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**Synchronous belts for
general power transmission**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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Synchronous belts for general power transmission

1 Scope This Japanese Industrial Standard specifies the ring-shaped endless synchronous belts (hereafter referred to as belts) for general power transmission. This Standard, however, does not apply to the synchronous belts for motor cars.

Remarks 1 The International Standard corresponding to this Standard is as follows.

ISO 5296-1 : 1989 *Synchronous belt drives—Belts—Part 1 : Pitch codes MXL, XL, L, H, XH and XXH—Metric and inch dimensions*

2 Types The belts are classified into the following five types according to the tooth dimensions.

XL L H XH and XXH

3 Quality

3.1 Appearance The belts shall be such flat belts having equidistant and bisymmetrical trapezoidal teeth, and shall be free from such defects harmful to use as distortions, flaws and the like (see Fig. 1).

3.2 Performance The belts shall be tested in accordance with 7.2, and the results shall satisfy the requirements specified in Table 1.

Table 1

Test item		Types				
		XL	L	H	XH	XXH
Tension test	Tensile Strength kN/25.4 mm	2.0 min.	2.7 min.	6.8 min.	9.4 min.	10.8 min.
	Elongation percentage ⁽¹⁾ %	4.0 max.	4.0 max.	4.0 max.	4.0 max.	4.0 max.

Note ⁽¹⁾ The elongation percentage shall be that under the load given in Table 4 of 7.2.

4 Construction The belt shall be made from the materials specified in 6 to the construction in which the core wire positions at pitch line⁽²⁾ and its periphery of toothed side is covered with a cloth coated with rubber or the teeth are made of rubber only (see Fig. 2).

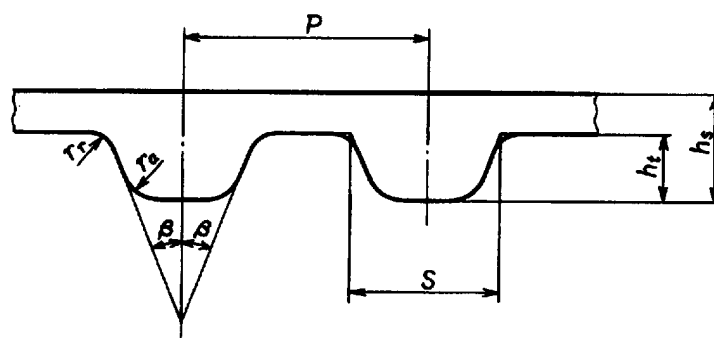
Note ⁽²⁾ The pitch line above-mentioned constitutes a basis of meshing of the belt with the toothed pulley, and it lies at the center of core wire of the belt and positions outside the tooth tip of the toothed pulley.

5 Dimensions

5.1 Tooth profiles and dimensions The tooth profiles and dimensions of the belts shall generally be in accordance with Fig. 1.

Remarks : The belts shall interlock with the toothed pulley (Fig. 2) (hereafter referred to as the pulleys) specified in 7.1.

Fig. 1



Notation	Types				
	XL	L	H	XH	XXH
$P(^{\circ})$ (mm)	5.080	9.525	12.700	22.225	31.750
$2\beta(^{\circ})$	50	40	40	40	40
S (mm)	2.57	4.65	6.12	12.57	19.05
h_t (mm)	1.27	1.91	2.29	6.35	9.53
h_s (mm)	2.3	3.6	4.3	11.2	15.7
r_s (mm)	0.38	0.51	1.02	1.57	2.29
r_a (mm)	0.38	0.51	1.02	1.19	1.52

Note (³) Numerical value P gives the basic dimension.

5.2 Length and number of teeth The length of the belt shall be measured in accordance with 7.1, and shall be presented by the length of pitch line of the belt. The belt length and tolerances on the length and number of teeth shall be as specified in Table 2.

