

Specification for

Automotive V-belts and pulleys

UDC 629.113.01:621.85.052.42

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mechanical Engineering Standards Committee (MEE/-) and the Automobile Standards Committee (AUE/-) to Technical Committee MEE/76 upon which the following bodies were represented:

- Agricultural Engineers' Association
- British Gear Manufacturers' Association
- British Rubber Manufacturers' Association
- National Coal Board
- Society of Motor Manufacturers and Traders Limited
- Coopted members

This British Standard, having been prepared under the direction of the Automobile Standards Committee and the Mechanical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 April 1984

© BSI 02-2000

First published 1966
First revision July 1973
Second revision April 1984

The following BSI references relate to the work on this standard:
Committee reference MEE/76
Draft for comment 81/80008 DC

ISBN 0 580 13834 8

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
Section 1. General	
1.1 Scope	1
1.2 Definitions	1
Section 2. Belts	
2.1 Designation	2
2.2 Cross section dimensions	2
2.3 Effective length	2
2.4 Tolerances on nominal belt length	3
2.5 Matched set tolerance	3
2.6 Variation of belt cross section	3
2.7 Variation of belt ride-out	3
2.8 Mean value of ride-out	3
2.9 Belt test life	4
2.10 Electrical resistance	4
2.11 Resistance to ozone	5
2.12 Resistance to oil	5
2.13 Hardness of rubber core	5
2.14 Resistance to low temperature	5
2.15 Resistance to high temperature	5
2.16 Marking	5
Section 3. Pulleys	
3.1 Design and construction	5
3.2 Dimensions	5
3.3 Designation	5
3.4 Surface of grooves	7
3.5 Cast iron pulleys	7
3.6 Axial and radial run-out	7
Appendix A Information to be supplied by the purchaser	8
Appendix B Recommended nominal belt lengths	8
Appendix C Determination of belt test life	9
Appendix D Determination of electrical resistance of belts	12
Appendix E Determination of belt resistance to ozone	13
Appendix F Determination of belt resistance to oil	13
Appendix G Determination of belt resistance to low temperature	14
Appendix H Determination of belt resistance to high temperature	14
Appendix J Measurement of run-out of pulleys	14
Appendix K Guidance and calculations for drive design	14
Figure 1 — Effective line differential	2
Figure 2 — Layout of measuring fixture	3
Figure 3 — Groove cross section of measuring fixture pulley	4
Figure 4 — Mean value f of belt ride-out on measuring pulley	4
Figure 5 — Belt cross section	5
Figure 6 — Groove cross section of production pulley	6
Figure 7 — Layout of test machine	11
Figure 8 — Apparatus for measuring the electrical resistance of belts	13
Figure 9 — Arrangement for radial run-out measurement	14

	Page
Figure 10 — Arrangement for axial run-out measurement	14
Figure 11 — Layout of drive	16
Table 1 — Nominal dimensions of belt cross section	3
Table 2 — Dimensions and characteristics of measuring fixture pulleys	3
Table 3 — Belt measuring force	3
Table 4 — Dimensions and characteristics of pulleys	6
Table 5 — Recommended nominal belt lengths for AV 10 groove section	8
Table 6 — Recommended nominal belt lengths for AV 13 groove section	9
Table 7 — Dimensions and characteristics of test pulleys	10
Table 8 — Sequence of calculation	15
Table 9 — Service factors for driven auxiliaries	17
Table 10 — Arc of contact factor K_1	17
Table 11 — Centrifugal tension factor K_2	17
Publications referred to	Inside back cover

Foreword

This revision of this British Standard was prepared under the direction of the Automobile Standards Committee and the Mechanical Engineering Standards Committee. The object is to provide standard dimensions, quality control test procedures and design data for automotive V-belts and their corresponding pulleys, based on practical experience of both manufacturers and users. This revision supersedes the 1973 edition which is withdrawn.

In this standard requirements for the pulley groove profile are specified but requirements for the fit of the belt in the groove are only specified for the purposes of length measurement and accurate speed ratio determination. Nominal dimensions of belts are specified solely for information for users and no requirements are given for belt performance.

This standard is technically equivalent to ISO 2790:1974 and ISO 5287:1978, published by the International Organization for Standardization (ISO), but, whereas ISO 2790 uses the “pitch” width of the belt system this standard uses the “effective width” of the pulley system.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1.1 Scope

This British Standard specifies the nominal cross section dimensions for V-belts and the design and construction of the corresponding pulleys used for driving the auxiliaries of automotive power units and their derivatives.

Recommended nominal belt lengths are given in Appendix B. Appendix K gives guidance on the calculations for drive design.

This standard does not specify requirements for belt performance.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

1.2 Definitions

For the purposes of this British Standard the following definitions apply.

1.2.1

V-grooved pulley

a pulley with one or more grooves around the circumference. The grooves have profiles of a truncated, non-truncated or rounded “V” that is symmetrical to the pulley axis

1.2.2

effective width, W_e

a groove width dimension characterizing the groove profile. It is a defined value not subject to tolerance (see Figure 1)

NOTE For all belt measuring pulleys, the effective width coincides with the actual top width of the groove within the specified tolerances.

1.2.3

effective diameter, d_e

the diameter of the pulley at the effective width of the pulley groove (see Figure 3 and Figure 6)

1.2.4

pitch diameter

the effective diameter corrected for the effective line differential

NOTE This calculation makes no allowance for slip and creep.

