INTERNATIONAL STANDARD

ISO 5290

Fourth edition
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Belt drives — Grooved pulleys for narrow V-belts — Groove sections 9N/J, 15N/J and 25N/J (effective system)

Transmissions par courroies — Poulies à gorges pour courroies trapézoïdales étroites — Sections de gorge 9N/J, 15N/J et 25N/J (système effectif)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 5290 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Friction belt drives*.

This fourth edition cancels and replaces the third edition (ISO 5290:1993), which has been technically revised.

Annex A of this International Standard is for information only.

Belt drives — Grooved pulleys for narrow V-belts — Groove sections 9N/J, 15N/J and 25N/J (effective system)

1 Scope

This International Standard specifies the principal characteristics of grooved pulleys (for groove sections 9N/J, 15N/J and 25N/J) intended to take both single and joined narrow V-belts for industrial power transmission drives.

Some background information on the series of effective diameters is given in annex A.

NOTE The effective width of a groove is regarded as the basic dimension of standardization in the effective system for grooves and for the corresponding narrow V-belts considered as a whole.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 254:1998, *Belt drives — Pulleys — Quality, finish and balance*

ISO 1081:1995, *Belt drives — V-belts and V-ribbed belts, and corresponding grooved pulleys — Vocabulary*

ISO 9980:1990, *Belt drives — Grooved pulleys for V-belts (system based on effective width) — Geometrical inspection of grooves*

3 Terms and definitions

For the purposes of this International Standard, the terms, definitions and symbols relating to drives using V-belts (i.e. belts and grooved pulleys) given in ISO 1081 apply.

4 Specifications

4.1 Groove profiles

4.1.1 Groove angle, α

The groove angle (see Figure 1) shall have one of the following values:

— α = 36° (for groove section 9N/J only);

— α = 38°;

— α = 40°;

— α = 42°.

NOTE The relationship between the groove angle and the range of effective diameters is given in Table 4.

4.1.2 Profile dimensions

The dimensions given in Table 1 and shown in Figures 1 and 2 shall have the values specified in Table 2.

NOTE The straight sides of the groove should be at least as high as $d_e - 2\delta h_2$.

4.2 Effective diameter, d_e

4.2.1 Series of effective diameters

See Table 3.

4.2.2 Groove angles in relation to given effective diameters

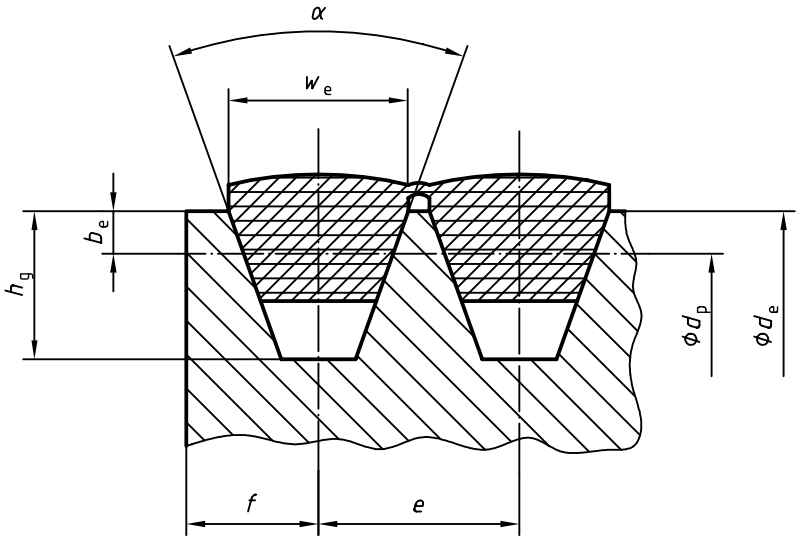
See Table 4.

4.2.3 Smallest effective diameters in relation to given groove sections

See Table 5.

Table 1 — Groove profile specifications

Dimension	Symbol
Effective width	w_e
Groove depth	h_g
Sidewall bevel depth	δh_2
Groove land height	δh_1
Effective diameter	d_e
Effective line differential	b_e
Groove spacing	e
Distance between edge of pulley and first groove centre	f



