

Australian Standard™

Endless wedge belt and V-belt drives



This Australian Standard was prepared by Committee ME-024, V-belt Drives. It was approved on behalf of the Council of Standards Australia on 31 July 2002 and published on 15 August 2002.

The following are represented on Committee ME-024:

Australian Chamber of Commerce and Industry
Department of Mineral Resources, NSW

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Australian Standard™

Endless wedge belt and V-belt drives

Originated as AS B243—1967, AS B241—1968 and AS 1916—1977.
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PREFACE

This Standard was prepared by the Standards Australia Committee ME-024, V-belt Drives, to supersede AS 2784—1985.

The objective of this Standard is to rationalize the range of endless wedge belts, V-belts and associated pulleys to facilitate correct initial selection and use of the belts and pulleys and to assist users in selection of replacement components for existing belt drives.

The format and much of the material in this Standard closely follows BS 3790:1995, *Specification for endless wedge belt drives and endless V-belt drives* and acknowledgement is made thereto.

The major differences between this Standard and the previous edition are as follows:

- (a) Pulley side wobble and run out tolerances have been halved to match BS 3790.
- (b) Addition of a centre distance variation requirement and test procedure to check for irregular running of V-belt drives arising from non-uniformities in the V-belt sections.
- (c) Alignment of the test method for electrical resistance with ISO 1813:1998.
- (d) Inclusion of the power rating calculations from ISO 5292:1995 (and BS 3790), in addition to retention of the Tables of power ratings for belts of common construction types and materials.
- (e) Incorporation of a test method for the tension in a belt using two different deflections depending on the span length of the belt to improve the ease of measurement of deflections.

The test method for the electrical resistance of a belt is at variance to BS 3790. BS 3790 strains the belt prior to the determination of electrical resistance whereas this Standard now tests the belt without straining it, in accordance with the method in ISO 1813.

Belts of E and SPP sections, are not included in this Standard, owing to lack of demand for these sections in Australia.

Attention is drawn to the fact that this Standard does not contain dynamometer test or any other performance test data regarding power transmission.

The power ratings provided in Appendix A (Tables A2 to A11) are based on formulas in ISO 5292.

This Standard is in broad agreement with the following ISO Standards:

- ISO 155 Belt drives—Pulleys—Limiting values for adjustment of centres
- ISO 254 Belt drives—Pulleys—Quality, finish and balance
- ISO 1081 Belt drives—V-belts and V-ribbed belts and corresponding grooved pulleys—Vocabulary
- ISO 1813 Belt drives—V-ribbed belts, joined V-belts and V-belts including wide section belts and hexagonal belts—Electrical conductivity of antistatic belts: Characteristics and methods of test
- ISO 4183 Belt drives—Classical and narrow V-belts—Grooved pulleys (system based on datum width)
- ISO 4184 Belt drives—Classical and narrow V-belts—Lengths in datum system
- ISO 5292 Belt drives—V-belts and V-ribbed belts—Calculation of power ratings

ISO 9608 V-belts—Uniformity of belts—Test method for determination of centre distance variation

While based on the listed ISO and British Standards, this Standard is not equivalent as it does not cover belts for the automotive industry. Major editorial changes to the text of the ISO Standards have also been made to combine the relevant requirements and test methods from several of these to suit the less diverse needs of the Australian V-belt market.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA

Australian Standard

Endless wedge belt and V-belt drives

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the dimensions and certain other properties of endless wedge belts and V-belts and their corresponding grooved pulleys for power transmission. Additional requirements are included for antistatic belts and fire-resistant belts.

NOTES:

- 1 Recommended power ratings for belts and information on the design, selection and installation of drive assemblies are given in Appendices A and B.
- 2 Recommendations on the storage of belts are provided in Appendix C.

This Standard does not apply to industrial variable speed drives employing pulleys with movable flanges.

NOTE: For belts for automotive use, additional requirements may apply. Industry standards should be consulted.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

3709 Vibration and shock—Balance quality of rotating rigid bodies

ISO

340 Conveyor belts—Flame retardation—Specifications and test method

4287 Geometrical Product Specifications (GPS)—Surface texture: Profile method—Terms, definitions and surface texture parameters

1.3 DEFINITIONS

For the purpose of this Standard, the following definitions apply:

1.3.1 Angle of a belt (α)

The included angle obtained by extending the sides of the belt (see Figure 1).

1.3.2 Angle of pulley groove (α)

The angle included by the sides of the groove cross-section.

NOTE: For any given profile, the pulley groove angle may have several different values depending upon the pulley diameter (see Table 8).

1.3.3 Antistatic belt

A belt that has an electrical resistance that does not exceed a specified maximum (see Clause 2.8).

1.3.4 Effective diameter of pulley (d_e)

The diameter of the pulley at the effective width of the pulley groove (see Figure 2).

1.3.5 Effective width of pulley (W_e)

A groove width characterizing the groove profile. It is a defined value not subject to tolerance and is usually located at the outermost extremities of the straight side walls of the groove. For all belt measuring pulleys and for most machined-type pulleys, it coincides with the actual top width of the groove within reasonable tolerances (see Figure 3).

1.3.6 Nominal height of a belt (T)

The height of the trapezium outlined on a cross-section of the belt (see Figure 1).

