BELT DRIVE PREVENTIVE MAINTENANCE & SAFETY MANUAL

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The Driving Force in Power Transmission®

Gates®

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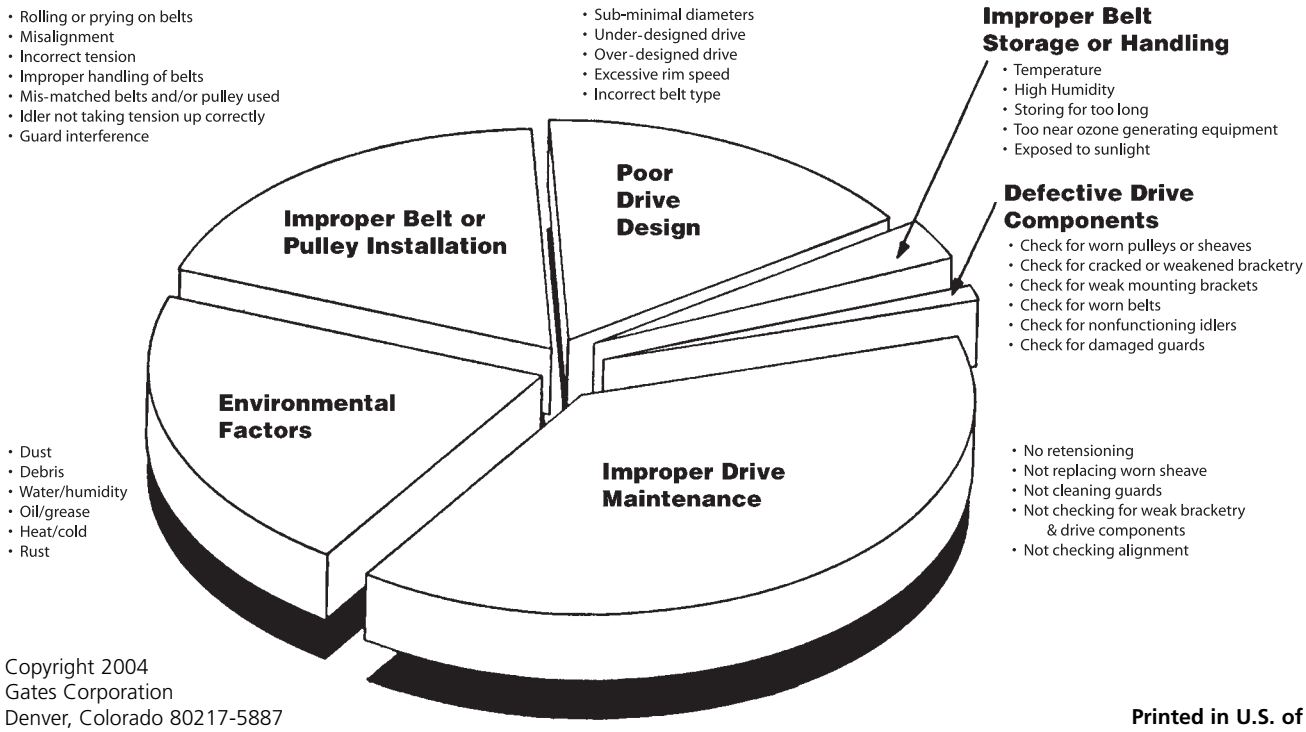
Sources of Drive Problems



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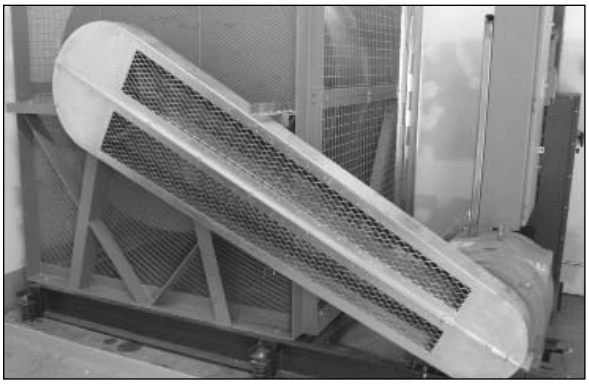
FOREWORD

Why have a preventive maintenance program?

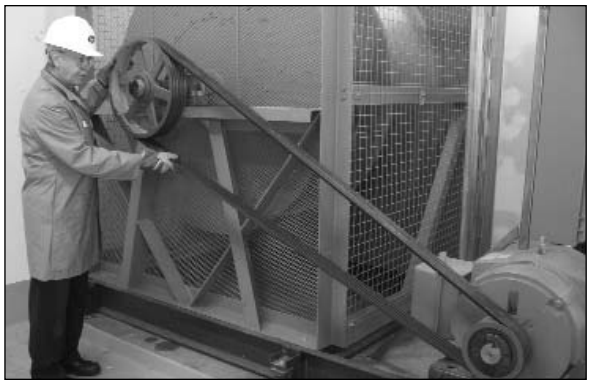
When compared to the constant lubrication problems associated with chain drives, or the mechanical problems and high costs associated with gear drives, belts are the most cost-effective, reliable means of power transmission.

However, optimum belt drive performance requires proper maintenance. The potential for long service life is built into every Gates belt. When coupled with a regularly scheduled maintenance program, belt drives will run relatively trouble-free for a long time.



Belt drive should have adequate guard

Power should be shut off and controls locked before inspecting



Carefully inspect all belts

**** Note** - If belt looks bad, it probably is*

Important to your business

An effective preventive maintenance program saves time and money. Inspecting and replacing belts and faulty drive components before they fail will reduce costly downtime and production delays.

What is a good belt maintenance program?

