL	D-L	D-H
W (mm)	0.508 ± 0.127	0.762 ± 0.127	1.372 ± 0.127
T (mm)	3.048 ± 0.178	4.572 ± 0.254	5.944 ± 0.127

Type H			Type XH			Type XXH		
Belt designation	**Pitch length (mm)**	**Number of teeth**	**Belt designation**	**Pitch length (mm)**	**Number of teeth**	**Belt designation**	**Pitch length (mm)**	**Number of teeth**
230 H	584.20	46	507 XH	1289.00	58	700 XXH	1778.00	56
240 H•	609.60	48	560 XH	1422.40	64	800 XXH	2032.00	64
255 H	647.70	51	630 XH	1600.20	72	900 XXH	2286.00	72
270 H•	685.80	54	700 XH	1778.00	80	1000 XXH	2540.00	80
280 H	711.20	56	770 XH	1955.80	88	1200 XXH	3048.00	96
300 H•	762.00	60	840 XH	2133.60	96	1400 XXH	3556.00	112
330 H•	838.20	66	980 XH	2489.20	112	1600 XXH	4064.00	128
335 H	850.90	67	1120 XH	2844.80	128	1800 XXH	4572.00	144
360 H•	914.40	72	1260 XH	3200.40	144			
370 H	939.80	74	1400 XH	3556.00	160			
390 H•	990.60	78	1540 XH	3911.60	176			
400 H	1016.00	80	1750 XH	4445.00	200			
420 H•	1066.80	84						
430 H	1092.20	86						
450 H•	1143.00	90						
465 H	1181.10	93						
480 H•	1219.20	96						
510 H•	1295.40	102						
540 H•	1371.60	108						
560 H	1422.40	112						
570 H•	1447.80	114						
600 H•	1524.00	120						
630 H•	1600.20	126						
660 H•	1676.40	132						
680 H	1727.20	136						
700 H•	1778.00	140						
730 H	1854.20	146						
750 H•	1905.00	150						
770 H	1955.80	154						
800 H•	2032.00	160						
850 H•	2159.00	170						
860 H	2184.40	172						
900 H•	2286.00	180						
950 H	2413.00	190						
1000 H•	2540.00	200						
1100 H•	2794.00	220						
1250 H•	3175.00	250						
1400 H•	3556.00	280						
1700 H•	4318.00	340						

*** Non stock items. / The sizes marked with • are also available as double sided timing belts.**

Standard width / designation B_c	
19.1 mm	**075**
25.4 mm	**100**
38.1 mm	**150**
50.8 mm	**200**
76.2 mm	**300**
101.6 mm	**400**
127.0 mm	**500**

Standard width / designation B_c	
50.8 mm	**200**
76.2 mm	**300**
101.6 mm	**400**
127.0 mm	**500**
152.4 mm	**600**
177.8 mm	**700**

Standard width / designation B_c	
50.8 mm	**200**
76.2 mm	**300**
101.6 mm	**400**
127.0 mm	**500**

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Further sizes available on request.

Standard Properties/Special Constructions

Standard properties

All Optibelt ZR timing belts are oil, heat and cold resistant as standard. They are not specifically marked.

Oil resistant

Oil resistance combats the contaminating effect of mineral oil and grease so long as large amounts of these substances do not come into contact with the timing belt. Contamination by animal or vegetable oil or water soluble machining oil will reduce belt life. Where there are higher concentrations, we recommend the use of special oil resistant Optibelt ZR timing belts.

Heat resistant

The heat resistant properties allow ambient temperatures of up to approx. +100° C. Temperatures above this could lead to premature ageing and brittleness in the belt. For high ambient temperatures, we recommend special heat resistant Optibelt ZR timing belts.

Cold resistant

The cold resistant properties allow ambient temperatures of down to approx. – 30° C. Lower temperatures will result in premature belt failure. For low ambient temperatures, we recommend special cold resistant Optibelt ZR timing belts.

The following special Optibelt ZR-timing belts are available for special applications and demanding design requirements.

Special Compound Constructions

Extra oil resistant Optibelt ZR timing belts

Continuous high concentrations of oil or grease result in swelling and rapid decay of the belts. In such cases we recommend extra oil resistant Optibelt ZR timing belts which have added oil resistance properties and largely withstand the damaging effects of these substances. The extra oil resistant timing belts have been developed to work in the following ambient temperatures:

Exposed to oil: from approx. – 35° C to approx. + 80° C

Extra heat resistant Optibelt ZR timing belts

Higher temperatures can affect the working life of the standard Optibelt ZR timing belts. A high heat resistant Optibelt ZR timing belt is available for ambient temperatures which are constantly greater than 85° C but under 120° C. Special rubber compounds largely prevent premature ageing and brittleness. Tests are useful in border line cases as the working life is affected by specific drive conditions such as the belt speed and pulley diameter.

Extra cold resistant Optibelt ZR timing belts

For ambient temperatures between approx. – 30° C to approx. – 50° C we consider it advisable to use Optibelt ZR timing belts which are extra cold resistant. Special rubber compounds prevent the timing belt from becoming hard and brittle. The timing belt is able to withstand the critical start-up phase without damage. Practical tests are recommended in border line cases.

Anti-Static Optibelt ZR timing belts

Anti-static timing belts enable electrostatic build-up in the drive to be safely dissipated. If the anti-static properties of a timing belt are inadequate, the static build-up can be considerable and presents a risk of ignition. If the Optibelt ZR timing belt is to be fitted in a building when there is a danger of explosion, it is advisable to use anti-static belts. The resistance of this timing belt is measured according to ISO 9563 between two electrodes and does not exceed $6 \times 10^{5 \frac{L}{W}}$

L = distance between the electrodes (mm)
W = timing belt width (mm)

Optibelt ZR timing belts with special compounds have ground top surfaces as standard. Minimum order quantities available on request.

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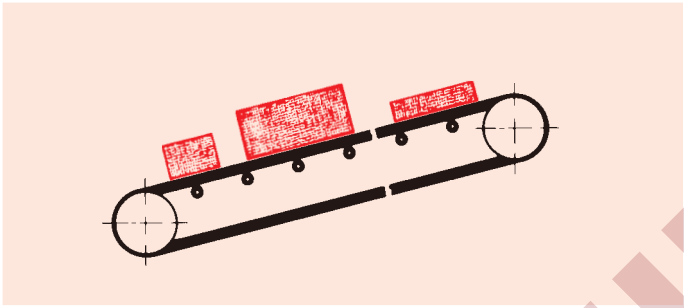
Special Constructions

Further Special Constructions

Optibelt ZR timing belts with reinforced top surfaces.

If the timing belt is to be used for transporting different goods, we recommend using Optibelt ZR timing belts with reinforced top surfaces. Please give the required overall thickness (h_s) of the belt when ordering.



Optibelt ZR timing belts with ground top surfaces

With applications where there are high belt speeds and vibration, we recommend Optibelt ZR timing belts with ground top surfaces. Grinding tolerances are given in the following table:

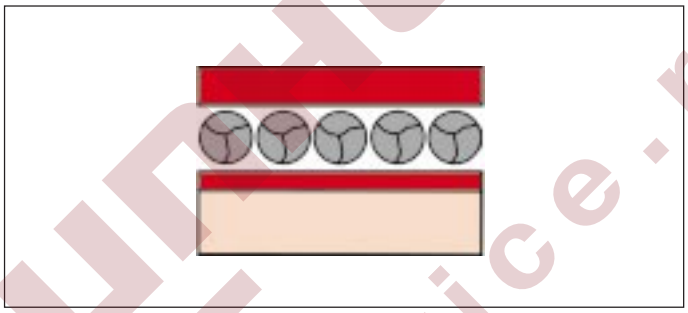
Table 4: Optibelt ZR timing belts with ground top surfaces to ISO 5296

Section	Overall belt thickness h_s (mm)		
	Standard construction	Class G 1	Class G 2
MXL	1.20 ± 0.25	1.20 ±0.13 (≥ 80MXL)	1.20 ± 0.25 (≥ 80MXL)
XL	2.30 ± 0.25	2.30 ±0.13	2.30 ± 0.25
L	3.60 ± 0.25	3.60 ±0.13	3.60 ± 0.25
H	4.30 ± 0.65	4.30 ±0.13	4.30 ± 0.25
XH	11.20* ± 0.65	—	11.20* ± 0.25
XXH	15.70* ± 0.65	—	15.70* ± 0.25

* Belt types XH and XXH have ground top surfaces as standard.

Optibelt ZR timing belts with angled sides

Optibelt ZR timing belts with angled sides can be made up to customer specification for special applications.



Special lengths, widths, tooth pitch or open-ended versions of the Optibelt ZR timing belts, in addition to minimum order quantities, are available on request.

Possible Combinations

Optibelt ZR timing belts with standard or special compounds can be combined with other special constructions. However the individual properties of the special compounds cannot be combined with each other. For example, the properties of an extra heat resistant belt cannot be combined with those of an anti-static belt.

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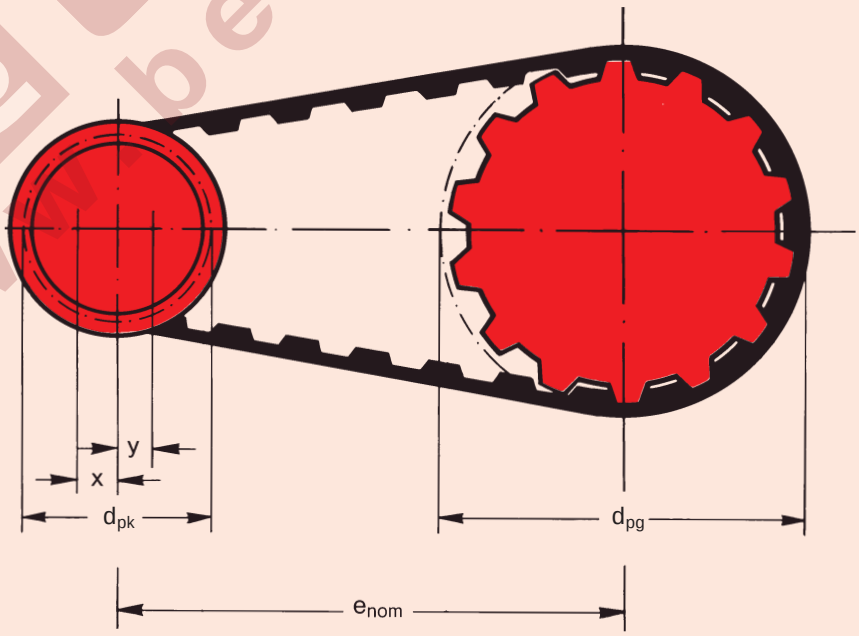
Drive Design
Explanation of symbols

B_c	=	Bets width	
c_0	=	Basic service factor	
c_1	=	Tooth in mesh factor	
c_2	=	Overall service factor	
c_3	=	Speed ratio correction factor	
c_4	=	Width factor	
d_a	=	Outside diameter of pulley	(mm)
d_p	=	Pitch diameter of pulley	(mm)
d_{pg}	=	Pitch diameter of large pulley	(mm)
d_{pk}	=	Pitch diameter of small pulley	(mm)
d_{p1}	=	Pitch diameter of driving pulley	(mm)
d_{p2}	=	Pitch diameter of driven pulley	(mm)
E_a	=	Belt deflection for given span length	(mm)
e	=	Drive centre distance	(mm)
e_{nom}	=	Drive centre distance with standard belt length	(mm)
f	=	Test force	(N)
i	=	Speed ratio	
L	=	Drive span length	(mm)
L_{pSt}	=	Standard pitch length of timing belt	(mm)
L_{pth}	=	Calculated pitch length of timing belt	(mm)
n_1	=	Speed of driving pulley	(min^{-1})
n_2	=	Speed of driven pulley	(min^{-1})
P	=	Power to be transmitted by timing belt drive	(kW)
P_B	=	Design power	(kW)
P_N	=	Rated power	(kW)
$P_Ü$	=	Transmissible power for standard belt width ($P_N \times c_1 \times c_7$)	(kW)
Sa	=	Minimum static shaft loading when stationary	(N)
$S_{n\ perm}$	=	Maximum permissible belt tension	(N)
S_{n1}	=	Belt tension	(N)
S_{n2}	=	Belt tension	
S_{n3}	=	Effektive tension	(N)
S_Z	=	Belt tension	(N)
S_{ZB}	=	Actual belt tension	(N)
t	=	Tooth pitch	(mm)
v	=	Belt speed	(m/s)
x	=	Minimum adjustment of drive centre distance e_{nom} for tensioning timing belt	(mm)
y	=	Minimum adjustment of drive centre distance e_{nom} for installation	(mm)
z_e	=	Number of teeth in mesh of small pulley	
z_g	=	Number of teeth on large pulley	
z_k	=	Number of teeth on small pulley	
z_r	=	Number of teeth on timing belt	
z_1	=	Number of teeth on driving pulley	
z_2	=	Number of teeth on driven pulley	



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Drive Design
Basic Service Factor c_0

The basic service factor c_0 takes into account the daily operating time, the type of drive and the prime mover. As it is almost impossible to put all the possible combinations of prime mover / driven unit / environmental conditions in a shortened form which conforms to standards, the service factors shown here are **given only as a guide**. The service factor should be increased in special cases, such as increased start-up torque, drives which are frequently started and stopped, high inertia acceleration or deceleration.

The total service factor c_2 is arrived at by adding the values derived from tables 5, 9 and 10 together.

Recommendation $c_2 > M_A / M_N$

Table 5

C_0	Types of Prime Mover								
	Electric motors with low start-up torque (up to 1.5 times the nominal torque) e.g. direct current shunt motors; internal combustion engines with 8 or more cylinders; water and steam turbines			Alternating current and threephase motors with standard start-up torque (1.5 to 2.5. times the nominal torque) e.g. direct current motors with compound winding; squirrel cage motors; internal combustion engines with 4-6 cylinders			Alternating current and threephase motors with a high start-up torque (above 2.5 times the nominal torque) e.g. single-phase motors and synchronous motors with high torque; induction brake motors; internal combustion engines up to 4 cylinders; hydraulic motors.		
Types of Driven Machine	Service factor c_0 at number of operating hours per day								
	up to 10	10 to 16	over 16	up to 10	10 to 16	over 16	up to 10	10 to 16	over 16
Very Light Duty Office equipment, cameras (spool driven), household appliances, tachometers, counters, conveyor belts for light goods	1.1	1.1	1.2	1.2	1.3	1.4	1.3	1.4	1.5
Light Duty Wood processing machines, (turning and planing machines, circular and band saws), paper machines (agitators, calenders, dryers), screen machinery (drums), setting, cutting and folding machines, centrifugal pumps, and compressors, fans up to10 kW, conveyors for light goods.	1.2	1.3	1.4	1.4	1.5	1.6	1.5	1.6	1.7
Medium Duty Machine tools (drilling, grinding, light milling and planing machines), textile machinery (spinning, twisting, winding, loom and warping machines), printing machines (rotary machines), laundry machinery (washing machines, dryers), fans and extractors over 10 kW, agitators and mixers for semi-liquid, doughy masses, generators, exciters, stamps, presses, cutters, shaker screens	1.3	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9
Heavy Duty Paper machinery (wood grinding and pulping machines), rubber processing machines (calenders, extruders, mills), conveyors for heavy goods, elevators, Redler and screw conveyors, bucket elevators, separators, Jordan pumps, hoists, lifts, mine and pit fans, screw type extractor fans	1.5	1.6	1.7	1.7	1.8	1.9	1.8	1.9	2.0
Extra Heavy Duty Crushers (gyrator, jaw and roller), piston engines (pumps, compressors), brickwork machines (pan crushers, mixing machines), grinders (ball, rod, and gravel)	1.6	1.7	1.8	1.8	1.9	2.0	1.9	2.0	2.1

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Drive Design
Permitted Belt Tension / Additional Factors

Table 6: Max. permitted belt tension $S_{n\ permitted}$ (N), width factor c_4

Width designations B_c	Belt width (mm)	Width factor c_4
012	3.2	
019	4.8	
025	6.4	0.15
031	7.9	0.21
037	9.5	0.28
043	11.1	0.35
050	12.7	0.42
062	15.9	0.57
075	19.1	0.71
087	22.2	0.86
100	25.4	1.00
125	31.8	1.29
150	38.1	1 58
175	44.5	1.84
200	50.8	2.14
250	63.5	2.72
300	76.2	3.36
350	88.9	4.06
400	101.6	4.76
500	127.0	6.15
600	152.0	7.50
700	178.0	8.89
800	203.0	10.32
900	229.0	11.70
1000	254.0	13.10
1100	279.0	14.41
1200	305.0	15.84
1300	330.0	17.16
1400	356.0	18.62

The permitted belt tensions in **bold** type are for standard widths.

Table 7: Teeth in Mesh Factor c_1

Number teeth in mesh	Teeth in mesh factor
6 or more	1.00
5	0.80
4	0.60
3	0.40
2	0.20

Speed Ratio Factor c_3

For speed increase drives the factor shown in the table below should be added to the basic service factor c_0.

Table 8

Speed ratio	Speed ratio factor c_3
< 1.00	0.2

Further additions to the total service factor could be necessary for oscillating drives, brake motors, electrical brakes etc. Details can be provided upon inquiry. Please state the peak loading.

0.20 should be deducted from the total service factor for frequent or extended operating breaks, or for occasional operation.

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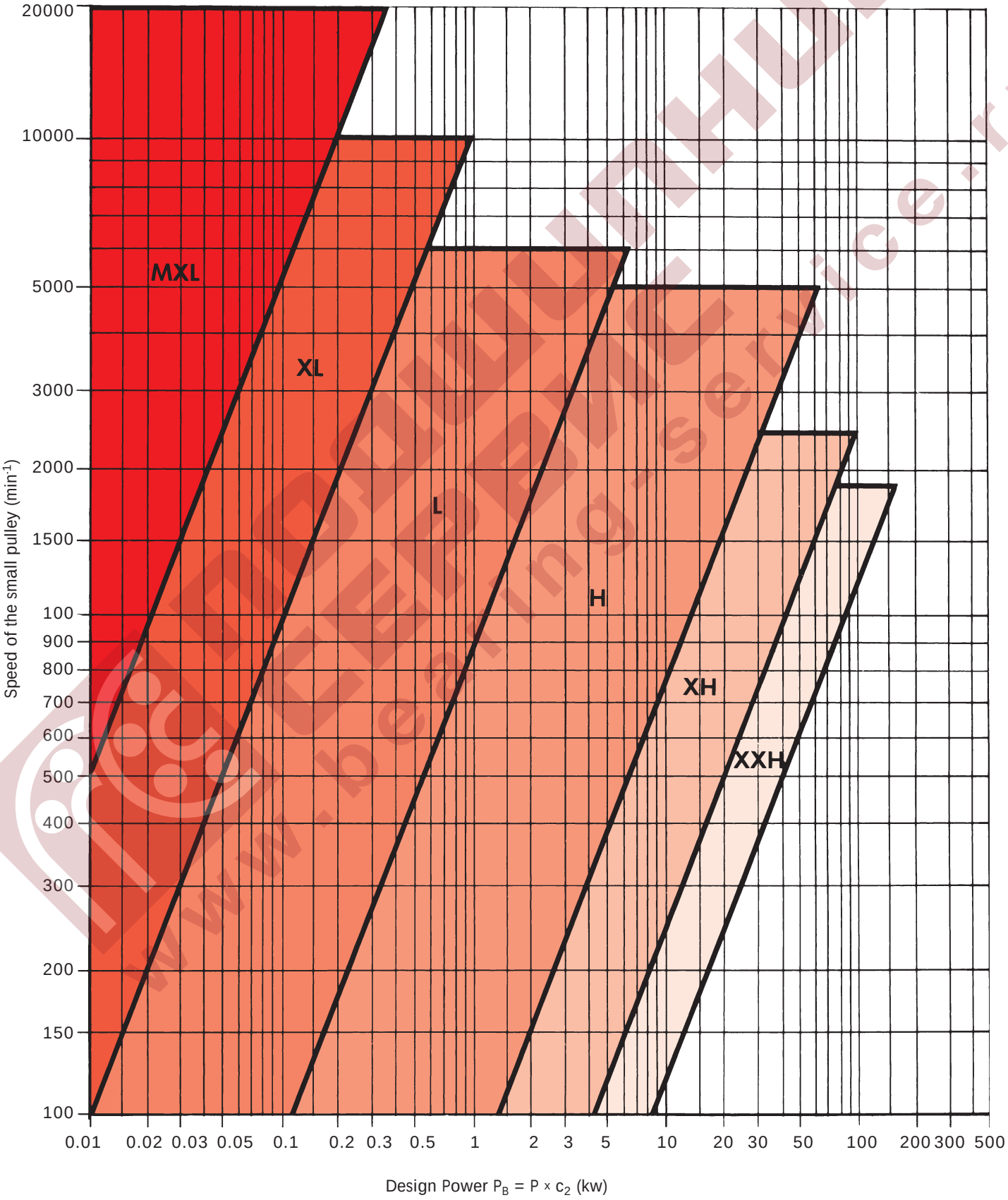
Drive Design

Guidelines for Selecting the Timing Belt Section

Diagram 1



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single and double-sided timing belts on Optibelt ZRS pulleys for cylindrical bored and for taper bush

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Drive Design
Formulae and Drive Design Examples

Prime Mover

Three-phase squirrel cage motor
with star delta start
P = 16 kW
n_1 = 2940 min^{-1}
Start-up torque: $M_A = 0.6\ M_N$

Operating Conditions

Start-up with no load
Drive centre distance: as required
between 600 and 630 mm
Toothed timing pulley diameter: as
required
Daily operating time: 20 hours

Driven Machine

centrifugal pump
P = 16 kW
n_2 = 700 min^{-1}

Formulae	Calculation Example
Total service factor $c_2 = c_0 + c_3$ c_0 from table 5, page 12 c_3 from table 8, page 13	$c_2 = 1.4 + 0 =$ **1.4** $c_0 = 1.4$ $c_3 = 0$
Design Power $P_B = P \times c_2$	$P_B = 16 \times 1.4 =$ **22.4 kW**
Section of timing belt selected from diagram 1, page 14	**Type H**
Calculation $i = \frac{n_1}{n_2} = \frac{z_2}{z_1} = \frac{d_{p2}}{d_{p1}}$	$i = \frac{2940}{700} =$ **4.2**
Number of teeth / pitch diameter For standard pulley range see pages 40 to 51 z_1 / d_{p1} see standard pulley range for cylindrical bore and taper bush $z_2 = z_1 \times i$ $d_{p2} = d_{p1} \times i$ Please not the reduced belt life in the power rating tables	z_1 = **20,** d_{p1} = **80.85** z_2 = 20 × 4.2 = **84** d_{p2} = 80.85 × 4.2 = **339.57 mm**

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Drive Design
Formulae and Drive Design Examples

Formulae

Drive centre distance (provisional selection)

Recommendation: $e > 0.5\ (d_{pg} + d_{pk}) + 15$ mm

$e < 2\ \ (d_{pg} + d_{pk})$

Pitch length of the timing belt

$$L_{pth} = 2\,e + 1.57\,(d_{pg} - d_{pk}) + \frac{(d_{pg} - d_{pk})^2}{4\,e}$$

L_{pth} see standard range pages 6 to 8

Drive centre distance from L_{pSt}

$$e_{nom} = K + \sqrt{K^2 - \frac{(d_{pg} - d_{pk})^2}{8}}$$

$$K = \frac{L_{pst}}{4} - \frac{\pi}{8}\,(d_{pg} + d_{pk})$$

Allowance x for belt tensioning

$x = 0.004 \times e_{nom}$

Allowance y for belt installation

y = from table 15 page 30

Calculation Example

$e > 0.5\ (339.57 + 80.85) + 15 = 225.21$ mm
$e < 2\ \ (339.57 + 80.85) = 840.84$ mm
$e =$ **620 mm** provisionally selected

$$L_{pth} = 2 \times 620 + 1.57\,(339.57 - 80.85) + \frac{(339.57 - 80.85)^2}{4 \times 620}$$

$L_{pth} =$ **1927.05 mm**

nearest standard timing belt length selected from page 8

$L_{pSt} =$ **1905 mm** **Type 750 H**

$$e_{nom} = 311.15 + \sqrt{311.15^2 - \frac{(339.57 - 80.85)^2}{8}}$$

$e_{nom} = 608.5$ mm

$$K = \frac{1905}{4} - \frac{\pi}{8}\,(339.57 + 80.85)$$

$K = 311.15$

$x \geq$ **2.4 mm**

$y \geq$ **17 mm**

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Drive Design
Formulae and Drive Design Examples

Formulae

Number of teeth in mesh on the small pulley

$$z_e = \frac{z_k}{6}\left(3 - \frac{d_{pg} - d_{pk}}{e_{nom}}\right)$$

z_e rounded off

Calculation Example

$$z_e = \frac{20}{6}\left(3 - \frac{339.57 - 80.85}{608.5}\right) = \mathbf{8.58}$$

$z_e = 8$

Teeth in mesh factor

c_1 from table 7 page 13

$c_1 = \mathbf{1}$ $z_e \geq \mathbf{6}$

Belt width calculation using the width factor

$$c_4 = \frac{P_B}{P_N \bullet c_1}$$

P_N from table 12 linearly interpolated

$$c_4 = \frac{22.4}{7.49 \times 1} = \mathbf{3.0}$$

from table 6 the nearest width factor above the calculated value (i.e. c4 = 3.36) gives a belt width of **76.2 mm** (width designation 300)

Design Summary:

1 Optibelt ZR timing belt	**750 H 300**
1 Optibelt ZR toothed timing belt pulley	**20 H 300**
1 Optibelt ZR toothed timing belt pulley	**84 H 300**

The belt width for Optibelt ZR timing belt **section MXL** can **only** be calculated using the belt tension force S_{n1}.
The recommended service factor for this section under normal drive conditions is c_2= 1.5. A higher service factor is necessary for long runs or shock loading.

Because of the low mass, the centrifugal force does not need be taken into account.