1.3.7 Nominal top width of a belt (W)

The larger width of the trapezium outlined on a cross-section of the belt (see Figure 1).

1.3.8 Pitch diameter of pulley (d_p)

The diameter of the pulley at the pitch width of pulley groove.

1.3.9 Pitch length of a belt (L_p)

The circumferential length of the belt at the pitch width, determined by the method specified in Clause 2.4.

1.3.10 Pitch line of a belt

Any circumferential line in the belt which keeps the same length when the belt is bent perpendicularly to its base.

1.3.11 Pitch width of a belt (W_p)

The width of the belt at its pitch zone.

1.3.12 Pitch width of pulley groove (W_p)

That width of the pulley groove which has the same dimension as the pitch width of the belt used with this pulley.

1.3.13 Pitch zone of a belt

The geometrical zone containing all of the pitch lines.

1.3.14 Relative height of a belt

The ratio of the nominal height (T) of the belt to its pitch width (W_p).

1.3.15 V-belt (classical V-belt)

A belt in which the outline formed by the base, sides and top of the belt approximates to a trapezium characterized by a relative height of approximately 0.73 (see Figure 1(b) and Clause 1.3.14).

1.3.16 V-grooved pulley

A pulley with one or more grooves obtained by rotation of a profile in the shape of a truncated or non-truncated symmetrical V around the pulley axis.

NOTE: A round groove bottom is acceptable provided the curvature is well below the anticipated belt contact area. In most cases, all the grooves of a pulley have identical profiles.

1.3.17 Wedge belt (narrow V-belt)

A belt in which the outline formed by the base, sides and top of the belt approximates to a trapezium characterized by a relative height of approximately 0.95 (see Figure 1(a) and Clause 1.3.14).

1.3.18 Wedge or V-belt drive

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

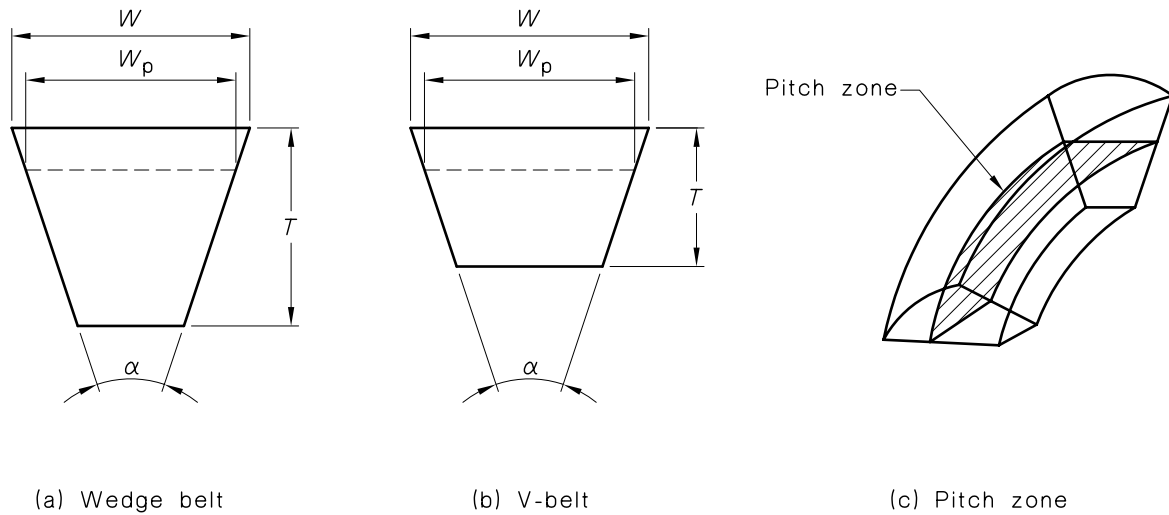


FIGURE 1 BELT CROSS-SECTIONS

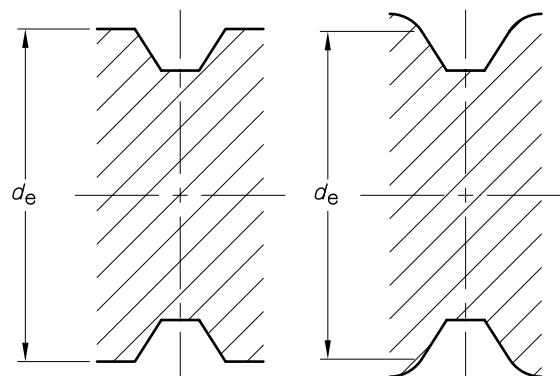


FIGURE 2 EFFECTIVE DIAMETER OF PULLEY

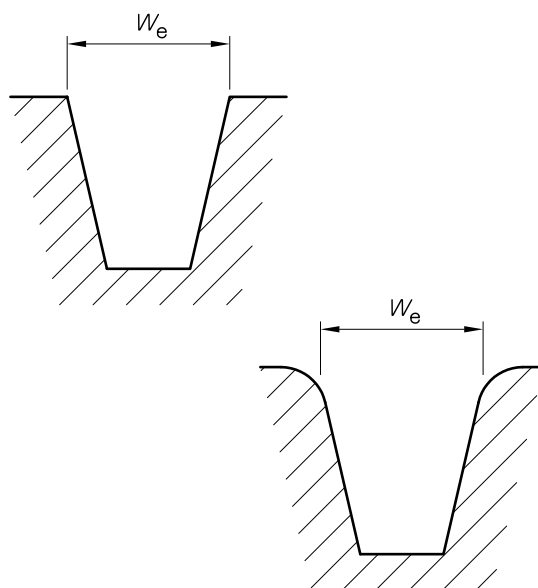


FIGURE 3 EFFECTIVE WIDTH OF PULLEY

SECTION 2 BELTS

2.1 GENERAL

All belts shall comply with Clauses 2.2 to 2.7 and Clause 2.10.

