



BSI Standards Publication

Belt drives — Pulleys — Limiting values for adjustment of centres

National foreword

This British Standard is the UK implementation of [ISO 155:2019](#). It supersedes [BS ISO 155:1998](#), which is withdrawn.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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This document was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Friction*.

This fourth edition cancels and replaces the third edition ([ISO 155:1998](http://www.iso.org/iso/155:1998)), which has been technically revised. The main changes compared to the previous edition are as follows:

- adding of curvilinear sections to [Table 6](#);
- editorial clarifications of the document.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Belt drives — Pulleys — Limiting values for adjustment of centres

1 Scope

This document specifies the limiting values for the adjustment of centres of two transmission pulleys.

It is applicable to:

- crowned pulleys for flat belts;
- grooved pulleys for V-belts, either single, multiple or joined;
- grooved pulleys for V-ribbed belts;
- toothed pulleys for synchronous belts.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Symbols

For the purpose of this document, the following symbols apply.

Symbol	Definition	Unit
$d \pm \delta_1$	Limits of small flat pulley diameter	mm
$D \pm \delta_2$	Limits of large flat pulley diameter	mm
e	Groove pitch of a V-ribbed pulley	mm
E	Nominal centre distance	mm
$E - i$	Lower limit for the adjustment of centre distance	mm
$E + s$	Upper limit for the adjustment of centre distance	mm
i_1	Factor related to the pulley dimensions and tolerances	—
i_2	Factor related to belt length tolerances	—
L	Nominal belt length	mm

p_b	Pitch of synchronous belt teeth	mm
s_1	Factor related to the pulley dimensions and tolerances	—
s_2	Factor related to belt length tolerances	—
s_3	Factor related to flat pulley crowning	—
s_4	Factor related to elastic properties of the belt	—
W_d	Datum width of a V-groove	mm
W_e	Effective width of a V-groove	mm

5 Specifications

Limiting values for adjustment of centre distance are specified in terms of factors i and s which are respectively subtracted from and added to the nominal centre distance, E (see [Figure 1](#)).

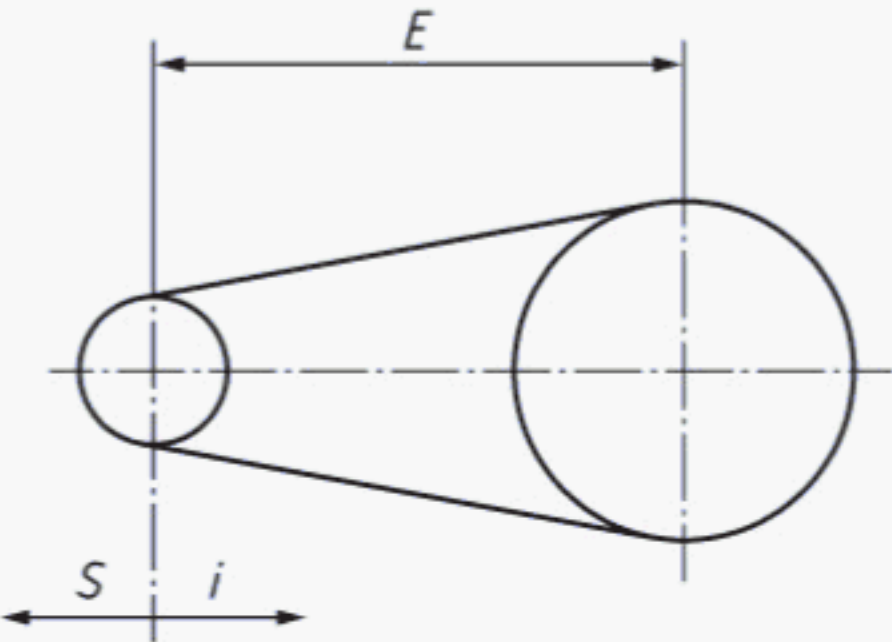


Figure 1 — Limiting values for adjustment of centre distance of pulleys

Values of i and s shall be rounded to the nearest millimetre.

Values of i and s are expressed as the sums of various components parts:

— for slack-off, see [Formula \(1\)](#):

$$i = i_1 + i_2 \tag{1}$$

where

i_1 is a factor related to the pulley dimensions and tolerances;

i_2 is a factor related to belt length tolerances;

— for take-up, see [Formula \(2\)](#):

$$s = s_1 + s_2 + s_3 + s_4 \tag{2}$$

where

- s_1 is a factor related to the pulley dimensions and tolerances;
- s_2 is a factor related to belt length tolerances;
- s_3 is a factor related to flat pulley crowning;
- s_4 is a factor related to elastic properties of the belt.

Factors with subscripts 1 to 3 determine the centre distance adjustment necessary to install a belt onto the pulleys and to readjust working tension.

Factor s_4 determines the centre distance adjustment necessary to maintain correct operation of a belt under the influence of belt extension and dimensional wear.

These limiting values should be considered by the belt manufacturers as maxima, and by the designers and makers of the machinery as minima.

6 Factors

The values of the different factors are given in the following tables:

- for factor i and factor s , see [Table 1](#);
- for diameter tolerance for flat pulley, see [Table 2](#);
- for datum widths for V-belts, see [Table 3](#);
- for effective widths for joined V-belts, see [Table 4](#);
- for Groove pitch for V-ribbed belts, see [Table 5](#);
- for values of i_1 for synchronous belts, see [Table 6](#);
- for values of s_4 related to belt material, see [Table 7](#).

