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Belt drives — V-belts for the automotive industry and corresponding pulleys — Dimensions

Transmissions par courroies — Courroies trapézoïdales pour la construction automobile et poulies correspondantes — Dimensions

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This fifth edition cancels and replaces the fourth edition (ISO 2790:2004), which has been technically revised. The main changes compared to the previous edition are as follows:

— the cogged type has been added throughout the document;

— the symmetry of the groove has been changed from (90 ± 2)° to (90 ± 0,5)° in Table 4, as in ISO 9981;

— the designation of belt has been added.

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 — V-belts for the automotive industry and corresponding pulleys — Dimensions

1 Scope

This document specifies the requirements for belts and pulleys for V-belt drives used for driving auxiliaries of internal combustion engines for the automotive industry.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1081 apply.

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

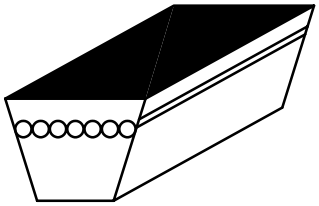
— IEC Electropedia: available at http://www.electropedia.org/

4 Belts

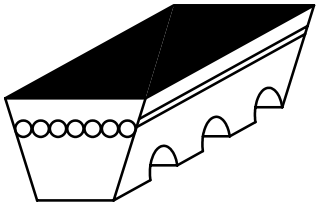
4.1 General

A belt is defined by its cross-section, type and by its effective length in millimetres measured under specified conditions. Cogged belt is represented by X.

Belt types are given in Figure 1.



a) Raw-edge plain belt type



b) Raw-edge cogged belt type

Figure 1 — Belt type

4.2 Cross-section

A cross-section of a belt is defined by the nominal top width, *w* (see Figure 2 and Table 1).

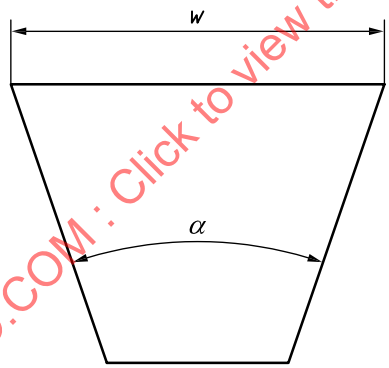


Figure 2 — Profile of the belt

Table 1 — Dimensions of belt cross-sections

Dimensions in millimetres

Parameter	Symbol	Cross section					
		AV 10 Plain type	AV 10X Cogged type	AV 13 Plain type	AV 13X Cogged type	AV 17 Plain type	AV 17X Cogged type
Nominal top width	*w*	10	10	13	13	17	17
Belt angle[a]	α (°)	40	40	40	40	40	40
[a] Belt angle can be changed if agreed otherwise between customer and belt manufacturer.							

4.3 Measurement of the effective length of a belt and its ride-out

Set the belt up on two identical pulleys, having the dimensions shown in Table 2 and mounted on a horizontal bench, and apply to the sliding pulley the measurement force, *F*, (see Figure 3).

To measure the effective length of a belt, rotate the belt at least twice to seat it properly and to divide the total force equally between the two strands of the belt. Then measure the centre distance between the two strands of the belt.

The effective length of the belt, L_e, is given by Formula (1).

$$L_e = E_{max} + E_{min} + C_e \quad (1)$$

where

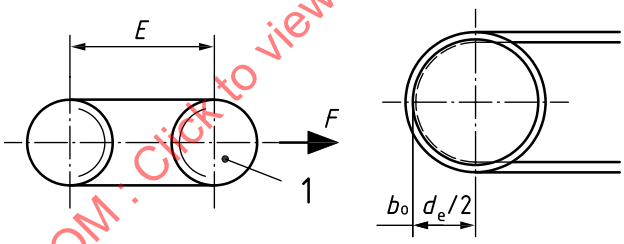
E_{max} is the measured maximum centre distance of the pulleys;

E_{min} is the measured minimum centre distance of the pulleys;

C_e is the effective circumference of one pulley, with $C_e = \pi d_e = 300\,\text{mm}$.

The ride-out, b_o, of the belt (see Figure 4) shall be, each type of belt, such that:

$$0\ \text{mm} < b_o < 2{,}4\ \text{mm}$$



Key

1 sliding pulley

Figure 3 — Measuring device

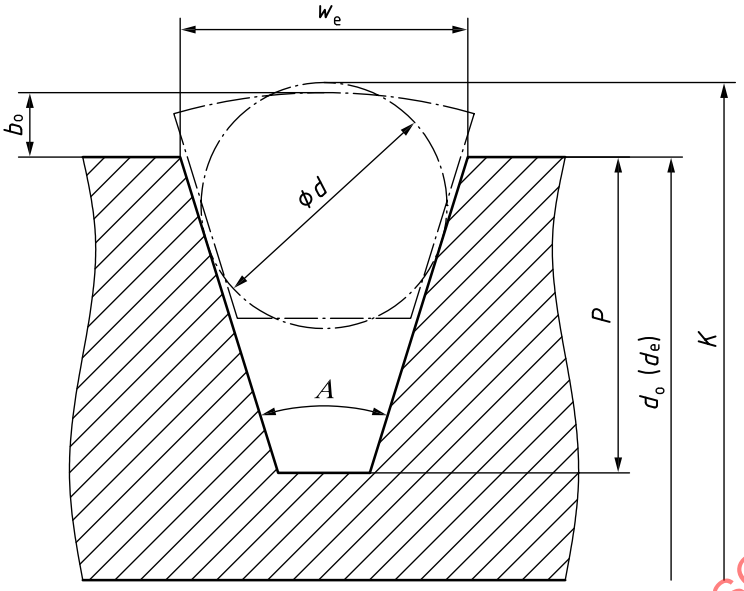


Figure 4 — Groove for measuring V-belts

Table 2 — Dimensions of checking pulley and measuring force

Parameter	Symbol	Unit	Dimensions Groove profiles		
			AV 10	AV 13	AV 17
Groove angle	A	degrees	36° ± 0,17°	36° ± 0,17°	36° ± 0,17°
Effective diameter	d_e	mm	95,49	95,49	95,49
Outside diameter	d_o	mm	95,5 ± 0,2	95,5 ± 0,2	95,5 ± 0,2
Effective width of groove	w_e	mm	9,7	12,7	16,8
Diameter of balls or rods for checking the pulley grooves	d	mm	$7{,}95^{0}_{-0{,}025}$	$11{,}124^{0}_{-0{,}025}$	$14{,}288^{0}_{-0{,}025}$
Distance from external tangent plain to ball or rods	K	mm	99,31 ± 0,05	103,53 ± 0,05	103,71 ± 0,05
Minimum depth of groove	P	mm	11	13,75	16
Tension[a]	F	N	267	267	356
NOTE Grooved pulleys for AVX profiles are the same as grooved pulleys for AV profiles.					
[a] The tension on each strand of the belt shall be equal to one half of the values shown.					

4.4 Centre distance variations

Centre distance variations, ΔE, are given in Table 3. They are determined in accordance with ISO 9608.

Table 3 — Centre distance variations

Dimensions in millimetres

Belt length range	Centre distance variations ΔE
Up to and including 1 000	≤1,2
Over 1 000 and including 2 000	≤1,6
Over 2 000	≤2,0

5 Service pulleys

5.1 General

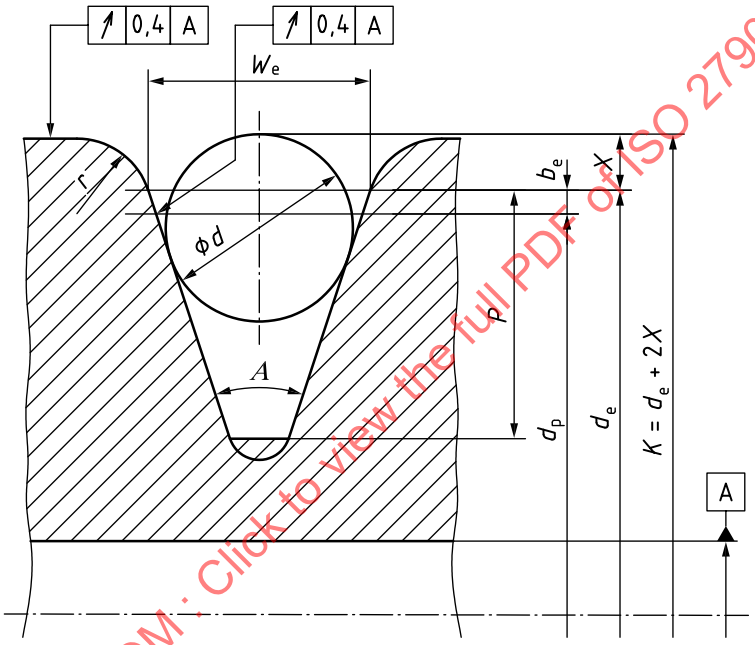
Grooved pulleys for AVX profiles are the same as grooved pulleys for AV profiles.

5.2 Dimensions

The dimensions of service pulleys are shown in Figure 5 and Figure 6 and given in Table 4 and Table 5.

The demands of modern accessory drives often make it necessary to use belts in sets. The dimensions of the grooves and groove spacings shown are for multiple belt drives or drives using joined belts.

