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TECHNIKA NAPĘDU I TRANSMISJI MOCY

62-600 Koło, ul. Toruńska 212
tel. 0-63/ 27 25 478 / fax. 0-63/ 26 16 258

www.technical.pl
biuro@technical.pl

Sklep internetowy
www.sklep.technical.pl

Pasy zębate PU z rękawa iSync

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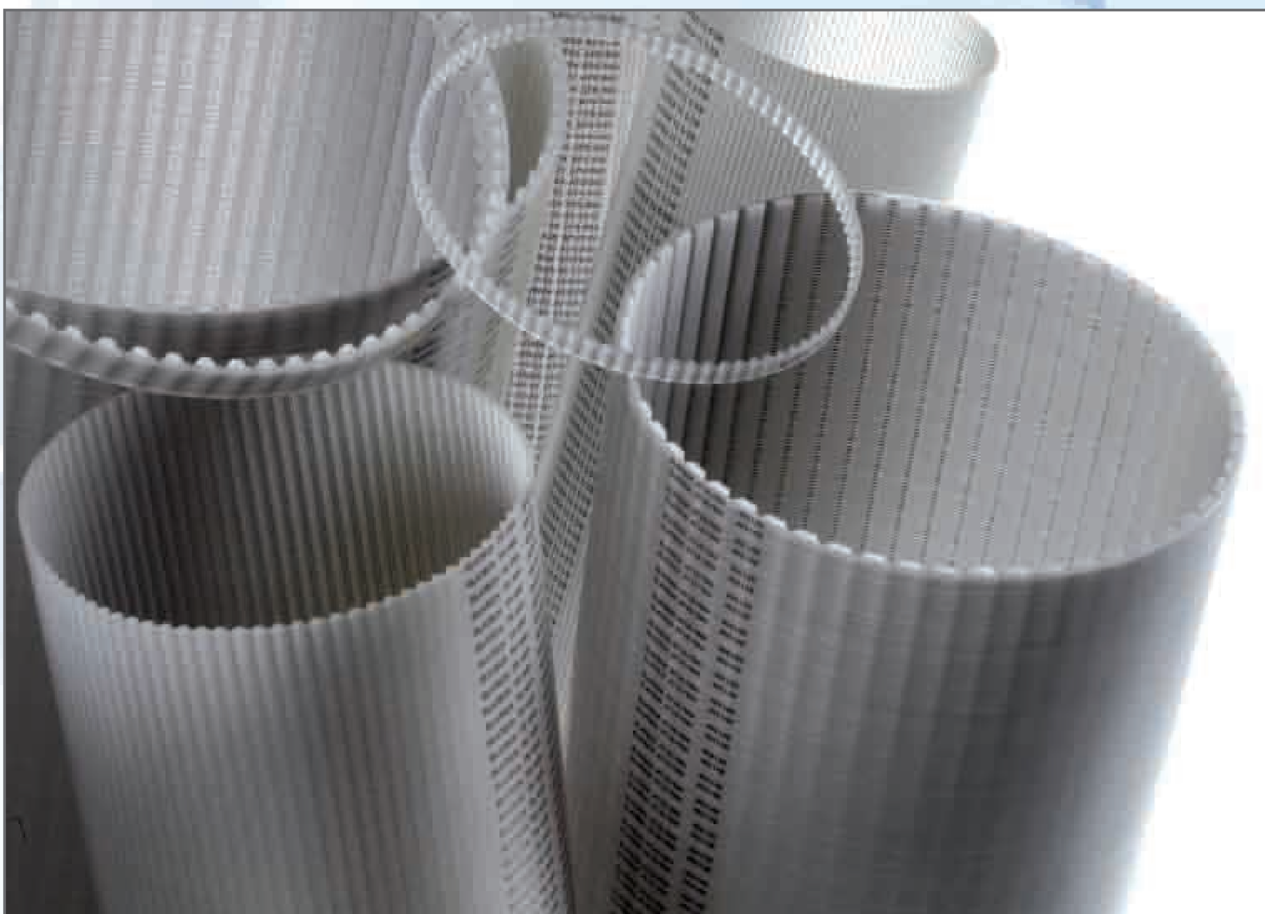
Antriebselemente

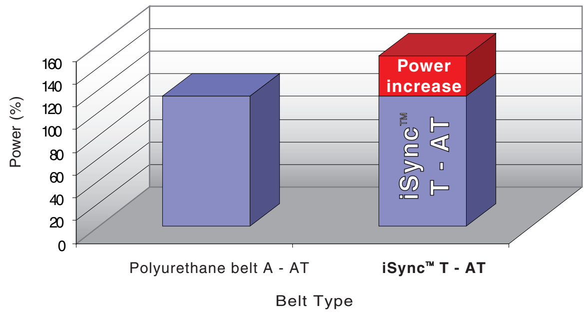
ELATECH® iSync™
high performance timing belts



ELATECH® iSync™

In the spirit of continuos innovation, in order to answer to the increased need of industry in power transmission, **ELATECH®** has developed the **iSync™** range of belts. **iSync™** belts are made with special polyurethane compound and high resistance steel tension cords which are processed with a unique and highly sophisticated technology to get a superior polyurethane belt. **iSync™** belts offer optimal performances on all type of industrial applications.

iSync™ belts are able to transmit up to 30% more than conventional T, AT type of belts in the same space or same power with a more compact drive.



Features

- High power transmission capabilities
- Maintenance free
- Superior length stability
- Clean power transmission with no dust dispersion
- No contamination of object in contact
- Very high chemical resistance and particularly to oils, greases and gasoline
- Superior abrasion resistance
- High quality, thermo-set polyurethane designed specifically for timing belt applications
- Available with either steel or Kevlar® reinforcement
- Application temperature -30°C - +100 °C

Typical application fields

ELATECH® iSync™ belts are suitable for power transmission drives where high precision is needed, cleanliness is critical and in difficult environment (presence of chemicals).

- Plotters
- Office automation
- Medical technology
- Packaging machines
- Swimming pool cleaning robots
- Banking machines
- Coin dispenser
- Vending machines
- Optical instruments
- Cameras
- Machine tools
- Robot arms
- Home appliances
- Vacuum systems
- Food processing machines
- Textile machines
- Gardening equipment and machines

Applications with special backing and cleats are specifically designed for special heavy duty conveying drives.

Available profile range

ELATECH® iSync™ belts are available in a standard range in the following profile range:

T2,5, T5, T10, AT5, AT10

As special the following profile can be manufactured on request **MXL, L, H, HTD5M, DD double sided executions.**

Tension cords

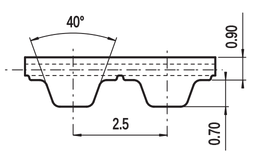
ELATECH® iSync™ timing belts are manufactured with high tensile strength steel cords as standard. All technical data shown in the catalogue are valid for standard cords. Belt with special cords have different mechanical and chemical properties.