A comprehensive, effective program of preventive maintenance consists of several elements:

- Maintaining a safe working environment.
- Regularly scheduled belt drive inspections.
- Proper belt installation procedures.
- Belt drive performance evaluations.
- Belt product knowledge.
- Belt storage and handling.
- Troubleshooting.

FOREWORD

Maintaining A Safe Working Environment

It is common sense to establish a safe working environment in and around belt drives. The following precautions will make belt drive inspection and maintenance easier and safer.

Power should be shut off and controls locked before inspecting

Wear Proper Clothing

Never wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves or loose lab coats around belt drives. Wear gloves while inspecting sheaves or sprockets to avoid being cut by nicks, burrs or sharply worn pulley edges. Wear safety glasses to avoid eye injuries. Don't be foolish! Wear proper clothing.
This technician is not wearing safety glasses, and his bulky lab coat and neck tie are hazards near moving components.

No loose or bulky clothing

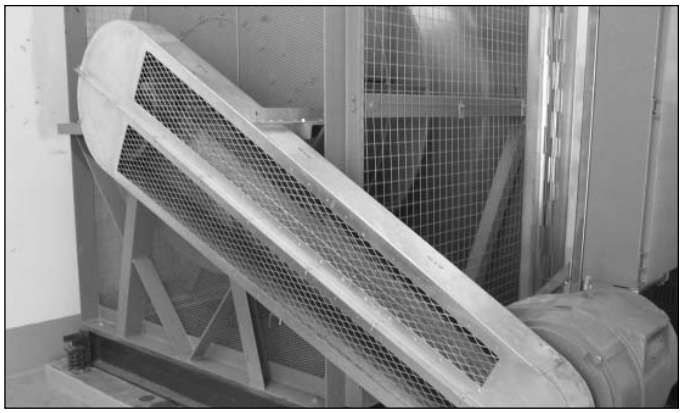
Maintain Safe Access to Drives

Always maintain a safe access to the belt drives. Keep area around drives free of clutter, debris and other obstructions. Floors should be clean and free of oil and debris to insure good footing and balance while working on machinery.

Don't clutter area around belt drive

Drive Guards

Always keep drives properly guarded. Every belt drive must be guarded when in operation. Guard must be designed and installed according to OSHA standards.



A properly guarded belt drive

A Properly Guarded Belt Drive

A properly designed guard has the following features:

- Completely encloses drive.
- Grills or vents for good ventilation.
- Accessible inspection door or panels.
- Can easily be removed and replaced if damaged.
- Where necessary, should protect the drive from weather, debris and damage.

Follow these precautions to make your preventive maintenance easier.

DRIVE SHUTDOWN & THOROUGH INSPECTION

Simple Drive Inspection

Begin preventive maintenance with a periodic drive inspection as a normal part of your maintenance rounds. Look and listen for any unusual vibration or sound while observing the guarded drive in operation. A well designed and maintained drive will operate smoothly and quietly.

Inspect guard for looseness or damage. Keep it free of debris or dust and grime buildup on either the inside or the outside of the guard. Any accumulation of material on the guard acts as insulation, and could cause drives to run hotter.

The effect of temperature on belt life is important. For example, an internal temperature increase of 18°F (or approximately 36°F rise in ambient drive temperature) may cut belt life in half.

Also look for oil or grease dripping from guard. This may indicate over-lubricated bearings. If this material gets on rubber belts, they may swell and become distorted, leading to early belt failure.

It's a good idea to check motor mounts for proper tightness. Check take-up slots or rails to see that they are clean and lightly lubricated.

How Often To Inspect

The following factors influence how often to inspect a drive.

- Critical nature of equipment
- Drive operating cycle
- Accessibility of equipment
- Drive operating speed
- Environmental factors
- Temperature extremes in environment

Experience with specific equipment is the best guide to how often to inspect belt drives. Drives operating at high speeds, heavy loads, frequent stop/start conditions and at temperature extremes or operating on critical equipment require frequent inspection.

When To Perform Preventive Maintenance

To help establish a preventive maintenance schedule, keep the following in mind.

Critical Drives

A quick visual and noise inspection may be needed every one to two weeks.

Normal Drives

With most drives, a quick visual and noise inspection can be performed once a month.

Complete Inspection

A drive shutdown for a thorough inspection of belts, sheaves or sprockets and other drive components may be required every three to six months.

Remember, a well-designed industrial belt drive is capable of operating for several years when properly maintained and used under normal conditions.

Follow the Preventive Maintenance Procedure on the following page when performing detailed maintenance during equipment shutdowns.

DRIVE SHUTDOWN & THOROUGH INSPECTION

Preventive Maintenance Check List

By following these steps, belt drives can be maintained efficiently and safely.

1. Always turn off the power to the drive. Lock the control box and tag it with a warning sign "Down For Maintenance. Do Not Turn Power On."
Make sure the power is turned off for the correct drive.

2. Test to make sure correct circuit has been turned off.

3. Place all machine components in a safe (neutral) position. Make sure that moving components are locked down or are in a safe position. Make sure that fans cannot unexpectedly freewheel.

4. Remove guard and inspect for damage. Check for signs of wear or rubbing against drive components. Clean and realign guard to prevent rubbing if necessary.

5. Inspect belt for wear or damage. Replace as needed.

6. Inspect sheaves or sprockets for wear and misalignment. Replace if worn.

Turn off power, lock controls and tag

7. Inspect other drive components such as bearings, shafts, motor mounts and take-up rails.

8. Inspect static conductive grounding system (if used) and replace components as needed.

9. Check belt tension and adjust as needed.

10. Recheck sheave or sprocket alignment.

11. Reinstall belt guard.

12. Turn power back on and restart drive. Look and listen for anything unusual.

DRIVE SHUTDOWN & THOROUGH INSPECTION

Preventive Maintenance Procedure

Once the power is off, locked and tagged, and the machine components are in safe positions, remove the guard and begin the inspection.

