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Belt drives — Classical and narrow V-belts — Lengths in datum system

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Reference number
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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.

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 4184 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Sub-Committee SC 1, *Veebelts and grooved pulleys*.

This second edition cancels and replaces the first edition (ISO 4184:1980), which has been technically revised.

Annex A of this International Standard is for information only.

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Belt drives — Classical and narrow V-belts — Lengths in datum system

1 Scope

This International Standard specifies, for classical and narrow V-belts of sections

| | |
|-----|---|
| Y | (for groove profile with datum width 5,3 mm), |
| Z | (for groove profile with datum width 8,5 mm), |
| A | (for groove profile with datum width 11 mm), |
| B | (for groove profile with datum width 14 mm), |
| C | (for groove profile with datum width 19 mm), |
| D | (for groove profile with datum width 27 mm), |
| E | (for groove profile with datum width 32 mm), |
| SPZ | (for groove profile with datum width 8,5 mm), |
| SPA | (for groove profile with datum width 11 mm), |
| SPB | (for groove profile with datum width 14 mm), |
| SPC | (for groove profile with datum width 19 mm): |

- the recommended datum lengths;
- the tolerances for datum lengths;
- the centre distance variations;
- the conditions for measuring the datum length and the centre distance variation.

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The V-belts of sections Y, Z, A, B, C, D, E are called classical V-belts and those of sections SPZ, SPA, SPB and SPC are called narrow V-belts.

It is important that narrow belts are not used with pulleys uniquely designed for classical belts.

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 3:1973, *Preferred numbers — Series of preferred numbers*.

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

ISO 4183:1989, *Belt drives — Classical and narrow V-belts — Grooved pulleys (system based on datum width)*.

ISO 9608:1988, *V-belts — Uniformity of belts — Centre distance variation — Specifications and test method*.

3 Definitions

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 Datum length, L_d

4.1 The standard datum lengths are the datum lengths under tension measured under the conditions specified in 7.1.

4.2 The nominal values of the standard datum lengths of V-belts, expressed in millimetres, have been selected from the R 20 series of preferred numbers, in accordance with ISO 3.

a) Classical V-belts — Sections Y, Z, A, B, C, D, E

Datum lengths of V-belts of section Y are given in table A.1.

Datum lengths of V-belts of sections Z, A, B, C, D and E, corresponding to the R 20 series of preferred numbers, are only applicable if the stock of moulds of the manufacturer conforms to this series. Otherwise, the datum lengths of these V-belts shall be those given in table A.1.

b) Narrow V-belts — Sections SPZ, SPA, SPB, SPC

Standard datum lengths of V-belts of narrow sections SPZ, SPA, SPB and SPC are given in table 1.

Table 1 — Standard datum lengths of narrow V-belts

Dimensions in millimetres

| L_d | Distribution according to the sections | | | |
|--------|--|-----|-----|-----|
| | SPZ | SPA | SPB | SPC |
| 630 | + | | | |
| 710 | + | | | |
| 800 | + | + | | |
| 900 | + | + | | |
| 1 000 | + | + | | |
| 1 120 | + | + | | |
| 1 250 | + | + | + | |
| 1 400 | + | + | + | |
| 1 600 | + | + | + | |
| 1 800 | + | + | + | |
| 2 000 | + | + | + | + |
| 2 240 | + | + | + | + |
| 2 500 | + | + | + | + |
| 2 800 | + | + | + | + |
| 3 150 | + | + | + | + |
| 3 550 | + | + | + | + |
| 4 000 | | + | + | + |
| 4 500 | | + | + | + |
| 5 000 | | | + | + |
| 5 600 | | | + | + |
| 6 300 | | | + | + |
| 7 100 | | | + | + |
| 8 000 | | | + | + |
| 9 000 | | | | + |
| 10 000 | | | | + |
| 11 200 | | | | + |
| 12 500 | | | | + |

5 Tolerances on datum lengths

5.1 Manufacturing tolerances

The permissible manufacturing tolerances for datum lengths of V-belts are given in table 2.

