INTERNATIONAL STANDARD

ISO 5290

Third edition
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Belt drives — Grooved pulleys for joined narrow V-belts — Groove sections 9J, 15J, 20J and 25J (effective system)

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Transmissions par courroies — Poulies à gorges pour courroies trapézoïdales jumelées étroites — Sections de gorge 9J, 15J, 20J et 25J (système effectif)

Reference number
ISO 5290:1993(E)

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.

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.

International Standard ISO 5290 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Sub-Committee SC 1, *Veebelts and grooved pulleys*.

This third edition cancels and replaces the second edition (ISO 5290:1985), which has been technically revised. In particular, clauses 3, 5 and 6 have been added.

Annexes A and B of this International Standard are for information only.

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Belt drives — Grooved pulleys for joined narrow V-belts — Groove sections 9J, 15J, 20J and 25J (effective system)

1 Scope

This International Standard specifies the principal characteristics of grooved pulleys (for groove sections 9J, 15J, 20J and 25J), intended to take joined narrow V-belts for industrial power transmission drives.

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

NOTES

1 The effective width of a groove is regarded as the basic dimension of standardization for grooves and for the corresponding joined V-belts considered as a whole.

2 The pitch line position can only be given approximately. The approximate pitch diameter of a pulley can be calculated by the formula

$$d_p = d_e - 2b_e$$

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 254:1990, *Belt drives — Pulleys — Quality, finish and balance.*

ISO 1081:1980, *Drives using V-belts and grooved pulleys — Terminology.*

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

3 Definitions and symbols

For the purposes of this International Standard, the terms and symbols relating to drives using V-belts (i.e. belts and grooved pulleys) defined 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:

$\alpha = 36°$ (for groove section 9J only)
$\alpha = 38°$
$\alpha = 40°$
$\alpha = 42°$

The relationship between the groove angle and the range of effective diameters which should be used is given in table 3.

4.1.2 Profile dimensions

The dimensions shown in figures 1 and 2 shall have the values specified in table 1.

NOTE 3 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 2.

4.2.2 Groove angles in relation to given effective diameters

See table 3.

4.2.3 Smallest effective diameters in relation to given groove sections

See table 4.

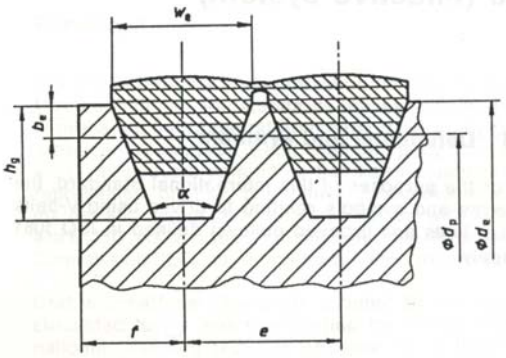

Figure 1

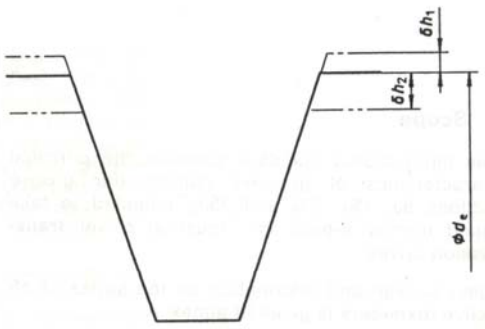

Figure 2

Table 1 — Profile dimensions

Dimensions and tolerances in millimetres

Groove section[1]	w_e	δh_1	δh_2	b_e	h_g min.	e	Tolerance on e [2]	Sum of deviations of e [3]	f min.
9J	8,9	0,2	0,3	0,6	8,9	10,3	± 0,25	± 0,5	9
15J	15,2	0,25	0,4	1,3	15,2	17,5	± 0,25	± 0,5	13
20J	20,9	0,3	0,45	1,8	20,9	24,4	± 0,3	± 0,6	17
25J	25,4	0,3	0,5	2,5	25,4	28,6	± 0,4	± 0,8	19

1) It will be left to the discretion of the individual national standards organizations whether either groove section 20J or groove section 25J will be adopted in their national standards.

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

3) The sum of all deviations from the nominal value e for all grooves in any one pulley should not exceed the value stated in this table.