Ordering Examples

Timing Belt Designation

The most important measurements can be derived from the belt code which is to be found on all standard timing belts:

Pitch length
Section
Belt width

Example: Timing belts 750 H 300
750 = 75.0 inches ≙ 1905 mm pitch length
H = type H, tooth pitch t = 12.7 mm
300 = 3.00 inches ≙ 76.2 mm belt width

Double section timing belts 270 D - L 075
270 = 27.0 inches ≙ 685.80 mm pitch length
L = type L, tooth pitch t = 9.525 mm
075 = 0.75 inches ≙ 19.1 mm belt width
D = double section timing belts

Toothed Timing Pulley Designation

The most important measurements can be derived from the belt code which is to be found on all standard toothed timing pulleys:

Number of teeth
Tooth pitch
Pulley width

Example: Pulley 20 H 300
20 = number of teeth (d_p = 80.85 mm, d_a = 79.48 mm)
H = type H, tooth pitch t = 12.7 mm
300 = pulley width for timing belts with a belt width of ≙ 76.2 mm

Drive Design

Belt Tension / Minimum Allowance for Adjustment x / y

Tension for Optibelt ZR timing belts

The correct belt tension is of crucial importance for trouble free transmission of power, and for the achievement of an acceptable belt service life. Often tension which is too high or too low results in premature belt failure. A belt which is overtensioned can cause bearing failure.

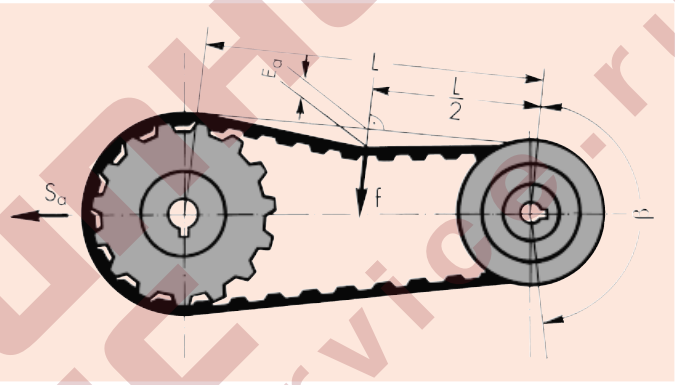
It has been shown that the more common tension instructions - e.g. using the “thumb pressure deflection method” - do not result in a tension level which allows the drive to operate at maximum efficiency. It is therefore recommended that the required static belt tension be calculated individually for each drive using the following Optibelt formulae.

Their extremely low stretch properties mean that once they have been fitted the Optibelt ZR timing belts require no further retensioning.

Formula symbols

f	=	Deflection force	(N)
S_{n3}	=	Effective tension	(N)
E_a	=	Belt deflection for a given span length	(mm)
L	=	Drive span length	(mm)

Apply the load f in the centre of , and at a right angles to, the span as shown in the diagram below. Calculate Ea - the belt deflection for a given span length - and check the deflection acheived against this figure. Adjust the tension if necessary.



1. Calculation of the load f at the centre of span

$$f = \frac{S_{n3}}{20}$$

$$S_{n3} = \frac{P \times 1000}{v}$$

$$f = \frac{1286}{20} = \mathbf{64.3\ N}$$

$$S_{n3} = \frac{16 \times 1000}{12.44} = 1286\ N$$

2. Calculation of the belt deflection for a span length E_a for the given drive span length L

$$E_a = \frac{L}{50}$$

$$L = \sqrt{e^2_{nom} - \left(\frac{d_{pg} - d_{pk}}{2}\right)^2}$$

$$E_a = \frac{594.6}{50} = 11.9\ mm$$

$$L = \sqrt{608.5^2 - \left(\frac{339.57 - 80.85}{2}\right)^2} = 594.6\ mm$$

3. Calculation of the static shaft load.

$$S_a = S_{n3} \times 1.1$$

$$S_a = \mathbf{1415\ N}$$

Length tolerance / minimum adjustment

Length tolerance for timing belts are checked on a two pulley measuring machine. Provision should be made for the adjustment of the drive centre distance to allow for these length tolerance.

For fixed centre drives without idler contact the Optibelt Technical Department.

Table 9

L_{pSt} (mm)	≥ 91.44 ≤ 254	≥ 255 ≤ 381	≥ 382 ≤ 508	≥ 509 ≤ 762	≥ 763 ≤ 1016	≥ 1017 ≤ 1270	≥ 1271 ≤ 1524	≥ 1525 ≤ 1778
Belt length tolerance (mm)	± 0.20	± 0.23	± 0.25	± 0.30	± 0.33	± 0.38	± 0.41	± 0.43

For each additional 300 mm add 0.03 mm.

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Type XL

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 10

Speed of small pulley (r.p.m.)	Number of teeth on small pulley	10 XL	11 XL	12 XL	13 XL	14 XL	15 XL	16 XL	17 XL	18 XL	19 XL	20 XL
	Pitch diameter (mm)	16.17	17.79	19.40	21.02	22.64	24.26	25.87	27.49	29.11	30.72	32.34
	100	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03
	200	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06
	300	0.04	0.05	0.05	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09
	400	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.10	0.11	0.12
	500	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.13	0.13	0.14	0.15
	600	0.09	0.10	0.10	0.12	0.13	0.13	0.14	0.15	0.16	017	0.18
	700	0.10	0.11	0.13	0.14	0.15	0.16	0.17	0.18	0.19	020	0.21
	800	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.21	0.22	0.24	0.25
	900	0.13	0.15	0.16	0.18	0.19	0.20	0.22	0.24	0.25	0.27	0.28
	1,000	0.15	0.16	0.18	0.20	0.22	0.23	0.25	0.27	0.28	0.30	0.31
	1,100	0.16	0.19	0.19	0.21	0.23	0.25	0.27	0.29	0.30	0.32	0.34
	1,200	0.18	0.20	0.22	0.24	0.25	0.28	0.29	0.31	0.33	0.35	0.37
	1,300	0.19	0.22	0.23	0.26	0.28	0.30	0.31	0.34	0.36	0.38	0.40
	1,400	0.21	0.23	0.25	0.28	0.30	0.32	0.34	0.37	0.39	041	0.43
	1,500	0.22	0.25	0.27	0.30	0.32	0.34	0.37	0.39	0.41	044	0.46
	1,600	0.25	0.27	0.30	0.32	0.34	0.37	0.40	0.42	0.44	0.46	0.48
	1,800	0.28	0.30	0.33	0.36	0.38	0.41	0.44	0.47	0.49	0.52	0.55
	2,000	0.31	0.34	0.37	0.40	0.43	0.46	0.48	0.52	0.55	0.58	0.61
	2,200	0.34	0.37	0.40	0.44	0.47	0.51	0.54	0.57	0.60	0.64	0.67
	2,400	0.37	0.40	0.44	0.48	0.51	0.55	0.59	0.63	0.66	0.70	0.73
	2,600	0.40	0.43	0.48	0.52	0.55	0.60	0.63	0.68	0.72	0.76	0.79
	2,800	0.43	0.47	0.51	0.56	0.60	0.64	0.69	0.73	0.77	0.82	0.86
	3,000	0.46	0.50	0.55	0.60	0.64	0.69	0.73	0.78	0.82	0.87	0.92
	3,200	0.48	0.54	0.59	0.64	0.68	0.73	0.78	0.83	0.88	0.93	0.97
	3,400	0.51	0.57	0.62	0.67	0.72	0.78	0.83	0.88	0.93	0.98	1.03
	3,600	0.55	0.60	0.66	0.72	0.77	0.82	0.88	0.93	0.98	1.04	1.09
	3,800	0.58	0.62	0.69	0.75	0.81	0.87	0.93	0.99	1.04	1.10	1.15
	4,000	0.61	0.67	0.73	0.80	0.86	0.92	0.97	1.03	1.09	1.16	1.22
	4,200	0.64	0.70	0.77	0.84	0.90	0.95	1.02	1.08	1.14	1.21	1.28
	4,400	0.67	0.74	0.81	0.87	0.93	1.00	1.07	1.14	1.20	1.27	1.33
	4,600	0.70	0.77	0.84	0.91	0.98	1.04	1.12	1.19	1.25	1 32	1.39
	4,800	0.73	0.80	0.88	0.95	1.02	1.09	1.16	1.24	1.31	1 38	1.45
	5,000	0.76	0.84	0.92	0.99	1.06	1.13	1.22	1.29	1.36	1.43	1.50
	5,500	0.86	0.93	1.01	1.09	1.18	1.25	1.33	1.41	1.49	1.57	1.64
	6,000	0.93	1.01	1.10	1.19	1.29	1.36	1.45	1.53	1.61	1.70	1.78
	6,500	1.01	1.10	1.20	1.29	1.38	1.46	1.56	1.66	1.75	1.84	1.92
	7,000	1.08	1.18	1.29	1.39	1.49	1.57	1.67	1.77	1.86	1.96	2.05
	7,500	1.16	1.27	1.37	1.47	1.58	1.68	1.78	1.88	1.98	2.08	2.18
	8,000	1.23	1.34	1.46	1.57	1.68	1.78	1 88	1.98	2.10	2.21	2.31
	8,500	1.30	1.42	1.54	1.65	1.77	1.88	2.00	2.10	2.22	2.33	2.43
	9,000	1.37	1.50	1.63	1.75	1.87	1.98	2.10	2.21	2.33	2.44	2.54
	9,500	1.44	1.57	1.71	1.83	1.96	2.08	2.20	2.32	2.45	2.56	2.66
	10,000	1.52	1.65	1.79	1.92	2.05	2.18	2.30	2.42	2.54	2.66	2.77

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

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Power Transmission

Type XL

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 10

21 XL	22 XL	23 XL	24 XL	25 XL	26 XL	27 XL	28 XL	29 XL	30 XL	Number of teeth on small pulley
33.96	35.57	37.19	38.81	40.43	42.04	43.67	45.28	46.89	48.51	Pitch diameter (mm)
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	100
0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	200
0.10	0.10	0.10	0.10	0.11	0.12	0.13	0.13	0.13	0.13	300
0.13	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.18	400
0.16	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.22	500
0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.25	0.27	0.28	600
0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.30	0.31	0.32	700
0.25	0.27	0.29	0.30	0.31	0.32	0.33	0.34	0.36	0.37	800
0.29	0.30	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.41	900
0.32	0.34	0.36	0.37	0.39	0.40	0.42	0.43	0.45	0.46	1,000
0.35	0.37	0.39	0.40	0.42	0.44	0.46	0.47	0.49	0.51	1,100
0.39	0.40	0.42	0.44	0.46	0.48	0.50	0.51	0.53	0.55	1,200
0.42	0.43	0.46	0.48	0.50	0.52	0.54	0.55	0.58	0.60	1,300
0.45	0.47	0.49	0.51	0.54	0.56	0.58	0.60	0.62	0.64	1,400
0.48	0.50	0.53	0.55	0.58	0.60	0.62	0.64	0.67	0.69	1,500
0.51	0.54	0.57	0.59	0.62	0.64	0.66	0.68	0.71	0.73	1,600
0.57	0.60	0.63	0.66	0.69	0.71	0.74	0.77	0.80	0.82	1,800
0.64	0.67	0.70	0.73	0.77	0.80	0.83	0.86	0.89	0.92	2,000
0.70	0.74	0.78	0.81	0.84	0.87	0.90	0.93	0.97	1.00	2,200
0.77	0.80	0.84	0.88	0.92	0.95	0.99	1.02	1.06	1.09	2,400
0.84	0.87	0.90	0.93	0.98	1.02	1.06	1.10	1.14	1.18	2,600
0.90	0.94	0.98	1.02	1.07	1.11	1.15	1.19	1.24	1.28	2,800
0.95	1.00	1.05	1.09	1.14	1.19	1.24	1.28	1.32	1.36	3,000
1.02	1.07	1.12	1.16	1.21	1.26	1.31	1.35	1.40	1.45	3,200
1.08	1.13	1.19	1.24	1.29	1.34	1.39	1.43	1.48	1.53	3,400
1.15	1.20	1.26	1.31	1.36	1.41	1.46	1.51	1.56	1.61	3,600
1.21	1.27	1.32	1.37	1.43	1.48	1.54	1.59	1.64	1.69	3,800
1.29	1.33	1.39	1.45	1.51	1.56	1.62	1.67	1.73	1.78	4,000
1.33	1.39	1.45	1.51	1.57	1.63	1.69	1.75	1.81	1.86	4,200
1.39	1.45	1.52	1.58	1.65	1.71	1.77	1.83	1.89	1.95	4,400
1.45	1.52	1.59	1.65	1.72	1.78	1.84	1.90	1.96	2.02	4,600
1.51	1.59	1.66	1.72	1.79	1.85	1.92	1.98	2.04	2.10	4,800
1.57	1.64	1.71	1.78	1.85	1.92	1.99	2.05	2.12	2.18	5,000
1.72	1.80	1.88	1.95	2.02	2.09	2.16	2.23	2.30	2.37	5,500
1.86	1.95	2.03	2.10	2.18	2.26	2.34	2.41	2.48	2.54	6,000
2.01	2.09	2.18	2.26	2.34	2.41	2.48	2.55	2.64	2.72	6,500
2.14	2.23	2.32	2.41	2.49	2.57	2.65	2.72	2.79	2.86	7,000
2.28	2.37	2.46	2.54	2.62	2.70	2.78	2.86	2.94	3.01	7,500
2.41	2.49	2.59	2.68	2.76	2.84	2.92	3.00	3.07	3.14	8,000
2.53	2.63	2.72	2.80	2.89	2.97	3.05	3.13	3.20	3.26	8,500
2.65	2.75	2.84	2.92	3.00	3.08	3.16	3.24	3.30	3.36	9,000
2.76	2.86	2.95	3.04	3.12	3.19	3.26	3.33	3.39	3.45	9,500
2.86	2.96	3.05	3.14	3.21	3.28	3.35	3.42	3.47	3.52	10,000

Speed of small pulley (r.p.m.)

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optibelt
Power Transmission

Type L

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 11

Number of teeth on small pulley	10 L	11 L	12 L	13 L	14 L	15 L	16 L	17 L	18 L	19 L	20 L	21 L	22 L	23 L	24 L	25 L	26 L	27 L	28 L	29 L
Pitch diameter (mm)	30.32	33.35	36.38	39.41	42.45	45.48	48.51	51.54	54.57	57.61	60.64	63.67	66.70	69.73	72.77	75.80	78.83	81.86	84.89	87.93
Speed of small pulley (r.p.m.)																				
100	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.12
200	0.07	0.09	0.10	0.10	0.11	0.12	0.13	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.20	0.20	0.21	0.22	0.23
300	0.12	0.13	0.14	0.15	0.16	0.17	0.19	0.20	0.21	0.22	0.23	0.25	0.25	0.27	0.28	0.30	0.31	0.32	0.33	0.34
400	0.16	0.18	0.19	0.20	0.22	0.23	0.25	0.26	0.28	0.30	0.31	0.33	0.34	0.36	0.37	0.39	0.40	0.42	0.43	0.45
500	0.19	0.21	0.23	0.25	0.28	0.29	0.31	0.33	0.35	0.37	0.39	0.41	0.43	0.45	0.47	0.49	0.51	0.53	0.54	0.56
600	0.23	0.26	0.28	0.31	0.33	0.35	0.37	0.40	0.42	0.44	0.47	0.49	0.51	0.54	0.56	0.58	0.60	0.63	0.65	0.68
700	0.28	0.31	0.33	0.35	0.38	0.41	0.43	0.46	0.49	0.51	0.54	0.57	0.60	0.63	0.65	0.68	0.71	0.74	0.76	0.79
800	0.31	0.34	0.37	0.40	0.43	0.46	0.50	0.53	0.56	0.59	0.62	0.65	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.90
900	0.35	0.39	0.42	0.46	0.49	0.52	0.56	0.60	0.63	0.66	0.70	0.73	0.77	0.81	0.84	0.87	0.90	0.94	0.97	1.01
1,000	0.39	0.43	0.46	0.51	0.54	0.58	0.62	0.66	0.70	0.74	0.78	0.81	0.85	0.89	0.93	0.97	1.00	1.04	1.08	1.12
1,100	0.43	0.47	0.51	0.56	0.60	0.64	0.69	0.72	0.77	0.81	0.85	0.90	0.93	0.97	1.01	1.06	1.10	1.15	1.19	1.23
1,200	0.47	0.52	0.56	0.60	0.66	0.70	0.75	0.79	0.84	0.88	0.93	0.97	1.01	1.06	1.11	1.16	1.20	1.25	1.29	1.34
1,300	0.51	0.56	0.60	0.66	0.71	0.75	0.81	0.86	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45
1,400	0.54	0.60	0.65	0.71	0.76	0.81	0.87	0.92	0.97	1.03	1.08	1.13	1.19	1.24	1.29	1.35	1.40	1.45	1.50	1.55
1,500	0.58	0.64	0.70	0.76	0.81	0.87	0.93	0.98	1.04	1.10	1.16	1.21	1.27	1.33	1.38	1.44	1.49	1.55	1.60	1.66
1,600	0.62	0.69	0.75	0.81	0.87	0.93	0.98	1.05	1.11	1.17	1.23	1.29	1.35	1.41	1.47	1.53	1.59	1.65	1.70	1.76
1,700	0.66	0.73	0.79	0.86	0.92	0.98	1.05	1.11	1.18	1.24	1.31	1.37	1.43	1.50	1.56	1.63	1.69	1.75	1.81	1.87
1,800	0.70	0.77	0.84	0.90	0.97	1.04	1.11	1.18	1.25	1.31	1.38	1.45	1.51	1.58	1.65	1.72	1.78	1.85	1.91	1.98
1,900	0.74	0.81	0.88	0.95	1.03	1.10	1.17	1.24	1.31	1.38	1.45	1.52	1.60	1.68	1.73	1.80	1.87	1.94	2.01	2.08
2,000	0.77	0.86	0.93	1.01	1.08	1.16	1.23	1.31	1.38	1.45	1.53	1.60	1.68	1.75	1.82	1.89	1.96	2.03	2.10	2.18
2,200	0.86	0.94	1.01	1.10	1.19	1.27	1.35	1.43	1.51	1.60	1.68	1.75	1.84	1.92	1.99	2.07	2.15	2.23	2.30	2.38
2,400	0.93	1.01	1.11	1.20	1.29	1.38	1.47	1.56	1.65	1.73	1.82	1.91	1.99	2.08	2.16	2.25	2.33	2.41	2.49	2.58
2,500	0.97	1.06	1.16	1.25	1.34	1.43	1.53	1.62	1.72	1.81	1.89	1.98	2.07	2.16	2.25	2.34	2.42	2.51	2.59	2.67
2,600	1.00	1.11	1.20	1.30	1.40	1.49	1.59	1.69	1.78	1.87	1.96	2.06	2.15	2.24	2.33	2.42	2.51	2.60	2.68	2.76
2,800	1.08	1.18	1.29	1.40	1.50	1.60	1.71	1.81	1.91	2.01	2.10	2.21	2.31	2.40	2.49	2.59	2.68	2.77	2.86	2.95
3,000	1.17	1.28	1.38	1.49	1.60	1.71	1.82	1.93	2.04	2.14	2.25	2.35	2.45	2.55	2.65	2.75	2.84	2.94	3.03	3.12
3,200	1.24	1.36	1.47	1.59	1.70	1.82	1.94	2.04	2.16	2.27	2.38	2.49	2.60	2.70	2.80	2.91	3.01	3.11	3.20	3.30
3,400	1.31	1.44	1.56	1.69	1.81	1.92	2.05	2.17	2.29	2.40	2.51	2.63	2.74	2.85	2.96	3.06	3.16	3.26	3.36	3.46
3,600	1.39	1.52	1.65	1.77	1.90	2.04	2.16	2.29	2.41	2.53	2.65	2.77	2.88	2.99	3.10	3.21	3.32	3.42	3.52	3.52
3,800	1.46	1.60	1.73	1.87	2.01	2.13	2.26	2.40	2.54	2.66	2.78	2.90	3.02	3.14	3.25	3.36	3.46	3.56	3.66	3.76
4,000	1.53	1.67	1.81	1.96	2.11	2.24	2.39	2.51	2.66	2.78	2.90	3.03	3.16	3.28	3.39	3.50	3.60	3.70	3.80	3.89
4,200	1.61	1.75	1.90	2.05	2.21	2.35	2.49	2.63	2.78	2.89	3.03	3.16	3.28	3.40	3.52	3.63	3.74	3.84	3.94	4.03
4,400	1.67	1.83	1.98	2.14	2.30	2.45	2.60	2.74	2.88	3.01	3.15	3.28	3.41	3.53	3.65	3.76	3.87	3.97	4.06	4.15
4,600	1.76	1.92	2.07	2.23	2.40	2.54	2.71	2.85	2.99	3.13	3.27	3.40	3.53	3.65	3.77	3.88	3.98	4.08	4.17	4.26
4,800	1.83	1.99	2.15	2.32	2.49	2.64	2.81	2.95	3.11	3.25	3.39	3.52	3.65	3.77	3.88	3.99	4.09	4.18	4.27	4.35
5,000	1.91	2.08	2.24	2.41	2.58	2.74	2.92	3.06	3.22	3.36	3.49	3.63	3.76	3.88	3.99	4.10	4.20	4.29	4.37	4.45
5,200	1.98	2.16	2.33	2.50	2.67	2.84	3.01	3.16	3.32	3.45	3.60	3.74	3.86	3.98	4.09	4.20	4.30	4.38	4.46	4.53
5,400	2.05	2.24	2.41	2.59	2.77	2.93	3.11	3.26	3.42	3.56	3.70	3.83	3.96	4.08	4.19	4.29	4.39	4.46	4.53	4.59
5,600	2.13	2.31	2.49	2.67	2.85	3.02	3.20	3.36	3.52	3.66	3.80	3.94	4.06	4.17	4.27	4.37	4.46	4.53	4.60	4.64
5,800	2.19	2.38	2.57	2.76	2.93	3.11	3.30	3.45	3.61	3.76	3.89	4.03	4.16	4.26	4.36	4.45	4.53	4.59	4.65	4.68
6,000	2.26	2.46	2.65	2.84	3.02	3.20	3.39	3.54	3.71	3.84	3.98	4.12	4.24	4.33	4.42	4.51	4.59	4.64	4.68	4.71

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

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Type L

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 11

Number of teeth on small pulley	30 L	31 L	32 L	33 L	34 L	35 L	36 L	37 L	38 L	39 L	40 L	41 L	42 L	43 L	44 L	45 L	46 L	47 L	48 L
Pitch diameter (mm)	90.96	93.99	97.02	100.05	103.08	106.12	109.15	112.18	115.21	118.24	121.28	124.31	127.34	130.37	133.40	136.44	139.47	142.50	145.53
Speed of small pulley (r.p.m.)																			
100	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.17	0.18	0.19	0.19
200	0.23	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.37
300	0.35	0.36	0.37	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.47	0.48	0.49	0.50	0.51	0.53	0.54	0.55	0.56
400	0.46	0.48	0.50	0.52	0.53	0.55	0.56	0.58	0.59	0.61	0.62	0.64	0.66	0.68	0.69	0.71	0.72	0.74	0.75
500	0.58	0.60	0.62	0.64	0.66	0.68	0.70	0.72	0.74	0.76	0.78	0.80	0.82	0.84	0.85	0.85	0.89	0.91	0.93
600	0.70	0.73	0.75	0.78	0.80	0.82	0.84	0.86	0.89	0.91	0.93	0.95	0.97	0.99	1.01	1.04	1.06	10.9	1.11
700	0.81	0.84	0.87	0.90	0.92	0.95	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.17	1.19	1.22	1.24	1.27	1.29
800	0.93	0.96	0.98	1.02	1.05	1.08	1.11	1.14	1.17	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47
900	1.04	1.08	1.11	1.14	1.18	1.22	1.25	1.29	1.32	1.35	1.38	1.42	1.45	1.48	1.51	1.55	1.58	1.62	1.65
1,000	1.16	1.20	1.23	1.27	1.31	1.35	1.38	1.42	1.46	1.50	1.53	1.57	1.61	1.65	1.68	1.72	1.75	1.79	1.82
1,100	1.27	1.31	1.35	1.39	1.43	1.47	1.51	1.56	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	1.99
1,200	1.38	1.43	1.47	1.42	1.56	1.61	1.65	1.70	1.74	1.78	1.82	1.87	1.91	1.95	1.99	2.04	2.08	2.12	2.16
1,300	1.49	1.54	1.59	1.64	1.69	1.74	1.78	1.83	1.87	1.92	1.96	2.01	2.06	2.11	2.15	2.20	2.24	2.29	2.33
1,400	1.60	1.66	1.71	1.76	1.81	1.86	1.91	1.96	2.01	2.06	2.10	2.16	2.21	2.26	2.31	2.36	2.40	2.45	2.49
1,500	1.72	1.77	1.82	1.88	1.93	1.99	2.04	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65
1,600	1.82	1.88	1.94	2.00	2.05	2.11	2.16	2.22	2.28	2.34	2.39	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80
1,700	1.93	1.99	2.05	2.11	2.17	2.23	2.29	2.35	2.41	2.47	2.52	2.58	2.64	2.70	2.75	2.81	2.86	2.91	2.96
1,800	2.04	2.10	2.16	2.23	2.29	2.35	2.41	2.47	2.53	2.59	2.65	2.71	2.77	2.83	2.88	2.94	2.99	3.05	3.10
1,900	2.14	2.21	2.28	2.35	2.41	2.47	2.53	2.60	2.66	2.72	2.78	2.84	2.90	2.96	3.02	3.08	3.14	3.20	3.25
2,000	2.25	2.32	2.38	2.45	2.52	2.59	2.66	2.72	2.78	2.84	2.90	2.97	3.03	3.10	3.16	3.22	3.28	3.34	3.39
2,200	2.45	2.53	2.60	2.67	2.74	2.81	2.88	2.95	3.02	3.09	3.16	3.23	3.29	3.35	3.41	3.47	3.53	3.59	3.65
2,400	2.66	2.73	2.80	2.88	2.96	3.04	3.11	3.18	3.25	3.32	3.39	3.46	3.52	3.59	3.65	3.71	3.77	3.83	3.89
2,500	2.75	2.83	2.91	2.99	3.06	3.14	3.21	3.29	3.36	3.43	3.50	3.57	3.63	3.70	3.76	3.82	3.88	3.94	3.99
2,600	2.84	2.93	3.01	3.09	3.16	3.24	3.31	3.39	3.46	3.53	3.60	3.67	3.73	3.80	3.86	3.92	3.98	4.04	4.09
2,800	3.03	3.12	3.20	3.28	3.36	3.44	3.51	3.59	3.66	3.73	3.80	3.87	3.93	4.00	4.06	4.12	4.17	4.22	4.27
3,000	3.21	3.30	3.39	3.47	3.55	3.63	3.71	3.78	3.85	3.92	3.99	4.06	4.12	4.18	4.24	4.29	4.34	4.39	4.43
3,200	3.39	3.48	3.56	3.64	3.72	3.80	3.88	3.95	4.02	4.09	4.16	4.22	4.28	4.34	4.39	4.44	4.48	4.52	4.56
3,400	3.55	3.64	3.72	3.80	3.88	3.96	4.04	4.11	4.18	4.25	4.31	4.36	4.41	4.46	4.51	4.55	4.58	4.65	4.65
3,600	3.71	3.80	3.89	3.97	4.04	4.12	4.19	4.26	4.32	4.38	4.44	4.49	4.53	4.57	4.61	4.66	4.69	4.71	4.71
3,800	3.85	3.94	4.03	4.11	4.18	4.25	4.32	4.38	4.43	4.49	4.54	4.58	4.61	4.65	4.68	4.72	4.74	4.75	4.72
4,000	3.98	4.07	4.16	4.23	4.30	4.37	4.43	4.48	4.53	4.58	4.63	4.66	4.68	4.70	4.72	4.73	4.74	4.73	4.71
4,200	4.12	4.20	4.28	4.35	4.41	4.48	4.54	4.58	4.61	4.65	4.68	4.70	4.71	4.73	4.74	4.75	4.74	4.72	4.65
4,400	4.24	4.32	4.39	4.45	4.50	4.56	4.61	4.64	4.67	4.70	4.72	4.72	4.72	4.74	4.71	4.71	4.69	4.65	4.54
4,600	4.34	4.41	4.48	4.53	4.58	4.63	4.67	4.69	4.71	4.73	4.74	4.74	4.71	4.70	4.65	4.64	4.59	4.53	4.39
4,800	4.43	4.50	4.57	4.61	4.64	4.68	4.71	4.71	4.71	4.71	4.71	4.72	4.69	4.65	4.55	4.53	4.46	4.37	4.20
5,000	4.52	4.58	4.63	4.66	4.70	4.72	4.73	4.77	4.73	4.71	4.67	4.66	4.62	4.56	4.42	4.38	4.28	4.15	3.95
5,200	4.59	4.64	4.68	4.70	4.72	4.74	4.73	4.74	4.72	4.70	4.60	4.57	4.50	4.41	4.24	4.19	4.05	3.90	3.66
5,400	4.65	4.68	4.71	4.75	4.75	4.75	4.70	4.72	4.67	4.60	4.48	4.45	4.35	4.23	4.04	3.96	3.80	3.61	3.31
5,600	4.68	4.71	4.73	4.77	4.75	4.73	4.66	4.64	4.58	4.49	4.35	4.30	4.16	4.02	3.77	3.67	3.47	3.26	2.90
5,800	4.71	4.72	4.73	4.75	4.73	4.68	4.58	4.55	4.46	4.36	4.18	4.10	3.94	3.76	3.48	3.35	3.11	2.85	2.44
6,000	4.74	4.73	4.72	4.72	4.67	4.61	4.48	4.44	4.32	4.19	3.97	3.87	3.69	3.46	3.13	2.97	2.69	2.39	1.92

