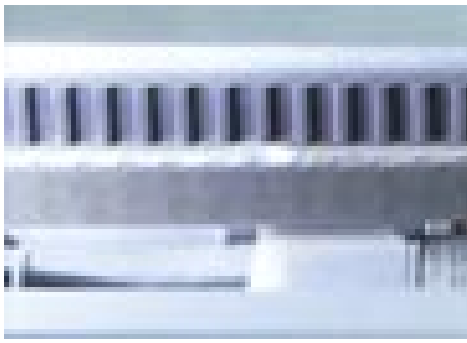
LONG LENGTH

CONTENTS

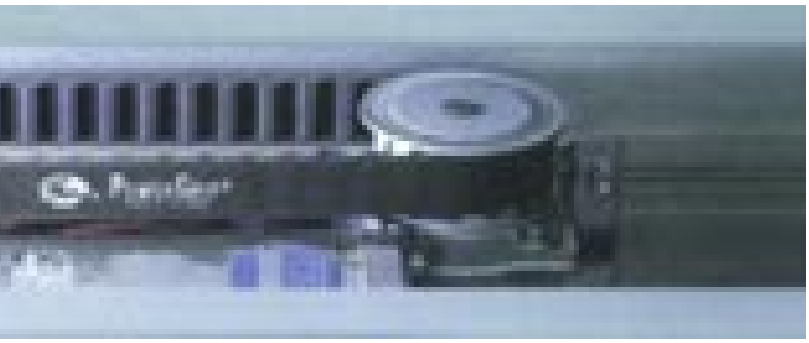


INTRODUCTION

Long Length synchronous belting is a cost-effective, efficient and low-maintenance alternative to the chain. Open-end synchronous belting is especially suited for linear movements (automated doors, automated warehouse conveyors and elevators), accurate positioning (machine tools, x-y coordinate machines) and reversal drives (computers, printers and office equipment). Gates Long Length belting is available in various sizes, constructions and tooth designs to cover a wide range of loads, speeds and applications. Long Length is a technically sophisticated, compact and economic option for modern linear drives.

Gates Long Length synchronous drives for

- **positioning accuracy**
- **repeatability**



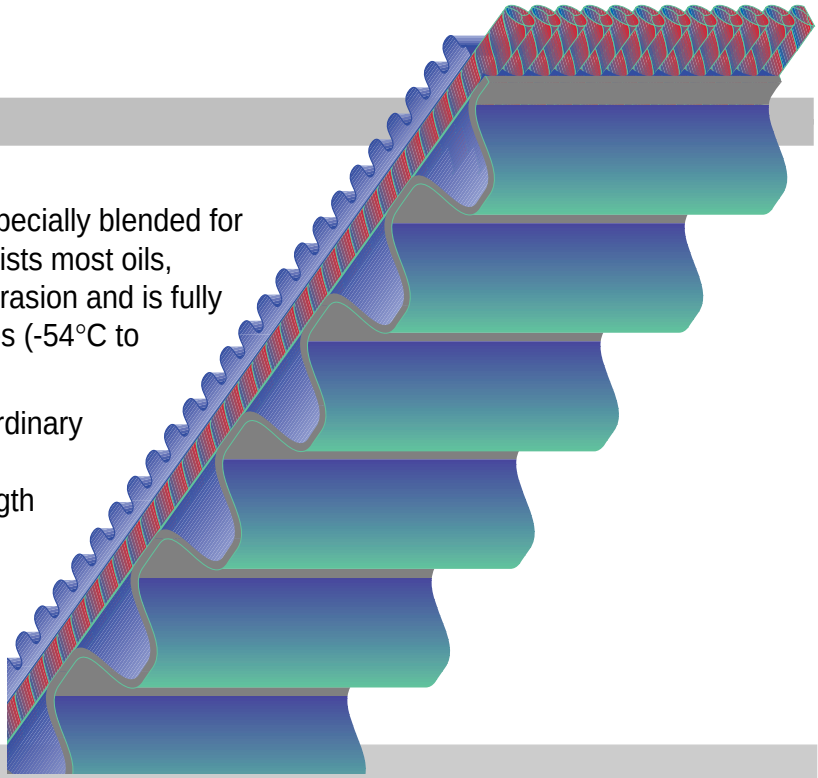
Long Length belting uses the same technical advances as the endless belt line.
For example: the curvilinear PowerGrip® HTD® tooth geometry eliminates stress concentration at tooth roots and allows higher power capacity and longer life compared to the classical timing belt.
By optimising this tooth shape, PowerGrip® GT continues the development of the HTD® design. The precise GT tooth geometry provides substantial performance improvements, depending on the number of teeth on the drive pulleys.
The Poly Chain® GT polyurethane synchronous belt constantly outperforms traditional drive systems. It is suited for a wide range of torques and speeds, transmits up to four times more power, is up to 60% more compact, and saves up to 30% more weight than classical belt drive systems.

ADVANTAGES

- **High positioning accuracy and repeatability.**
- **High power transmission thanks to sophisticated materials and tooth profiles.**
- **Positive power transmission with low axial load.**
- **High modulus tensile members giving length stability.**
- **Low-noise drives.**
- **Easy attachment using clamping fixtures.**
- **Low maintenance.**
- **No environmental pollution due to lubricants.**

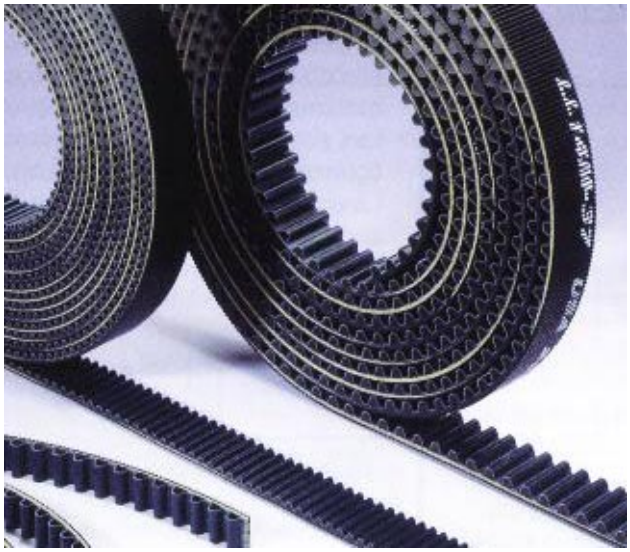
LONG LENGTH FEATURES & BENEFITS

POLY CHAIN® GT LONG LENGTH



CONSTRUCTION

- Patented tooth profile.
- Lightweight polyurethane compound, specially blended for adhesion to the cords and fabric. It resists most oils, chemicals, pollutants, corrosion and abrasion and is fully operational under extreme temperatures (-54°C to +85°C).
- Tough aramid tensile cords give extraordinary carrying power. Their flex fatigue life is exceptional and their high impact strength withstands shock and surge loading.
- Abrasion resistant fabric facing decreases friction with the sprocket thus reducing noise and heat buildup.



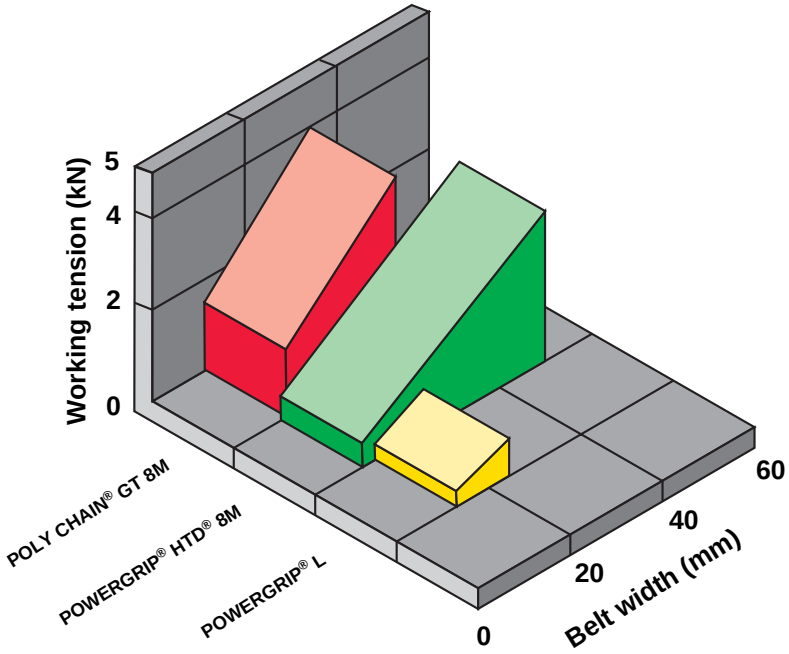
BENEFITS

- High positioning accuracy, making the belt ideally suited for applications with repetitive movements.
- High power transmission thanks to sophisticated materials and tooth profile.
- Positive power transmission with low axial load.
- High modulus tensile members.
- Low-noise drives.
- Easy to attach with clamping fixtures.
- Maintenance-free.
- No environmental pollution due to lubricants.
- Weight and space savings.

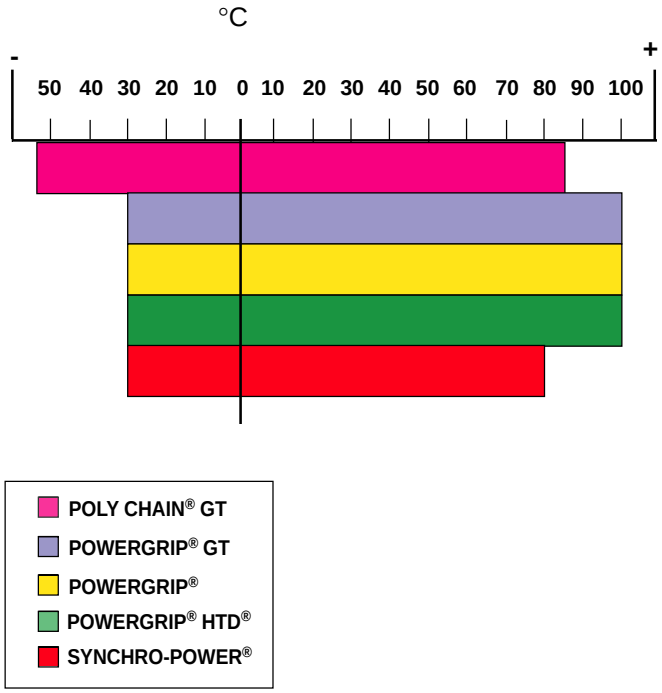
LONG LENGTH FEATURES & BENEFITS

POWER RATING COMPARISON

Similar diameter pulley and belt widths

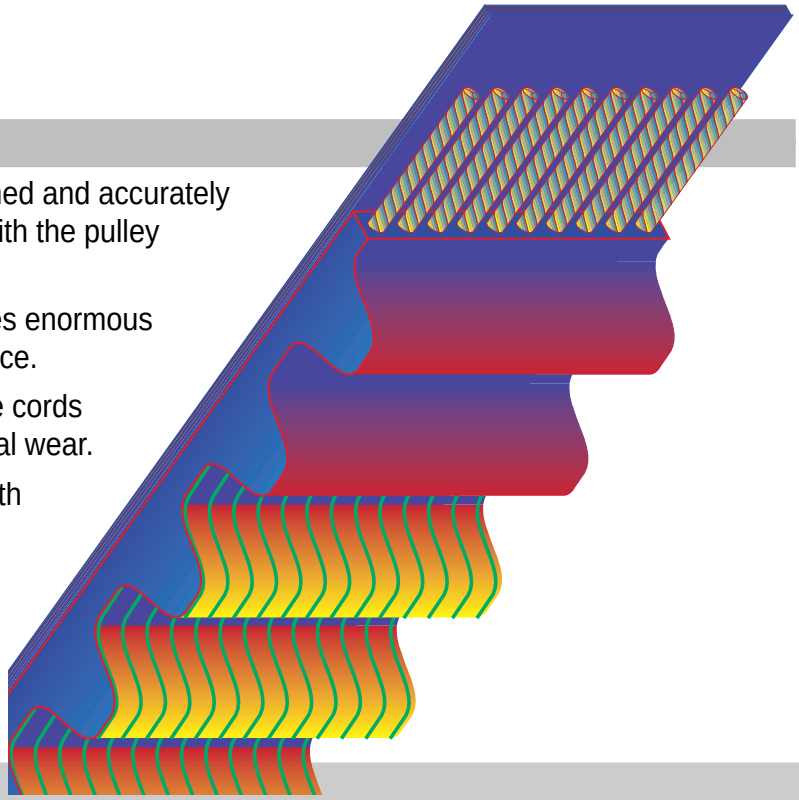


TEMPERATURE COMPARISON



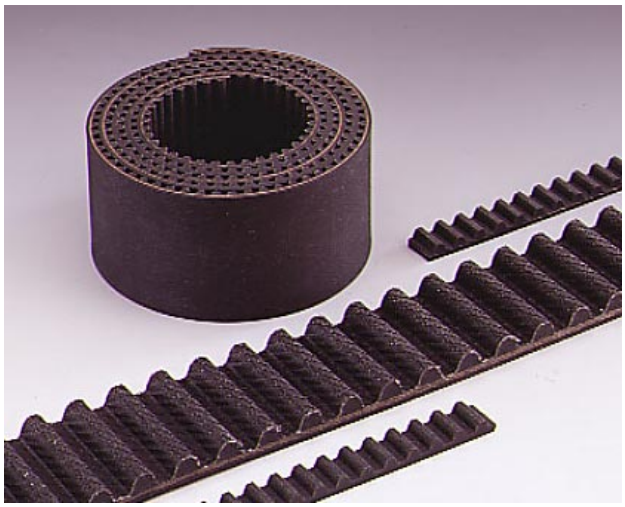
LONG LENGTH FEATURES & BENEFITS

POWERGRIP® GT LONG LENGTH



CONSTRUCTION

- Polychloroprene teeth are precision formed and accurately spaced to ensure correct engagement with the pulley grooves.
- Steel and fibreglass tensile member gives enormous strength, flex life and elongation resistance.
- Durable and flexible backing protects the cords from environmental pollution and frictional wear.
- Low friction nylon facing protects the tooth surface against wear.

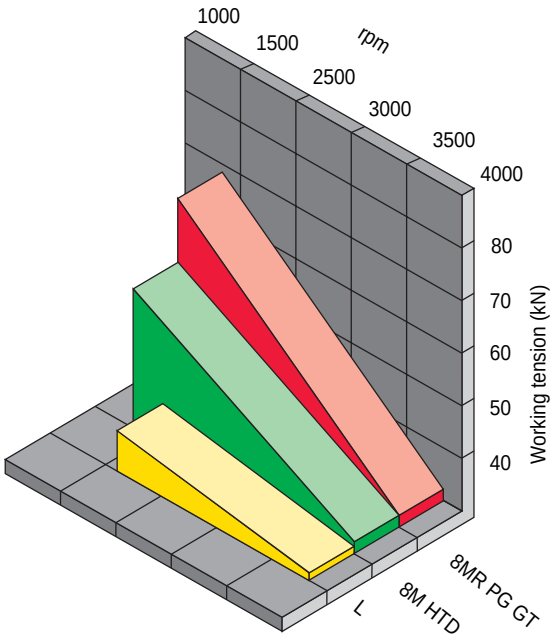


BENEFITS

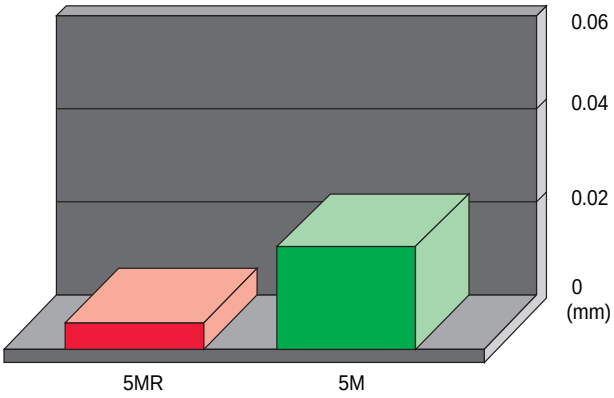
- Substantially increased working tensions (example: 306 N for 8 mm pitch belts of 50 mm width).
- Reduced noise levels.
- Better positioning accuracy.
- Compact drive package with reduced weight.
- Improved tooth jump resistance.
- Cost-effective, long-lasting and virtually maintenance-free.
- Low bearing load because of freedom of high tension.
- Efficiency up to 99%.

LONG LENGTH FEATURES & BENEFITS

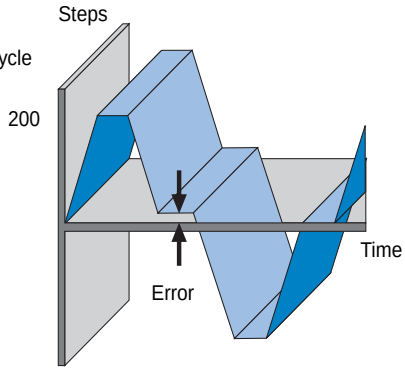
POWER RATING COMPARISON



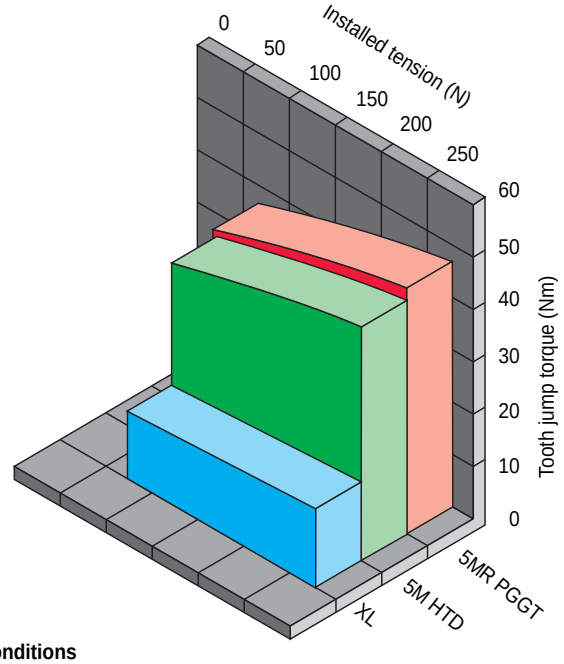
POSITIONING ACCURACY



Application	motion transfer
Belt	60 teeth
Width	9 mm
Pulleys	20/20 grooves
Speed	330 rpm
Static tension	14 N
Motor	200 steps/cycle



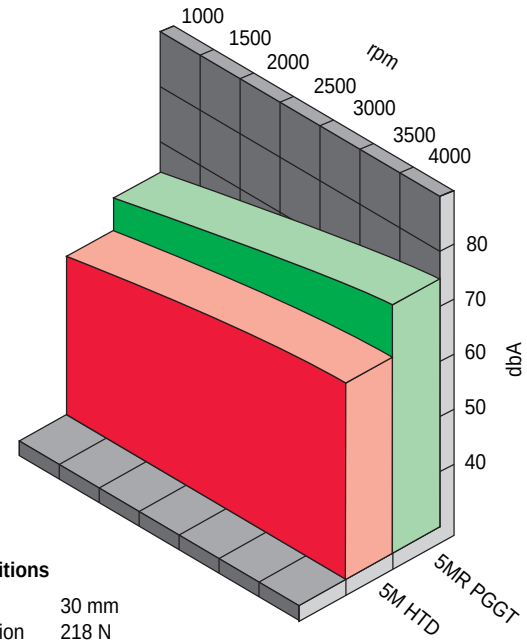
TOOTH JUMP RESISTANCE



Test conditions

Speed	2300 rpm
Pulleys	5MR-20S/P20-5M (31.8 mm) / PXL (32.0 mm)
Belt width	16 mm

NOISE



Test conditions

Belt width	30 mm
Static tension	218 N

Microphone location midway between the pulley rotational axes, 100 mm from the belt edge.

1

LONG LENGTH FEATURES & BENEFITS

POWERGRIP® HTD® LONG LENGTH

CONSTRUCTION

- Curvilinear tooth design improves stress distribution and allows higher overall loading.
- Steel and fibreglass tensile members provide excellent flex life and high resistance to elongation.
- Precisely formed and accurately spaced polychloroprene teeth ensure smooth engagement with pulley grooves.
- Durable polychloroprene backing protects against environmental pollution and frictional wear.
- Tough nylon facing protects tooth surface.

BENEFITS

- High working tensions (example: 4205 N for 8 mm pitch belts of 50 mm width; 15502 N for 14 mm pitch belts of 85 mm width).
- Efficiency up to 99%.
- Compact design: high flexibility allows small pulley diameters.
- Long service life and maintenance-free.
- Low bearing load because of freedom of high tension.

POWERGRIP® LONG LENGTH

CONSTRUCTION

- Trapezoidal tooth form.
- Precisely formed and accurately spaced polychloroprene teeth ensure correct engagement with pulley grooves.
- Steel and fibreglass tensile members.
- Nylon fabric cover protects the tooth surfaces.
- Available in standard pitches according to ISO 5296 XL, L and H.

BENEFITS

- Working tensions up to 710 N (H pitch, 1 inch width).
- Efficiency up to 99%.
- Positive slip-proof engagement.
- Constant angular velocity.
- Compact design.
- Maintenance-free and economical operation.

