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3410

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Agricultural machinery — Endless variable-speed V-belts and groove sections of corresponding pulleys

Machines agricoles — Courroies trapézoïdales sans fin pour variateurs de vitesse et profils de gorges des poulies correspondantes

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3410 was drawn up by Technical Committee ISO/TC 41, *Pulleys and belts (including vee-belts)*, and was circulated to the Member Bodies in August 1974.

It has been approved by the Member Bodies of the following countries :

Australia	India	Sweden
Czechoslovakia	Italy	Turkey
Denmark	Poland	United Kingdom
Finland	Romania	U.S.A.
France	South Africa, Rep. of	
Germany	Spain	

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Belgium
Canada

Agricultural machinery – Endless variable-speed V-belts and groove sections of corresponding pulleys

1 SCOPE AND FIELD OF APPLICATION

This International Standard lays down the main dimensions of endless variable-speed V-belts intended for use on agricultural machinery (and, in particular, harvester-thresher machines), together with the groove section of the corresponding fixed- or variable-diameter pulleys.

2 DIMENSIONAL SPECIFICATIONS

2.1 Belts

Preliminary remark

An endless variable-speed V-belt on agricultural machinery transmits a high degree of force per unit of section; when it approaches a groove pulley, its cross-section undergoes appreciable deformations. For this reason, the various dimensions which are defined hereunder are to be taken as being those of the belt placed on the device used for the measurement of its length, and subjected to the force F . The dimensions l_p , B , W and T are those relating to the parts of the belt when in contact with the measuring pulleys.

2.1.1 Cross-section (see figure 1)

The cross-section is characterized by a "relative height" (relation of height T of sides to pitch width l_p) which, on average, is in the region of 0,5; the pitch line is shown as being at approximately one-third of the height of the profile below the large base of the trapezium.

2.1.2 Pitch lengths of belts

The range of pitch lengths is that of the R 40 series of preferred numbers from 1 000 to 5 000 mm (see table 2). If intermediate values are required, they should be taken from the R 80 series of preferred numbers.

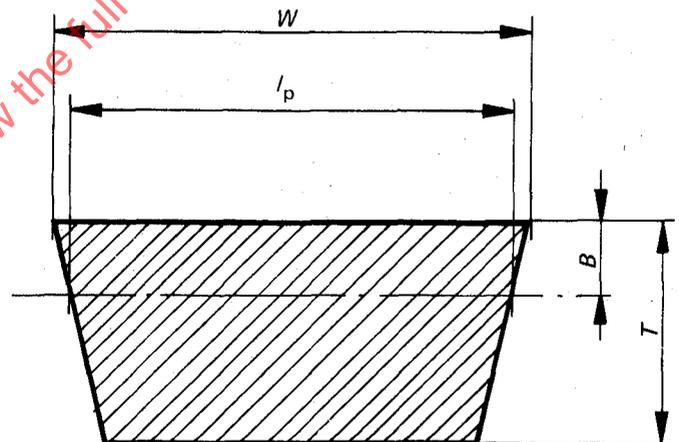


FIGURE 1 – Cross-section

TABLE 1 – Cross-sectional dimensions

Values in millimetres

Designation	Symbol	HI	HJ	HK	HL	HM
Pitch width	l_p	23,6	29,6	35,5	41,4	47,3
Nominal top width	W	25,4	31,8	38,1	44,5	50,8
Nominal height	T	12,7	15,1	17,5	19,8	22,2
$0,160 l_p$ ¹⁾	B	3,8	4,7	5,7	6,6	7,6

1) Approximate expression.

2.1.3 Tolerance on length

The length of the belts is affected by the maximum admissible variations of $+p/2 -p$, where p is calculated, with a certain amount of approximation, using the formula :

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

L being the preferred number from the R 10 series equal to or immediately greater than the length, expressed in millimetres.

2.2 Grooved pulleys

These belts are almost always used with two variable-diameter pulleys (type 2), one of these pulleys possibly allowing for the release of the drive (type 3); more rarely, this type of belt can be made to function jointly with a fixed-diameter pulley (type 1). Table 3 gives, for each of these types, the pitch diameter minimum values and radial dimensions of the groove.

