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# International Standard



# 5294

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Synchronous belt drives — Pulleys

*Transmissions synchrones par courroies — Poulies*

First edition — 1979-07-15

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 5294:1979](#)

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UDC 621.85.051 : 621.85.052.44

Ref. No. ISO 5294-1979 (E)

Descriptors : belt drives, pulleys, dimensions, dimensional tolerances.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5294 was developed by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, and was circulated to the member bodies in February 1978.

It has been approved by the member bodies of the following countries:

Austria	India	Spain
Belgium	Ireland	Sweden
Canada	Italy	United Kingdom
Chile	Mexico	USA
Czechoslovakia	Poland	USSR
France	Romania	
Germany, F. R.	South Africa, Rep. of	

No member body expressed disapproval of the document.

Attention is called to the fact that the synchronous pulleys specified in this International Standard are subject to patent rights held by Uniroyal, Inc.

The patent holder in authorizing the inclusion of the details of this patented item in this International Standard has given the assurance that it would be willing to negotiate licenses under patent and like rights with applicants throughout the world on reasonable terms and conditions.

# Synchronous belt drives – Pulleys

## iTeh STANDARD PREVIEW (standards.iteh.ai)

### 1 Scope and field of application

This International Standard specifies the principal characteristics of synchronous pulleys for use in synchronous endless belt drives<sup>1)</sup> for mechanical power transmission and where positive indexing or synchronization may be required. The principal characteristics include : tooth dimensions and tolerances; standard pulley dimensions and tolerances, and quality specification.

### 2 Reference

ISO/R 254, *Quality, machining and balancing of transmission pulleys.*<sup>2)</sup>

### 3 Standard tooth dimensions

#### 3.1 Involute teeth

**3.1.1** The involute tooth profile results in different dimensions for each pulley diameter. Therefore, to specify the involute tooth dimensions would require a very voluminous table. For this reason, as well as because of the difficulty in specifying the curved sides of an involute tooth, dimensions are specified for the rack generating tool required to produce the involute tooth.

**3.1.2** Dimensions and tolerances for the rack generating tool for synchronous pulleys with involute teeth are given in table 1 and figure 1.

1) These drives have been known by various titles in the past, for example : timing belt drives, positive belt drives, gear belt drives.

2) Under revision.