How to Inspect a Belt

Observing signs of unusual belt wear or damage will help troubleshoot possible drive problems.

Mark or note a point on the belt, or on one of the belts in a multiple V-belt drive. Wearing gloves, work around the belt(s), checking for cracks, frayed spots, cuts, or unusual wear patterns.

Begin by inspecting the belt

Check the belt for exposure to excessive heat. Excessive heat can come from a hot environment or from belt slip that generates heat. The maximum environmental temperature for a properly maintained V-belt is 140˚F. The maximum environmental temperature for a properly maintained synchronous belt is 185˚F.

Rubber belts that are running hot, or running in a hot environment will harden and develop cracks from the bottom of the belt upwards.

Refer to the PROBLEM/SOLUTION SUMMARY TABLE for other symptoms.

Belts should be replaced if there are obvious signs of cracking, fraying, unusual wear or loss of teeth.

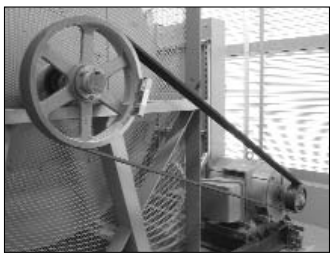
How to Check Alignment

While the drive is shut down, it is a good idea to check the sheaves or sprockets for proper alignment.

To check alignment, use a straight edge, string, or Gates EZ Align™ laser alignment tool.

Using a straight edge to check alignment

Using a string to check alignment



Using EZ Align™ laser alignment tool on both ends

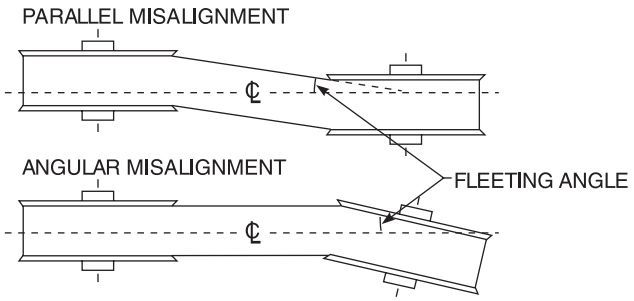
Using EZ Align™ laser alignment tool, showing reflected laser on emitter

Using EZ Align™ laser alignment tool showing laser line on target

If using a straight edge (or string), line the straight edge along the outside face of both sheaves or sprockets as shown in the photo. If the drive is properly aligned, the straight edge or string will contact each sheave or sprocket evenly. The straight edge or string (pulled tight) should touch the two outer edges of each sheave or pulley for a total of four points of contact. Misalignment of sprockets and shafts will show up as a gap between the outside face of the sheave or sprocket and the straight edge. Check for tilting or shaft misalignment by using a bubble level. For proper alignment, the bubble should be in the same position as measured on each shaft.

DRIVE SHUTDOWN & THOROUGH INSPECTION

If using the Gates EZ Align™ laser alignment tool, follow the detailed instructions included with the tool. The EZ Align laser alignment tool makes it very quick and easy to check alignment of shafts, sheaves and sprockets.



There are three possible causes and solutions of sheave or sprocket misalignment:

1. Angular Misalignment: The motor shafts and driven machine shafts are not parallel.
    a. Correct alignment by adjusting the motor shaft into alignment with the driveN shaft.
2. Parallel Misalignment: Sheaves or sprockets are not properly located on the shafts.
    a. Loosen and reposition one or both sheaves or sprockets until properly aligned.
3. Sheaves or sprockets are tilted on the shaft due to incorrect bushing installation.
    a. Rotate drive by hand and look for excessive wobble. If wobble is observed, remove and reinstall sheave or sprocket. Follow the bushing installation procedures explained in the INSTALLATION section. Further check alignment by using one of the previously mentioned methods.

Misalignment on V-belt drives should be less than 1/2˚ or 1/10" per foot of center distance. Misalignment for synchronous, Polyflex®, or Micro-V® belts should be less than 1/4˚ or 1/16" per foot of center distance.

When a synchronous belt drive has been aligned (following the procedure discussed above in the "How to Check Alignment" section), do not continue to adjust alignment in an attempt to make the synchronous belt ride in the center of the sprocket's face width. Synchronous belts, while neutral tracking, will tend to ride in contact with a flange on one side of the sprockets. Synchronous belts on drives that are properly aligned will lightly contact the flanges. Synchronous belts on misaligned drives will ride hard against the flanges and generate additional noise. Attempting to adjust a synchronous belt drive's alignment to force the belt to ride in the center of the sprocket's face width will typically result in misalignment.

Guard Inspection

Check the guard for wear or possible damage. Don't overlook wear on the inside of the guard. Check for any areas that may be contacting the belt. Clean the guard to prevent it from becoming blocked and closed to ventilation. Clean off any grease or oil that may have spilled onto the guard from over-lubricated bearings.

Check Other Drive Components

It is always a good idea to examine bearings for proper lubrication. Check the motor base bolts and adjustment screws to make sure they are not loose. If loose, tighten to the recommended torque value. Make sure that adjustment screws are free of debris, dirt, or rust.

Check Belt Tension

Following the drive component inspection, the final step is to check belt tension. Rotate the drive two or three revolutions by hand and check the belt tension. If necessary, retension the belt and make a final alignment check.

If V-belts are undertensioned, they can slip. Slippage generates heat and will result in cracking and belt failure.

If synchronous belts are undertensioned, they can jump teeth or ratchet. Ratcheting will damage the belt and result in premature belt failure.