3 MEASUREMENT OF THE LENGTH OF BELTS

3.1 Principle of measurement

The device recommended, shown in sketch-form in figure 3, consists essentially of two grooved pulleys of similar functional dimensions, one of which is movable in the same plane as the pulley by force F (table 4).

Rotate the belt to make at least two complete revolutions of the belt, then measure the distance E between centres of the two pulleys.

TABLE 2 – Recommended range of belt pitch lengths

Pitch length mm	Tolerance		Profile				
	+ p/2 mm	- p mm	HI	HJ	HK	HL	HM
1 000	7	14	X				
1 060	8	16	X				
1 120	8	16	X				
1 180	8	16	X				
1 250	8	16	X				
1 320	9	18	X				
1 400	9	18	X	X			
1 500	9	18	X	X	X		
1 600	9	18	X	X	X		
1 700	11	22	X	X	X		
1 800	11	22	X	X	X		
1 900	11	22	X	X	X		
2 000	11	22	X	X	X	X	X
2 120	13	26		X	X	X	X
2 240	13	26		X	X	X	X
2 360	13	26		X	X	X	X
2 500	13	26		X	X	X	X
2 650	15	30		X	X	X	X
2 800	15	30		X	X	X	X
3 000	15	30		X	X	X	X
3 150	15	30		X	X	X	X
3 350	18	36				X	X
3 550	18	36				X	X
3 750	18	36				X	X
4 000	18	36				X	X
4 250	22	44					X
4 500	22	44					X
4 750	22	44					X
5 000	22	44					X

NOTE – Reduced length tolerances may be used in national standards or with the agreement of manufacturer and user.