SYNCHRO-POWER® LONG LENGTH

CONSTRUCTION

- Tough and flexible polyurethane compound of consistence quality.
- Steel tensile member.
- Resistant to various oils, ozone and abrasion.
- Temperature range from -30°C to +80°C.

BENEFITS

- Allowable working tensions up to 15100 N (AT10 pitch of 100 mm width).
- Efficiency up to 98%.
- Fixed centre distances possible.
- Long service life.

LONG LENGTH BELTING PROGRAMME

POLY CHAIN® GT

	Pitch mm	T mm	B mm	Length on roll (m)	Width - mm Aramid
8M	8.00	3.40	5.90	30	12, 21, 36
14M	14.00	6.00	10.20	30	20, 37

POWERGRIP® GT

	Pitch mm	T mm	B mm	Length on roll (m)	Width - mm Glass fibre	Steel
3MR	3.00	1.12	2.41	30	6, 9, 15	6, 9, 15
5MR	5.00	1.92	3.81	30	6, 10, 15, 25	6, **10, 15, 25**
8MR	8.00	3.34	5.60	30	10, 15, 20, 30, 50	10, **15, 20, 30, 50**

POWERGRIP® HTD®

	Pitch mm	T mm	B mm	Length on roll (m)	Width - mm Glass fibre	Steel
3M	3.00	1.10	2.40	30	6, **9**, 15	6, 9, 15
5M	5.00	2.10	3.80	30	**6, 10, 15, 25**	6, 10, 15, 25
8M	8.00	3.40	6.00	30	**10, 15, 20, 30, 50,** 85	10, 15, 20, 30, 50, 85
14M	14.00	6.00	10.00	30	25, **40, 55, 85**, 115	25, **40, 55, 85**, 115

POWERGRIP®

	Pitch inch	Pitch mm	T mm	B mm	Length on roll (m)	Width - code Glass fibre	Steel
XL	1/5"	5.080	1.27	2.30	30	**025**, 031, **037, 050**	**025**, 031, **037, 050**
L	3/8"	9.525	1.91	3.60	30	037, **050, 075**, 100	037, **050, 075**, 100
H	1/2"	12.700	2.29	4.30	30	050, **075, 100,** 150, 200, 300	050, **075, 100,** 150, 200, 300

SYNCHRO-POWER®

	Pitch inch	Pitch mm	T mm	B mm	Length on roll (m)	Width - mm Steel
T5		5.000	1.20	2.20	50	6, 10, 16, 25, 32, 50
T10		10.000	2.50	4.50	50	16, 25, 32, 50, 75, 100
AT5		5.000	1.20	2.70	50	6, 10, 16, 25, 32, 50
AT10		10.000	2.50	5.00	50	16, 25, 32, 50, 75, 100
						Width - code
L	3/8"	9.525	1.91	3.60	50	037, 050, 075, 100, 150
H	1/2"	12.700	2.29	4.30	50	050, 075, 100, 150, 200, 300, 400

Stock widths are printed in bold. Other lengths and widths on request.

Construction

PowerGrip® GT 3MR, 5MR and 8MR pitches,
PowerGrip® HTD® 3M, 5M, 8M and 14M pitches,
PowerGrip® XL, L and H pitches:

- Fibreglass or steel tensile cords.
- Polychloroprene teeth and backing.

Poly Chain® GT 8M and 14M pitches:

- Aramid tensile cord.
- Polyurethane teeth and backing.

Synchro-Power® L and H pitches, T5 and T10 pitches, AT5 and AT10 pitches:

- Steel tensile cord.
- Polyurethane teeth and backing.

Ordering code is composed as follows:

Example:	LL-8M-20
LL	- Long Length
8M	- Pitch HTD® 8 mm
20	- Belt width (mm)

BELT DRIVE SELECTION PROCEDURE

2

HORIZONTAL DRIVE

STEP 1 Select the belt pitch

Make a first estimation of the effective tension (T_e) by taking only the mass of the weight (M) into account.

T_e = {Max. of acceleration force and deceleration force} + m x g x μ

Choose the belt pitch using the belt pitch selection guides on page 10.

STEP 2 Calculate the effective tension

Total mass = 2 x $m_{p(R)}$ + m_b + M
T_e = Max{F_a, F_b} + F_R
The lifting force (m x g) is zero.

STEP 3 Determine the belt width

The diameter of the pulley is calculated by combining the required speed of movement and the speed of the motor.

Design force F_{Des} = T_e x S_1 (see page 9)

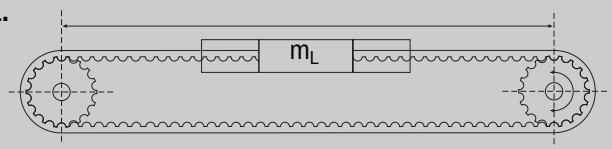
Minimum width factor = F_{Des} / T_{as}

Min. width factor < width factor belt
(see the respective charts for the corresponding pitches)

STEP 4 Check the minimum breaking load

Max. belt tension = T_e + installation tension in belt span (see page 41)
Max. belt tension x S_2 < minimum breaking load
S_2 depends on type of application
For the minimum breaking load, refer to the respective charts for the corresponding pitches.

1.



VERTICAL DRIVE

M *= mass of weight + cage* / ***m*** *= mass of counter weight*

STEP 1 Calculate the effective tension

Mass M goes up

1. Starting forces (fig. 2)

Span 1 : F_G = m x g F_G - F_a = m x (g - a)
F_a = m x a
Span 2 : F_G = M x g F_G + F_a = M x (g + a)
F_a = M x a

2. Deceleration forces (fig. 3)

Span 1 : F_G = m x g F_G + F_b = m x (g + b)
F_b = m x b
Span 2 : F_G = M x g F_G - F_b = M x (g - b)
F_b = M x b

Mass M goes down

1. Starting forces (fig. 4)

Span 1 : F_G = m x g F_G + F_a = m x (g + a)
F_a = m x a
Span 2 : F_G = M x g F_G - F_a = M x (g - a)
F_a = M x a

2. Deceleration forces (fig. 5)

Span 1 : F_G = m x g F_G - F_b = m x (g - b)
F_b = m x b
Span 2 : F_G = M x g F_G + F_b = M x (g + b)
F_b = M x b

T_e = span 2 - span 1

The highest value of effective tension T_e is the one used for calculation.

Rule of thumb : multiply the biggest mass of the system (m or M) by the sum of g and the biggest acceleration value (a or b). This gives you T_e.

STEP 2 Select the belt pitch

Choose the belt pitch using the belt pitch selection guides on page 10.

STEP 3 Determine the belt width

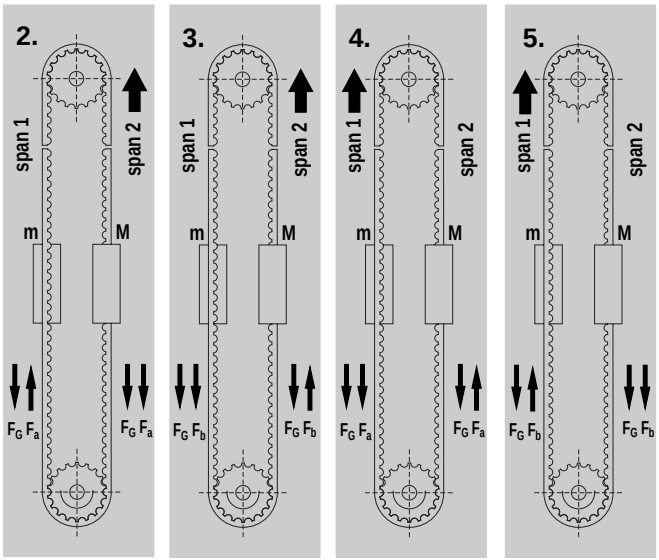
The diameter of the pulley is calculated by combining the required speed of movement and the speed of the motor.
Design force F_{Des} = T_e x S_1 (see page 9)
Minimum width factor = F_{Des} / T_{as}
Min. width factor < width factor belt
(see the respective charts for the corresponding pitches)

STEP 4 Check the minimum breaking load

Max. belt tension = T_e + installation tension in belt span (see page 41)
Max. belt tension x S_2 < minimum breaking load
S_2 depends on the type of application.
Minimum breaking load: see respective charts for the corresponding pitches.

For safety reasons, the minimum value for S_2 should be between 8 and 10.

BELT DRIVE SELECTION PROCEDURE



FORMULAE

TORQUE

$T = T_e \times (\text{pitch diameter} / 2000)$ (Nm)

pitch diameter in mm

POWER

$P = (T \times \pi \times n) / 30\,000 = (T_e \times V) / 1000$ (kW)

BELT SPEED

$$V = \frac{\pi \times \text{pitch diameter} \times n}{60\,000} = \frac{\text{number of teeth} \times \text{pitch} \times n}{60\,000} \text{ (m/s)}$$

PULLEY MASS

$$m_p = \frac{[(\text{outs. diam. pull.})^2 - (\text{shaft diam.})^2] \times \pi \times \text{pull. width} \times \text{density}}{4 \times 10^6}$$

density : kg/dm³

REDUCED PULLEY MASS

$m_{p(R)} = (m_p / 2) \times [1 + (\text{shaft diameter})^2 / (\text{outside diameter})^2]$

MASS OF BELT

m_b = belt length in meters x (belt width in mm / 10) x specific weight

specific weight in kg for 1 meter of belt length and 10 mm of belt width

ACCELERATION FORCE

$F_a = m \times a$

DECELERATION FORCE

$F_b = m \times b$

FRICTION FORCE

$F_R = m \times g \times \mu$

BASIC SERVICE FACTORS

LOAD FACTOR S_L

Calculate the LOAD FACTOR S_L following the table below:

Uniform load **1.0**

	Daily service in hours		
	3-8 hours	8-16 hours	16-24 hours
With low peak load	1.2	1.4	1.6
With high peak load	1.5	1.7	1.9
With very high peak load	1.8	2.0	2.2

TEETH IN MESH FACTOR S_{TIM}

T.I.M.	S_{TIM}
≥ 6	1.0
5	0.8
4	0.6
3	0.4

RATIO FACTOR S_R

Applies only to speed-up ratios.

Speed ratios	S_R
1 - 1.24	-
1.25 - 1.74	0.10
1.75 - 2.49	0.20
2.50 - 3.49	0.30
≥ 3.50	0.40

BENDING FACTOR S_B

With reverse bending by back idlers S_B 0.2

SPECIAL SERVICE FACTOR S_S

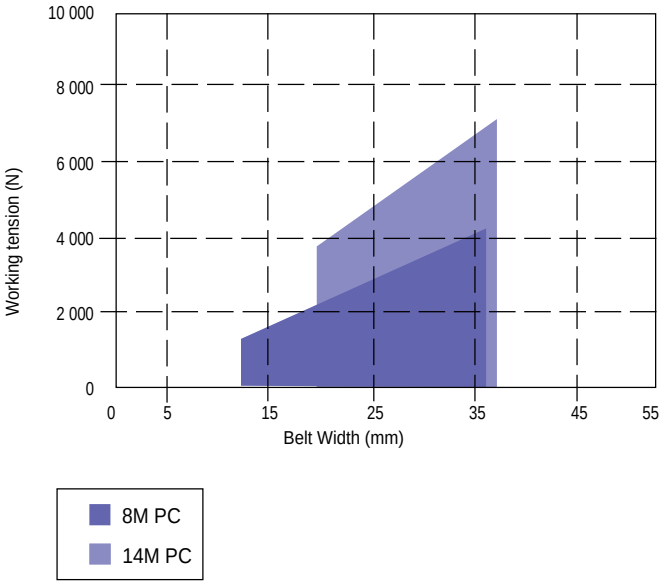
For intermittent or occasional service S_S 0.2

TOTAL SERVICE FACTOR S_1

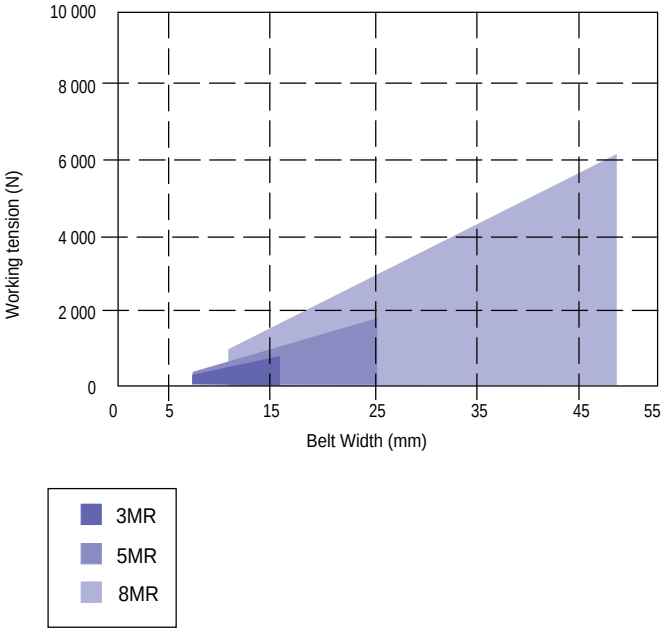
$$S_1 = \frac{S_L + S_R + S_B - S_S}{S_{TIM}}$$

BELT PITCH SELECTION GUIDES

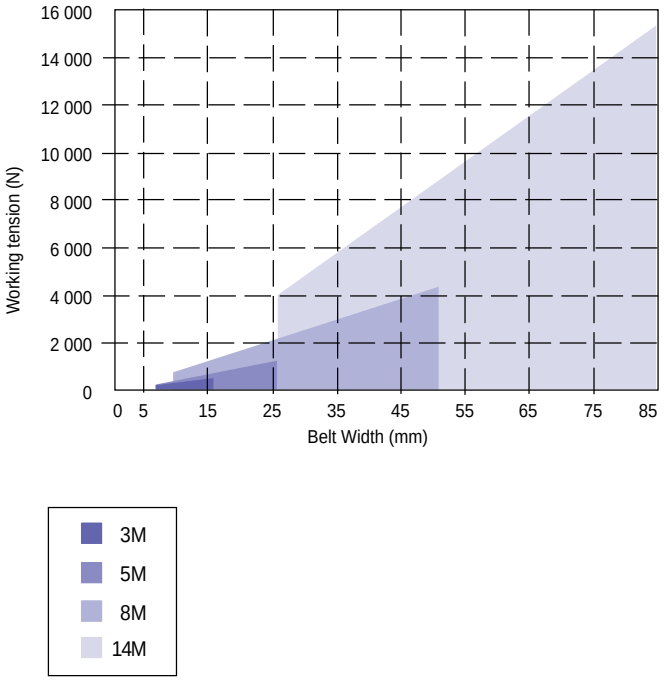
POLY CHAIN® GT



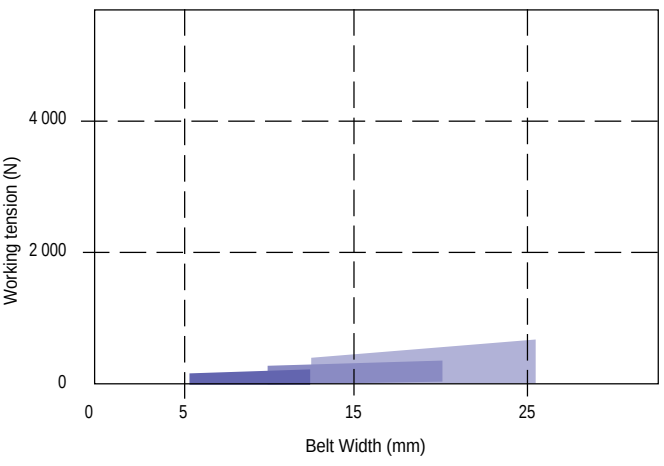
POWERGRIP® GT



POWERGRIP® HTD®



POWERGRIP®



EXAMPLES OF CALCULATION

HORIZONTAL DRIVE

Data given :

v = 5 m/sec — Low peak load, service 9 hrs/day
a = 15 m/sec^2 — Centre distance 2 500 mm
b = 25 m/sec^2
m_L = 30 kg
μ = 0.05
d_p = pulley diameter 75 mm (determined by motor speed and belt speed)
d_s = shaft diameter 25 mm
S_2 > 5

STEP 1

T_e = 30 x 25 + 30 x 9.81 x 0.05 = 765 N = 0.765 kN
Table page 10 : LL-5MR-25 with steel cord
Number of pulley grooves for 5 mm pitch = (p x 75) / 5 = 47.1 => 48 teeth
Belt width 25 mm => pulley width 30 mm (page 19)

STEP 2

Pulley mass $m_p = \frac{(75.25^2-25^2) \times p \times 30 \times 7.83}{4 \times 10^6}$ = 0.93 kg

Reduced pulley mass $m_{p(R)} = \frac{0.93}{2}\left(1 + \frac{25^2}{75.25^2}\right)$ = 0.52 kg

Mass of belt $m_b = \left[(2 \times 2.5) + \left(\frac{48 \times 5}{1000}\right)\right] \times 2.5 \times \frac{44.8}{1000}$ = 0.59 kg

Total weight m = 2 x 0.52 + 0.59 + 30 = 31.63 kg

Acceleration force F_a = 31.63 x 15 = 475 N
Deceleration force F_b = 31.63 x 25 = 791 N
F_b is taken into account for calculation of T_e.

Friction force F_R = 31.63 x 9.81 x 0.05 = 15.5 N

Working tension T_e = 791 + 15.5 = 806.5 N

STEP 3

S_1 = 1.4 (from table on page 9)
Design force F_{Des} = 806.5 x 1.4 = 1129 N
Specific allowable working tension T_{as} = 614 N
(table page 18)

Min. width factor = $\frac{F_{Des}}{T_{as}} = \frac{1129}{614}$ = 1.838

Width factor for belt width 25 mm = 2.93
Min. width factor < width factor ? Yes !

STEP 4

S_2 = 8
Minimum breaking load 9920 N (table page 18)
(1.6 x 806.5) x 5 < 9920 ? Yes !

VERTICAL DRIVE

Data given :

v = 3 m/sec — Low peak load, service 12 hrs/day
a = 1.5 m/sec^2
b = 6 m/sec^2
M = 500 kg (weight + cage)
m = 450 kg
n = 160 rpm
S_2 > 8

STEP 1

Rule of thumb : T_e = 500 x (g + 6) = 7905 N
Since the belt has to bear the entire span force due to the inertia of the counter weight, belt sizing will be based on the above case. Sizing of the drive motor, on the other hand, only has to take account of the largest difference in span force when starting up.
Bearing friction is not taken into account.

STEP 2

Table on page 10 : HTD 14M-85 with steel cord

STEP 3

Belt speed v = 3 = (number of teeth x 14 x 160) / 60 000
=> 80 teeth (standard pulley)
S_1 = 1.4 (from table on page 9)
Design force F_{Des} = 7905 x 1.4 = 11067 N
Specific allowable working tension T_{as} = 6226 N
(table page 28)

Min. width factor = F_{Des} / T_{as} = 11067 / 6226 = 1.78

Width factor for belt width 85 mm = 2.49
Min. width factor < width factor ? Yes !

STEP 4

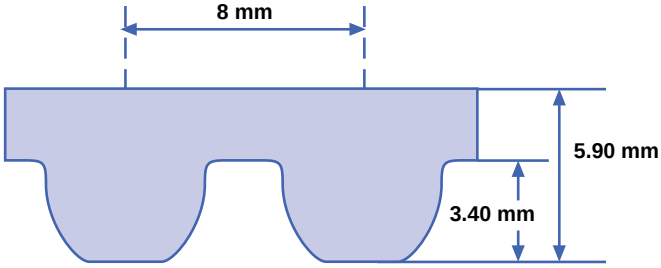
S_2 = 8
Minimum breaking load 150200 N (table page 28)
(1.6 x 7905) x 8 < 150200 ? Yes !