Special type of tension member such as stainless steel, HFE high flexibility or aramid fiber (Kevlar®) are available on request for special applications.

Aramid (Kevlar®) tension cords are used where non magnetic drives are requested.
Stainless steel used where high corrosion resistance is required.
Fiberglass and polyester used where high flexibility and water restistance are required.

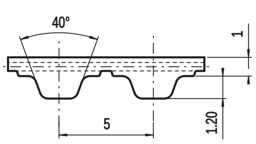
Standard belt sizes

T2,5



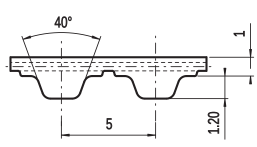
Number of teeth z	length [mm]
48	120
58	145
64	160
71	177,5
72	180
80	200
84	210
92	230
98	245
106	265
111	277,5
114	285
116	290
122	305
127	317,5
132	330
137	342,5
152	380
168	420
192	480
200	500
216	540
240	600
260	650
312	780
366	915
380	950

T5



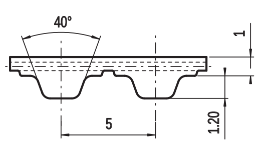
Number of teeth z	length [mm]
33	165
37	185
40	200
43	215
44	220
45	225
49	245
50	250
51	255
52	260
54	270

T5



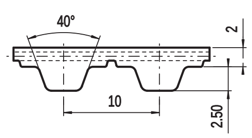
Number of teeth z	length [mm]
55	275
56	280
59	295
60	300
61	305
64	320
65	325
66	330
68	340
70	350
71	355
72	360
73	365
75	375
78	390
80	400
82	410
84	420
85	425
86	430
88	440
89	445
90	450
91	455
92	460
95	475
96	480
100	500
102	510
105	525
109	545
110	550
112	560
115	575
118	590
120	600
122	610
124	620
125	625
126	630
128	640
130	650
132	660
135	675
138	690
140	700
144	720
145	725
150	750
156	780
160	800
163	815
168	840

T5



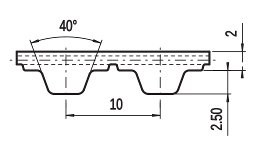
Number of teeth z	length [mm]
170	850
172	860
180	900
188	940
198	990
200	1000
215	1075
220	1100
223	1115
228	1140
240	1200
243	1215
263	1315
270	1350
276	1380
288	1440

T10



Number of teeth z	length [mm]
26	260
32	320
35	350
37	370
40	400
41	410
44	440
45	450
50	500
53	530
55	550
56	560
60	600
61	610
63	630
65	650
66	660

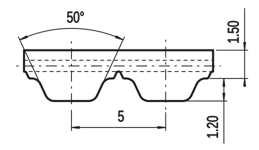
T10



Number of teeth z	length [mm]
69	690
70	700
72	720
75	750
78	780
80	800
81	810
84	840
85	850
88	880
89	890
90	900
91	910
92	920
95	950
96	960
97	970
98	980
100	1000
101	1010
105	1050
108	1080
110	1100
111	1110
114	1140
115	1150
120	1200
121	1210
124	1240
125	1250
130	1300
132	1320
135	1350
139	1390
140	1400
142	1420
144	1440
145	1450
146	1460
150	1500
156	1560
160	1600
161	1610
170	1700
175	1750
178	1780
180	1800
188	1880
196	1960
225	2250

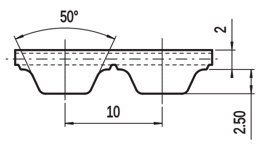
Order example
ELATECH® iSync™ Timing Belt U 420 T5 / 16

AT5



Number of teeth z	length [mm]
45	225
51	255
56	280
60	300
68	340
75	375
78	390
84	420
90	450
91	455
100	500
109	545
120	600
122	610
132	660
142	710
144	720
150	750
156	780
165	825
172	860
195	975
210	1050
225	1125
300	1500

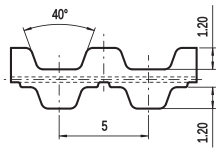
AT10



Number of teeth z	length [mm]
50	500
53	530
56	560
60	600
61	610
66	660
70	700
73	730
78	780
80	800
84	840
89	890
92	920
96	960
98	980
100	1000
101	1010
105	1050
108	1080
110	1100
115	1150
120	1200
121	1210
125	1250
128	1280
130	1300
132	1320
135	1350
136	1360
140	1400
142	1420
148	1480
150	1500
160	1600
170	1700
172	1720
180	1800
186	1860
194	1940

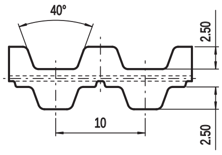
Order example
ELATECH® iSync™ Timing Belt U 450 AT5 / 16

DT5



Number of teeth z	length [mm]
60	300
70	350
80	400
82	410
90	450
92	460
96	480
100	500
103	515
110	550
118	590
120	600
124	620
130	650
140	700
150	750
160	800
163	815
170	850
172	860
180	900
188	940
206	1030
220	1100
228	1140
278	1390

DT10



Number of teeth z	length [mm]
53	530
60	600
63	630
66	660
70	700
72	720
75	750
80	800
84	840
90	900
98	980
100	1000
110	1100
120	1200
121	1210
124	1240
125	1250
130	1300
132	1320
135	1350
140	1400
142	1420
150	1500
160	1600
161	1610
170	1700
180	1800
188	1880

Profile		Belt width
DT5	[mm]	6 - 8 - 10 - 12 - 16 - 20 - 25 - 32
DT10	[mm]	10 - 12 - 16 - 20 - 25 - 32 - 50

XL

Number of teeth z	length [mm]	length [Inches]
30	152,4	6
35	177,8	7
38	193	7,6
40	203,2	8
42	213,4	8,4
45	228,6	9
47	238,8	9,4
50	254	10
51	259,1	10,2
52	264,2	10,4
53	269,2	10,6
55	279,4	11
57	289,6	11,4
58	294,6	11,6
60	304,8	12
62	315	12,4
63	320	12,6
64	325,1	12,8
65	330,2	13
68	345,4	13,6
70	355,6	14
75	381	15
76	386,1	15,2
77	391,2	15,4
80	406,4	16
83	421,6	16,6
85	431,8	17
90	457,2	18
93	472,4	18,6
95	482,6	19
100	508,6	20
105	533,4	21
106	538,5	21,2
110	558,8	22
115	584,2	23
120	609,6	24
125	635	25
127	645,2	25,4
130	660,4	26
135	685,8	27
145	736,6	29
150	762	30
160	812,8	32
165	838,2	33
172	873,8	34,4
180	914,4	36
188	955	37,6
192	975,4	38,4
195	990,6	39
207	1051,6	41,4
230	1168,4	46
240	1219,2	48
256	1300,5	51,2
282	1432,6	56,4
315	1600,2	63
335	1701,8	67

