Foreword

The formulation of this National Standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Enhancing the Implementation of AFMA Through Improved Agricultural Engineering Standards" which was funded by the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).

This Standard was reviewed by the Technical Committee for Study 2 – Development of Standards for Engineering Materials and was circulated to various private and government agencies/organizations concerned for their comments and reactions. These standards were presented to the Philippine Society of Agricultural Engineers (PSAE) and subjected to a public hearing organized by the National Agriculture and Fisheries Council (NAFC). The comments and reactions received during the presentation and public hearing were taken into consideration in the finalization of the standards.

This Standard has been technically formulated in accordance with PNS 01:Part 4:1998–Rules for the Structure and Drafting of Philippine National Standard. It provides specifications and proper application of drives using V-belts and does not cover manufacturing specifications.

In the preparation of this standard, the following references were considered.

ASAE S211.4:1986, V-belt and V-ribbed belt drives for Agricultural Machines

Baumeister, Theodore (ed.) 1997. Mark's handbook for mechanical engineers. 10th Edition. Mc Graw Hill Book Company, USA.

Carmichael, C. (ed.) 1950. Kent's Mechanical engineer's handbook. Design and production volume. 12th Edition. John Wiley and Sons, Inc., USA.

Faires, V. M. 1969. Design of Machine Elements. Macmillan Company, New York USA.

Horton, H. L. (Ed.) 1984. Machinery's handbook. 23rd Edition. Industrial press inc, New York.

Richey, C. B. (Ed.) 1961. Agricultural engineer's handbook. Mc Graw Hill Book Company, USA.

ISO 3410:1989, Agricultural Machinery – Endless variable-speed V-belts and groove sections of corresponding pulleys

JIS B 1854:1987, Grooved pulleys for classical V-belts

Shigley, Joseph, E. 1977. Mechanical engineering design. 3rd Edition. Mc Graw Hill Book Company, USA.

Mitsuboshi Design Manual

Engineering Materials – V-belts and Pulleys for Agricultural Machines – Specifications and Applications

1 Scope

This Standard establishes specifications and provides technical information for the proper application of V-belts and pulleys for drives of agricultural machinery.

2 Reference

The following normative references contains provisions which, through reference in this text, constitute provisions of this Standard:

PAES 304:2000, Engineering Materials – Keys and Keyways for Agricultural Machines – Specifications and Applications

3 Application

V-belt drives are commonly used for transmitting motion and power to shafts with short center distances, and may be operated with small pulley diameters. In addition, a number of V-belts may be used on a multi-grooved pulley, thus making a multiple-belt drive.

4 Definitions

4.1
V-belt
flexible machine element used to transmit motion and power between two shafts, the cross section of which is shaped roughly like a regular trapezoid outlined by the base, sides and top of the belt

4.2
V-pulley
wheel with one or more grooved rims used to transmit motion and power by means of one or more V-belts

NOTE:
The cross section of the grooved rim is in the shape of an open-channel outlined by the base and the two slanted sides.

4.3
V-belt drive
power transmission device, which consists of one or more V-belts, mounted on two or more V-pulleys

4.4
pulley diameter
the outside diameter of the pulley

4.5
pulley pitch diameter
the diameter of the pulley, which coincides with the belt pitch

4.6
belt pitch
the region in the belt that keeps the same length when the belt is bent perpendicularly to its base

4.7
belt length
the length of the belt at the level of its pitch

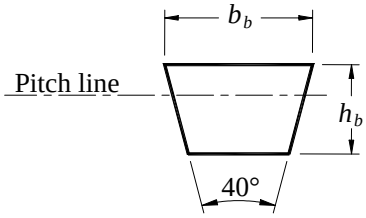
4.8
speed ratio
ratio of the angular velocities of the pulleys making no allowance for slip and creep

4.9
belt speed
the linear speed of the belt at the level of the pulley pitch diameter

5 Belts

5.1 Nomenclature

Figure 1 shows the designation of dimensions of V-belts. Nominal dimensions of belt cross-sections for agricultural machines are shown in Table 1.



Where: b_b is the top width of the belt
h_b is the height of classical V-belt

Figure 1 –Designation of dimensions of V-belts

5.2 V-belt specifications

Specifications of V-belts are given in Table 1.

Table 1 –Specifications of V-belts

Type of Cross section	b_b, mm	h_b, mm	Power range (one or more belts), watts
A	13	8	186-1,457
B	16	10	746-18,642
C	22	13	11,186-74,570
D	32	19	37,285-186,425
E	38	25	74,570 and up

NOTE: Because of different constructions and methods of manufacture, the cross-sectional shape, dimensions and included angle between the sidewalls may differ among manufacturers. However, all belts of a given cross-section shall operate interchangeably in standard grooves of the same cross-section but belts of different manufacturers should never be mixed on the same drive.

5.3 Materials

A V-belt is constructed of cords (cotton, rayon, synthetic, or steel) and fabric impregnated with rubber

5.4 Marking

5.4.1 The following information shall be marked on the V-belt:

1) Type of cross section and pitch length
2) Manufacturer's name, trademark

5.4.2 The following information shall be marked on the packaging:

1) Type of cross section and pitch length
2) Manufacturer's name, trademark, and address

6 V-Pulleys

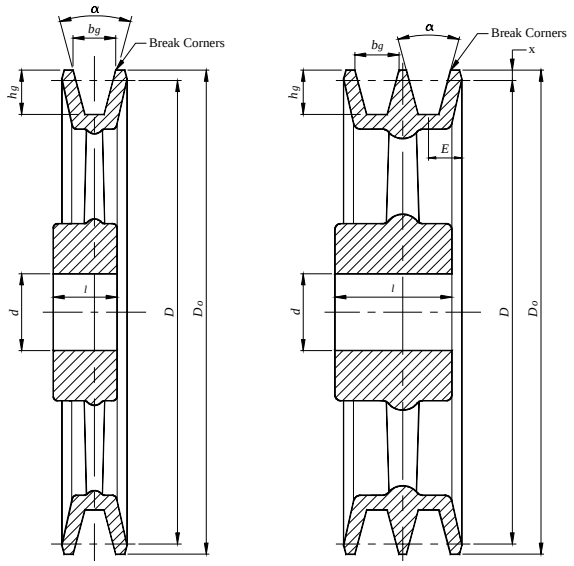
6.1 Nomenclature

V-pulleys can either be single-grooved or multi-grooved and the designation of their dimensions are shown in Figure 2.

6.2 V-pulley specification

6.2.1 Minimum recommended pulley diameters are indicated in Table 2.

6.2.2 The recommended ratio, *l/d* shall be at least 1.5.



Single-grooved Multi-grooved

Where b_g is the top width of the pulley groove
D is the pulley pitch diameter
D_o is the pulley outside diameter
d is the bore diameter
l is the hub length
h_g is the height of the pulley groove
α is the groove angle
x is one-half the difference between the outside diameter and the pitch diameter

Figure 2 – Types and designation of dimensions of V-pulleys

Table 2 – Specifications of V-pulleys

Pulley cross section	Pitch diameter		x, mm	h_g, mm	α, degrees	b_g, mm	E, mm	d, mm	l, mm
	Min. recommended, mm	Range (mm)							
A	65	65 – 140 Over 140	3.2	12	34 38	12.5 12.8	9.5 +1.8 -0	12-21	25-40
B	115	115 – 180 Over 180	4.4	15	34 38	16.2 16.5	12.7 +3.8 -0	16-30	32-50
C	175	175 – 200 201 – 305 Over 305	5.1	20	34 36 38	22.3 22.5 22.7	17.5 +3.8 -0	30-54*	63-80*
D	300	300 – 330 331 – 430 Over 430	7.6	27	34 36 38	32 32.3 32.6	22.2 +6.4 -0		
E	450	450 – 610 Over 610	10.2	33	36 38	38.8 39.2	28.6 +6.4 -0		

***** For 3 grooved V-pulleys.

6.3 Materials

V-pulleys are generally made of cast iron, cast steel, or pressed steel. The cast materials have good friction and wear characteristics. Pulleys made of pressed steel are lighter than cast pulleys, but in many instances they have lower friction and may produce excessive belt wear.

6.4 Marking

6.4.1 The following information shall be marked on the pulley:

1) Type of cross section and pulley diameter
2) Manufacturer's name and/or its trademark

6.4.2 The following information shall be marked on the packaging:

1) Type of cross section and pulley diameter
2) Manufacturer's name, trademark and address

7 Recommended Design Practices

7.1 Pulley diameters

In designing belt drives, it should be recognized that the use of larger pulley diameters will result in lower bearing loads and can result in the use of smaller and less expensive belt cross-sections. Pulley diameters should conform to the minimum recommended values as specified in Table 2.