8M BELT PITCH

Tensile cord	Aramid
Weight for one metre in g by 10 mm belt width	47.0

No. of pulley grooves		22	26	30	34	38	≥ 44
Specific allowable working tension for 21 mm belt width (N)	Aramid tensile cord	2256	2326	2375	2382	2400	2416

Belt width	12 mm	21 mm	36 mm
Width factor	0.57	1	1.71



3

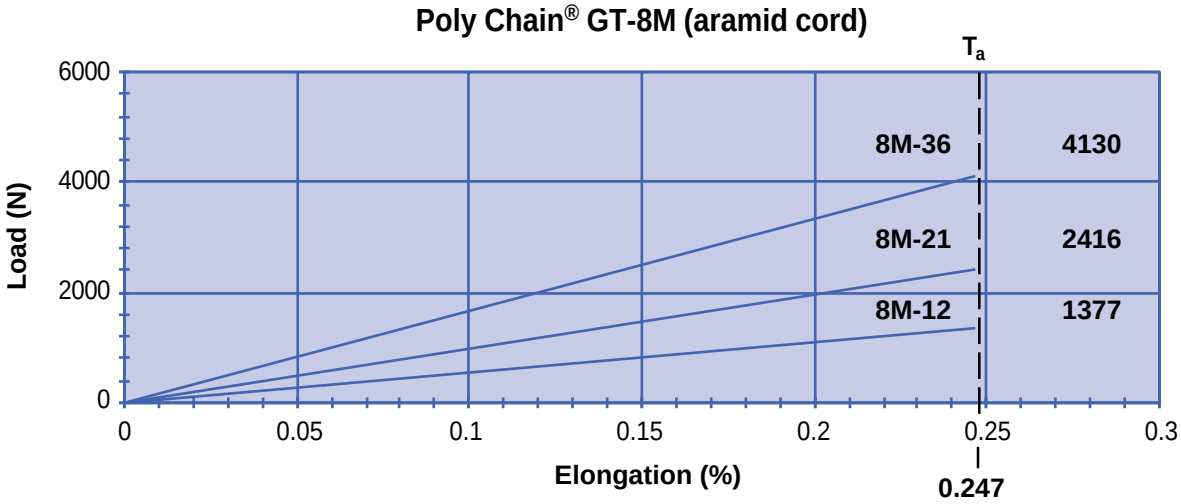
MINIMUM BREAKING TENSION (N)

Width	Aramid tensile cord
8M-12	8280
8M-21	14485
8M-36	24830

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Aramid tensile cord
8M-12	557
8M-21	978
8M-36	1672



POLY CHAIN® GT 8M PULLEY DIAMETERS

N	PD mm	OD mm
22	56.02	54.42
23	58.57	56.97
24	61.12	59.52
25	63.66	62.06
26	66.21	64.61
27	68.75	67.15
28	71.30	69.70
29	73.85	72.25
30	76.39	74.79
31	78.94	77.34
32	81.49	79.89
33	84.03	82.43
34	86.58	84.98
35	89.13	87.53
36	91.67	90.07
37	94.22	92.62
38	96.77	95.17
39	99.31	97.71
40	101.86	100.26
41	104.41	102.81
42	106.95	105.35
43	109.50	107.90
44	112.05	110.44
45	114.59	112.99
46	117.14	115.54
47	119.68	118.08
48	122.23	120.63
49	124.79	123.18
50	127.32	125.72
51	129.87	128.27
52	132.42	130.82
53	134.96	133.36
54	137.51	135.91
55	140.06	138.46
56	142.60	141.00
57	145.15	143.55
58	147.70	146.10
59	150.24	148.64
60	152.79	151.19
61	155.34	153.74
62	157.88	156.28
63	160.43	158.83
64	162.97	161.37
65	165.52	163.92
66	168.07	166.47
67	170.61	169.01
68	173.16	171.56
69	175.71	174.11
70	178.25	176.65
71	180.80	179.20
72	183.35	181.75
73	185.89	184.29
74	188.44	186.84
75	190.99	189.39
76	193.53	191.93
77	196.08	194.48
78	198.63	197.03
79	201.17	199.57
80	203.72	202.12
81	206.26	204.66
82	208.81	207.21
83	211.36	209.76
84	213.90	212.30
85	216.45	214.85
86	219.00	217.40
87	221.54	219.94
88	224.09	222.49
89	226.64	225.04
90	229.18	227.58
91	231.73	230.10
92	234.28	232.68
93	236.82	235.22
94	239.37	237.77
95	241.92	240.32
96	244.46	242.86
97	247.01	245.41
98	249.55	247.95
99	252.10	250.50
100	254.65	253.05
101	257.19	255.59
102	259.74	258.14
103	262.29	260.69
104	264.83	263.23
105	267.38	265.78
106	269.93	268.33
107	272.47	270.87
108	275.02	273.42
109	277.57	275.97
110	280.11	278.51
111	282.66	281.06
112	285.21	283.61
113	287.75	286.15
114	290.30	288.70
115	292.85	291.24
116	295.39	293.79
117	297.94	296.34
118	300.48	298.88
119	303.03	301.43
120	305.58	303.98
121	308.12	306.52
122	310.67	309.07
123	313.22	311.62
124	315.76	314.16
125	318.31	316.71
126	320.86	319.26
127	323.40	321.80
128	325.95	324.35
129	328.50	326.90
130	331.04	329.44
131	333.59	331.99
132	336.14	334.54
133	338.68	337.08
134	341.23	339.63
135	343.77	342.17
136	346.32	344.72
137	348.87	347.27
138	351.41	349.81
139	353.96	352.36
140	356.51	354.91
141	359.05	357.45
142	361.60	360.00
143	364.15	362.55
144	366.69	365.09
145	369.24	367.64
146	371.79	370.19
147	374.33	372.73
148	376.88	375.28
149	379.43	377.83
150	381.97	380.37
151	384.52	382.92
152	387.06	385.46
153	389.61	388.01
154	392.16	390.56
155	394.70	393.10
156	397.25	395.65
157	399.80	398.20
158	402.34	400.74
159	404.89	403.29
160	407.44	405.84
161	409.98	408.38
162	412.53	410.93
163	415.08	413.48
164	417.62	416.02
165	420.17	418.57
166	422.72	421.12
167	425.26	423.66
168	427.81	426.21
169	430.35	428.75
170	432.90	431.30
171	435.45	433.85
172	437.99	436.39
173	440.54	438.94
174	443.09	441.49
175	445.63	444.03
176	448.18	446.58
177	450.73	449.13
178	453.27	451.67
179	455.82	454.22
180	458.37	456.77
181	460.91	459.31
182	463.46	461.86
183	466.01	464.41
184	468.55	466.95
185	471.10	469.50
186	473.65	472.04
187	476.19	474.59
188	478.74	477.14
189	481.28	479.68
190	483.83	482.23
191	486.38	484.78
192	488.92	487.32

N : number of grooves
PD : pitch diameter
OD : outside diameter

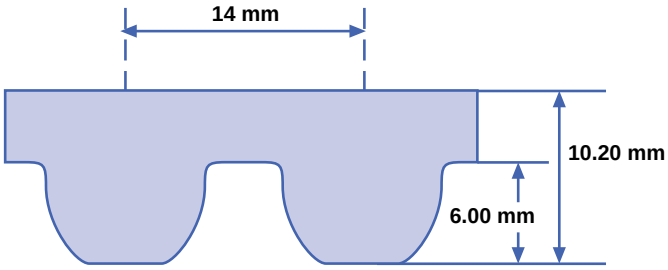
Belt width	Typical pulley width
12 mm	20 mm
21 mm	30 mm
36 mm	45 mm

14M BELT PITCH

Tensile cord	Aramid
Weight for one metre in g by 10 mm belt width	79.0

No. of pulley grooves		28	34	40	≥52
Specific allowable working tension for 37 mm belt width (N)	Aramid tensile cord	6570	6870	7000	7160

Belt width	20 mm	37 mm
Width factor	0.54	1



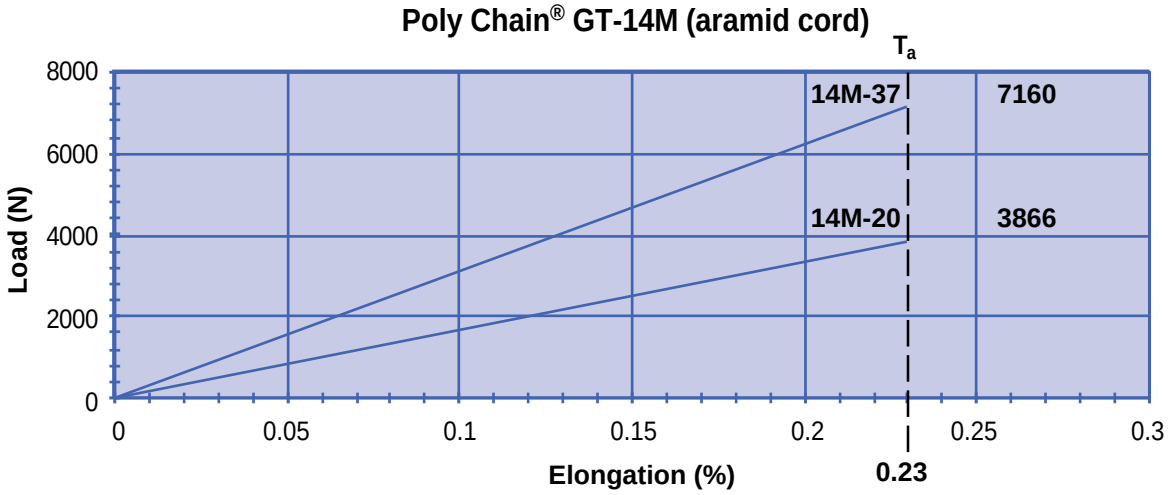
MINIMUM BREAKING TENSION (N)

Width	Aramid tensile cord
14M-20	22805
14M-37	42190

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Aramid tensile cord
14M-20	1680
14M-37	3113



POLY CHAIN® GT 14M PULLEY DIAMETERS

N	PD mm	OD mm
28	124.78	121.98
29	129.23	126.43
30	133.69	130.89
31	138.15	135.35
32	142.60	139.80
33	147.06	144.26
34	151.52	148.72
35	155.97	153.17
36	160.43	157.63
37	164.88	162.09
38	169.34	166.54
39	173.80	171.00
40	178.25	175.45
41	182.71	179.91
42	187.17	184.37
43	191.62	188.82
44	196.08	193.28
45	200.54	197.74
46	204.99	202.19
47	209.45	206.65
48	213.90	211.11
49	218.36	215.56
50	222.82	220.02
51	227.27	224.47
52	231.73	228.93
53	236.19	233.39
54	240.64	237.84
55	245.10	242.30
56	249.55	246.76
57	254.01	251.21
58	258.47	255.67
59	262.92	260.12
60	267.38	264.58
61	271.84	269.04
62	276.29	273.49
63	280.75	277.95
64	285.21	282.41
65	289.66	286.86
66	294.12	291.32
67	298.57	295.78
68	303.03	300.23
69	307.49	304.69
70	311.94	309.14
71	316.40	313.60
72	320.86	318.06
73	325.31	322.51
74	329.97	326.97
75	334.23	331.43
76	338.68	335.88
77	343.14	340.34
78	347.49	344.80
79	352.05	349.25
80	356.51	353.71
81	360.96	358.16
82	365.42	362.62
83	369.88	367.08
84	374.33	371.53
85	378.79	375.99
86	383.25	380.45
87	387.70	384.90
88	392.16	389.36
89	396.61	393.82
90	401.07	398.27
91	405.53	402.73
92	409.98	407.18
93	414.44	411.64
94	418.90	416.10
95	423.35	420.55
96	427.81	425.01
97	432.26	429.47
98	436.72	433.92
99	441.18	438.38
100	445.63	442.83
101	450.09	447.29
102	454.55	451.75
103	459.00	456.20
104	463.46	460.66
105	467.92	465.12
106	472.37	469.57
107	476.83	474.03
108	481.28	478.49
109	485.74	482.94
110	490.20	487.40
111	494.65	491.85
112	499.11	496.31
113	503.57	500.77
114	508.03	505.22
115	512.48	509.68
116	516.94	514.14
117	521.39	518.59
118	525.85	523.05
119	530.30	527.51
120	534.76	531.96
121	539.22	536.42
122	543.67	540.87
123	548.13	545.33
124	552.59	549.79
125	557.04	554.24
126	561.50	558.70
127	565.95	563.16
128	570.41	567.61
129	574.87	572.07
130	579.32	576.52
131	583.78	580.98
132	588.24	585.44
133	592.69	589.89
134	597.15	594.35
135	601.61	598.81
136	606.06	603.26
137	610.52	607.72
138	614.97	612.18
139	619.43	616.63
140	623.89	621.09
141	628.34	625.54
142	632.80	630.00
143	637.26	634.46
144	641.71	638.91
145	646.17	643.37
146	650.63	647.83
147	655.08	652.28
148	659.54	656.74
149	663.99	661.20
150	668.45	665.65
151	672.91	670.11
152	677.36	674.56
153	681.82	679.02
154	686.28	683.48
155	690.73	687.93
156	695.19	692.39
157	699.65	696.85
158	704.10	701.30
159	708.56	705.76
160	713.01	710.22
161	717.47	714.67
162	721.93	719.13
163	726.38	723.58
164	730.84	728.04
165	735.30	732.50
166	739.75	736.95
167	744.21	741.41
168	748.66	745.87
169	753.12	750.32
170	757.58	754.78
171	762.03	759.23
172	766.49	763.69
173	770.95	768.15
174	775.40	772.60
175	779.86	777.06
176	784.32	781.52
177	788.77	785.97
178	793.23	790.43
179	797.68	794.89
180	802.14	799.34
181	806.60	803.80
182	811.05	808.25
183	815.51	812.71
184	819.97	817.17
185	824.42	821.62
186	828.88	826.08
187	833.34	830.54
188	837.79	834.99
189	842.25	839.45
190	846.71	843.92
191	851.16	848.37
192	855.62	852.83

N : number of grooves
PD : pitch diameter
OD : outside diameter

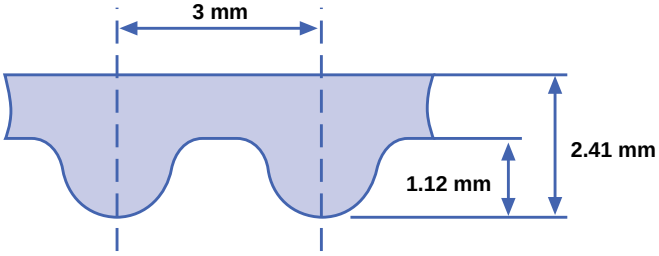
Belt width	Typical pulley width
20 mm	33 mm
37 mm	51 mm

3MR BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	22.9	27.6

No. of pulley grooves		11	14	18	24	32	40	≥ 48
Specific allowable working tension for 6 mm belt width (N)	Glass cord	127	136	141	146	159	167	188
	Steel cord				197	215	225	254

Belt width	6 mm	9 mm	15 mm
Width factor	1	1.66	2.97



MINIMUM BREAKING TENSION (N)

Width	Glass cord	Steel cord
3MR-6	1200	1590
3MR-9	1990	2650
3MR-15	2290	4240

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
3MR-6	42	57
3MR-9	70	95
3MR-15	125	169

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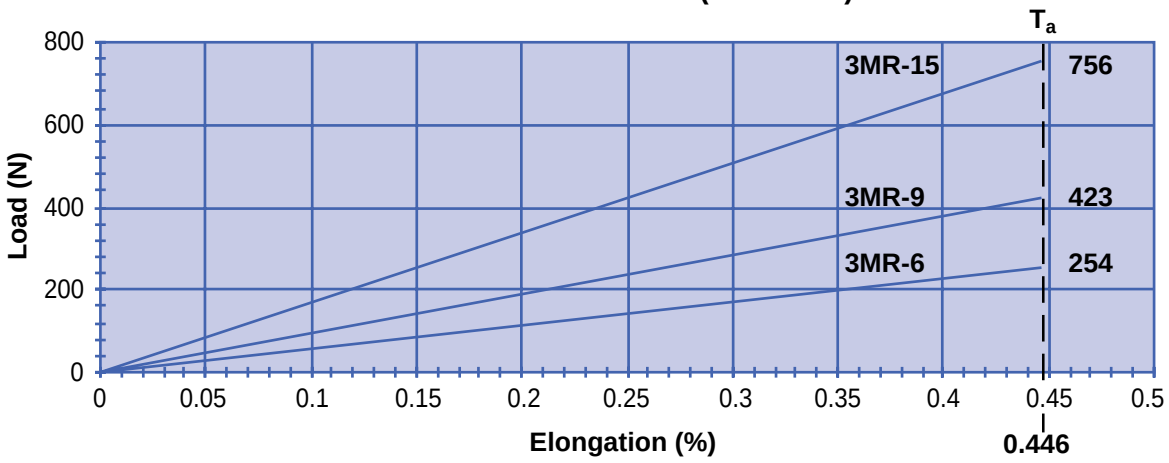
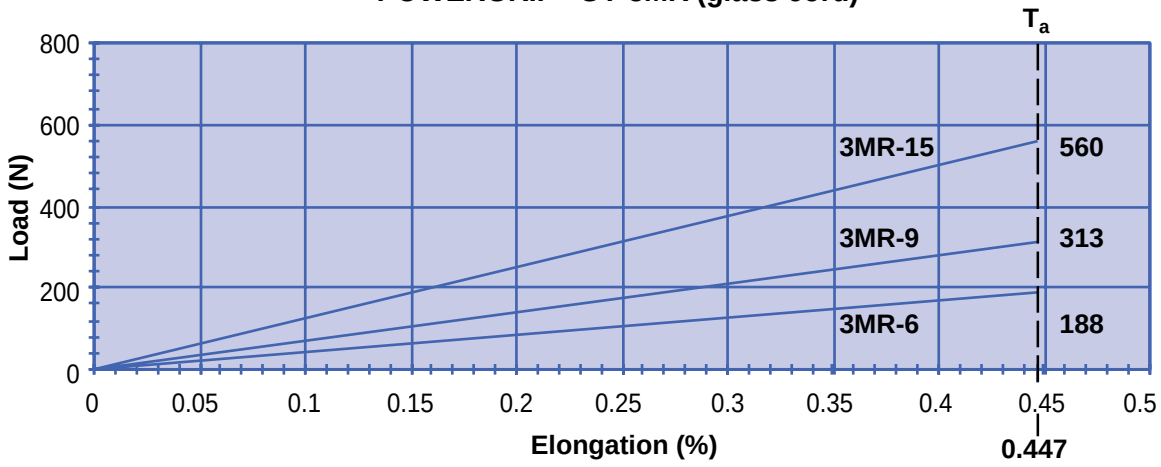
POWERGRIP® GT-3MR (steel cord)



POWERGRIP® GT-3MR (glass cord)



3MR PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm	N	PD mm	OD mm
10	9.55	8.79	64	61.12	60.35	118	112.68	111.92
11	10.50	9.74	65	62.07	61.31	119	113.64	112.87
12	11.46	10.70	66	63.03	62.26	120	114.59	113.83
13	12.41	11.65	67	63.98	63.22	121	115.55	114.78
14	13.37	12.61	68	64.94	64.17	122	116.50	115.74
15	14.32	13.56	69	65.89	65.13	123	117.46	116.69
16	15.28	14.52	70	66.85	66.08	124	118.41	117.65
17	16.23	15.47	71	67.80	67.04	125	119.37	118.60
18	17.19	16.43	72	68.75	67.99	126	120.32	119.56
19	18.14	17.38	73	69.71	68.95	127	121.28	120.51
20	19.10	18.34	74	70.66	69.90	128	122.23	121.47
21	20.05	19.29	75	71.62	70.86	129	123.19	122.42
22	21.01	20.25	76	72.57	71.81	130	124.14	123.38
23	21.96	21.20	77	73.53	72.77	131	125.10	124.33
24	22.92	22.16	78	74.48	73.72	132	126.05	125.29
25	23.87	23.11	79	75.44	74.68	133	127.01	126.24
26	24.83	24.07	80	76.39	75.63	134	127.96	127.20
27	25.78	25.02	81	77.35	76.59	135	128.92	128.15
28	26.74	25.98	82	78.30	77.54	136	129.87	129.11
29	27.69	26.93	83	79.26	78.50	137	130.83	130.06
30	28.65	27.89	84	80.21	79.45	138	131.78	131.02
31	29.60	28.84	85	81.17	80.41	139	132.74	131.97
32	30.56	29.80	86	82.12	81.36	140	133.69	132.93
33	31.51	30.75	87	83.08	82.32	141	134.65	133.88
34	32.47	31.71	88	84.03	83.27	142	135.60	134.84
35	33.42	32.66	89	84.99	84.23	143	136.56	135.79
36	34.38	33.62	90	85.94	85.18	144	137.51	136.75
37	35.33	34.57	91	86.90	86.14	145	138.46	137.70
38	36.29	35.53	92	87.85	87.09	146	139.42	138.66
39	37.24	36.48	93	88.81	88.05	147	140.37	139.61
40	38.20	37.44	94	89.76	89.00	148	141.33	140.57
41	39.15	38.39	95	90.72	89.96	149	142.28	141.52
42	40.11	39.35	96	91.67	90.91	150	143.24	142.48
43	41.06	40.30	97	92.63	91.87			
44	42.02	41.25	98	93.58	92.82			
45	42.97	42.21	99	94.54	93.78			
46	43.93	43.16	100	95.49	94.73			
47	44.88	44.12	101	96.45	95.69			
48	45.84	45.07	102	97.40	96.64			
49	46.79	46.03	103	98.36	97.60			
50	47.75	46.98	104	99.31	98.55			
51	48.70	47.94	105	100.27	99.51			
52	49.66	48.89	106	101.22	100.46			
53	50.61	49.85	107	102.18	101.42			
54	51.57	50.80	108	103.13	102.37			
55	52.52	51.76	109	104.09	103.33			
56	53.48	52.71	110	105.04	104.28			
57	54.43	53.67	111	106.00	105.24			
58	55.39	54.62	112	106.95	106.19			
59	56.34	55.58	113	107.91	107.15			
60	57.30	56.53	114	108.86	108.10			
61	58.25	57.49	115	109.82	109.06			
62	59.21	58.44	116	110.77	110.01			
63	60.16	59.40	117	111.73	110.96			

