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मानक

IS 15149 (2002): Belt Drives - Pulleys and V-Ribbed Belts for the Automotive Industry -- PK Profile : Dimensions [PGD 31: Bolts, Nuts and Fasteners Accessories]





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Indian Standard

BELT DRIVES — PULLEYS AND V-RIBBED BELTS FOR THE AUTOMOTIVE INDUSTRY — PK PROFILE : DIMENSIONS

ICS 21.220.10

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

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Price Group 4

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 9981 : 1998 'Belt drives — Pulleys and V-ribbed belts for the automotive industry — PK profile: Dimensions' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of Pulleys and Belts Sectional Committee and approval of the Basic and Production Engineering Division Council.

The text of this ISO Standard has been approved as suitable for publication as Indian Standard without deviations. In this adopted standard, certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated:

International Standard	Corresponding Indian Standard	Degree of Equivalence	
ISO 254 : 1988 Belt drives — Pulleys quality, finish and balance	IS 15147 : 2002 Belt drives — Pulleys — Quality, finish and balance	Identical	

At present, there is no corresponding Indian Standard to ISO 4287 : 1997 'Geometrical Product Specification (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters'. The technical Committee responsible for the preparation of this standard has reviewed the provisions of the above mentioned ISO Standard and decided that it is acceptable for use in conjunction with this standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

BELT DRIVES — PULLEYS AND V-RIBBED BELTS FOR THE AUTOMOTIVE INDUSTRY — PK PROFILE : DIMENSIONS

1 Scope

This International Standard specifies the principal dimensional characteristics of V-ribbed pulley groove profiles, together with the corresponding endless V-ribbed belts of PK profile which are used predominantly for automotive accessory drive applications.

The complete array of V-ribbed belts and pulleys of PH, PJ, PK, PL and PM profile for industrial and other nonautomotive applications is the subject of ISO 9982. PK belt profile dimensions and tolerances are the same in both International Standards.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the 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 254:1998, Belt drives - Pulleys - Quality, finish and balance.

ISO 4287:1997, Geometrical product specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.

3 Pulleys

3.1 Groove dimensions and tolerances

The groove dimensions of PK pulleys are shown in figures 1 and 2, and given in table 1.



Figure 1 — Cross-section of pulley grooves



 $d_{\rm e}$ = effective diameter

- d_0 = outer diameter
- K = diameter over balls or rods
- $d_{\rm B}$ = checking ball or rod diameter

Figure 2 — Pulley diameters

	Dimensions in millimetres		
Groove pitch, e	± 0,05 ^{1) 2)}	3,56	
Groove angle, $\alpha^{3)}$, for measuring	± 0° 15'	40°	
Groove angle, $\alpha^{3)}$, for testing and actual use	± 1°	40°	
r _t	min.	0,25	
r _b	max.	0,5	
Checking ball or rod diameter, $d_{\rm B}$	± 0,01	2,5	
2 <i>x</i>	nom.	0,99	
2 <i>N</i> ⁴)	max.	1,68	
f	min.	2,5	

Table 1 — Dimensions of PK pulley grooves

1) The tolerance on e applies to the distance between the axes of two consecutive grooves.

2) The sum of all deviations from the nominal value e for all grooves in any one pulley shall not exceed ± 0.3 .

3) The centreline of the groove shall make an angle of $90^{\circ} \pm 0.5^{\circ}$ with the axis of the pulley.

4) N is not related to the nominal diameter of the pulley but is measured from the actual ride position of the ball or rod in the pulley.

3.2 Minimum effective diameter

The minimum recommended effective diameter, d_{p} , for PK pulleys is 45 mm.

3.3 Tolerances on finished pulley

3.3.1 Checking conditions

Profile, diameter and run-out tolerances shall be checked on the finished pulley without surface coating.

3.3.2 Groove-to-groove diameter tolerances

The variation in diameters between the grooves in any one pulley shall not exceed 0,15 mm. This variation is obtained by comparing the diameters over balls or rods.