Table 2

Nominal length	Belt Length mm	Types					Tolerances on length mm
		XL	L	H	XH	XXH	
		No. of teeth	No. of teeth	No. of teeth	No. of teeth	No. of teeth	
60	152.40	30	—	—	—	—	±0.41
70	177.80	35	—	—	—	—	
80	203.20	40	—	—	—	—	
90	228.60	45	—	—	—	—	
100	254.00	50	—	—	—	—	
110	279.40	55	—	—	—	—	±0.46
120	304.80	60	—	—	—	—	
124	314.32	—	33	—	—	—	
130	330.20	65	—	—	—	—	
140	355.60	70	—	—	—	—	
150	381.00	75	40	—	—	—	±0.51
160	406.40	80	—	—	—	—	
170	431.80	85	—	—	—	—	
180	457.20	90	—	—	—	—	
187	476.25	—	50	—	—	—	
190	482.60	95	—	—	—	—	±0.61
200	508.00	100	—	—	—	—	
210	533.40	105	56	—	—	—	
220	558.80	110	—	—	—	—	
225	571.50	—	60	—	—	—	
230	584.20	115	—	—	—	—	±0.66
240	609.60	120	64	48	—	—	
250	635.00	125	—	—	—	—	
255	647.70	—	68	—	—	—	
260	660.40	130	—	—	—	—	
270	685.80	—	72	54	—	—	±0.76
285	723.90	—	76	—	—	—	
300	762.00	—	80	60	—	—	
322	819.15	—	86	—	—	—	
330	838.20	—	—	66	—	—	
345	876.30	—	92	—	—	—	±0.81
360	914.40	—	—	72	—	—	
367	933.45	—	98	—	—	—	
390	990.60	—	104	78	—	—	
420	1 066.80	—	112	84	—	—	
450	1 143.00	—	120	90	—	—	±0.86
480	1 219.20	—	128	96	—	—	
507	1 289.05	—	—	—	58	—	
510	1 295.40	—	136	102	—	—	
540	1 371.60	—	144	108	—	—	
560	1 422.40	—	—	—	64	—	±0.91
570	1 447.80	—	—	114	—	—	
600	1 524.00	—	160	120	—	—	
630	1 600.20	—	—	126	72	—	
660	1 676.40	—	—	132	—	—	
700	1 778.00	—	—	140	80	56	±0.97
750	1 905.00	—	—	150	—	—	
770	1 955.80	—	—	—	88	—	
800	2 032.00	—	—	160	—	64	
840	2 133.60	—	—	—	96	—	
850	2 159.00	—	—	170	—	—	±1.02
900	2 286.00	—	—	180	—	72	
980	2 489.20	—	—	—	112	—	
1 000	2 540.00	—	—	200	—	80	
1 100	2 794.00	—	—	220	—	—	
							±1.07

Table 2 (concluded)

Nominal Length	Belt Length mm	Types					Tolerances on length mm
		XL	L	H	XH	XXH	
		No. of teeth	No. of teeth	No. of teeth	No. of teeth	No. of teeth	
1 120	2 844.80	—	—	—	128	—	±1.12
1 200	3 048.00	—	—	—	—	96	±1.12
1 250	3 175.00	—	—	250	—	—	±1.17
1 260	3 200.40	—	—	—	144	—	±1.17
1 400	3 556.00	—	—	280	160	112	±1.22
1 540	3 911.60	—	—	—	176	—	±1.32
1 600	4 064.00	—	—	—	—	128	±1.32
1 700	4 318.00	—	—	340	—	—	±1.37
1 750	4 445.00	—	—	—	200	—	±1.42
1 800	4 572.00	—	—	—	—	144	±1.42

5.3 Width The width of the belt and tolerances on width shall be as specified in Table 3.

Table 3

Type	Nominal width of belt	Belt Width mm	Tolerances on width mm		
			Nominal length of belt up to and including 330 (838.20 mm)	Nominal length of belt over 330 (838.20 mm) up to and including 660 (1 676.40 mm)	Nominal length of belt over 660 (1 676.40 mm)
XL	025	6.4	+0.5 -0.8	—	—
	031	7.9			
	037	9.5			
L	050	12.7	+0.8 -0.8	+0.8 -1.3	—
	075	19.1			
	100	25.4			
H	075	19.1	+0.8 -0.8	+0.8 -1.3	+0.8 -1.3
	100	25.4			
	150	38.1			
	200	50.8	+0.8 -1.3 +1.3 -1.5	+1.3 -1.3 +1.5 -1.5	+1.3 -1.5 +1.5 -2.0
XH	200	50.8	—	+4.8 -4.8	+4.8 -4.8
	300	76.2			
	400	101.6			
XXH	200	50.8	—	—	+4.8 -4.8
	300	76.2			
	400	101.6			
	500	127.0			

6 Materials to be used

6.1 Rubber All of the rubber shall have been so blended as to meet purposes of use and shall be homogeneous in composition.