Tolerances of axial and radial run out in millimetres



Key

d_p pitch diameter

b_e values of b_e for the different types of belt are not standardized, they can be determined in accordance with ISO 8370-1:1993, 7.2

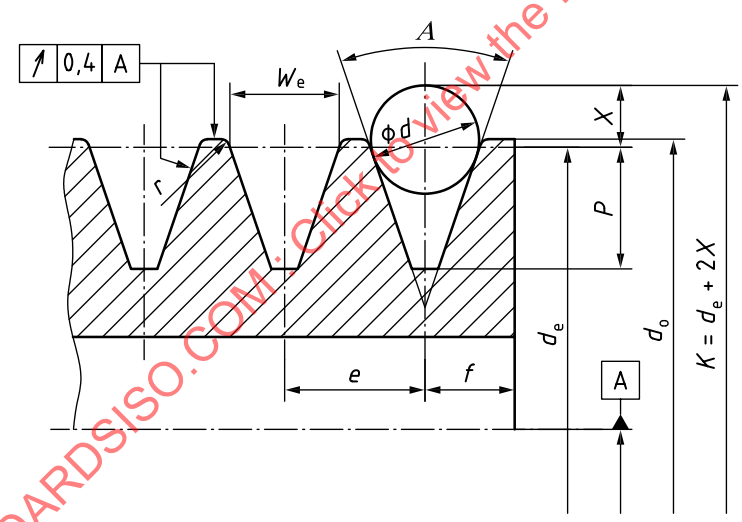
Figure 5 — Groove for service pulley

Table 4 — Dimensions of grooved pulleys

Dimensions in millimetres
Angles in degrees

Parameter	Symbol	Dimensions Groove profiles		
		AV 10	AV 13	AV 17
Effective width of groove	w_e	9,7	12,7	16,8
Groove angle[a]	A	36° ± 0,5°	36° ± 0,5°	36° ± 0,5°
Minimum groove depth	P	11	13,75	16
Minimum curved radius of sides at top of groove	r	0,8	0,8	0,8
Corrective term	$2X$	3,8	8	8,21
The sides of the groove shall be smooth. The axial and radial run-outs shall be measured separately as the full indictor movement of the ball mounted under spring pressure, to follow the groove as the pulley is rotated. The optional bottom corner radii, if used, shall be below the depth, P. The centreline of the groove shall make an angle of 90° ± 0,5° with the axis of the pulley. NOTE Grooved pulleys for AVX profiles are the same as grooved pulleys for AV profiles. [a] For pulley diameters less than 57 mm, 70 mm and 102 mm respectively for AV 10, AV 13 and AV 17, it is recommended that the groove angle be reduced to 34°.				

Tolerances of axial and radial run out in millimetres



with $d_o - d_e \leq 1{,}4$ mm

Figure 6 — Multigrooved pulleys

Table 5 — Dimensions of multigrooved pulleys

Dimensions in millimetres,
Angles in degrees

Parameter	Symbol	Dimensions Groove profiles		
		AV 10	AV 13	AV 17
Effective width of groove	w_e	9,7	12,7	16,8
Groove angle	A	36° ± 0,5°	36° ± 0,5°	36° ± 0,5°
Minimum groove depth	P	11	13,75	16
Minimum curved radius of sides at top of groove	r	0,8	0,8	0,8
Ball diameter	d	$7{,}95^{0}_{-0{,}025}$	$11{,}124^{0}_{-0{,}025}$	$14{,}288^{0}_{-0{,}025}$
Corrective term	$2X$	3,8	8	8,21
Groove pitch	e	12,6 ± 0,3	15,9 ± 0,3	21,36 ± 0,4
Centre of groove to face	f	8 ± 0,6	10 ± 0,6	15 ± 0,8
The sides of the groove shall be smooth. The axial and radial run-outs shall be measured separately as the full indictor movement of the ball mounted under spring pressure, to follow the groove as the pulley is rotated. The optional bottom corner radii, if used, shall be below the depth, P. The axis of symmetry of any cross-section of the groove shall make an angle of 90°, with a maximum deviation of 0,5°, with a half-plain passing through the axis of the pulley. NOTE 1 The sum tolerance on the groove pitch, e, for more than 2 grooves is ± 0,6 mm. NOTE 2 Grooved pulleys for AVX profiles are the same as grooved pulleys for AV profiles.				

5.3 Checking of effective diameter

Place two balls or rods, the diameters of which are shown in Table 6, in contact with the groove to be checked and displaced by 180°.

Then measure the distance, K, between the external tangent plains to the balls or rods and parallel to the axis of the pulley.

The effective diameter is given by Formula (2).

$$d_e = K - 2X \tag{2}$$

The effective diameter shall be such that:

$d_e + 2X$ does not vary more than 0,6 mm.

In the case of each groove in a multigrooved pulley of the same nominal dimensions, the distance over balls, K, shall not vary from groove to groove by more than:

0,01 mm per 5 mm of diameter,

with a top limit of:

0,3 mm for diameters 152 mm and above.