Standard grade cast iron pulleys can no longer be used for these values as the rim speed is greater than 30 m/s.

optibelt
Power Transmission

Type H

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 12

Speed of small pulley (r.p.m.) \ Number of teeth on small pulley	14 H	15 H	16 H	17 H	18 H	19 H	20 H	21 H	22 H	23 H	24 H	25 H	26 H	27 H	28 H	29 H	30 H	31 H
Pitch diameter (mm)	56.60	60.64	64.68	68.72	72.77	76.81	80.85	84.89	88.94	92.98	97.02	101.06	105.11	109.15	113.19	117.23	121.28	125.32
100	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.28	0.29	0.30	0.31	0.33	0.34	0.36	0.37	0.39	0.40	0.42
200	0.37	0.40	0.43	0.45	0.48	0.50	0.53	0.55	0.58	0.61	0.63	0.66	0.69	0.72	0.74	0.77	0.79	0.82
300	0.55	0.59	0.63	0.67	0.72	0.75	0.79	0.83	0.87	0.91	0.95	0.99	1.03	1.07	1.11	1.15	1.19	1.23
400	0.74	0.79	0.84	0.90	0.95	1.00	1.05	1.11	1.16	1.22	1.27	1.32	1.37	1.43	1.48	1.53	1.58	1.64
500	0.93	0.99	1.05	1.12	1.19	1.25	1.32	1.39	1.45	1.52	1.58	1.65	1.72	1.78	1.84	1.91	1.98	2.04
600	1.11	1.19	1.27	1.34	1.42	1.51	1.58	1.66	1.74	1.82	1.89	1.97	2.05	2.13	2.21	2.29	2.36	2.44
700	1.29	1.39	1.48	1.57	1.66	1.75	1.84	1.93	2.03	2.12	2.21	2.30	2.39	2.48	2.57	2.67	2.76	2.85
800	1.48	1.59	1.69	1.79	1.89	2.00	2.10	2.21	2.31	2.42	2.52	2.63	2.73	2.84	2.94	3.05	3.15	3.26
900	1.66	1.78	1.89	2.01	2.13	2.25	2.36	2.48	2.60	2.72	2.83	2.95	3.07	3.19	3.30	3.42	3.54	3.66
1,000	1.84	1.97	2.10	2.24	2.36	2.50	2.63	2.76	2.89	3.02	3.15	3.28	3.41	3.54	3.66	3.79	3.92	4.05
1,100	2.03	2.17	2.31	2.46	2.60	2.75	2.89	3.03	3.18	3.32	3.46	3.60	3.74	3.89	4.03	4.17	4.30	4.45
1,200	2.21	2.36	2.52	2.68	2.83	2.99	3.15	3.30	3.46	3.62	3.77	3.92	4.07	4.23	4.39	4.54	4.69	4.84
1,300	2.40	2.56	2.73	2.90	3.07	3.24	3.41	3.57	3.74	3.91	4.07	4.24	4.41	4.58	4.74	4.91	5.07	5.23
1,400	2.58	2.76	2.94	3.13	3.30	3.48	3.66	3.84	4.02	4.20	4.38	4.56	4.74	4.92	5.10	5.28	5.45	5.63
1,500	2.77	2.96	3.15	3.34	3.54	3.73	3.92	4.11	4.30	4.48	4.68	4.88	5.07	5.26	5.45	5.64	5.82	6.01
1,600	2.96	3.15	3.36	3.57	3.77	3.98	4.18	4.38	4.59	4.79	4.99	5.19	5.39	5.60	5.80	6.00	6.19	6.39
1,700	3.14	3.34	3.56	3.78	4.00	4.21	4.43	4.65	4.86	5.08	5.30	5.51	5.72	5.93	6.14	6.35	6.56	6.77
1,800	3.34	3.54	3.77	4.00	4.23	4.46	4.68	4.92	5.14	5.37	5.59	5.82	6.04	6.26	6.48	6.70	6.92	7.14
1,900	3.52	3.78	4.04	4.22	4.46	4.70	4.94	5.18	5.42	5.66	5.89	6.13	6.36	6.60	6.83	7.06	7.28	7.51
2,000	3.70	3.88	4.18	4.44	4.68	4.94	5.19	5.45	5.69	5.94	6.18	6.43	6.68	6.92	7.16	7.40	7.64	7.88
2,100	3.89	4.13	4.39	4.55	4.92	5.18	5.44	5.71	5.97	6.23	6.48	6.74	6.99	7.25	7.50	7.75	7.99	8.23
2,200	4.08	4.22	4.59	4.86	5.14	5.42	5.69	5.97	6.24	6.51	6.77	7.04	7.30	7.57	7.83	8.09	8.34	8.59
2,300	4.26	4.51	4.80	5.09	5.37	5.65	5.94	6.22	6.51	6.79	7.06	7.34	7.62	7.89	8.15	8.42	8.68	8.94
2,400	4.44	4.61	5.00	5.30	5.59	5.89	6.18	6.48	6.77	7.06	7.35	7.64	7.92	8.20	8.48	8.75	9.02	9.29
2,500	4.61	4.90	5.20	5.51	5.82	6.12	6.43	6.74	7.04	7.34	7.63	7.93	8.22	8.51	8.80	9.08	9.35	9.63
2,600	4.50	5.09	5.41	5.72	6.04	6.36	6.68	6.99	7.30	7.61	7.92	8.22	8.52	8.82	9.12	9.35	9.58	9.91
2,800	5.15	5.46	5.80	6.14	6.48	6.82	7.15	7.49	7.83	8.15	8.47	8.79	9.11	9.43	9.74	10.03	10.32	10.61
3,000	5.50	5.84	6.19	6.55	6.92	7.27	7.63	7.98	8.34	8.68	9.01	9.30	9.58	9.96	10.33	10.61	10.94	11.24
3,200	5.86	6.22	6.58	6.97	7.35	7.73	8.09	8.47	8.84	9.19	9.54	9.89	10.24	10.58	10.91	11.22	11.53	11.68
3,400	6.20	6.58	6.96	7.27	7.78	8.17	8.56	8.94	9.33	9.70	10.06	10.42	10.78	11.13	11.47	11.79	12.10	12.40
3,600	6.55	6.95	7.34	7.78	8.20	8.62	9.00	9.41	9.82	10.19	10.56	10.93	11.30	11.65	12.00	12.32	12.64	12.94
3,800	6.96	7.31	7.73	8.17	8.61	9.04	9.45	9.87	10.29	10.67	11.05	11.43	11.80	12.16	12.52	12.84	13.15	13.45
4,000	7.23	7.66	8.09	8.57	9.02	9.46	9.88	10.31	10.74	11.13	11.52	11.90	12.28	12.64	13.00	13.32	13.63	13.92
4,200	7.58	8.01	8.46	8.94	9.42	9.88	10.30	10.75	11.19	11.58	11.97	12.36	12.74	13.11	13.47	13.78	14.08	14.36
4,400	7.92	8.34	8.82	9.33	9.81	10.28	10.71	11.17	11.62	12.02	12.41	12.80	13.18	13.54	13.89	14.19	14.49	14.79
4,600	8.25	8.71	9.19	9.70	10.18	10.68	11.12	11.58	12.03	12.43	12.82	13.21	13.59	13.94	14.29	14.57	14.85	15.14
4,800	8.56	9.20	9.54	10.06	10.57	11.06	11.50	11.97	12.44	12.83	13.21	13.60	13.98	14.33	14.67	14.94	15.20	15.46
5,000	8.90	9.38	9.89	10.42	10.93	11.44	11.88	12.35	12.82	13.21	13.59	13.97	14.35	14.68	15.01	15.26	15.49	15.71
5,200	9.21	9.72	10.23	10.77	11.29	11.80	12.24	12.72	13.20	13.57	13.94	14.31	14.68	15.08	15.32	15.54	15.75	15.96
5,400	9.53	10.04	10.57	11.12	11.64	12.16	12.60	13.08	13.55	13.91	14.27	14.63	14.99	15.31	15.59	15.80	15.96	16.14
5,600	9.83	10.36	10.89	11.45	11.98	12.50	12.94	13.41	13.88	14.27	14.58	14.97	15.27	15.58	15.83	16.00	16.13	16.27
5,800	10.15	10.67	11.22	11.78	12.31	12.82	13.26	13.73	14.20	14.59	14.87	15.26	15.52	15.80	16.03	16.16	16.25	16.36
6,000	10.45	10.98	11.53	12.09	12.63	13.15	13.57	14.04	14.50	14.88	15.12	15.51	15.74	15.99	16.19	16.28	16.32	16.38

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

Standard grade cast iron pulleys can no longer be used for these values as the rim speed is greater than 30 m/s.

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Power Transmission

Type H

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 12

32 H	33 H	34 H	35 H	36 H	37 H	38 H	39 H	40 H	41 H	42 H	43 H	44 H	45 H	46 H	47 H	48 H	Number of teeth on small pulley
129.36	133.40	137.45	141.49	145.53	149.57	153.62	157.66	161.70	165.74	169.79	173.83	177.87	181.91	185.96	190.00	194.04	Pitch diameter (mm)
0.43	0.45	0.46	0.47	0.48	0.50	0.51	0.52	0.53	0.55	0.56	0.57	0.58	0.60	0.61	0.62	0.63	100
0.84	0.87	0.90	0.93	0.95	0.98	1.00	1.03	1.05	1.08	1.11	1.14	1.16	1.19	1.22	1.25	1.27	200
1.27	1.31	1.35	1.39	1.42	1.46	1.50	1.54	1.58	1.62	1.66	1.70	1.74	1.78	1.82	1.86	1.89	300
1.69	1.74	1.79	1.84	1.89	1.95	2.00	2.05	2.10	2.16	2.21	2.26	2.31	2.37	2.42	2.47	2.52	400
2.10	2.17	2.23	2.30	2.36	2.43	2.50	2.57	2.63	2.70	2.76	2.83	2.89	2.96	3.02	3.09	3.15	500
2.52	2.59	2.68	2.76	2.83	2.91	2.99	3.07	3.15	3.23	3.31	3.39	3.46	3.54	3.62	3.70	3.77	600
2.94	3.03	3.12	3.21	3.30	3.39	3.48	3.57	3.66	3.76	3.85	3.94	4.03	4.12	4.21	4.30	4.39	700
3.36	3.47	3.57	3.67	3.77	3.88	3.98	4.08	4.18	4.29	4.39	4.49	4.59	4.69	4.79	4.89	4.99	800
3.77	3.89	4.00	4.12	4.23	4.35	4.46	4.58	4.69	4.81	4.92	5.03	5.14	5.26	5.37	5.48	5.59	900
4.18	4.31	4.44	4.57	4.69	4.82	4.94	5.07	5.19	5.32	5.44	5.57	5.69	5.82	5.94	6.07	6.19	1,000
4.59	4.73	4.87	5.01	5.15	5.29	5.42	5.56	5.69	5.83	5.97	6.11	6.24	6.38	6.51	6.64	6.77	1,100
4.99	5.14	5.29	5.44	5.59	5.74	5.89	6.04	6.19	6.34	6.48	6.63	6.77	6.92	7.07	7.22	7.36	1,200
5.39	5.56	5.72	5.88	6.04	6.20	6.36	6.52	6.68	6.84	6.99	7.15	7.30	7.46	7.61	7.77	7.92	1,300
5.80	5.97	6.14	6.31	6.48	6.65	6.82	6.99	7.16	7.33	7.50	7.67	7.83	7.99	8.15	8.31	8.47	1,400
6.19	6.38	6.56	6.74	6.92	7.10	7.28	7.46	7.64	7.82	7.99	8.17	8.34	8.51	8.68	8.85	9.02	1,500
6.58	6.78	6.97	7.17	7.36	7.55	7.74	7.93	8.11	8.30	8.48	8.66	8.84	9.02	9.20	9.38	9.55	1,600
6.97	7.18	7.38	7.58	7.78	7.98	8.18	8.38	8.57	8.76	8.95	9.14	9.33	9.52	9.70	9.89	10.07	1,700
7.36	7.57	7.78	7.99	8.20	8.41	8.61	8.82	9.02	9.22	9.42	9.62	9.81	10.01	10.20	10.39	10.58	1,800
7.73	7.96	8.18	8.40	8.62	8.84	9.05	9.26	9.47	9.68	9.88	10.08	10.28	10.48	10.67	10.87	11.06	1,900
8.11	8.34	8.57	8.80	9.03	9.25	9.47	9.69	9.90	10.11	10.32	10.53	10.74	10.94	11.14	11.34	11.53	2,000
8.47	8.71	8.95	9.19	9.42	9.65	9.87	10.10	10.32	10.54	10.75	10.97	11.18	11.39	11.59	11.80	12.00	2,100
8.84	9.09	9.33	9.58	9.82	10.05	10.28	10.51	10.74	10.96	11.18	11.40	11.62	11.83	12.03	12.23	12.43	2,200
9.20	9.46	9.71	9.96	10.21	10.45	10.68	10.92	11.15	11.37	11.59	11.81	12.03	12.24	12.44	12.65	12.85	2,300
9.55	9.81	10.07	10.33	10.58	10.82	11.06	11.30	11.53	11.76	11.98	12.21	12.43	12.64	12.84	13.05	13.25	2,400
9.90	10.17	10.43	10.69	10.95	11.20	11.44	11.68	11.92	12.15	12.38	12.61	12.83	13.03	13.23	13.43	13.63	2,500
10.24	10.51	10.78	11.05	11.31	11.56	11.80	12.05	12.29	12.52	12.74	12.96	13.18	13.39	13.59	13.79	13.99	2,600
10.90	11.18	11.45	11.73	12.00	12.25	12.50	12.75	12.99	13.22	13.44	13.66	13.88	14.07	14.26	14.45	14.64	2,800
11.53	11.81	12.09	12.37	12.65	12.90	13.14	13.39	13.63	13.85	14.06	14.28	14.49	14.67	14.85	15.03	15.20	3,000
12.14	12.42	12.70	12.98	13.26	13.50	13.74	13.98	14.22	14.42	14.62	14.82	15.02	15.20	15.36	15.53	15.66	3,200
12.70	12.98	13.26	13.54	13.82	14.05	14.28	14.51	14.74	14.95	15.14	15.32	15.48	15.62	15.78	15.91	16.01	3,400
13.24	13.52	13.79	14.07	14.34	14.56	14.77	14.99	15.20	15.40	15.50	15.59	15.67	15.82	15.96	16.07	16.14	3,600
13.74	14.01	14.28	14.55	14.81	15.03	15.22	15.40	15.58	15.72	15.78	15.80	15.85	15.99	16.16	16.23	16.24	3,800
14.20	14.49	14.74	14.98	15.22	15.42	15.60	15.76	15.90	15.97	16.03	16.11	16.11	16.20	16.29	16.35	16.35	4,000
14.63	14.90	15.15	15.35	15.58	15.85	15.91	16.04	16.13	16.25	16.27	16.29	16.29	16.32	16.38	16.35	16.34	4,200
15.01	15.27	15.49	15.67	15.87	16.01	1613	16.24	16.29	16.33	16.35	16.35	16.36	16.34	16.30	16.25	16.19	4,400
15.35	15.58	15.78	15.93	16.10	16.21	16.29	16.35	16.35	16.38	16.38	16.36	16.32	16.28	16.22	16.12	15.90	4,600
15.64	15.84	16.01	16.14	16.27	16.33	16.37	16.38	16.33	16.32	16.30	16.27	16.17	16.01	15.81	15.55	15.46	4,800
15.88	16.07	16.19	16.29	16.37	16.38	16.38	16.33	16.21	16.15	16.07	15.99	15.89	15.72	15.49	15.23	14.87	5,000
16.07	16.23	16.31	16.36	16.40	16.36	16.30	16.19	15.99	15.85	15.70	15.60	15.49	15.28	15.04	14.76		5,200
16.21	16.34	16.37	16.37	16.36	16.26	16.13	15.96	15.68	15.52	15.35	15.15	14.96	14.55	14.21			5,400
16.30	16.38	16.36	16.32	16.23	16.08	15.88	15.63	15.26	15.07	14.86	14.65						5,600
16.33	16.37	16.30	16.19	16.04	15.80	15.53	15.20	14.73	14.30	14.12							5,800
16.30	16.29	16.16	15.98	15.76	15.44	15.08	14.67										6,000

Speed of small pulley (r.p.m.)

Standard grade cast iron pulleys can no longer be used for these values as the rim speed is greater than 30 m/s.

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optibelt

Power Transmission

Type XH

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 13

Number of teeth on small pulley	18 XH	19 XH	20 XH	21 XH	22 XH	23 XH	24 XH	25 XH	26 XH	27 XH	28 XH	29 XH
Pitch diameter (mm)	127.34	134.41	141.49	148.56	155.64	162.71	169.79	176.86	183.94	191.01	198.08	205.16
Speed of small pulley (r.p.m.)												
100	0.57	0.60	0.63	0.66	0.69	0.73	0.75	0.79	0.83	0.86	0.88	0.91
200	1.13	1.19	1.25	1.32	1.38	1.45	1.51	1.57	1.63	1.70	1.76	1.82
300	1.70	1.79	1.88	1.98	2.07	2.17	2.26	2.36	2.45	2.55	2.64	2.73
400	2.26	2.39	2.51	2.59	2.76	2.89	3.01	3.14	3.26	3.39	3.51	3.63
500	2.82	2.98	3.13	3.25	3.44	3.59	3.74	3.90	4.06	4.21	4.36	4.52
600	3.38	3.57	3.74	3.90	4.12	4.30	4.48	4.67	4.85	5.03	5.21	539
700	3.93	4.15	4.36	4.55	4.79	5.00	5.21	5.42	5.62	5.83	6.04	6.25
800	4.48	4.62	4.97	5.21	5.45	5.69	5.93	6.17	6.41	6.64	6.87	7.10
900	5.03	5.30	5.57	5.84	6.11	6.37	6.64	6.90	7.15	7.42	7.68	7.93
1,000	5.57	5.87	6.16	6.45	6.75	7.03	7.33	7.62	7.90	8.19	8.47	8.74
1,100	6.11	6.43	6.75	7.07	7.39	7.70	8.02	8.32	8.62	8.93	9.24	9.53
1,200	6.65	6.99	7.33	7.67	8.02	8.35	8.68	9.01	9.33	9.65	9.97	10.32
1,300	7.17	7.54	7.90	8.27	8.63	8.98	9.33	9.68	10.03	10.36	10.68	11.00
1,400	7.68	8.08	8.47	8.84	9.23	9.60	9.97	10.32	10.68	11.03	11.38	11.71
1,500	8.21	8.60	9.01	9.40	9.81	10.19	10.59	10.94	11.32	11.68	12.04	12.37
1,600	8.70	9.12	9.55	9.96	10.38	10.78	11.18	11.54	11.94	12.31	12.67	12.73
1,700	9.18	9.63	10.07	10.49	10.94	11.33	11.76	12.13	12.53	12.90	13.26	13.60
1,800	9.66	10.11	10.58	11.01	11.47	11.88	12.32	12.69	13.10	13.46	13.82	14.16
1,900	10.13	10.60	11.06	11.52	11.99	12.41	12.85	13.36	13.91	14.12	14.35	14.89
2,000	10.57	11.05	11.53	12.00	12.49	12.91	13.35	13.73	14.13	14.47	14.82	15.14
2,100	11.02	11.50	11.99	12.48	12.97	13.40	13.82	14.20	14.59	14.93	15.28	15.57
2,200	11.41	11.92	12.43	12.93	13.43	13.96	14.49	14.76	15.02	15.35	15.67	15.94
2,300	11.87	12.36	12.86	13.38	13.87	14.29	14.70	15.05	15.42	15.71	16.02	16.26
2,400	12.28	12.76	13.26	13.76	14.27	14.68	15.08	15.42	15.77	16.04	16.32	16.53
2,500	12.67	13.15	13.64	14.14	14.66	15.06	15.45	15.76	16.09	16.33	16.58	16.74
2,600	13.05	13.52	14.01	14.51	15.04	15.41	15.77	16.06	16.37	16.57	16.78	16.90
2,800	13.73	14.20	14.66	15.16	15.69	16.02	16.33	16.56	16.78	16.89	17.0Z	17.03
3,000	14.35	14.77	15.21	15.71	16.22	16.47	16.73	16.87	17.01	17.01	17.02	16.87
3,200	14.90	15.28	15.66	16.14	16.63	16.81	16.97	17.01	17.02	16.90	16.76	16.45
3,400	15.36	15.68	15.99	16.45	16.91	16.98	17.04	16.95	16.84	16.54	16.25	15.73
3,600	15.82	16.03	16.23	16.64	17.06	17.01	16.94	16.68	16.43	15.94	15.46	14.72
3,800	16.05	16.19	16.35	16.70	17.06	16.86	16.64	15.96	15.97	15.15	14.34	13.37
4,000	16.26	16.29	16.33	16.62	17.89	16.53	16.15	15.50	14.86	13.91	12.94	
4,200	16.35	16.35	16.16	16.37	16.58	16.01	15.45	14.75	13.67	12.60		
4,400	16.26	16.22	15.83	15.96	16.08	15.30	14.52	13.24	11.94			

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

Refers to drives for which standard grade cast iron pulleys can no longer be used and where a reduced service life must be taken into consideration.

optibelt
Power Transmission

Type XH

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 13

30 XH	31 XH	32 XH	33 XH	34 XH	35 XH	36 XH	37 XH	38 XH	39 XH	40 XH	Number of teeth on small pulley
212.23	219.31	226.38	233.46	240.53	247.61	254.68	261.75	268.63	275.90	282.98	Pitch diameter (mm)
0.94	0.97	1.00	1.04	1.07	1.10	1.13	1.16	1.19	1.22	1.25	100
1.88	1.95	2.01	2.08	2.14	2.20	2.26	2.33	2.39	2.45	2.51	200
2.82	2.92	3.01	3.11	3.20	3.29	3.38	3.47	3.56	3.65	3.74	300
3.74	3.87	4.00	4.13	4.25	4.37	4.49	4.61	4.73	4.85	4.97	400
4.67	4.84	5.01	5.16	5.30	5.45	5.59	5.74	5.88	6.02	6.16	500
5.57	5.75	5.93	6.11	6.28	6.46	6.63	6.81	6.98	7.16	7.33	600
6.46	6.67	6.87	7.07	7.27	7.47	7.67	7.87	8.07	8.27	8.47	700
7.33	7.56	7.79	8.01	8.23	8.45	8.67	8.89	9.11	9.33	9.55	800
8.18	8.43	8.68	8.92	9.16	9.40	9.63	9.87	10.11	10.35	10.58	900
9.01	9.28	9.55	9.81	10.06	10.31	10.56	10.82	11.07	11.32	11.57	1,000
9.81	10.10	10.38	10.65	10.91	11.18	11.44	11.71	11.97	12.23	12.49	1,100
10.66	10.92	11.18	11.46	11.73	12.00	12.27	12.54	12.81	13.08	13.35	1,200
11.32	11.63	11.94	12.22	12.49	12.77	13.04	13.32	13.59	13.86	14.13	1,300
12.04	12.36	12.67	12.94	13.21	13.48	13.75	14.02	14.29	14.56	14.82	1,400
12.70	13.03	13.35	13.62	13.88	14.14	14.40	14.67	14.93	15.19	15.45	1,500
12.79	13.42	14.04	14.29	14.53	14.77	15.01	15.26	15.50	15.74	15.98	1,600
13.94	14.25	14.55	14.79	15.02	15.25	15.48	15.71	15.94	16.17	16.40	1,700
14.49	14.79	15.08	15.28	15.48	15.68	15.88	16.08	16.28	16.48	16.67	1,800
15.43	15.50	15.56	15.74	15.91	16.08	16.25	16.42	16.59	16.76	16.93	1,900
15.45	15.72	15.98	16.12	16.25	16.38	16.51	16.65	16.78	16.91	17.04	2,000
15.85	16.09	16.32	16.41	16.53	16.59	16.77	16.88	16.98	17.01	17.02	2,100
16.20	16.41	16.61	16.72	16.82	16.84	16.95	17.03	17.01	16.98	16.87	2,200
16.49	16.66	16.82	16.88	16.95	16.98	17.02	16.95	16.84	16.74	16.64	2,300
16.73	16.85	16.97	17.03	17.04	17.01	16.98	16.83	16.66	16.40	16.15	2,400
16.89	16.97	17.04	17.02	16.93	16.87	16.70	16.40	16.22	15.90	15.58	2,500
17.01	17.02	17.02	16.95	16.83	16.68	16.55	16.15	15.80	15.31	14.86	2,600
17.02	16.88	16.76	16.55	16.25	15.91	15.48	14.97	14.39	13.66	12.94	2,800
16.74	16.44	16.15	15.76	15.25	14.69	13.99	13.27				3,000
16.15	15.65	15.17	14.56	13.81	12.98						3,200
15.23	14.46	13.79	12.94								3,400
13.97	13.10										3,600
12.41											3,800
											4,000
											4,200
											4,400

Speed of small pulley (r.p.m.)

