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SURFACE VEHICLE STANDARD

SAE J636

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V-Belts and Pulleys

Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. ***Scope***—This specification covers standard dimensions, tolerances, and methods of measurement of V-belts and pulleys for automotive V-belt drives.

2. ***References***—There are no referenced publications specified herein.

3. ***V-Belt Types***—Automotive V-belts are produced in a variety of constructions in a basic trapezoidal shape. The inside circumference of the V-belt can be a plain straight line or corrugated by means of cogs or notches for the purpose of increasing the belt(s) flexibility for use with pulleys in the lower proposed diameter. Belts are to be dimensioned in such a way that they are functional in pulleys dimensioned as described in subsequent sections.

4. ***Pulleys***—Pulleys are to conform to requirements of Figure 1 and Tables 1A, 1B, 2A, and 2B.

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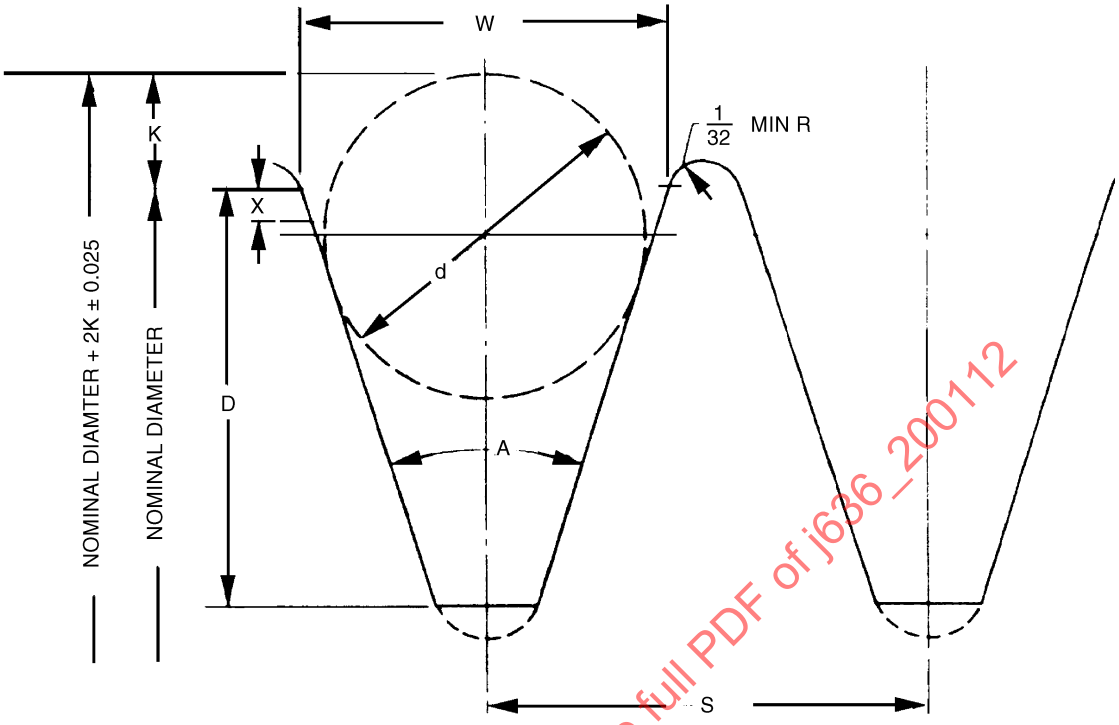


NOTES:

1. The sides of the groove are to be 3.2 µm (125 µin) A. A. maximum.
2. Radial runout is not to exceed 0.38 mm (0.015 in) full indicator movement (FIM). Axial runout is not to exceed 0.38 mm (0.015 in) FIM. Runout in the two directions is measured separately with a ball mounted under spring pressure to follow the groove as the pulley is rotated. Diameter, load, and overhang conditions may require or permit variations in the above-specified runout limits.
3. Bottom corner radii optional, but if used, it shall be below the depth, D.
4. In pulleys for use with belts in multiple on common centers, the diameters over the ball gages are not to vary from groove to groove in the same pulley more than 0.05 mm/25 mm (0.002 in/in) of diameter, with top limit of 0.30 mm (0.012 in) for diameters 152 mm (6 in) and above.
5. Centerline of groove is to be 90 degrees ± 2 degrees with pulley axis.
6. The X dimension is radial. 2X is to be subtracted from the effective diameter to obtain "pitch diameter" for speed ratio calculations.