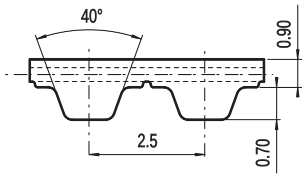
L

Number of teeth z	length [mm]	length [Inches]
33	314,3	12,4
40	381	15
44	419,1	16,5
46	438,2	17,3
50	476,3	18,8
56	533,4	21
60	571,5	22,5
64	609,6	24
68	647,7	25,5
72	685,8	27
76	723,9	28,5
80	762	30
86	819,2	32,3
92	876,3	34,5
98	933,5	36,8
100	952,5	37,5
104	990	39
112	1066,8	42
114	1084,6	42,7
120	1143	45
128	1219,2	48
136	1295,4	51
144	1371,6	54
160	1524,1	60

Profile		Belt width
XL	[mm]	6,4 - 7,9 9,5 - 12,7
	[inch]	0,25 - 0,31 0,37 - 0,50
L	[mm]	12,7 - 19,0 25,4 - 38,1
	[inch]	0,50 - 0,75 1,00 - 1,50

ELATECH® iSync™ high performance endless timing belt technical data

T2,5 iSync™



Belt characteristics

- Truly endless polyurethane timing belt with steel tension cords according to DIN 7721 T1
- Metric pitch 2,5 mm
- Ideal for drives where high belt flexibility is requested
- Allows to use small diameter pulleys
- Transmissible power up to 5 kW
- Rpm up to 10.000 [1/min]

- Width tolerance: ±0,3 [mm]
- Thickness tolerance: ±0,2 [mm]

Belt width [mm]	4	6	8	10	12	16	25	32
Weight [g/m]	6	9	12	15	18	24	37	48

Other widths are available on request

Tooth shear strength

rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	0,47	0,000	1200	0,29	0,361	3400	0,23	0,810
20	0,45	0,010	1300	0,28	0,385	3600	0,22	0,845
40	0,44	0,018	1400	0,28	0,408	3800	0,22	0,880
60	0,43	0,027	1440	0,28	0,417	4000	0,22	0,914
80	0,42	0,035	1500	0,27	0,431	4500	0,21	0,996
100	0,41	0,043	1600	0,27	0,454	5000	0,21	1,074
200	0,38	0,080	1700	0,27	0,476	5500	0,20	1,150
300	0,36	0,114	1800	0,26	0,498	6000	0,19	1,223
400	0,35	0,145	1900	0,26	0,519	6500	0,19	1,293
500	0,34	0,175	2000	0,26	0,541	7000	0,19	1,360
600	0,33	0,204	2200	0,25	0,582	7500	0,18	1,426
700	0,32	0,232	2400	0,25	0,622	8000	0,18	1,489
800	0,31	0,259	2600	0,24	0,662	8500	0,17	1,551
900	0,30	0,286	2800	0,24	0,700	9000	0,17	1,611
1000	0,30	0,311	3000	0,24	0,715	9500	0,17	1,668
1100	0,29	0,336	3200	0,23	0,738	10000	0,16	1,725

The total power "P" and the total torque "M" transmitted by the belt, are calculated with the following formulas:

$$P\ [kW] = P_{spez} \cdot z_e \cdot z_k \cdot b / 1000$$

$$M\ [Nm] = M_{spez} \cdot z_e \cdot z_k \cdot b / 100$$

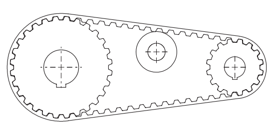
$$z_e = \frac{z_k}{180} \cdot \arccos \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A} \right]$$

P = power in kW
M = torque in Nm
P_{spez} = specific power
M_{spez} = specific torque
z_e = number of teeth in mesh of the small pulley
z_{emax} = 12
z_k = number of teeth of the small pulley
b = belt width in cm
A = centre distance [mm]
t = pitch

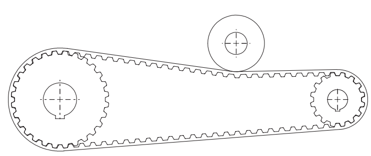
Flexibility

Minimum number of teeth and minimum diameter

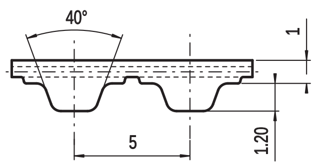
Drive without reverse bending
- Driver pulley z_{min} = 10
- Idler (flat) running on belt teeth d_{min} = 15 mm



Drive with reverse bending and double sided belt
- Driver pulley z_{min} = 18
- Idler (flat) running on belt back d_{min} = 15 mm



T5 iSync™



Belt characteristic

- Truly endless polyurethane timing belt with steel tension cords according to DIN 7721 T1
- Metric pitch 5 mm
- Ideal for drives where high belt flexibility is requested
- Allows to use small diameter pulleys
- Rpm up to 10.000 [1/min]

- Width tolerance: ±0,5 [mm]
- Thickness tolerance: ±0,15 [mm]

Belt width [mm]	10	12	16	25	32	50	75	100
Weight [g/m]	24	28	38	60	77	120	180	240

Other widths are available on request

Tooth shear strength

rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	2,523	0,000	1200	1,607	2,019	3400	1,248	4,444
20	2,458	0,051	1300	1,580	2,151	3600	1,229	4,632
40	2,403	0,101	1400	1,555	2,279	3800	1,209	4,812
60	2,354	0,148	1440	1,545	2,330	4000	1,191	4,988
80	2,312	0,194	1500	1,532	2,406	4500	1,149	5,414
100	2,276	0,238	1600	1,510	2,529	5000	1,111	5,818
200	2,135	0,447	1700	1,489	2,651	5500	1,078	6,206
300	2,032	0,638	1800	1,470	2,770	6000	1,046	6,571
400	1,951	0,817	1900	1,451	2,888	6500	1,017	6,924
500	1,884	0,987	2000	1,433	3,001	7000	0,991	7,262
600	1,829	1,149	2200	1,400	3,226	7500	0,966	7,588
700	1,781	1,306	2400	1,371	3,445	8000	0,943	7,897
800	1,738	1,456	2600	1,342	3,654	8500	0,920	8,191
900	1,701	1,603	2800	1,317	3,860	9000	0,900	8,480
1000	1,667	1,745	3000	1,306	3,940	9500	0,880	8,758
1100	1,635	1,884	3200	1,292	4,059	10000	0,862	9,027

The total power "P" and the total torque "M" transmitted by the belt, are calculated with the following formulas:

$$P\,[kW] = P_{spez} \cdot z_e \cdot z_k \cdot b / 1000$$

$$M\,[Nm] = M_{spez} \cdot z_e \cdot z_k \cdot b / 100$$

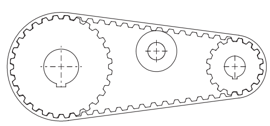
$$z_e = \frac{z_k}{180} \cdot \arccos \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A} \right]$$

P = power in kW
M = torque in Nm
P_{spez} = specific power
M_{spez} = specific torque
z_e = number of teeth in mesh of the small pulley
z_{emax} = 12
z_k = number of teeth of the small pulley
b = belt width in cm
A = centre distance [mm]
t = pitch