Refers to drives for which standard grade cast iron pulleys can no longer be used and where a reduced service life must be taken into consideration.

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Power Transmission

Type XXH

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 14

Speed of small pulley (r.p.m.)	Number of teeth on small pulley	18 XXH	19 XXH	20 XXH	21 XXH	22 XXH	23 XXH	24 XXH	25 XXH	26 XXH	27 XXH	28 XXH	29 XXH
	Pitch diameter (mm)	181.91	192.02	202.13	212.23	222.34	232.45	242.55	252.66	262.77	272.87	282.98	293.08
	100	0.99	1.05	1.10	1.16	1.22	1.27	1.32	1.38	1.43	1.49	1.54	1.60
	200	1.98	1.09	2.20	2.31	2.42	2.53	2.64	2.75	2.86	2.97	3.08	3.19
	300	2.97	3.14	3.30	3.46	3.62	3.79	3.95	4.11	4.27	4.44	4.60	4.76
	400	3.95	4.17	4.38	4.59	4.80	5.02	5.24	5.46	5.67	5.88	6.09	6.30
	500	4.95	5.21	5.45	5.73	5.98	6.25	6.51	6.77	7.03	7.29	7.55	7.81
	600	5.88	6.20	6.51	6.83	7.14	7.45	7.76	8.07	8.37	8.67	8.97	9.27
	700	6.83	7.19	7.56	7.92	8.27	8.62	8.97	9.32	9.67	10.01	10.35	10.69
	800	7.76	8.18	8.57	8.98	9.37	9.77	10.16	10.54	10.92	11.29	11.66	12.03
	900	8.72	9.18	9.57	10.01	10.44	10.88	11.30	11.71	12.11	12.51	12.91	13.31
	1,000	9.57	10.02	10.55	11.02	11.49	11.95	12.13	12.71	13.28	13.70	14.11	14.52
	1,100	10.44	10.97	11.49	12.05	12.64	13.04	13.43	13.90	14.37	14.79	15.21	15.63
	1,200	11.40	11.85	12.40	12.92	13.45	13.95	14.45	14.91	15.38	15.80	16.22	16.64
	1,300	12.12	12.70	13.28	13.81	14.37	14.60	14.83	15.57	16.32	16.73	17.14	17.55
	1,400	12.90	13.51	14.12	14.66	15.23	15.73	16.26	16.70	17.18	17.57	17.95	18.34
	1,500	13.66	14.28	14.91	15.46	16.04	16.54	17.05	17.71	17.96	18.31	18.66	19.01
	1,600	14.39	15.03	15.68	16.23	17.04	17.28	17.78	18.38	18.64	18.95	19.25	19.56
	1,700	15.07	15.73	16.40	16.93	17.49	17.95	18.43	18.81	19.21	19.46	19.70	19.95
	1,800	15.71	16.37	17.06	17.58	18.12	18.55	19.00	19.33	19.68	19.93	20.12	20.24
	1,900	16.31	16.98	17.67	18.16	18.68	19.07	19.48	19.74	20.04	20.13	20.25	20.30
	2,000	16.88	17.54	18.23	18.69	19.17	19.51	19.86	20.05	20.28	20.35	20.38	20.28
	2,100	17.39	18.05	18.73	19.14	19.58	19.84	20.14	20.25	20.39	20.29	20.18	20.00
	2,200	17.84	18.50	19.17	19.54	19.91	20.11	20.32	20.33	20.37	20.22	19.98	19.60
	2,300	18.25	18.90	19.55	19.84	20.16	20.28	20.39	20.30	20.21	19.76	19.45	18.94
	2,400	18.60	19.22	19.86	20.09	20.32	20.30	20.35	20.12	19.91	19.47	18.91	18.19
	2,500	18.90	19.50	22.34	21.37	20.39	20.28	20.19	19.80	19.45	18.75	18.00	17.11
	2,600	19.15	19.72	20.28	20.32	20.37	20.12	19.91	19.36	18.84	18.04	17.10	
	2,800	19.44	19.92	20.40	20.21	20.02	19.46	18.96	18.04	17.12	15.89		
	3,000	19.49	19.85	20.19	19.74	19.24	18.32	17.43	16.06	14.66			

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

Refers to drives for which standard grade cast iron pulleys can no longer be used and where a reduced service life must be taken into consideration.

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optibelt
Power Transmission

Type XXH

Power rating P_N (kW) using a belt width of 1" ≙ 25.4 mm

Table 14

30 XXH	31 XXH	32 XXH	33 XXH	34 XXH	35 XXH	36 XXH	37 XXH	38 XXH	39 XXH	40 XXH	Number of teeth on small pulley
303.19	313.30	323.40	333.51	343.62	353.72	363.83	373.94	384.04	394.15	404.25	Pitch diameter (mm)
1.65	1.70	1.76	1.81	1.87	1.92	1.98	2.05	2.14	2.20	2.20	100
3.30	3.39	3.50	3.61	3.73	3.82	3.93	4.07	4.20	4.41	4.38	200
4.92	5.08	5.32	5.40	5.56	5.71	5.87	6.05	6.22	6.38	6.51	300
6.51	6.73	6.93	7.14	7.35	7.54	7.75	7.97	8.19	8.39	8.57	400
8.06	8.32	8.57	8.82	9.08	9.31	9.55	9.82	10.08	10.31	10.54	500
9.57	9.86	10.15	10.43	10.73	11.00	11.28	11.56	11.86	12.14	12.40	600
11.02	11.34	11.67	11.98	12.32	12.60	12.91	13.22	13.53	13.83	14.12	700
12.40	12.75	13.10	13.34	13.79	14.12	14.39	14.75	15.06	15.39	15.68	800
13.70	14.08	14.44	14.59	15.15	15.49	15.82	16.12	16.55	16.76	17.05	900
14.93	15.30	15.67	16.02	16.40	16.72	16.98	17.24	17.65	17.94	18.23	1,000
16.04	16.42	16.71	17.05	17.49	17.71	18.00	18.29	18.55	18.86	19.17	1,100
17.05	17.41	17.76	18.08	18.43	18.71	18.97	19.23	19.45	19.65	19.86	1,200
17.96	18.21	18.53	18.81	19.21	19.39	19.55	19.74	19.89	20.08	20.28	1,300
18.72	19.01	19.29	19.34	19.80	19.97	20.08	20.20	20.32	20.36	20.39	1,400
19.36	19.52	19.74	19.92	20.19	20.20	20.21	20.23	20.21	20.19	20.18	1,500
19.86	20.03	20.19	20.29	20.38	20.33	20.28	20.23	20.05	19.86	19.64	1,600
20.19	20.21	20.26	20.30	20.34	20.01	19.78	19.66	19.34	19.04	18.73	1,700
20.37	20.38	20.33	20.28	20.06	19.73	19.40	19.07	18.59	18.02	17.43	1,800
20.37	20.27	19.98	19.74	19.53	18.97	18.41	17.84	17.15	16.33	15.50	1,900
20.19	19.95	19.63	19.16	18.73	18.03	17.33	16.62	15.70	14.65	13.58	2,000
19.81	19.31	18.80	18.20	17.65	16.66	15.67	14.67				2,100
19.24	18.66	17.98	17.17	16.23	15.22						2,200
18.46	17.59	16.65									2,300
17.43	16.44										2,400
											2,500
											2,600
											2,800
											3,000

Speed of small pulley (r.p.m.)

The use of these pulley/speed combinations will lead to a reduction in the service life of the belts.

Refers to drives for which standard grade cast iron pulleys can no longer be used and where a reduced service life must be taken into consideration.

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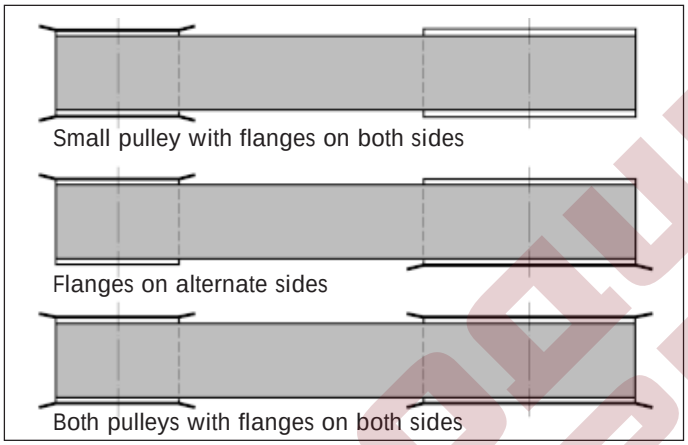
Design Hints
Flanges / Minimum Pulley Diameters

Flanges

The pulleys may be fitted with flanges on one or both sides to assist the smooth running of the timing belt.

If the drive centre distance is ≥ $8d_{pk}$ then one pulley should be equipped with flanges on both sides.

We recommend the use of standard pulleys. See the range on pages 40 to 51. If this is not possible for design reasons, special pulleys may be employed. See Page 53.



Allowance y for Installation

Table 15

Section	Flanges on both pulleys (mm)	Flange on one pulley (mm)
MXL	11	9
XL	17	13
L, H	22	17
XH	48	37

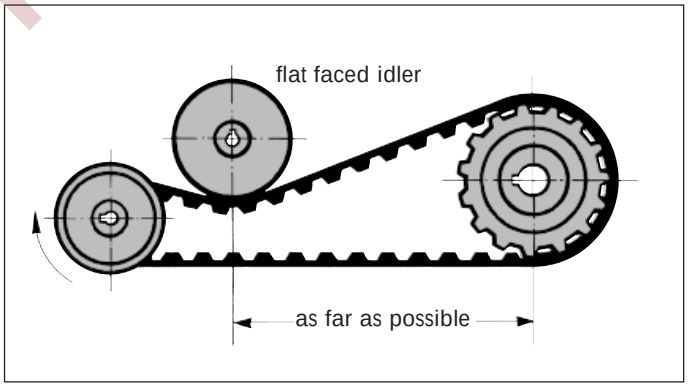
Maximum Timing Belt Width

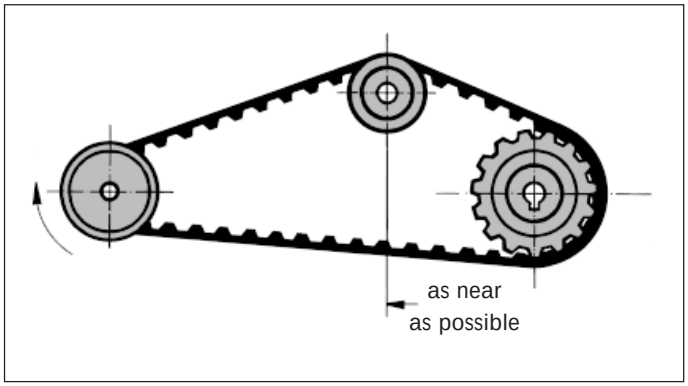
The maximum timing belt width should not exceed the pitch diameter of the smallest pulley being used.

Tension or Guide Idlers

Idlers are either toothed or flat faced pulleys that do not transmit power within the drive system. Because they create additional bending stresses within the belt, their use should be restricted to the following applications:

- Diameter of the idler ≥ the smallest pulley in the drive system
- Width of the idler ≥ the smallest pulley in the drive system
- Always locate any idlers in the slack side of the drive
- Inside idlers:
  ≤ 40 teeth always use a toothed pulley
  > 40 teeth a flat face pulley can be used
- Because they run on the back of the belt, flat pulleys must always be used as outside idlers.
- Crowned pulleys must never be used.
- Ensure that the idler is positioned to ensure that the maximum possible number of teeth are in mesh on the smallest drive pulley.
- Keep the arc of contact on idlers to a minimum (outside idler).





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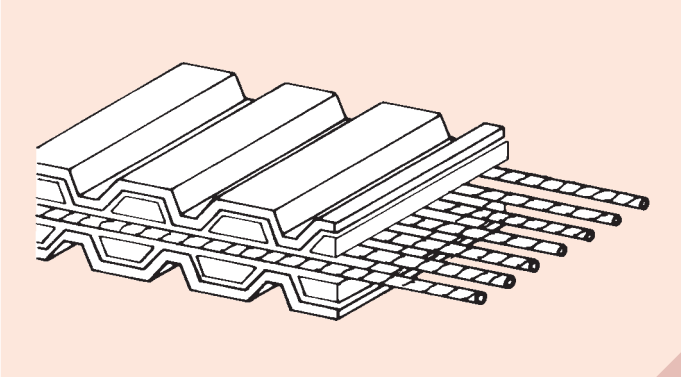
Design Hints

Double sided timing belts to ISO 5296

Construction



Tension Cord

As on standard belts, the tension cord consists of continuous, spirally wound glass fibre. This material ensures high tensile strength with the minimum stretch. Exceptional flexibility is achieved by embedding it centrally.

Teeth

The teeth are arranged directly opposite each other and are manufactured from a medium hard, shear and wear resistant rubber compound. They mesh exactly with the tooth pitch of the pulley with the minimum resistance. As long as 6 teeth or more are in mesh, their strength usually exceeds the tensile strength of the tension cord.

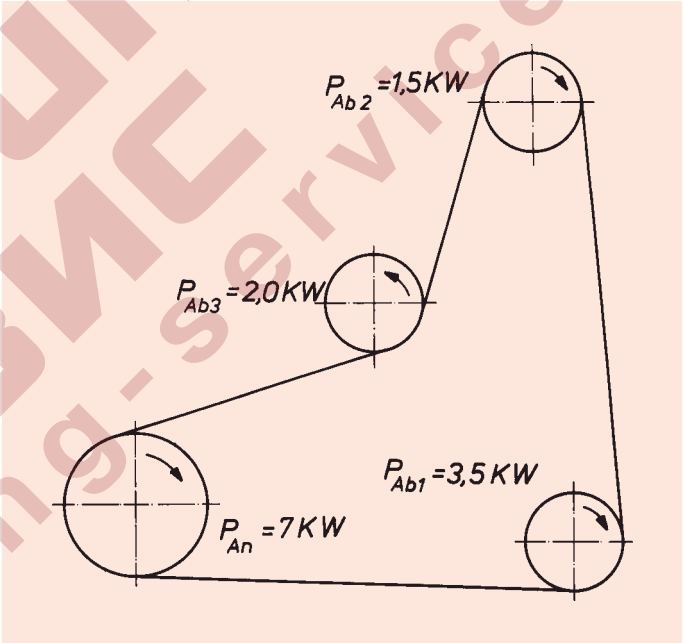
Fabric Cover

Both sides of the teeth are covered with a tough, friction resistant fabric giving an effect similar to the protective surface-hardening applied to gears. After an extended running period the surface of this protective fabric, which has a low coefficient of friction, acquires a polish, ensuring a longer life.

Drive Design

The protective covering on both tooth faces and the resultant identical power transmission capability of both sides of the belt, means that the distribution of the power to be transmitted is not inhibited. The maximum permitted nominal power rating can be transmitted from either the inner or the outer tooth face. With several driven pulleys the power can be distributed in any combination through both sides of the belt. The total power transmitted cannot, however, exceed the maximum permitted levels.

Example:



The design must be based on the nominal power values for standard belts (see pages 20 – 29). For the sizes available see pages 6 to 8.

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Design Hints
Installation and Maintenance

Safety hints

Open and readily accessible drive systems should be guarded to obviate any risk of injury.

Before commencing installation, the prime mover should be stopped and secured against any possibility of accidental start up e.g. by disconnecting electric power at the mains. The driven machine should be prevented from rotating.

The correct design of drive systems using Optibelt ZR timing belts ensures a high level of operational safety and optimum belt life.

It has been found in practice that unsatisfactory service life is frequently attributable to installation and maintenance errors. We recommend that the following precautions be taken:

- **Toothed Timing Pulleys**

  The teeth should be clean and comply with standard specifications.

- **Alignment**

  All shafts and pulleys should be aligned before belt installation

  Maximum deviation in shaft parallel alignment:

Table 16

Belt width designation B_c	Shaft misalignment
≤ 100	± 1°
> 100 ≤ 200	± 0.5°
> 200 ≤ 400	± 0.25°
> 400	± 0.15°

- **Timing Belt Sets**

  Timing belts which run in pairs or in multiples on the one drive system must always be ordered as sets. This ensures that all belts are from the same sleeve and that the lengths are identical.

- **Installation**

  Before installation, the drive centre distance should be reduced to enable the timing belts to be fitted with absolutely no force. If this is not possible the timing belts must be fitted together with one or both of the pulleys. Any use of force during the fitting of the belt will result in damage to the low stretch tension cord and other components; this damage may not be immediately apparent.

- **Tensioning**

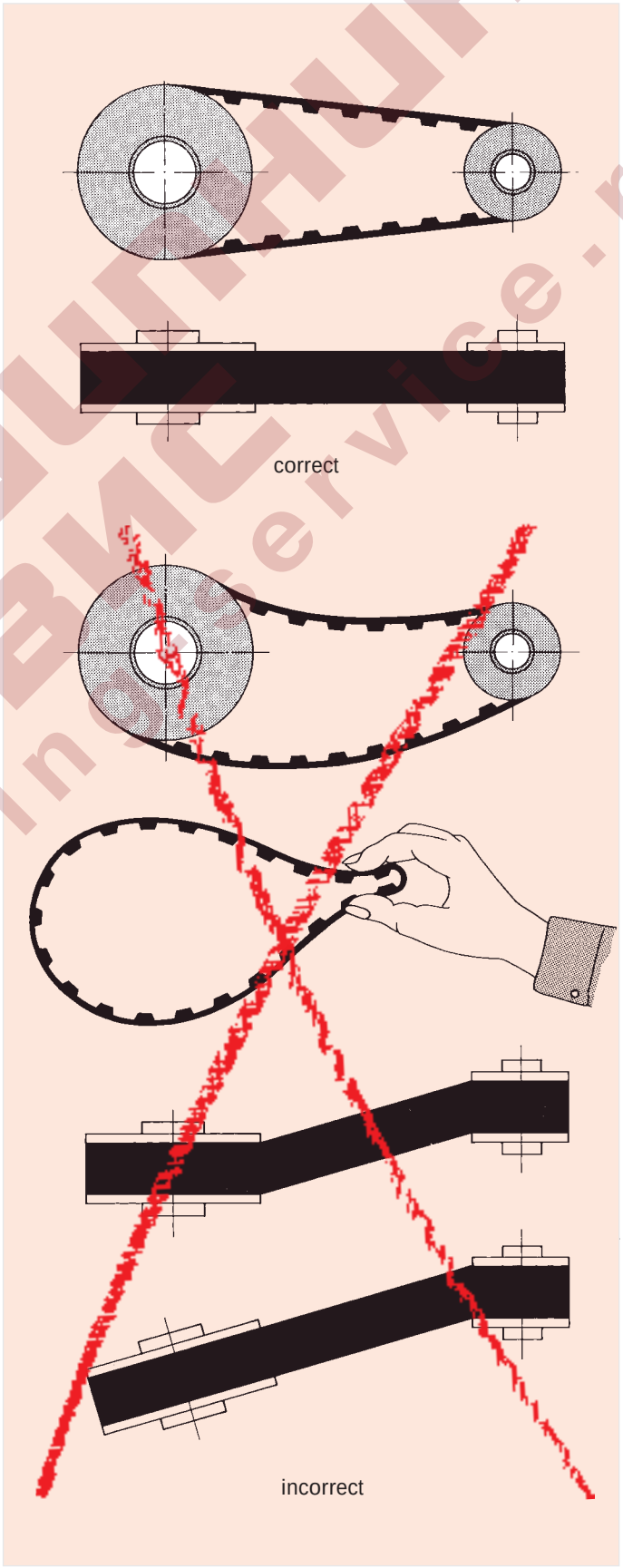
  Tensioning should be carried out in accordance with the guidelines on page 19. Once fitted, no further checking or adjustment is necessary.

- **Idlers**

  Idlers should be avoided. If this is not possible, our recommendations on page 30 of this Technical Manual should be followed.

- **Maintenance**

  Optibelt ZR timing belts require virtually no maintenance if they are used under normal environmental conditions.



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Power Transmission

Design Hints
Problems – Causes – Remedies

Problems	Causes	Remedies
Severe wear on the belt tooth faces	Incorrect belt tension Tooth pitch selection error Overloading	Adjust belt tension Check section selected, and replace if necessary Use wider belts with higher power transmission capability
Excessive wear in the land between the timing belt teeth	Excessive belt tension Drive design too weak Incorrect pulleys	Reduce the tension Increase belt width or pulley diameters Replace pulleys
Unusual wear on the edges of the belt	Shafts not parallel Incorrect flanged pulleys Drive centre distance varying during running	Realign the shafts Check design and replace Strengthen mountings and chassis
Belt teeth shearing off	Too few teeth in mesh Overloading	Increase diameter of the small pulley or choose wider belts Redesign using wider belts or larger pulleys
Excessive lateral belt movement	Shafts not parallel Pulleys not in line Shock loading with belt tension too great	Re-align the shafts Re-align pulleys Reduce the belt tension
Flanges becoming detached	Pulleys not in line Shafts not parallel Incorrect flange installation	Re-align the pulleys Re-align the shafts Install flanges correctly
Apparent belt stretch	Bearing or motor mounts are flexing	Adjust belt tension Strengthen bearing and motor mounts
Excessive operating noise	Incorrect shaft alignment Belt tension too high Pulley diameter too small Belt overloaded Belt width too great at higher speeds	Re-align shafts Reduce the tension Increase pulley diameter Increase belt width or number of teeth in mesh Reduce the belt width by redesign using larger belt section
Unusual wear on the pulleys	Unsuitable material Incorrect tooth pitch Insufficient surface hardness	Use stronger materials Replace pulleys or belt Use harder material or carry out surface hardening
Top surface of the belt brittle and cracking	Ambient temperature above + 85 °C Unacceptable radiation	Replace belt with extra heat resistant construction Screen or use suitable belt construction
Cracks in the belt surface	Ambient temperature below – 30 °C	Replace belt with extra cold resistant construction
Softening of belt surface	Effects of contamination	Screen or use suitable belt construction

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Design Hints
Length - Measuring Conditions

Measuring the Pitch Length to ISO 5296

The timing belt is placed over two measuring pulleys of equal size with the same tooth pitch as the belt. One of the pulleys is on a fixed centre, the other is on a moveable centre. Both are free to rotate.

The permitted tolerances for the measuring pulleys may be found in table 17.

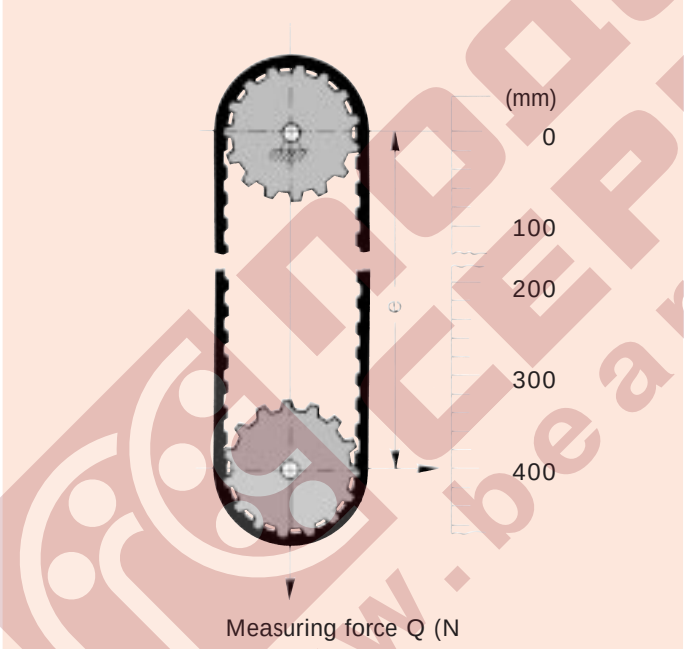
The moveable measuring pulley is loaded with the measuring force Q (see table 18).

The pulleys should be rotated under load at least twice before measuring the drive centre distance *e*, to ensure that the belt is properly seated and the total measuring force is equally distributed over both belt spans.