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

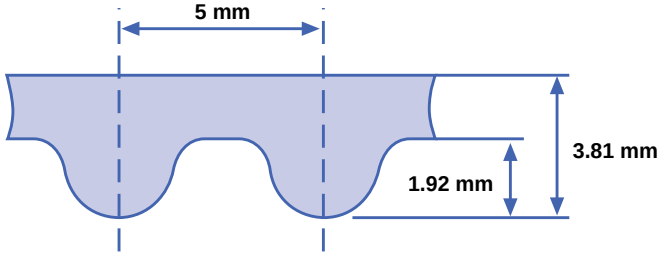
N : number of grooves
PD : pitch diameter
OD: outside diameter

Belt width	Typical pulley width
6 mm	10 mm
9 mm	13 mm
15 mm	19 mm

5MR BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	37.6	44.8

No. of pulley grooves		14	18	24	28	32	40	≥ 48
Specific allowable working tension for 10 mm belt width (N)	Glass cord	245	296	360	385	409	438	455
	Steel cord				520	552	591	614



Belt width	6 mm	10 mm	15 mm	25 mm
Width factor	0.53	1	1.58	2.93

MINIMUM BREAKING TENSION (N)

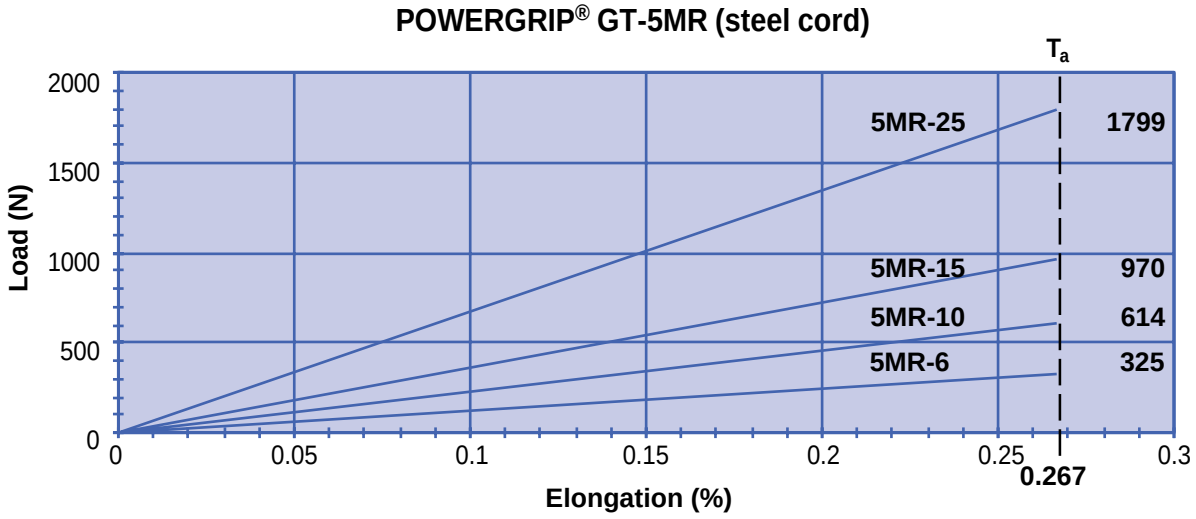
Width	Glass cord	Steel cord
5MR-6	2350	2480
5MR-10	4100	4340
5MR-15	5280	5580
5MR-25	9400	9920

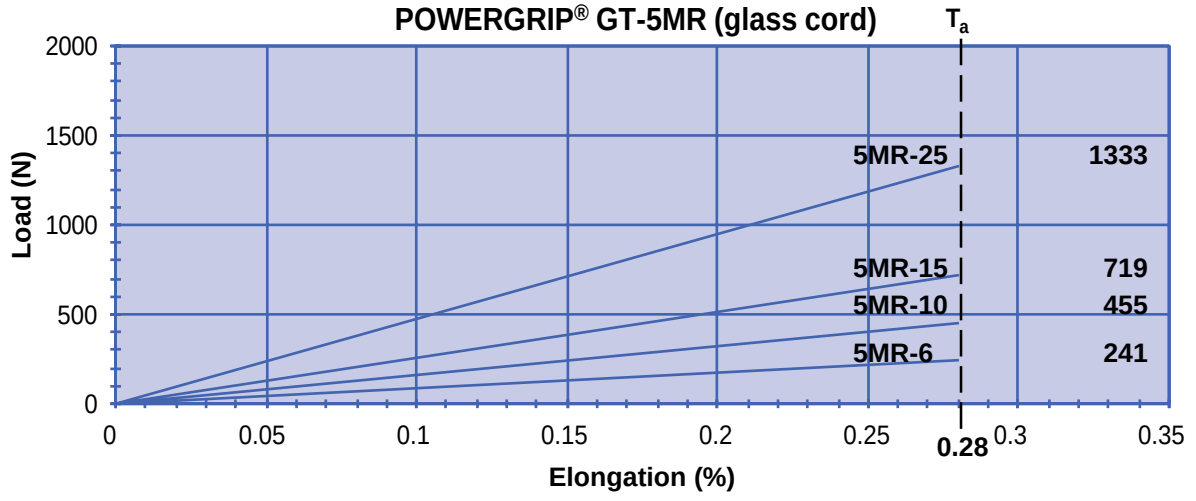
ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
5MR-6	86	122
5MR-10	163	230
5MR-15	257	363
5MR-25	475	674

4





5MR PULLEY DIAMETERS

N	PD mm	OD mm
14	22.28	21.14
15	23.87	22.73
16	25.46	24.32
17	27.06	25.91
18	28.65	27.50
19	30.24	29.10
20	31.83	30.69
21	33.42	32.28
22	35.01	33.87
23	36.61	35.46
24	38.20	37.05
25	39.79	38.65
26	41.38	40.24
27	42.97	41.38
28	44.56	43.42
29	46.15	45.01
30	47.75	46.60
31	49.34	48.20
32	50.93	49.79
33	52.52	51.38
34	54.11	52.97
35	55.70	54.56
36	57.30	56.15
37	58.89	57.74
38	60.48	59.34
39	62.07	60.93
40	63.66	62.52
41	65.25	64.11
42	66.85	65.70
43	68.44	67.29
44	70.03	68.89
45	71.62	70.48
46	73.21	72.07
47	74.80	73.66
48	76.39	75.25
49	77.99	76.84
50	79.58	78.43
51	81.17	80.03
52	82.76	81.62
53	84.35	83.21
54	85.94	84.80
55	87.54	86.39
56	89.13	87.98
57	90.72	89.58
58	92.31	91.17
59	93.90	92.76
60	95.49	94.35
61	97.08	95.94
62	98.68	97.53
63	100.27	99.12
64	101.86	100.72
65	103.45	102.31
66	105.04	103.90
67	106.63	105.49
68	108.23	107.08
69	109.82	108.67
70	111.41	110.27
71	113.00	111.86
72	114.59	113.45
73	116.18	115.04
74	117.77	116.63
75	119.37	118.22
76	120.96	119.81
77	122.55	121.41
78	124.14	123.00
79	125.73	124.59
80	127.32	126.18
81	128.92	127.77
82	130.51	129.36
83	132.10	130.96
84	133.69	132.55
85	135.28	134.14
86	136.87	135.73
87	138.46	137.32
88	140.06	138.91
89	141.65	140.50
90	143.24	142.10
91	144.83	143.69
92	146.42	145.28
93	148.10	146.87
94	149.61	148.46
95	151.20	150.05
96	152.79	151.65
97	154.38	153.24
98	155.87	154.83
99	157.56	156.42
100	159.15	158.01
101	160.75	159.60
102	162.34	161.20
103	163.93	162.79
104	165.52	164.38
105	167.11	165.97
106	168.70	167.56
107	170.30	169.15
108	171.89	170.74
109	173.48	172.34
110	175.07	173.93
111	176.66	175.52
112	178.25	177.11
113	179.85	178.70
114	181.44	180.29
115	183.03	181.89
116	184.62	183.48
117	186.21	185.07
118	187.80	186.66
119	189.39	188.25
120	190.99	189.84
121	192.58	181.43
122	194.17	193.03
123	195.76	194.62
124	197.35	196.21
125	198.94	197.80
126	200.54	199.39
127	202.13	200.98
128	203.72	202.58
129	205.31	204.17
130	206.90	205.76
131	208.49	207.35
132	210.08	208.94
133	211.68	210.53
134	213.27	212.12
135	214.86	213.72
136	216.45	215.31
137	218.04	216.90
138	219.63	218.49
139	221.23	220.08
140	222.82	221.67
141	224.41	223.27
142	226.00	224.86
143	227.59	226.45
144	229.18	228.04
145	230.77	229.63
146	232.37	231.22
147	223.96	232.81
148	235.55	234.41
149	237.14	236.00
150	238.73	237.59

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

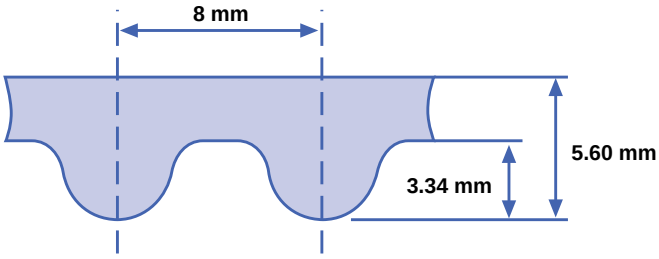
N : number of grooves
PD : pitch diameter
OD : outside diameter

Belt width	Typical pulley width
6 mm	11 mm
10 mm	16 mm
15 mm	21 mm
25 mm	30 mm

8MR BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	54.0	74.0

No. of pulley grooves		22	26	30	34	38	≥ 44
Specific allowable working tension for 20 mm belt width (N)	Glass cord	884	1055	1215	1375	1509	1605
	Steel cord	1193	1424	1640	1856	2037	2167



Belt width	10 mm	15 mm	20 mm	30 mm	50 mm
Width factor	0.46	0.73	1	1.57	2.91

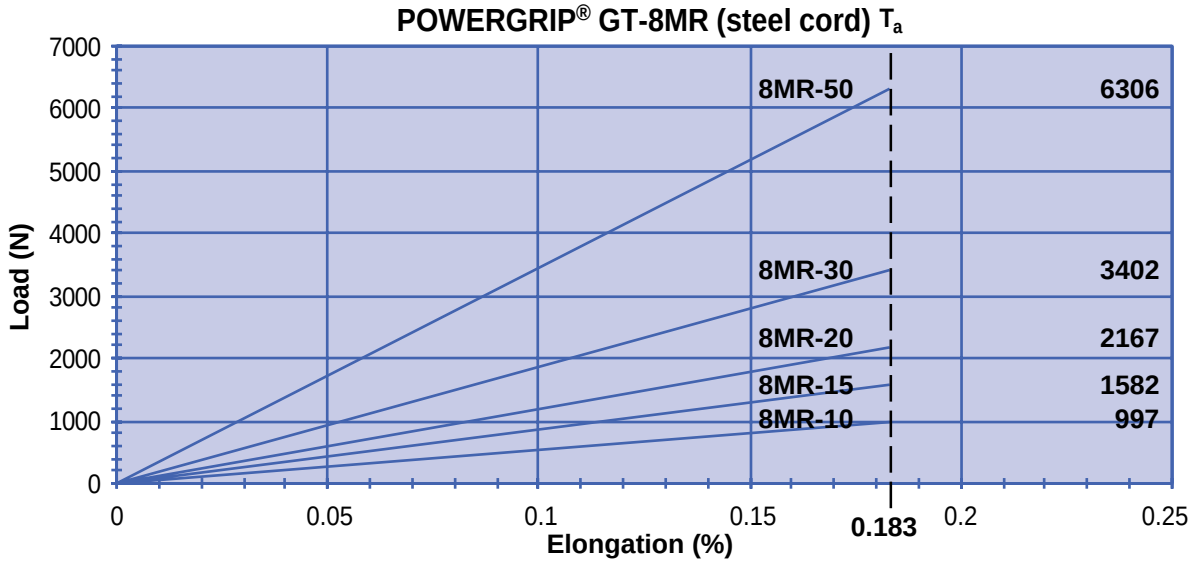
MINIMUM BREAKING TENSION (N)

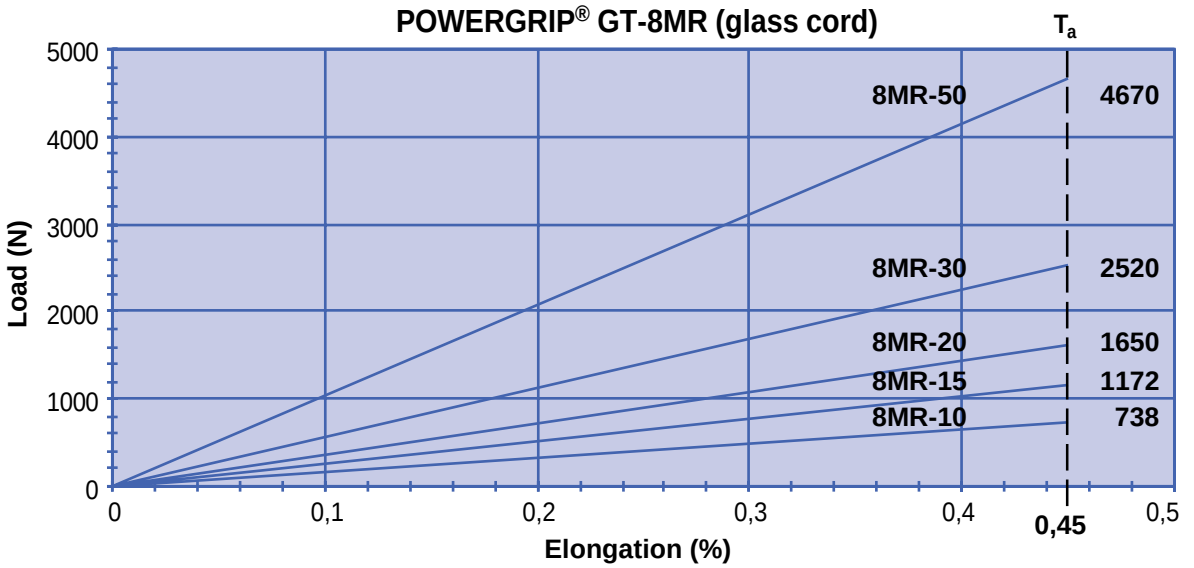
Width	Glass cord	Steel cord
8MR-10	5030	9970
8MR-15	7550	14950
8MR-20	10050	19950
8MR-30	15950	29890
8MR-50	27700	51525

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
8MR-10	165	545
8MR-15	261	864
8MR-20	358	1184
8MR-30	562	1859
8MR-50	1042	3448





8MR PULLEY DIAMETERS

N	PD mm	OD mm
22	56.02	54.42
23	58.57	56.97
24	61.12	59.52
25	63.66	62.06
26	66.21	64.61
27	68.75	67.15
28	71.30	69.70
29	73.85	72.25
30	76.39	74.79
31	78.94	77.34
32	81.49	79.89
33	84.03	82.43
34	86.58	84.98
35	89.13	87.53
36	91.67	90.07
37	94.22	92.62
38	96.77	95.17
39	99.31	97.71
40	101.86	100.26
41	104.41	102.81
42	106.95	105.35
43	109.50	107.90
44	112.05	110.44
45	114.59	112.99
46	117.14	115.54
47	119.68	118.08
48	122.23	120.63
49	124.79	123.18
50	127.32	125.72
51	129.87	128.27
52	132.42	130.82
53	134.96	133.36
54	137.51	135.91
55	140.06	138.46
56	142.60	141.00
57	145.15	143.55
58	147.70	146.10
59	150.24	148.64
60	152.79	151.19
61	155.34	153.74
62	157.88	156.28
63	160.43	158.83
64	162.97	161.37
65	165.52	163.92
66	168.07	166.47
67	170.61	169.01
68	173.16	171.56
69	175.71	174.11
70	178.25	176.65
71	180.80	179.20
72	183.35	181.75
73	185.89	184.29
74	188.44	186.84
75	190.99	189.39
76	193.53	191.93
77	196.08	184.48
78	198.63	197.03
79	201.17	199.57
80	203.72	202.12
81	206.26	204.66
82	208.81	207.21
83	211.36	209.76
84	213.90	212.30
85	216.45	214.85
86	219.00	217.40
87	221.54	219.94
88	224.09	222.49
89	226.64	225.04
90	229.18	227.58
91	231.73	230.13
92	234.28	232.68
93	236.82	235.22
94	239.37	237.77
95	241.92	240.32
96	244.46	242.86
97	247.01	245.41
98	249.55	247.95
99	252.10	250.50
100	254.65	253.05
101	257.19	255.59
102	259.74	258.14
103	262.29	260.69
104	264.83	263.23
105	267.38	265.78
106	269.93	268.33
107	272.47	270.87
108	275.02	273.42
109	277.57	275.97
110	280.11	278.51
111	282.66	281.06
112	285.21	283.61
113	287.75	286.15
114	290.30	288.70
115	292.85	291.24
116	295.39	293.79
117	297.94	296.34
118	300.48	298.88
119	303.03	301.43
120	305.58	303.98
121	308.12	306.52
122	310.67	309.07
123	313.22	311.62
124	315.76	314.16
125	318.31	316.71
126	320.86	319.26
127	323.40	321.80
128	325.95	324.35
129	328.50	326.90
130	331.04	329.44
131	333.59	331.99
132	336.14	334.54
133	338.68	337.08
134	341.23	339.63
135	343.77	342.17
136	346.32	344.72
137	348.87	347.27
138	351.41	349.81
139	353.96	352.36
140	356.51	354.91
141	359.05	357.45
142	361.60	360.00
143	364.15	362.55
144	366.69	365.09
145	369.24	367.64
146	371.79	370.19
147	374.33	372.73
148	376.88	375.28
149	379.43	377.83
150	381.97	380.37
151	384.52	382.92
152	387.06	385.46
153	389.61	388.01
154	392.16	390.56
155	394.70	393.10
156	397.25	395.65
157	399.80	398.20
158	402.34	400.74
159	404.89	403.29
160	407.44	405.84
161	409.98	408.38
162	412.53	410.93
163	415.08	413.47
164	417.62	416.02
165	420.17	418.57
166	422.72	421.12
167	425.26	423.66
168	427.81	426.21
169	430.35	428.75
170	532.90	431.30
171	435.45	433.85
172	437.99	436.39
173	440.54	438.94
174	443.09	441.49
175	445.63	444.03
176	448.18	446.58
177	450.73	449.13
178	453.27	451.67
179	455.82	454.22
180	458.37	456.77
181	460.91	459.31
182	463.46	461.86
183	466.01	464.41
184	468.55	466.95
185	471.10	469.50
186	473.65	472.04
187	476.19	474.59
188	478.74	477.14
189	481.28	479.68
190	483.83	482.23
191	486.38	484.78
192	488.92	487.32

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

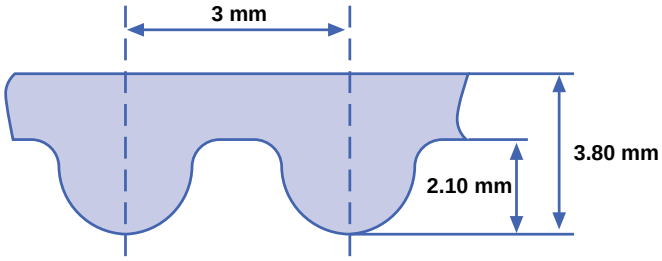
Belt width	Typical pulley width
10 mm	18 mm
15 mm	23 mm
20 mm	28 mm
30 mm	38 mm
50 mm	60 mm

3M BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	22.9	27.6

No. of pulley grooves		10	14	18	24	32	40	≥ 48
Specific allowable working tension for 6 mm belt width (N)	Glass cord	80	86	89	92	100	105	118
	Steel cord				124	135	142	159

Belt width	6 mm	9 mm	15 mm
Width factor	1	1.66	2.97



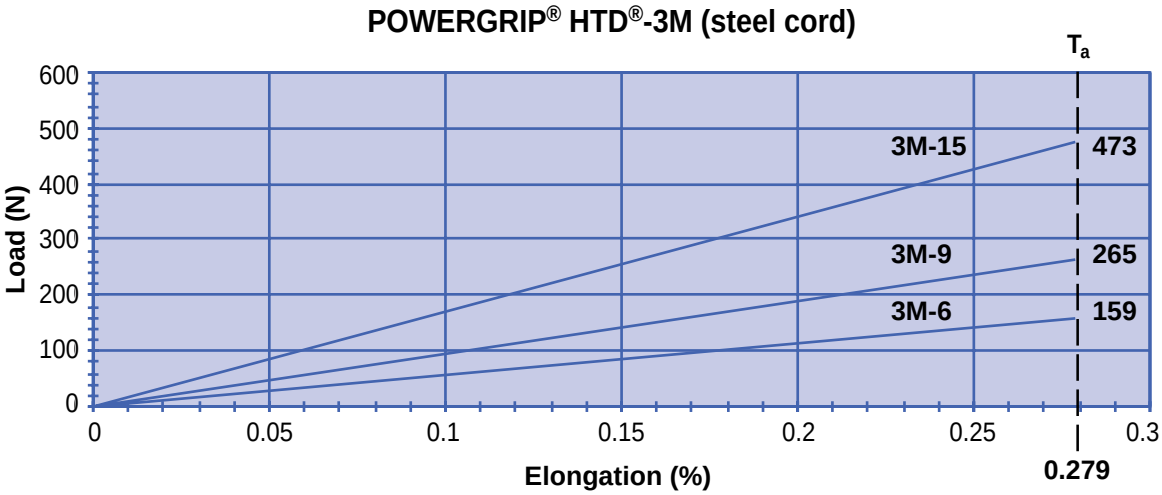
MINIMUM BREAKING TENSION (N)