7.2 Length calculations

7.2.1 The approximate belt length for a two-pulley drive (Fig. 3) may be calculated using the formula

$$L = 2C + \frac{\pi}{2}(D_L + D_S) + \frac{(D_L - D_S)^2}{4C} \quad \text{.....[Eq. 1]}$$

Where:
L = length of the belt (mm)
C = distance between centers of pulleys (mm)
D_L = pitch diameter of the large pulley (mm)
D_S = pitch diameter of the small pulley (mm)

If this calculation results in a length, which is not of standard length (for standard lengths see Table 10), the next longer standard length should be used and necessary correction for center distance should be made. The center distance can be calculated from the formula:

$$C = \frac{b + \sqrt{b^2 - 32(D_L - D_S)^2}}{16} \quad \text{.....[Eq. 2]}$$

Where:
$b = 4L_S - 6.28(D_L + D_S)$
L_s = standard belt length

7.2.2 To determine the belt length when more than two pulleys are used on a drive (Fig. 4), lay out the pulleys in terms of their pitch diameters to scale in the position desired when a new belt is applied and first brought to driving tension. The length of the belt shall be the

sum of the tangents (*T*) and the connecting arcs around the diameters of the pulleys. The length of the connecting arcs can be calculated by the formula:

$$Length\ of\ arc = \frac{D \times A}{115} \quad \text{.....[Eq. 3]}$$

Where:

D = the diameter of the pulley

A = the angle in degrees subtended by the arc of belt contact on the pulley

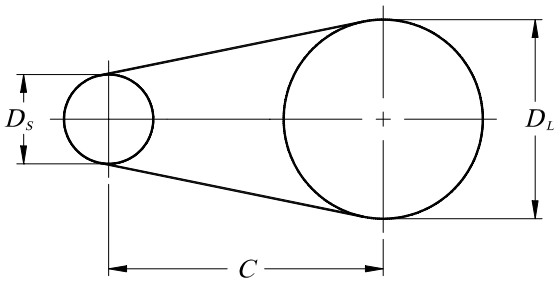


Fig. 3 – V-belt drive with two pulleys

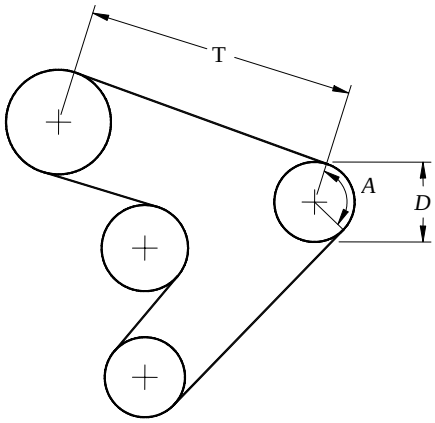


Fig 4 – V-belt drive with more than two pulleys

7.3 Selection

7.3.1 Selection of a V-belt should be based on nature of the load, type of driving unit, horsepower rating, size of pulleys, and speeds of driving and driven units. Figure 5 serves as an aid in the proper selection of v-belts. Tables 3–7 indicate the power transmitted by one belt with velocity and size of pulley as determining factors in the power transmitted.

7.3.2 Since V-belts are used on different machines, service factors (indicated in Table 8) should be used to correct for loading. To obtain the horsepower capacity of the drive, multiply the rated horsepower (name plate rating) of the driving unit by the recommended service factor.

7.4 Correction for arc of contact

Correction for arc of contact for small pulley is determined from Table 9, the arc being given by the approximate formula:

$$Arc\ of\ contact = 180 - \frac{60(D_L - D_S)}{C} \quad \text{.....[4]}$$

Where:

D_L = diameter of the large pulley

D_S = diameter of the small pulley

C = center distance of drive**.**

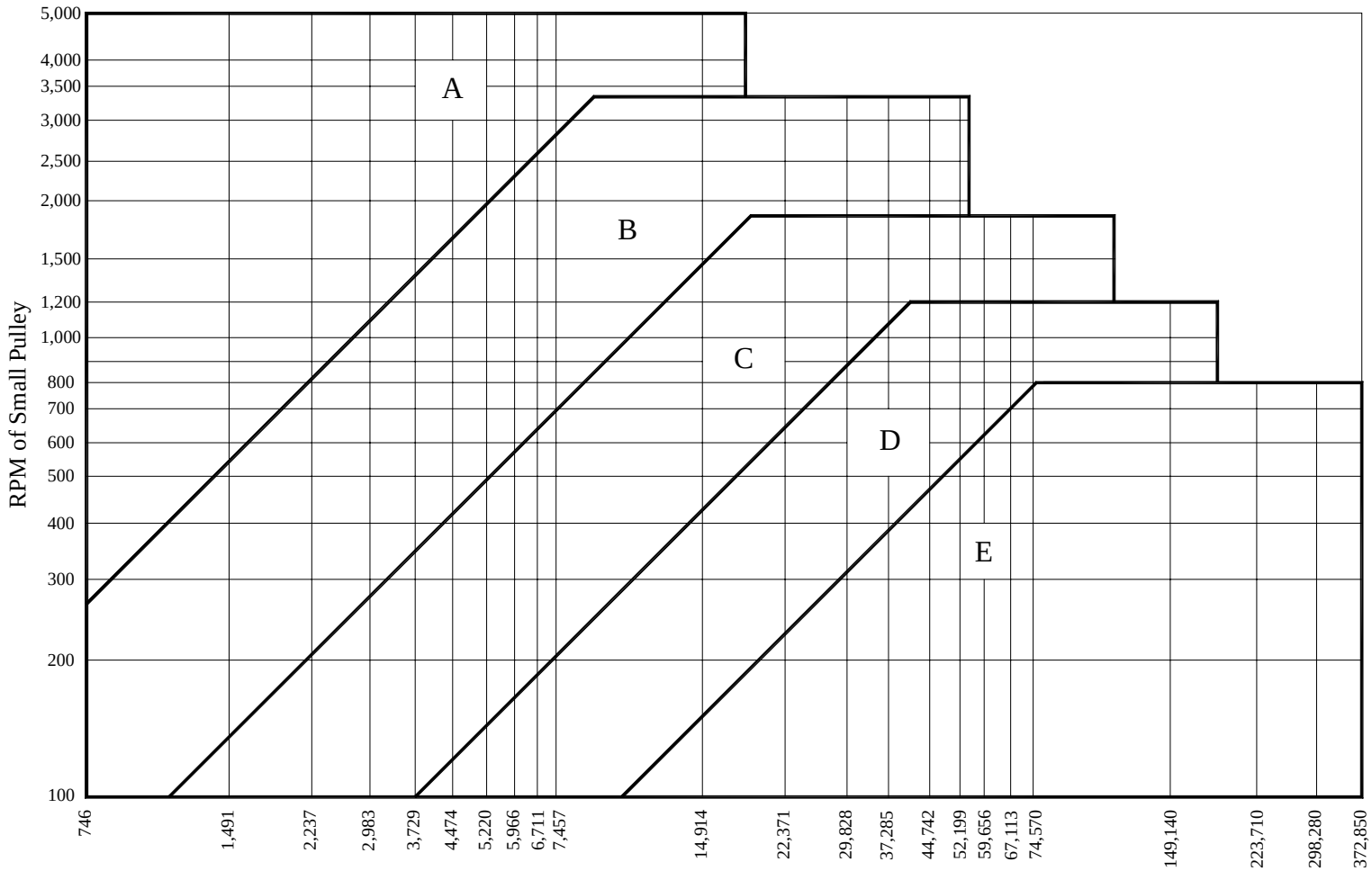


Figure 5 – Belt selection chart

Table 3 - Power ratings for section A V-belt

Rpm of Small pulley	Pitch diameter of small pulley, mm																		Additional power per belt for speed ratio, watts								
	67	70	75	80	85	90	95	100	105	11	115	120	125	130	140	150	160	175	1 - 1.01	1.02-1.04	1.05-1.08	1.09-1.12	1.13-1.18	1.19-1.24	1.25-1.35	1.35-1.51	1.52-1.99	2 and over
200	149	172	194	216	246	268	291	313	336	358	380	410	433	455	500	544	589	656	0	0	7	7	7	15	15	22	22	22
400	254	298	343	388	433	477	522	567	611	656	694	738	783	828	910	992	1,081	1,201	0	7	7	15	22	30	30	37	45	45
600	343	410	477	537	604	671	731	798	858	917	984	1,096	1,104	1,171	1,290	1,409	1,536	1,715	0	7	15	22	30	37	45	60	67	75
800	425	507	597	679	761	843	925	1,007	1,089	1,171	1,253	1,335	1,409	1,491	1,648	1,805	1,961	2,192	0	7	22	30	45	52	67	75	89	97
1,000	500	604	708	805	910	1,014	1,111	1,215	1,312	1,409	1,506	1,603	1,700	1,797	1,991	2,177	2,364	2,640	0	15	30	37	52	67	82	97	104	119
1,160	552	671	790	910	1,022	1,141	1,253	1,365	1,476	1,588	1,700	1,812	1,924	2,036	2,245	2,461	2,670	2,975	0	15	30	45	60	75	97	112	127	142
1,200	567	694	813	932	1,051	1,171	1,290	1,402	1,521	1,633	1,752	1,864	1,976	2,088	2,312	2,528	2,744	3,065	0	15	30	45	67	82	97	112	127	142
1,400	634	776	910	1,051	1,186	1,320	1,454	1,588	1,723	1,849	1,984	2,110	2,237	2,364	2,617	2,863	3,102	3,453	0	22	37	60	75	97	112	134	149	172
1,600	694	850	1,007	1,156	1,312	1,462	1,611	1,760	1,909	2,058	2,200	2,341	2,483	2,625	2,901	3,169	3,438	3,818	0	22	45	67	89	104	127	149	172	194
1,750	731	902	1,074	1,238	1,402	1,566	1,730	1,887	2,043	2,200	2,356	2,513	2,662	2,811	3,102	3,393	3,669	4,072	0	22	45	67	97	119	142	164	186	209
1,800	746	917	1,096	1,260	1,432	1,603	1,767	1,931	2,088	2,252	2,409	2,565	2,722	2,871	3,169	3,460	3,743	4,154	0	22	45	75	97	119	142	172	194	216
2,000	798	992	1,178	1,365	1,544	1,730	1,909	2,088	2,259	2,431	2,602	2,774	2,938	3,102	3,423	3,729	4,027	4,452	0	30	52	82	104	134	164	186	216	239
2,200	843	1,051	1,253	1,454	1,655	1,849	2,043	2,230	2,424	2,602	2,789	2,968	3,139	3,311	3,646	3,975	4,280	4,720	0	30	60	89	119	149	179	209	239	268
2,400	887	1,111	1,327	1,544	1,752	1,961	2,170	2,371	2,573	2,767	2,960	3,147	3,326	3,512	3,855	4,191	4,504	4,944	0	30	67	97	127	164	194	224	261	291
2,600	925	1,163	1,394	1,626	1,849	2,073	2,289	2,498	2,707	2,916	3,117	3,311	3,497	3,684	4,042	4,385	4,698	5,130	0	37	67	104	142	172	209	246	276	313
2,800	962	1,215	1,462	1,700	1,939	2,170	2,394	2,617	2,834	3,050	3,259	3,460	3,654	3,848	4,206	4,549	4,862	5,272	0	37	75	112	149	186	224	261	298	336
3,000	999	1,260	1,521	1,775	2,021	2,259	2,498	2,729	2,953	3,169	3,385	3,594	3,788	3,982	4,347	4,683	4,981	5,369	0	37	82	119	164	201	239	283	321	365
3,200	1,022	1,298	1,573	1,834	2,095	2,341	2,588	2,826	3,057	3,281	3,497	3,706	3,907	4,101	4,459	4,780	5,071	5,421	0	45	89	127	172	216	261	298	343	388
3,400	1,051	1,335	1,618	1,894	2,163	2,416	2,670	2,916	3,147	3,378	3,594	3,803	4,004	4,176	4,541	4,847	5,116	5,421	0	45	89	134	179	231	276	321	365	410
3,450	1,051	1,342	1,633	1,909	2,177	2,438	2,692	2,938	3,169	3,400	3,617	3,825	4,027	4,213	4,564	4,862	5,116	5,406	0	45	89	142	186	231	276	321	373	418
3,600	1,074	1,372	1,663	1,946	2,222	2,483	2,744	2,990	3,229	3,460	3,676	3,885	4,079	4,265	4,601	4,884	5,116		0	45	97	142	194	239	291	336	388	433
3,800	1,089	1,394	1,700	1,991	2,267	2,543	2,804	3,057	3,296	3,520	3,736	3,945	4,131	4,310	4,623	4,884	5,078		0	52	104	157	201	254	306	358	410	462
4,000	1,096	1,417	1,730	2,028	2,312	2,588	2,856	3,110	3,348	3,572	3,781	3,982	4,161	4,333	4,623	4,840			0	52	104	164	216	268	321	373	433	485
4,200	1,111	1,439	1,752	2,058	2,349	2,625	2,893	3,147	3,385	3,609	3,811	3,997	4,168	4,325	4,579				0	60	104	172	224	283	336	395	447	507
4,400	1,111	1,447	1,775	2,081	2,379	2,655	2,923	3,169	3,400	3,617	3,818	3,997	4,154	4,295	4,511				0	60	119	179	239	298	358	410	470	529
4,600	1,111	1,454	1,782	2,095	2,394	2,677	2,938	3,184	3,408	3,617	3,803	3,967	4,109	4,228					0	60	127	186	246	306	373	433	492	559
4,800	1,111	1,454	1,790	2,103	2,401	2,685	2,938	3,184	3,400	3,594	3,766	3,915	4,042						0	67	127	194	261	321	388	447	515	582
5,000	1,096	1,454	1,790	2,103	2,401	2,677	2,931	3,162	3,371	3,557	3,714	3,840							0	67	134	201	268	336	403	470	537	604
5,200	1,081	1,447	1,782	2,095	2,394	2,662	2,908	3,132	3,326	3,490	3,632								0	67	142	209	276	350	418	492	559	626
5,400	1,066	1,424	1,767	2,081	2,371	2,640	2,871	3,080	3,266	3,415									0	75	142	216	291	365	433	507	582	649
5,600	1,044	1,409	1,745	2,058	2,341	2,595	2,826	3,020	3,184	3,311									0	75	149	224	298	373	447	529	604	679
5,800	1,014	1,380	1,715	2,021	2,304	2,550	2,759	2,938	3,080										0	75	157	231	313	388	470	544	626	701
6,000	977	1,342	1,678	1,976	2,252	2,483	2,677	2,841											0	82	164	239	321	403	485	567	641	723
6,200	940	1,305	1,633	1,924	2,185	2,409	2,588	2,722											0	82	164	246	336	418	500	582	664	746
6,400	895	1,253	1,581	1,864	2,110	2,312	2,476												0	89	172	261	343	433	515	604	686	776
6,600	850	1,201	1,521	1,790	2,028	2,207													0	89	179	268	358	440	529	619	708	798
6,800	790	1,141	1,447	1,708	1,924	2,095													0	89	186	276	365	455	544	641	731	820
7,000	731	1,074	1,372	1,618	1,812														0	97	186	283	373	470	567	656	753	843
7,200	664	999	1,283	1,514	1,693														0	97	194	291	388	485	582	679	776	872
7,400	589	917	1,186	1,402															0	97	201	298	395	500	597	694	798	895
7,600	507	820	1,081	1,275															0	104	201	306	395	507	611	716	813	917