FIGURE 1—V-BELT PULLEY DIMENSIONS

TABLE 1A—V-BELT PULLEY DIMENSIONS, mm

SAE Size	Recommended[1] Min Effective Dia	A Groove Angle (deg) ±0.5	W Effective Groove Width	D Groove Depth Min	d Ball or Rod Dia (±0.013)	2K 2X Ball[2] Extension	2X[3]	S Groove[4] Spacing (±0.38)
6A	57	36	6.3	7	5.558	4.16	1.0	8.00
8A	57	36	8.0	9	7.142	5.63	1.3	10.49
10A	61	36	9.7	11	7.938	3.77	1.5	13.74
11A	70	36	11.2	13	9.525	5.88	1.8	15.01
13A	76	36	12.7	14	11.113	7.99	2.0	16.79
15A	76	34				6.42		
	Over 102	36	15.2	14	12.700	7.02	0	19.76
	Over 152	38				7.56		
17A	76	34				8.21		
	Over 102	36	16.8	15	14.288	8.82	0.5	21.36
	Over 152	38				9.38		
20A	89	34				11.77		
	Over 114	36	20.0	18	17.463	12.42	1.0	24.54
	Over 152	38				13.02		
23A	102	34				15.67		
	Over 152	36	23.1	21	20.638	16.33	1.5	27.71
	Over 203	38				16.94		

1. Pulley effective diameters below those recommended should be used with caution, because power transmission and belt life may be reduced.
2. 2K dimensions are calculated in millimeters.
3. 2X is to be subtracted from the effective diameter to obtain "pitch diameter" for speed ratio calculation.
4. These values are intended for adjacent grooves of the same effective width (W). Choice of pulley manufacture or belt design parameter may justify variance from these values. The S dimension shall be the same on all multiple groove pulleys in a drive using matched belts.

TABLE 1B—V-BELT PULLEY DIMENSIONS, in

SAE Size	Recommended[1] Min Effective Dia	A Groove Angle (deg) ±0.5	W Effective Groove Width	D Groove Depth Min	d Ball or Rod Dia (±0.0005)	2K 2X Ball Extension	2X[2]	S Groove[3] Spacing (±0.015)
0.250	2.25	36	0.248	0.276	0.2188	0.164	0.04	0.315
0.315	2.25	36	0.315	0.354	0.2812	0.222	0.05	0.413
0.380	2.40	36	0.380	0.433	0.3125	0.154	0.06	0.541
0.440	2.75	36	0.441	0.512	0.3750	0.231	0.07	0.591
0.500	3.00	36	0.500	0.551	0.4375	0.314	0.08	0.661
11/16 (0.600)	3.00	34	0.597	0.551	0.500	0.258	0.00	0.778
	Over 4.00	36				0.280		
	Over 6.00	38				0.302		
3/4 (0.660)	3.00	34	0.660	0.630	0.5625	0.328	0.02	0.841
	Over 4.00	36				0.352		
	Over 6.00	38				0.374		
7/8 (0.790)	3.50	34	0.785	0.709	0.6875	0.472	0.04	0.966
	Over 4.50	36				0.496		
	Over 6.00	38				0.520		
1 (0.910)	4.00	34	0.910	0.827	0.8125	0.616	0.06	1.091
	Over 6.00	36				0.642		
	Over 8.00	38				0.666		

1. Pulley effective diameters below those recommended should be used with caution, because power transmission and belt life may be reduced.
2. 2X is to be subtracted from the effective diameter to obtain "pitch diameter" for speed ratio calculation.
3. These values are intended for adjacent grooves of the same effective width (W). Choice of pulley manufacture or belt design parameter may justify variance from these values. The S dimension shall be the same on all multiple groove pulleys in a drive using matched belts.