If belts are overtensioned, belt and bearing life can be reduced.

The proper way to check belt tension is to use a tension tester. Gates has a variety of tension testers, ranging from the simple spring scale type tester to the sophisticated Sonic Tension Meter.

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.

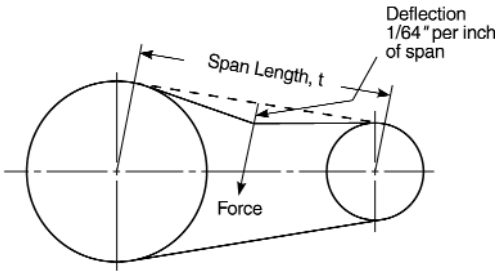
The Sonic Tension Meter measures the vibration of the belt span and instantly converts the vibration frequency into belt static tension. This is the span vibration method of tensioning belts.

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 off 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® II can be used to quickly calculate the proper installation tensions. Design Flex® II is available for download at www.gates.com.

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

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		Tri-Power Molded Notch	
				Minimum	Maximum	Minimum	Maximum
A AX	3.0	1750 to 3600	2.00 to 4.00	2.7	3.8	3.8	5.4
	3.2			2.9	4.2	3.9	5.6
	3.4 - 3.6			3.3	4.8	4.1	5.9
	3.8 - 4.2			3.8	5.5	4.3	6.3
	4.6 - 7.0			4.9	7.1	4.9	7.1
B BX	4.6	1160 to 1800	2.00 to 4.00	5.1	7.4	7.1	10.0
	5.0 - 5.2			5.8	8.5	7.3	11.0
	5.4 - 5.6			6.2	9.1	7.4	11.0
	6.0 - 6.8			7.1	10.0	7.7	11.0
	7.4 - 9.4			8.1	12.0	7.9	12.0
C CX	7.0	870 to 1800	2.00 to 4.00	9.1	13.0	12.0	18.0
	7.5			9.7	14.0	12.0	18.0
	8.0 - 8.5			11.0	16.0	13.0	18.0
	9.0 - 10.5			12.0	18.0	13.0	19.0
	11.0 - 16.0			14.0	21.0	13.0	19.0
D	12.0 - 13.0	690 to 1200	2.00 to 4.00	19.0	27.0		
	13.5 - 15.5			21.0	30.0		
	16.0 - 22.0			24.0	36.0		

Span Vibration Method

The Gates Sonic Tension Meter can be used with all Gates belts. The Sonic Tension Meter measures the vibration in the belt span, and converts that measurement into a reading of the actual static tension in the belt. To use the Sonic Tension Meter, you will need to enter the belt unit weight, belt width for synchronous belts or number of ribs or strands for V-belts, and the span length. To measure the span vibration, press the "Measure" key on the meter, tap the belt span to vibrate the belt, and hold the microphone approximately 3/8" to 1/2" away from the back of the belt. The Sonic Tension Meter will display the static tension, and can also display the vibration frequency.

Since the span vibration method is intended to be a very accurate method of measuring actual tension in a belt, it is important that the proper recommended tension is calculated for the specific belt drive. Procedures for calculating belt tension are included in each of the appropriate Gates drive design manuals. To determine the belt tension recommended for specific drive applications, refer to the appropriate belt drive design manual or download the Gates belt drive selection program, DesignFlex® II, at www.gates.com. Alternatively, Gates Power Transmission Product Application engineers can be contacted at (303) 744-5800.

The adjusted belt weights for use with the Gates Sonic Tension Meter are shown in the following table.

Belt Product Family	Belt Cross Section	Belt Type	Adjusted Belt Weight (grams/meter)
Super HC® V-belts	3VX	Single	61
	5VX	Single	158
	3V	Single	72
	5V	Single	200
	8V	Single	510
	3VX	PowerBand®	70
	5VX	PowerBand®	185
	3V	PowerBand®	96
	5V	PowerBand®	241
	8V	PowerBand®	579
Predator® Belts	3VP	PowerBand®	89
	5VP	PowerBand®	217
	8VP	PowerBand®	528
	BP	PowerBand®	212
	CP	PowerBand®	332
Tri-Power® V-belts	AX	Single	85
	BX	Single	144
	CX	Single	232
Hi Power® II V-belts	A	Single	96
	B	Single	168
	C	Single	276
	D	Single	554
	E	Single	799
	A	PowerBand®	151
	B	PowerBand®	200
	C	PowerBand®	342
	D	PowerBand®	663
Hi Power® II Dubl V-belts	AA	Single	125
	BB	Single	194
	CC	Single	354
	DD	Single	750
Power Cable® Belts	A	Single	108
	B	Single	172
	C	Single	302
Micro-V® Belts	H	Single	5
	J	Single	7
	K	Single	18
	L	Single	29
	M	Single	109

Belt Product Family	Belt Cross Section	Belt Type	Adjusted Belt Weight (grams/meter)
Metric Power™ V-belts	10X-Notched	Single	44
	13X-Notched	Single	86
	17X-Notched	Single	139
For belt lengths over 3000mm	13X	Single	100
For belt lengths over 3000mm	17X	Single	171
	XPZ	Single	51
	XPA	Single	87
	XPB	Single	156
	XPC	Single	249
For belt lengths over 3000mm	SPZ	Single	72
For belt lengths over 3000mm	SPA	Single	115
For belt lengths over 3000mm	SPB	Single	186
For belt lengths over 3000mm	SPC	Single	337
Truflex® Belts	2L	Single	22
	3L	Single	44
	4L	Single	77
	5L	Single	125
PoweRated® Belts	3L	Single	52
	4L	Single	83
	5L	Single	138
Polyflex® Belts	3M	Single	4
	5M	Single	10
	7M	Single	24
	11M	Single	49
	3M	JB®	5
	5M	JB®	11
	7M	JB®	30
	11M	JB®	64