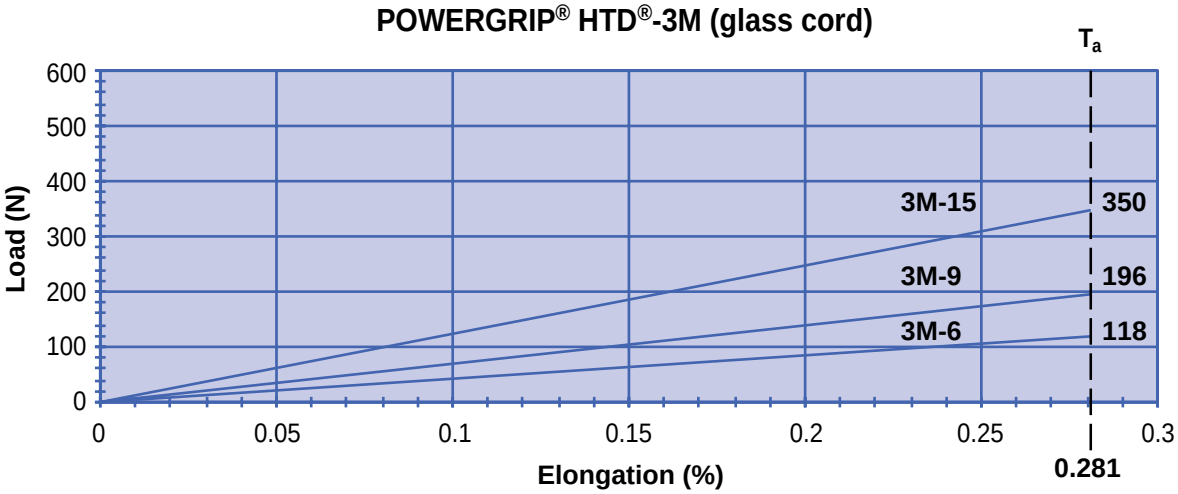
Width	Glass cord	Steel cord
3M-6	1200	1590
3M-9	1990	2650
3M-15	2990	4240

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
3M-6	42	57
3M-9	70	95
3M-15	125	169





3M PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm	N	PD mm	OD mm
10	9.55	8.79	64	61.12	60.35	118	112.68	111.92
11	10.50	9.74	65	62.07	61.31	119	113.64	112.87
12	11.46	10.70	66	63.03	62.26	120	114.59	113.83
13	12.41	11.65	67	63.98	63.22	121	115.55	114.78
14	13.37	12.61	68	64.94	64.17	122	116.50	115.74
15	14.32	13.56	69	65.89	65.13	123	117.46	116.69
16	15.28	14.52	70	66.85	66.08	124	118.41	117.65
17	16.23	15.47	71	67.80	67.04	125	119.37	118.60
18	17.19	16.43	72	68.75	67.99	126	120.32	119.56
19	18.14	17.38	73	69.71	68.95	127	121.28	120.51
20	19.10	18.34	74	70.66	69.90	128	122.23	121.47
21	20.05	19.29	75	71.62	70.86	129	123.19	122.42
22	21.01	20.25	76	72.57	71.81	130	124.14	123.38
23	21.96	21.20	77	73.53	72.77	131	125.10	124.33
24	22.92	22.16	78	74.48	73.72	132	126.05	125.29
25	23.87	23.11	79	75.44	74.68	133	127.01	126.24
26	24.83	24.07	80	76.39	75.63	134	127.96	127.20
27	25.78	25.02	81	77.35	76.59	135	128.92	128.15
28	26.69	26.93	82	78.30	77.54	136	129.87	129.11
29	27.69	26.93	83	79.26	78.50	137	130.83	130.06
30	28.65	27.89	84	80.21	79.45	138	131.78	131.02
31	29.60	28.84	85	81.17	80.41	139	132.74	131.97
32	30.56	29.80	86	82.12	81.36	140	133.69	132.93
33	31.51	30.75	87	83.08	82.32	141	134.65	133.88
34	32.47	31.71	88	84.03	83.27	142	135.60	134.84
35	33.42	32.66	89	84.99	84.23	143	136.56	135.79
36	34.38	33.62	90	85.94	85.18	144	137.51	136.75
37	35.33	34.57	91	86.90	86.14	145	138.46	137.70
38	36.29	35.53	92	87.85	87.09	146	139.42	138.66
39	37.24	36.48	93	88.81	88.05	147	140.37	139.61
40	38.20	37.44	94	89.76	89.00	148	141.33	140.57
41	39.15	38.39	95	90.72	89.96	149	142.28	141.52
42	40.11	39.35	96	91.67	90.91	150	143.24	142.48
43	41.06	40.30	97	92.63	91.87			
44	42.02	41.25	98	93.58	92.82			
45	42.97	42.21	99	94.54	93.78			
46	43.93	43.16	100	95.49	94.73			
47	44.88	44.12	101	96.45	95.69			
48	45.84	45.07	102	97.40	96.64			
49	46.79	46.03	103	98.36	97.60			
50	47.75	46.98	104	99.31	98.55			
51	48.70	47.94	105	100.27	99.51			
52	49.66	48.89	106	101.22	100.46			
53	50.61	49.85	107	102.18	101.42			
54	51.57	50.80	108	103.13	102.37			
55	52.52	51.76	109	104.09	103.33			
56	53.48	52.71	110	105.04	104.28			
57	54.43	53.67	111	106.00	105.24			
58	55.39	54.62	112	106.95	106.19			
59	56.34	55.58	113	107.91	107.15			
60	57.30	56.53	114	108.86	108.10			
61	58.25	57.49	115	109.82	109.06			
62	59.21	58.44	116	110.77	110.01			
63	60.16	59.40	117	111.73	110.96			

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

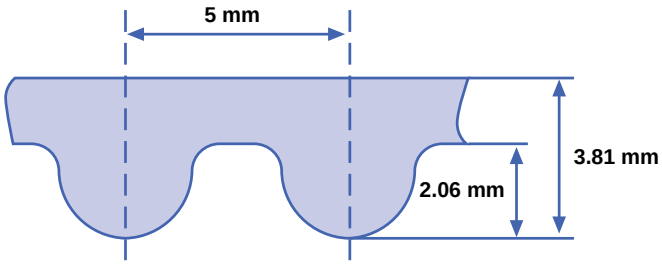
Belt width	Typical pulley width
6 mm	10 mm
9 mm	13 mm
15 mm	19 mm

5M BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	37.6	44.8

No. of pulley grooves		14	18	24	28	32	≥36
Specific allowable working tension for 10 mm belt width (N)	Glass cord	190	220	260	275	290	300
	Steel cord				371	392	405

Belt width	6 mm	10 mm	15 mm	25 mm
Width factor	0.53	1	1.58	2.93



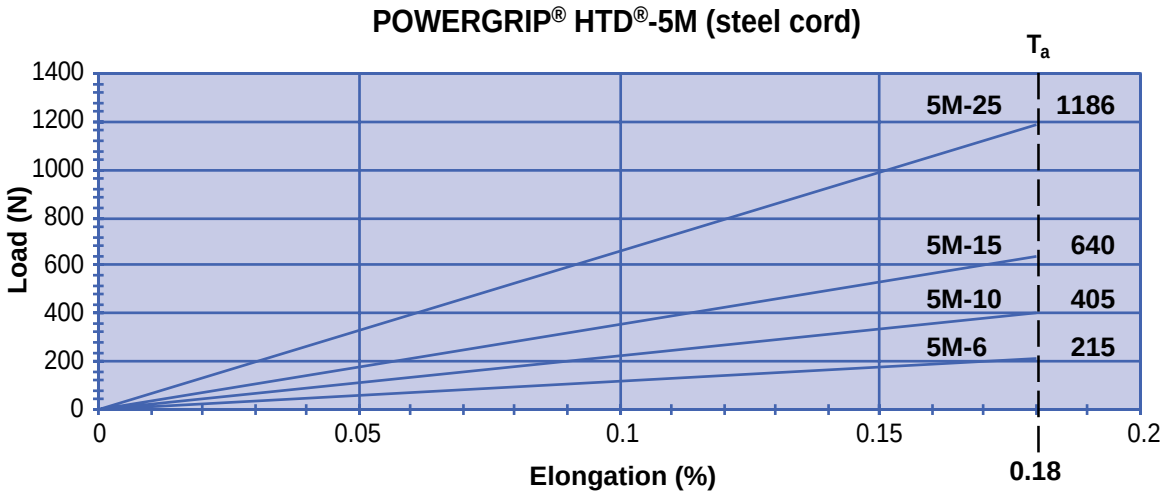
MINIMUM BREAKING TENSION (N)

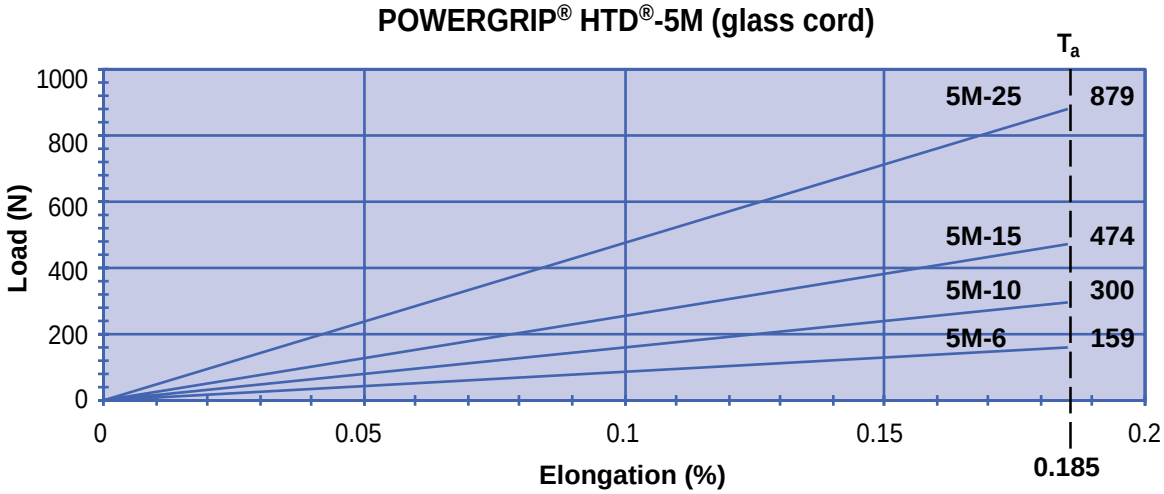
Width	Glass cord	Steel cord
5M-6	2350	2480
5M-10	4100	4300
5M-15	5280	5580
5M-25	9400	9900

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
5M-6	86	122
5M-10	162	230
5M-15	256	363
5M-25	475	674





5M PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm	N	PD mm	OD mm
14	22.28	21.14	68	108.23	107.08	122	194.17	193.03
15	23.87	22.73	69	109.82	108.67	123	195.76	194.62
16	25.46	24.32	70	111.41	110.27	124	197.35	196.21
17	27.06	25.91	71	113.00	111.86	125	198.94	197.80
18	28.65	27.50	72	114.59	113.45	126	200.54	199.39
19	30.24	29.10	73	116.18	115.04	127	202.13	200.98
20	31.83	30.69	74	117.77	116.63	128	203.72	202.58
21	33.42	32.28	75	119.37	118.22	129	205.31	204.17
22	35.01	33.87	76	120.96	119.81	130	206.90	205.76
23	36.61	36.46	77	122.55	121.41	131	208.49	207.35
24	38.20	37.05	78	124.14	123.00	132	210.08	208.94
25	39.79	38.65	79	125.73	124.59	133	211.68	210.53
26	41.38	40.24	80	127.32	126.18	134	213.27	212.12
27	42.97	41.83	81	128.92	127.77	135	214.86	213.72
28	44.56	43.42	82	130.51	129.36	136	216.45	215.31
29	46.15	45.01	83	132.10	130.96	137	218.04	216.90
30	47.75	46.60	84	133.69	132.55	138	219.63	218.49
31	49.34	48.20	85	135.28	134.14	139	221.23	220.08
32	50.93	49.79	86	136.87	135.73	140	222.82	221.67
33	52.52	51.38	87	138.46	137.32	141	224.41	223.27
34	54.11	52.97	88	140.06	138.91	142	226.00	224.86
35	55.70	54.56	89	141.65	140.50	143	227.59	226.45
36	57.30	56.15	90	143.24	142.10	144	229.18	228.04
37	58.89	57.74	91	144.83	143.69	145	230.77	229.63
38	60.48	59.34	92	146.42	145.28	146	232.37	231.22
39	62.07	60.93	93	148.01	146.87	147	233.96	232.81
40	63.66	62.52	94	149.61	148.46	148	235.55	234.41
41	65.25	64.11	95	151.20	150.05	149	237.14	236.00
42	66.85	65.70	96	152.79	151.65	150	238.73	237.59
43	68.44	67.29	97	154.38	153.24			
44	70.03	68.89	98	155.97	154.83			
45	71.62	70.48	99	157.56	156.42			
46	73.21	72.07	100	159.15	158.01			
47	74.80	73.66	101	160.75	159.60			
48	76.39	75.25	102	162.34	161.20			
49	77.99	75.84	103	163.93	162.79			
50	79.58	78.43	104	165.52	164.38			
51	81.17	80.03	105	167.11	165.97			
52	82.76	81.62	106	168.70	167.56			
53	84.35	83.21	107	170.30	169.15			
54	85.94	84.80	108	171.89	170.74			
55	87.54	86.39	109	173.48	172.34			
56	89.13	87.98	110	175.07	173.93			
57	90.72	89.58	111	176.66	175.52			
58	92.31	91.17	112	178.25	177.11			
59	93.90	92.76	113	179.85	178.70			
60	95.49	94.35	114	181.44	180.29			
61	97.08	95.94	115	183.03	181.89			
62	98.68	97.53	116	184.62	183.48			
63	100.27	99.12	117	186.21	185.07			
64	101.86	100.72	118	187.80	186.66			
65	103.45	102.31	119	189.39	188.25			
66	105.04	103.90	120	190.99	189.84			
67	106.63	105.49	121	192.58	191.43			

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

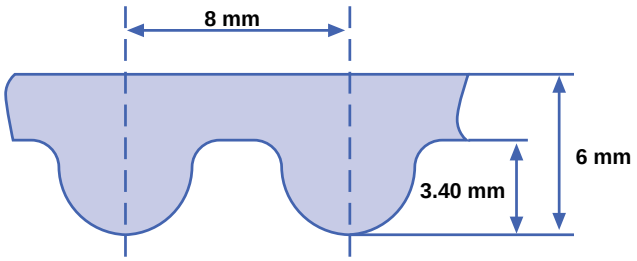
Belt width	Typical pulley width
6 mm	11 mm
10 mm	16 mm
15 mm	21 mm
25 mm	31 mm

8M BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	54.0	65.2

No. of pulley grooves		22	26	30	34	38	≥44
Specific allowable working tension for 20 mm belt width (N)	Glass cord	680	760	845	930	995	1070
	Steel cord	918	1026	1141	1256	1343	1445

Belt width	10 mm	15 mm	20 mm	30 mm	50 mm
Width factor	0.46	0.73	1	1.57	2.91



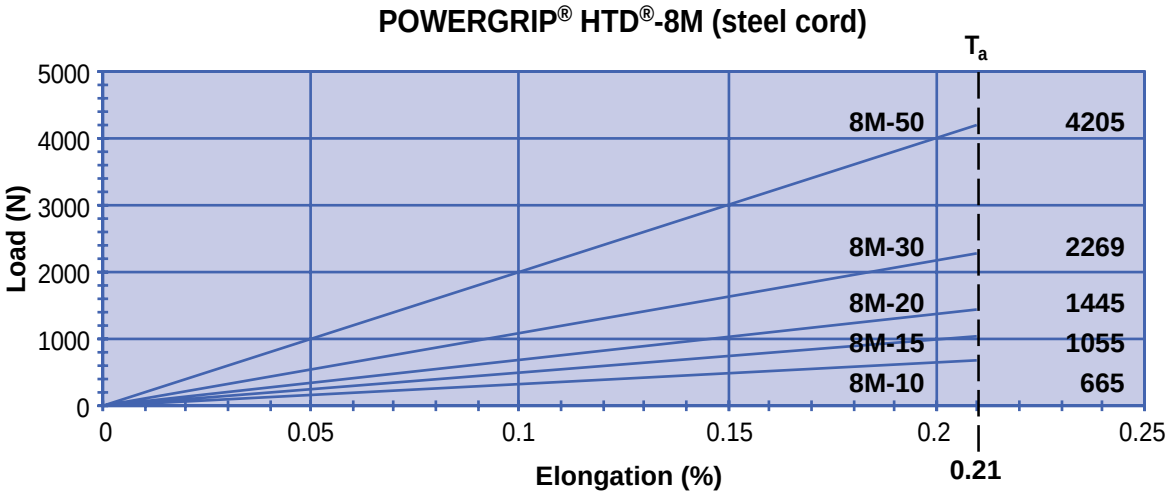
MINIMUM BREAKING TENSION (N)

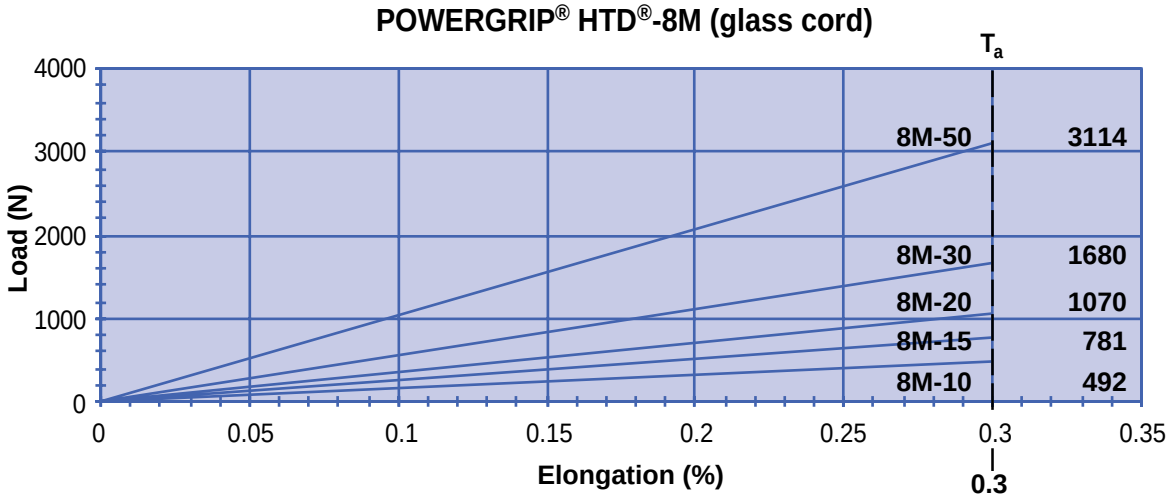
Width	Glass cord	Steel cord
8M-10	5030	4860
8M-15	7550	7300
8M-20	10050	9700
8M-30	15950	15400
8M-50	27700	26700

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
8M-10	165	317
8M-15	261	503
8M-20	358	690
8M-30	562	1083
8M-50	1042	2008