TABLE 2A—MEASURING PULLEY DIMENSIONS, mm

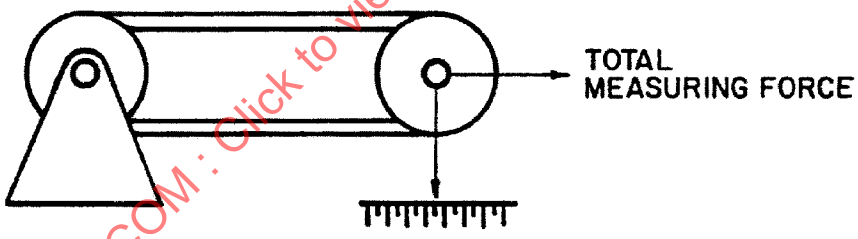
SAE Size	d_1 Effective Dia (±0.05)	Effective Pulley Circumference	A Groove Angle (deg) ±0.15	W Effective Groove Width	D Groove Depth Min	d Ball or Rod Dia (±0.013)	d_2 Dia[1] Over Balls or Rods (±0.05)
6A	97.03	304.8	36	6.3	7	5.558	101.18
8A	97.03	304.8	36	8.0	9	7.142	102.66
10A	97.03	304.8	36	9.7	11	7.938	100.80
11A	97.03	304.8	36	11.2	13	9.525	102.91
13A	97.03	304.8	36	12.7	14	11.113	105.02
15A	97.03	304.8	34	15.2	14	12.700	103.45
17A	97.03	304.8	34	16.8	16	14.288	105.24
20A	121.29	381.0	34	20.0	18	17.463	133.06
23A	121.29	381.0	34	23.1	21	20.638	136.96

1. d_2 dimensions are calculated in millimeters.

TABLE 2B—MEASURING PULLEY DIMENSIONS, in

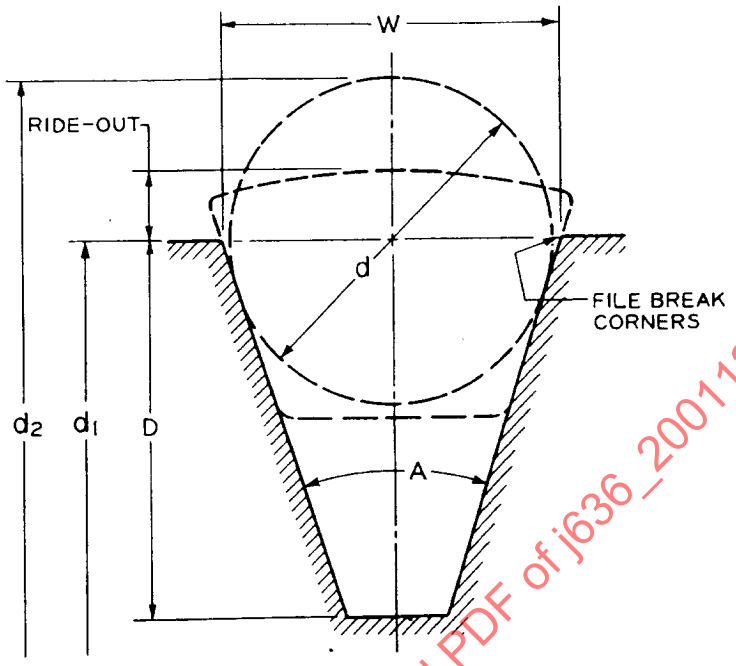
SAE Size US	d_1 Effective Dia (±0.002)	Effective Pulley Circumference	A Groove Angle (deg) ±0.15	W Effective Groove Width	D Groove Depth Min	d Ball or Rod Dia (±0.0005)	d_2 Dia Over Balls or Rods (±0.002)
0.250	3.820	12.000	36	0.248	0.276	0.2188	3.984
0.315	3.820	12.000	36	0.315	0.354	0.2812	4.042
0.380	3.820	12.000	36	0.380	0.433	0.3125	3.974
0.440	3.820	12.000	36	0.441	0.512	0.3750	4.051
0.500	3.820	12.000	36	0.500	0.551	0.4375	4.134
11/16 (0.600)	3.820	12.000	34	0.597	0.551	0.5000	4.078
3/4 (0.660)	3.820	12.000	34	0.660	0.630	0.5625	4.148
7/8 (0.790)	4.775	15.000	34	0.785	0.709	0.6875	5.247
1 (0.910)	4.775	15.000	34	0.910	0.827	0.8125	5.391

5. ***V-Belt Measurement***—Belt length and SAE size are defined by using effective length and rideout as measured in standard pulleys. These are determined by use of a measuring fixture comprised of two pulleys of equal diameter, a method of applying force, and a means of measuring the center distance between the two pulleys. One of the two pulleys is fixed in position while the other is movable along a graduated scale. The fixture is shown schematically in Figure 2. Specifications for measuring pulley dimensions are given in Tables 2A and 2B and Figure 3.