Belt Product Family	Belt Cross Section	Belt Type	Adjusted Belt Weight (grams/meter)
PowerGrip® Timing Belts	MXL	Synchronous	1.3
	XL	Synchronous	2.4
	L	Synchronous	3.2
	H	Synchronous	3.9
	XH	Synchronous	11.3
	XXH	Synchronous	14.9
PowerGrip® Timing Twin Power® Belts	XL	Synchronous	1.9
	L	Synchronous	3.2
	H	Synchronous	4.6
PowerGrip® HTD® Belts	3M	Synchronous	2.4
	5M	Synchronous	3.9
	8M	Synchronous	6.2
	14M	Synchronous	9.9
	20M	Synchronous	12.8
PowerGrip® HTD® Twin Power® Belts	3M	Synchronous	2.7
	5M	Synchronous	4.6
	8M	Synchronous	7.2
	14M	Synchronous	12.3
PowerGrip® GT® Belts	8M	Synchronous	5.8
	14M	Synchronous	9.7
PowerGrip® GT® 2 Belts	2M	Synchronous	1.4
	3M	Synchronous	2.8
	5M	Synchronous	4.1
	8M	Synchronous	5.5
	14M	Synchronous	9.6
	20M	Synchronous	12.8
PowerGrip® GT® 2 Twin Power® Belts	8M	Synchronous	6.93
	14M	Synchronous	11.44
Poly Chain® GT® 2 Belts and Poly Chain® GT® Belts	5M	Synchronous	3
	8M	Synchronous	4.7
	14M	Synchronous	7.9

INSTALLATION

How to Install Belts

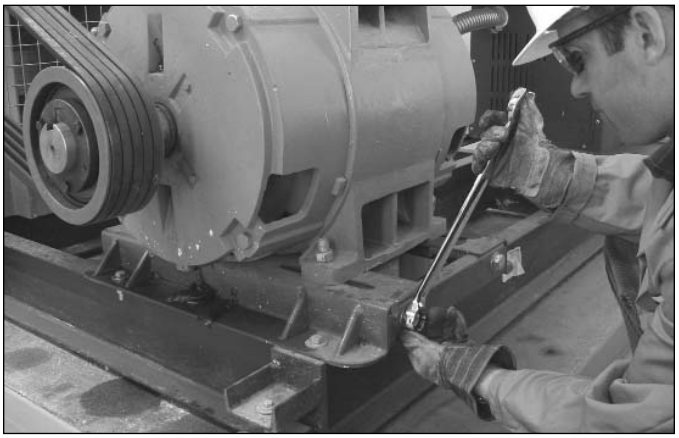
When a belt is being installed, the same basic steps must be followed, regardless of whether the belt is a V-belt or a synchronous belt.

Preparation

1. Confirm that the power is off, locked, and tagged. Never work on a belt drive until this important step is completed. Wear proper safety equipment (hardhat, gloves, safety glasses, steel toe shoes).
2. Remove belt guard and place away from drive so that it does not interfere with working on the drive.

Removal

3. Loosen motor mounting bolts or adjusting screws.



4. Move the motor in until the belt is slack and can be removed easily without prying. Never pry off a belt, as the sheave or sprocket can be damaged. Prying off belts also adds the risk of injury.

5. Remove old belt

Inspection

6. Inspect the old belt for any unusual wear. Excessive or unusual wear may indicate problems with the drive design or past maintenance procedures. Refer to the Problem/Solution Summary Table in the Belt Performance and Troubleshooting section for guidelines in matching belt appearance to possible problem causes.
7. Inspect the sheaves or sprockets for unusual or excessive wear. Belt life will be reduced if the sheaves or sprockets are worn. Wear gloves for protection from nicks or sharp surfaces.

   <u>For V-belt sheaves:</u> Inspect grooves for wear and nicks. Use Gates sheave gauges to determine if the grooves are worn. Place the proper sheave gauge into the sheave groove and check for wear. If more than 1/32" of wear can be seen between the gauge and groove side wall, the sheaves are worn and should be replaced. A light source such as a flashlight may be used to backlight the gauge.

Do not be misled by "shiny" grooves. Grooves that are "shiny" are often polished because of heavy wear.

Inspect the sheave grooves for rust or pitting. If rusted or pitted surfaces are found, the sheave should be replaced.

<u>For Synchronous sprockets:</u> Inspect sprocket grooves for unusual or excessive wear. Check for excessive wear by both visually inspecting the grooves and by running your finger along the sprocket grooves. If you can feel or see noticeable wear, the sprockets are worn and should be replaced.

Do not be misled by "shiny" grooves. Grooves that are "shiny" are often polished because of heavy wear.

Inspect the sprocket grooves for rust or pitting. If rusted or pitted surfaces are found, the sprocket should be replaced.

Check the sprocket flanges and make sure that they are not loose or bent. Bent flanges can interfere with the belt and cause premature belt wear and failure.

8. If necessary, clean sheave and sprocket grooves by wiping the surface with a rag slightly dampened with a light, non-volatile solvent. Do not sand or scrape the grooves to remove debris.

Installation

9. If necessary, install new sheaves or sprockets. Refer to page 14 for detailed instructions for installing QD or Taper-Lock® bushings.
10. Check the sheave or sprocket alignment. In order to achieve optimum belt life, it is important that the drive's sheaves or sprockets be aligned properly. Use a straightedge or Gates EZ Align® laser alignment tool. Adjust the sheave or sprocket position as necessary.
11. Install the new belt or set of belts.