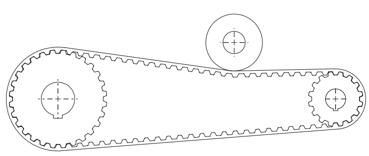
Flexibility

Minimum number of teeth and minimum diameter

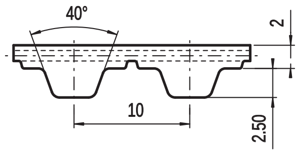
Drive without reverse bending
- Driver pulley z_{min} = 10
- Idler (flat) running on belt teeth d_{min} = 30 mm



Drive with reverse bending and double sided belt
- Driver pulley z_{min} = 15
- Idler (flat) running on belt back d_{min} = 30 mm



T10 iSync™



Belt characteristics

- Truly endless polyurethane timing belt with steel tension cords according to DIN 7721 T1
- Metric pitch 10 mm
- Ideal for drives where high belt flexibility is requested
- Allows to use small diameter pulleys
- Rpm up to 10.000 [1/min]

- Width tolerance: ±0,5 [mm]
- Thickness tolerance: ±0,2 [mm]

Belt width [mm]	10	16	25	32	50	75	100	150
Weight [g/m]	50	77	120	155	240	365	480	725

Other widths are available on request

Tooth shear strength

rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	8,244	0,000	1200	4,808	6,042	3400	3,460	12,318
20	8,009	0,168	1300	4,708	6,409	3600	3,385	12,761
40	7,805	0,327	1400	4,614	6,764	3800	3,312	13,179
60	7,627	0,479	1440	4,577	6,902	4000	3,245	13,592
80	7,472	0,626	1500	4,526	7,109	4500	3,088	14,549
100	7,339	0,768	1600	4,444	7,445	5000	2,946	15,424
200	6,804	1,425	1700	4,366	7,771	5500	2,817	16,224
300	6,411	2,014	1800	4,292	8,090	6000	2,701	16,969
400	6,105	2,557	1900	4,222	8,401	6500	2,593	17,646
500	5,857	3,066	2000	4,157	8,706	7000	2,492	18,269
600	5,648	3,549	2200	4,033	9,291	7500	2,398	18,836
700	5,467	4,007	2400	3,920	9,851	8000	2,311	19,359
800	5,306	4,445	2600	3,815	10,386	8500	2,228	19,832
900	5,163	4,866	2800	3,718	10,901	9000	2,150	20,264
1000	5,034	5,271	3000	3,680	11,097	9500	2,077	20,661
1100	4,916	5,663	3200	3,626	11,389	10000	2,007	21,015

The total power "P" and the total torque "M" transmitted by the belt, are calculated with the following formulas:

P [kW] $= P_{spez} \cdot z_e \cdot z_k \cdot b / 1000$

M [Nm] $= M_{spez} \cdot z_e \cdot z_k \cdot b / 100$

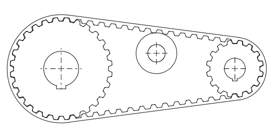
$$Z_e = \frac{Z_k}{180} \cdot \arccos \cdot \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A} \right]$$

P = power in kW
M = torque in Nm
P_{spez} = specific power
M_{spez} = specific torque
z_e = number of teeth in mesh of the small pulley
z_{emax} = 12
z_k = number of teeth of the small pulley
b = belt width in cm
A = centre distance [mm]
t = pitch

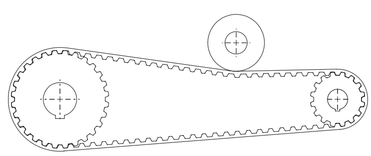
Flexibility

Minimum number of teeth and minimum diameter

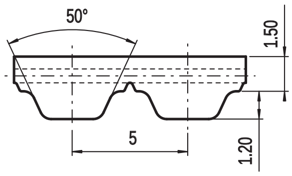
Drive without reverse bending
- Driver pulley z_{min} = 12
- Idler (flat) running on belt teeth d_{min} = 60 mm



Drive with reverse bending and double sided belt
- Driver pulley z_{min} = 20
- Idler (flat) running on belt back d_{min} = 60 mm



AT5 iSync™



Belt characteristics

- Truly endless polyurethane timing belt with steel tension cords. Metric pitch 5 mm
- Tooth profile and dimension are optimised to guarantee uniform load distribution and mini mum deformation under load
- High resistance and low stretch steel cords to guarantee high stability and low elongation
- Reduced polygonal effect with reduced drive vibration and noise
- Rpm up to 10.000 [1/min]

- Width tolerance: ±0,5 [mm]
- Thickness tolerance: ±0,15 [mm]

Belt width [mm]	6	10	16	25	32	50	75	100
Weight [g/m]	21	34	54	86	110	175	260	350

Other widths are available on request

Tooth shear strength

rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min⁻¹]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	3,813	0,000	1200	2,668	3,352	3400	1,993	7,096
20	3,758	0,079	1300	2,620	3,566	3600	1,954	7,368
40	3,708	0,155	1400	2,574	3,773	3800	1,917	7,627
60	3,663	0,230	1440	2,557	3,855	4000	1,881	7,879
80	3,623	0,304	1500	2,531	3,975	4500	1,799	8,479
100	3,586	0,376	1600	2,491	4,173	5000	1,725	9,032
200	3,448	0,722	1700	2,452	4,365	5500	1,658	9,549
300	3,343	1,050	1800	2,416	4,554	6000	1,596	10,029
400	3,235	1,355	1900	2,381	4,737	6500	1,539	10,473
500	3,137	1,642	2000	2,348	4,918	7000	1,485	10,887
600	3,050	1,916	2200	2,285	5,265	7500	1,436	11,278
700	2,972	2,178	2400	2,229	5,601	8000	1,389	11,635
800	2,900	2,430	2600	2,175	5,923	8500	1,346	11,980
900	2,834	2,671	2800	2,125	6,231	9000	1,304	12,289
1000	2,775	2,905	3000	2,106	6,352	9500	1,264	12,576
1100	2,719	3,132	3200	2,079	6,531	10000	1,228	12,854

The total power “P” and the total torque “M” transmitted by the belt, are calculated with the following formulas:

$$P\ [kW] = P_{spez} \bullet z_e \bullet z_k \bullet b / 1000$$

$$M\ [Nm] = M_{spez} \bullet z_e \bullet z_k \bullet b / 100$$

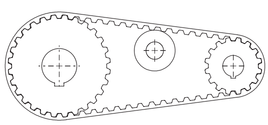
$$z_e = \frac{Z_k}{180} \cdot \arccos\left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A}\right]$$

P = power in kW
M = torque in Nm
P_{spez} = specific power
M_{spez} = specific torque
z_e = number of teeth in mesh of the small pulley
z_{emax} = 12
z_k = number of teeth of the small pulley
b = belt width in cm
A = centre distance [mm]
t = pitch