8M PULLEY DIAMETERS

N	PD mm	OD mm
22	56.02	54.65
23	58.57	57.20
24	61.12	59.75
25	63.66	62.29
26	66.21	64.84
27	68.75	67.38
28	71.30	69.93
29	73.85	72.48
30	76.39	75.02
31	78.94	77.65
32	81.49	80.16
33	84.03	82.68
34	86.58	85.22
35	89.13	87.78
36	91.67	90.30
37	94.22	92.85
38	96.77	95.39
39	99.31	97.94
40	101.86	100.49
41	104.41	103.03
42	106.95	105.58
43	109.50	108.13
44	112.05	110.67
45	114.59	113.22
46	117.14	115.77
47	119.68	118.31
48	122.23	120.86
49	124.78	123.41
50	127.32	125.95
51	129.87	128.50
52	132.42	131.05
53	134.96	133.59
54	137.51	136.14
55	140.06	138.68
56	142.60	141.23
57	145.15	143.78
58	147.70	146.32
59	150.24	148.87
60	152.79	151.42
61	155.34	153.96
62	157.88	156.51
63	160.43	159.06
64	162.97	161.60
65	165.52	164.15
66	168.07	166.70
67	170.61	169.24
68	173.16	171.79
69	175.71	174.34
70	178.25	176.88
71	180.80	179.43
72	183.35	181.97
73	185.89	184.52
74	188.44	187.07
75	190.99	189.61
76	193.53	192.16
77	196.08	194.71
78	198.63	197.25
79	201.17	199.81
80	203.72	202.35
81	206.26	204.89
82	208.81	207.44
83	211.36	209.99
84	213.90	212.53
85	216.45	215.08
86	219.00	217.63
87	221.54	220.17
88	224.09	222.72
89	226.63	225.27
90	229.18	227.81
91	231.73	230.36
92	234.28	232.90
93	236.82	235.45
94	239.37	238.00
95	241.92	240.54
96	244.46	243.09
97	247.01	245.64
98	249.55	248.18
99	252.10	250.73
100	254.65	253.28
101	257.19	255.82
102	259.74	258.37
103	262.29	290.92
104	264.83	263.46
105	267.38	266.01
106	269.93	268.56
107	272.47	271.10
108	275.02	273.65
109	277.57	276.19
110	280.11	278.74
111	282.66	281.29
112	285.21	283.83
113	287.75	286.38
114	290.30	288.93
115	292.85	291.47
116	295.39	294.02
117	297.94	296.57
118	300.48	299.11
119	303.03	301.66
120	305.58	304.21
121	308.12	306.75
122	310.67	309.30
123	313.22	311.85
124	315.76	314.39
125	318.31	316.94
126	320.86	319.48
127	323.41	322.03
128	325.95	324.58
129	328.50	327.12
130	331.04	329.67
131	333.59	332.22
132	336.14	334.76
133	338.68	337.31
134	341.23	339.86
135	343.77	342.40
136	346.32	344.95
137	348.87	347.50
138	351.41	350.04
139	353.96	352.59
140	356.51	355.14
141	359.05	357.68
142	361.60	360.23
143	364.15	362.77
144	366.69	365.32
145	369.24	367.87
146	371.79	370.41
147	374.33	372.96
148	376.88	375.51
149	379.43	378.05
150	381.97	380.60
151	384.52	383.15
152	387.06	385.70
153	389.61	388.24
154	392.16	390.79
155	394.70	393.33
156	397.25	395.88
157	399.80	398.43
158	402.34	400.97
159	404.89	403.52
160	407.44	406.07
161	409.98	408.61
162	412.53	411.16
163	415.08	413.70
164	417.62	416.25
165	420.17	418.80
166	422.72	421.34
167	425.26	423.89
168	427.81	426.44
169	430.35	428.98
170	432.90	431.53
171	435.45	434.08
172	437.99	436.62
173	440.54	439.17
174	443.09	441.72
175	445.63	444.26
176	448.18	446.81
177	450.73	449.36
178	453.27	451.90
179	455.82	454.45
180	458.37	456.99
181	460.91	459.54
182	463.46	462.09
183	466.01	464.63
184	468.55	467.18
185	471.10	469.73
186	473.65	472.27
187	476.19	474.82
188	478.74	477.37
189	481.28	479.91
190	483.83	482.46
191	486.38	485.01
192	488.92	487.55

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

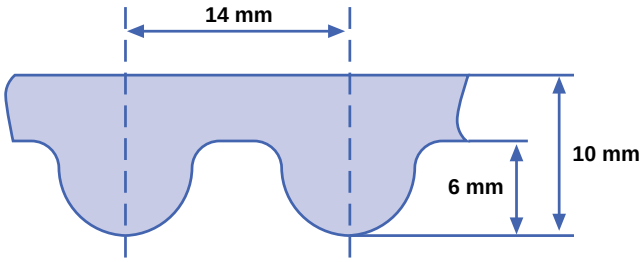
Belt width	Typical pulley width
10 mm	18 mm
15 mm	23 mm
20 mm	28 mm
30 mm	38 mm
50 mm	60 mm

14M BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	96.0	132.0

No. of pulley grooves		28	34	40	≥52
Specific allowable working tension for 40 mm belt width (N)	Glass cord	3290	4042	4558	4612
	Steel cord	4442	5457	6153	6226

Belt width	25 mm	40 mm	55 mm	85 mm
Width factor	0.63	1	1.50	2.49



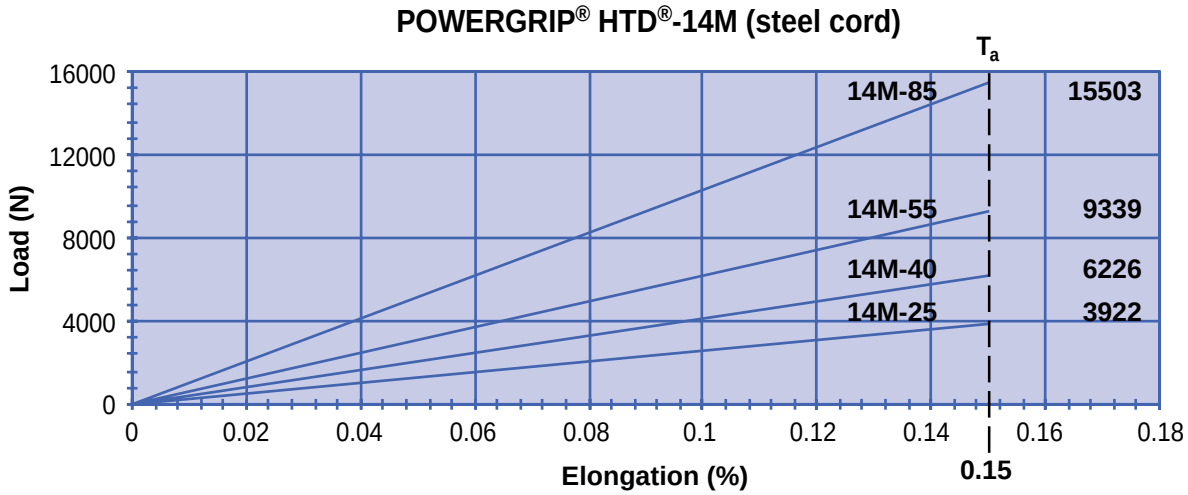
MINIMUM BREAKING TENSION (N)

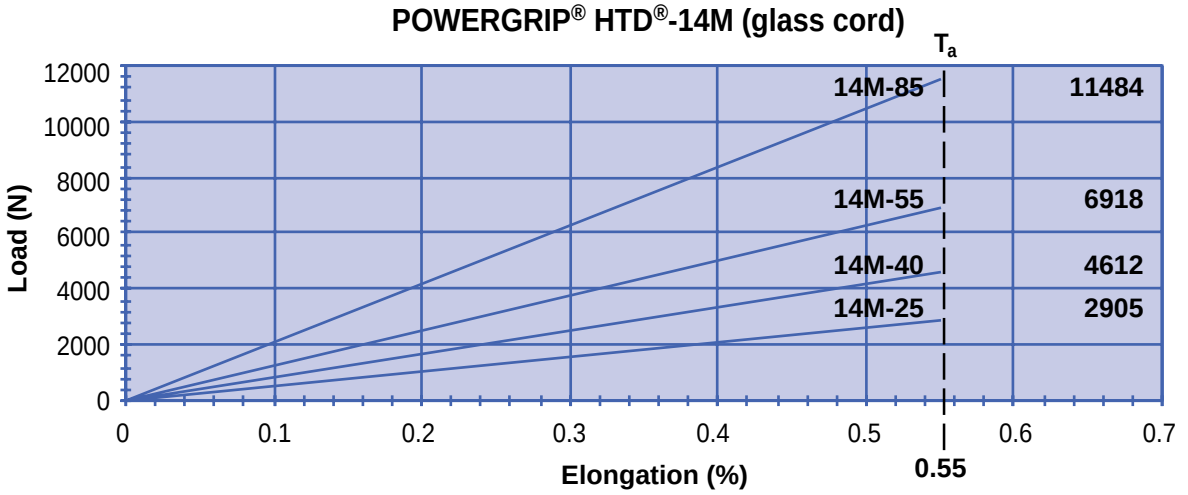
Width	Glass cord	Steel cord
14M-25	17010	42194
14M-40	27950	69300
14M-55	37250	92400
14M-85	60500	150200

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
14M-25	528	2615
14M-40	839	4151
14M-55	1258	6226
14M-85	2088	10335





14M PULLEY DIAMETERS

N	PD mm	OD mm
28	124.78	122.12
29	129.23	126.57
30	133.69	130.99
31	138.15	135.46
32	142.60	139.88
33	147.06	144.35
34	151.51	148.79
35	155.98	153.24
36	160.43	157.68
37	164.88	162.13
38	169.34	166.60
39	173.80	171.02
40	178.25	175.49
41	182.71	179.92
42	187.17	184.37
43	191.62	188.83
44	196.08	193.28
45	200.53	197.74
46	204.99	202.30
47	209.45	206.65
48	213.90	211.11
49	218.36	215.57
50	222.82	220.02
51	227.27	224.48
52	231.73	228.94
53	236.19	233.39
54	240.64	237.85
55	245.10	242.30
56	249.55	246.76
57	254.01	251.22
58	258.47	255.67
59	262.92	260.13
60	267.38	264.59
61	271.84	269.04
62	276.29	273.50
63	280.75	277.95
64	285.21	282.41
65	289.66	286.87
66	294.12	291.32
67	298.57	295.78
68	303.03	300.24
69	307.49	304.69
70	311.94	309.15
71	316.40	313.61
72	320.86	318.06
73	325.31	322.52
74	329.77	326.97
75	334.22	331.43
76	338.68	335.89
77	343.14	340.34
78	347.59	344.80
79	352.05	349.26
80	356.51	353.71
81	360.96	358.17
82	365.42	362.63
83	369.88	367.08
84	374.33	371.54
85	378.79	375.99
86	383.24	380.45
87	387.70	384.91
88	392.16	389.36
89	396.61	393.82
90	401.07	398.28
91	405.53	402.73
92	409.98	407.19
93	414.44	411.64
94	418.90	416.10
95	423.35	420.56
96	427.81	425.01
97	432.26	429.47
98	436.72	433.93
99	441.18	438.38
100	445.63	442.84
101	450.09	447.30
102	454.55	451.75
103	459.00	456.21
104	463.46	460.66
105	467.92	465.12
106	472.37	469.58
107	476.83	474.03
108	481.28	478.49
109	485.74	482.95
110	490.20	487.40
111	494.65	491.86
112	499.11	496.32
113	503.57	500.77
114	508.02	505.23
115	512.48	509.68
116	516.93	514.14
117	521.39	518.60
118	525.85	523.05
119	530.30	527.51
120	534.76	531.97
121	539.22	536.42
122	543.67	540.88
123	548.13	545.34
124	552.59	549.79
125	557.04	554.25
126	561.50	558.70
127	565.95	563.16
128	570.41	567.62
129	574.87	572.07
130	579.32	576.53
131	583.78	580.99
132	588.24	585.44
133	592.69	589.90
134	597.15	594.35
135	601.61	598.81
136	606.06	603.27
137	610.52	607.72
138	614.97	612.18
139	619.43	616.64
140	623.89	621.09
141	628.34	625.55
142	632.80	630.01
143	637.26	634.46
144	641.71	638.92
145	646.17	643.37
146	650.63	647.83
147	655.08	652.29
148	659.54	656.74
149	663.99	661.20
150	668.45	665.66
151	672.91	670.11
152	677.36	674.57
153	681.82	679.03
154	686.28	683.48
155	690.73	687.94
156	695.19	692.39
157	699.64	696.85
158	704.10	701.31
159	708.56	705.76
160	713.01	710.22
161	717.47	714.68
162	721.93	719.13
163	726.38	723.59
164	730.84	728.05
165	735.30	732.50
166	739.75	736.96
167	744.21	741.41
168	748.66	745.87
169	753.12	750.33
170	757.58	754.78
171	762.03	759.24
172	766.49	763.70
173	770.95	768.15
174	775.40	772.61
175	779.86	777.06
176	784.32	781.52
177	788.77	785.98
178	793.23	790.43
179	797.68	794.89
180	802.14	799.35
181	806.60	803.80
182	811.05	808.26
183	815.51	812.72
184	819.97	817.17
185	824.42	821.63
186	828.88	826.08
187	833.33	830.54
188	837.79	835.00
189	842.25	839.45
190	846.70	843.91
191	851.16	848.37
192	855.62	852.82

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

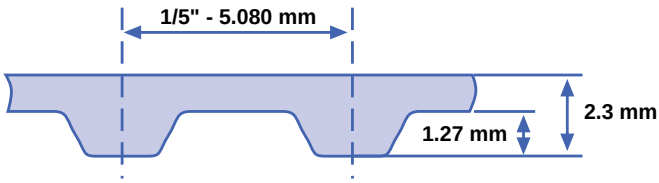
Belt width	Typical pulley width
25 mm	40 mm
40 mm	54 mm
55 mm	70 mm
85 mm	102 mm

XL BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	23.2	30.5

No. of pulley grooves	10	≥12
Specific allowable working tension for 1/4" belt width (N)	28	35

Belt width	1/4"	3/8"	1/2"
Width factor	1	1.57	2.29



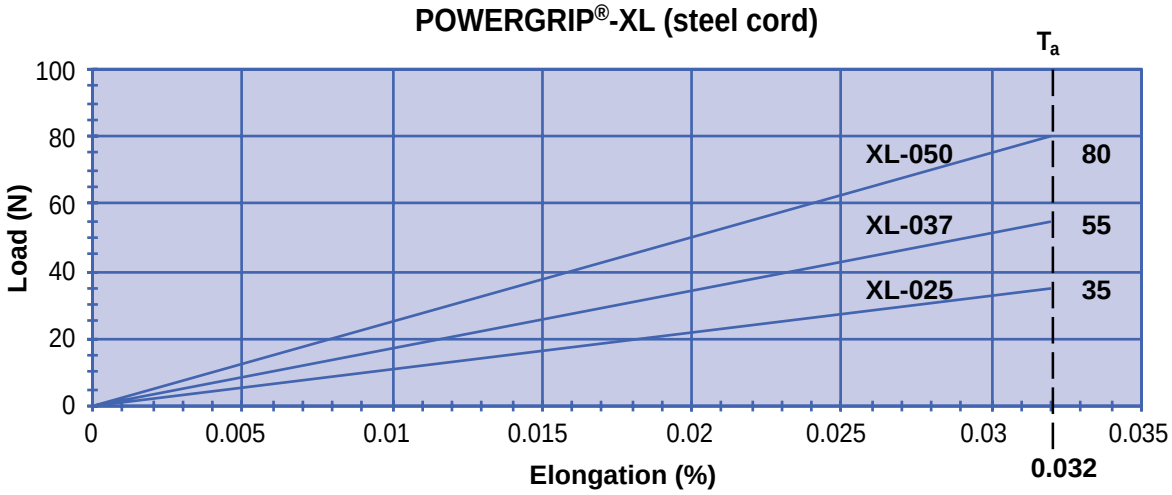
MINIMUM BREAKING TENSION (N)

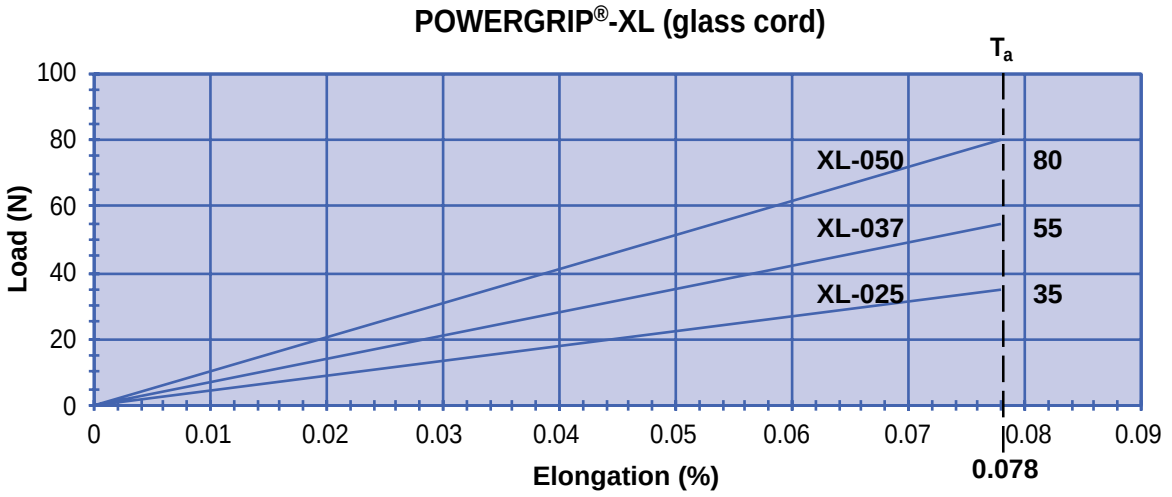
Width	Glass cord	Steel cord
XL-025	1230	1700
XL-037	2060	2850
XL-050	2680	3700

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
XL-025	45	108
XL-037	70	170
XL-050	110	250





XL PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm	N	PD mm	OD mm
10	16.17	15.66	64	103.49	102.98	118	190.81	190.30
11	17.79	17.28	65	105.11	104.60	119	192.42	191.91
12	19.40	18.89	66	106.72	106.21	120	194.04	193.53
13	21.02	20.51	67	108.34	107.83			
14	22.64	22.13	68	109.96	109.45			
15	24.26	23.75	69	111.57	111.06			
16	25.87	25.36	70	113.19	112.68			
17	27.49	26.98	71	114.81	114.30			
18	29.11	28.60	72	116.43	115.92			
19	30.72	30.21	73	118.04	117.53			
20	32.34	31.83	74	119.66	119.15			
21	33.96	33.45	75	121.28	120.77			
22	35.57	35.06	76	122.89	122.38			
23	37.19	36.68	77	124.51	124.00			
24	38.81	38.30	78	126.13	125.62			
25	40.43	39.92	79	127.74	127.23			
26	42.04	41.53	80	129.36	128.85			
27	43.67	43.16	81	130.98	130.47			
28	45.28	44.77	82	132.60	132.09			
29	46.89	46.38	83	134.21	133.70			
30	48.51	48.00	84	135.83	135.32			
31	50.13	49.62	85	137.45	136.94			
32	51.74	51.23	86	139.06	138.55			
33	53.36	52.85	87	140.68	140.17			
34	54.98	54.47	88	142.30	141.79			
35	56.60	56.09	89	143.91	143.40			
36	58.21	57.70	90	145.53	145.02			
37	59.83	59.32	91	147.15	146.64			
38	61.45	60.94	92	148.77	148.26			
39	63.06	62.55	93	150.38	149.87			
40	64.68	64.17	94	152.00	151.49			
41	66.30	65.79	95	153.62	153.11			
42	67.91	67.40	96	155.23	154.72			
43	69.53	69.02	97	156.85	156.34			
44	71.15	70.64	98	158.47	157.96			
45	72.77	72.26	99	160.08	159.57			
46	74.38	73.87	100	161.70	161.19			
47	76.00	75.49	101	163.32	162.81			
48	77.62	77.11	102	164.94	164.43			
49	79.23	78.72	103	166.55	166.04			
50	80.85	80.34	104	168.17	167.66			
51	82.47	81.96	105	169.79	169.28			
52	84.08	83.57	106	171.40	170.89			
53	85.70	85.19	107	173.02	172.51			
54	87.32	86.81	108	174.64	174.13			
55	88.94	88.43	109	176.25	175.74			
56	90.55	90.04	110	177.87	177.36			
57	92.17	91.66	111	179.49	178.98			
58	93.79	93.28	112	181.11	180.60			
59	95.40	94.89	113	182.72	182.21			
60	97.02	96.51	114	184.34	183.83			
61	98.64	98.13	115	185.96	185.45			
62	100.25	99.74	116	187.57	187.06			
63	101.87	101.36	117	189.19	188.68			

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

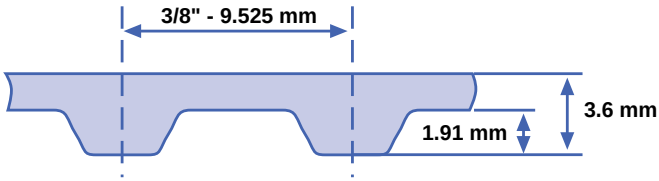
Belt width	Typical pulley width
1/4"	8.9 mm
3/8"	14.3 mm
1/2"	19.0 mm

L BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	31.6	40.4

No. of pulley grooves	10	12	14	16	18
Specific allowable working tension for 3/8" belt width (N)	56	70	70	70	70

Belt width	3/8"	1/2"	3/4"
Width factor	1	1.57	2.29



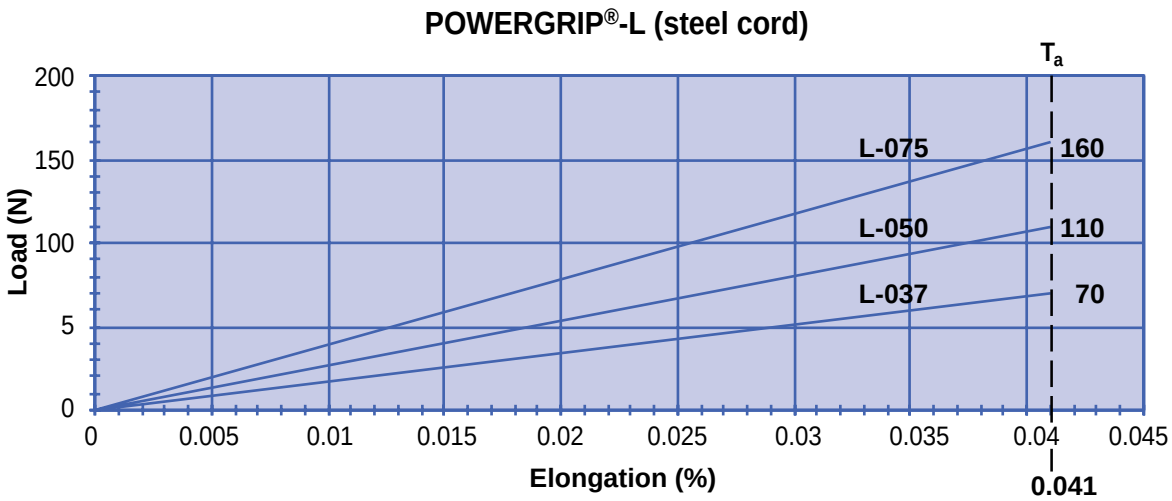
MINIMUM BREAKING TENSION (N)