    Replace all belts on multiple V-belt drives. Never replace a single belt or a portion of a multiple belt drive. Always use belts from the same manufacturer on a multiple belt drive. If a new belt is used with old belts, the load will not be shared evenly between the belts on a multiple V-belt drive. Mixing new and old belts very possibly could lead to premature belt failure and uneven sheave wear.

    When installing the belt, make sure that there is clearance to slip the belt over the sheave or sprocket. Do not pry or use force to install the belt. Do not roll the belt onto the drive.
12. Adjust the motor base adjustment screws to take up the center distance on the belt drive until the belts are tight.
13. Check belt tension, using a tension gauge or Sonic Tension Meter. Adjust the belt drive's center distance until the correct tension is measured.

    On multiple belt drives, some belts may appear to hang unevenly when installed. It is normal for belts within RMA length and matching tolerances to have noticeable differences in the distance the belt span sags. This is called the "catenary effect".

    Catenary effect is a curve made by a cord of uniform weight suspended between two points.

    Follow the recommended run-in and retensioning procedure to minimize the visible difference in belt sag.
14. Rotate the belt drive by hand for a few revolutions. Re-check the belt tension and adjust as necessary.
15. Re-check the drive alignment and adjust as necessary.

Completion

16. Secure motor mounting bolts to the correct torque.
17. Re-check the belt tension and adjust as necessary. Tightening the motor mounting bolts may have changed the belt tension.
18. Replace the belt guard.
19. Start the drive, looking and listening for any unusual noise or vibration. If possible, shut down the drive and check the bearings and motor for unusual heat. If the motor or bearings are hot, the belt tension may be too high, or bearings may not be properly lubricated. Temperatures can be checked with an infrared pyrometer.

V-belt Run-In Procedure

20. A run-in procedure is recommended for all V-belt drives so that the optimum belt life can be achieved. A run-in consists of starting the drive and letting it run under full load for up to 24 hours. If a 24 hour run-in is not possible, let the belt drive run overnight, to the next shift, or at least a few hours. After the belts have run-in, stop the belt drive and check the belt tension. Running the belts under full load for an extended period of time will seat the V-belts into the sheave grooves.
    V-belt tension will drop after the initial run-in and seating process. This is normal. Adjust the belt tension as necessary.

    Since tension in V-belts will drop after the initial run-in and seating process, failure to check and retension the belt will result in low belt tension and belt slippage. This slippage will result in premature belt failure.

How to Install Taper-Lock® and QD® Bushed Sheaves and Sprockets

It is important that new or replacement sheaves or sprockets be properly installed. Most sheaves or sprockets are attached to a shaft with a tapered bushing that fits a mating tapered bore in the sheave or sprocket. Bushings come in several different bore size diameters. This allows for a reduction in the parts inventory required in your plant because one bushing size with multiple bore sizes can be used with a number of different sizes of sheaves or sprockets.

There are two styles of bushings: Taper-Lock® and QD®. Installation and removal instructions for each style are noted below.

Taper-Lock® Type Sprocket Installation and Removal

To Install TAPER-LOCK® Type Bushings

1. Clean the shaft, bore of bushing, outside of bushing and the sprocket hub bore of all oil, paint and dirt. File away any burrs.

   Note: The use of lubricants can cause sprocket breakage. DO NOT USE LUBRICANTS IN THIS INSTALLATION.

2. Insert the bushing into the sprocket hub. Match the hole pattern, not threaded holes (each complete hole will be threaded on one side only).

3. "LIGHTLY" oil the bolts and thread them into those half-threaded holes indicated by "O" on the diagram above.

   Note: Do not lubricate the bushing taper, hub taper, bushing bore, or the shaft. Doing so could result in sprocket breakage.

4. With the key in the shaft keyway, position the assembly onto the shaft allowing for small axial movement of the sprocket which will occur during the tightening process.

   Note: When mounting sprockets on a vertical shaft, precautions must be taken to positively prevent the sprocket and/or bushing from falling during installation.

5. Alternately torque the bolts until the sprocket and bushing tapers are completely seated together (at approximately half of the recommended torque; see table below).

   Note: Do not use worn hex key wrenches. Doing so may result in a loose assembly or may damage bolts.

6. Check the alignment and sprocket runout (wobble), and correct as necessary.

7. Continue alternate tightening of the bolts to the recommended torque values specified in the table below.

Taper-Lock® Bushings

Bushing Style	Bolts		Torque Wrench	
	Qty.	Size	lb-ft	lb-in
1008	2	1/4-20 x 1/2	4.6	55
1108	2	1/4-20 x 1/2	4.6	55
1210	2	3/8-16 x 5/8	14.6	175
1610	2	3/8-16 x 5/8	14.6	175
2012	2	7/16-14 x 7/8	23.3	280
2517	2	1/2-13 x 1	35.8	430
3020	2	5/8-11 x 1 1/4	66.7	800
3525	3	1/2-13 x 1 1/2	83.3	1000
4030	3	5/8-11 x 1 3/4	141.7	1700
4535	3	3/4-10 x 2	204.2	2450
5040	3	7/8-9 x 2 1/4	258.3	3100
6050	3	1 1/4-7 x 3 1/2	651.7	7820
7060	4	1 1/4-7 x 3 1/2	651.7	7820

Caution: Excessive bolt torque can cause sprocket and/or bushing breakage.

Note: To insure proper bushing/sprocket performance, full bushing contact on the shaft is recommended.

8. To increase the bushing gripping force, firmly tap the face of the bushing using a drift or sleeve (Do not hit the bushing directly with the hammer).