Table 4 - Power ratings for section B V-belt

Rpm of small pulley	Pitch diameter of small pulley (mm)																	
	115	120	125	130	135	140	145	150	155	160	165	170	175	185	190	200	220	240
200	507	544	589	626	671	708	746	790	828	865	910	947	984	1,066	1,104	1,178	1,298	1,447
870	1,626	1,782	1,931	2,081	2,230	2,379	2,528	2,677	2,826	2,968	5,354	3,259	3,408	3,691	3,833	4,116	4,534	5,078
400	8,87	962	1,037	1,111	1,193	1,268	1,342	1,417	1,491	1,566	1,633	1,708	1,782	1,931	1,998	2,148	2,364	2,647
600	1,223	1,335	1,439	1,551	1,655	1,767	1,872	1,984	2,088	2,192	2,297	2,401	2,506	2,714	2,819	3,028	3,333	3,743
800	1,529	1,670	1,812	1,946	2,088	2,230	2,364	2,506	2,640	2,774	2,916	3,050	3,184	3,445	3,579	3,840	4,236	4,743
1,000	1,805	1,976	2,148	2,319	2,491	2,655	2,826	2,990	3,154	3,318	3,482	3,646	3,803	4,124	4,280	4,601	5,063	5,667
1,160	2,013	2,207	2,401	2,595	2,789	2,975	3,169	3,356	3,542	3,721	3,907	4,086	4,273	4,631	4,802	5,153	5,667	6,338
1,200	2,066	2,267	2,468	2,662	2,856	3,057	3,251	3,438	3,632	3,825	4,012	4,198	4,385	4,750	4,929	5,287	5,816	6,495
1,400	2,304	2,528	2,759	2,983	3,199	3,423	3,639	3,855	4,072	4,288	4,497	4,705	4,914	5,317	5,518	5,913	6,488	7,226
1,750	2,670	2,938	3,207	3,475	3,736	3,989	4,250	4,497	4,750	4,996	5,235	5,473	5,712	6,174	6,398	6,831	7,457	8,277
1,600	2,520	2,774	3,020	3,274	3,520	3,758	3,997	4,236	4,474	4,705	4,937	5,160	5,391	5,831	6,048	6,465	7,077	7,830
1,800	2,714	2,990	3,266	3,535	3,803	4,064	4,325	4,586	4,832	5,086	5,332	5,570	5,809	6,279	6,503	6,942	7,606	8,352
2,000	2,893	3,192	3,482	3,773	4,057	4,340	4,616	4,884	5,153	5,421	5,675	5,928	6,174	6,659	6,890	7,345	7,979	8,725
2,200	3,042	3,363	3,676	3,982	4,280	4,579	4,869	5,153	5,429	5,705	5,966	6,227	6,480	6,972	7,203	7,681	8,277	8,948
2,400	3,177	3,512	3,840	4,161	4,474	4,780	5,078	5,369	5,660	5,936	6,204	6,465	6,719	7,203	7,435	7,830	8,426	9,098
2,600	3,289	3,632	3,975	4,303	4,631	4,944	5,250	5,548	5,831	6,115	6,383	6,637	6,890	7,360	7,606	7,979	8,501	9,023
2,800	3,371	3,729	4,079	4,415	4,750	5,063	5,376	5,667	5,958	6,234	6,495	6,749	6,980	7,420	7,606	7,979	8,426	
3,000	3,430	3,796	4,154	4,497	4,825	5,145	5,451	5,742	6,025	6,286	6,540	6,778	7,002	7,397	7,606	7,904		
3,200	3,460	3,833	4,191	4,534	4,869	5,183	5,481	5,764	6,033	6,286	6,517	6,734	6,928	7,271	7,412			
3,400	3,468	3,840	4,198	4,541	4,862	5,168	5,459	5,727	5,981	6,204	6,420	6,607	6,771					
3,600	3,445	3,818	4,168	4,504	4,817	5,108	5,384	5,630	5,854	6,063	6,242	6,391						
3,800	3,393	3,758	4,101	4,422	4,720	4,996	5,250	5,473	5,667	5,839								
4,000	3,311	3,669	3,997	4,303	4,579	4,832	5,056	5,242	5,406									
4,200	3,192	3,535	3,848	4,131	4,385	4,608	4,795											
4,400	3,042	3,371	3,661	3,915	4,139	4,325												
4,600	2,856	3,162	3,423	3,654														
4,800	2,632	2,908	3,147															
5,000	2,379	2,617																

Rpm of small pulley	Additional power per belt for speed ratio, watts									
	1-1.01	1.02-1.04	1.05-1.08	1.09-1.12	1.13-1.18	1.19-1.24	1.25-1.34	1.35-1.51	1.52-1.99	2 and over
200	0	7	15	22	30	37	45	52	60	60
870	0	30	60	89	119	157	186	216	246	276
400	0	15	30	45	60	67	82	97	112	127
600	0	22	45	60	82	104	127	149	172	186
800	0	30	60	82	112	142	172	194	224	254
1,000	0	37	67	104	142	179	209	246	283	313
1,160	0	37	82	119	164	201	246	283	328	365
1,200	0	45	82	127	172	209	254	298	336	380
1,400	0	52	97	149	194	246	298	343	395	440
1,750	0	60	127	186	246	306	373	433	492	552
1,600	0	60	112	172	224	283	336	395	447	507
1,800	0	60	127	186	254	313	380	440	507	567
2,000	0	67	142	209	283	350	425	492	567	634
2,200	0	75	157	231	313	388	462	544	619	694
2,400	0	82	172	254	336	425	507	589	679	761
2,600	0	89	186	276	365	455	552	641	731	820
2,800	0	97	194	298	395	492	589	686	7502	887
3,000	0	104	209	313	425	529	634	738	843	947
3,200	0	112	224	336	447	567	679	790	902	1,014
3,400	0	119	239	358	477	597	716	835	954	1,074
3,600	0	127	254	380	507	634	761	887	1,014	1141
3,800	0	134	268	403	537	671	805	940	1,066	1,201
4,000	0	142	283	425	567	701	843	984	1,126	1,268
4,200	0	149	298	440	589	738	887	1,037	1,186	1,327
4,400	0	157	313	462	619	776	932	1,081	1,238	1,394
4,600	0	164	321	485	649	813	969	1,133	1,298	1,454
4,800	0	172	336	507	679	843	1,014	1,186	1,350	1,521
5,000	0	179	350	529	701	880	1,059	1,230	1,409	1,581