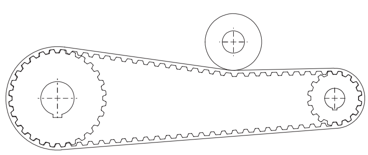
Flexibility

Minimum number of teeth and minimum diameter

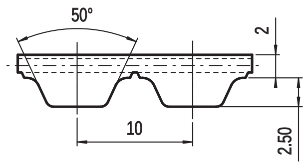
Drive without reverse bending
- Driver pulley z_{min} = 15
- Idler (flat) running on belt teeth d_{min} = 30 mm



Drive with reverse bending and double sided belt
- Driver pulley z_{min} = 25
- Idler (flat) running on belt back d_{min} = 60 mm



AT10 iSync™



Belt characteristics

- Truly endless polyurethane timing belt with steel tension cords. Metric pitch 10 mm
- Tooth profile and dimension are optimised to guarantee uniform load distribution and mini mum deformation under load
- High resistance and low stretch steel cords to guarantee high stability and low elongation
- Reduced polygonal effect with reduced drive vibration and noise
- Rpm up to 10.000 [1/min]

- Width tolerance: ±0,5 [mm]
- Thickness tolerance: ±0,2 [mm]

Belt width [mm]	16	25	32	50	75	100	150
Weight [g/m]	101	158	200	316	475	630	950

Other widths are available on request

Tooth shear strength

rpm [min-1]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min-1]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]	rpm [min-1]	M_{spez} [Ncm/cm]	P_{spez} [W/cm]
0	15,903	0,000	1200	10,174	12,785	3400	7,019	24,989
20	15,670	0,328	1300	9,945	13,538	3600	6,838	25,778
40	15,452	0,647	1400	9,731	14,266	3800	6,664	26,516
60	15,246	0,958	1440	9,649	14,550	4000	6,500	27,225
80	15,053	1,261	1500	9,529	14,968	4500	6,120	28,837
100	14,870	1,557	1600	9,340	15,649	5000	5,777	30,248
200	14,103	2,954	1700	9,160	16,305	5500	5,464	31,470
300	13,483	4,236	1800	8,990	16,944	6000	5,179	32,536
400	12,927	5,414	1900	8,828	17,563	6500	4,916	33,460
500	12,439	6,513	2000	8,672	18,162	7000	4,670	34,232
600	12,008	7,545	2200	8,380	19,305	7500	4,441	34,878
700	11,626	8,522	2400	8,113	20,390	8000	4,227	35,409
800	11,282	9,451	2600	7,866	21,414	8500	4,023	35,808
900	10,969	10,337	2800	7,632	22,378	9000	3,832	36,113
1000	10,683	11,186	3000	7,544	22,751	9500	3,651	36,322
1100	10,418	12,000	3200	7,416	23,296	10000	3,479	36,429

The total power "P" and the total torque "M" transmitted by the belt, are calcula-ted with the following formulas:

P [kW] $= P_{spez} \bullet z_e \bullet z_k \bullet b / 1000$

M [Nm] $= M_{spez} \bullet z_e \bullet z_k \bullet b / 100$

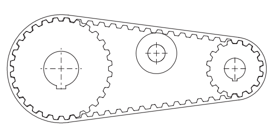
$$z_e = \frac{Z_k}{180} \cdot \arccos \cdot \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A} \right]$$

P = power in kW
M = torque in Nm
P_{spez} = specific power
M_{spez} = specific torque
z_e = number of teeth in mesh of the small pulley
z_{emax} = 12
z_k = number of teeth of the small pulley
b = belt width in cm
A = centre distance [mm]
t = pitch

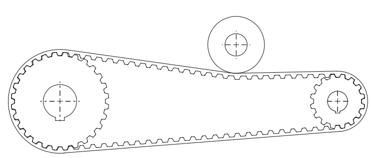
Flexibility

Minimum number of teeth and minimum diameter

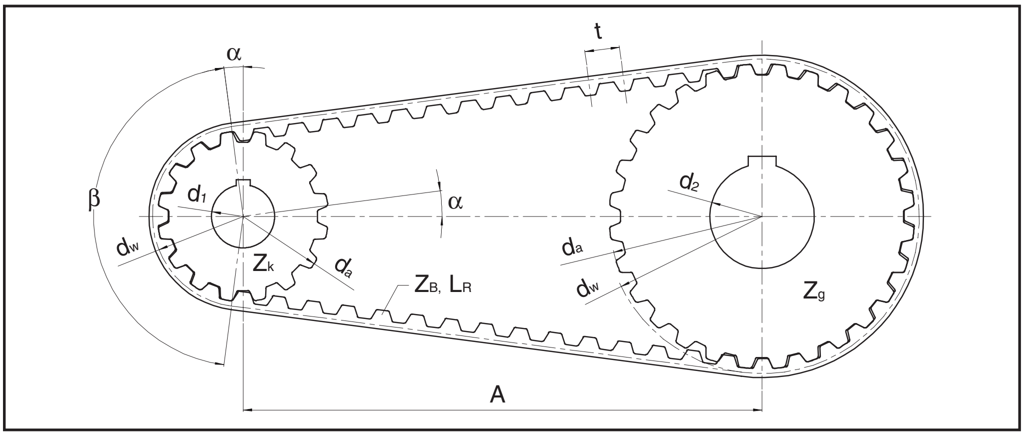
Drive without reverse bending
- Driver pulley $z_{min} = 15$
- Idler (flat) running on belt teeth $d_{min} = 50$ mm



Drive with reverse bending and double sided belt
- Driver pulley $z_{min} = 25$
- Idler (flat) running on belt back $d_{min} = 120$ mm



Drive calculation



Definitions

b	(cm)	Belt width
L_R	(mm)	Belt lenght
z_R	-	Number of teeth of the belt
B	(mm)	Pulley width
A	(mm)	Center distance
A_{eff}	(mm)	Effective center distance
d	(mm)	Pulley bore diameter
d_a	(mm)	Pulley outside diameter
d_{ak}	(mm)	Small pulley outside diameter
d_{ag}	(mm)	Large pulley outside diameter
d_w	(mm)	Pulley pitch diameter
d_{wk}	(mm)	Small pulley pitch circle diameter
d_{wg}	(mm)	Large pulley pitch circle diameter
F_{Wsta}	(N)	Static Shafts load
F_{TV}	(N)	Pretension force per belt side
F_{Tzul}	(N)	Allowable tensile load

F_U	(N)	Peripheral force
M	(Nm)	Torque
P	(kW)	Power
t_{ab}	(s)	Acceleration time
t_{av}	(s)	Deceleration time
v	(m/s)	Peripheral speed
z_e	-	N. of teeth in mesh
z_k	-	Number of teeth of the small pulley
z_g	-	Number of teeth of the large pulley
i	-	Drive ratio ($n_1 : n_2$)
ρ	(kg/dm^3)	Specific weight
J	(kgm^2)	Moment of inertia
t	(mm)	Pitch
n	(min^{-1})	Rpm
n_1	(min^{-1})	Rpm of driver pulley
ω	(s^{-1})	Angular speed
β	(°)	Wrap angle