NOTE The pitch line position can only be given approximately. The approximate pitch diameter, d_p, of a pulley can be calculated by the formula:

$$d_p = d_e - 2b_e$$

Figure 1 — Groove profile

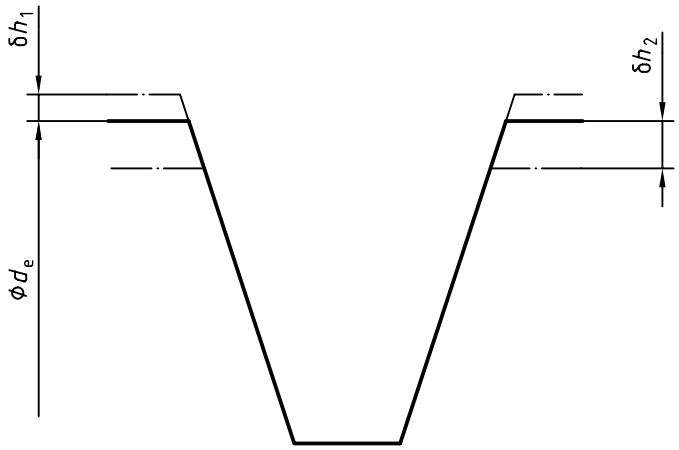


Figure 2 — Groove profile — Sidewall bevel depth — Groove land height

Table 2 — Profile dimensions

Dimensions and tolerances in millimetres

Groove section	w_e	δh_1	δh_2	b_e [a]	h_g min	e	**Tolerance on** e [b]	**Sum of deviations of** e [c]	f min.
9N/J	8,9	0,2	0,3	0,6	8,9	10,3	± 0,25	± 0,5	9
15N/J	15,2	0,25	0,4	1,3	15,2	17,5	± 0,25	± 0,5	13
25N/J	25,4	0,3	0,5	2,5	25,4	28,6	± 0,4	± 0,8	19

a This differential can tend to zero.

b This tolerance applies to the distance between the axes of two consecutive groove profiles.

c The sum of all deviations from the nominal value, e, for all grooves in any one pulley shall not exceed the value stated in this table.

Table 3 — Series of effective diameters

Dimensions in millimetres

d_e		Groove sections					
		9N/J		15N/J		25N/J	
		Status [a]	d_e	Status [a]	d_e	Status [a]	d_e
nom.	min.		max.		max.		max.
67	67	*	71				
71	71	**	75				
75	75	*	79				
80	80	**	84				
85	85	*	89				
90	90	**	94				
95	95	*	99				
100	100	**	104				
106	106	*	110				
112	112	**	116				
118	118	*	122				
125	125	**	129				
132	132	*	136				
140	140	**	144				
150	150	*	154				
160	160	**	164				
170	170						
180	180	*	184	**	187		
190	190			*	197		
200	200	**	204	**	207		
212	212			*	219		
224	224	*	228	**	231		
236	236			*	243		
250	250	**	254	**	257		
265	265			*	272		
280	280	*	284,5	**	287		
300	300			*	307		
315	315	**	320	**	322	**	320
335	335					*	340,4
355	355	*	360,7	*	362	**	360,7
375	375					*	381
400	400	**	406,4	**	407	**	406,4

Table 3 *(continued)*

d_e		Groove sections					
		9N/J		15N/J		25N/J	
nom.	min.	Status [a]	d_e max.	Status [a]	d_e max.	Status [a]	d_e max.
425	425					*	431,8
450	450	*	457,2	*	457,2	**	457,2
475	475					*	482,6
500	500	**	508	**	508	**	508
530	530					*	538,5
560	560	*	569	*	569	**	569
600	600					*	609,6
630	630	*	640,1	**	640,1	**	640,1
670	670						
710	710	*	721,4	*	721,4	*	721,4
750	750						
800	800	*	812,8	**	812,8	**	812,8
850	850						
900	900			*	914,4	*	914,4
950	950						
1 000	1 000			**	1 016	**	1 016
1 060	1 060						
1 120	1 120			*	1 137,9	*	1 137,9
1 180	1 180						
1 250	1 250			**	1 270	**	1 270
1 320	1 320						
1 400	1 400			*	1 422,4	*	1 422,4
1 500	1 500						
1 600	1 600			*	1 625,6	**	1 625,6
1 700	1 700						
1 800	1 800			*	1 828,8	*	1 828,8
1 900	1 900						
2 000	2 000					**	2 032
2 120	2 120						
2 240	2 240					*	2 275,8
2 360	2 360						
2 500	2 500					**	2 540

[a] Effective diameters marked with a double asterisk (**) are especially recommended.

Effective diameters marked with a single asterisk (*) are recommended.

Table 4 — Groove angles

Dimensions in millimetres

Groove section	Groove angles, α			
	36°	38°	40°	42°
	Effective diameters, d_e			
9N/J	$d_e \leqslant 90$	$90 < d_e \leqslant 150$	$150 < d_e \leqslant 300$	$d_e > 300$
15N/J		$d_e \leqslant 250$	$250 < d_e \leqslant 400$	$d_e > 400$
25N/J		$d_e \leqslant 400$	$400 < d_e \leqslant 560$	$d_e > 560$

Table 5 — Smallest effective diameters

Groove section	Smallest effective diameter mm
9N/J	67
15N/J	180
25N/J	315

5 Geometrical inspection of grooves

5.1 Groove profile

The corresponding limit gauges in accordance with 3.2.3 of ISO 9980:1990 shall be used.

