

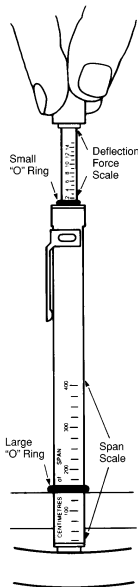
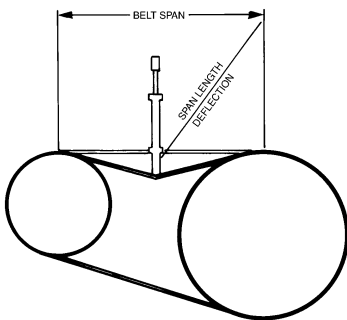
INDUSTRIAL V-BELT TENSION TESTER

GENERAL RULES OF TENSIONING

1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension soon after the first 24 hours of operation.
- 3.a. Over tensioning shortens belt and bearing life.
 - b. Under tensioning, depending on degree, destroys belts quickly.
4. Keep belts free from foreign materials which may cause slip.
5. Make belt drive inspections on a periodic basis. Re-tension drive when belts are first observed to be slipping.

If you want to check the tension in a belt drive, use the procedure below:

1. Check first for pulley groove wear and replace pulley if worn.
2. Tighten up belts as you would normally.
3. Rotate drive by hand to evenly distribute tension in the belts.
4. Use the ProTorque Industrial V & Wedge Belt Tension Tester as follows:
5. Measure the belt span (see below).



6. Position bottom of large "O" Ring on the span scale at the measured value (ins/cm).
7. Set the small "O" Ring on the deflection force scale to zero.
8. Place tension tester squarely on the belt at centre of span. Push plunger down at right angles to the belt span, until the bottom of the large "O" Ring is level with the top of an adjacent belt. (For single belts, use a straight edge laid across the pulley rims.)
9. Remove the tension tester and read the force applied in kgs from the bottom of the small "O" Ring on the deflection force scale.

10. Repeat steps 6 to 9 for each belt. Add all the values together and divide the total by the number of belts to obtain the mean or average.
11. Compare the mean applied force with the values recommended in the tables overleaf.

For new belts a value nearer the maximum table figure is advised and for used belts a value nearer the minimum table figure is applicable.

12. If the mean applied force is on the low side – tighten up the drive – rotate the belts by hand and then repeat steps 6-on until correct.
13. If the mean applied force is on the high side – slacken off the drive – rotate the belts by hand and then repeat steps 6-on until correct.

Note: If using a spring balance to measure the load, the required deflection to be applied is $0.015 \times \text{Span (mm)}$.

In order to check the static and dynamic hub loads use the following:

The total static hub load W_s , in Newtons, imposed by the belts on the shaft is the vector sum of the tensions in the belts and it can be calculated with sufficient accuracy by the following formula:

$$W_s = 32zP \sin \left(\frac{\theta}{2} \right)$$

Where z = the number of belts

P = the force at centre of span (N)

θ = the arc of contact on smaller pulley (degrees)

To determine the dynamic hub load W_r , in Newtons, a correction has to be made to the static tension to account for the effect of centrifugal force before the vector summation, i.e.

$$W_r = 32z (P - K) \sin \left(\frac{\theta}{2} \right)$$

Where K = the correction factor for centrifugal tension (see table overleaf).

$$\text{Span length } S = C_A \times \sin \left(\frac{\theta}{2} \right)$$

Where C_A = centre to centre distance (mm) (calculated)

$$\theta = 180 - 60 \left(\frac{D_d - d_d}{C_A} \right)$$

D_d = datum diameter of large pulley (mm)

d_d = datum diameter of small pulley (mm)