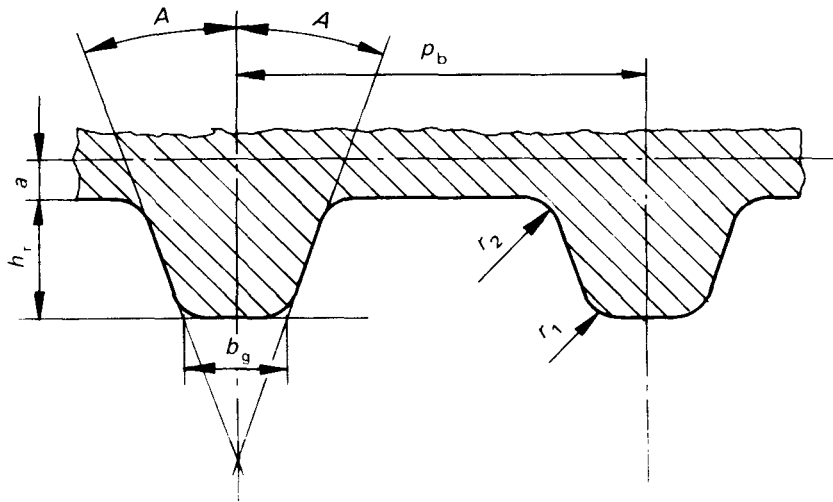


Figure 1 – Generating tool rack for pulleys with involute teeth

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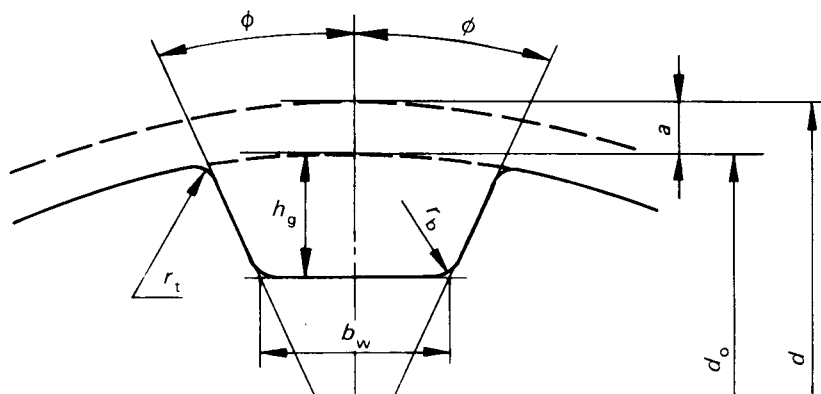
Table 1 – Dimensions and tolerances for generating tool rack for pulleys with involute teeth

Pitch code	Number of teeth in pulley	$p_b$		$A$ degrees $\pm 0,12$	$h_r$		$b_g$		$r_1$		$r_2$		$2a$	
		mm $\pm 0,003$	in $\pm 0.000\ 1$		mm $+ 0,05$ $0$	in $+ 0.002$ $0$	mm $+ 0,05$ $0$	in $+ 0.002$ $0$	mm $\pm 0,03$	in $\pm 0.001$	mm $\pm 0,03$	in $\pm 0.001$	mm	in
XL	10 and over	5,080	0.200 0	25	1,40	0.055	1,27	0.050	0,61	0.024	0,61	0.024	0,508	0.020
L	10 and over	9,525	0.375 0	20	2,13	0.084	3,10	0.122	0,86	0.034	0,53	0.021	0,762	0.030
H	14 to and including 19	12,700	0.500 0	20	2,59	0.102	4,24	0.167	1,47	0.058	1,04	0.041	1,372	0.054
	over 19										1,42	0.056		
XH	18 and over	22,225	0.875 0	20	6,88	0.271	7,59	0.299	2,01	0.079	1,93	0.076	2,794	0.110
XXH	18 and over	31,750	1.250 0	20	10,29	0.405	11,61	0.457	2,69	0.106	2,82	0.111	3,048	0.120

**3.2 Straight-sided teeth**

3.2.1 Involute teeth are normally recommended for synchronous belt drives. Since straight-sided teeth are in use, their specifications are also included.

3.2.2 Dimensions and tolerances for straight-sided teeth (see figure 2) are given in table 2.



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Figure 2 – Straight-sided teeth

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**Table 2 – Dimensions and tolerances for pulleys with straight-sided teeth**

Pitch code	$b_w$		$h_g$		$\phi$ degrees $\pm 1,5^\circ$	$r_b$ max.		$r_t$		$2a$	
	mm	in	mm	in		mm	in	mm	in	mm	in
XL	$1,32 \pm 0,05$	$0,052 \pm 0,002$	$1,65 \begin{smallmatrix} 0 \\ -0,08 \end{smallmatrix}$	$0,065 \begin{smallmatrix} 0 \\ -0,003 \end{smallmatrix}$	25	0,41	0,016	$0,64 \begin{smallmatrix} +0,05 \\ 0 \end{smallmatrix}$	$0,025 \begin{smallmatrix} +0,002 \\ 0 \end{smallmatrix}$	0,508	0,020
L	$3,05 \pm 0,10$	$0,120 \pm 0,004$	$2,67 \begin{smallmatrix} 0 \\ -0,10 \end{smallmatrix}$	$0,105 \begin{smallmatrix} 0 \\ -0,004 \end{smallmatrix}$	20	1,19	0,047	$1,17 \begin{smallmatrix} +0,13 \\ 0 \end{smallmatrix}$	$0,046 \begin{smallmatrix} +0,005 \\ 0 \end{smallmatrix}$	0,762	0,030
H	$4,19 \pm 0,13$	$0,165 \pm 0,005$	$3,05 \begin{smallmatrix} 0 \\ -0,13 \end{smallmatrix}$	$0,120 \begin{smallmatrix} 0 \\ -0,005 \end{smallmatrix}$	20	1,60	0,063	$1,60 \begin{smallmatrix} +0,13 \\ 0 \end{smallmatrix}$	$0,063 \begin{smallmatrix} +0,005 \\ 0 \end{smallmatrix}$	1,372	0,054
XH	$7,90 \pm 0,15$	$0,311 \pm 0,006$	$7,14 \begin{smallmatrix} 0 \\ -0,13 \end{smallmatrix}$	$0,281 \begin{smallmatrix} 0 \\ -0,005 \end{smallmatrix}$	20	1,98	0,078	$2,39 \begin{smallmatrix} +0,13 \\ 0 \end{smallmatrix}$	$0,094 \begin{smallmatrix} +0,005 \\ 0 \end{smallmatrix}$	2,794	0,110
XXH	$12,17 \pm 0,18$	$0,479 \pm 0,007$	$10,31 \begin{smallmatrix} 0 \\ -0,13 \end{smallmatrix}$	$0,406 \begin{smallmatrix} 0 \\ -0,005 \end{smallmatrix}$	20	3,96	0,156	$3,18 \begin{smallmatrix} +0,13 \\ 0 \end{smallmatrix}$	$0,125 \begin{smallmatrix} +0,005 \\ 0 \end{smallmatrix}$	3,048	0,120