Table 5 - Power ratings for section C V-belt

Rpm of Small pulley	Pitch diameter of small pulley (mm)															Additional power per belt for speed ratio, watts									
	175	190	200	215	230	240	255	265	280	290	305	315	330	355	405	1 - 1.01	1.02-1.04	1.05-1.08	1.09-1.12	1.13-1.18	1.19-1.24	1.25-1.35	1.35-1.51	1.52-1.99	2 and over
100	761	858	954	1,051	1,148	1,238	1,335	1,424	1,521	1,611	1,708	1,797	1,887	2,073	2,431	0	7	22	30	37	52	60	67	82	89
200	1,342	1,521	1,708	1,887	2,058	2,237	2,416	2,588	2,767	2,938	3,110	3,281	3,453	3,796	4,474	0	22	37	60	82	97	119	134	157	179
300	1,857	2,125	2,379	2,640	2,893	3,154	3,408	3,654	3,907	4,161	4,407	4,653	4,899	5,391	6,353	0	30	60	89	119	149	179	209	239	261
400	2,334	2,677	3,013	3,348	3,676	4,004	4,333	4,661	4,981	5,302	5,623	5,943	6,256	6,883	8,128	0	37	82	119	157	194	231	276	313	350
500	2,781	3,192	3,602	4,012	4,415	4,810	5,212	5,608	5,995	6,383	6,771	7,151	7,532	8,277	9,769	0	52	97	149	194	246	291	343	395	440
600	3,199	3,684	4,161	4,638	5,108	5,578	6,040	6,503	6,957	7,405	7,830	8,277	8,725	9,620	11,260	0	60	119	179	239	291	350	410	470	529
700	3,594	4,146	4,690	5,235	5,772	6,301	6,831	7,353	7,830	8,352	8,874	9,396	9,843	10,813	12,677	0	67	134	209	276	343	410	477	552	619
800	3,960	4,579	5,198	5,802	6,398	6,987	7,606	8,128	8,725	9,247	9,843	10,365	10,887	12,006	14,019	0	82	157	231	313	395	470	544	626	708
870	4,213	4,869	5,526	6,174	6,816	7,442	8,054	8,650	9,247	9,843	10,440	14,019	11,633	12,751	14,839	0	82	172	254	343	425	515	597	679	768
900	4,310	4,996	5,667	6,331	6,987	7,606	8,277	8,874	9,545	10,142	10,738	11,335	11,931	13,050	15,138	0	89	179	261	350	440	529	619	708	790
1,000	4,638	5,384	6,115	6,831	7,532	8,203	8,948	9,620	10,291	10,887	11,558	12,155	12,751	13,945	16,182	0	97	194	291	395	492	589	686	783	880
1,100	4,944	5,742	6,532	7,300	8,054	8,799	9,545	10,216	10,962	11,633	12,304	12,975	13,572	14,765	17,002	0	104	216	321	433	537	649	8210	865	969
1,160	5,116	5,951	6,763	7,532	8,352	9,098	9,843	10,589	11,335	12,006	12,677	13,348	14,019	15,212	17,449	0	112	224	418	455	567	679	798	910	1,022
1,200	5,227	6,085	6,920	7,755	8,501	9,321	10,067	10,813	11,558	12,304	12,975	13,646	14,243	15,511	17,673	0	119	239	350	470	589	701	820	940	1,059
1,300	5,488	6,391	7,278	8,128	8,948	9,769	10,589	11,335	12,155	12,826	13,572	14,243	14,839	16,107	18,195	0	127	254	380	507	634	761	887	1,022	1,148
1,400	5,734	6,681	7,606	8,501	9,396	10,216	11,036	11,857	12,602	13,348	14,019	14,690	15,361	16,555	18,493	0	134	276	410	552	686	820	962	1,096	1,230
1,500	5,951	6,935	7,904	8,799	9,769	10,589	11,409	12,229	13,050	13,721	14,467	15,138	15,734	16,853	18,568	0	149	291	440	589	731	880	1,029	1,178	1,320
1,600	6,145	7,166	8,128	9,098	9,769	10,962	11,782	12,602	13,348	14,094	14,765	15,436	15,958	17,002		0	157	313	470	626	783	940	1,096	1,253	1,409
1,700	6,309	7,368	8,426	9,396	10,067	11,186	12,080	12,826	13,646	14,317	14,989	15,585	16,107	17,002		0	164	336	500	664	835	999	1,163	1,335	1,499
1,750	6,391	7,457	8,501	9,470	10,440	11,335	12,155	12,975	13,721	14,392	15,063	15,585	16,107	17,002		0	172	343	515	686	858	1,029	1,201	1,372	1,544
1,800	6,458	7,532	8,576	9,545	10,291	11,409	12,229	13,050	13,795	14,467	15,063	15,585	16,107			0	179	350	529	708	880	1,059	1,230	1,409	1,588
1,900	6,577	7,681	8,725	9,769	10,514	11,558	12,379	13,199	13,870	14,467	15,063	15,511	15,958			0	186	373	559	746	932	1,119	1,305	1,491	1,670
2,000	6,667	7,755	8,874	9,843	10,664	11,707	12,453	13,199	13,870	14,467	14,914					0	194	395	589	783	977	1,171	1,372	1,566	1,760
2,100	6,734	7,904	8,948	9,918	10,813	11,707	12,453	13,199	13,795	14,243						0	209	410	619	820	1,029	1,230	1,439	1,648	1,849
2,200	6,763	7,904	8,948	9,992	10,887	11,707	12,379	13,050	13,572							0	216	433	649	865	1,074	1,290	1,506	1,723	1,939
2,300	6,771	7,904	8,948	9,918	10,887	11,558	12,229	12,826								0	224	447	679	902	1,126	1,350	1,573	1,805	2,028
2,400	6,749	7,904	8,948	9,843	10,664	11,409	12,006									0	239	470	701	940	1,178	1,409	1,641	1,879	2,118
2,500	6,696	7,830	8,799	9,769	10,514	11,186										0	246	492	731	977	1,223	1,469	1,715	1,961	2,200
2,600	6,607	7,681	8,725	9,545	10,291	10,813										0	254	507	761	1,022	1,275	1,529	1,782	2,036	2,289
2,700	6,488	7,532	8,501	9,321	9,918											0	261	529	790	1,059	1,320	1,588	1,849	2,118	2,379
2,800	6,331	7,375	8,277	9,023												0	276	552	820	1,096	1,372	1,641	1,916	2,192	2,468
2,900	6,137	7,144	7,979	8,650												0	283	567	850	1,133	1,417	1,700	1,984	2,274	2,558
3,000	5,913	6,860	7,606													0	291	589	880	1,178	1,469	1,760	2,058	2,349	2,640
3,100	5,652	6,540	7,233													0	306	604	910	1,215	1,514	1,820	2,125	2,431	2,729
3,200	5,347	6,174														0	313	626	940	1,253	1,566	1,879	2,192	2,506	2,819
3,300	5,004	5,757														0	321	649	969	1,290	1,618	1,939	2,259	2,588	2,908
3,400	4,623															0	336	664	999	1,335	1,663	1,998	2,327	2,662	2,998

Table 6 - Power ratings for section D V-belt

Rpm of Small pulley	Pitch diameter of small pulley (mm)																	
	305	315	330	340	355	370	380	395	405	430	455	480	510	535	560	585	610	
50	1,476	1,581	1,685	1,790	1,894	1,998	2,103	2,200	2,304	2,513	2,714	2,916	3,117	3,318	3,512	3,714	3,907	
100	2,617	2,811	3,013	3,207	3,400	3,594	3,788	3,982	4,168	4,556	4,937	5,317	5,690	6,063	6,435	6,808	7,181	
150	3,639	3,922	4,206	4,489	4,772	5,048	5,332	5,608	5,884	6,435	6,987	7,532	8,054	8,576	9,172	9,694	10,216	
200	4,594	4,959	5,324	5,690	6,055	6,420	6,778	7,136	7,532	8,203	8,948	9,620	10,291	11,036	11,707	12,379	13,050	
250	5,488	5,936	6,383	6,831	7,271	7,681	8,128	8,576	9,023	9,918	10,738	11,633	12,453	13,348	14,168	14,989	15,809	
300	6,331	6,860	7,390	7,904	8,426	8,948	9,470	9,992	10,514	11,484	12,528	13,497	14,541	15,511	16,480	17,449	18,419	
350	7,136	7,755	8,352	8,948	9,545	10,142	10,738	11,335	11,931	13,050	14,168	15,361	16,480	17,599	18,717	19,761	20,880	
400	7,904	8,576	9,247	9,918	10,589	11,260	11,931	12,602	13,199	14,541	15,809	17,077	18,344	19,537	20,805	21,998	23,191	
450	8,650	9,396	10,142	10,887	11,633	12,379	13,050	13,795	14,541	15,958	17,375	18,717	20,134	21,476	22,744	24,086	25,354	
500	9,321	10,142	10,962	11,782	12,602	13,348	14,168	14,989	15,734	17,300	18,792	20,283	21,774	23,191	24,683	26,025	27,442	
550	9,992	10,887	11,782	12,677	13,497	14,392	15,212	16,033	16,927	18,568	20,208	21,774	23,340	24,906	26,398	27,889	29,306	
600	10,664	11,558	12,528	13,497	14,392	15,287	16,182	17,151	18,046	19,761	21,476	23,191	24,832	26,472	28,038	29,530	31,021	
650	11,260	12,229	13,273	14,243	15,212	16,182	17,151	18,121	19,090	20,880	22,744	24,459	26,174	27,889	29,530	31,096	32,587	
690	11,707	12,751	13,795	14,839	15,883	16,853	17,897	18,866	19,836	21,774	23,639	25,428	27,218	28,933	30,574	32,214	33,706	
700	11,782	12,901	13,945	14,989	16,033	17,002	18,046	19,015	20,059	21,998	23,862	25,652	27,442	29,157	30,872	32,438	34,004	
750	12,304	13,423	14,541	15,660	16,778	17,822	18,866	19,910	20,954	22,968	24,906	26,771	28,635	30,350	32,065	33,631	35,197	
800	12,826	14,019	15,138	16,331	17,449	18,568	19,686	20,730	21,774	23,862	25,876	27,815	29,604	31,394	33,109	34,675	36,166	
850	13,273	14,541	15,734	16,927	18,121	19,239	20,358	21,476	22,595	24,683	26,696	28,709	30,499	32,289	33,929	35,495	36,987	
870	13,497	14,690	15,958	17,151	18,344	19,463	20,656	21,774	22,893	24,981	27,069	29,008	30,872	32,587	34,228	35,794	37,210	
900	13,721	14,989	16,256	17,449	18,643	19,836	21,029	22,147	23,266	25,428	27,516	29,455	31,319	33,035	34,675	36,166	37,509	
950	14,094	15,436	16,704	17,971	19,239	20,432	21,625	22,744	23,937	26,100	28,187	30,126	31,916	33,631	35,197	36,614	37,882	
1,000	14,467	15,809	17,151	18,419	19,686	20,954	22,147	23,340	24,459	26,621	28,709	30,648	32,438	34,004	35,495	36,838	37,956	
1,050	14,765	16,182	17,524	18,866	20,134	21,402	22,595	23,788	24,906	27,143	29,157	31,021	32,736	34,302	35,644	36,838		
1,100	15,063	16,480	17,822	19,164	20,507	21,774	22,968	24,161	25,279	27,442	29,455	31,319	32,885	34,377	35,570			
1,150	15,287	16,778	18,121	19,463	20,805	22,073	23,266	24,459	25,578	27,740	29,679	31,394	32,960	34,228				
1,160	15,361	16,778	18,195	19,537	20,880	22,147	23,340	24,534	25,652	27,815	29,679	31,394	32,885	34,153				
1,200	15,511	16,927	18,344	19,761	21,029	22,296	23,564	24,683	25,801	27,889	29,753	31,394	32,811					
1,250	15,660	17,151	18,568	19,910	21,252	22,446	23,713	24,832	25,950	27,964	29,679	31,245						
1,300	15,809	17,226	18,643	20,059	21,327	22,595	23,788	24,906	25,950	27,889	29,530	30,872						
1,350	15,809	17,300	18,717	20,059	21,402	22,595	23,788	24,832	25,876	27,665	29,231							
1,400	15,883	17,375	18,717	20,059	21,327	22,520	23,713	24,757	25,727	27,367								
1,450	15,809	17,300	18,717	19,985	21,252	22,446	23,490	24,534	25,428	26,920								
1,500	15,734	17,226	18,568	19,910	21,103	22,222	23,266	24,161	24,981									
1,550	15,660	17,077	18,419	19,686	20,805	21,924	22,893	23,713	24,534									
1,600	15,436	16,853	18,195	19,388	20,507	21,551	22,446	23,191										
1,650	15,212	16,629	17,897	19,090	20,134	21,029	21,849											
1,700	14,989	16,331	17,524	18,643	19,612	20,507												
1,750	14,616	15,883	17,077	18,121	19,015													
1,800	14,243	15,436	16,555	17,524														
1,850	13,795	14,989	16,033															
1,900	13,273	14,392	15,361															
1,950	12,677	13,721																
2,000	12,080																	