Table 2 — Series of effective diameters

Dimensions in millimetres

d_e nom.	d_e min.	Groove sections 9J Status[1]	9J d_e max.	15J Status[1]	15J d_e max.	20J Status[1]	20J d_e max.	25J Status[1]	25J d_e 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	*	274,6		
280	280	*	284,5	**	287	**	289,6		
300	300			*	307	*	309,6		
315	315	**	320	**	322	**	324,6	**	320
335	335					*	344,6	*	340,4
355	355	*	360,7	*	362	**	364,6	**	360,7
375	375					*	384,6	*	381
400	400	**	406,4	**	407	**	409,6	**	406,4
425	425					*	434,6	*	431,8
450	450	*	457,2	*	457,2	**	459,6	**	457,2
475	475					*	484,6	*	482,6
500	500	**	508	**	508	**	509,6	**	508
530	530							*	538,5
560	560	*	569	*	569	*	569,6	**	569

d_e nom.	d_e min.	Groove sections 9J Status[1]	9J d_e max.	15J Status[1]	15J d_e max.	20J Status[1]	20J d_e max.	25J Status[1]	25J d_e max.
600 630	600 630	*	640,1	**	640,1	**	640,1	* **	609,6 640,1
670 710	670 710	*	721,4	*	721,4	*	721,4	*	721,4
750 800	750 800	*	812,8	**	812,8	**	812,8	**	812,8
850 900	850 900			*	914,4	*	914,4	*	914,4
950 1 000	950 1 000			**	1 016	**	1 016	**	1 016
1 060 1 120	1 060 1 120			*	1 137,9	*	1 137,9	*	1 137,9
1 180 1 250	1 180 1 250			**	1 270	**	1 270	**	1 270
1 320 1 400	1 320 1 400			*	1 422,4	*	1 422,4	*	1 422,4
1 500 1 600	1 500 1 600			*	1 625,6	**	1 625,6	**	1 625,6
1 700 1 800	1 700 1 800			*	1 828,8	*	1 828,8	*	1 828,8
1 900 2 000	1 900 2 000					**	2 032	**	2 032
2 120 2 240	2 120 2 240							*	2 275,8
2 360 2 500	2 360 2 500							**	2 540

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

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

Table 3 — Groove angles

Dimensions in millimetres

Groove section	Groove angles, α 36°	38°	40°	42°
	Effective diameters, d_e			
9J 15J 20J 25J	$d_e \leqslant 90$	$90 < d_e \leqslant 150$ $d_e \leqslant 250$ $d_e \leqslant 335$ $d_e \leqslant 400$	$150 < d_e \leqslant 300$ $250 < d_e \leqslant 400$ $335 < d_e \leqslant 500$ $400 < d_e \leqslant 560$	$d_e > 300$ $d_e > 400$ $d_e > 500$ $d_e > 560$

Table 4 — Smallest effective diameters

Groove section	Smallest effective diameter
	mm
9J	67
15J	180
20J	265
25J	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 shall be used with the values of the correction term given in table 5, in accordance with clause 5 of ISO 9980:1990.

5.4 Run-out tolerances

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

6 Quality, surface finish and balancing of pulleys

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

Table 5 — Checking balls or rods and correction terms

Dimensions in millimetres

Groove section	Groove angle α	Diameter of balls or rods d		Rounded correction term $2h_s$
		nom.	tol.[1]	
9J	36° to 42°	9	$^{0}_{-0,036}$	11
15J	38° to 42°	14,7	$^{0}_{-0,043}$	16
20J	38° to 42°	20	$^{0}_{-0,052}$	21
25J	38°	25	$^{0}_{-0,052}$	28
	40°			28
	42°			29

1) Tolerances are in accordance with ISO 286-2:1988, tolerance grade h9.

Table 6 — Tolerances on radial and axial run-outs

Dimensions and tolerances in millimetres

Effective diameter d_e nom.	Tolerances on radial and axial run-outs	
	radial t_1	axial at level a [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

1) $a = b_e$, 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 9J,

7 mm for pulleys with groove section 15J,

9,6 mm for pulleys with groove section 20J,

1,6 % for pulleys with groove section 25J.

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

Annex B
(informative)

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 8419:1987, *Narrow joined V-belts — Lengths in effective system.*

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Descriptors: belt drives, pulleys, grooved pulleys, profiles, dimensions, dimensional tolerances, geometrical tolerances, run-out tolerances.

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