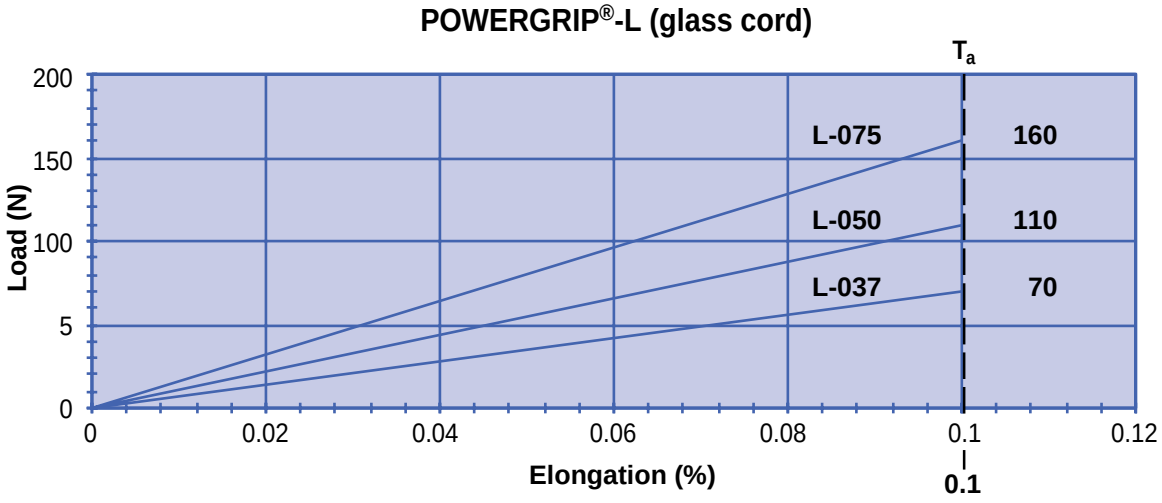
Width	Glass cord	Steel cord
L-037	2060	2850
L-050	2680	3700
L-075	4325	5985

ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
L-037	70	170
L-050	110	268
L-075	160	390





L PULLEY DIAMETERS

N	PD mm	OD mm
10	30.32	29.56
11	33.35	32.59
12	36.38	35.62
13	39.41	38.65
14	42.45	41.69
15	45.48	44.72
16	48.51	47.75
17	51.54	50.78
18	54.57	53.81
19	57.61	56.85
20	60.64	59.88
21	63.67	62.91
22	66.70	65.94
23	69.73	68.97
24	72.77	72.01
25	75.80	75.04
26	78.83	78.07
27	81.86	81.10
28	84.89	84.13
29	87.93	87.17
30	90.96	90.20
31	93.99	93.23
32	97.02	96.26
33	100.05	99.29
34	103.08	102.32
35	106.17	105.35
36	109.15	108.39
37	112.18	111.42
38	115.21	114.45
39	118.24	117.48
40	121.28	120.52
41	124.31	123.55
42	127.34	126.58
43	130.37	129.61
44	133.40	132.64
45	136.44	135.68
46	139.47	138.71
47	142.50	141.74
48	145.53	114.76
49	148.56	147.80
50	151.60	150.84
51	154.63	153.87
52	157.66	156.90
53	160.69	159.93
54	163.72	162.96
55	166.75	165.99
56	169.79	169.03
57	172.82	172.06
58	175.85	175.09
59	178.88	178.12
60	181.91	181.15
61	184.95	184.19
62	187.98	187.22
63	191.01	190.25

N	PD mm	OD mm
64	194.04	193.28
65	197.07	196.31
66	200.11	199.35
67	203.14	202.38
68	206.17	205.41
69	209.20	208.44
70	212.23	211.47
71	215.27	215.51
72	218.30	217.54
73	221.33	220.57
74	224.36	223.60
75	227.39	226.63
76	230.42	229.66
77	233.46	232.70
78	236.49	235.73
79	239.52	238.76
80	242.55	241.79
81	245.58	244.82
82	248.62	247.86
83	251.65	250.89
84	254.68	253.92
85	257.71	256.95
86	260.74	259.08
87	263.78	263.02
88	266.81	266.05
89	269.84	269.08
90	272.87	272.11
91	275.90	275.14
92	278.94	278.18
93	281.97	281.21
94	285.00	284.24
95	288.03	287.27
96	291.06	290.30
97	294.09	293.33
98	297.13	296.37
99	300.16	299.40
100	303.19	302.43
101	306.22	305.46
102	309.25	308.49
103	312.29	311.53
104	315.32	314.56
105	318.35	317.59
106	321.38	320.62
107	324.41	323.65
108	327.45	326.69
109	330.48	329.72
110	333.50	332.74
111	336.54	335.78
112	339.57	338.81
113	342.61	341.85
114	345.64	344.88
115	348.67	347.91
116	351.70	350.94
118	357.76	357.00

N	PD mm	OD mm
119	360.80	360.04
120	363.83	363.07
130	394.15	393.39
140	424.74	423.71
150	454.79	454.03

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

N : number of grooves
PD : pitch diameter
OD : outside diameter

Belt width	Typical pulley width
3/8"	14.3 mm
1/2"	17 mm
3/4"	25 mm

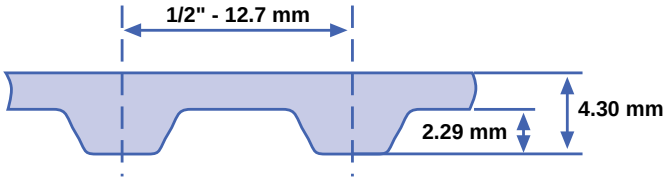
4

H BELT PITCH

Tensile cord	Glass fibre	Steel
Weight for one metre in g by 10 mm belt width	37.6	51.5

No. of pulley grooves	16	18	20	24
Specific allowable working tension for 1/2" belt width (N)	310	310	310	310

Belt width	1/2"	3/4"	1"
Width factor	1	1.57	2.29



MINIMUM BREAKING TENSION (N)

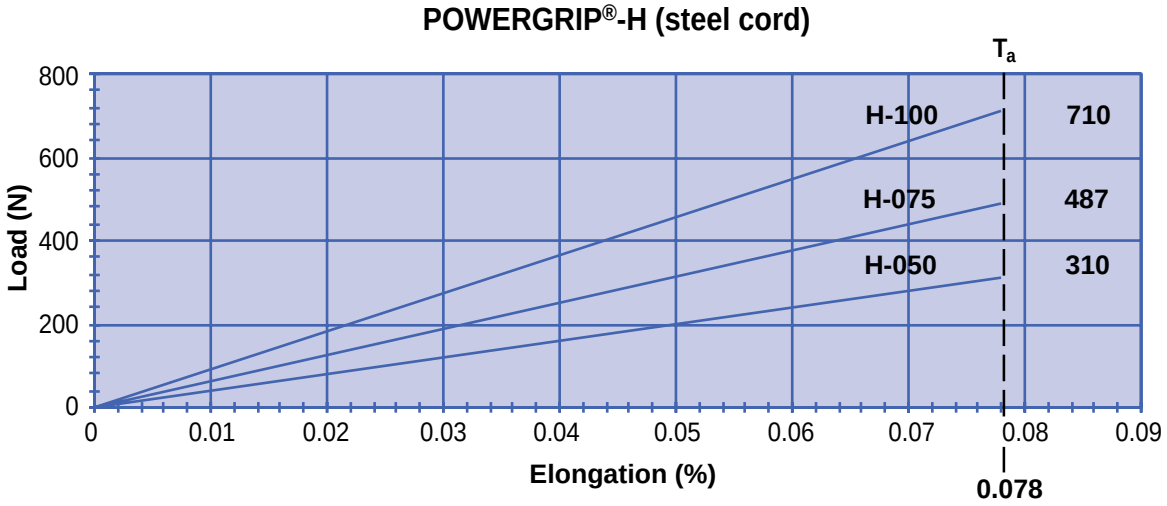
Width	Glass cord	Steel cord
H-050	7060	6465
H-075	10600	9700
H-100	14130	12930

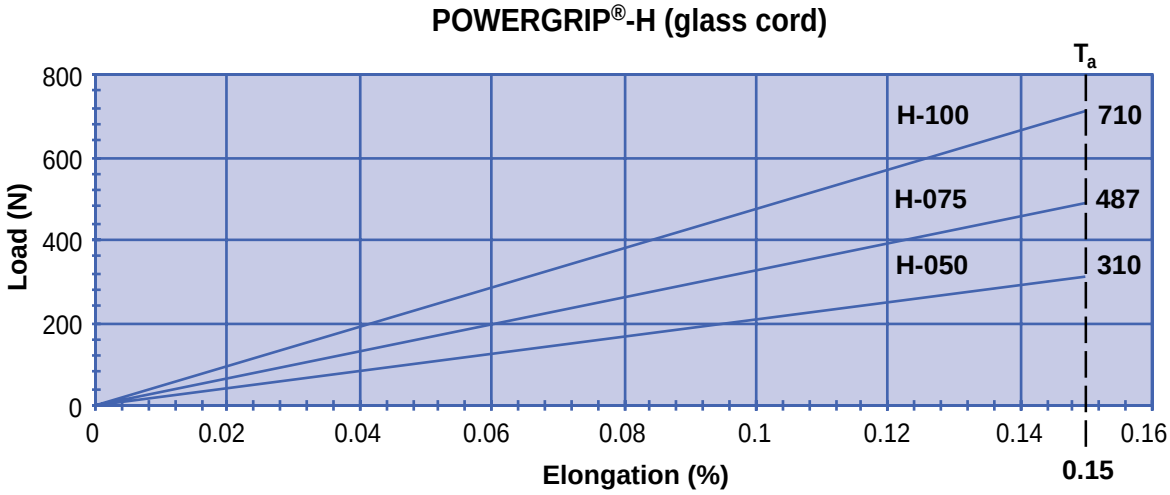
ELONGATION

(Effective tension in N related to 1 mm elongation per 1000 mm span length = 0.1%)

Width	Glass cord	Steel cord
H-050	207	397
H-075	325	627
H-100	474	910

4





H PULLEY DIAMETERS

N	PD mm	OD mm
14	56.60	55.23
15	60.64	59.27
16	64.68	63.31
17	68.72	67.35
18	72.77	71.40
19	76.81	75.44
20	80.85	79.48
21	84.89	83.52
22	88.94	87.57
23	92.98	91.61
24	97.02	95.65
25	101.06	99.69
26	105.11	103.74
27	109.15	107.78
28	113.19	111.82
29	117.23	115.86
30	121.28	119.91
31	125.32	123.95
32	129.36	127.99
33	133.40	132.03
34	137.45	136.08
35	141.49	140.12
36	145.53	144.16
37	149.57	148.20
38	153.62	152.25
39	157.66	156.29
40	161.70	160.33
41	165.74	164.37
42	169.79	168.42
43	173.83	172.46
44	177.87	176.50
45	181.91	180.54
46	185.96	184.59
47	190.00	188.63
48	194.04	192.67
49	198.08	196.71
50	202.13	200.76
51	206.17	204.80
52	210.21	208.84
53	214.25	212.88
54	218.30	216.93
55	222.34	220.97
56	226.38	225.01
57	230.42	229.05
58	234.47	233.10
59	238.51	237.14
60	242.55	241.18
61	246.59	245.22
62	250.64	249.27
63	254.68	253.31
64	258.72	267.35
65	262.77	261.40
66	266.81	265.44
67	270.85	269.48

N	PD mm	OD mm
68	274.89	273.52
69	278.94	277.57
70	282.98	281.61
71	287.02	285.65
72	291.06	289.69
73	295.11	293.74
74	299.15	297.78
75	303.19	301.82
76	307.23	305.86
77	311.28	309.90
78	315.32	313.95
79	319.36	317.99
80	323.40	322.03
81	327.45	326.08
82	331.49	330.12
83	335.53	334.16
84	339.57	338.20
85	343.62	342.25
86	347.66	346.29
87	351.70	350.33
88	355.74	354.37
89	359.79	358.42
90	363.83	362.46
91	367.87	366.50
92	371.91	370.54
93	375.96	374.59
94	380.00	378.63
95	384.04	382.67
96	388.08	386.71
97	392.13	390.76
98	396.17	394.80
99	400.21	398.84
100	404.25	402.88
101	408.30	406.93
102	412.34	410.97
103	416.38	415.01
104	420.42	419.05
105	424.47	423.10
106	428.51	427.14
107	432.55	431.18
108	436.59	435.22
109	440.64	439.27
110	444.68	443.31
111	448.72	447.35
112	452.76	451.39
113	456.81	455.44
114	460.85	459.48
115	464.89	463.52
116	468.93	467.56
117	472.98	471.61
118	477.02	475.65
119	481.06	479.69
120	485.10	483.73
125	505.32	503.95

N	PD mm	OD mm
130	525.53	524.16
135	545.74	544.37
140	565.96	564.59
145	586.17	584.80
150	606.38	605.01
156	630.64	629.27

Backside idler diameter at least 1.5 x smallest pulley diameter in use.

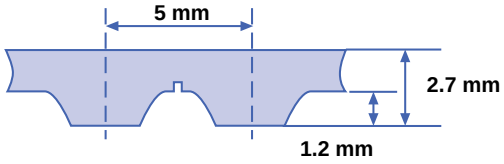
N : number of grooves
PD : pitch diameter
OD : outside diameter

Belt width	Typical pulley width
1/2"	17 mm
3/4"	25 mm
1"	32 mm

SYNCHRO-POWER® METRIC STANDARDS

AT5 BELT PITCH

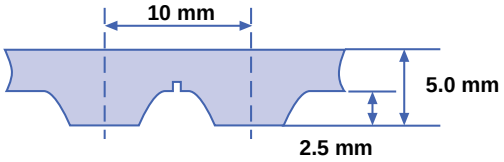
Belt width	6 mm	10 mm	16 mm	25 mm	32 mm	50 mm
Allowable working tension (N)	580	610	1050	1730	2220	3520



Weight (g/10 mm) 30 g
(Pulley dimensions see page 37)

AT10 BELT PITCH

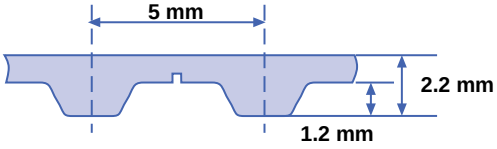
Belt width	16 mm	25 mm	32 mm	50 mm	75 mm	100 mm
Allowable working tension (N)	2300	3640	4710	7540	11430	15100



Weight (g/10 mm) 64 g
(Pulley dimensions see page 38)

T5 BELT PITCH (DIN 7721)

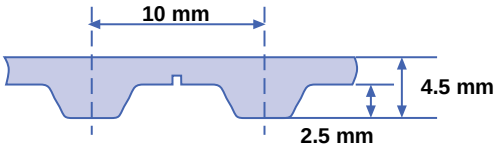
Belt width	6 mm	10 mm	16 mm	25 mm	32 mm	50 mm
Allowable working tension (N)	162	280	470	780	1000	1565



Weight (g/10 mm) 25 g
(Pulley dimensions see page 39)

T10 BELT PITCH (DIN 7721)

Belt width	16 mm	25 mm	32 mm	50 mm	75 mm	100 mm
Allowable working tension (N)	1150	1860	2480	3820	5860	7820



Weight (g/10 mm) 53 g
(Pulley dimensions see page 40)

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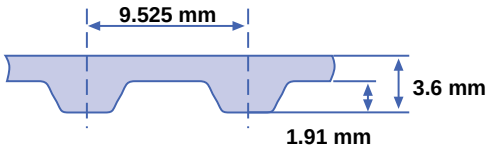
SYNCHRO-POWER® ISO STANDARDS

L BELT PITCH

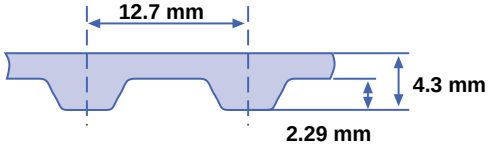
Belt width	037	050	075	100	150
Allowable working tension (N)	600	800	1300	1730	2660
Weight (kg/50 m rolls)	1.37	2.75	4.12	5.5	8



(Pulley dimensions see page 33)

H BELT PITCH

Belt width	050	075	100	150	200	300	400
Allowable working tension (N)	880	1420	1960	2930	4000	6040	8080
Weight (kg/50 m rolls)	3.37	5.06	6.75	10.12	13.50	19.9	25



(Pulley dimensions see page 35)

AT5 PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm
12	18.85	17.85	66	104.80	103.80
13	20.45	19.45	67	106.40	105.40
14	22.05	21.05	68	108.00	107.00
15	23.65	22.65	69	109.60	108.60
16	25.20	24.20	70	111.20	110.20
17	26.80	25.80	71	112.80	111.80
18	28.40	27.40	72	114.35	113.35
19	30.00	29.00	73	115.95	114.95
20	31.60	30.60	74	117.55	116.55
21	33.30	32.30	75	119.15	118.15
22	34.85	33.85	76	120.75	119.75
23	36.45	35.45	77	122.35	121.35
24	38.00	37.00	78	123.90	122.90
25	39.60	38.60	79	125.50	124.50
26	41.20	40.20	80	127.10	126.10
27	42.80	41.80	81	128.70	127.70
28	44.35	43.35	82	130.30	129.30
29	43.95	44.95	83	131.90	130.90
30	47.55	46.55	84	133.45	132.45
31	49.15	48.15	85	135.05	134.05
32	50.70	49.70	86	136.65	135.65
33	52.30	51.30	87	138.25	137.25
34	53.85	52.85	88	139.85	138.85
35	55.45	54.45	89	141.45	140.45
36	57.05	56.05	90	143.00	142.05
37	58.65	57.65	91	144.60	143.60
38	60.25	59.25	92	146.20	145.20
39	61.85	60.85	93	147.75	146.80
40	63.45	62.45	94	149.40	148.40
41	65.00	64.00	95	150.95	150.00
42	66.60	65.60	96	152.55	151.60
43	68.30	67.30	97	154.15	153.15
44	69.80	68.80	98	155.75	154.75
45	81.40	70.40	99	157.30	156.35
46	73.00	72.00	100	158.90	157.95
47	74.55	73.55	101	160.50	159.55
48	76.15	75.15	102	162.10	161.15
49	77.75	76.75	103	163.70	162.70
50	79.35	78.35	104	165.30	164.30
51	80.95	79.95	105	166.90	165.90
52	82.55	81.55	106	168.50	167.50
53	84.10	83.10	107	170.10	169.10
54	85.70	84.70	108	171.65	170.70
55	87.30	86.30	109	173.25	172.25
56	88.90	87.90	110	174.85	173.85
57	90.50	89.50	111	176.45	175.45
58	92.10	91.10	112	178.00	177.05
59	93.65	92.65	113	179.60	178.65
60	95.25	94.25			
61	97.55	95.85			
62	98.45	97.45			
63	100.05	99.05			
64	101.65	100.65			
65	103.25	102.25			

Backside idler diameter at least 60 mm.

N : number of grooves
PD : pitch diameter
OD : outside diameter

AT10 PULLEY DIAMETERS

N	PD mm	OD mm
15	47.90	45.90
16	51.05	49.05
17	61.95	52.25
18	57.45	55.45
19	60.60	58.60
20	63.80	60.80
21	67.00	65.00
22	70.15	68.15
23	73.35	71.35
24	76.55	74.55
25	79.70	77.70
26	82.90	80.90
27	86.10	84.10
28	89.25	87.25
29	92.45	90.45
30	95.65	93.65
31	98.80	96.80
32	102.00	100.00
33	105.20	103.20
34	108.40	106.40
35	111.55	109.55
36	114.75	112.75
37	117.90	115.90
38	121.10	119.10
39	124.30	122.30
40	127.45	125.45
41	130.65	128.65
42	133.85	131.85
43	137.00	135.00
44	140.20	138.20
45	143.40	141.40
46	146.55	144.55
47	149.75	147.75
48	152.95	150.95
49	156.10	154.10
50	159.30	157.30
51	162.50	160.50
52	165.65	163.65
53	168.85	166.85
54	172.05	170.05
55	175.20	173.20
56	178.40	176.40
57	181.60	179.60
58	184.75	182.75
59	187.95	185.95
60	191.10	189.10
61	194.30	192.30
62	197.50	195.50
63	200.65	198.65
64	203.85	201.85
65	207.05	205.05
66	210.20	208.20
67	213.40	211.40
68	216.60	214.60

N	PD mm	OD mm
69	219.75	217.75
70	222.95	220.95
71	226.15	224.15
72	229.30	227.30
73	232.50	230.50
75	238.90	236.90
76	242.05	240.05
77	245.25	243.25
78	248.40	246.40
79	251.60	249.60
80	254.80	252.80
81	257.95	255.95
82	261.15	259.15
83	264.35	262.35
84	267.50	265.50
85	270.70	268.70
86	273.90	271.90
87	277.05	275.05
88	280.95	278.25
89	283.45	281.45
90	286.60	284.60
91	289.80	287.80
92	293.00	291.00
93	296.15	294.15
94	299.35	297.35
95	302.55	300.55
96	305.70	303.70
97	308.90	306.90
98	312.10	310.10
99	315.25	313.25
100	318.45	316.45
101	321.65	319.65
102	324.80	322.80
103	328.00	326.00
104	331.20	329.20
105	334.35	332.35
106	337.55	335.55
107	340.75	338.75
108	343.90	341.90
109	347.10	345.10
110	350.30	348.30
111	353.45	351.45
112	356.65	354.65
113	359.80	357.80

Backside idler diameter at least 120 mm.