Calculation formula

Power

$$P = \frac{M \cdot n}{9550}$$

$$P = \frac{F_u \cdot d_w \cdot n}{19100 \cdot 10^3}$$

Peripheral force

$$F_u = \frac{19100 \cdot P \cdot 10^3}{n \cdot d_w}$$

$$F_u = \frac{2000 \cdot M}{d_w}$$

Torque

$$M = \frac{F_U \cdot d_W}{2000}$$

$$M = \frac{9550 \cdot P}{n}$$

Angular speed

$$\omega = \frac{\pi \cdot n}{30}$$

pheripheral speed

$$v = \frac{d_W \cdot n}{19100}$$

Acceleration torque

$$M_{ab} = \frac{J \cdot \Delta n}{9{,}55 \cdot t_{ab}}$$

Moment of inertia

$$J = 98{,}2 \cdot 10^{-15} \cdot B \cdot \rho \cdot \left(d_a^4 - d^4\right)$$

rpm

$$n = \frac{19100 \cdot v}{d_w}$$

The necessary data for drive calculation are:

- Power to be transmitted P [kW]
- Driver rpm n_1 [min^{-1}]
- Motor starting torque M_{ab} [Nm]
- Required center distance A [mm]
- Maximum driver pulley diameter d_{w1} [mm]

Safety factors

Belt selection is made according to a constant working load. For start up torque and in case of peak loads and vibrations must be considered a safety factor c_1.

Transmission with steady load $c_1 = 1{,}0$

Transmission with peak or fluctuating loads:

Light	$c_1 = 1{,}4$
Medium	$c_1 = 1{,}7$
Heavy	$c_1 = 2{,}0$

For speed up driver factor c_2 must be considered:

i = from 0,66 to 1	$c_2 = 1{,}1$
i = from 0,40 to 0,66	$c_2 = 1{,}2$
i < 0,40	$c_2 = 1{,}3$

The resulting total safety factor is:

$c_0 = c_1 \cdot c_2$

Select type of belt

For the initial drive selection, use the selection graph. For initial pulley choice, it is recommended to use the driver pulley with maximum diameter allowable in the application.

Calculate drive ratio

$$i = \frac{n_{driver}}{n_{driven}}$$

Calculate belt lenght

Belt lenght for drive with ratio i # 1

$$L_R \approx \frac{t}{2} \cdot (z_g + z_k) + 2A + \frac{1}{4A} \cdot \left[\frac{(z_g - z_k) \cdot t}{\pi}\right]^2$$

and more precisely:

$$L_R = 2A \cdot \sin \frac{\beta}{2} + \frac{t}{2} \cdot \left[z_g + z_k + \left(1 - \frac{\beta}{180}\right) \cdot (z_g - z_k) \right]$$

Belt lenght for drive with ratio i = 1

$$L_R = 2 \cdot A + \pi \cdot d_w = 2 \cdot A + z \cdot t$$

Calculate teeth in mesh

$$z_e = \frac{\beta}{360} \cdot z_k$$

with $\beta\,[°] =$ wrap angle

$$\beta = 2 \cdot \arccos \cdot \left[\frac{t \cdot (z_g - z_k)}{2 \cdot \pi \cdot A}\right]$$

Determine belt width

$$b = \frac{P \cdot 1000 \cdot c_0}{z_k \cdot z_e \cdot P_{spez}} \qquad b = \frac{100 \cdot M \cdot c_0}{z_k \cdot z_e \cdot M_{spez}}$$

Verifiy allowable tensile load

The allowable tensile load of the belt must be highter than the total corrected peripheral force.

$F_{Tzul} > c_0 \cdot F_U$ with $F_u = \frac{2000 \cdot M}{d_w}$

Calculate shaft load

$$F_{Wsta} = 2 \cdot F_{Tv} \cdot \cos \cdot \beta$$
$$F_{Wsta} = 2 \cdot F_{Tv} \ (\text{for } i = 1)$$

Determine installation tension

A drive is correctly tensioned when the belt slack side is tensioned in all working conditions. It is also important to use the minimum necessary tension to minimize shaft loads. Belt tension is dependent also on belt length L_R and its number of teeth Z_R. According to belt number of teeth, following tension is suggested:

2 shafts drive

$Z_R < 75$	$F_{TV} = 1/3\ F_U$
$75 < Z_R < 150$	$F_{TV} = 1/2\ F_U$
$Z_R > 150$	$F_{TV} = 2/3\ F_U$

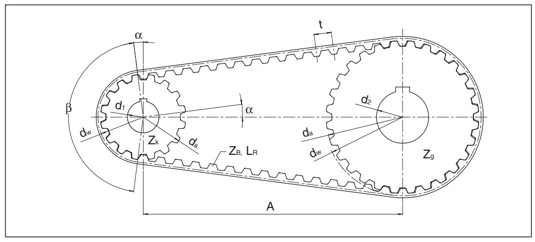
More than 2 shafts drive

$F_{TV} > F_U$

In order to ensure the correct drive installation tension, it is recommended to use the special belt tension meter available from ELATECH®.

Calculation example

- Power to be transmitted 15 [kW]
- Driver rpm n_1 1500 [1/min]
- Driven rpm n_2 1500 [1/min]
- Motor start up torque M_{ab} 200 [Nm]
- Required center distance A 400 [mm]
- Max allowable driver pulley diameter d_w 130 [mm]
- Safety factor c_1 1,4



Calculate drive ratio

$$\frac{n_1}{n_2} = 1$$

Select belt type and pitch

From selection graph and the corrected power of 21 kW, a **AT10** pitch is chosen.

Calculate pulley diameter
From the maximum allowable pulleys diameter, the drive ratio and the type of belt selected, the number of teeth of the driver and driven pulley is calculated.

$$z = \frac{130 \cdot \pi}{10} = 40{,}84 \text{ - select } z = 40 \text{ with } d_W = 127{,}32 \text{ mm}$$

The maximum allowable diameter is chosen to minimize belt width.

$z_1 = 40$
$z_2 = 40$

Calculate belt length

$$L_R = 2 \cdot A + \pi \cdot d_w = 2 \cdot A + z \cdot t$$

$$L_R = 2 \cdot 400 + 40 \cdot 10 = 1200 \text{ mm}$$

Calculate teeth in mesh
Being the drive ratio 1, the pulleys have 20 teeth in mesh.
$z_e = 20$

Calculate belt width

$$b = \frac{1000 \cdot 15 \cdot 1{,}4}{40 \cdot 12 \cdot 14{,}968} = 2{,}92 \text{ cm} = 29{,}2 \text{ mm}$$

A belt width of 32 mm is selected.
The belt width is verified according to the peak torque (starting torque) for n = 0 with 200 Nm as start up torque

$$b = \frac{100 \cdot 200}{40 \cdot 12 \cdot 9{,}529} = 4{,}37 \text{ cm} = 43{,}7 \text{ mm}$$

The next belt width 50 mm is chosen.