Table 2 — Manufacturing tolerances of V-belts
Dimensions and tolerances in millimetres

| Nominal datum length L_d | Permissible deviation for sections | |
|-------------------------------|------------------------------------|--------------------|
| | Y, Z, A, B, C, D, E | SPZ, SPA, SPB, SPC |
| $L_d \leq 250$ | +8 -4 | |
| $250 < L_d \leq 315$ | +9 -4 | |
| $315 < L_d \leq 400$ | +10 -5 | |
| $400 < L_d \leq 500$ | +11 -6 | |
| $500 < L_d \leq 630$ | +13 -6 | ± 6 |
| $630 < L_d \leq 800$ | +15 -7 | ± 8 |
| $800 < L_d \leq 1\ 000$ | +17 -8 | ± 10 |
| $1\ 000 < L_d \leq 1\ 250$ | +19 -10 | ± 13 |
| $1\ 250 < L_d \leq 1\ 600$ | +23 -11 | ± 16 |
| $1\ 600 < L_d \leq 2\ 000$ | +27 -13 | ± 20 |
| $2\ 000 < L_d \leq 2\ 500$ | +31 -16 | ± 25 |
| $2\ 500 < L_d \leq 3\ 150$ | +37 -18 | ± 32 |
| $3\ 150 < L_d \leq 4\ 000$ | +44 -22 | ± 40 |
| $4\ 000 < L_d \leq 5\ 000$ | +52 -26 | ± 50 |
| $5\ 000 < L_d \leq 6\ 300$ | +63 -32 | ± 63 |
| $6\ 300 < L_d \leq 8\ 000$ | +77 -38 | ± 80 |
| $8\ 000 < L_d \leq 10\ 000$ | +93 -46 | ± 100 |
| $10\ 000 < L_d \leq 12\ 500$ | +112 -56 | ± 125 |
| $12\ 500 < L_d \leq 16\ 000$ | +140 -70 | |
| $16\ 000 < L_d \leq 20\ 000$ | +170 -85 | |

The tolerances of the classical V-belts of sections Y, Z, A, B, C, D and E are approximately $+1,2p$ and $-0,6p$, where p is calculated with a certain degree of approximation, using the formula:

$$p = 0,8 \sqrt[3]{L} + 0,006L$$

where L is the preferred number in the R 10 series, in accordance with ISO 3, equal to or immediately greater than the datum length expressed in millimetres.

The tolerances of the narrow V-belts of sections SPZ, SPA, SPB and SPC are approximately

$$\pm 0,01L$$

where L is the preferred number in the R 10 series, in accordance with ISO 3, equal to or immediately greater than the length datum expressed in millimetres.

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5.2 Belt matching tolerances of V-belts in the same set

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Values for the tolerances on the lengths of V-belts of the same set in multiple-grooved drives are given in table 3.

Table 3 — Belt matching tolerances

Dimensions and tolerances in millimetres

| Nominal datum length L_d | Maximum permissible deviation between the lengths of belts of the same set for sections | |
|-------------------------------|---|--------------------|
| | Y, Z, A, B, C, D, E | SPZ, SPA, SPB, SPC |
| $L_d \leq 1\ 250$ | 2 | 2 |
| $1\ 250 < L_d \leq 2\ 000$ | 4 | 2 |
| $2\ 000 < L_d \leq 3\ 150$ | 8 | 4 |
| $3\ 150 < L_d \leq 5\ 000$ | 12 | 6 |
| $5\ 000 < L_d \leq 8\ 000$ | 20 | 10 |
| $8\ 000 < L_d \leq 12\ 500$ | 32 | 16 |
| $12\ 500 < L_d \leq 20\ 000$ | 48 | — |

6 Centre distance variations

Permissible centre distance variations of any belt are given in table 4.

