Measuring Belt Tension

The spring scale type tester measures how much force is required to deflect the belt a specified distance at the center of its span. This is the force deflection method of tensioning belts.

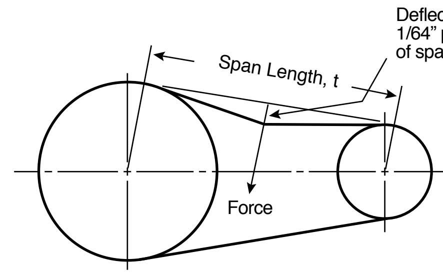
The Sonic Tension Meter measures the vibration of the belt span and instantly converts the vibration frequency into belt static tension. This is the span vibration method of tensioning belts.

For more information, refer to the Troubleshooting Tools section.

Force Deflection Tension Method

The force deflection tension method does not directly measure belt span tension or static tension. The deflection force is a calculated value that is based on the amount of static tension required in the belt. Static tension is the tension force that is actually in the belt, while deflection force is simply a measurement to check how much static tension is in the belt. The tension testers used for the force deflection tension method are available in one, two, or five barrel configurations. The one barrel tension tester can measure up to 30 lb. of force; the two barrel tension tester can measure up to 66 lb. of force; and the five barrel tension tester can measure up to 165 lb. of force. Add the force readings from each barrel to determine the total force being measured.

1. Measure span length (t). Span length is the distance from where the belt exits one pulley to where it enters the next pulley.



2. Position the lower of the two O-Rings using either of these methods:
   a. On the scale reading “Deflection Inches”, set the O-Ring to show a deflection equal to 1/64” per inch of span length (t).
   b. On the scale reading “Inches of Span Length”, set O-Ring to show a deflection equal to the inches of measured span length (t).
3. At the center of the span (t), apply force using the appropriately sized Gates tension testers. Apply the force perpendicular to the span. If the belt is a wide synchronous belt or a PowerBand belt, place a piece of steel or angle iron across the belt width and deflect the entire width of the belt evenly. Deflect the belt until the bottom edge of the lower O-Ring is at the correct deflection distance. If multiple individual V-belts are used on the drive, the deflection distance can be measured against an adjacent belt. For drives with only one belt, use a straightedge or string pulled tight across the sheaves, sprockets, or top of the belt to establish a reference line. When the belt is deflected to measure tension, measure the deflection distance by measuring from the belt to the straight edge or string reference line.

4. Find the amount of deflection force on the upper scale of the tension tester. The sliding rubber O-Ring slides up the scale as the tool compresses and stays up for a reading of the deflection force. Read at the bottom edge of the ring. Remember to slide the O-Ring down before using again.

5. Installation tension forces should ideally be calculated for each specific drive. The tension calculations are included in all Gates drive design manuals. Additionally, the Gates drive design and selection computer program, Design Flex® Pro™ can be used to quickly calculate the proper installation tensions. Design Flex® Pro™ and Design Flex Web® are available at www.gates.com/drivedesign.

   If installation tension values for a specific V-belt drive are not available, the tables shown can be used to determine generic tension values based on the V-belt cross section. As synchronous belt drives are more sensitive to proper belt tensioning, there are no similar quick reference tension tables for them.

Compare the deflection force with the range of forces recommended. If less than the minimum recommended deflection force, the belts are too loose and should be tightened. If more than the maximum recommended deflection force, the belts are too tight and should be loosened.

Recommended Deflection Force Per Belt For Hi-Power® II V-Belts, Hi Power II PowerBand Belts or Tri-Power® Molded Notch V-Belts

V-Belt Cross Section	Small Sheave Diameter Range (In.)	Small Sheave RPM Range	Speed Ratio Range	Recommended Deflection Force (Lbs.) Hi-Power II Minimum	Hi-Power II Maximum	Tri-Power Molded Notch Minimum	Tri-Power Molded Notch Maximum
	3.0			2.7	3.8	3.8	5.4
	3.2	1750	2.00	2.9	4.2	3.9	5.6
A	3.4 - 3.6	to	to	3.3	4.8	4.1	5.9
AX	3.8 - 4.2	3600	4.00	3.8	5.5	4.3	6.3
	4.6 - 7.0			4.9	7.1	4.9	7.1
	4.6			5.1	7.4	7.1	10.0
	5.0 - 5.2	1160	2.00	5.8	8.5	7.3	11.0
B	5.4 - 5.6	to	to	6.2	9.1	7.4	11.0
BX	6.0 - 6.8	1800	4.00	7.1	10.0	7.7	11.0
	7.4 - 9.4			8.1	12.0	7.9	12.0
	7.0			9.1	13.0	12.0	18.0
	7.5	870	2.00	9.7	14.0	12.0	18.0
C	8.0 - 8.5	to	to	11.0	16.0	13.0	18.0
CX	9.0 - 10.5	1800	4.00	12.0	18.0	13.0	19.0
	11.0 - 16.0			14.0	21.0	13.0	19.0
	12.0 - 13.0	690	2.00	19.0	27.0		
D	13.5 - 15.5	to	to	21.0	30.0		
	16.0 - 22.0	1200	4.00	24.0	36.0		

Recommended Deflection Force Per Belt For Super HC® V-Belts, Super HC PowerBand® Belts, Super HC Molded Notch V-Belts or Super HC Molded Notch PowerBand Belts

V-Belt Cross Section	Small Sheave Diameter Range (In.)	Small Sheave RPM Range	Speed Ratio Range	Recommended Deflection Force (Lbs.) Minimum	Maximum
	2.65 - 2.80	1200-3600		3.0	4.3
	3.00 - 3.15	1200-3600	2.00	3.3	4.8
3V	3.35 - 3.65	1200-3600	to	3.7	5.4
	4.12 - 5.00	900-3600	4.00	4.4	6.4
	5.30 - 6.90	900-3600		4.8	7.1
	2.20	1200-3600		2.8	4.1
	2.35 - 2.50	1200-3600		3.2	4.7
	2.65 - 2.80	1200-3600	2.00	3.5	5.1
3VX	3.00 - 3.15	1200-3600	to	3.8	5.5
	3.35 - 3.65	1200-3600	4.00	4.1	6.0
	4.12 - 5.00	900-3600		4.8	7.1
	5.30 - 6.90	900-3600		5.8	8.6
	4.40 - 4.65	1200-3600		9.0	13.0
	4.90 - 5.50	1200-3600	2.00	10.0	15.0
5VX	5.90 - 6.70	1200-3600	to	11.0	17.0
	7.10 - 8.00	600-1800	4.00	13.0	19.0
	8.50 - 10.90	600-1800		14.0	20.0
	11.80 - 16.00	400-1200		15.0	23.0
	7.10 - 8.00	600-1800	2.00	11.0	16.0
5V	8.50 - 10.90	600-1800	to	13.0	18.0
	11.80 - 16.00	400-1200	4.00	14.0	21.0
8V	12.50 - 17.00	600-1200	2.00	28.0	41.0
			to		
	18.00 - 24.00	400- 900	4.00	32.0	48.0