Antistatic belts shall comply with Clause 2.8 in addition to Clauses 2.2 to 2.7 and Clause 2.10.

Fire-resistant belts shall comply with Clause 2.9 in addition to Clauses 2.2 to 2.7 and Clause 2.10.

2.2 MATERIALS AND WORKMANSHIP

Belts shall consist of a suitable combination of fabric, cord and elastomeric compound(s), the whole being bonded together in a uniform manner and shape in accordance with the best manufacturing practice. Belts shall be suitable for operating at ambient temperatures between -18°C and 60°C , and shall not be adversely affected by the temperature under normal operating conditions within this range.

Belts shall be classified according to their construction type.

NOTE: Figure 4 shows examples of basic belt construction types.

2.3 CROSS-SECTION DIMENSIONS

The nominal cross-section dimensions and the nominal included angle of the belts shall be as given in Table 1. The belts shall fit pulley grooves within the limits given in Table 2 when mounted on two measuring pulleys made in accordance with the dimensions set out in Table 3 and shown in Figure 5.

2.4 DETERMINATION OF BELT PITCH LENGTH

The belt pitch length and pitch length variation shall be as given in Table 4. The pitch length of a belt shall be determined when the belt is mounted on a pair of measuring pulleys having groove dimensions as given in Table 3, with total forces applied and with the belt positioned in the grooves in accordance with Table 2.

The total forces shown shall be equally divided between the two strands of the belt, and the pulleys shall be rotated at least two revolutions to seat the belt properly. The pitch length shall be calculated by adding the pitch circumference of one of the two equal pulleys to twice the measured centre distance E (see Figure 6).

2.5 CENTRE DISTANCE VARIATION

The centre distance variation, ΔE , shall not exceed the values given in Table 5. The centre distance variation shall be determined when the belt is mounted as for the determination of belt pitch length described in Clause 2.4. With the belt seated in the pulleys after two complete revolutions, rotate the belt system a further full revolution at a speed not exceeding 1 m/s. Observe the variation in the distance between the axes of the measuring pulleys during the revolution and record the maximum and minimum values of the centre distance occurring during the revolution as $E_{\max}$ and $E_{\min}$. Calculate the centre distance variation, ΔE , from the following equation:

$$\Delta E = E_{\max} - E_{\min} \quad \dots (1)$$

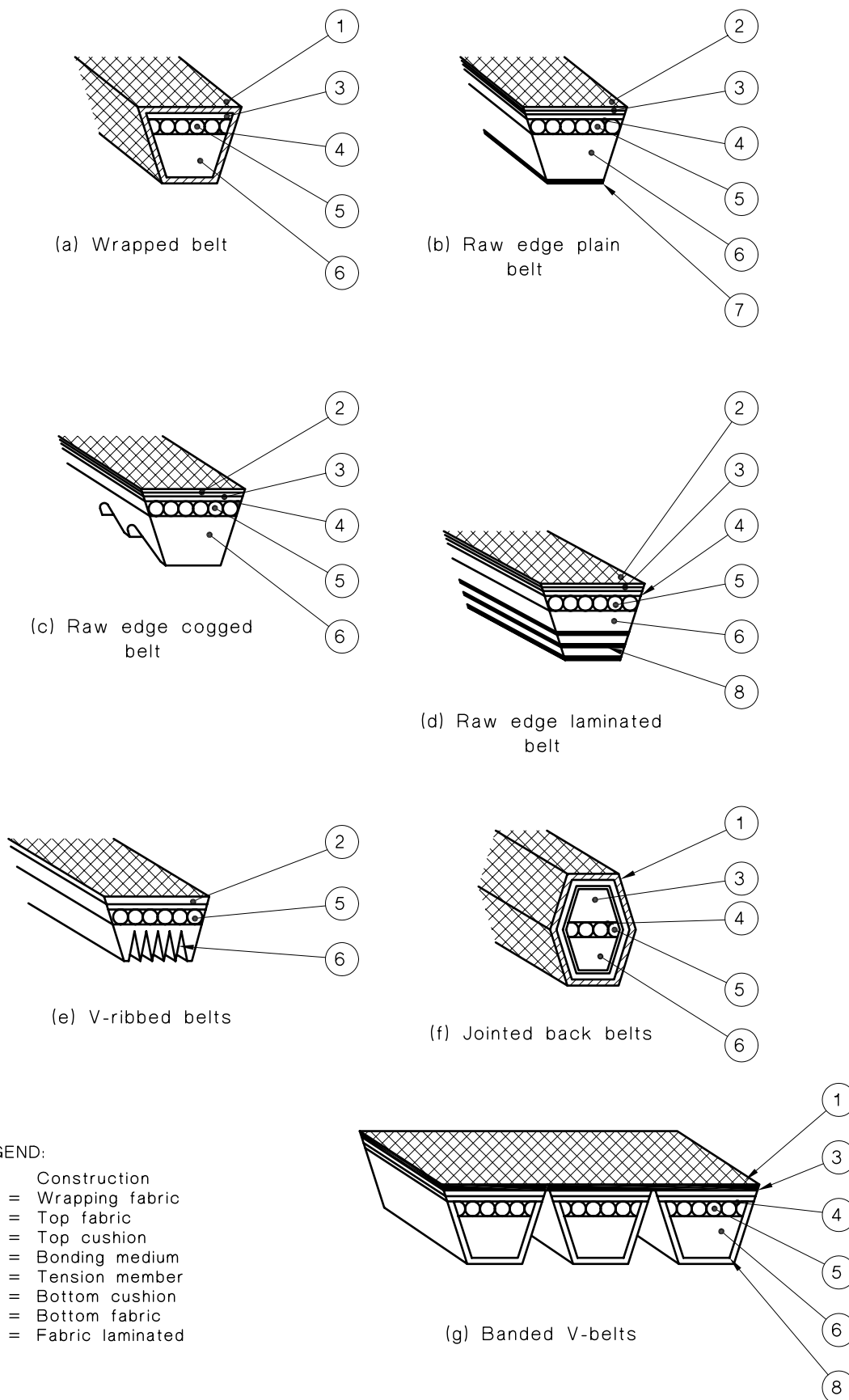


FIGURE 4 BASIC BELT CONSTRUCTIONS

TABLE 1
BELT CROSS-SECTION DIMENSIONS

Type of belt	Cross-section symbol	Pitch width W_p mm	Nominal top width W mm	Nominal height T mm	Nominal included angle, α degrees
Wedge belts	SPZ	8.5	10.0	8.0	40
	SPA	11.0	13.0	10.0	40
	SPB	14.0	17.0	14.0	40
	SPC	19.0	22.0	18.0	40
V-belts	Y	5.3	6.0	4.0	40
	Z	8.5	10.0	6.0	40
	A	11.0	13.0	8.0	40
	B	14.0	17.0	11.0	40
	C	19.0	22.0	14.0	40
	D	27.0	32.0	19.0	40

TABLE 2
TOLERANCES AND FORCE REQUIREMENTS FOR MEASUREMENT OF NEW BELTS

Type of belt	Cross-section symbol	Total force (F) applied to belt N	Position of top face of belt with respect to top of groove, mm	
			Max.	Min.
Wedge belts	SPZ	360	+1.1	−0.4
	SPA	560	+1.3	−0.6
	SPB	900	+1.4	−0.7
	SPC	1500	+1.5	−1.0
V-belts	Y	40	+0.8	−0.8
	Z	110	+1.6	−1.6
	A	200	+1.6	−1.6
	B	300	+1.6	−1.6
	C	750	+1.5	−2.0
	D	1400	+1.6	−3.2

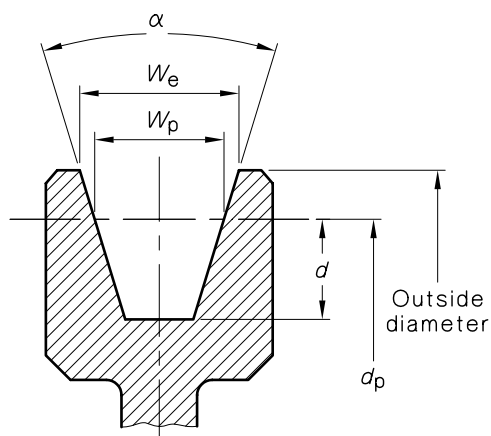


FIGURE 5 PULLEY MEASUREMENT POSITIONS

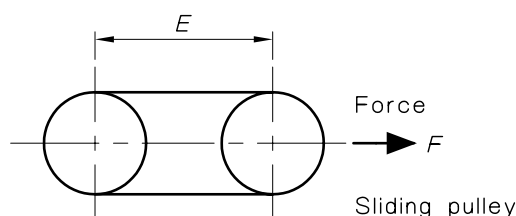


FIGURE 6 SCHEMATIC DIAGRAM OF PULLEY SET-UP FOR DETERMINING BELT PITCH LENGTH

2.6 MATCHED BELTS

In order to avoid uneven distribution of load, belts running on a multiple belt drive shall be matched belts and their lengths shall be within the tolerances given for matched sets in Table 4.

NOTES:

- 1 Age and storage conditions may alter the length of the belt (see Appendix C).
- 2 It is recommended that belts from different manufacturers not be mixed on the same drive.

2.7 BELT FITTING

Wedge belts and V-belts shall not be mixed on the same drive.

NOTES:

- 1 If a drive is designed to be fitted with wedge belts, replacement belts are to be wedge belts.
- 2 If a drive is designed to be fitted with V-belts with pulley groove profiles as given in Table 8, replacement belts may be either V-belts or wedge belts. If wedge belts are used, consideration should be given to minimum pulley diameters.
- 3 Further information on drive design, including a worked example, is given in Appendix A.