**3.3 Pitch-to-pitch tolerances**

Tolerances on the amount of deviation of belt pitch between adjacent teeth, and on the summation of deviations within 90°

arc of a pulley, are given in table 3. This tolerance applies to the distance between the same point on either the right or left corresponding flanks of adjacent teeth.

**Table 3 – Pitch-to-pitch tolerances**

Outside diameter $d_o$		Allowable deviation of pitch			
		Between any two adjacent teeth		Summation within a 90° arc	
mm	in	mm	in	mm	in
Up to and including 25,40	Up to and including 1.000	0,03	0.001	0,05	0.002
Over 25,40 up to and including 50,80	Over 1.000 up to and including 2.000	0,03	0.001	0,08	0.003
Over 50,80 up to and including 101,60	Over 2.000 up to and including 4.000	0,03	0.001	0,10	0.004
Over 101,60 up to and including 177,80	Over 4.000 up to and including 7.000	0,03	0.001	0,13	0.005
Over 177,80 up to and including 304,80	Over 7.000 up to and including 12.000	0,03	0.001	0,15	0.006
Over 304,80 up to and including 508,00	Over 12.000 up to and including 20.000	0,03	0.001	0,18	0.007
Over 508,00	Over 20.000	0,03	0.001	0,20	0.008

**4 Standard pulley dimensions**

**4.1 Pulley widths**

The standard pulley width designation, the nominal pulley width, and the minimum actual pulley width required,  $b_f$  for flanged pulleys,  $b_f'$  for unflanged pulleys (see figure 3), are given in table 4.

Users are advised that the values given for  $b_f$  apply also to pulleys with only one flange.

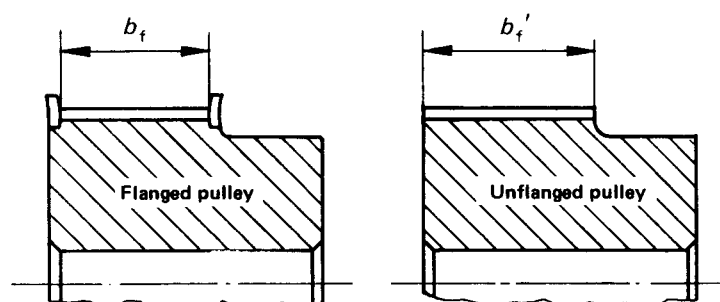
**4.2 Pulley diameters**

4.2.1 Standard pulley diameters are given in table 5.

**Table 4 – Standard pulley widths**

Pitch code	Standard pulley width designation	Nominal pulley width		Minimum flanged pulley width $b_f$		Minimum unflanged pulley width $b_f'$	
		mm	in	mm	in	mm	in
XL	025	6,4	0.25	7,1	0.28	8,9	0.35
	031	7,9	0.31	8,6	0.34	10,4	0.41
	037	9,5	0.37	10,4	0.41	12,2	0.48
L	050	12,7	0.50	14,0	0.55	17,0	0.67
	075	19,1	0.75	20,3	0.80	23,3	0.92
	100	25,4	1.00	26,7	1.05	29,7	1.17
H	075	19,1	0.75	20,3	0.80	24,8	0.98
	100	25,4	1.00	26,7	1.05	31,2	1.23
	150	38,1	1.50	39,4	1.55	43,9	1.73
	200	50,8	2.00	52,8	2.08	57,3	2.26
	300	76,2	3.00	79,0	3.11	83,5	3.29
XH	200	50,8	2.00	56,6	2.23	62,6	2.46
	300	76,2	3.00	83,8	3.30	89,8	3.54
	400	101,6	4.00	110,7	4.36	116,7	4.59
XXH	200	50,8	2.00	56,6	2.23	64,1	2.52
	300	76,2	3.00	83,8	3.30	91,3	3.59
	400	101,6	4.00	110,7	4.36	118,2	4.65
	500	127,0	5.00	137,7	5.42	145,2	5.72