3.3.3 Radial and axial circular run-out

Radial and axial circular run-outs shall not exceed 0,25 mm full indicator movement (FIM). Run-out in the two directions is measured separately with a ball mounted under spring pressure to ensure contact with the groove as the pulley is rotated.

3.3.4 Diameter over balls

The tolerances on the diameters over balls (K) shall not exceed \pm 0,6 mm.

3.3.5 Groove finish

The pulley grooves shall have a surface roughness $Ra \le 3,2 \mu m$. See ISO 254 and ISO 4287 for definitions and the method of measurement.

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3.4 Pitch diameter, d_p

The fit of a V-ribbed belt in the corresponding pulley is shown in figure 3. The true pitch diameter of a V-ribbed pulley is slightly larger than the effective diameter and its exact value is determined with the particular belt being used.

A nominal value of the effective line differential, b_e , of 2 mm may be used to calculate the speed ratio. If more precision is required, the belt manufacturer should be consulted.

Further information is given in ISO 8370.



Figure 3 — Determination of pitch diameter

3.5 Designation of pulleys

A V-ribbed pulley for the automotive industry is characterized by the number of grooves, the profile and the effective diameter. It is designated by a series of numbers and letters as follows:

- a) the first letter "P" means "Pulley";
- b) the first set of numbers indicates the number of grooves;
- c) the second set of letters indicates the groove profile;
- d) the second set of numbers indicates the effective diameter, in millimetres.

EXAMPLE



4 Belts

4.1 Belt dimensions

The dimensions of the PK belts are shown on figure 4 and given in table 2.



Nominal width of the belt $b = n \times P_b$, where n is the number of ribs



Figure 4 — Cross-section of belt

Table 2 — PK belt dimensions

	Dimensions in millimetres		
Rib pitch, p _b	ı	3,56	
r _b	min.	0,5	
r _t	max.	0,25	
Belt height, h	~	4 to 6	
NOTE — Rib pitch and belt height are	shown as reference dimensions o	nly. Cumulative	

ectea the belt operates and the modulus of the tension member.

4.2 Measurement of the effective belt length

4.2.1 Measuring fixture (see figure 5)

The effective belt length shall be determined by placing the belt on a measuring fixture composed of the following elements.

4.2.1.1 Two pulleys of equal diameter, one of which is fixed and the other movable.

Their profile shall comply with figure 1 and table 1, and their recommended effective diameter shall be determined from the values given in table 3.

4.2.1.2 Device for applying a total measuring force to the movable pulley.

4.2.1.3 Device for measuring the centre distance between the two pulleys.





4.2.2 Measuring force

The measuring force to be applied for measuring the effective length of belts is given in table 3.

Table 3 — Measuring pulley and measuring force

Dimensions in millimetres and measuring force in newtons

Pulley effective circumference (at level of effective diameter), $U_{\rm e}$	300
Diameter over balls or rods, K $\pm 0,13$	96,48
Measuring force per rib, F	100

4.2.3 Procedure

To measure the effective length of a belt, rotate the belt at least two revolutions 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 pulleys, E, and calculate the effective length, L_{e} , of the belt using the following formula:

$$L_{\rm e} = E_{\rm max} + E_{\rm min} + U_{\rm e}$$

where

 $U_{\rm e}$ is the effective circumference of the measuring pulleys;

 $E_{\rm max}$ is the maximum centre distance between the pulleys;

 E_{\min} is the minimum centre distance between the pulleys.

IS 15149 : 2002 ISO 9981 : 1998

4.3 Designation of belts

A V-ribbed belt for the automotive industry is characterized by the number of belt ribs, the profile and the effective length. It is designated by a series of numbers and letters as follows:

- a) the first set of numbers indicates the number of belt ribs;
- b) the letters indicate the belt profile;
- c) the second set of numbers indicates the effective length, in millimetres.

EXAMPLE

1500 PΚ 6 Number of belt ribs Belt profile -Effective length (mm) -

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