TABLE 3
DIMENSIONS OF PULLEYS FOR MEASURING NEW WEDGE BELTS AND V-BELTS

Type of belt	Cross-section symbol	Pitch width W_p mm	Nominal pitch diameter d_p mm	Nominal pulley circumference at pitch diameter mm	Outside diameter mm	Effective width of groove W_e mm	Minimum groove depth d mm	Groove angle α degrees
Wedge belts	SPZ	8.5	95.5	300	99.76 0 −0.06	9.91 0 +0.03	11.0	38±0.25
	SPA	11.0	143.2	450	149.13 0 −0.06	12.96 0 +0.03	14.0	38±0.25
	SPB	14.0	191.0	600	198.29 0 −0.06	16.45 0 +0.03	17.5	38±0.25
	SPC	19.0	318.3	1000	328.26 0 −0.06	22.35 0 +0.03	23.8	38±0.25
V-belts	Y	5.3	28.7	90	32.13 0 −0.06	6.24 0 +0.03	6.3	32±0.25
	Z	8.5	57.3	180	62.60 0 −0.06	10.06 0 +0.03	9.5	34±0.25
	A	11.0	95.5	300	102.42 0 −0.06	13.05 0 +0.03	12.0	34±0.25
	B	14.0	127.3	400	136.08 0 −0.06	16.61 0 +0.03	15.0	34±0.25
	C	19.0	222.8	700	234.62 0 −0.06	22.53 0 +0.03	20.0	34±0.25
	D	27.0	318.3	1000	334.97 0 −0.06	32.32 0 +0.03	28.0	36±0.25

TABLE 4
STANDARD PITCH LENGTHS OF WEDGE BELTS AND V-BELTS

Pitch length range	Standard pitch lengths, mm										Maximum pitch length variation mm		Maximum deviation of length-code numbers for matched set*	
	Wedge belts				V-belts						Single †	Matched set		
	SPZ	SPA	SPB	SPC	Y	Z	A	B	C	D				
200 to 399					200 224 250 280 315 355							+8 −6	2	Same length-code number
400 to 529					400 450 500	405 475						+10 −6		
530 to 709	630					530 625 700	630 700					+12 −6		
710 to 899	710 800	800				780	790 890					+12 −8		
900 to 1 249	900 1 000 1 120	900 1 000 1 120				920 1 080	990 1 100	930 1 000 1 100 1 210				+14 −10		
1 250 to 1 599	1 250 1 400	1 250 1 400	1 250 1 400 1 600				1 250 1 430 1 550	1 370 1 560	1 560			+16 −10		
1 600 to 1 899	1 600 1 800	1 600 1 800	1 800				1 750	1 690 1 760	1 760			+18 −12	4	Two length-code numbers
1 900 to 2 249	2 000	2 000 2 240	2 000	2 000 2 240			1 940 2 050 2 200	1 950 2 180	1 950 2 190			+30 −16		
2 250 to 2 799	2 240 2 500	2 500	2 240 2 500	2 500			2 300 2 480 2 570 2 700	2 300 2 500 2 700	2 340 2 490 2 720	2 740		+34 −18		
2 800 to 3 149	2 800	2 800	2 800	2 800			2 910 3 080	2 870	2 880 3 080	3 130		+36 −18		
3 150 to 3 699	3 150 3 550	3 150 3 550	3 150 3 550	3 150 3 550			3 290 3 540	3 200 3 600	3 310 3 520	3 330		+38 −20	6	Three length-code numbers
3 700 to 4 999		4 000 4 500	4 000 4 500	4 000 4 500				4 060 4 430 4 820	4 060 4 600	3 730 4 080 4 620	+46 −24			

(continued)

TABLE 4 (continued)

Pitch length range	Standard pitch lengths, mm										Maximum pitch length variation mm		Maximum deviation of length-code numbers for matched set*
	Wedge belts				V-belts						Single †	Matched set	
	SPZ	SPA	SPB	SPC	Y	Z	A	B	C	D			
5 000 to 5 999			5 000 5 600	5 000 5 600				5 370	5 380	5 400	+50 −28	8	Four length-code numbers
6 000 to 6 999			6 300	6 300				6 070	6 100 6 860	6 100 6 840	+56 −32		
7 000 to 8 999			7 100 8 000	7 100 8 000					7 600	7 620 8 410	+66 −38		
9 000 to 9 990				9 000					9 100	9 140	+66 −38	12	Six length-code numbers
10 000 to 12 499				10 000 11 200					10 700	10 700 12 200	+74 −44		
12 500 to 16 000				12 500						13 700 15 200	+90 −50	14	Seven length-code numbers

* See Note 2 to Clause 2.10.

† The values shown in this column represent the manufacturing tolerances on the nominal pitch length.