The effective length of the timing belt is given by twice the centre distance *e* plus the pitch circumference of one of the measuring pulleys.

$$L_p = 2\ e + U_p$$

Arrangement for measuring the belt length



Clearance between the measuring pulley and the belt tooth

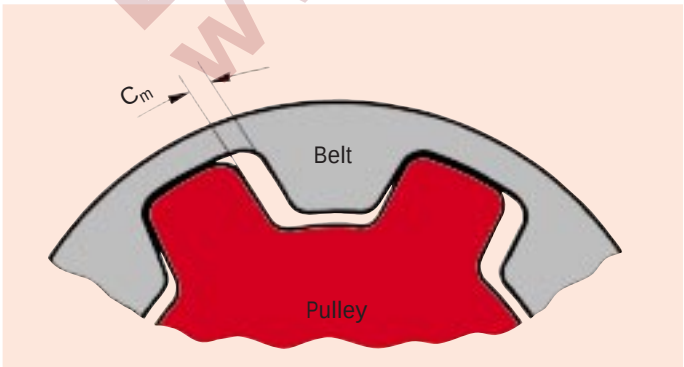


Table 17: Pulleys for measuring the belt length to ISO 5296

Section	Number of teeth	Pitch circumference U_p (mm)	Outside diameter d_a (mm)	Run-out tolerance of the outside diameter T.I.R.[1] (mm)	Side wobble tolerance T.I.R.[1] (mm)	Min. clearance C_m (mm)
MXL	20	40.64	12.428 ± 0.013	0.013	0.025	0.30
XL	10	50.80	15.662 ± 0.013	0.013	0.025	0.30
L	16	152.40	47.748 ± 0.013	0.013	0.025	0.33
H	20	254.00	79.479 ± 0.013	0.013	0.025	0.38
XH	24	533.40	166.992 ± 0.025	0.013	0.051	0.53
XXH	24	762.00	239.504 ± 0.025	0.013	0.076	0.64

[1] Maximum total fluctuation

Table 18: Total measuring force

Width designation B_c	Belt width (mm)	Measuring force Q (N)					
		MXL	**XL**	**L**	**H**	**XH**	**XXH**
012	3.2	13					
019	4.8	20					
025	6.4	27	36				
031	7.9		44				
037	9.5		53				
050	12.7			105			
075	19.1			180	445		
100	25.4			245	620		
150	38.1				980		
200	50.8				1340	2000	2500
300	76.2				2100	3100	3900
400	101.6					4450	5600
500	127.0						7100

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Pulleys
Dimensions and Tolerances

Optibelt ZRS Standard Pulleys

Optibelt ZRS standard pulleys are manufactured to ISO 5294 using a gear cutting process. This ensures minimum tooth clearance and a precise tooth engagement. The following figures and tables show the dimensions and tolerances of the Optibelt ZRS standard pulleys.

Hobbing cutter for pulleys with involute tooth patterns to ISO 5294

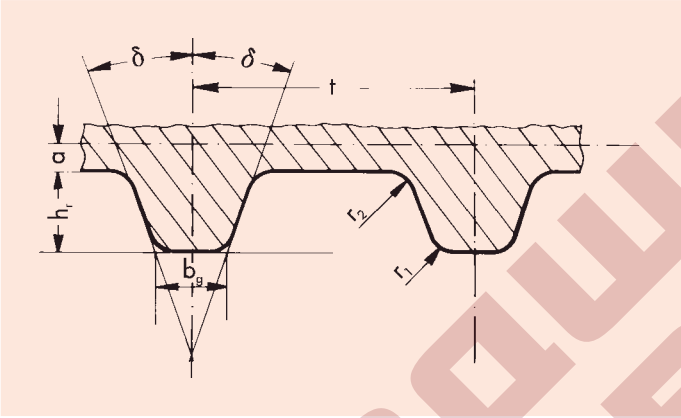

Table 19: Dimensions and permitted deviations of the hobbing cutter for pulleys with involute tooth patterns to ISO 5294

Section	Number of teeth	t (mm) ± 0.003	d (Grad) ± 0.12°	h_r (mm) + 0.05 0	b_g (mm) + 0.05 0	r_1 (mm) ± 0.03	r_2 (mm) ± 0.03	2 a (mm)
MXL	≥ 10	2.032	20°	0.66	0.84	0.25	0.13	0.508
XL	≥ 10	5.080	20°	1.40	1.27	0.61	0.61	0.508
L	≥ 10	9.525	20°	2.13	3.10	0.86	0.53	0.762
H	14–19	12.700	20°	2.59	4.24	1.47	1.04	1.372
	>						1.42	
XH	≥ 18	22.225	20°	6.88	7.59	2.01	1.93	2.794
XXH	≥ 18	31.750	20°	10.29	11.61	2.69	2.82	3.048

Table 20: Tolerances for the outside diameter of the pre-machined blanks

Outside diameter d_a (mm)	Tolerances (mm)
≤ 100	+ 0.3 + 0.2
> 100 ≤ 200	+ 0.4 + 0.3
> 200 ≤ 300	+ 0.5 + 0.4
> 300 ≤ 500	+ 0.7 + 0.5
> 500	+ 0.9 + 0.7

Permitted tolerances in tooth pitch

The permitted tolerances in the distance between two teeth and the sum of the deviations within a 90° arc on a pulley are given in the following table. These tolerances are understood to be the distance between the equivalent points on the right and the left side respectively of two adjacent teeth.

Table 21

Outside diameter d_a (mm)	Permitted tolerance in tooth pitch (mm)	
	between two adjacent teeth (mm)	total within 90°-arc (mm)
≤ 25.40	0.03	0.05
> 25.40 ≤ 50.80	0.03	0.08
> 50.80 ≤ 101.60	0.03	0.10
> 101.60 ≤ 177.80	0.03	0.13
> 177.80 ≤ 304.80	0.03	0.15
> 304.80 ≤ 508.00	0.03	0.18
> 508.00	0.03	0.20

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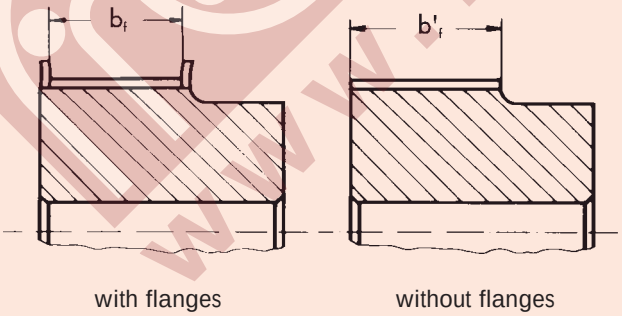
Pulleys
Dimensions and Tolerances

Table 22: Pulley widths to ISO 5294

Section	Pulley width designation	Nominal pulley width (mm)	Smallest pulley width with flanges b_f (mm)	Smallest pulley width without flanges b'_f (mm)
MXL	012	3.2	3.8	5.6
	019	4.8	5.3	7.1
	025	6.4	7.1	8.9
XL	025	6.4	7.1	8.9
	031	7.9	8.6	10.4
	037	9.5	10.4	12.2
L	050	12.7	14.0	17.0
	075	19.1	20.3	23.3
	100	25.4	26.7	29.7
H	075	19.1	20.3	24.6
	100	25.4	26.7	31.2
	150	38.1	39.4	43.9
	200	50.8	52.8	57.3
	300	76.2	79.0	83.5
XH	200	50.8	56.6	62.6
	300	76.2	83.8	89.8
	400	101.6	110.7	116.7
XXH	200	50.8	56.6	64.1
	300	76.2	83.8	91.3
	400	101.6	110.7	118.2
	500	127.0	137.7	145.2



Note

The minimum width for pulleys without flanges (b'_f) can be reduced if the drive alignment can be guaranteed; however it may not be less than the dimension (b_f) for the pulley with flanges.

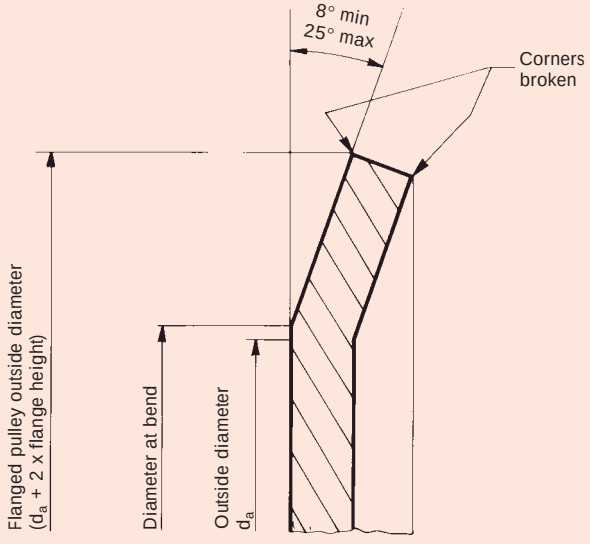
Table 23: Permitted tolerances for the outside diameter to ISO 5294

Outside diameter d_a (mm)	Permitted tolerances (mm)
≤ 25.40	+ 0.05 0
> 25.40 ≤ 50.80	+ 0.08 0
> 50.80 ≤ 101.60	+ 0.10 0
> 101.60 ≤ 177.80	+ 0.13 0
> 177.80 ≤ 304.80	+ 0.15 0
> 304.80 ≤ 508.00	+ 0.18 0
> 508.00	+ 0.20 0

Table 24: Minimum flange height to ISO 5294

Type	Minimum flange height (mm)
MXL	0.5
XL	1.0
L	1.5
H	2.0
XH	4.8
XXH	6.1

Flange dimensions to ISO 5294



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Pulleys
Dimensions and Tolerances

Table 25: Axial circular run-out to ISO 5294

Outside diameter (mm)	Maximum total fluctuation (mm)
≤ 101.60	0.10
> 101.60 ≤ 254.00	0.01 mm per 10 mm outside diameter
> 254.00	0.25 mm + 0.0005 mm per mm outside diameter above 254.00 mm

Table 26: Radial circular run-out to ISO 5294

Outside diameter (mm)	Maximum total fluctuation (mm)
≤ 203.20	0.13
> 203.20	0.13 mm + 0.0005 mm per mm outside diameter above 203.20 mm

Balancing

Steel pulleys machined on all sides do not need to be balanced if the rim speed is less than 30 m/s. Cast iron pulleys for average speeds should be balanced statically as follows:

Static balancing shall be done so as to leave on the working diameter (datum or effective, according to the type of pulley) an eccentric residual mass not exceeding the larger of the two following values.

a) 0.005 kg.

b) 0.2 % of the equivalent mass of the pulleys and any companion bushing.

The equivalent mass is taken as the mass of a geometrically identical pulley made of cast iron.

For dynamic balancing, the operation shall be implemented according to ISO 1940-1. the G quality grade is determined by the largest of the following two numbers:

G_1: 6.3 mm/s

G_2: $\frac{5v}{M}$ mm/s

The expression for G_2 derives from the definition in ISO 1940-1.

In that formula:

5: is the practical limit of the residual eccentric mass, in grams, specified in 5.6 a);

v: is the circumferential pulley speed, in metres per second;

M: is the equivalent mass of the pulley, in kilograms, as given in 5.6 b).

The G quality grad may be less than G_1 or G_2 if the user specifies a particular requirement.

Pulleys running at rim speeds in excess of 30 m/s require dynamic balancing up to 1.8×10^{-5}.

Parallelism

The teeth should run parallel to the axis of the bore with a tolerance of not more than 0.001 mm per millimetre width.

Taper

The taper may not exceed 0.001 mm per millimetre of the width of the driving face and at the same time should not exceed the permitted outside diameter tolerances given in table 25

Surface quality to ISO/FDIS 254

The surface finish may not exceed the value Ra = 3.2 µm on tooth flanks and tops.

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Timing Belt Pulleys

Pitch diameter and outside diameter (mm)

Table 27

Number of teeth	Type MXL		Type XL		Type L		Type H		Type XH		Type XXH	
	pitch diameter	outside diameter	pitch diameter	outside diameter	pitch diameter	outside diameter	pitch diameter	outside diameter	pitch diameter	outside diameter	pitch diameter	outside diameter
10	6.47	5.96	16.17	15.66	30.32	29.56						
11	7.11	6.61	17.79	17.28	33.35	32.59						
12	7.76	7.25	19.40	18.89	36.38	35.62						
13	8.41	7.90	21.02	20.51	39.41	38.65						
14	9.06	8.55	22.64	22.13	42.45	41.69	56.60	55.23				
15	9.70	9.19	24.26	23.75	45.48	44.72	60.64	59.27				
16	10.35	9.84	25.87	25.36	48.51	47.75	64.68	63.31				
17	11.00	10.49	27.49	26.98	51.54	50.78	68.72	67.35				
18	11.64	11.14	29.11	28.60	54.57	53.81	72.77	71.40	127.34	124.55	181.91	178.87
19	12.29	11.78	30.72	30.21	57.61	56.85	76.81	75.44	134.41	131.62	192.02	188.98
20	12.94	12.43	32.34	31.83	60.64	59.88	80.85	79.48	141.49	138.70	202.13	199.09
21	13.58	13.08	33.96	33.45	63.67	62.91	84.89	83.52	148.56	145.77	212.23	209.18
22	14.23	13.72	35.57	35.06	66.70	65.94	88.94	87.57	155.64	152.83	222.34	219.29
23	14.88	14.37	37.19	36.68	69.73	68.97	92.98	91.61	162.71	159.92	232.45	229.40
24	15.52	15.02	38.81	38.30	72.77	72.01	97.02	95.65	169.79	167.00	242.55	239.50
25	16.17	15.66	40.43	39.92	75.80	75.04	101.06	99.69	176.86	174.07	252.66	249.61
26	16.82	16.31	42.04	41.53	78.83	78.07	105.11	103.74	183.94	181.13	262.77	259.72
27	17.46	16.96	43.67	43.16	81.86	81.10	109.15	107.78	191.01	188.22	272.87	269.82
28	18.11	17.60	45.28	44.77	84.89	84.13	113.19	111.82	198.08	195.29	282.98	279.93
29	18.75	18.24	46.89	46.38	87.93	87.17	117.23	115.86	205.16	202.37	293.08	290.03
30	19.40	18.90	48.51	48.00	90.96	90.20	121.28	119.91	212.23	209.44	303.19	300.14
31	20.04	19.53	50.13	49.62	93.99	93.23	125.32	123.95	219.31	216.52	313.30	310.25
32	20.70	20.19	51.74	51.23	97.02	96.26	129.36	127.99	226.38	223.59	323.40	320.35
33	21.34	20.83	53.36	52.85	100.05	99.29	133.40	132.03	233.46	230.67	333.51	330.46
34	21.99	21.49	54.98	54.47	103.08	102.32	137.45	136.08	240.53	237.74	343.62	340.57
35	22.63	22.12	56.60	56.09	106.12	105.36	141.49	140.12	247.61	244.82	353.72	350.67
36	23.29	22.78	58.21	57.70	109.15	108.39	145.53	144.16	254.68	251.89	363.83	360.78
37	23.93	23.42	59.83	59.32	112.18	111.42	149.57	148.20	261.75	258.95	373.94	370.89
38	24.59	24.08	61.45	60.94	115.21	114.45	153.62	152.25	268.83	266.04	384.04	380.99
39	25.22	24.71	63.06	62.55	118.24	117.48	157.66	156.29	275.90	273.11	394.15	391.10
40	25.87	25.36	64.68	64.17	121.28	120.52	161.70	160.33	282.98	280.19	404.25	401.21
41	26.52	26.00	66.30	65.79	124.31	123.55	165.74	164.37	290.05	287.26	414.36	411.31
42	27.18	26.67	67.91	67.40	127.34	126.58	169.79	168.42	297.13	294.34	424.47	421.42
43	27.81	27.30	69.53	69.02	130.37	129.61	173.83	172.46	304.20	301.41	434.57	431.52
44	28.45	27.94	71.15	70.64	133.40	132.64	177.87	176.50	311.28	308.48	444.68	441.63
45	29.11	28.60	72.77	72.26	136.44	135.68	181.91	180.54	318.35	315.54	454.79	451.74
46	29.74	29.23	74.38	73.87	139.47	138.71	185.96	184.59	325.42	322.63	464.89	461.84
47	30.40	29.89	76.00	75.49	142.50	141.74	190.00	188.63	332.50	329.69	475.00	471.95
48	31.05	30.54	77.62	77.11	145.53	144.76	194.04	192.67	339.57	336.78	485.11	482.07
49	31.70	31.19	79.23	78.72	148.56	147.80	198.08	196.71	346.65	343.86	495.21	492.16
50	32.33	31.83	80.85	80.34	151.60	150.84	202.13	200.76	353.72	350.93	505.32	502.27
51	33.00	32.50	82.47	81.96	154.63	153.87	206.17	204.80	360.80	358.01	515.42	512.37
52	33.63	33.12	84.08	83.57	157.66	156.90	210.21	208.84	367.87	365.07	525.53	522.48
53	34.29	33.79	85.70	85.19	160.69	159.93	214.25	212.88	374.95	372.16	535.64	532.59
54	34.94	34.43	87.32	86.81	163.72	162.96	218.30	216.93	382.02	379.22	545.74	542.70
55	35.60	35.09	88.94	88.43	166.75	165.99	222.34	220.97	389.09	386.30	555.85	552.81
56	36.22	35.72	90.55	90.04	169.79	169.03	226.38	225.01	396.17	393.38	565.96	562.91
57	36.86	36.36	92.17	91.66	172.82	172.06	230.42	229.14	403.24	400.45	576.06	573.01
58	37.52	37.02	93.79	93.28	175.85	175.09	234.47	233.10	410.32	407.53	586.17	583.12
59	38.16	37.65	95.40	94.89	178.88	178.12	238.51	237.14	417.39	414.60	596.27	593.22
60	38.81	38.30	97.02	96.51	181.91	181.15	242.55	241.18	424.47	421.67	606.38	603.33
61	39.46	38.95	98.64	98.13	184.95	184.19	246.59	245.22	431.54	428.75	616.49	613.44
62	40.10	39.59	100.25	99.74	187.98	187.22	250.64	249.27	438.62	435.83	626.59	623.54
63	40.73	40.22	101.87	101.36	191.01	190.25	254.68	253.31	445.69	442.90	636.70	633.65
64	41.39	40.89	103.49	102.98	194.04	193.28	258.72	257.35	452.76	449.96	646.81	643.76
65	42.04	41.53	105.11	104.60	197.07	196.31	262.77	261.40	459.84	457.05	656.91	653.86
66	42.69	42.18	106.72	106.21	200.11	199.35	266.81	265.44	466.91	464.12	667.02	663.97
67	43.32	42.82	108.34	107.83	203.14	202.38	270.85	269.48	473.99	471.20	677.13	674.08
68	43.97	43.46	109.96	109.45	206.17	205.41	274.89	273.52	481.06	478.27	687.23	684.18
69	44.62	44.11	111.57	111.06	209.20	208.44	278.94	277.57	488.14	485.34	697.34	694.29
70	45.29	44.78	113.19	112.68	212.23	211.47	282.98	281.61	495.21	492.42	707.44	704.39
71	45.92	45.41	114.81	114.30	215.27	214.51	287.02	285.65	502.29	499.49	717.55	714.50
72	46.57	46.06	116.43	115.92	218.30	217.54	291.06	289.69	509.36	506.57	727.66	724.61
73	47.22	46.71	118.04	117.53	221.33	220.57	295.11	293.74	516.43	513.64	737.76	734.71
74	47.85	47.39	119.66	119.15	224.36	223.60	299.15	297.78	523.51	520.72	747.87	744.82

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Timing Belt Pulleys

Pitch diameter and outside diameter (mm)

Table 27

Number of teeth	Type MXL pitch diameter	Type MXL outside diameter	Type XL pitch diameter	Type XL outside diameter	Type L pitch diameter	Type L outside diameter	Type H pitch diameter	Type H outside diameter	Type XH pitch diameter	Type XH outside diameter	Type XXH pitch diameter	Type XXH outside diameter
75	48.51	48.00	121.28	120.77	227.39	226.63	303.19	301.82	530.58	527.79	757.98	754.93
76	49.15	48.64	122.89	122.38	230.42	229.66	307.23	305.86	537.66	534.87	768.08	765.03
77	49.81	49.30	124.51	124.00	233.46	232.70	311.28	309.91	544.73	541.93	778.19	775.14
78	50.43	49.93	126.13	125.62	236.49	235.73	315.32	313.95	551.81	549.02	788.30	785.25
79	51.10	50.60	127.74	127.23	239.52	238.76	319.36	317.99	558.88	556.08	798.40	795.35
80	51.73	51.22	129.36	128.85	242.55	241.79	323.40	322.03	565.96	563.17	808.51	805.46
81	52.39	51.88	130.98	130.47	245.58	244.82	327.45	326.08	573.03	570.24	818.61	815.56
82	53.04	52.54	132.60	132.09	248.62	247.86	331.49	330.12	580.10	577.31	828.72	825.67
83	53.68	53.18	134.21	133.70	251.65	250.89	335.53	334.16	587.18	584.39	838.83	835.78
84	54.32	53.81	135.83	135.32	254.68	253.92	339.57	338.20	594.25	591.46	848.93	845.88
85	55.00	54.49	137.45	136.94	257.71	256.95	343.62	342.25	601.33	598.54	859.04	855.99
86	55.62	55.11	139.06	138.55	260.74	259.98	347.66	346.29	608.40	605.61	869.15	866.10
87	56.25	55.73	140.68	140.17	263.78	263.02	351.70	350.33	615.48	612.69	879.25	876.20
88	56.93	56.41	142.30	141.79	266.81	266.05	355.74	354.37	622.55	619.76	889.36	886.31
89	57.55	57.04	143.91	143.40	269.84	269.08	359.79	358.42	629.63	626.84	899.46	896.42
90	58.20	57.69	145.53	145.02	272.87	272.11	363.83	362.46	636.70	633.91	909.57	906.53
91	58.85	58.34	147.15	146.64	275.90	275.14	367.87	366.50	643.71	640.98	919.68	916.64
92	59.51	59.00	148.77	148.26	278.94	278.18	371.91	370.54	650.85	648.06	929.78	926.73
93	60.14	59.62	150.38	149.87	281.97	281.21	375.96	374.59	657.92	655.13	939.89	935.54
94	60.81	60.30	152.00	151.49	285.00	284.24	380.00	378.63	665.00	662.20	949.99	946.94
95	61.44	60.93	153.62	153.11	288.03	287.27	384.04	382.67	672.07	669.28	960.10	957.05
96	62.08	61.57	155.23	154.72	291.06	290.30	388.08	386.71	679.15	676.35	970.21	967.16
97	62.74	62.23	156.85	156.34	294.09	293.33	392.13	390.76	686.22	683.43	980.32	977.27
98	63.40	62.88	158.47	157.96	297.13	296.37	396.17	394.80	693.30	690.51	990.42	987.37
99	64.01	63.50	160.08	159.57	300.16	299.40	400.21	398.84	700.37	697.58	1.000.53	997.48
100	64.67	64.16	161.70	161.19	303.19	302.43	404.25	402.88	707.44	704.65	1.010.63	1.007.58
101	65.32	64.81	163.32	162.81	306.22	305.46	408.30	406.93	714.52	711.73	1.020.74	1.017.69
102	65.95	65.44	164.94	164.43	309.25	308.49	412.34	410.97	721.59	718.80	1.030.85	1.027.80
103	66.62	66.12	166.55	166.04	312.29	311.53	416.38	415.01	728.67	725.88	1.040.95	1.037.90
104	67.25	66.74	168.17	167.66	315.32	314.56	420.42	419.05	735.74	732.94	1.051.06	1.048.01
105	67.91	67.39	169.79	169.28	318.35	317.59	424.47	423.10	742.82	740.03	1.061.17	1.058.12
106	68.55	68.04	171.40	170.89	321.38	320.62	428.51	427.14	749.89	747.10	1.071.27	1.068.22
107	69.20	68.70	173.02	172.51	324.41	323.65	432.55	431.18	756.97	754.18	1.081.38	1.078.33
108	69.86	69.34	174.64	174.13	327.45	326.69	436.59	435.22	764.04	761.25	1.091.49	1.088.44
109	70.51	69.99	176.25	175.74	330.48	329.72	440.64	439.27	771.11	768.32	1.101.59	1.098.54
110	71.13	70.63	177.87	177.36	333.50	332.74	444.68	443.31	778.19	775.40	1.111.70	1.108.65
111	71.81	71.31	179.49	178.98	336.54	335.78	448.72	447.35	785.26	782.47	1.121.80	1.118.75
112	72.44	71.93	181.11	180.60	339.57	338.81	452.76	451.39	792.34	789.53	1.131.91	1.128.86
113	73.09	72.58	182.72	182.21	342.61	341.85	456.81	455.44	799.41	796.62	1.142.02	1.138.97
114	73.75	73.34	184.34	183.83	345.64	344.88	460.85	459.48	806.49	803.70	1.152.12	1.149.07
115	74.37	73.86	185.96	185.45	348.67	347.91	464.89	463.52	813.56	810.77	1.162.23	1.159.18
116	75.02	74.51	187.57	187.06	351.70	350.94	468.93	467.56	820.64	817.83	1.172.34	1.169.29
117	75.68	75.17	189.19	188.68	354.73	353.97	472.98	471.61	827.71	824.92	1.182.44	1.179.39
118	76.33	75.82	190.81	190.30	357.76	357.00	477.02	475.65	834.78	831.99	1.192.55	1.189.50
119	76.95	76.43	192.42	191.91	360.80	360.04	481.06	479.69	841.86	839.06	1.202.66	1.199.62
120	77.63	77.11	194.04	193.53	363.83	363.07	485.10	483.73	848.93	846.14	1.212.76	1.209.71

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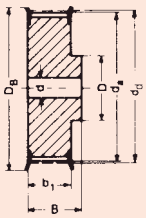
Standard timing belt pulleys for cylindrical bores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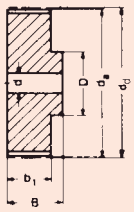
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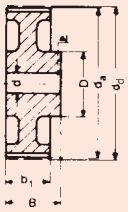
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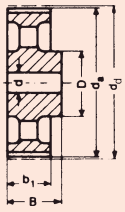
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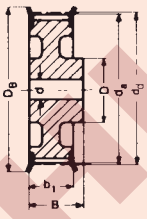
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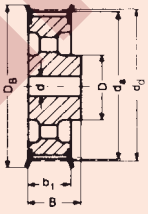
Type 6AF