9. Re-torque the bushing bolts after Step 8.

10. Recheck all bolt torque values after the initial drive run-in, and periodically thereafter. Repeat steps 5 through 9 if loose.

To Remove TAPER-LOCK® Type Bushings

1. Loosen and remove all mounting bolts.

2. Insert bolts into all jack screw holes indicated by "●" (see figure above).

3. Loosen the bushing by alternately tightening the bolts in small but equal increments until the tapered sprocket and bushing surfaces disengage.

QD® Type Sprocket Installation and Removal

Position One

Position Two

To Install QD® Type Bushings

1. Clean the shaft, bore of bushing, outside of bushing and the sprocket hub bore of all oil, paint and dirt. File away any burrs.

   Note: The use of lubricants can cause sprocket breakage. DO NOT USE LUBRICANTS IN THIS INSTALLATION.

2. For "Position One" or "Position Two" (whichever applies), line up the unthreaded bushing holes "C" with the threaded sprocket hub holes "T". Lightly oil the bolts and thread them (with lock washers) into the sprocket hub engaging only 2 or 3 threads. Bolt heads should be mounted outside to allow for disassembly. When mounting sprockets on 'M' through 'W' bushing sizes, position the threaded jack screw hole (J) as far from the bushing saw slot as possible to reduce the possibility of bushing breakage during disassembly.

   Note: Do not lubricate the bushing taper, hub taper, bushing bore, or the shaft. Doing so could result in sprocket breakage.

3. With the key in the shaft keyway, position the assembly onto the shaft allowing for small axial movement of the sprocket which will occur during the tightening process. When installing large or heavy parts in "Position One" (see figure above), it may be easier to mount the key and bushing onto the shaft first, then place the sprocket on the bushing and align the holes.

   Note: When mounting sprockets on a vertical shaft, precautions must be taken to positively prevent the sprocket and/or bushing from falling during installation.

4. Alternately tighten the bolts until the sprocket and bushing tapers are completely seated together (at approximately half the recommended torque).

5. Check the alignment and sprocket runout (wobble), and correct as necessary.

6. Continue alternate tightening of the bolts to the recommended torque values specified in the table below.

   Note: Excessive bolt torque can cause sprocket and/or bushing breakage. When properly mounted, there must be a gap between bushing flange and sprocket after the bolts are tightened.

Bushing Style	Bolts		Torque Wrench	
	Qty.	Size	lb-ft	lb-in
H	2	1/4 x 3/4	7.9	95
JA	3	10-24 x 1	4.5	54
SH & SDS	3	1/4-20 x 1 3/8	9.0	108
SD	3	1/4-20 x 1 7/8	9.0	108
SK	3	5/16-18 x 2	15.0	180
SF	3	3/8-16 x 2	30.0	360
E	3	1/2-13 x 2 3/4	60.0	720
F	3	9/16-12 x 3 5/8	75.0	900
J	3	5/8-11 x 4 1/2	135.0	1620
M	4	3/4-10 x 6 3/4	225.0	2700
N	4	7/8-9 x 8	300.0	3600
W	4	1 1/8-7 x 11 1/2	600.0	7200
S	5	1 1/4-7 x 15 1/2	750.0	9000
P	4	1-8 x 9 1/2	450.0	5400

QD® Bushings

Caution: Excessive bolt torque can cause sprocket and/or bushing breakage.

Note: To insure proper bushing/sprocket performance, full bushing contact on the shaft is recommended.

7. Tighten the set screw, when available, to hold the key securely during operation.

To Remove QD® Type Bushings

1. Loosen and remove all mounting bolts.
2. Insert bolts into all threaded jack screw holes.
3. Loosen the bushing by first tightening the bolt furthest from the bushing saw slot, then alternately tighten remaining bolts. Keep tightening the bolts in small but equal increments until the tapered sprocket and bushing surfaces disengage.

   Note: Excessive or unequal pressure on the bolts can break the bushing flange, making removal nearly impossible without destroying the sprocket.

BELT STORAGE AND HANDLING

Storage Recommendations

Proper preventive maintenance should not be limited to the actual belt drive operating on equipment, but should also include following proper storage procedures. In order to retain their serviceability and dimensions, proper storage procedures must be followed for all belt types. Quite often premature belt failures can be traced to improper belt storage procedures that damaged the belt before it was installed on the drive. By following a few common sense steps, these types of belt failures can be avoided.

General Guidelines

Recommended

Belts should be stored in a cool and dry environment with no direct sunlight. Ideally, less than 85˚ F and 70% relative humidity.

Store on shelves or in boxes or containers. If the belt is packaged in a box, like Poly Chain® GT®2, store the belt in its individual box.

V-belts may be stored by hanging on a wall rack if they are hung on a saddle or diameter at least as large as the minimum diameter sheave recommended for the belt cross section.

When the belts are stored, they must not be bent to diameters smaller than the minimum recommended sheave or sprocket diameter for that cross section. (see Technical Information section) Belts should not be stored with back bends that are less than 1.3 times the minimum recommended sheave or sprocket diameter for that cross section.

If stored in containers, make sure that the belt is not distorted when in the container. Limit the contents in a container so that the belts at the bottom of the container are not damaged by the weight of the rest of the belts in the container.

Not Recommended

Belts should not be stored near windows, which may expose the belts to direct sunlight or moisture.

Belts should not be stored near heaters, radiators, or in the direct airflow of heating devices.

Belts should not be stored near any devices that generate ozone. Ozone generating devices include transformers and electric motors.

Belts should not be stored where they are exposed to solvents or chemicals in the atmosphere.

Do not store belts on the floor unless they are in a protective container. Floor locations are exposed to traffic that may damage the belts.

Do not crimp belts during handling or while stored.