TABLE 5
CENTRE DISTANCE VARIATION DURING TEST

Belt length	millimetres	
	Centre distance variation, ΔE	
	Top width	
	≤25	>25
Up to and including 1000	1.2	1.8
1001 to 2000	1.6	2.2
2001 to 5000	2.0	3.4
5001 and greater	2.5	3.4

2.8 ANTISTATIC BELTS

For antistatic belts, when determined in accordance with Appendix D, the electrical resistance of a test length of an antistatic belt at any test point shall not exceed the value calculated from the following equation:

$$R = 6 \times 10^5 \frac{L}{l} \quad \dots (2)$$

where

R = resistance of test length, in ohms

L = distance between test electrodes, in millimetres

l = sum of the length of the working sides of the belt, in millimetres

NOTE: Antistatic performance may not be necessary in some applications, the type of belt specified should be checked prior to application of this Clause.

2.9 FIRE-RESISTANT BELTS

For fire resistant belts, when determined in accordance with Appendix E, the fire-resistance performance of a fire-resistant belt shall comply with Table 6.

NOTE: Fire-resistance may not be necessary in some applications, the type of belt specified should be checked prior to application of this Clause.

TABLE 6
FIRE-RESISTANCE REQUIREMENTS

Cross-section symbol		Average extinguishing time for six test pieces, s		Maximum extinguishing time for any one test piece, s	
V-belts	Wedge belts	Flame	Glow	Flame	Glow
— A B	SPZ SPA SPB	5	5	10	12
C D	SPC —		7		15

2.10 MARKING

All belts shall be marked legibly and durably on the outer non-working face with the following information:

- The belt cross-section.
- The nominal pitch length.
- The name, trade name or symbol of the manufacturer.
- Code number for matching, if applicable (see Note 2).
- For belts with antistatic properties, either the word 'antistatic' or the letters 'AS'.
- For belts with fire-resistance properties, either the words 'fire resistant' or the letters 'FR'.

NOTES:

- In certain applications, e.g. mines, the approval of regulatory authorities is necessary for FR and AS specifications.
- A system of marking is recommended to indicate the tolerance on pitch length for the purpose of matching belts for use on multiple belt drives (for example, see Appendix F).
- Manufacturers making a statement of compliance with this Australian Standard on wedge belts or V-belts, on packaging or on literature related thereto are advised to ensure that such compliance is capable of being verified.

SECTION 3 PULLEYS

3.1 MATERIALS

Pulleys shall be made of cast iron, steel, suitable alloys, or any material that can be shaped to the standardized dimensions and tolerances and is capable of withstanding without damage the conditions of service, including those relating to heating, mechanical stresses, abrasion and the environment. The pulley material should dissipate any significant heat that might be generated by the belts.

Cast or sintered pulleys shall consist of an appropriate material and be free of significant porosities or flaws and of shrinkage holes or voids in the arms, the web and the hub. Defects shall not affect the integrity and reliability of the drive.

For cast pulleys, superficial defects of the rim, boss and centre plate or web (excluding those in the spokes or arms) may be filled with a material homogeneous with the original material in such a way as will not give rise to internal stresses. Filling materials having only the appearance of metal shall not be used. Any filling shall be completed prior to balancing.

3.2 SURFACE FINISH

The surface finish of the working surfaces shall be measured in a plane parallel to the action of the belt and shall be not coarser than the value given in Table 7.

The edge of V-pulley grooves shall be chamfered or radiused to remove the sharp corners.

TABLE 7
SURFACE FINISH

Working surface	Surface finish R_a^* , μm
V-pulley grooves	3.2
All pulley bores and rim edges	6.3

*See ISO 4287

3.3 TOLERANCES

The axial and radial run out of the pulley shall not exceed the following values:

- (a) Up to and including 500 mm diameter 0.001 mm per millimetre of diameter.
- (b) Over 500 mm up to and including 1500 mm diameter...0.0015 mm per millimetre of diameter.
- (c) Over 1500 mm diameter 0.002 mm per millimetre of diameter.

3.4 BALANCING

3.4.1 General

The purpose of balancing a pulley is to improve its mass distribution so as to diminish the out-of-balance forces exerted as it revolves; such forces cannot be completely eliminated, but the remaining imbalance shall not be greater than the allowable limit.

As balancing is an expensive operation, the specified limit of the residual imbalance is given a value as large as the envisaged applications might allow. Two classes of balancing are considered as follows:

- (a) Balancing in one plane, called static balancing.
- (b) Balancing in two planes, called dynamic balancing.

Static balancing is usually sufficient; dynamic balancing may be necessary for pulleys with large face widths or for pulleys revolving relatively fast.

3.4.2 Static balancing

All pulleys shall be statically balanced.

Static balancing shall be done so as to leave on the working diameter (pitch or effective, according to the type of pulley) an eccentric residual mass not exceeding the larger of the following two values for cast iron pulleys:

- (a) 0.2% of the pulley and companion bush mass.
- (b) 5 g.

For pulleys made of other materials, the limit shall be multiplied by the ratio of the density of cast iron (7200 kg/m³) to the density of the respective pulley material.

The static balancing may be done by mechanical or electronic methods.

3.4.3 Dynamic balancing

Where the rotational speed of a pulley is known, the necessity for dynamic balancing shall be determined by one of the following methods:

- (a) By calculating the limiting speed, n_1 , in revolutions per minute from the following equation:

$$n_1 = \sqrt{\frac{1.58 \times 10^{11}}{ld}} \quad \dots (3)$$

where

l = pulley face width, in millimetres

d = diameter (pitch or effective) of the pulley in millimetres

If $n > n_1$, dynamic balancing is normally necessary, n being the actual speed of the pulley in revolutions per minute.