Section XL – Tooth pitch 5.08 mm for belt widths 025, 031, 037

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	Pilot bored d (mm)	Finish bored d_{max} (mm)	Setscrew	Weight (≈ kg)
10 XL 037	10	6F	St	16.17	15.66	23	14.3	19.8	9.5	5.0	6.4	M3	0.02
11 XL 037	11	6F	St	17.79	17.28	23	14.3	19.8	9.5	5.0	6.4	M3	0.02
12 XL 037	12	6F	St	19.40	18.89	25	14.3	19.8	12.7	5.0	7.9	M3	0.03
14 XL 037	14	6F	St	22.64	22.13	28	14.3	19.8	14.3	6.0	9.5	M4	0.04
15 XL 037	15	6F	St	24.26	23.75	28	14.3	19.8	15.9	6.0	11.1	M4	0.04
16 XL 037	16	6F	St	25.87	25.36	32	14.3	19.8	17.5	6.0	12.7	M4	0.05
18 XL 037	18	6F	St	29.11	28.60	36	14.3	19.8	19.0	6.0	14.3	M4	0.06
20 XL 037	20	6F	St	32.34	31.83	38	14.3	22.2	23.8	6.0	17.5	M4	0.08
21 XL 037	21	6F	St	33.96	33.45	38	14.3	22.2	23.8	6.0	17.5	M4	0.09
22 XL 037	22	6F	St	35.57	35.06	42	14.3	22.2	25.4	6.0	19.1	M4	0.10
24 XL 037	24	6F	St	38.81	38.30	44	14.3	22.2	27.0	6.0	20.6	M4	0.12
26 XL 037	26	6F	St	42.04	41.53	48	14.3	22.2	30.0	6.0	23.0	M4	0.14
28 XL 037	28	6F	St	45.28	44.77	51	14.3	22.2	30.2	6.0	23.0	M4	0.16
30 XL 037	30	6F	St	48.51	48.00	54	14.3	22.2	34.9	6.0	23.0	M4	0.19
32 XL 037	32	6	Al	51.74	51.23	—	14.3	25.4	38.0	8.0	23.0	M4	0.11
36 XL 037	36	6	Al	58.21	57.70	—	14.3	25.4	38.0	8.0	23.0	M4	0.13
40 XL 037	40	6	Al	64.68	64.17	—	14.3	25.4	38.0	8.0	23.0	M4	0.17
42 XL 037	42	6W	Al	67.91	67.40	—	14.3	25.4	38.0	8.0	23.0	M4	0.13
44 XL 037	44	6W	Al	71.15	70.64	—	14.3	25.4	38.0	8.0	23.0	M4	0.15
48 XL 037	48	6W	Al	77.62	77.11	—	14.3	25.4	38.0	8.0	23.0	M4	0.16
60 XL 037	60	6A	Al	97.02	96.51	—	14.3	25.4	38.0	8.0	23.0	M4	0.18
72 XL 037	72	6A	Al	116.43	115.92	—	14.3	25.4	38.0	8.0	23.0	M4	0.23

Section L – Tooth pitch 9.525 mm for belt width 050

10 L 050	10	6F	St	30.32	29.56	36	19	26	22	6.0	13.0	—	0.11
12 L 050	12	6F	St	36.38	35.62	42	19	26	28	6.0	17.0	—	0.19
13 L 050	13	6F	St	39.41	38.65	44	19	26	30	6.0	19.0	—	0.21
14 L 050	14	6F	St	42.45	41.68	48	19	26	33	8.0	20.0	—	0.25
15 L 050	15	6F	St	45.48	44.72	51	19	26	36	8.0	23.0	—	0.30
16 L 050	16	6F	St	48.51	47.75	54	19	26	38	8.0	23.0	—	0.33
17 L 050	17	6F	St	51.54	50.78	57	19	26	40	10.0	24.0	—	0.36
18 L 050	18	6F	St	54.57	53.81	60	19	26	40	10.0	24.0	—	0.41
19 L 050	19	6F	St	57.61	56.84	60	19	26	40	10.0	24.0	—	0.45
20 L 050	20	6F	St	60.64	59.88	66	19	26	46	10.0	28.0	—	0.50
21 L 050	21	6F	St	63.67	62.91	71	19	26	46	10.0	28.0	—	0.55
22 L 050	22	6F	St	66.70	65.94	75	19	26	50	10.0	30.0	—	0.62
24 L 050	24	6F	St	72.77	72.00	79	19	26	50	12.0	30.0	—	0.68
26 L 050	26	6F	St	78.83	78.07	87	19	26	50	12.0	30.0	—	0.82
28 L 050	28	6F	St	84.89	84.13	91	19	26	50	12.0	30.0	—	0.92
30 L 050	30	6F	St	90.96	90.20	97	19	26	50	12.0	30.0	—	1.10
32 L 050	32	6F	St	97.02	96.26	103	19	26	50	12.0	30.0	—	1.20
36 L 050	36	6WF	GG	109.15	108.24	115	19	26	50	12.0	30.0	—	1.00
40 L 050	40	6WF	GG	121.28	120.51	127	19	26	50	12.0	30.0	—	1.10
44 L 050	44	6AF	GG	133.40	132.64	140	19	26	50	12.0	30.0	—	1.20
48 L 050	48	6AF	GG	145.53	144.77	152	19	26	50	12.0	30.0	—	1.30
60 L 050	60	6A	GG	181.91	181.15	—	19	28	50	15.0	30.0	—	1.30
72 L 050	72	6A	GG	218.30	217.53	—	19	28	50	15.0	30.0	—	1.70
84 L 050	84	6A	GG	254.68	253.92	—	19	28	50	15.0	30.0	—	1.90

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St = steel Al = aluminium GG = cast iron Subject to technical changes

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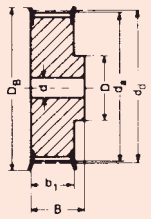
Standard timing belt pulleys for cylindrical bores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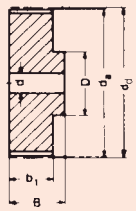
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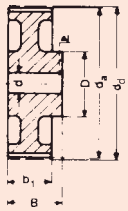
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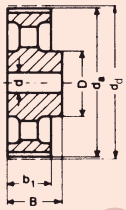
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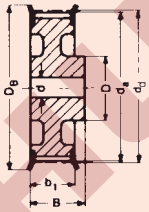
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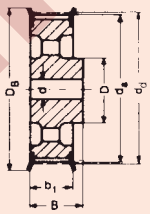
Type 10AF

Section L – Tooth pitch 9.525 mm for belt width 075

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	Pilot bored d (mm)	Finish bored d_{max} (mm)	Weight (≈ kg)
10 L 075	10	6F	St	30.32	29.59	36	25	32	22	6	13	0.15
12 L 075	12	6F	St	36.38	35.62	42	25	32	28	8	17	0.23
13 L 075	13	6F	St	39.41	38.65	44	25	32	30	8	19	0.26
14 L 075	14	6F	St	42.45	41.68	48	25	32	33	8	20	0.32
15 L 075	15	6F	St	45.48	44.72	51	25	32	36	8	23	0.35
16 L 075	16	6F	St	48.51	47.75	54	25	32	38	8	23	0.42
17 L 075	17	6F	St	51.54	50.78	57	25	32	40	10	24	0.45
18 L 075	18	6F	St	54.57	53.81	60	25	32	40	10	24	0.51
19 L 075	19	6F	St	57.61	56.84	60	25	32	40	10	24	0.57
20 L 075	20	6F	St	60.64	59.88	66	25	32	46	10	28	0.63
21 L 075	21	6F	St	63.67	62.91	71	25	32	46	10	28	0.70
22 L 075	22	6F	St	66.70	65.94	75	25	32	50	10	30	0.75
24 L 075	24	6F	St	72.77	72.00	79	25	32	50	12	30	0.85
26 L 075	26	6F	St	78.83	78.07	87	25	32	50	12	30	1.00
28 L 075	28	6F	St	84.89	84.13	91	25	32	50	12	30	1.20
30 L 075	30	6F	St	90.96	90.20	97	25	32	50	12	30	1.40
32 L 075	32	6F	St	97.02	96.26	103	25	32	50	12	30	1.50
36 L 075	36	6WF	GG	109.15	108.38	115	25	32	55	12	32	1.30
40 L 075	40	6WF	GG	121.28	120.51	127	25	32	60	12	35	1.60
44 L 075	44	6AF	GG	133.40	132.64	140	25	32	60	12	35	1.70
48 L 075	48	6AF	GG	145.53	144.77	152	25	32	60	12	35	1.90
60 L 075	60	6A	GG	181.91	181.15	—	26	35	60	15	35	1.80
72 L 075	72	6A	GG	218.30	217.53	—	26	35	60	15	35	2.30
84 L 075	84	6A	GG	254.68	253.92	—	26	35	60	15	35	2.50

Section L – Tooth pitch 9.525 mm for belt width 100

10 L 100	10	6F	St	30.32	29.59	36	31	38	22	6	13	0.81
12 L 100	12	6F	St	36.38	35.62	42	31	38	28	8	17	0.29
13 L 100	13	6F	St	39.41	38.65	44	31	38	30	8	19	0.30
14 L 100	14	6F	St	42.45	41.68	48	31	38	33	8	20	0.38
15 L 100	15	6F	St	45.48	44.72	51	31	38	36	8	23	0.40
16 L 100	16	6F	St	48.51	47.75	54	31	38	38	8	23	0.51
17 L 100	17	6F	St	51.54	50.78	57	31	38	40	10	24	0.54
18 L 100	18	6F	St	54.57	53.81	60	31	38	40	10	24	0.62
19 L 100	19	6F	St	57.61	56.84	60	31	38	40	10	24	0.69
20 L 100	20	6F	St	60.64	59.88	66	31	38	46	10	28	0.76
21 L 100	21	6F	St	63.67	62.91	71	31	38	46	10	28	0.82
22 L 100	22	6F	St	66.70	65.94	75	31	38	50	10	30	0.92
24 L 100	24	6F	St	72.77	72.00	79	31	38	50	12	30	1.10
26 L 100	26	6F	St	78.83	78.07	87	31	38	50	12	30	1.30
28 L 100	28	6F	St	84.89	84.13	91	31	38	50	12	30	1.40
30 L 100	30	6F	St	90.96	90.20	97	31	38	50	12	30	1.70
32 L 100	32	6F	St	97.02	96.26	103	31	38	50	12	30	1.80
36 L 100	36	6CWF	GG	109.15	108.38	115	32	32	55	12	32	1.50
40 L 100	40	6CWF	GG	121.28	120.51	127	32	32	60	12	35	1.80
44 L 100	44	10AF	GG	133.40	132.64	140	32	32	60	12	35	1.90
48 L 100	48	10AF	GG	145.53	144.77	152	32	32	60	12	35	2.10
60 L 100	60	6A	GG	181.91	181.15	—	32	35	60	15	35	2.00
72 L 100	72	6A	GG	218.30	217.53	—	32	35	60	15	35	2.50
84 L 100	84	6A	GG	254.68	253.92	—	32	35	60	15	35	2.70

St = steel GG = cast iron Subject to technical changes

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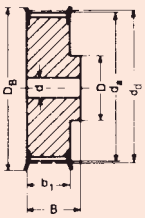
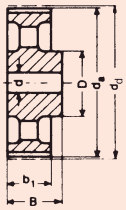

Type 6F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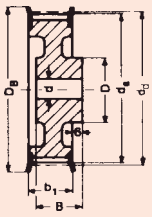
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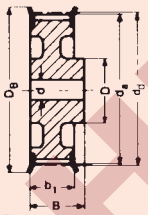
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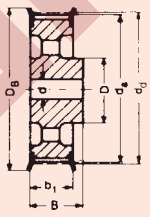
Type 6AF

Section H – Tooth pitch 12.7 mm for belt width 075

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	Pilot bored d (mm)	Finnish bored d_{max} (mm)	Weight (≈ kg)
14 H 075	14	6F	St	56.59	55.22	64.0	26.4	40	40	10	24	0.50
16 H 075	16	6F	St	64.67	63.31	70.0	26.4	40	46	10	26	0.60
18 H 075	18	6F	St	72.77	71.39	79.0	26.4	40	54	12	32	0.80
19 H 075	19	6F	St	76.81	75.44	82.5	26.4	40	58	12	35	1.00
20 H 075	20	6F	St	80.85	79.48	86.0	26.4	40	62	12	35	1.10
21 H 075	21	6F	St	84.89	83.52	91.0	26.4	40	67	12	38	1.20
22 H 075	22	6F	St	88.93	87.56	94.0	26.4	40	70	12	38	1.40
24 H 075	24	6F	St	97.03	95.65	102.0	26.4	40	75	12	42	1.60
26 H 075	26	6F	St	105.11	103.73	112.0	26.4	40	80	15	45	1.80
28 H 075	28	6F	St	113.18	111.82	120.0	26.4	40	80	15	45	2.00
30 H 075	30	6F	St	121.29	119.90	128.0	26.4	40	80	15	45	2.10
32 H 075	32	6F	St	129.30	127.99	135.0	26.4	40	70	15	45	2.20
36 H 075	36	6F	St	145.54	144.16	152.0	26.4	40	80	15	45	2.40
40 H 075	40	6F	St	161.70	160.33	168.0	26.4	40	80	20	45	2.80
44 H 075	44	6A	GG	177.88	176.50	184.0	26.4	40	80	20	45	2.70
48 H 075	48	6A	GG	194.03	192.67	200.0	26.4	40	90	20	50	3.00

Section H – Tooth pitch 12.7 mm for belt width 100

14 H 100	14	6F	St	56.60	55.22	63	31	41	40	10	24	0.65
16 H 100	16	6F	St	64.68	63.31	71	31	41	46	10	28	0.85
18 H 100	18	6F	St	72.77	71.39	79	31	41	54	12	32	1.10
19 H 100	19	6F	St	76.81	75.44	83	31	41	58	12	34	1.20
20 H 100	20	6F	St	80.85	79.48	87	31	41	62	12	35	1.40
21 H 100	21	6F	St	84.89	83.52	91	31	41	67	12	38	1.60
22 H 100	22	6F	St	88.94	87.56	93	31	41	70	12	41	1.70
24 H 100	24	6F	St	97.02	95.65	103	31	41	75	12	45	2.00
26 H 100	26	6CWF	GG	105.11	103.73	111	32	32	55	15	32	1.40
28 H 100	28	6CWF	GG	113.19	111.82	119	32	32	60	15	35	1.60
30 H 100	30	6CWF	GG	121.28	119.90	127	32	32	60	15	35	1.70
32 H 100	32	6WF	GG	129.36	127.99	135	32	40	70	20	40	2.20
36 H 100	36	6WF	GG	145.53	144.16	152	32	40	80	20	45	3.00
40 H 100	40	6AF	GG	161.70	160.33	168	32	40	80	20	45	2.80
44 H 100	44	6AF	GG	177.87	176.50	184	32	40	80	20	45	3.10
48 H 100	48	6AF	GG	194.04	192.67	200	32	40	80	20	45	3.30
60 H 100	60	6A	GG	242.55	241.18	—	34	45	80	20	45	5.50
72 H 100	72	6A	GG	291.06	289.69	—	34	45	80	20	45	7.10
84 H 100*	84	6A	GG	339.57	338.20	—	34	45	80	20	45	8.20
96 H 100*	96	6A	GG	388.08	386.71	—	34	45	80	20	45	9.90
120 H 100*	120	6A	GG	485.10	483.73	—	34	50	90	20	50	13.10

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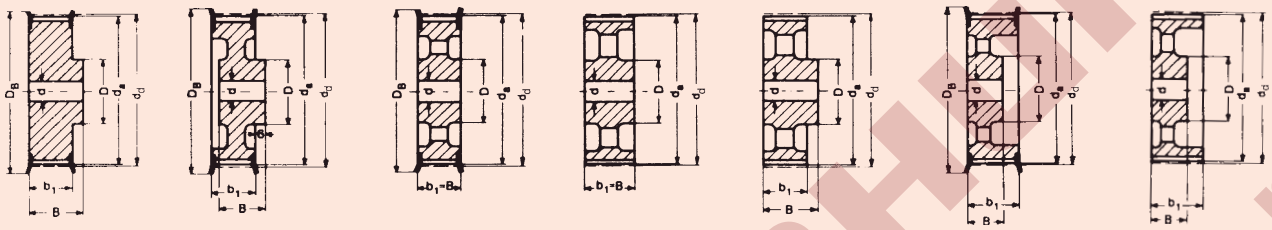

Type 6F | Type 6CWF | Type 10AF | Type 10A | Type 6A | Type 11AF | Type 11A

Section H – Tooth pitch 12,7 mm for belt width 150

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	Pilot bored d (mm)	Finnish bored d_{max} (mm)	Weight (≈ kg)
14 H 150	14	6F	St	56.60	55.22	63	44	54	40	12	24	0.82
16 H 150	16	6F	St	64.68	63.31	71	44	54	46	12	28	1.10
18 H 150	18	6F	St	72.77	71.39	79	44	54	54	12	32	1.50
19 H 150	19	6F	St	76.81	75.44	83	44	54	58	12	34	1.70
20 H 150	20	6F	St	80.85	79.48	87	44	54	62	12	35	1.80
21 H 150	21	6F	St	84.89	83.52	91	44	54	67	12	38	2.20
22 H 150	22	6F	St	88.94	87.56	93	44	54	70	12	41	2.30
24 H 150	24	6F	St	97.02	95.65	103	44	54	75	12	45	2.60
26 H 150	26	6CWF	GG	105.11	103.73	111	45	35	55	15	32	1.70
28 H 150	28	6CWF	GG	113.19	111.82	119	45	35	60	15	35	1.90
30 H 150	30	6CWF	GG	121.28	119.90	127	45	35	60	15	35	2.10
32 H 150	32	6CWF	GG	129.36	127.99	135	45	45	70	20	40	2.60
36 H 150	36	6CWF	GG	145.53	144.16	152	45	45	80	20	45	3.20
40 H 150	40	10AF	GG	161.70	160.33	168	45	45	80	20	45	3.80
44 H 150	44	10AF	GG	177.87	176.50	184	45	45	80	20	45	3.70
48 H 150	48	10AF	GG	194.04	192.67	200	45	45	80	20	45	4.00
60 H 150	60	10A	GG	242.55	241.18	—	46	46	85	20	48	5.10
72 H 150	72	10A	GG	291.06	289.69	—	46	46	85	20	48	7.90
84 H 150*	84	10A	GG	339.57	338.20	—	46	46	85	20	48	8.90
96 H 150*	96	10A	GG	388.08	386.71	—	46	46	85	20	48	10.10
120 H 150*	120	6A	GG	485.10	483.73	—	46	55	95	24	55	17.20

Section H – Tooth pitch 12.7 mm for belt width 200

14 H 200	14	6F	St	56.60	55.22	63	58	68	40	12	24	1.1
16 H 200	16	6F	St	64.68	63.31	71	58	68	46	15	28	1.4
18 H 200	18	6F	St	72.77	71.39	79	58	68	54	15	32	1.8
19 H 200	19	6F	St	76.81	75.44	83	58	68	58	15	34	2.1
20 H 200	20	6F	St	80.85	79.48	87	58	68	62	15	35	2.3
21 H 200	21	6F	St	84.89	83.52	91	58	68	67	15	38	2.6
22 H 200	22	6F	St	88.94	87.56	93	58	68	70	15	41	2.8
24 H 200	24	6F	St	97.02	95.65	103	58	68	75	15	45	3.4
26 H 200	26	6CWF	GG	105.11	103.73	111	58	42	60	15	35	2.3
28 H 200	28	6CWF	GG	113.19	111.82	119	58	42	60	15	35	2.5
30 H 200	30	6CWF	GG	121.28	119.90	127	58	42	70	15	40	2.9
32 H 200	32	6CWF	GG	129.36	127.99	135	58	47	70	20	40	3.2
36 H 200	36	6CWF	GG	145.53	144.16	152	58	47	80	20	45	3.8
40 H 200	40	11AF	GG	161.70	160.33	168	58	45	80	20	45	4.1
44 H 200	44	11AF	GG	177.87	176.50	184	58	45	80	20	45	4.4
48 H 200	48	11AF	GG	194.04	192.67	200	58	45	85	20	48	5.1
60 H 200	60	11A	GG	242.55	241.18	—	60	50	90	20	50	7.1
72 H 200	72	11A	GG	291.06	289.69	—	60	50	90	20	50	8.0
84 H 200*	84	11A	GG	339.57	338.20	—	60	50	90	20	50	12.0
96 H 200*	96	11A	GG	388.08	386.71	—	60	50	90	20	50	13.6
120 H 200*	120	10A	GG	485.10	483.73	—	60	60	100	24	57	16.6

St = steel GG = cast iron Subject to technical changes *Non stock items.

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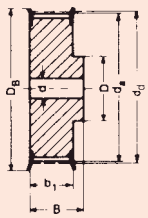
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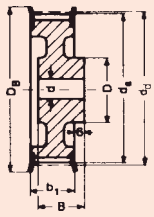
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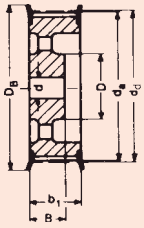
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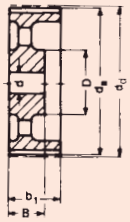
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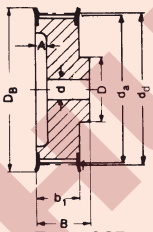
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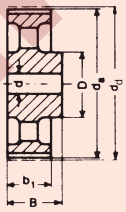
Type 6A

Section H – Tooth pitch 12.7 mm for belt width 300

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	A (mm)	Pilot bored d (mm)	Finnish bored d_{max} (mm)	Weight (≈ kg)
16 H 300	16	6F	St	64.68	63.31	71	84	94	46	—	15	28	2.0
18 H 300	18	6F	St	72.77	71.39	79	84	94	54	—	15	32	2.6
19 H 300	19	6F	St	76.81	75.44	83	84	94	58	—	15	34	2.9
20 H 300	20	6F	St	80.85	79.48	87	84	94	62	—	15	35	3.2
21 H 300	21	6F	St	84.89	83.52	91	84	94	67	—	15	38	3.6
22 H 300	22	6F	St	88.94	87.56	93	84	94	70	—	15	41	4.0
24 H 300	24	6F	St	97.02	95.65	103	84	94	75	—	15	45	4.7
26 H 300	26	6CWF	GG	105.11	103.73	111	84	57	60	—	15	35	3.3
28 H 300	28	6CWF	GG	113.19	111.82	119	84	57	60	—	15	35	3.6
30 H 300	30	6CWF	GG	121.28	119.90	127	84	57	70	—	15	40	4.2
32 H 300	32	6CWF	GG	129.36	127.99	135	84	57	70	—	20	40	4.3
36 H 300	36	6CWF	GG	145.53	144.16	152	84	57	80	—	20	45	5.2
40 H 300	40	11AF	GG	161.70	160.33	168	84	55	80	—	20	45	5.6
44 H 300	44	11AF	GG	177.87	176.50	184	84	55	80	—	20	45	5.9
48 H 300	48	11AF	GG	194.04	192.67	200	84	55	85	—	20	48	6.6
60 H 300	60	11A	GG	242.55	241.18	—	86	55	100	—	20	57	9.9
72 H 300	72	11A	GG	291.06	289.69	—	86	55	100	—	20	57	13.0
84 H 300*	84	11A	GG	339.57	338.20	—	86	55	100	—	20	57	15.1
96 H 300*	96	11A	GG	388.08	386.71	—	86	55	100	—	20	57	18.2
120 H 300*	120	11A	GG	485.10	483.73	—	86	65	110	—	24	62	26.0

Section XH – Tooth pitch 22.225 mm for belt width 200

18 XH 200*	18	6CF	GG	127.34	124.55	142	64.4	60	85	18	20	50	5.0
20 XH 200*	20	6CF	GG	141.49	138.69	155	64.4	60	95	18	20	55	6.0
22 XH 200*	22	6CF	GG	155.64	152.84	170	64.4	60	110	18	20	65	7.2
24 XH 200*	24	6CF	GG	169.79	166.69	184	64.4	60	125	18	25	70	8.6
26 XH 200*	26	6CF	GG	183.94	181.14	198	64.4	60	140	18	25	80	10.1
28 XH 200*	28	6CWF	GG	198.08	195.29	212	64.4	60	120	18	25	70	9.6
30 XH 200*	30	6CWF	GG	212.23	209.44	227	64.4	60	120	18	25	70	10.4
32 XH 200*	32	6CWF	GG	226.38	223.59	240	64.4	60	130	18	25	75	11.2
40 XH 200*	40	6CWF	GG	282.98	280.18	297	64.4	60	140	18	25	80	16.0
48 XH 200*	48	6A	GG	339.57	336.78	—	65.0	80	150	—	30	85	18.4
60 XH 200*	60	6A	GG	424.47	421.67	—	65.0	80	150	—	30	85	24.3
72 XH 200*	72	6A	GG	509.36	506.57	—	65.0	80	150	—	40	85	28.1
84 XH 200*	84	6A	GG	594.25	591.46	—	65.0	80	160	—	40	90	31.9
96 XH 200*	96	6A	GG	679.15	676.35	—	65.0	80	160	—	40	90	37.0

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*Non stock items. St = steel GG = cast iron Subject to technical changes

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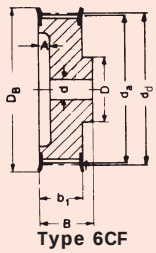
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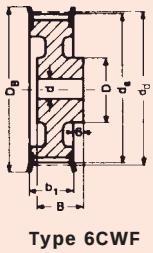
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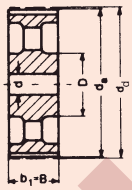
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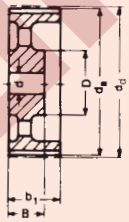
Type 11A