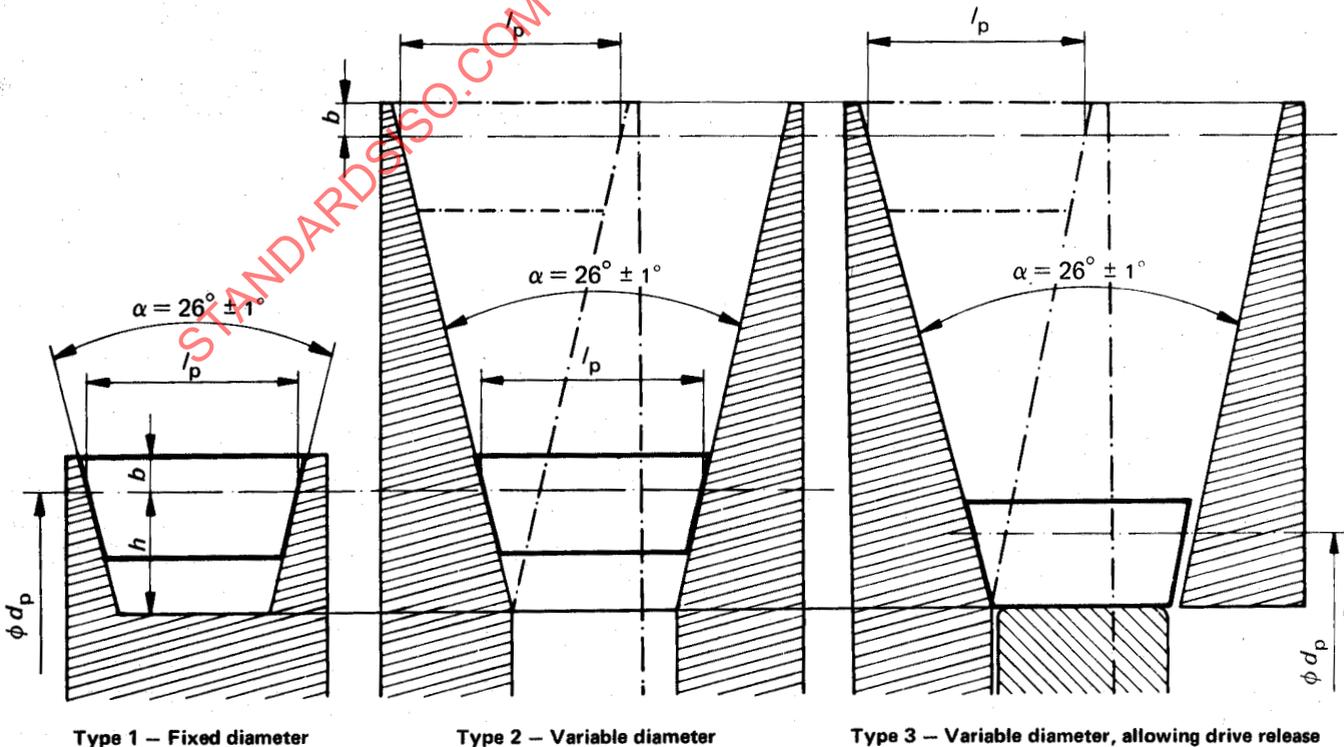


FIGURE 2 – Pulleys

TABLE 3 – Dimensions of pulleys

Values in millimetres

Pulley type	Dimension	Approximate expression	Profile				
			HI	HJ	HK	HL	HM
1-2-3	l_p		23,6	29,6	35,5	41,4	47,3
1-2-3	b min.	$0,16 l_p$	3,8	4,7	5,7	6,6	7,6
1-2 3	d_p min.	$3,55 l_p$ $3,15 l_p$	84 74	105 93	126 112	147 130	162 149
1-2 3	h min.	$0,535 l_p$ $T-B$	13 8,9	16 10,4	19 11,8	22 13,2	25 14,6

NOTE – The values of d_p min. and h min. have been rounded.