6.2 Cloth The cloth shall be nylon fabric and other fabric suitable to the purposes of use, and its warp and weft yarns shall be uniform in density. It shall be free from such defects as flaw and distortion.

6.3 Core wires The core wires shall be steel wires, glassfibres, synthetic fibres and others suitable to the purposes of use, and shall have been twisted uniformly.

7 Measurement of length and tension test

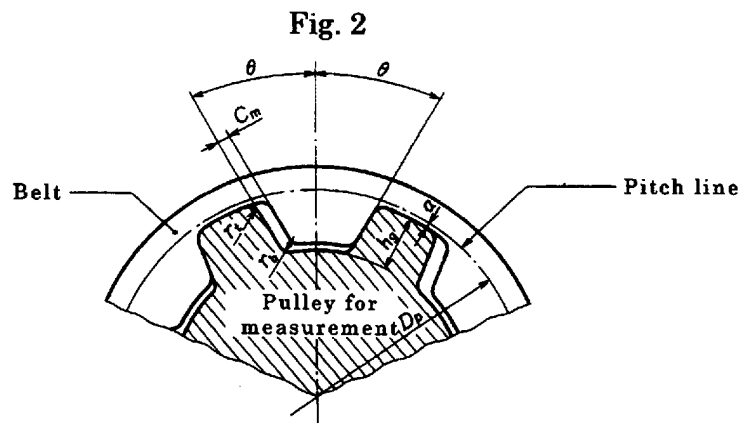
7.1 Measurement of length The belt length shall be measured by the apparatus as given in Fig. 3. Hang (see Fig. 3) the belt over the two pulleys for length measurement shown in Fig. 2, and after applying the load prescribed in the table of Fig. 3, turn the belt at least two turns to measure the centre distance of the pulleys, and calculate the length of the belt by the following equation:

$$L_P = 2C + \pi D_P \quad (1)$$

where, L_P : length of belt (mm)

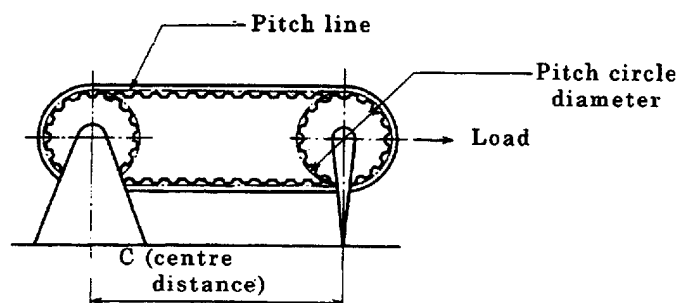
C : centre distance (mm)

D_P : pitch circle diameter of pulley (mm)



Type	Nominal length of belt	No. of teeth of pulley	πD_P mm	Outside dia. of pulley mm	Permissible value of run-out		Minimum clearance C_s mm	h_g mm	r_b mm	r_t mm	$2a$ mm	θ (°)
					Outer periphery mm	Side face mm						
XL	60 or more to 120 excl.	10	50.80	15.662 ± 0.013	0.013	0.025	0.30	1.52 ± 0.10	0.50 ± 0.10	0.50 ± 0.10	0.508	25 ± 1.5
	120 min.	16	81.28	25.364 ± 0.013								
L	124 min.	16	152.40	47.748 ± 0.013	0.013	0.025	0.33	2.68 ± 0.10	0.85 ± 0.10	0.85 ± 0.10	0.762	20 ± 1.5
H	240 min.	20	254.00	79.479 ± 0.013	0.013	0.025	0.38	3.00 ± 0.10	1.23 ± 0.10	1.23 ± 0.10	1.372	
XH	507 min.	24	533.40	166.992 ± 0.025	0.013	0.051	0.53	8.40 ± 0.10	2.40 ± 0.10	2.40 ± 0.10	2.794	
XXH	700 min.	24	762.00	239.504 ± 0.025	0.013	0.076	0.64	12.15 ± 0.10	3.20 ± 0.10	3.20 ± 0.10	3.048	