Section XH – Tooth pitch 22.225 mm for belt width 300

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	D (mm)	A (mm)	Pilot bored d (mm)	Finnish bored d_{max} (mm)	Weight (≈ kg)
18 XH 300*	18	6CF	GG	127.34	124.55	142	91.4	70	85	35	20	50	6.8
20 XH 300*	20	6CF	GG	141.49	138.69	155	91.4	70	95	35	20	55	7.4
22 XH 300*	22	6CF	GG	155.64	152.84	170	91.4	70	110	35	20	65	9.0
24 XH 300*	24	6CF	GG	169.79	166.69	184	91.4	70	125	35	25	70	10.6
26 XH 300*	26	6CF	GG	183.94	181.14	198	91.4	70	140	35	25	80	13.0
28 XH 300*	28	6CWF	GG	198.08	195.29	212	91.4	70	120	35	25	70	12.0
30 XH 300*	30	6CWF	GG	212.23	209.44	227	91.4	70	120	35	25	70	13.0
32 XH 300*	32	6CWF	GG	226.38	223.59	240	91.4	70	130	35	25	75	14.7
40 XH 300*	40	6CWF	GG	282.98	280.18	297	91.4	70	140	35	25	80	19.9
48 XH 300*	48	10A	GG	339.57	336.78	—	92.0	92	150	—	30	85	22.5
60 XH 300*	60	10A	GG	424.47	421.67	—	92.0	92	150	—	30	85	31.5
72 XH 300*	72	10A	GG	509.36	506.57	—	92.0	92	150	—	40	85	36.4
84 XH 300*	84	10A	GG	594.25	591.46	—	92.0	92	160	—	40	90	43.4
96 XH 300*	96	10A	GG	679.15	676.35	—	92.0	92	160	—	40	90	48.5

Section XH – Tooth pitch 22.225 mm for belt width 400

18 XH 400*	18	6CF	GG	127.34	124.55	142	118.4	85	85	47	20	50	8.5
20 XH 400*	20	6CF	GG	141.49	138.69	155	118.4	85	95	47	20	55	9.4
22 XH 400*	22	6CF	GG	155.64	152.84	170	118.4	85	110	47	20	65	11.5
24 XH 400*	24	6CF	GG	169.79	166.69	184	118.4	85	125	47	25	70	13.4
26 XH 400*	26	6CF	GG	183.94	181.14	198	118.4	85	140	47	25	80	15.6
28 XH 400*	28	6CWF	GG	198.08	195.29	212	118.4	85	120	47	25	70	14.5
30 XH 400*	30	6CWF	GG	212.23	209.44	227	118.4	85	120	47	25	70	16.0
32 XH 400*	32	6CWF	GG	226.38	223.59	240	118.4	85	130	47	25	75	18.0
40 XH 400*	40	6CWF	GG	282.98	280.18	297	118.4	85	140	47	25	80	24.0
48 XH 400*	48	11A	GG	339.57	336.78	—	119.0	92	150	—	30	85	30.8
60 XH 400*	60	11A	GG	424.47	421.67	—	119.0	92	150	—	30	85	36.2
72 XH 400*	72	11A	GG	509.36	506.57	—	119.0	92	150	—	40	85	42.7
84 XH 400*	84	11A	GG	594.25	591.46	—	119.0	92	160	—	40	90	49.7
96 XH 400*	96	11A	GG	679.15	676.35	—	119.0	92	160	—	40	90	59.9

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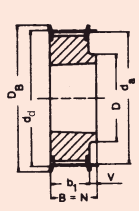
Standard timing belt pulleys for taper bushes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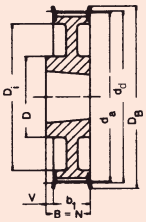
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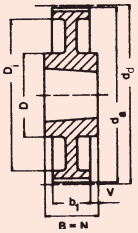
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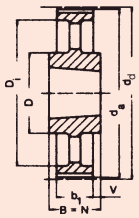
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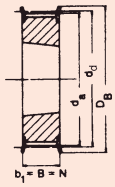
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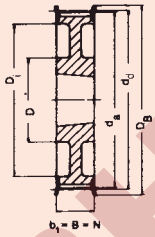
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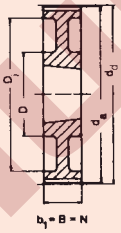
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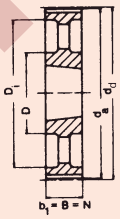
Type 3A

Section L – Tooth pitch 9.525 mm for belt width 050

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 18 L 050	18	8F	St	54.57	53.81	60	19.0	22.0	22.0	3.0	—	44	—	1108	0.2
TB 19 L 050	19	8F	St	57.61	56.84	60	19.0	22.0	22.0	3.0	—	44	—	1108	0.2
TB 20 L 050	20	8F	St	60.64	59.88	66	19.0	22.0	22.0	3.0	—	48	—	1108	0.2
TB 21 L 050	21	8F	St	63.67	62.91	71	19.0	22.0	22.0	3.0	—	48	—	1108	0.3
TB 22 L 050	22	8F	St	66.70	65.94	75	19.0	22.0	22.0	3.0	—	51	—	1108	0.3
TB 23 L 050	23	8F	St	69.73	68.97	79	19.0	22.0	22.0	3.0	—	54	—	1108	0.4
TB 24 L 050	24	8F	St	72.77	72.00	79	19.0	22.0	22.0	3.0	—	54	—	1108	0.4
TB 25 L 050	25	8F	St	75.80	75.04	83	19.0	22.0	22.0	3.0	—	56	—	1108	0.5
TB 26 L 050	26	8F	St	78.83	78.07	87	19.0	22.0	22.0	3.0	—	60	—	1108	0.5
TB 27 L 050	27	8F	St	81.86	81.10	87	19.0	22.0	22.0	3.0	—	65	—	1108	0.6
TB 28 L 050	28	8F	St	84.89	84.13	91	19.0	22.0	22.0	3.0	—	65	—	1108	0.6
TB 30 L 050	30	8F	St	90.96	90.20	97	19.0	22.0	22.0	3.0	—	70	—	1108	0.8
TB 32 L 050	32	8F	St	97.02	96.26	103	19.0	22.0	22.0	3.0	—	74	—	1108	0.9
TB 36 L 050	36	8F	GG	109.15	108.39	115	19.0	22.0	22.0	3.0	—	87	—	1108	1.2
TB 40 L 050	40	8F	GG	121.28	120.51	127	19.0	25.0	25.0	6.0	—	97	—	1610	1.5
TB 48 L 050	48	8WF	GG	145.53	144.77	152	19.0	25.0	25.0	6.0	—	88	124	1610	2.3
TB 60 L 050	60	7W	GG	181.91	181.15	—	19.0	25.0	25.0	3.0	—	92	166	1610	2.0
TB 72 L 050	72	7A	GG	218.30	217.53	—	19.0	25.0	25.0	3.0	—	92	202	1610	3.0
TB 84 L 050	84	7A	GG	254.68	253.90	—	19.0	25.0	25.0	3.0	—	92	236	1610	4.0
TB 96 L 050	96	7A	GG	291.06	290.30	—	19.0	32.0	32.0	6.5	—	106	270	2012	5.5
TB 120 L 050	120	7A	GG	363.83	363.07	—	19.0	32.0	32.0	6.5	—	106	343	2012	6.8

Section L – Tooth pitch 9.525 mm for belt width 075

TB 18 L 075	18	3F	St	54.57	53.81	60	25.0	25.0	25.0	—	—	—	—	1108	0.2
TB 19 L 075	19	3F	St	57.61	56.84	60	25.0	25.0	25.0	—	—	—	—	1108	0.3
TB 20 L 075	20	3F	St	60.64	59.88	66	25.0	25.0	25.0	—	—	—	—	1108	0.3
TB 21 L 075	21	3F	St	63.67	62.91	71	25.0	25.0	25.0	—	—	—	—	1108	0.4
TB 22 L 075	22	3F	St	66.70	65.94	75	25.0	25.0	25.0	—	—	—	—	1108	0.4
TB 23 L 075	23	3F	St	69.73	68.97	79	25.0	25.0	25.0	—	—	—	—	1108	0.4
TB 24 L 075	24	3F	St	72.77	72.00	79	25.0	25.0	25.0	—	—	—	—	1108	0.5
TB 25 L 075	25	3F	St	75.80	75.04	83	25.0	25.0	25.0	—	—	—	—	1108	0.6
TB 26 L 075	26	3F	St	78.83	78.07	87	25.0	25.0	25.0	—	—	—	—	1108	0.6
TB 27 L 075	27	3F	St	81.86	81.10	87	25.0	25.0	25.0	—	—	—	—	1108	0.7
TB 28 L 075	28	3F	St	84.89	84.13	91	25.0	25.0	25.0	—	—	—	—	1108	0.7
TB 30 L 075	30	3F	St	90.96	90.20	97	25.0	25.0	25.0	—	—	—	—	1108	0.9
TB 32 L 075	32	3F	St	97.02	96.26	103	25.0	25.0	25.0	—	—	—	—	1108	1.0
TB 36 L 075	36	3F	GG	109.15	108.39	115	25.0	25.0	25.0	—	—	—	—	1610	1.2
TB 40 L 075	40	3F	GG	121.28	120.51	127	25.0	25.0	25.0	—	—	—	—	1610	1.7
TB 48 L 075	48	3WF	GG	145.53	144.77	152	25.0	25.0	25.0	—	—	92	124	1610	2.5
TB 60 L 075	60	3W	GG	181.91	181.15	—	25.0	25.0	25.0	—	—	92	166	1610	3.0
TB 72 L 075	72	3A	GG	218.30	217.53	—	25.0	25.0	25.0	—	—	92	202	1610	4.0
TB 84 L 075	84	7A	GG	254.68	253.90	—	25.0	32.0	32.0	3.5	—	106	236	2012	5.2
TB 96 L 075	96	7A	GG	291.06	290.30	—	25.0	32.0	32.0	3.5	—	106	270	2012	6.5
TB 120 L 075	120	7A	GG	363.83	363.07	—	25.0	32.0	32.0	3.5	—	106	343	2012	7.6

Taper bush	1108	1610	2012
Bore d_2 (mm) from ... to ...	10-28	14-42	14-50

St = steel
GG = cast iron
Subject to technical changes

Bore diameters d_2 see page 52

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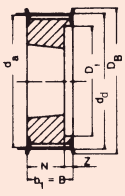
Standard timing belt pulleys for taper bushes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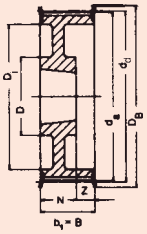
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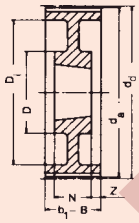
Type 9W


Type 3A

Section L – Tooth pitch 9.525 mm for belt width 100

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 18 L 100	18	5F	St	54.57	53.81	60	31.0	31.0	22.0	—	9.0	—	38	1108	0.2
TB 19 L 100	19	5F	St	57.61	56.84	60	31.0	31.0	22.0	—	9.0	—	38	1108	0.3
TB 20 L 100	20	5F	St	60.64	59.88	66	31.0	31.0	22.0	—	9.0	—	45	1108	0.4
TB 21 L 100	21	5F	St	63.67	62.91	71	31.0	31.0	22.0	—	9.0	—	47	1108	0.4
TB 22 L 100	22	5F	St	66.70	65.94	75	31.0	31.0	22.0	—	9.0	—	51	1108	0.4
TB 23 L 100	23	5F	St	69.73	68.97	79	32.0	32.0	22.0	—	10.0	—	54	1108	0.5
TB 24 L 100	24	5F	St	72.77	72.00	79	32.0	32.0	22.0	—	10.0	—	54	1108	0.6
TB 25 L 100	25	5F	St	75.80	75.04	83	32.0	32.0	22.0	—	10.0	—	56	1108	0.6
TB 26 L 100	26	5F	St	78.83	78.07	87	32.0	32.0	22.0	—	10.0	—	60	1108	0.7
TB 27 L 100	27	5F	St	81.86	81.10	87	32.0	32.0	22.0	—	10.0	—	62	1108	0.8
TB 28 L 100	28	5F	St	84.89	84.13	91	32.0	32.0	22.0	—	10.0	—	65	1108	0.8
TB 30 L 100	30	5F	St	90.96	90.20	97	32.0	32.0	25.0	—	7.0	—	71	1210	0.9
TB 32 L 100	32	5F	St	97.02	96.26	103	32.0	32.0	25.0	—	7.0	—	75	1210	1.0
TB 36 L 100	36	5F	GG	109.15	108.39	115	32.0	32.0	25.0	—	7.0	—	89	1610	1.4
TB 40 L 100	40	5F	GG	121.28	120.51	127	32.0	32.0	25.0	—	7.0	—	101	1610	1.7
TB 48 L 100	48	5WF	GG	145.53	144.77	152	32.0	32.0	25.0	—	7.0	92	124	1610	2.7
TB 60 L 100	60	9W	GG	181.91	181.15	—	32.0	32.0	25.0	—	3.5	92	166	1610	2.4
TB 72 L 100	72	3A	GG	218.30	217.53	—	32.0	32.0	32.0	—	—	106	202	2012	4.4
TB 84 L 100	84	3A	GG	254.68	253.90	—	32.0	32.0	32.0	—	—	106	236	2012	6.0
TB 96 L 100	96	3A	GG	291.06	290.30	—	32.0	32.0	32.0	—	—	106	270	2012	7.1
TB 120 L 100	120	3A	GG	363.83	363.07	—	32.0	32.0	32.0	—	—	106	343	2012	8.5

Taper bush	1108	1210	1610	2012
Bore d_2 (mm) from … to …	10-28	11-32	14-42	14-50

St = steel
GG = cast iron
Subject to technical changes

Bore diameters d_2 see page 52

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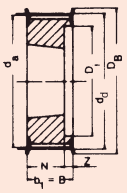
Standard timing belt pulleys for taper bushes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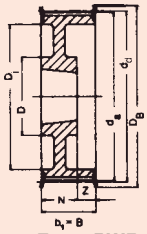
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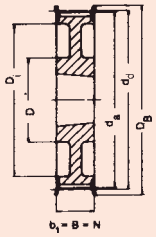
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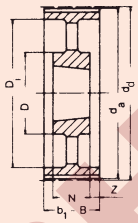
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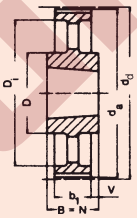
Type 7A

Section H – Tooth pitch 12.7 mm for belt width 100

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 16 H 100	16	5F	St	64.68	63.31	71	31.0	31.0	22.0	—	9.0	—	45	1108	0.4
TB 18 H 100	18	5F	St	72.77	71.39	79	31.0	31.0	25.0	—	6.0	—	52	1210	0.5
TB 19 H 100	19	5F	St	76.81	75.44	83	31.0	31.0	25.0	—	6.0	—	56	1210	0.6
TB 20 H 100	20	5F	St	80.55	79.48	87	31.0	31.0	25.0	—	6.0	—	60	1210	0.7
TB 21 H 100	21	5F	GG	84.89	83.52	91	32.0	32.0	25.0	—	7.0	—	63	1210	0.8
TB 22 H 100	22	5F	GG	88.94	87.56	93	32.0	32.0	25.0	—	7.0	—	67	1210	0.9
TB 23 H 100	23	5F	GG	92.98	91.61	97	32.0	32.0	25.0	—	7.0	—	71	1610	0.9
TB 24 H 100	24	5F	GG	97.02	95.65	103	32.0	32.0	25.0	—	7.0	—	75	1610	1.0
TB 25 H 100	25	5F	GG	101.06	99.69	106	32.0	32.0	25.0	—	7.0	—	79	1610	1.0
TB 26 H 100	26	5F	GG	105.11	103.73	111	32.0	32.0	25.0	—	7.0	—	83	1610	1.2
TB 27 H 100	27	5F	GG	109.15	107.78	115	32.0	32.0	25.0	—	7.0	—	87	1610	1.3
TB 28 H 100	28	5F	GG	113.19	111.82	119	32.0	32.0	25.0	—	7.0	—	91	1610	1.5
TB 30 H 100	30	5F	GG	121.28	119.90	127	32.0	32.0	25.0	—	7.0	—	99	1610	1.7
TB 32 H 100	32	5WF	GG	129.36	127.99	135	32.0	32.0	25.0	—	7.0	92	108	1610	2.0
TB 36 H 100	36	5WF	GG	145.53	144.16	152	32.0	32.0	25.0	—	7.0	92	124	1610	2.7
TB 40 H 100	40	5WF	GG	161.70	160.33	168	32.0	32.0	25.0	—	7.0	92	140	1610	3.6
TB 44 H 100	44	3WF	GG	177.87	176.50	184	32.0	32.0	32.0	—	—	106	153	2012	3.8
TB 48 H 100	48	3WF	GG	194.04	192.67	200	32.0	32.0	32.0	—	—	106	169	2012	3.2
TB 60 H 100	60	9A	GG	242.55	241.18	—	34.0	34.0	32.0	—	1.0	106	223	2012	4.8
TB 72 H 100	72	9A	GG	291.06	289.69	—	34.0	34.0	32.0	—	1.0	106	270	2012	5.7
TB 84 H 100*	84	9A	GG	339.57	338.20	—	34.0	34.0	32.0	—	1.0	106	318	2012	6.8
TB 96 H 100*	96	7A	GG	388.08	386.71	—	34.0	45.0	45.0	5.5	—	119	366	2517	8.2
TB 120 H 100*	120	7A	GG	485.10	483.73	—	34.0	45.0	45.0	5.5	—	119	462	2517	12.1

Section H – Tooth pitch 12.7 mm for belt width 150

TB 18 H 150	18	5F	St	72.77	71.39	79	45.0	45.0	25.0	—	20.0	—	53	1210	0.6
TB 19 H 150	19	5F	St	76.81	75.44	83	45.0	45.0	25.0	—	20.0	—	56	1210	0.7
TB 20 H 150	20	5F	St	80.55	79.48	87	45.0	45.0	25.0	—	20.0	—	60	1210	0.8
TB 21 H 150	21	5F	GG	84.89	83.52	91	45.0	45.0	25.0	—	20.0	—	64	1210	1.0
TB 22 H 150	22	5F	GG	88.94	87.56	93	45.0	45.0	25.0	—	20.0	—	68	1210	1.2
TB 23 H 150	23	5F	GG	92.98	91.61	97	45.0	45.0	25.0	—	20.0	—	71	1610	1.3
TB 24 H 150	24	5F	GG	97.02	95.65	103	45.0	45.0	25.0	—	20.0	—	74	1610	1.2
TB 25 H 150	25	5F	GG	101.06	99.69	106	45.0	45.0	25.0	—	20.0	—	78	1610	1.2
TB 26 H 150	26	5F	GG	105.11	103.73	111	45.0	45.0	25.0	—	20.0	—	82	1610	1.4
TB 27 H 150	27	5F	GG	109.15	107.78	115	45.0	45.0	25.0	—	20.0	—	87	1610	1.6
TB 28 H 150	28	5F	GG	113.19	111.82	119	45.0	45.0	25.0	—	20.0	—	91	1610	1.8
TB 30 H 150	30	5F	GG	121.28	119.90	127	45.0	45.0	25.0	—	20.0	—	99	1610	2.0
TB 32 H 150	32	5WF	GG	129.36	127.99	135	45.0	45.0	25.0	—	20.0	92	108	1610	2.3
TB 36 H 150	36	5WF	GG	145.53	144.16	152	45.0	45.0	25.0	—	20.0	92	124	1610	3.1
TB 40 H 150	40	5WF	GG	161.70	160.33	168	45.0	45.0	25.0	—	20.0	92	140	1610	4.0
TB 44 H 150	44	5WF	GG	177.87	176.50	184	45.0	45.0	32.0	—	13.0	106	153	2012	4.4
TB 48 H 150	48	5WF	GG	194.04	192.67	200	45.0	45.0	32.0	—	13.0	106	169	2012	4.8
TB 60 H 150	60	9A	GG	242.55	241.18	—	46.0	46.0	32.0	—	7.0	106	223	2012	5.4
TB 72 H 150	72	9A	GG	291.06	289.69	—	46.0	46.0	32.0	—	7.0	106	270	2012	6.5
TB 84 H 150*	84	9A	GG	339.57	338.20	—	46.0	46.0	32.0	—	7.0	106	320	2012	8.4
TB 96 H 150*	96	9A	GG	388.08	386.71	—	46.0	46.0	45.0	—	0.5	119	366	2517	11.0
TB 120 H 150*	120	9A	GG	485.10	483.73	—	46.0	46.0	45.0	—	0.5	119	462	2517	14.8

Taper bush	1108	1210	1610	2012	2517
Bore d_2 (mm) from … to …	10-28	11-32	14-42	14-50	16-60

St = steel
GG = cast iron
Subject to technical changes

Bore diameters d_2 see page 52

*Non stock iterms.

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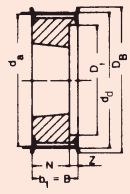
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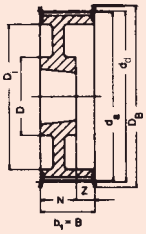
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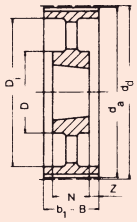
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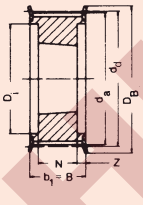
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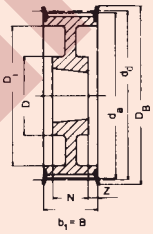
Type 4WF

Section H – Tooth pitch 12.7 mm for belt width 200

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 18 H 200	18	5F	St	72.77	71.39	79	58.0	58.0	25.0	—	33.0	—	52	1210	0.8
TB 19 H 200	19	5F	St	76.81	75.44	83	58.0	58.0	25.0	—	33.0	—	56	1610	0.9
TB 20 H 200	20	5F	St	80.55	79.48	87	58.0	58.0	25.0	—	33.0	—	60	1610	1.0
TB 21 H 200	21	5F	GG	84.89	83.52	91	58.0	58.0	25.0	—	33.0	—	64	1610	1.7
TB 22 H 200	22	5F	GG	88.94	87.56	93	58.0	58.0	25.0	—	33.0	—	68	1610	1.5
TB 23 H 200	23	5F	GG	92.98	91.61	97	58.0	58.0	25.0	—	33.0	—	71	1610	1.8
TB 24 H 200	24	5F	GG	97.02	95.65	103	58.0	58.0	25.0	—	33.0	—	74	1610	1.5
TB 25 H 200	25	5F	GG	101.06	99.69	106	58.0	58.0	25.0	—	33.0	—	78	1610	1.5
TB 26 H 200	26	5F	GG	105.11	103.73	111	58.0	58.0	25.0	—	33.0	—	82	1610	1.8
TB 27 H 200	27	5F	GG	109.15	107.78	115	58.0	58.0	25.0	—	33.0	—	87	1610	1.9
TB 28 H 200	28	5F	GG	113.19	111.82	119	58.0	58.0	25.0	—	33.0	—	91	1610	1.9
TB 30 H 200	30	5F	GG	121.28	119.90	127	58.0	58.0	25.0	—	33.0	—	99	1610	2.3
TB 32 H 200	32	5F	GG	129.36	127.99	135	58.0	58.0	32.0	—	26.0	—	107	2012	3.0
TB 36 H 200	36	5WF	GG	145.53	144.16	152	58.0	58.0	32.0	—	26.0	102	124	2012	3.0
TB 40 H 200	40	5WF	GG	161.70	160.33	168	58.0	58.0	32.0	—	26.0	106	140	2012	3.6
TB 44 H 200	44	5WF	GG	177.87	176.50	184	58.0	58.0	32.0	—	26.0	106	153	2012	4.5
TB 48 H 200	48	5WF	GG	194.04	192.67	200	58.0	58.0	45.0	—	13.0	119	169	2517	4.6
TB 60 H 200	60	9A	GG	242.55	241.18	—	60.0	60.0	45.0	—	7.5	119	223	2517	7.0
TB 72 H 200	72	9A	GG	291.06	289.69	—	60.0	60.0	45.0	—	7.5	119	270	2517	8.0
TB 84 H 200*	84	9A	GG	339.57	338.20	—	60.0	60.0	45.0	—	7.5	119	320	2517	9.0
TB 96 H 200*	96	9A	GG	388.08	386.71	—	60.0	60.0	45.0	—	7.5	119	366	2517	11.5
TB 120 H 200*	120	9A	GG	485.10	483.73	—	60.0	60.0	45.0	—	7.5	119	462	2517	15.4

Section H – Tooth pitch 12.7 mm for belt width 300

TB 20 H 300	20	4F	St	80.55	79.48	87	84.0	84.0	38.0	—	23.0	—	65	1615	1.5
TB 21 H 300	21	4F	GG	84.89	83.52	91	84.0	84.0	38.0	—	23.0	—	66	1615	1.2
TB 22 H 300	22	4F	GG	88.94	87.56	93	84.0	84.0	38.0	—	23.0	—	67	1615	1.6
TB 23 H 300	23	4F	GG	92.98	91.61	97	84.0	84.0	38.0	—	23.0	—	71	1615	1.8
TB 24 H 300	24	4F	GG	97.02	95.65	103	84.0	84.0	38.0	—	23.0	—	75	1615	2.1
TB 25 H 300	25	4F	GG	101.06	99.69	106	84.0	84.0	38.0	—	23.0	—	79	1615	2.0
TB 26 H 300	26	4F	GG	105.11	103.73	111	84.0	84.0	38.0	—	23.0	—	83	1615	2.7
TB 27 H 300	27	4F	GG	109.15	107.78	115	84.0	84.0	32.0	—	26.0	—	87	2012	3.0
TB 28 H 300	28	4F	GG	113.19	111.82	119	84.0	84.0	32.0	—	26.0	—	91	2012	2.4
TB 30 H 300	30	4F	GG	121.28	119.90	127	84.0	84.0	32.0	—	26.0	—	99	2012	2.9
TB 32 H 300	32	4F	GG	129.36	127.99	135	84.0	84.0	45.0	—	19.5	—	107	2517	3.3
TB 36 H 300	36	4F	GG	145.53	144.16	152	84.0	84.0	45.0	—	19.5	—	124	2517	4.5
TB 40 H 300	40	4F	GG	161.70	160.33	168	84.0	84.0	45.0	—	19.5	—	137	2517	6.0
TB 44 H 300	44	4WF	GG	177.87	176.50	184	86.0	86.0	45.0	—	20.5	119	153	2517	6.6
TB 48 H 300	48	4WF	GG	194.04	192.67	200	86.0	86.0	45.0	—	20.5	119	169	2517	7.6
TB 60 H 300	60	9A	GG	242.55	241.18	—	86.0	86.0	45.0	—	20.5	119	223	2517	8.4
TB 72 H 300	72	9A	GG	291.06	289.69	—	86.0	86.0	45.0	—	20.5	119	270	2517	10.4
TB 84 H 300*	84	9A	GG	339.57	338.20	—	86.0	86.0	45.0	—	20.5	119	320	2517	12.5
TB 96 H 300*	96	9A	GG	388.08	386.71	—	86.0	86.0	76.0	—	5.0	150	362	3030	14.2
TB 120 H 300*	120	9A	GG	485.10	483.73	—	86.0	86.0	76.0	—	5.0	150	460	3030	18.8

Taper bush	1210	1610	1615	2012	2517	3030
Bore d_2 (mm) from … to …	11-32	14-42	14-42	14-50	16-60	35-75

St = steel
GG = cast iron
Subject to technical changes

Bore diameters d_2 see page 52

*Non stock items.