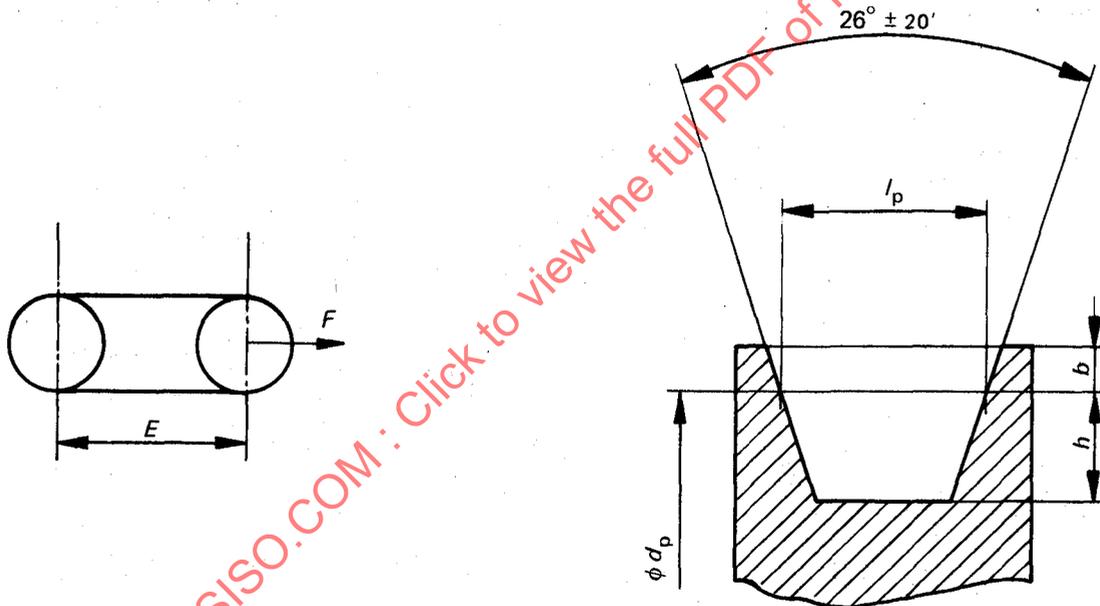


FIGURE 3 – Measuring device

TABLE 4 – Characteristics of measurement pulleys and conditions of measurement

Designation	Symbol	Unit	HI	HJ	HK	HL	HM	
Pitch width	l_p	mm	23,6	29,6	35,5	41,4	47,3	
Approximate expression	$0,160 l_p$	b	mm	3,8	4,7	5,7	6,6	7,6
	$0,535 l_p$	h min.	mm	13	16	19	22	25
	$5,3 l_p$	d_p	mm	127,32 ± 0,13	159,16 ± 0,13	190,99 ± 0,13	222,82 ± 0,13	254,65 ± 0,13
	$17 l_p$	C_p	mm	400	500	600	700	800
Measuring force	$1,46 l_p^2$	F	N	800	1300	1800	2500	3300

Belt ride-out shall be between - 0,8 mm and + 4,1 mm

3.2 Calculation of the length

The pitch length of the belt — i.e. its length measured at the level where its width is equal to the pitch width — is obtained by the formula :

$$L_p = 2E + C_p$$

where C_p is the pitch circumference of the control pulleys (table 4).

3.3 Groove section of measurement pulleys

Only the values of l_p , C_p and the angle of the groove are of importance; the radial dimensions b and h as given on the sketch and in table 4 are supplied only for information.

3.4 Groove checking of measurement pulleys

3.4.1 Principle

The groove of measurement pulleys can be checked by means of two cylindrical rollers of which the diameter d is given in table 5. The diameters d have been determined so that the simultaneous contact of each roller with the two sides is made at the level of the pitch circumference.

3.4.2 Checking method

Place the two rollers in the groove to be checked and put them in contact with the latter, so that their axes are parallel (see figure 4).

Then measure the distance K between the tangent planes to the rollers outside of the pulley and parallel to the axis of the latter.

The measured value of K should be that given in table 5.

TABLE 5 — Roller diameters and values of K

Values in millimetres

Type	d		K	
	nom.	tol. 1)	nom.	tol.
HI	24,221	+ 0,005 - 0,004	156,99	± 0,2
HJ	30,379	+ 0,006 - 0,005	196,37	
HK	36,434		235,62	
HL	42,489		274,87	
HM	48,544		314,11	

1) Tolerance j5 : see ISO/R 286.

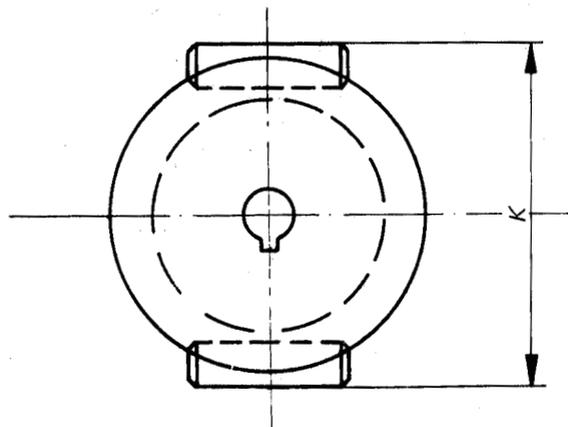
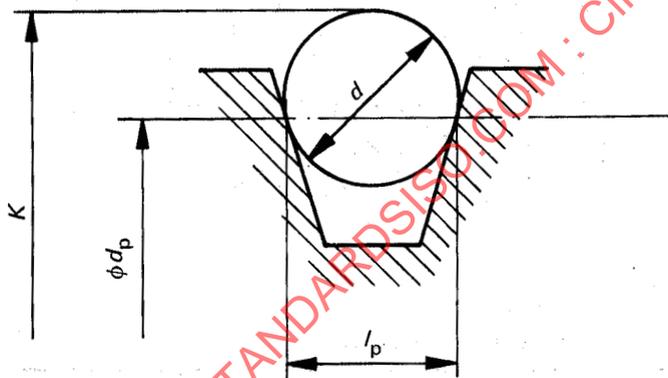


FIGURE 4 — Checking method