NOTE—The outside diameter and the effective diameter on the measuring pulley are one and the same.

FIGURE 2—DIAGRAM OF A FIXTURE FOR MEASURING V-BELTS



NOTE: The outside diameter and the effective diameter on the measuring pulley are one and the same.

FIGURE 3—MEASURING PULLEY DIMENSIONS

5.1 Length—To measure the length, the belt is placed on the measuring fixture at the force shown in Tables 3A and 3B, and rotated around the pulleys at least two revolutions of the belt to seat the belt properly in the pulley grooves and to divide the total force equally between the two strands of the belt. The mid-point of the center distance travel of the movable pulley defines the center distance and will be measured through one revolution of the belt minimum after the two seating revolutions. The belt effective length is equal to two times the center distance plus the effective pulley circumference. Standard belt center distance tolerances are shown in Tables 4A and 4B.

TABLE 3A—MEASURING CONDITIONS AND RIDEOUT, SI UNITS

SAE Size Metric	Total Measuring Force, N	Rideout[1] mm	Rideout[1] Tolerance mm
6A	222	0.8	±0.8
8A	222	0.8	±0.8
10A	267	1.5	±1.1
11A	267	1.0	±1.1
13A	267	1.5	±1.1
15A	267	2.3	±1.1
17A	356	2.3	±1.1
20A	445	2.3	±1.1
23A	534	2.3	±1.1

1. The belt rideout, as measured along the circumference of the belt, must fall within the specified tolerance at all points with the exception of measurements at points of dimension variations inherent to the manufacturing process or product such as material splices, belt identifications, etc.

TABLE 3B—MEASURING CONDITIONS AND RIDEOUT, U.S. CUSTOMARY UNITS

SAE Size In	Total Measuring Force, lb	Rideout[1] in	Rideout[1] Tolerance in
0.250	50	0.031	±0.031
0.315	50	0.031	±0.031
0.380	60	0.060	±0.045
0.440	60	0.040	±0.045
0.500	60	0.060	±0.045
11/16 (0.600)	60	0.090	±0.045
3/4 (0.660)	80	0.090	±0.045
7/8 (0.790)	100	0.090	±0.045
1 (0.910)	120	0.090	±0.045

1. The belt rideout, as measured along the circumference of the belt, must fall within the specified tolerance at all points with the exception of measurements at points of dimension variations inherent to the manufacturing process or product such as material splices, belt identifications, etc.

TABLE 4A—STANDARD BELT CENTER DISTANCE TOLERANCES, mm

Belt Length	Tolerance on Center Distance
1270 and less	±3.0
Over 1270–1524, incl.	±4.1
Over 1524–2032, incl.	±4.8
Over 2032–2540, incl.	±5.6

TABLE 4B—STANDARD BELT CENTER DISTANCE TOLERANCES, in

Belt Length	Tolerance on Center Distance
50 and less	±0.12
Over 50–60, incl.	±0.16
Over 60–80, incl.	±0.19
Over 80–100, incl.	±0.22

5.2 Rideout—The rideout standard and rideout tolerance are shown in Table 3. The rideout of a belt section is determined by measuring from a straight edge across the top of the belt to the rim of the measuring pulley, as shown in Figure 4.

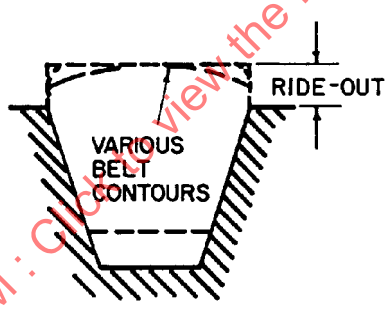


FIGURE 4—MEASURING BELT RIDE