Rpm of Small pulley	Additional power per belt for speed ratio, watts									
	1 -1.01	1.02-1.04	1.05-1.08	1.09-1.12	1.13-1.18	1.19-1.24	1.25-1.35	1.35-1.51	1.52-1.99	2 and over
50	0	15	37	52	67	89	104	119	142	157
100	0	37	67	104	142	172	209	246	276	313
150	0	52	104	157	209	261	313	262	418	470
200	0	67	142	209	276	350	418	485	552	626
250	0	89	172	261	350	433	522	604	694	783
300	0	104	209	313	418	522	626	789	835	940
350	0	119	246	365	485	604	731	850	969	1,096
400	0	142	276	418	559	694	835	969	1,111	1,253
450	0	157	313	470	626	783	940	1,096	1,253	1,409
500	0	172	350	522	694	865	1,044	1,215	1,387	1,566
550	0	194	380	574	761	954	1,148	1,335	1,529	1,715
600	0	209	418	626	835	1,044	1,253	1,462	1,663	1,872
650	0	224	455	679	902	1,126	1,357	1,581	1,805	2,028
690	0	239	477	716	962	1,201	1,439	1,678	1,916	2,155
700	0	246	485	731	969	1,215	1,462	1,700	1,946	2,185
750	0	261	522	783	1,044	1,305	1,559	1,820	2,081	2,341
800	0	276	559	835	1,111	1,387	1,663	1,946	2,222	2,498
850	0	298	589	887	1,178	1,476	1,767	2,066	2,364	2,655
870	0	306	604	902	1,208	1,551	1,812	2,110	2,416	2,722
900	0	313	626	940	1,253	1,566	1,872	2,185	2,498	2,811
950	0	328	664	992	1,320	1,648	1,976	2,312	2,640	2,968
1,000	0	350	694	1,044	1,387	1,737	2,081	2,431	2,774	3,124
1,050	0	365	731	1,096	1,462	1,820	2,185	2,550	2,916	3,281
1,100	0	380	768	1,148	1,529	1,909	2,289	2,670	3,057	3,438
1,150	0	403	798	1,201	1,596	1,998	2,394	2,796	3,192	3,594
1,160	0	403	805	1,208	1,611	2,013	2,416	2,819	3,221	3,624
1,200	0	418	835	1,253	1,670	2,081	2,498	2,916	3,333	3,751
1,250	0	433	872	1,298	1,737	2,170	2,602	3,035	3,475	3,907
1,300	0	455	902	1,350	1,805	2,259	2,707	3,162	3,609	4,064
1,350	0	470	940	1,402	1,872	2,341	2,811	3,281	3,751	4,221
1,400	0	485	977	1,454	1,946	2,431	2,916	3,400	3,885	4,377
1,450	0	507	1,007	1,506	2,013	2,520	3,020	3,520	4,027	4,534
1,500	0	522	1,044	1,559	2,081	2,602	3,124	3,646	4,168	4,690
1,550	0	537	1,081	1,611	2,155	2,692	3,229	3,766	4,303	4,847
1,600	0	559	1,111	1,663	2,222	2,781	3,333	3,885	4,444	4,996
1,650	0	574	1,148	1,715	2,289	2,863	3,438	4,012	4,586	5,153
1,700	0	589	1,178	1,767	2,364	2,953	3,542	4,131	4,720	5,309
1,750	0	611	1,215	1,820	2,431	3,035	3,646	4,250	4,862	5,466
1,800	0	626	1,253	1,872	2,498	3,124	3,751	4,377	4,996	5,623
1,850	0	641	1,283	1,924	2,573	3,214	3,855	4,497	5,138	5,779
1,900	0	656	1,320	1,976	2,640	3,296	3,960	4,616	5,280	5,936
1,950	0	679	1,357	2,028	2,707	3,385	4,064	4,735	5,414	6,092
2,000	0	694	1,387	2,081	2,781	3,475	4,168	4,862	5,555	6,249

Table 7 - Power ratings for section E V-belt

Rpm of Small pulley	Pitch diameter of small pulley (mm)																
	455	480	510	535	560	585	610	635	660	685	710	735	760	785	810	865	915
50	3,385	3,684	3,975	4,273	4,564	4,855	5,138	5,429	5,712	6,003	6,286	6,570	6,853	7,136	7,412	7,979	1,044
100	6,063	6,614	7,166	7,681	8,277	8,799	31,692	9,918	10,440	10,962	11,484	12,006	12,528	13,050	13,572	14,616	15,660
150	8,501	9,247	10,067	10,887	11,633	12,453	13,199	13,945	14,765	15,511	16,256	17,002	17,822	18,568	19,314	20,805	22,222
200	10,738	11,782	12,751	13,795	14,839	23,266	16,853	17,822	18,792	19,761	20,730	21,700	22,669	23,639	24,608	26,547	28,411
250	12,826	14,094	15,361	16,555	17,822	19,015	20,208	21,402	22,595	23,788	24,981	26,174	27,293	28,486	22,147	31,841	34,078
300	14,839	16,331	17,748	19,164	20,656	22,073	23,415	24,832	26,249	27,591	28,933	30,275	31,618	32,960	34,228	36,838	39,373
350	16,704	18,419	20,059	21,700	23,266	24,906	26,472	28,038	29,604	31,096	32,662	34,153	35,644	37,061	38,553	41,386	44,145
400	18,493	20,358	22,147	24,012	25,801	27,516	29,306	31,021	32,736	34,377	36,092	37,658	39,298	40,864	42,430	45,488	48,396
435	19,686	29,082	23,639	25,503	27,442	29,306	31,170	32,960	19,836	36,539	38,254	39,970	41,685	43,325	44,966	48,098	51,080
450	20,134	22,222	24,235	26,174	28,113	30,052	31,916	33,780	35,644	37,434	39,224	40,939	42,654	44,295	45,935	49,142	52,124
500	21,700	23,937	26,100	28,187	30,275	32,363	34,377	36,316	38,254	40,193	41,983	43,847	45,562	47,352	48,992		
550	23,191	25,503	27,815	30,052	32,289	34,451	36,539	38,627	40,641	42,579	44,518	46,383	48,172	49,887	51,602	54,809	57,717
575	23,862	26,249	28,635	30,947	33,184	35,421	37,583	39,671	41,685	43,698	45,637	47,501	49,291	51,006	52,721	55,853	58,761
600	24,534	26,994	29,381	31,767	34,078	36,316	38,553	40,641	42,729	44,742	46,681	48,545	50,335	52,050	53,690	56,748	59,507
650	25,727	28,337	30,872	33,333	35,719	38,031	40,268	42,430	44,518	46,532	48,396	50,260	52,050	53,690	55,256	58,090	60,551
690	26,621	29,306	31,916	34,377	36,838	39,149	41,461	43,623	45,711	47,650	49,589	51,379	53,019	54,660	56,077	58,687	
700	26,845	29,530	32,140	34,675	37,061	39,448	41,685	43,847	45,935	47,949	49,813	51,602	53,243	54,809	56,226	58,761	
750	27,815	30,574	33,258	35,794	38,254	40,641	42,878	45,040	47,054	48,992	50,782	52,423	53,989	55,406	56,599		
800	28,635	31,469	34,153	36,763	39,224	41,610	43,773	45,861	47,874	49,664	51,304	52,796	54,138	55,331			
850	29,306	32,214	34,899	37,509	39,970	42,281	44,444	46,383	48,247	49,887	51,379	52,646					
900	29,903	32,736	35,495	38,031	40,417	42,654	44,667	46,532	48,247	49,664							
950	30,275	33,184	35,868	38,329	40,641	42,729	44,667	46,308	47,799								
1,000	30,574	33,407	36,017	38,404	40,641	42,579	44,295										
1,050	30,648	33,407	35,943	38,254	40,268	42,057											
1,100	30,574	33,258	35,644	37,807	39,671												
1,150	30,275	32,885	35,122	37,061													
1,200	29,903	32,289	34,377														
1,250	29,231	31,469															
1,300	28,411	30,499															