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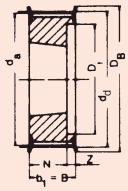
Standard timing belt pulleys for taper bushes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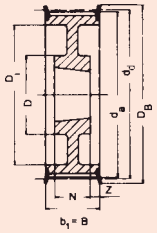
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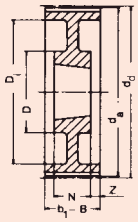
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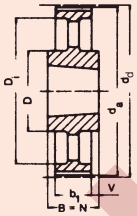
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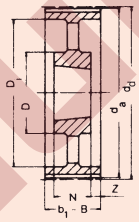
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Section XH – Tooth pitch 22.225 mm for belt width 200

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 18 XH 200*	18	5F	GG	127.34	124.55	138	64	64	45	—	20.0	—	95	2517	2.6
TB 20 XH 200*	20	5F	GG	141.49	138.69	154	64	64	45	—	20.0	—	110	2517	3.6
TB 22 XH 200*	22	5F	GG	155.64	152.84	168	64	64	45	—	20.0	—	120	2517	4.8
TB 24 XH 200*	24	5F	GG	169.79	166.69	183	64	64	45	—	20.0	—	135	2517	6.1
TB 26 XH 200*	26	5F	GG	183.94	181.14	198	64	64	45	—	20.0	—	150	2517	7.4
TB 28 XH 200*	28	4WF	GG	198.08	195.29	211	64	64	45	—	10.0	120	165	2517	9.0
TB 30 XH 200*	30	4WF	GG	212.23	209.44	226	64	64	45	—	10.0	120	180	2517	8.6
TB 32 XH 200*	32	4WF	GG	226.38	223.59	240	64	64	45	—	10.0	120	195	2517	9.8
TB 40 XH 200*	40	4WF	GG	282.98	280.18	296	64	64	51	—	7.0	160	245	3020	13.3
TB 48 XH 200*	48	9W	GG	339.57	336.78	—	64	64	51	—	7.0	160	300	3020	19.0

Section XH – Tooth pitch 22.225 mm for belt width 300

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 18 XH 300*	18	5F	GG	127.34	124.55	138	90	90	45	—	45.0	—	95	2517	3.7
TB 20 XH 300*	20	5F	GG	141.49	138.69	154	90	90	45	—	45.0	—	110	2517	4.7
TB 22 XH 300*	22	5F	GG	155.64	152.84	168	90	90	45	—	45.0	—	120	2517	6.0
TB 24 XH 300*	24	5F	GG	169.79	166.69	183	90	90	45	—	45.0	—	135	2517	7.6
TB 26 XH 300*	26	5F	GG	183.94	181.14	198	90	90	45	—	45.0	—	150	2517	9.8
TB 28 XH 300*	28	5F	GG	198.08	195.29	211	90	90	51	—	39.0	—	165	3020	11.6
TB 30 XH 300*	30	5F	GG	212.23	209.44	226	90	90	51	—	39.0	—	180	3020	11.9
TB 32 XH 300*	32	5F	GG	226.38	223.59	240	90	90	51	—	39.0	—	195	3020	13.8
TB 40 XH 300*	40	4WF	GG	282.98	280.18	296	90	90	51	—	19.5	160	245	3020	19.5
TB 48 XH 300*	48	9W	GG	339.57	336.78	—	90	90	51	—	19.5	160	300	3020	27.0

Taper bush	2012	2517	3020	3535
Bore d_2 (mm) from … to …	14-50	16-60	25-75	35-90

GG = cast iron
Subject to technical changes

Bore diameters d_2 see page 52

*Non stock items.

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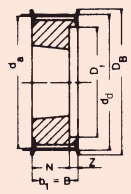
Standard timing belt pulleys for taper bushes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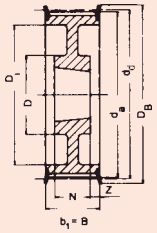
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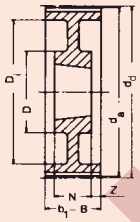
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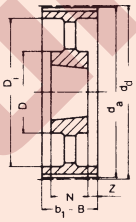
Type 9A

Section XH – Tooth pitch 22.225 mm for belt width 400

Designation	Number of teeth	Type	Material	d_p (mm)	d_a (mm)	D_B (mm)	b_1 (mm)	B (mm)	N (mm)	V (mm)	Z (mm)	D (mm)	D_1 (mm)	Taper bush	Weight withaut bush (≈ kg)
TB 20 XH 400*	20	5F	GG	141.49	138.69	154	119	119	45	—	74.0	—	110	2517	6.0
TB 22 XH 400*	22	5F	GG	155.64	152.84	168	119	119	45	—	74.0	—	120	2517	7.2
TB 24 XH 400*	24	5F	GG	169.79	166.69	183	119	119	51	—	68.0	—	135	3020	8.4
TB 26 XH 400*	26	5F	GG	183.94	181.14	198	119	119	51	—	68.0	—	150	3020	10.3
TB 28 XH 400*	28	5F	GG	198.08	195.29	211	119	119	51	—	68.0	—	165	3020	12.3
TB 30 XH 400*	30	5F	GG	212.23	209.44	226	119	119	51	—	68.0	—	180	3020	14.3
TB 32 XH 400*	32	5F	GG	226.38	223.59	240	119	119	51	—	68.0	—	195	3020	19.9
TB 40 XH 400*	40	4WF	GG	282.98	280.18	296	119	119	89	—	15.0	190	245	3535	24.6
TB 48 XH 400*	48	9W	GG	339.57	336.78	—	119	119	89	—	15.0	190	300	3535	30.0

Taper bush	2517	3020	3535
Bore d_2 (mm) from … to …	16-60	25-75	35-90

GG = cast iron
* non stock item
Subject to technical changes

Bore diameters d_2 see page 52

*Non stock items.

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Taper bushes

Taper bushes with metric bores, keywayed to DIN 6885 Section 1

	Taper bush															
	1008	1108	1210	1215	1310	1610	1615	2012	2517	3020	3030	3525	3535	4040	4545	5050
Bore diameter d_2 (mm)	10 11 12 14 16 18 19 20 22 24✦ 25✦	10 11 12 14 16 18 19 20 22 24 25 28✦	11 12 14 16 18 19 20 22 24 25 28 30 32	11 12 14 16 18 19 20 22 24 25 28 30 32	14 16 18 19 20 22 24 25 28 30 32 35	14 16 18 19 20 22 24 25 28 30 32 35 38 40 42✦	14 16 18 19 20 22 24 25 28 30 32 35 38 40 42✦	14 16 18 19 20 22 24 25 28 30 32 35 38 40 42 45 48 50	16 18 19 20 22 24 25 28 30 32 35 38 40 42 45 48 50 55 60	25 28 30 32 35 38 40 42 45 48 50 55 60 65 70 75	35 38 40 42 45 48 50 55 60 65 70 75	35 38 40 42 45 48 50 55 60 65 70 75 80 85 90	35 38 40 42 45 48 50 55 60 65 70 75 80 85 90	40 42 45 48 50 55 60 65 70 75 80 85 90 95 100	55 60 65 70 75 80 85 90 95 100 105 110	70 75 80 85 90 95 100 105 110 115 120 125
														Material: GG 20		
Torque (Nm)	5.7	5.7	20	20	20	20	20	31	49	92	92	115	115	172	195	275
Bush length (mm)	22.3	22.3	25.4	38.1	25.4	25.4	38.1	31.8	44.5	50.8	76.2	63.5	88.9	101.6	114.3	127.0
Weight at $d_{2\,min}$ (≈ kg)	0.12	0.16	0.28	0.39	0.32	0.41	0.60	0.75	1.06	2.50	3.75	3.90	5.13	7.68	12.70	15.17

✦ These bores are supplied with a shallow keyway.

Shallow keyways for taper bushes

Bore diameter d_2 (mm)	Keyway width b (mm)	Keyway depth t_2 (mm)	Bore diameter d_2 (mm)	Keyway width b (mm)	Keyway depth t_2 (mm)
24	8	2.0	28	8	2.0
25	8	1.3	42	12	2.2

Taper bushes with inch bores, keywayed to British standard BS 46 Section 1

	Taper bush															
	1008	1108	1210	1215	1310	1610	1615	2012	2517	3020	3030	3525	3535	4040	4545	5050
Bore diameter d_2 (inches)	3/8* 1/2 5/8 3/4 7/8 1✦	3/8* 1/2 5/8 3/4 7/8 1 1 1/8✦*	1/2 5/8 3/4 7/8 1 1 1/8 1 1/4	5/8* 3/4 7/8 1 1 1/8 1 1/4	1/2* 5/8* 3/4* 7/8* 1* 1 1/8 1 1/4 1 3/8	1/2 5/8 3/4 7/8* 1 1 1/8 1 1/4 1 3/8 1 1/2 1 5/8	1/2 5/8 3/4 7/8 1 1 1/8 1 1/4 1 3/8 1 1/2 1 5/8✦*	5/8* 3/4 7/8 1 1 1/8 1 1/4 1 3/8 1 1/2 1 5/8 1 3/4 1 7/8 2	3/4 7/8 1 1 1/8 1 1/4 1 3/8 1 1/2 1 5/8 1 3/4 1 7/8 2 2 1/8 2 1/4 2 3/8 2 1/2	1 1/4 1 3/8 1 1/2 1 5/8 1 3/4 1 7/8 2 2 1/8 2 1/4 2 3/8 2 1/2 2 5/8 3	1 1/4 1 3/8 1 1/2 1 5/8 1 3/4* 1 7/8 2 2 1/8* 2 1/4 2 3/8 2 1/2 2 5/8* 2 3/4* 3	1 1/2* 1 5/8* 1 3/4* 1 7/8* 2* 2 1/8* 2 1/4* 2 3/8* 2 1/2* 2 5/8* 2 3/4* 2 7/8* 3* 3 1/8* 3 1/4* 3 3/8*	1 1/2 1 5/8 1 3/4 1 7/8 2 2 1/8 2 1/4 2 3/8 2 1/2 2 5/8 2 3/4 2 7/8 3 3 1/8 3 1/4 3 3/8 3 1/2✦*	1 3/4* 1 7/8* 2* 2 1/8* 2 1/4* 2 3/8* 2 1/2* 2 5/8* 2 3/4* 2 7/8* 3* 3 1/8* 3 1/4* 3 3/8* 3 1/2* 3 3/4✦* 4✦*	2 1/4* 2 3/8* 2 1/2* 2 3/4* 2 7/8* 3* 3 1/4* 3 3/8* 3 1/2* 4* 4 1/4✦* 4 1/2✦*	3* 3 1/4* 3 1/2* 3 3/4* 4* 4 1/4* 4 1/2* 4 3/4* 5✦*
														Material: GG 20		
Torque (Nm)	5.7	5.7	20	20	20	20	20	31	49	92	92	115	115	172	195	275
Bush length (mm)	22.3	22.3	25.4	38.1	25.4	25.4	38.1	31.8	44.5	50.8	76.2	63.5	88.9	101.6	114.3	127.0
Weight at $d_{2\,min}$ (≈ kg)	0.12	0.16	0.28	0.39	0.32	0.41	0.60	0.75	1.06	2.50	3.75	3.90	5.13	7.68	12.70	15.17

* Non stock items. ✦ These bores are supplied with a shallow keyway.

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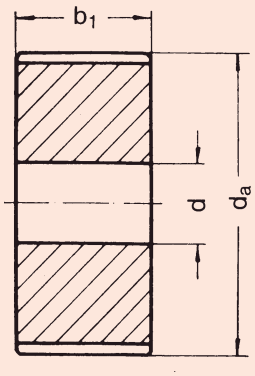
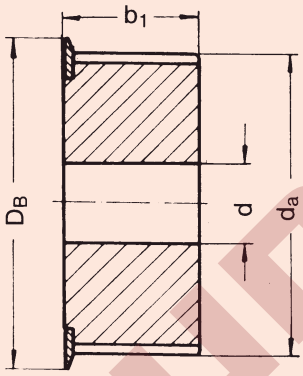
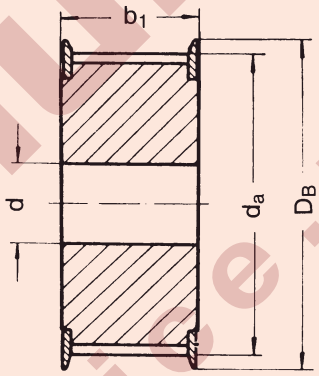
optibelt ZRS Timing Belt Pulleys
Recommended special designs



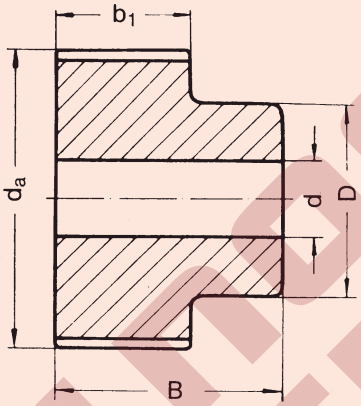
OB construction



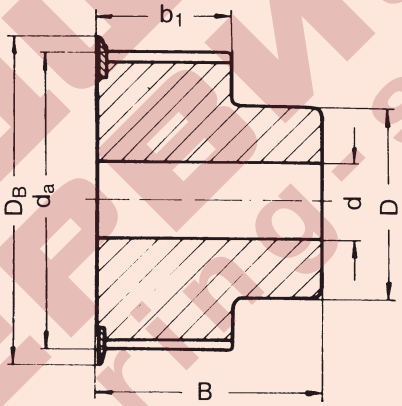
EB construction



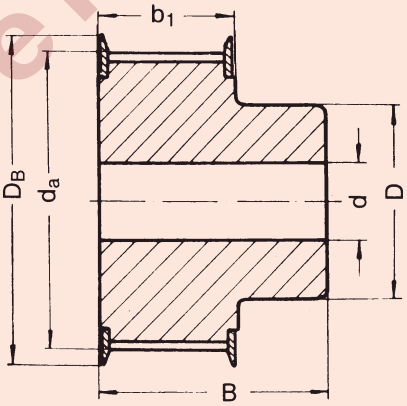
ZB construction



OBN construction



EBN construction



ZBN construction

Materials

Steel, cast iron, aluminium;
other materials on request
Do not use standard grade cast iron for speeds > 30 m/s!

Boring

All pulleys are pilot bored. Available with finished bore to DIN H7 tolerance if required.

Dimensions

The dimensions are to be found on pages 35 to 51.

Abbreviations

OB = without flanges
EB = one flange
ZB = two flanges
OBN = without flange, with hub
EBN = one flange, with hub
ZBN = two flanges, with hub

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Data Sheet

for Calculating / Checking Drive Installations optibelt ZR

Company: _____

Street address: _____

Town / post code: _____

Person to be contacted: _____

Department: _____ Date: _____

Phone: _____ Fax: _____

Quantity	Optibelt Type	Designation	Construction
	timing belt		
	driver pulley		
	driven pulley		

for test ☐ new drive ☐

for pilot production ☐ existing drive ☐

for series production ☐ requirement: _____ per annum

The parameters printed below in bold face are the minimum necessary for a drive design, where the other parameters cannot be determined by means of further data. Special conditions or factors should also be noted.

LOAD

DRIVER UNIT

Prime mover (e. g. 3-cyl. diesel): _____

Daily operating time: _____ hours

Steady running ☐ Shock or pulsating running ☐

Number of starts / stops per hour ☐

and / or reverses under load: _____ per day ☐

Full load starting torque M_A = _____ M_N or M_A = _____ Nm

DRIVEN UNIT

Driven machine (e. g. milling machine):

Light duty drive, shock-free and steady running ☐

Medium duty drive, intermittent operation with low to medium shock load ☐

Heavy duty drive, intermittent operation with medium to high shock load ☐

Very heavy duty drive, continuous operation with high shock load ☐

Basic drive service factor c_0 = _____

Max. driver power P_{An} = _____ **kW at** n_1 = _____ **rpm**

or max. driver torque M_{An} = _____ Nm at n = _____ rpm

Max. input drive power P_{Ab} = _____ kW at n_2 = _____ rpm

or max. output drive torque M_{Ab} = _____ Nm at n = _____ rpm

max. / min. Driven speed n_{2max} = _____ rpm / n_{2min} = _____ rpm

GEOMETRY

Pitch diameter d_{p1} or number of teeth z_1 of driver pulley d_{p1} = _____ mm or z_1 = _____

Max. o/a width B = _____ mm max. clearance dia. = _____ mm

pilot bored ☐ finish bored with keyway ☐ taper bushed ☐

Bore diameter d = _____ mm Tolerance range: _____

Max. static shaft loading S_a = _____ N

Pitch diameter d_{p2} or number of teeth z_2 of driven pulley d_{p2} = _____ mm or z_2 = _____

Max. o/a width B = _____ mm max. clearance dia. = _____ mm

pilot bored ☐ finish bored with keyway ☐ taper bushed ☐

Bore diameter d = _____ mm Tolerance range: _____

Max. static shaft loading S_a = _____ N

Drive ratio i = _____ i_{min} = _____ i_{max} = _____

Centre distance a = _____ **mm** a_{min} = _____ mm a_{max} = _____ mm

Centres adjustable ☐ or centres not adjustable ☐ then

Tension or guide pulley: inside ☐ Arrangement: slack side ☐

outside ☐ tight side ☐

Pulley d_p = _____ mm

or flat pulley d_a = _____ mm

OPERATING CONDITIONS

Arrangement of shafts: horizontal ☐ or vertical ☐

Ambient temperature ☐ T = _____ °C T_{min} = _____ °C T_{max} = _____ °C

Normal air humidity ☐ Relative humidity: _____ %

Contaminant (if any): solid ☐ material (e. g. dust, swarf): _____

liquid ☐ material (e. g. water, oil): _____

gas ☐ material (e. g. sulphur vapour): _____

For the design of multiple pulley systems, please let us have a sketch with the coordinates of the shafts and the load information for each pulley and idler.

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Notes on the proposed drive arrangement:

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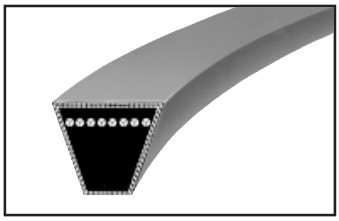
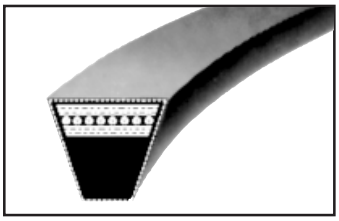
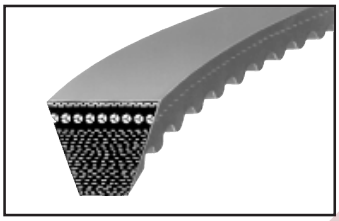
Power Transmission



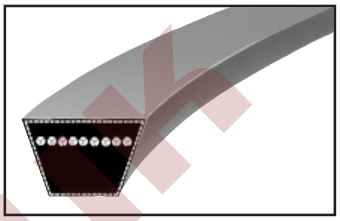
optibelt **SK**
High performance wedge belts to BS 3790, DIN 7753 Part 1 and RMA / MPTA



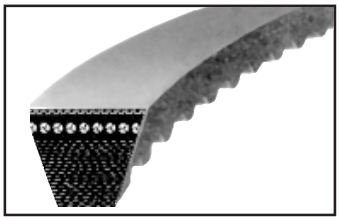
optibelt **RED POWER II**
High performance wedge belts to BS 3790, DIN 7753 Part 1 and RMA / MPTA - service free



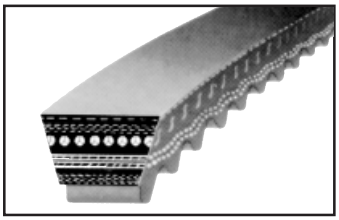
optibelt **SUPER TX M=S**
Moulded cogged raw edge belts to BS 3790 and DIN 7753 Part 1



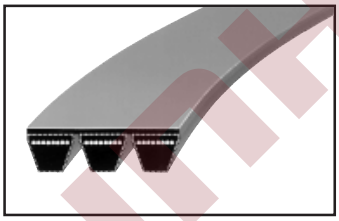
optibelt **VB**
Classical belts to BS 3790 and DIN 2215



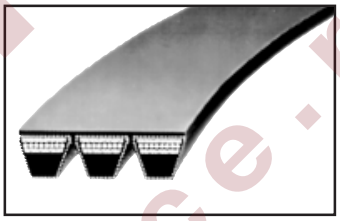
optibelt **MARATHON 1**
Automotive fan belts – raw edge, moulded cogged, maintenance free



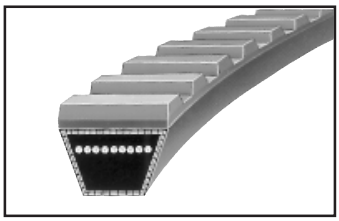
optibelt **MARATHON 2 M=S**
Automotive fan belts – raw edge, moulded cogged, maintenance free, heavy duty, may be used in sets without restrictions



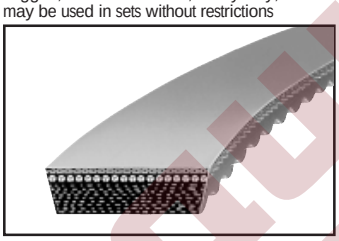
optibelt **KB**
Kraftbands



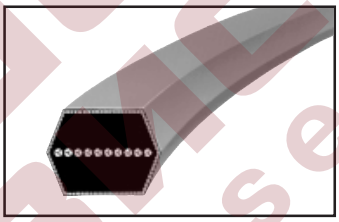
optibelt **KB RED POWER II**
Kraftbands



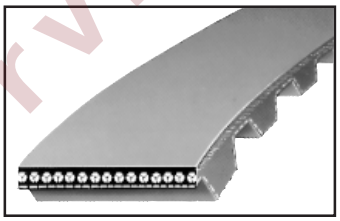
optibelt **PKR**
Endless V-belts with patterned top surface DIN 2215



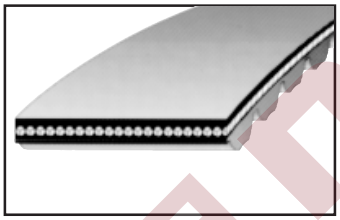
optibelt **SUPER VX**
Variable speed belts – moulded cogged raw edge



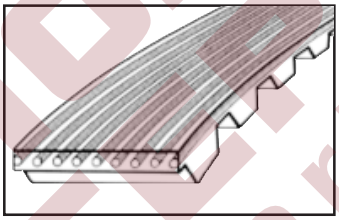
optibelt **DK**
Double section V-belts DIN 7722



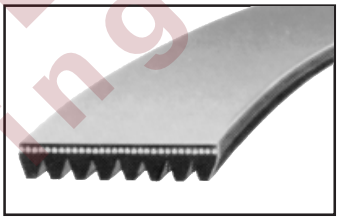
optibelt **ZR/HTD®/ZRK**
Timing belts



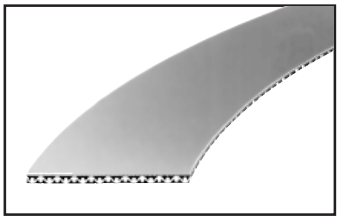
optibelt **OMEGA**
Timing belts



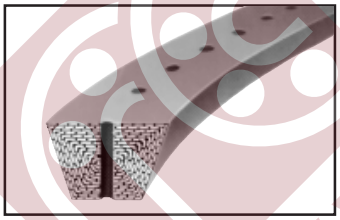
optibelt **ZRM/ZRP/ZRL/ Optiflex**
Polyurethane timing belts and open ended timing belting



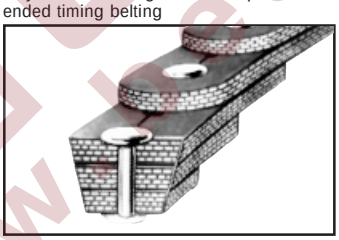
optibelt **RB/RBK**
Ribbed belts



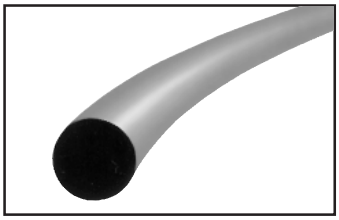
optimax **HF**
Endless flat belts



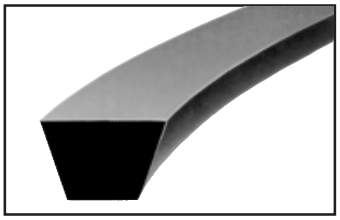
optimat **OE**
Open ended V-belting, punched DIN 2216



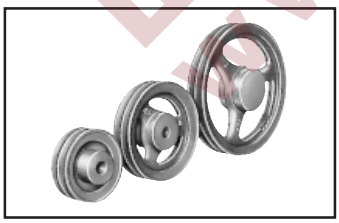
optibelt **LB**
Link belting



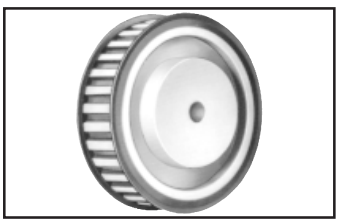
optibelt **RR**
Round plastic belting



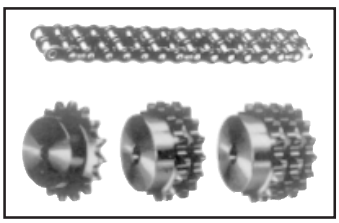
optibelt **KK**
Plastic V-belting



optibelt **KS**
V-grooved pulleys



optibelt **ZRS**
Timing belt pulleys



optichain **RK/RKB/KTR**
Roller chain
Chain sprockets

optibelt **CE**
Clamping bushes

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