NOTE – The minimum unflanged pulley width ( $b_f'$ ) may be reduced when the alignment of the drive can be controlled, but shall not be less than the minimum flanged pulley width ( $b_f$ ).



**Figure 3 – Minimum pulley width**





4.2.2 Tolerances on pulley diameters are given in table 6.

4.3 Flange dimensions

The pulley flange dimensions are given in table 7 and figure 4.

Table 6 – Tolerances on diameter

Outside diameter		Tolerances	
mm	in	mm	in
Up to and including 25,40	Up to and including 1.000	+ 0,05 0	+ 0.002 0
Over 25,40 up to and including 50,80	Over 1.000 up to and including 2.000	+ 0,08 0	+ 0.003 0
Over 50,80 up to and including 101,60	Over 2.000 up to and including 4.000	+ 0,10 0	+ 0.004 0
Over 101,60 up to and including 177,80	Over 4.000 up to and including 7.000	+ 0,13 0	+ 0.005 0
Over 177,80 up to and including 304,80	Over 7.000 up to and including 12.000	+ 0,15 0	+ 0.006 0
Over 304,80 up to and including 508,00	Over 12.000 up to and including 20.000	+ 0,18 0	+ 0.007 0
Over 508,00	Over 20.000	+ 0,20 0	+ 0.008 0

Table 7 – Minimum flange height

Pitch code	Minimum flange height	
	mm	in
XL	1,0	0.04
L	1,5	0.06
H	2,0	0.08
XH	4,8	0.19
XXH	6,1	0.24

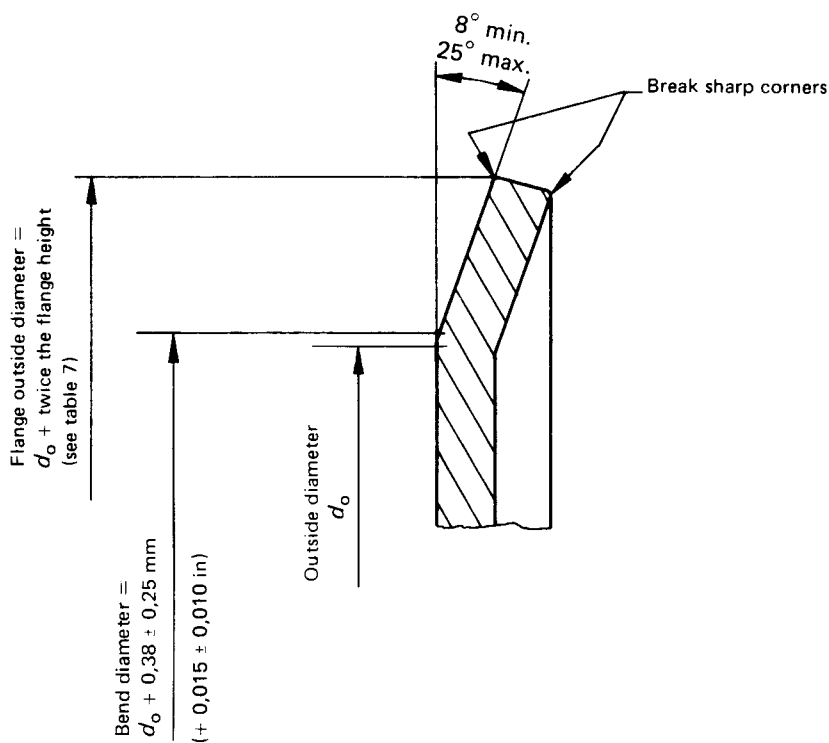


Figure 4 – Flange dimensions