5.2 Groove spacing

A groove spacing locator incorporating sets of interchangeable balls as indicated in 5.3 and in accordance with clause 4 of ISO 9980:1990 shall be used.

5.3 Effective diameter

Cylindrical checking balls with the values of the correction term given in Table 6 in accordance with clause 5 of ISO 9980:1990 shall be used.

5.4 Run-out tolerances

In accordance with clause 6 of ISO 9980:1990, the tolerance on radial and axial run-outs shall be checked using the values given in Table 7.

6 Quality, surface finish and balancing of pulleys

The quality, surface finish and balancing of pulleys are specified in ISO 254.

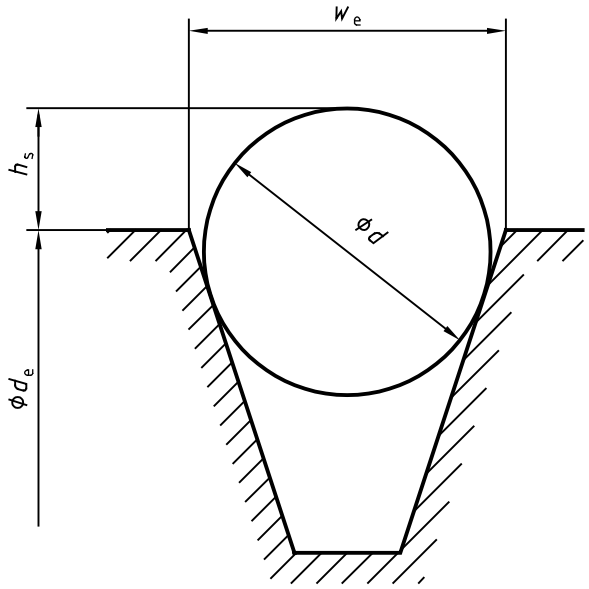


Figure 3 — Fittings of balls or rods in the groove to be checked

Table 6 — Checking balls or rods and correction terms (see Figure 3)

Dimensions in millimetres

Groove section	Groove angle α	Diameter of balls or rods d		Rounded correction term $2h_s$
		nom.	tol. [a]	
9N/J	36° to 42°	9	$^{0}_{-0,036}$	11
15N/J	38° to 42°	14,7	$^{0}_{-0,043}$	16
25N/J	38°	25	$^{0}_{-0,052}$	28
	40°			28
	42°			29

[a] Tolerances are in accordance with ISO 286-2:1988, tolerance grade h9.

Table 7 — Tolerances on radial and axial run-outs

Dimensions and tolerances in millimetres

Effective diameter	Tolerances on radial and axial run-outs	
	radial	axial measured at level a [a] (see Figure 14 of ISO 9980:1990)
d_e nom.	t_1	t_2
$d_e \leqslant 125$	0,2	0,3
$125 < d_e \leqslant 315$	0,3	0,4
$315 < d_e \leqslant 710$	0,4	0,6
$710 < d_e \leqslant 1\,000$	0,6	0,8
$1\,000 < d_e \leqslant 1\,250$	0,8	1
$1\,250 < d_e \leqslant 1\,600$	1	1,2
$1\,600 < d_e \leqslant 2\,500$	1,2	1,2

[a] $a = b_e$, where b_e is the effective line differential.

Annex A
(informative)

Background information

A.1 In this International Standard, the effective width is used as a basic dimension to describe the pulley grooves. For this reason, only the effective diameter of the pulley can be considered as the nominal diameter.

A.2 A series of preferred numbers was considered a good basis on which to grade the diameters and it was decided that this should be the R20 series, in accordance with ISO 3, which could be complemented, for smaller diameters, by intermediate values from the R40 series, in accordance with ISO 3. It was also decided that values from the R10 series, in accordance with ISO 3, should be especially recommended.

A.3 As industry in the USA requires a tolerance of $^{+1,6}_{0}$ % to allow for the difference between inch and millimetre dimensions, the interests of all parties can be covered by choosing, as the maximum effective diameter, the nominal diameter, plus

— 4 mm for pulleys with groove section, 9N/J,

— 7 mm for pulleys with groove section, 15N/J,

— 1,6 % for pulleys with groove section, 25N/J,

and the minimum effective diameter can be equal to the nominal diameter because all interested parties require positive tolerances only.

Bibliography

[1] ISO 3:1973, *Preferred numbers — Series of preferred numbers*

[2] ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

[3] ISO 8419:—[1)], *Belt drives — Narrow V-belts — Sections 9N/J, 15N/J and 25N/J (lengths in effective system)*

1) To be published. (Revision of ISO 8419:1994)

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