Table 4 — Centre distance variations

Dimensions in millimetres

| Belt length | | Top width | |
|-------------|----------------------|-----------|------|
| over | up to (inclusive) | ≤ 25 | > 25 |
| | | ΔE | |
| — | 1 000 | 1,2 | 1,8 |
| 1 000 | 2 000 | 1,6 | 2,2 |
| 2 000 | 5 000 | 2 | 3,4 |
| 5 000 | — | 2,5 | 3,4 |

Table 5 — Measurement characteristics

| Belt section | Datum circumference of the measuring pulleys mm | Measuring force N |
|--------------|--|----------------------|
| Y | 90 | 40 |
| Z | 180 or 300 | 110 |
| A | 300 or 450 | 200 |
| B | 400 or 600 | 300 |
| C | 700 or 1 000 | 750 |
| D | 1 000 | 1 400 |
| E | 1 800 | 1 800 |
| SPZ | 300 | 360 |
| SPA | 450 | 560 |
| SPB | 600 | 900 |
| SPC | 1 000 | 1 500 |

7 Measuring and checking

7.1 Checking belt length

For the measurement of the datum length, set the belt up on two identical pulleys with a datum circumference according to that given in table 5 and having functional dimensions according to ISO 4183. The pulleys shall be mounted on parallel horizontal axes on a testing-bench. Apply to the sliding pulley the measuring force indicated in table 5. Rotate the pulleys in order that the belt effects one to three rotations and thus seats properly in the pulley grooves. Measure the distance between the axes of the pulleys.

The datum length L_d of any belt is given by the formula

$$L_d = E_{\max} + E_{\min} + C_d$$

where

E is the distance between the axes of the pulleys, in millimetres;

C_d is the pulley datum circumference, in millimetres.

7.2 Checking centre distance variation

Check the centre distance variations in accordance with ISO 9608.

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8 Designation and marking

8.1 Designation

The physical dimensions of classical or narrow V-belts shall be designated by

- the section (one or three letters, see clause 1);
- the appropriate datum length (see tables 1 and A.1).

EXAMPLES

A belt of section A and datum length 1 550 mm is designated as follows:

A 1 550

A belt of section SPA and datum length 1 250 mm is designated as follows:

SPA 1 250

8.2 Marking

All classical or narrow V-belts manufactured in accordance with this International Standard shall be marked legibly and durably on the outer non-working face with the appropriate designation.

Annex A (informative)

Datum lengths of classical V-belt sections

Table A.1 — Datum lengths

Dimensions in millimetres

| Y | Z | Sections | | | | |
|-----|-------|----------|-------|--------|--------|--------|
| | | A | B | C | D | E |
| 200 | 405 | 630 | 930 | 1 565 | 2 740 | 4 660 |
| 224 | 475 | 700 | 1 000 | 1 760 | 3 100 | 5 040 |
| 250 | 530 | 790 | 1 100 | 1 950 | 3 330 | 5 420 |
| 280 | 625 | 890 | 1 210 | 2 195 | 3 730 | 6 100 |
| 315 | 700 | 990 | 1 370 | 2 420 | 4 080 | 6 850 |
| 355 | 780 | 1 100 | 1 560 | 2 715 | 4 620 | 7 650 |
| 400 | 920 | 1 250 | 1 760 | 2 880 | 5 400 | 9 150 |
| 450 | 1 080 | 1 430 | 1 950 | 3 080 | 6 100 | 12 230 |
| 500 | 1 330 | 1 550 | 2 180 | 3 520 | 6 840 | 13 750 |
| | 1 420 | 1 640 | 2 300 | 4 060 | 7 620 | 15 280 |
| | 1 540 | 1 750 | 2 500 | 4 600 | 9 140 | 16 800 |
| | | 1 940 | 2 700 | 5 380 | 10 700 | |
| | | 2 050 | 2 870 | 6 100 | 12 200 | |
| | | 2 200 | 3 200 | 6 815 | 13 700 | |
| | | 2 300 | 3 600 | 7 600 | 15 200 | |
| | | 2 480 | 4 060 | 9 100 | | |
| | | 2 700 | 4 430 | 10 700 | | |
| | | | | 4 820 | | |
| | | | 5 370 | | | |
| | | | 6 070 | | | |

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