- (b) By using the nomogram presented in Figure 7.

Unless the user has specified a particular requirement, the 'G' quality level shall be the larger of the following two values:

- (i) $G_1 = 6.3$
- (ii) $G_2 = 5 \nu/m$

where

ν = circumferential pulley speed, in metres per second

m = equivalent mass of the pulley taken as the mass of a geometrically similar pulley made of cast iron, in kilograms

NOTE: The expression for G_2 is in relation to the smallest practical residual eccentric mass given in Clause 3.4.2.

Dynamic balancing shall be carried out in accordance with the method specified in AS 3709.

3.5 STANDARD DIMENSIONS OF PULLEYS

Pulley faces and grooves shall conform to the dimensions and tolerances specified in Table 8 and illustrated in Figure 8.

NOTE: Recommended pulley diameters are given in Table 9.

3.6 INSTALLATION AND TAKE-UP ALLOWANCES

The limiting values for the adjustment of centres for the two transmission pulleys shall be—

- (a) lower limiting value nominal centre distance minus 1.5% L_p ; and
- (b) higher limiting value nominal centre distance plus 3% L_p ,

where L_p is the pitch length of the belt.

NOTES:

- 1 The above limiting values should be regarded by the belt manufacturers as maxima and by the designers and makers of the machinery as minima.
- 2 Recommended practice for installation tension in drives and for calculation of the resultant force imposed on shafts is given in Appendix B.