1.2.5

pitch width, W_p

the width of the belt at its neutral axis (see Figure 1)

1.2.6

effective line differential

the radial displacement between the levels of the effective width of the pulley and the pitch width of the belt (see Figure 1)

NOTE When the effective line differential is zero, the pitch width of the belt and the effective width of the pulley are coincident.

NOTE 2 The effective line differential is used to obtain pitch diameters from the effective diameters and hence calculate the speed ratio.

1.2.7

V-belt

an endless flexible belt having a cross section that approximates to a regular trapezium. On a cross section of a straight sided belt, the trapezium is outlined by the base, sides and top of the belt. The intersection of the extended profiles of the base, sides and top occurs when the corners are cut short or rounded

1.2.8

V-belt drive

a drive comprising one or more belts mounted on V-grooved pulleys. The profiles of the belts and the pulley grooves are such that the belts only come into contact with the sides of the pulley grooves and not with the base of the grooves

1.2.9

speed ratio

the ratio of the number of revolutions of the pulleys, calculated from the ratio of the pitch diameters of the pulleys

1.2.10

top width, W

the larger width of the trapezium outlined on a cross section (see Figure 5)

1.2.11

height, T

the height of the trapezium outlined on a cross section (see Figure 5)

1.2.12

angle, A

the included angle obtained by extending the side of the belt (see Figure 5)

1.2.13

effective length, L_e

the length of a line circumscribing a belt at the effective diameter of the measuring pulleys

1.2.14

ride-out

the distance from the top of the belt to the effective width level of the pulley

1.2.15

groove angle, a

the included angle obtained by extending the sides of the pulley grooves (see Figure 3 and Figure 6)

NOTE For any given belt section the pulley groove angle will have a value dependent on the effective diameter of the pulley.

1.2.16

effective circumference, C_e

the circumference of a circle with a diameter equal to the effective diameter

Section 2. Belts

2.1 Designation

Belts shall be designated by the groove profile in which they are intended to be run as AV 10 or AV 13 and by their nominal effective length.

2.2 Cross section dimensions

The nominal cross section dimensions and the nominal included angle shall be as given in Table 1.

2.3 Effective length

2.3.1 General. The effective length shall be measured in accordance with 2.3.2.

NOTE No requirements are specified for effective length: these should be specified by the purchaser [see Appendix A a)].

2.3.2 Method of measurement

2.3.2.1 Measuring fixture. The measuring fixture shall consist of two pulleys with dimensions as shown in Table 2 and layout as shown in Figure 2, with a groove section as shown in Figure 3, and with one pulley centre fixed. The other pulley shall be moveable in a plane at right angles to the axes of the pulleys and in a line with the grooves of the pulleys. The pulleys shall be fully rotatable and a means of applying a measuring force shall be provided.

2.3.2.2 Procedure. Mount the belt on the measuring fixture (2.3.2.1) and position in the grooves under the forces given in Table 3. Rotate the pulleys at least twice to seat the belt properly, before making any measurements, so that the measuring force F is equally divided between the two strands of the belt. Determine the effective length L_e (in mm) of the belt from the following equation:

$$L_e = 2C + C_e$$

where

C is the centre distance of the measuring pulleys (see Figure 2) (in mm);

C_e is the effective circumference of one measuring pulley (see Table 2) (in mm).

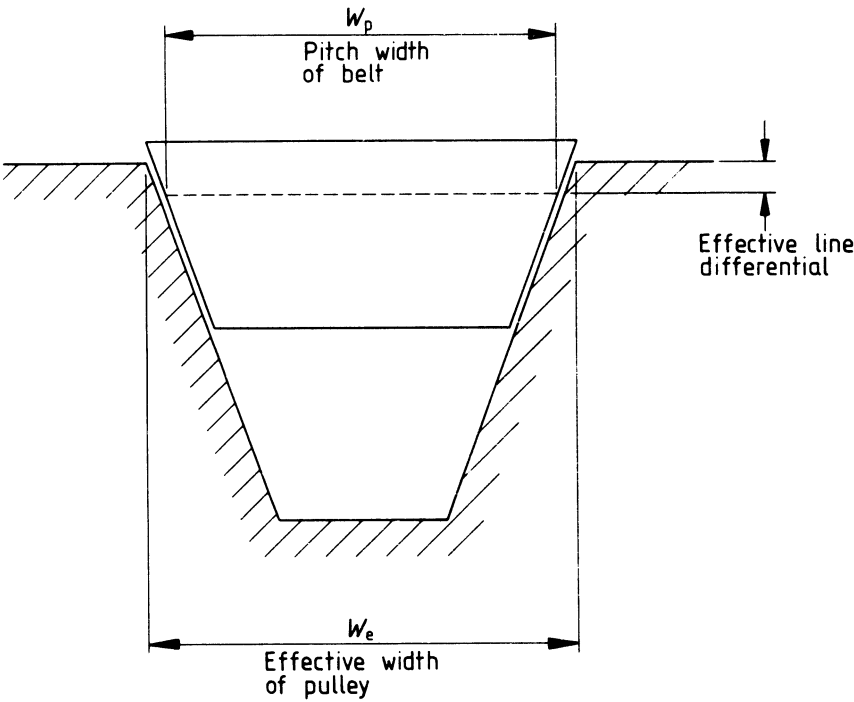


Figure 1 — Effective line differential