Determine installation tension according to belt number of teeth

$$F_U = \frac{2000 \cdot M_{ab}}{d_w} = 3141 \text{ N}$$

$$Z_R = \frac{1200}{10} = 120 \text{ teeth}$$

The installation tension per belt side F_{TV} is therefore:

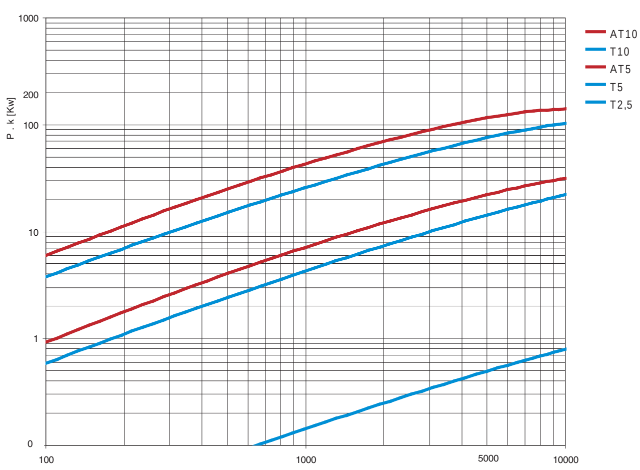
$$F_{TV} = \frac{1}{2} \cdot F_U = 1570 \text{ N with } z_R = 120$$

Verify flexibility
The minimum pulley diameters are respected.

Selected belt

ELATECH® iSync™ U1200 AT10 / 50

Selection graph



ELATECH® iSync™

Belt installation

Drive installation
When installing belt on pulleys, it must be checked before tensioning the drive, that belt teeth and pulley grooves correctly match.

Belt drive tension
Correct belt drive tension and alignement are very important to optimize belt life and minimize noise level. In fact improper tension in the belt drive, affect belt fit in the pulley grooves while correct tension minimizes belt pulley interference reducing the noise in the drive.

Drive Alignment
Pulley misalignment will result in an unequal tension, edge wear and reduction of belt life. Also, misaligned drives are much noisier than correctly aligned drives due to the amount of interference that is created between the belt teeth and the pulley grooves.
Proper pulley alignement should be checked with a straight edge or by using a laser alignment tool.

Belt width [mm]	10	16	32 over
Allowable pulley misalignment [°]	0,28	0,16	0,1

Idlers
Idlers are often a mean to apply tension to the drive when the centre distance is fixed but also to increase the number of teeth in mesh of the small pulley. A toothed idler on the inside of the belt on the slack side is recommended with respect to a back side idler. Drives with inside flat idlers are not recommended as noise and abnormal belt wear may occur.

- Idler location is on the slack side span of the belt drive
- Diameter for inside toothed idler must be ≥ of the diameter of the small pulley in the drive
- Idler must be mounted on a rigid support
- Idlers both flat and toothed, should be uncrowned with a minimum arc of contact.
- Idler should be positioned respecting: 2 • (dwk + dwg)< A
- Idlers width should be ≥ of pulley width B

Backside idlers, although increase the teeth in mesh on both pulleys in the drive, force counterflexure of the belt thus contributing to premature failure. When such an idler is necessary, it should be at least 1,25 times the diameter of the small pulley in the drive and it must be located as close as possible to the small pulley in the drive in order to maximise the number of teeth in mesh of the small pulley.

Belt handling and storage

Proper storage is important in order avoid damaging the belts which may cause premature belt failure. Do not store belts on the floor unless in a protective container to avoid damages which may be accidentally caused by people or machine traffic.
Belts should be stored in order to prevent direct sunlight and in a dry and cool environment without presence of chemicals in the atmosphere.
Avoid belt storage near windows (to avoid sunlight and moisture), near electric motors or devices which generate ozone, near direct airflow of heating/cooling systems.

Do not crimp belts while handling or when stored to avoid damage to tensile cords. Belts must not be hang on small pins to avoid bending to a small diameter. Handle belts with care while moving and installing. On installation, never force the belt over the pulley flange.

Special belts

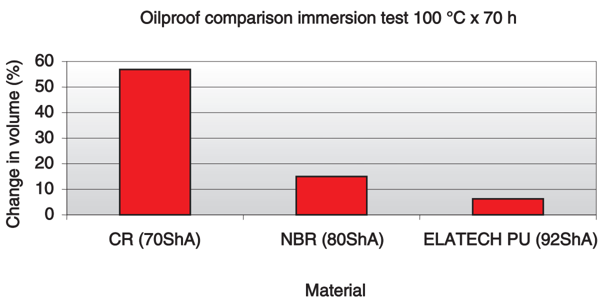
Special belts with cleats, backing and with special moulded shape are designed and manufactured to maximize application performance.



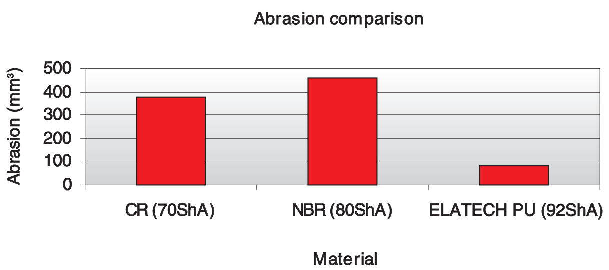

Material characteristics

ELATECH® belts are manufactured as standard in thermoplastic polyurethane 92 Sh. A hardness. Non standard material and compounds are available for applications in special enviroments or in respect of special specifications. Standard colour, unless differently specified, is white. Other colours are available upon request.

Resistance to oils
ELATECH® polyurethane has an high resistance to most oils. The following graph compares synthetic rubber CR and NBR with ELATECH® polyurethane.



Abrasion resistance
ELATECH® polyurethane has excellent abrasion resistance properties. The graph below shows comparison with synthetic rubber.



FDA/USDA approval
Standard material is not FDA approved. For applications where FDA approval is required, a special material will be used. The standard color of the FDA material is transparent.
Material code U-FDA.

Chemical resistance
The impact of chemicals on ELATECH® polyurethane results in different modification of the material's properties. As the resistance mainly depends on the concentration and the temperatures used, the information provided can only be general. If further detailed information is required please contact with our technical department.

Oil and Grease
ELATECH® polyurethane is well-resistant to oil and grease and specifically to pure oils even at 80°C.

Acids and alkaline solutions
The resistance to acids and alkaline solutions of the ELATECH® polyurethane is limited. It has shown to be moderate resistant to diluted acids and alkaline solutions at room temperature and to be resistant for a very a short time with high concentration solutions. Special compounds are available on specific request.

Bacteria and microbes
In case of high exposure to microbe attack it is recommended to use a special material. Please contact with our technical department.