Fig. 3



Nominal width of belt	Width of belt mm	Load N				
		XL	L	H	XH	XXH
025	6.4	36				
031	7.9	44				
037	9.5	53				
050	12.7		105			
075	19.1		180	445		
100	25.4		245	620		
150	38.1			980		
200	50.8			1 340	2 000	2 500
300	76.2			2 100	3 100	3 900
400	101.6				4 450	5 600
500	127.0					7 100

7.2 Tension test The tension test of the belt shall be made as follows: Take three test pieces⁽⁵⁾ out of a test specimen as its original shape to the length of 250 mm or over⁽⁴⁾, measure the tensile strength and, at the same time, elongation which is measured under the load given in Table 4, at a temperature of 20^{+10}_0 °C by employment of a tension testing machine, and obtain the elongation percentage from the equation (3). Set the tension speed as 25mm/min to 50 mm/min, average the measured values of the three pieces, excluding the measured value of the test piece broken at the clamping portion, and round off to an integer place. The clamps used shall be so constructed as to be capable of clamping the test piece perfectly.

If a sample width is more than 25.4 mm, its width shall be reduced to 25.4 mm, and if the sample width is less than 25.4 mm, it shall be corrected by the equation (2) by using the width factor given in Table 5.

Notes ⁽⁴⁾ In the case where the length is 250 mm or less, test shall be carried out for the length as it is.

⁽⁵⁾ In the case where it is impossible to take three test pieces, three pieces shall be sampled from the same lot.

Table 4

Type	XL	L	H	XH	XXH
Load kN/25.4 mm	1.6	2.2	5.4	7.5	8.7

$$T_B = \frac{T_s}{K_w} \quad (2)$$

where, T_B : tensile strength of belt width 25.4 mm kN
 T_s : tensile strength of belt kN
 K_w : width factor (Table 5)

$$\text{Elongation percentage (\%)} = \frac{\Delta l}{l} \times 100 \quad (3)$$

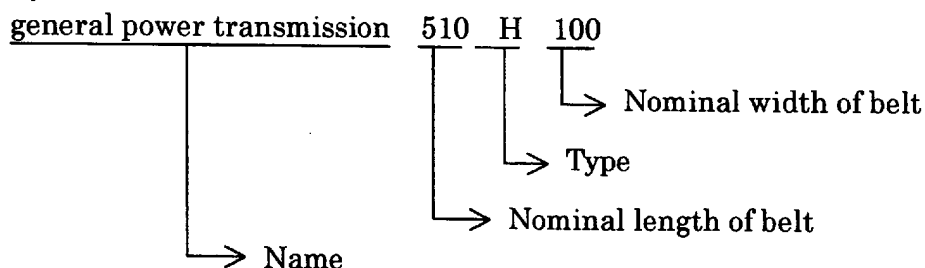
where, l : initial length of belt (mm)
 Δl : elongation of belt (mm)

Table 5

Nominal width of belt	025	031	037	050	075	100
Width of belt mm	6.4	7.9	9.5	12.7	19.1	25.4
Width factor	0.15	0.21	0.28	0.42	0.71	1.00

8 Designation The product shall be designated by the name, nominal length, type and nominal width of belt in this order.

Example : Synchronous belt for



9 Marking The belt shall be marked with the following particulars:

- (1) Nominal length
- (2) Type
- (3) Nominal width
- (4) Manufacturer's name or its abbreviation
- (5) Date of manufacture or its abbreviation

Related standards:

JIS B 1856 *Synchronous belt drives — Pulleys*

JIS K 6368 *Narrow V belts for power transmission*

JIS K 6373 *Synchronous belts for light duty power transmission*

ISO 5295:1987 *Synchronous belts — Calculation of power rating and drive center distance*