Rpm of Small pulley	Additional power per belt for speed ratio, watts									
	1 - 1.01	1.02-1.04	1.05-1.08	1.09-1.12	1.13-1.18	1.19-1.24	1.25-1.35	1.35-1.51	1.52-1.99	2 and over
50	0	30	67	97	134	164	201	231	268	298
100	0	67	134	201	268	328	395	462	529	597
150	0	97	201	298	395	500	597	694	798	895
200	0	134	268	395	529	664	798	925	1,059	1,193
250	0	164	336	500	664	828	992	1,163	1,327	1,491
300	0	201	395	597	798	992	1,193	1,394	1,588	1,790
350	0	231	462	694	932	1,163	1,394	1,626	1,857	2,088
400	0	268	529	798	1,059	1,327	1,588	1,857	2,125	2,386
435	0	291	574	865	1,156	1,439	1,730	2,021	2,312	2,595
450	0	298	597	895	1,193	1,491	1,790	2,088	2,386	2,685
500	0	328	664	992	1,327	1,655	1,991	2,319	2,655	2,983
550	0	365	731	1,096	1,462	1,827	2,185	2,550	2,916	3,281
575	0	380	761	1,133	1,529	1,909	2,289	2,670	3,050	3,430
600	0	395	798	1,193	1,588	1,991	2,386	2,781	3,184	3,579
650	0	433	865	1,290	1,723	2,155	2,588	3,020	3,445	3,878
690	0	455	917	1,372	1,834	2,289	2,744	3,207	3,661	4,116
700	0	462	932	1,394	1,857	2,319	2,781	3,251	3,714	4,176
750	0	500	999	1,491	1,991	2,491	2,983	3,482	3,982	4,474
800	0	529	1,059	1,588	2,125	2,655	3,184	3,714	4,243	4,772
850	0	567	1,126	1,693	2,252	2,819	3,385	3,945	4,511	5,071
900	0	597	1,193	1,790	2,386	2,983	3,579	4,176	4,772	5,369
950	0	634	1,260	1,887	2,520	3,154	3,781	4,407	5,041	5,675
1,000	0	664	1,327	1,991	2,655	3,318	3,982	4,638	5,309	5,973
1,050	0	694	1,394	2,088	2,789	3,482	4,176	4,877	5,772	6,271
1,100	0	731	1,462	2,185	2,916	3,646	4,377	5,108	5,839	6,570
1,150	0	761	1,529	2,289	3,050	3,818	4,579	5,339	6,100	6,868
1,200	0	798	1,596	2,386	3,184	3,982	4,772	5,570	6,368	7,166
1,250	0	828	1,663	2,483	3,318	4,146	4,974	5,802	6,629	7,464
1,300	0	865	1,730	2,588	3,453	4,310	5,175	6,033	6,898	7,763

Table 8 – Service factors for components of farm implements

Function of operating unit	Service factor
Cutting (sickle bars)	1.5
Cutting (sickle bars with counter weight)	1.3
Cutting (reels)	1.0
Pickup attachments for combines	1.0
Feeding (front cylinder beaters, feeder rolls, draper canvas, etc.)	1.3
Threshing, chopping, etc. (combine cylinders, corn-sheller cylinders, hammer-mill motors, etc)	1.5
Separation (rear cylinder beaters, straw walkers, etc.)	1.0
Cleaning (fans, cleaning shoes, sieves, etc.)	1.0
Expelling (straw spreaders, husk blowers, etc.)	1.3
Delivery (augers, elevators, etc.)	1.3
Traction for self-propelled machines	1.3
Hydraulic system, oil pumps	1.3

Table 9 – Correction factors corresponding to various degrees of contact on small pulley

Arc of contact, degrees	Correction factor	Arc of contact, degrees	Correction factor
180	1.00	133	0.87
174	0.99	127	0.85
169	0.97	120	0.82
163	0.96	113	0.80
157	0.94	106	0.77
151	0.93	90	0.73
145	0.91	91	0.70
139	0.89	83	0.65

7.5 Correction for belt length

Since short belts are subjected to the action of load a greater number of times, the hours of life of a short belt are less than those of a long belt. A correction factor for belt-length should be applied to achieve a proper design of belt drives. The belt-length correction factor is specified in Table 10.

7.6 Corrected power rating

The corrected power is obtained by getting the product of the arc correction factor, belt-length correction factor and the power rating of the selected belt from Tables 3-7**.** In getting the power rating from Tables 3-7, an additional power to account for the speed ratio is added.

7.7 Multiple belt drives

In order to determine the number of belts to be used in multiple belt drives, the power capacity of the drive (section 7.3.2) is divided by the corrected power rating (see section 7.6)

Table 10 – Belt length and belt length correction factor

Length designation	Outside length					Belt correction factor				
	A	B	C	D	E	A	B	C	D	E
26	713.74	-	-	-	-	0.81	-	-	-	-
31	840.74	-	-	-	-	0.84	-	-	-	-
35	942.34	960.12	-	-	-	0.87	0.81	-	-	-
38	1,018.54	1,036.32	-	-	-	0.88	0.83	-	-	-
42	1,120.14	1,137.92	-	-	-	0.90	0.85	-	-	-
46	1,221.74	1,239.52	-	-	-	0.92	0.87	-	-	-
51	1,348.74	1,366.52	1,402.08	-	-	0.94	0.89	0.80	-	-
55	1,450.34	1,468.12	1,503.68	-	-	0.96	0.90	-	-	-
60	1,557.34	1,595.12	1,630.68	-	-	0.98	0.92	0.82	-	-
68	1,780.54	1,798.32	1,833.88	-	-	1.00	0.95	0.85	-	-
75	1,958.34	1,976.12	2,011.68	-	-	1.02	0.97	0.87	-	-
80	2,085.34	-	-	-	-	1.04	-	-	-	-
81	-	2,128.52	2,164.08	-	-		0.98	0.89	-	-
85	2,212.34	2,230.12	2,265.68	-	-	1.05	0.99	0.90	-	-
90	2,339.34	2,357.12	2,392.68	-	-	1.06	1.00	0.91	-	-
96	2,491.74	-	2,545.08	-	-	1.08	-	0.92	-	-
97	-	2,534.92	2,570.48	-	-	-	1.02	-	-	-
105	2,720.34	2,738.12	2,773.68	-	-	1.10	1.04	0.94	-	-
112	2,898.14	2,915.92	2,951.48	-	-	1.11	1.05	0.95	-	-
120	3,101.34	3,119.12	3,154.68	3,180.08	-	1.13	1.07	0.97	0.86	-
128	3,304.54	3,322.32	3,357.88	3,383.28	-	1.14	1.08	0.98	0.87	-
144	-	3,728.72	3,764.28	3,789.68	-	-	1.11	1.00	0.90	-
158	-	4,048.32	4,119.88	4,145.28	-	-	1.13	1.02	0.92	-
173	-	4,465.32	4,500.88	4,526.28	-	-	1.15	1.04	0.93	-
180	-	4,643.12	4,678.68	4,704.08	4,749.8	-	1.16	1.05	0.94	0.91
195	-	5,024.12	5,059.68	5,085.08	5,130.8	-	1.18	1.07	0.96	0.92
210	-	5,405.12	5,440.68	5,466.08	5,511.8	-	1.19	1.08	0.98	0.94
240	-	6,129.02	6,151.88	6,164.58	6,184.9	-	1.22	1.11	1.00	0.96
270	-	6,891.02	6,913.88	6,926.58	6,946.9	-	1.25	1.14	1.03	0.99
300	-	7,653.02	7,675.88	7,688.58	7,708.9	-	1.27	1.16	1.05	1.01
330	-	-	8,437.88	8,450.58	8,470.9	-	-	1.19	1.07	1.03
360	-	-	9,199.88	9,212.58	9,232.9	-	-	1.21	1.09	1.05
390	-	-	9,961.88	9,974.58	9,994.9	-	-	1.23	1.11	1.07
420	-	-	10,723.88	10,736.58	10,756.9	-	-	1.24	1.12	1.09
480	-	-	-	12,260.58	12,280.9	-	-	-	1.16	1.12
540	-	-	-	13,784.58	13,804.9	-	-	-	1.18	1.14
600	-	-	-	15,308.58	15,328.9	-	-	-	1.20	1.17
660	-	-	-	16,832.58	16,852.9	-	-	-	1.23	1.19