INSTRUCTIONS FOR TENSIONING A DRIVE

COG CONSTRUCTION BELTS DEFLECTION FORCE REQUIRED FOR INSTALLING AND MAINTAINING TENSION IN V AND WEDGE BELT DRIVES

WRAPPED CONSTRUCTION BELTS DEFLECTION FORCE REQUIRED FOR INSTALLING AND MAINTAINING TENSION IN V AND WEDGE BELT DRIVES

Cross Section Symbol	Small Pulley Diameter	Required Deflection Force 'P' at Centre of Span for Belt Speed Range			
		New Belt(s)		Used Belt(s)	
		Up to 20 m/sec	20 m/sec and over	Up to 20 m/sec	20 m/sec and over
ZX	mm 40-60 over 60	N 4-9 9-15	N 4.5-11 11-15	N 2.5-6 6-10	N 3-7 7-10
AX	63-89 90-118 over 118	15-27 27-33 33-44	12-21 21-28 28-38	10-18 18-22 22-29	8-14 14-19 19-25
BX	90-139 140-200 over 200	30-52 52-64 64-72	24-45 45-58 58-68	20-35 35-43 43-48	16-30 30-39 39-45
CX	160-315 over 315	72-108 108-111	63-102 102-120	48-72 72-74	42-68 68-80
XPZ	56-79 80-112 over 112	16-27 27-33 33-38	12-22 22-32 32-36	11-18 18-22 22-25	8-15 15-21 21-24
XPA	71-105 106-140 over 140	30-50 50-60 60-75	24-45 45-54 54-68	20-33 33-40 40-50	16-30 30-36 36-45
XPB	112-159 160-250 over 250	60-84 84-108 108-120	57-81 81-100 100-110	40-56 56-72 72-80	38-54 54-67 67-73
XPC	200-355 over 355	122-174 174-198	112-176 176-230	81-116 116-132	75-117 117-153

Cross Section Symbol	Small Pulley Diameter	Required Deflection Force 'P' at Centre of Span for Belt Speed Range			
		New Belt(s)		Used Belt(s)	
		Up to 20 m/sec	20 m/sec and over	Up to 20 m/sec	20 m/sec and over
Z	mm 50-70 over 70	N 5-8 8-16	N 6-12 10-16	N 4-6 7-14	N 3.5-7 8-14
A	75-89 90-118 over 118	16-22 22-30 30-42	12-16 16-26 26-36	11-15 15-20 20-28	8-11 11-17 17-24
B	125-159 160-200 over 200	36-48 48-57 57-66	28-39 39-48 48-60	24-32 32-38 38-44	19-26 26-32 32-40
C	200-315 over 315	74-98 98-111	60-88 88-104	49-65 65-74	40-59 59-69
D	355-450 over 450	142-170 170-238	132-160 160-218	95-113 113-159	88-107 107-145
SPZ	67-95 over 95	16-26 26-36	12-22 22-33	11-17 17-24	8-15 15-22
SPA	100-140 over 140	36-54 54-75	28-46 46-66	24-36 36-50	19-31 31-44
SPB	160-250 over 250	66-94 94-112	58-84 84-96	44-63 63-75	39-56 56-64
SPC	224-355 over 355	117-159 159-190	99-154 154-180	78-106 106-127	66-103 103-120

VALUES OF K TO CORRECT FOR THE EFFECT OF CENTRIFUGAL TENSION

Belt speed	Centrifugal tension correction factor K								
	XPZ/SPZ	XPA/SPA	XPB/SPB	XPC/SPC	ZX/Z	AX/A	BX/B	CX/C	D
m/sec	N	N	N	N	N	N	N	N	N
1	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-
4	-	-	-	0.5	-	-	-	-	-
5	-	-	0.5	0.7	-	-	-	-	-
6	-	0.3	0.6	1.1	-	-	-	-	1.2
7	0.2	0.4	0.8	1.4	-	-	-	-	1.6
8	0.3	0.5	1.0	1.7	-	-	-	1.0	2.1
9	0.4	0.6	1.2	2.1	-	-	-	1.2	2.7
10	0.5	0.8	1.5	2.5	-	-	1.0	1.4	3.3
12	0.7	1.2	2.2	3.7	-	0.8	1.4	2.1	4.5
14	1.0	1.6	3.1	5.2	0.8	1.0	1.8	2.8	6.0
16	1.3	2.0	3.9	6.7	1.0	1.3	2.4	3.7	8.0
18	1.6	2.5	5.1	8.7	1.2	1.7	3.1	4.7	10.2
20	2.0	3.2	6.2	10.7	1.5	2.1	3.8	5.8	12.5
22	2.4	4.0	7.7	12.9	1.8	2.5	4.5	7.0	15.2
24	2.8	4.8	9.2	15.5	2.1	3.0	5.3	8.3	18.0
26	3.2	5.6	10.9	18.0	2.4	3.5	6.2	9.7	21.2
28	3.9	6.2	12.5	20.7	2.9	4.2	7.4	11.3	24.5
30	4.4	7.3	14.5	25.0	3.3	4.7	8.4	13.0	28.1
32	5.0	8.0	16.4	28.1	3.8	5.3	9.6	14.8	32.0
34	5.7	9.2	18.4	31.2	4.3	6.1	10.8	16.7	36.1
36	6.4	10.2	20.7	35.5	4.8	6.8	12.15	18.7	40.6
38	7.1	20.5	23.2	39.7	5.3	7.6	13.6	20.9	45.1
40	7.9	22.5	25.5	43.9	5.9	8.4	15.0	23.1	50.0

For further information on the ProTorque belt range visit: www.protorque.uk