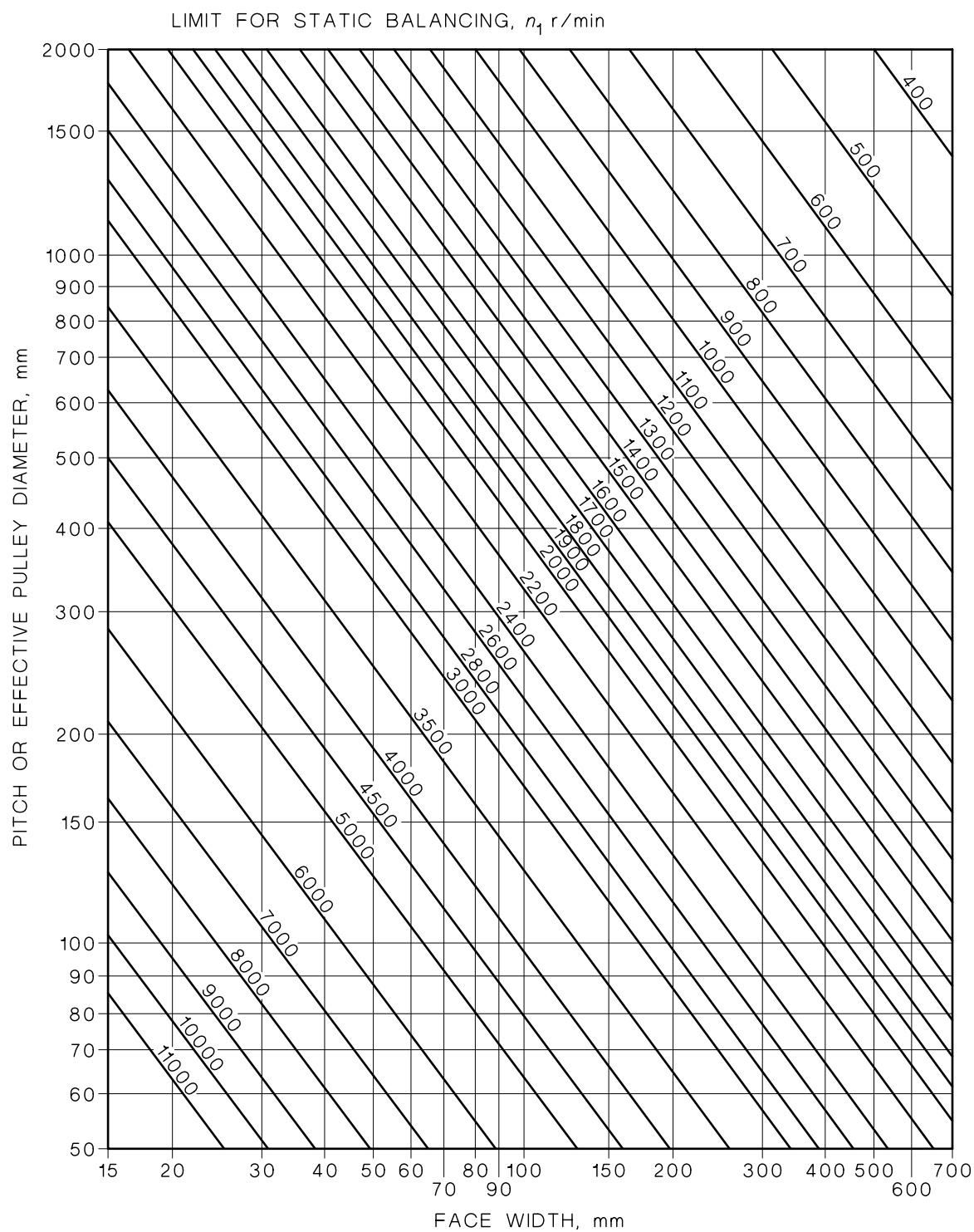


FIGURE 7 PULLEY LIMITING ROTATIONAL SPEED INDICATING LIMITS FOR STATIC OR DYNAMIC BALANCING

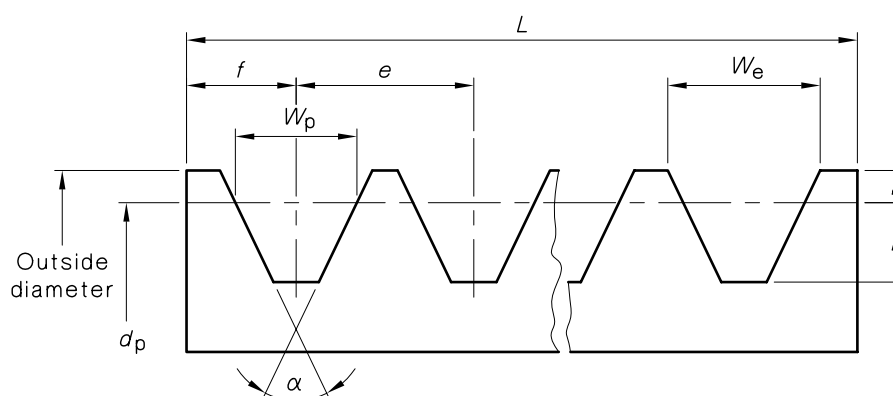


FIGURE 8 V-GROOVED PULLEY MEASUREMENT POSITIONS

TABLE 8

DIMENSIONS OF STANDARD V-GROOVED PULLEYS

Cross-section symbol	Groove pitch width	Minimum distance from outside diameter to pitch diameter	Minimum groove depth below pitch diameter (see Note 4)	Centre to centre of grooves (see Note 2)	Edge of pulley to first groove centre (see Note 3)	Pitch diameter	Effective width of groove	Groove angle
	W_p mm	b mm	h mm	e mm	f mm	d_p mm	W_e mm	α degrees
Y	5.3	1.6	4.7	8 ± 0.3	7.0 ± 1.0	≤ 60	6.2	32 ± 0.5
						> 60	6.33	36 ± 0.5
Z and SPZ	8.5	2.0	9.0	12 ± 0.3	8.0 ± 1.0	≤ 80	9.7	34 ± 0.5
						> 80	9.9	38 ± 0.5
A and SPA	11.0	2.75	11.0	15 ± 0.3	10.0 $+2.0, -1.0$	≤ 118	12.7	34 ± 0.5
						> 118	12.9	38 ± 0.5
B and SPB	14.0	3.5	14.0	19 ± 0.4	12.5 $+2.0, -1.0$	≤ 190	16.1	34 ± 0.5
						> 190	16.4	38 ± 0.5
C and SPC	19.0	4.8	19.0	25.5 ± 0.5	17.0 $+2.0, -1.0$	≤ 315	21.9	34 ± 0.5
						> 315	22.3	38 ± 0.5
D	27.0	8.1	19.9	37 ± 0.6	24.0 $+3.0, -1.0$	≤ 475	32.3	36 ± 0.5
						> 475	32.6	38 ± 0.5

NOTES:

- See also Table 3 for symbols.
- See Table 9 for recommended pulley pitch diameter.
- The tolerances on dimension 'e' apply to the distance between the centres of any two grooves whether adjacent or not.
- It is recommended that the tolerances on dimension 'f' should be taken into account in the alignment of the pulleys.
- Where the pulleys are to be used for V-belt sections Z, A, B or C only, dimension 'h' may be reduced by 20%.
- The maximum distance L between the outside edges of the pulley, i.e. the face width, is equal to $(x - 1)e + 2f$, where x is the number of grooves.

TABLE 9
RECOMMENDED PULLEY PITCH AND OUTSIDE DIAMETERS

millimetres

Pitch diameter* d_p	Outside diameter									
	Y	Z only	Z and SPZ	A only	A and SPA	B only	B and SPB	C only	C and SPC	D
20	23.2									
22.4	25.6									
25	28.2									
28	31.2									
31.5	34.7									
35.5	38.7									
40	43.2									
45	48.2									
50	53.2	54								
53		57								
56	59.2	60								
60		64								
63	66.2	67								
67			71							
71	74.2		75							
75			79	80.5						
80	83.2		84	85.5						
85			89	90.5						
90	93.2		94	95.5						
95			99	100.5						
100	103.2		104		105.5					
106					111.5					
112	115.2		116		117.5					
118					123.5					
125	128.2		129		130.5	132				
132					137.5	139				
140			144		145.5	147				
150			154		155.5	157				
160			164		165.5		167			
170							177			
180			184		185.5		187			
190							197			
200			204		205.5		207	209.6		
212							219	221.6		
224							231		233.6	
236							243		245.6	
250			254		255.5		257		259.6	
265									274.6	
280							287		289.6	
315			319		320.5		322		324.6	
355							362		364.6	371.2
375										391.2
400			404		405.5		407		409.6	416.2
425										441.2
450									459.6	466.2

(continued)