8 Idlers

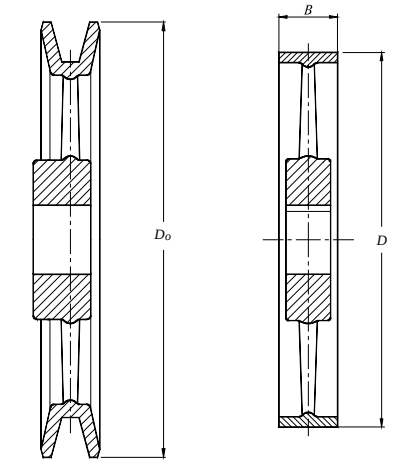
8.1 Idlers may be necessary on agricultural belt drives to provide take-up or to increase the arc of contact to obtain the required drive capacity. If an idler is needed, it should be located on the slack side of the drive.

8.2 An idler should have its axis of rotation perpendicular to the plane of the belt strand on which it runs. The idler mounting should be strong enough to maintain its relationship at all times.

8.3 Idlers may be grooved or flat (Figure 6). If grooved idlers are needed, groove dimensions should be as shown in Table 2. Grooved idlers used as inside idlers (Figure 7), should be placed close to the large pulley. Flat idlers are used as either inside or outside idlers (Figure 7). Table 11 specifies the minimum recommended diameters for idlers.

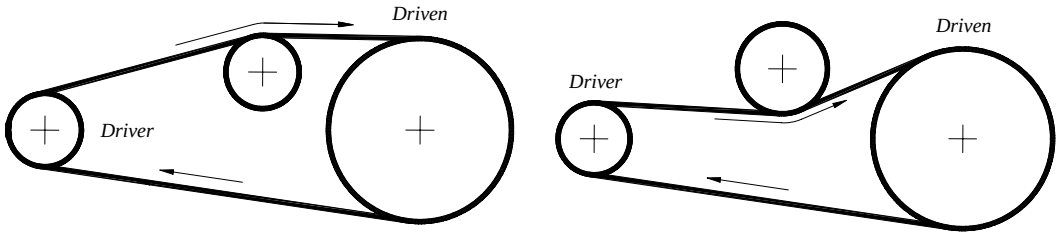
Table 11 - Minimum recommended diameters for idlers, mm

Cross section	Minimum O.D. of grooved inside idler	Minimum O.D of flat inside idler	Minimum O. D. of flat outside idler	Minimum face width of flat idler
A	70	57	108	25
B	102	95	152	32
C	172	146	216	38
D	229	190	343	51



Grooved idler Flat idler

Figure 6 - Types of idlers



Inside idler Outside idler

Figure 7 – Positions of idlers

9 Safety

9.1 Enclosing the drive with covers is recommended for safety and to avoid foreign materials from getting in contact with the drive.

9.2 Make drive inspection on a periodic basis. Inspect belts for wear and tear and for its tightness. Tightness of keys and setscrews should also be inspected periodically.

9.3 Use belts with proper markings.

9.4 Use proper keys as specified in PAES 304:2000.

Annex A
(Informative)

Example of V-belt drive selection

A.1 Given parameters

A 7,457 W split-phase motor running at 1,750 rpm is to be used to drive a rotary pump. The pump should run at approximately 1,175 rpm. The center distance should not exceed 1,118 mm. Space limits the diameter of the driven pulley to 292 mm. Determine the pulley diameters, the belt size, and the number of belts.

A.2 Power capacity of the drive (design power)

The power capacity of the drive is the product of the nameplate rating and the recommended service factor given in Table 8. The obtained power capacity of the drive is:

$$\text{Design Power} = 1.3 \times 7{,}450\,\text{W} = 9{,}685\text{W}$$

A.3 Belt selection

A.3.1 The belt section to be used shall be section B belt (from Figure 5)

A.3.2 The size of the driven pulley that will be used shall be 280 mm. The diameter of the small pulley is:

$$D_S = D_L \times \frac{n_L}{n_S} = 280\,\text{mm} \times \frac{1{,}175\,\text{rpm}}{1{,}750\,\text{rpm}} = 188\,\text{mm}$$

Where:

D_L is the pitch diameter of the large pulley, mm
D_S is the pitch diameter of the small pulley, mm
n_L number of revolutions of the large pulley, rpm
n_S number of revolutions of the small pulley, rpm

A.3.3 Since the limit for center distance is 1,118 mm, use 1,000 mm tentatively. Compute for the length using the equation below.

$$L = 2C + \frac{\pi}{2}(D_L + D_S) + \frac{(D_L - D_S)^2}{4C}$$

$$L = 2 \times 1{,}000\,\text{mm} + \frac{\pi}{2}(280\,\text{mm} + 188\,\text{mm}) + \frac{(280\,\text{mm} - 188\,\text{mm})^2}{4 \times 1{,}000\,\text{mm}} = 2{,}002.12\,\text{mm}$$

A.3.4 Since the obtained length is not a standard length, select a length from stock sizes provided by the manufacturers. A correction for the center distance shall be made using the following equation.

$$C = \frac{b + \sqrt{b^2 - 32(D_L - D_S)^2}}{16}$$

Where:

$$b = 4L_S - 6.28(D_L + D_S)$$

$$L_S = \text{Standard length}$$

A.4 Belt speed

The belt speed is computed as:

$$V = \frac{\pi \times D_S \times n_S}{1{,}000} = \frac{\pi \times 188\,\text{mm} \times 1750\,\text{rpm}}{1{,}000} = 1{,}033.58\,\text{m/min}$$

A.5 Speed ratio

The speed ratio of the drive is computed by:

$$\textit{Speed ratio} = \frac{n_S}{n_L} = \frac{1{,}750\,\text{rpm}}{1{,}175\,\text{rpm}} = 1.48$$

A.6 Power rating of the belt

Given the velocity and the diameter of the small pulley, the closest power rating of the belt from Table 4 for Section B V-belts is given by:

$$\begin{aligned}\text{Power rating} &= \text{table rating} + \text{additional power for speed ratio}\\ &= 6{,}174 + 433\\ &= 6{,}607\,\text{W/belt}\end{aligned}$$

A.7 Arc of contact

The arc of contact is computed from the equation below. The computed arc of contact given the above parameters is 174.78 degrees. The arc of contact correction factor from Table 9 is 0.98.

$$\text{Arc of contact} = 180 - \frac{60(280 - 188)}{1{,}000} = 174.78°$$

A.8 Corrected power rating

The corrected power is the product of the power rating, service factor, arc of contact correction factor, and the belt length correction factor. For the obtained length, the belt length correction factor is 1.00 (Table 10). Therefore, the correct power is:

$$\text{Corrected power rating} = 6{,}607 \text{watts} \times 0.98 \times 1.00 = 6{,}475 \text{ W/ belt}$$

A.9 Required number of belts for multiple drives

The number of belts needed is:

$$\text{Number of belts} = \frac{\text{Power capacity}}{\text{Corrected power rating}} = \frac{9{,}685 \text{ W}}{6{,}475 \text{ W / belt}} = 1.496 \approx 2 \text{ belts}$$

Therefore use two section B belts for this drive.