Table 1 — Factor i and s

Factor	Belt type					Variation of centre distance
	Flat	Classical and narrow V-belt		V-ribbed	Synchronous	
		Individual	Joined			
i_1	$2 (\delta_1+\delta_2)$	$2 w_d$	$5,1 w_e$	$5,1 e^a$	(see Table 6)	Slack-off
i_2	$0,01 L$	$0,009 L$		$0,009 L$	0	
s_1	$1,5 (\delta_1+\delta_2)$	0	0	0	0	Take-up
s_2	$0,01 L$	$0,009 L$		$0,009 L$	0	
s_3	$0,003 (d + D)$	0		0	0	
s_4	(see Table 7)	$0,011 L$		(see Table 7)	$0,005 L$	
^a In case of the pulleys with flanges, the value shall be agreed with the belt manufacturers.						

Table 2 — Diameter tolerance for flat pulley

Dimensions in millimetres

d	δ_1	d	δ_2
40	0,5	800 to 1 000	6,3
45 and 50	0,6	1 120 to 1 400	8
56 and 63	0,8	1 600 to 2 000	10
71 and 80	1		
90 to 112	1,2		
125 and 140	1,6		
160 to 200	2		
224 and 250	2,5		
280 to 355	3,2		
400 to 500	4		
560 to 710	5		

Table 3 — Datum widths for V-belts

Dimensions in millimetres

Classical section	Narrow section	Datum width w_d
Y	—	5,3
Z	SPZ	8,5
A	SPA	11
B	SPB	14
C	SPC	19
D	—	27
E	—	32

Table 4 — Effective widths for joined V-belts

Dimensions in millimetres

Classical section	Effective width w_e	Narrow section	Effective width w_e
AJ	13	9J	8,9
BJ	16,5	15J	15,2
CJ	22,4	20J	20,9
DJ	32,8	25J	25,4

Table 5 — Groove pitch for V-ribbed belts

Dimensions in millimetres

Profile	Groove pitch <i>e</i>
PH	1,6
PJ	2,34
PK	3,56
PL	4,7
PM	9,4

Table 6 — Values of i_1 for synchronous belts

Dimensions in millimetres

Pitch designation	P_b	i_1^a		
		With flange on belt assembly side of large pulley or on both pulleys	With flange on belt assembly side of small pulley only	Without flange on belt assembly side
MXL	2,032	2,5 p_b	1,3 p_b	0,9 p_b
XXL	3,175	2,5 p_b		
XL	5,08	1,8 p_b		
L	9,525	1,5 p_b		
H	12,7	1,5 p_b		
XH	22,225	2 p_b		
XXH	31,75	2 p_b		
H3M, R3M	3	4,8 p_b	2,5 p_b	2,0 p_b
H5M, R5M	5	4,8 p_b		
G8M, H8M, R8M, S8M	8	3,8 p_b		
H14M, R14M, S14M	14	3,8 p_b		
H20M, R20M	20	3,8 p_b		
T2.5	2,5	3,0 p_b	1,5 p_b	0,9 p_b
AT3	3	3,3 p_b	1,7 p_b	
T5/AT5	5	2,4 p_b	1,3 p_b	
T10/AT10	10	2,4 p_b	1,3 p_b	
T20/AT20	20	2,0 p_b	1,1 p_b	

^a Values are valid for minimum flange heights as specified in [ISO 19347:2015](#), Table A.1, [ISO 13050:2014](#), Annex D and [ISO 17396:2017](#), Table A.6. If these flange heights are exceeded, the centre adjustment values should be increased accordingly.

Table 7 — Values of s_4 related to belt material

Material of belt, tensile members	s_4
Low modulus of elasticity, e.g. polyamide or similar	0,016 L
Mid modulus of elasticity, e.g. polyester or similar	0,011 L
High modulus of elasticity, e.g. aramid, glass fibre or metal	0,005 L

Bibliography

- [1] ISO 22, *Belt drives — Flat transmission belts and corresponding pulleys — Dimensions and tolerances*
- [2] ISO 4183, *Belt drives — Classical and narrow V-belts — Grooved pulleys (system based on datum width)*
- [3] ISO 4184, *Belt drives — Classical and narrow V-belts — Lengths in datum system*
- [4] [ISO 5290](#), *Belt drives — Grooved pulleys for joined narrow V-belts — Groove sections 9N/J, 15N/J and 25N/J (effective system)*
- [5] [ISO 5291](#), *Belt drives — Grooved pulleys for joined classical V-belts — Groove sections AJ, BJ, CJ and DJ (effective system)*
- [6] [ISO 8419](#), *Belt drives — Narrow V-belts — Sections 9N/J, 15N/J and 25N/J (lengths in the effective system)*
- [7] [ISO 9982](#), *Belt drives — Pulleys and V-ribbed belts for industrial applications — PH, PJ, PK, PL and PM profiles: dimensions*
- [8] [ISO 13050:2014](#), *Synchronous belt drives — Metric pitch, curvilinear profile systems G, H, R and S, belts and pulleys*
- [9] [ISO 17396:2017](#), *Synchronous belt drives — Metric pitch — Tooth profiles T and AT endless and open ended belts and pulleys*
- [10] [ISO 19347:2015](#), *Synchronous belt drives — Imperial pitch trapezoidal profile system — Belts and pulleys*

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