UV resistance
ELATECH® polyurethane is UV resistant. A long exposure to UV radiation (sunlight) will have as an effect to slightly change the color of the belt. However the technical performances of the product will remain unchanged.

Low temperature compound
For low temperature use special compound (-30 +5 °C) U-LT can be supplied.

High temperature compound
For high temperature use special compound (+20 +110 °C) U-HT can be supplied.

Chemical resistance

CHEMICAL REFERENCE	0/40° C	40/80°C
Acetic acid	B	C
Acetic acid 3 n	C	C
Acetic acid, 20 %	B	C
Acetone	C	C
Acetone	B	-
AL-chloride, aqueous, 5 %	A	-
Ammonia, 10 %	A	-
Amyl acetate	C	C
Aniline	B	C
ASTM Fuel A	A	-
ASTM Fuel B	A	-
ASTM Fuel C	B	-
ASTM oil 1	A	A
ASTM oil 2	A	A
ASTM oil 3	A	A
Baking Soda	A	-
Benzene	B	C
Benzine	B	C
Bleaching agent	A	A
Blood	A	B
Brine	A	B
Buthyl alcohol (Butanol)	B	B
Butric acid	B	B
Butter	A	A
Butylacetate	C	-
Carbon tetrachloride	C	C
Chloro benzene	C	C
Chloroform	B	B
Cyclohexanol	B	B
Cyclohexanone	C	C
Dibutylphthalate	B	-
Diesel oil	A	-
Dimethylformamide	D	D
Dioctyl phthalate	A	A
Dye	B	B
Ethanol 96 %	B	-
Ethyl acetate	C	C
Ethyl alcohol (Ethanol)	B	C
Ethylacetate	C	C
Ethylene dichloride	B	B
Ethylene glycol	A	B
Ethylene glycol acetate	B	C
Ethylether	B	C
Fat (animal)	A	A
Fe chloride, aqueous, 5 %	B	C
Formalin	B	C
Freon 22	B	C
Fructose	A	A
Fruit juice	A	A
Gasoline	B	C
Gelatin	A	A
Glycerin (Glycerol)	B	C
Glycol	A	B
Glysantin / water 1:1	A	B
Honey	A	B
Hydrochloric acid, 20 %	B	-

Note
- The above table is valid for material to be conveyed containing chemicals and or oil. In case of immersion, please contact with our technical department.
- It must be considered that alkalis, acids, peroxides, water and water solutions may corrode the steel tension member. In case, please contact our technical department for solutions.

CHEMICAL REFERENCE	0/40° C	40/80°C
Hydrogen	A	-
Ink	B	B
Isopropanol	B	-
Kerosene	A	B
Lactic acid	B	C
Liqueur	A	B
Margarine	A	A
Methyl alcohol (Methanol)	B	C
Methyl ethyl ketone (MEK)	C	C
Methylen chloride	D	-
Milk	A	A
Mineral oil	A	B
Molasses	A	A
Nicotine	A	-
Nitric acid, 20 %	D	-
Oil animal	B	B
Oil heavy	A	B
Oil light	A	B
Oil Machine	B	B
Oil tar	B	B
Oil turpentine	B	B
Oil vegetable (peanut, pine, soy, sunflower)	A	A
Oleic acid	B	-
Ozone	A	A
Paraffin	B	B
Petrol, premium grade	C	-
Petrol, standard grade	A	-
Petroleum ether	B	C
Salt	A	A
Sea water	A	B
Silicone grease	A	A
Soap	A	B
Soda soap fat	A	B
Sodium chloride solution, conc.	A	B
Sodium hydroxide solution 1N	B	B
Starch	A	A
Strong acid (pH3)	B	C
Strong alkali (pH11-14)	B	C
Styrene	B	C
Sugar	A	A
Sulphuric acid, 20 %	B	-
Tannic acid	A	B
Tannic acid	A	A
Toluene	B	C
trichloroethylene	C	C
Triocresyl phosphate	B	C
Vaseline	A	A
Vinegar	B	C
Water	A	B
Water oxygenated	B	B
Water salt	A	B
Water soapy	A	B
Wax	A	A
Weak acid (pH4)	B	B
Weak alkali (pH10-11)	B	B
Yeast	A	B

A = resistant over a prolonged period
B = conditionallly resistant, after a certain time appreciable differences are possible
C = not resistant, short-term contact possible
D = not resistant, pronounced attack

Troubleshooting

DAMAGE	CAUSE	REMEDY
Belt tooth jumping	Over load (shock on the machine)	Increase belt size/modify design
	Overload due to machine accident	Prevent reoccur of the accident
	Shortage of teeth in mesh	Increase teeth in mesh by using an idler
	Lack of initial tension	Correct initial tension
	Pulley diameter too small	Change design
	Moment of inertia for start and stop is not considered	Change design
Abnormal noise level	Bad pulley alignment	Adjust alignment
	Incorrect pulley tooth shape	Change pulley
	Belt wider than pulley diameter	Change design
	Over load	Change design
	Belt over-tension	Correct initial tension
Belt side abrasion	Bad pulley alignment	Adjust alignment
	Poor flange shape	Correct flange bending or change flange
	Pulley flange roughness	Change flange to an appropriate one
Belt tooth abrasion	Presence of particles between belt and pulley	Improve environment or apply a protective cover
	Over load	Change design (increase belt size)
	Over tension	Correct initial tension
	Belt tooth jumping due to lack of initial tension	Correct initial tension
Belt tooth bottom abrasion	Bad pulley profile	Use correct pulley
	Over tension	Correct initial tension
Belt back abrasion	Contact with undesired element (i.e. machine frame)	Eliminate contact
Belt back cracking	Running under too low temperature	Increase environment temperature or ask for special compound
	Pulleys too small	Observe minimum pulley diameter recommendations
Belt breakage	Over load (shock on the machine)	Increase belt size/modify design
	Undesired particles in mesh	Improve environment or apply a protective cover
	Tension member corrosion	Improve environment or use aramid/stainless steel cords
	Belt run off over pulley flange	Adjust alignment and change pulley flange
	Not enough belt teeth in clamping plate	Use larger clamping plate
	Clamping plate screws tightened incorrectly	Apply optimum torque to clamp plate screws
Tension member partial tear	Presence of undesired particles in mesh	Improve environment or apply a protective cover
	Improper installation	Pay care when installing
	Belt folded or twisted	Pay care in handling
	Fatigue on side due to bad alignment	Correct alignment
Back covering abnormal abrasion	Aggressive environment	Change belt back cover or improve environment conditions
Pulley tooth abrasion	Presence of undesired particles in mesh	Improve environment or apply a protective cover
	Over load	Change design
	Belt over tension	Correct initial tension
	Pulley material not adequate (too soft)	Change pulley material or adopt surface treatment

Notes:

The data contained in this publication are for information purposes only and do not enlarge, amend or imply any warranty other than provided by the manufacturer with the product. In the spirit of continuos technical improvement, thespecifications in this catalogue are subject to change without notice.