N : number of grooves
PD : pitch diameter
OD: outside diameter

T5 PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm
10	16.05	15.05	64	102.05	101.05
11	17.65	16.65	65	103.65	102.65
12	19.25	18.25	66	105.20	104.20
13	20.85	19.85	67	106.80	105.80
14	22.45	21.45	68	108.40	107.40
15	24.05	23.05	69	110.00	109.00
16	25.60	24.60	70	111.60	110.60
17	27.20	26.20	71	113.20	112.20
18	28.80	27.80	72	114.75	113.75
19	30.40	29.40	73	116.35	115.35
20	32.00	31.00	74	117.95	116.95
21	33.70	32.70	75	119.55	118.55
22	35.25	34.25	76	121.15	120.15
23	36.85	35.85	77	122.75	121.75
24	38.40	37.40	78	124.30	123.30
25	40.00	39.00	79	125.90	124.90
26	41.60	40.60	80	127.50	126.50
27	43.20	42.20	81	129.10	128.10
28	44.75	43.75	82	130.70	129.70
29	46.34	45.35	83	132.30	131.30
30	47.95	46.95	84	133.85	132.85
31	49.55	48.55	85	135.45	134.45
32	51.10	50.10	86	137.05	136.05
33	52.70	51.70	87	138.65	137.65
34	54.25	53.25	88	140.25	139.25
35	55.85	54.85	89	141.84	140.85
36	57.45	56.45	90	143.43	142.45
37	59.05	58.05	91	145.00	144.00
38	60.65	59.65	92	146.60	145.60
39	62.25	61.25	93	148.20	147.20
40	63.85	62.85	94	149.80	148.80
41	65.40	64.40	95	151.40	150.40
42	67.00	66.00	96	153.00	152.00
43	68.70	67.70	97	154.60	153.55
44	70.20	69.20	98	156.15	155.15
45	81.10	80.80	99	157.75	156.75
46	73.40	72.40	100	159.35	158.35
47	74.95	73.95	101	160.95	159.95
48	76.55	75.55	102	162.55	161.55
49	78.15	77.15	103	164.10	163.10
50	79.75	78.75	104	165.70	164.70
51	81.35	80.35	105	167.30	166.30
52	82.95	81.95	106	168.90	167.90
53	84.50	83.50	107	170.50	169.50
54	86.10	85.10	108	172.10	171.10
55	87.70	86.70	109	173.65	172.65
56	89.30	88.30	110	175.30	174.25
57	90.90	89.90	111	176.85	175.85
58	92.50	91.50	112	178.45	177.45
59	94.05	93.05	113	180.00	179.00
60	95.65	94.65			
61	97.95	96.95			
62	98.85	97.85			
63	100.45	99.45			

Backside idler diameter at least 30 mm.

N : number of grooves
PD : pitch diameter
OD: outside diameter

T10 PULLEY DIAMETERS

N	PD mm	OD mm	N	PD mm	OD mm
12	38.35	36.35	66	210.20	208.20
13	41.50	39.50	67	213.40	211.40
14	44.70	42.70	68	216.60	214.60
15	47.90	45.90	69	219.75	217.75
16	51.05	49.05	70	222.95	220.95
17	54.25	52.25	71	226.15	224.15
18	57.45	55.45	72	229.30	227.30
19	60.60	58.60	73	232.50	230.50
20	63.80	61.80	74	235.70	223.70
21	67.00	65.00	75	238.90	236.90
22	70.15	68.15	76	242.05	240.05
23	73.35	71.35	77	245.25	243.25
24	76.55	74.55	78	248.40	246.40
25	79.70	77.70	79	251.60	249.60
26	82.90	80.90	80	254.80	252.80
27	86.10	84.10	81	257.95	255.95
28	89.25	87.25	82	261.15	259.15
29	92.45	90.45	83	264.35	262.35
30	95.65	93.65	84	267.50	265.50
31	98.80	96.80	85	270.70	268.70
32	102.00	100.00	86	273.90	271.90
33	105.20	103.20	87	277.05	275.05
34	108.40	106.40	88	280.95	278.95
35	111.55	109.55	89	283.45	281.45
36	114.75	112.75	90	286.60	284.60
37	117.90	115.90	91	289.80	287.80
38	121.10	119.10	92	293.00	291.00
39	124.30	122.30	93	296.15	294.15
40	127.45	125.45	94	299.35	297.35
41	130.65	128.65	95	302.55	300.55
42	133.85	131.85	96	305.70	303.70
43	137.00	135.00	97	308.90	306.90
44	140.20	138.20	98	312.10	310.10
45	143.40	141.40	99	315.25	313.25
46	146.55	144.55	100	318.45	316.45
47	149.75	147.75	101	321.65	319.65
48	152.95	150.95	102	324.80	322.80
49	156.10	154.10	103	328.00	326.00
50	159.30	157.30	104	331.20	329.20
51	162.50	160.50	105	334.35	332.35
52	165.65	163.65	106	337.55	335.55
53	168.85	166.85	107	340.75	338.75
54	172.05	170.05	108	343.90	341.90
55	175.20	173.20	109	347.10	345.10
56	178.40	176.40	110	350.30	348.30
57	181.60	179.60	111	353.45	351.45
58	184.75	182.75	112	356.65	354.65
59	187.95	185.95	113	359.80	357.80
60	191.10	189.10			
61	194.30	192.30			
62	197.50	195.50			
63	200.65	198.65			
64	203.85	201.85			
65	207.05	205.05			

Backside idler diameter at least 60 mm.

N : number of grooves
PD : pitch diameter
OD : outside diameter

PULLEY TOLERANCES

PULLEY BORE/FACE DIAMETER TOLERANCE SPECIFICATIONS

Gates recommend the use of pulleys which are precision made to close tolerances. Inaccurate manufacture or reboring may result in poor drive performance. Permissible tolerances for bore (Δ_B) and for outside diameter (Δ_{OD}) are shown in the tables on this page.

PITCH ACCURACY

The table on this page shows the pitch accuracy tolerance (Δ_P).

HELIX ANGLE

Grooves should be parallel to the axis of the bore within 0.01 mm per 10 mm.

DRAFT

The maximum permissible draft is 0.01 mm per 10 mm of face width, but it must not exceed the outside diameter tolerance.

ECCENTRICITY

Allowable amount from pulley bore to outside diameter is shown below.

Outside diameter mm	Total eccentricity (indicator reading) mm
to 203	0.1
over 203	0.005 per 10 mm of ø (may not exceed the tolerance on face diameter)

PARALLELISM

Bore of pulley to be perpendicular to vertical faces of pulley within 0.01 mm per 10 mm of radius with a maximum of 0.51 mm T.I.R. (Total Indicator Reading).

BORE DIAMETER

OD mm	Δ_B mm	
	+	-
≤ -25	0.0254	0.00
26-50	0.0381	0.00
51-75	0.0508	0.00
76+	0.0635	0.00

OUTSIDE DIAMETER

OD mm	Δ_{OD} mm	
	+	-
≤ -25.40	0.05	0.00
25.50-51.00	0.07	0.00
51.10-102.00	0.10	0.00
102.10-178.00	0.12	0.00
178.10-305.00	0.15	0.00
305.10-508.00	0.17	0.00
508.10 +	0.20	0.00

PITCH ACCURACY

OD mm	Δ_P mm	$\Delta_P 90°$ mm
≤ -25.40		± 0.064
25.50-51.00		± 0.089
51.10-102.00		± 0.114
102.10-178.00	± 0.025	± 0.127
178.10-305.00		± 0.152
305.10-508.00		± 0.165
508.10 +		± 0.191

INSTALLATION TENSION

Belt installation tension is critical for optimal service and smooth running of the belt. Installation tension guarantees minimum span force on the slack side so that the belt teeth can mesh with the teeth on the pulley. Apart from the functional requirements of the drive, it is the service life or load capability of the belt which determines the amount of belt installation tension. The most favourable installation tension force is one which optimally meets all the requirements.

Numerous tests have indicated that simple service calls for an installation tension force of 1.1 - 1.2 x T_e on the shaft. That means a tension of 0.55 - 0.6 x T_e on each belt span.

However, there are two kinds of drives where you must apply a tension force of 1.1 - 1.2 x T_e on each belt span :

1. Omega drives.
2. Drives where high positioning accuracy is required and where frequent shock loads may appear.

Overtensioning the belt may damage the bearings and lead to faster wear of the belt.

Reduced belt elongation can be obtained by using the maximum values of the recommended tensions.

Belt installation tension can be checked for linear drives by measuring belt elongation. Since the force-elongation characteristic is linear in the permissible working tension range in accordance with Hooke's Law, belt elongation due to installation tensioning may be determined with the values given. This increase in length may then be easily checked by marking the unloaded belt at two points and then measuring the change in length due to installation tensioning force.

The safety factor against fracture must be sufficiently high. For high load lifters S_2 > 10 is recommended.

DRIVE ALIGNMENT

Synchronous belts are sensitive to misalignment and should not be used on drives where misalignment is inherent to the drive operation. Misalignment leads to inconsistent belt wear and premature tensile failure due to unequal tensile member loading.

Synchronous belts are made with high modulus tensile members which provide length stability over the belt life. Consequently, misalignment does not allow equal load distribution across the entire belt top width. So, in a misaligned drive, the load is being carried by only a small portion of the belt top width, resulting in reduced performance.

There are two types of misalignment: parallel and angular. Parallel misalignment is where the driveR and driveN shafts are parallel, but the two pulleys lie in different planes. When the two shafts are not parallel, the drive is angularly misaligned.

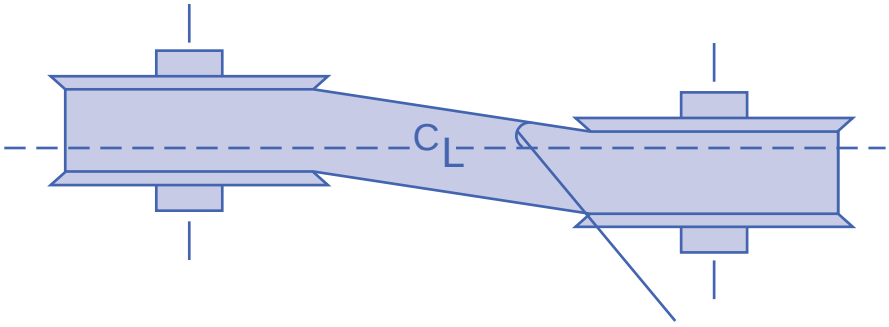
A fleeting angle is the angle at which the belt enters and exits the pulley, and equals the sum of the parallel and angular misalignments.

Any degree of pulley misalignment will result in some reduction of belt life, which is not accounted for in the normal drive design procedure. Misalignment of all positive belt drives should not exceed 1/4° or 5 mm per metre of centre distance. Alignment should be checked with a good straight edge.

The straight edge should be applied from driveR to driveN and from driveN to driveR so that the effect of parallel and angular misalignment is taken into account.

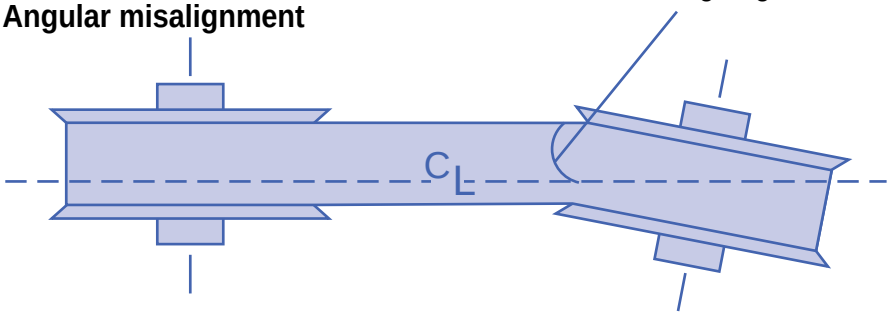
Drive misalignment can also cause belt tracking problems. However, some degree of belt tracking is normal and won't affect performance.

Parallel misalignment



Fleeting angle

Angular misalignment

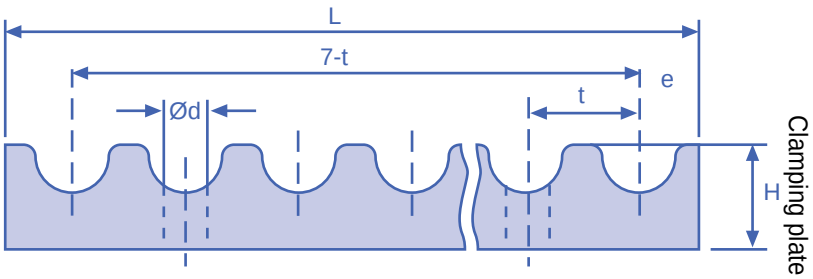


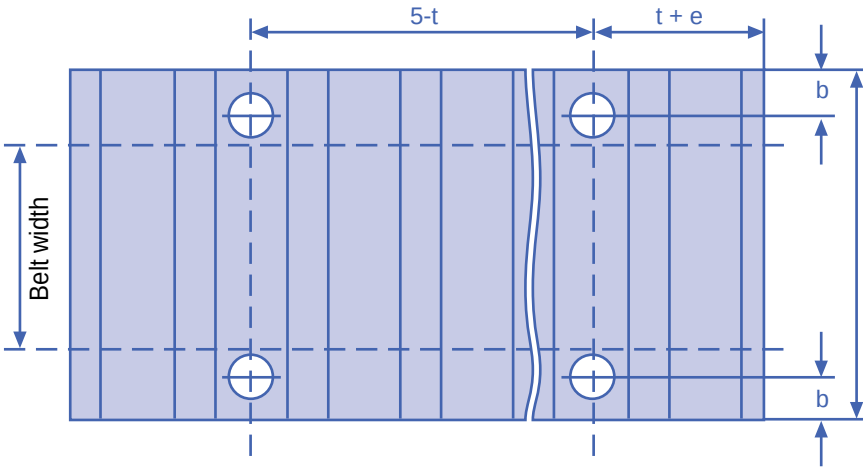
AMBIENT CONDITIONS

The application of belts under aggressive environmental conditions could negatively affect the drive's performance. In case of doubt please check with your Gates representative.

POWERGRIP® HTD® AND POWERGRIP® GT CLAMPING FIXTURES

The ends of the belts must be kept in positive mesh. For this purpose clamping plates with an accurate tooth profile are necessary. Excessive pressure exerted by the tension members leads to damage and weakening of the joint. The clamping bolts should be located on both sides of the belt and be tightened up equally.





DIMENSIONS

Belt pitch (mm)					
t	b	ød	e	L	H
3	5	4.5	2.0	25.0	5
5	6	5.5	3.2	41.5	8
8	8	9.0	5.0	66.0	15
14	10	11.0	9.0	116.0	22

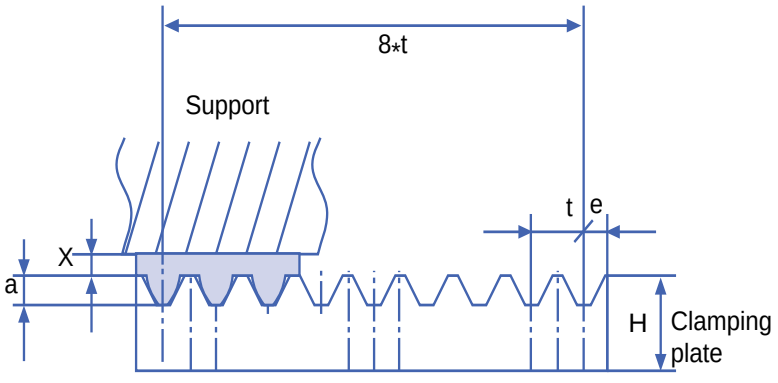
The clamping fixture is merely a suggestion and can be modified according to the particular application. At least 6 teeth should be clamped to be able to transfer the full working tension. For high load applications, a larger number of teeth is recommended (i.e. for high load lifters: min. 16 teeth in mesh).

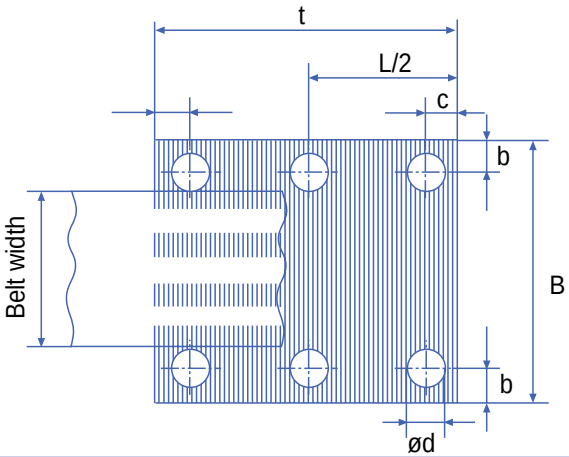
POLY CHAIN® GT CLAMPING FIXTURES

Belt pitch (mm)								
t	a	b	c	ød	e	L	H	X
8	3.5	8	8	9	4	72	12	2.5
14	6.3	10	9	11	9	130	22	4.2

X: Distance between support and clamping plate, tolerance ± 0.1 mm.

This example illustrates clamping to the machine, for which we recommend 9 teeth in mesh. For joining belts together, we recommend using clamps with at least 18 teeth in mesh (9 each side). The clamping fixture is merely a suggestion and can be modified according to the particular application.





6

ABBREVIATIONS

a	Acceleration [m/sec^2]
b	Deceleration [m/sec^2]
B	Pulley width [mm]
d_p	Pulley outside diameter [mm]
d_s	Shaft diameter [mm]
F_a	Acceleration force [N]
F_b	Deceleration force [N]
F_{Des}	Design force [N]
F_G	Gravity [N]
F_R	Friction force [N]
g	Acceleration by gravity [9.81 m/sec^2]
μ	Coefficient of friction
m	Mass of counter weight [kg]
M	Mass of weight [kg]
m_b	Mass of belt [kg]
m_p	Pulley mass [kg]
$m_{p(R)}$	Reduced pulley mass [kg]
n	Revolutions per minute
P	Power [kW]
S_B	Bending factor
S_L	Load factor
S_R	Ratio factor
S_S	Special service factor
S_{TIM}	Teeth in mesh factor
S_1	Total service factor
S_2	Safety factor against fracture
T	Torque [Nm]
T_a	Allowable working tension [N]
T_{as}	Specific allowable working tension[N]
T_e	Effective tension [N]
T_i	Installation tension [N]
TIM	Teeth in mesh
T.I.R.	Total Indicator Reading
T_S	Span tension [N]
v	Speed [m/sec]

ADDRESSES

OPERATIONS

BELGIUM
Gates Europe nv
Dr. Carlierlaan 30
B - 9320 Erembodegem
Tl : (32) 053 / 76 27 11
Fx : (32) 053 / 76 27 13

GERMANY
Gates GmbH Aachen
Eisenbahnweg 50
D - 52068 Aachen
Tl : (49) 0241 / 5108-0
Fx : (49) 0241 / 5108-297

UK
Power Transmission Ltd
Tinwald Downs Road
Heathhall - Dumfries
DG1 1TS
Tl : (44) 01387 / 24 20 00
Fx : (44) 01387 / 24 20 10

FRANCE
Gates S.A.
Power Transmission Div.
111, rue Francis Garnier
B.P. 37
F - 58027 Nevers - Cedex
Tl : (33) 03 86 71 75 00
Fx : (33) 03 86 36 62 47

SPAIN
Gates S.A.
Polígono Industrial
Les Malloles
E - 08660 Balsareny
(Barcelona)
Tl : (34) 93 / 877 70 00
Fx : (34) 93 / 877 70 39

SALES AND MARKETING FACILITIES

FRANCE
Gates France S.A.R.L.
B.P. 37
Zone Industrielle
F - 95380 Louvres
Tl : (33) 01 34 47 41 41
Fx : (33) 01 34 72 60 54

GERMANY
Gates GmbH Langenfeld
Haus Gravener Str. 191-193
D - 40764 Langenfeld
Tl : (49) 02173 / 795-0
Fx : (49) 02173 / 795-150

ITALY
Gates S.R.L.
Via Senigallia 18
(Int. 2 - Blocco A - Edificio 1)
I - 20161 Milano MI
Tl : (39) 02 / 662 16 21
Fx : (39) 02 / 645 86 36

Gates homepage:
http://www.gates.com/europe

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