Belts are crimped by bending them to a diameter smaller than the minimum recommended diameter sheave or sprocket for that cross section. Do not use ties or tape to pull belt spans tightly together near the "end" of the belt. This will crimp the belt and cause premature belt failure. Do not hang on a small diameter pin that suspends all of the belt weight and bends the belt to a diameter smaller than the minimum recommended sheave or sprocket diameter. Improper storage will damage the tensile cord and the belt will fail prematurely. Handle belts carefully when removing from storage and going to the application. Do not inadvertently crimp or damage the belts by careless handling.

Storage Methods

V-belts

V-belts can be coiled in loops for storage purposes. Each coil results in a number of loops. One coil results in three loops, two coils results in five loops, etc. The maximum number of coils that can be used depends on the belt length. If coiling a belt for storage, consult the table on the next page and follow the limits shown.

BELT STORAGE AND HANDLING

Belt Cross Section	Belt Length (in)	Belt Length (mm)	Number of Coils	Number of Loops
3L, 4L, 5L, A, AX, AA, B, BX, 3V, 3VX, 9R, 13R, 13C, 13CX, 13D, 16R, 16C, 16CX, 9N	Under 60	Under 1500	0	1
	60 up to 120	1500 up to 3000	1	3
	120 up to 180	3000 up to 4600	2	5
	180 and over	4600 and over	3	7
BB, C, CX, 5V, 5VX, 16D, 22C, 22CX, 15N	Under 75	Under 1900	0	1
	75 up to 144	1900 up to 3700	1	3
	144 up to 240	3700 up to 6000	2	5
	240 and over	6000 and over	3	7
CC, D, 22D, 32C	Under 120	Under 3000	0	1
	120 up to 240	3000 up to 6100	1	3
	240 up to 330	6100 up to 8400	2	5
	330 up to 420	8400 up to 10,600	3	7
	420 and over	10,600 and over	4	9
8V, 25N	Under 180	Under 4600	0	1
	80 up to 270	4600 up to 6900	1	3
	270 up to 390	6900 up to 9900	2	5
	390 up to 480	9900 up to 12,200	3	7
	Over 480	12,200 and over	4	9

PowerBand® V-belts, Synchronous Belts, Micro-V® Belts

Poly Chain® GT®2 is shipped in individual boxes. Poly Chain® GT®2 should be stored in the box in which it was shipped.

These belts may be stored by hanging on a wall rack if they are hung on a saddle or diameter at least as large as the minimum diameter sheave or sprocket recommended for the belt cross section, and the belts are not distorted.

PowerBand® V-belts, Synchronous belts, and Micro-V® belts up to 120 inches (3000 mm) may be stored in a nested configuration. Nests are formed by laying a belt on its side on a flat surface and placing as many belts inside the first belt as possible without undue force. When nests are formed, do not bend the belts to a diameter that is smaller than the minimum recommended sheave or sprocket diameter. Nests may be stacked without damaging the belts if they are tight and stacked with each nest rotated 180˚ from the nest below.

PowerBand® V-belts and Micro-V® belts over 120 inches (3000 mm) may be rolled up and tied for shipment. These individual rolls may be stacked for easy storage. When the belts are rolled, they must not be bent to a diameter that is smaller than the minimum diameter recommended for the cross section.

Variable Speed Belts

Variable speed belts have a thicker cross section and are more sensitive to distortion than other V-belts. Do not hang variable speed belts from pins, racks, or saddles. Store variable speed belts on their edge on shelves. Variable speed belts that are in sleeves may be stacked, taking care to avoid distorting the belts at the bottom of the stack.

Storage Effects

Belts may be stored up to six years if properly stored at temperatures less than 85˚F and relative humidity less than 70%.

If the storage temperature is higher than 85˚ F, the storage limit for normal service performance is reduced by one half for each 15˚F increase in temperature. Belts should never be stored at temperatures above 115˚F.

At relative humidity levels above 70%, fungus or mildew may form on stored belts. This has minimal affect on belt performance, but should be avoided.

When equipment is stored for prolonged periods of time (over six months), the belt tension should be relaxed so that the belt does not take a set, and the storage environment should meet the 85˚F and 70% or less relative humidity condition. If this is not possible, belts should be removed and stored separately in a proper environment.

BELT IDENTIFICATION

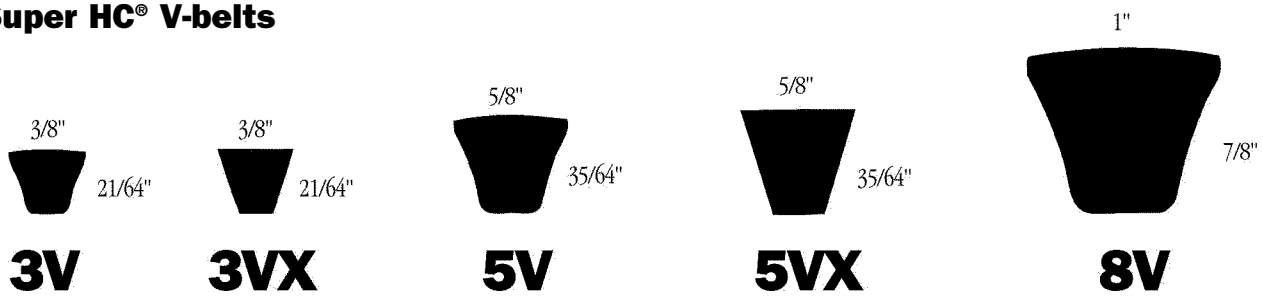
When preventive maintenance inspections indicate that belts need replacing, it is important to install the correct belts.

Consequently, it is important to identify the various types and sizes of belts available, and then quickly be able to specify the correct replacement.

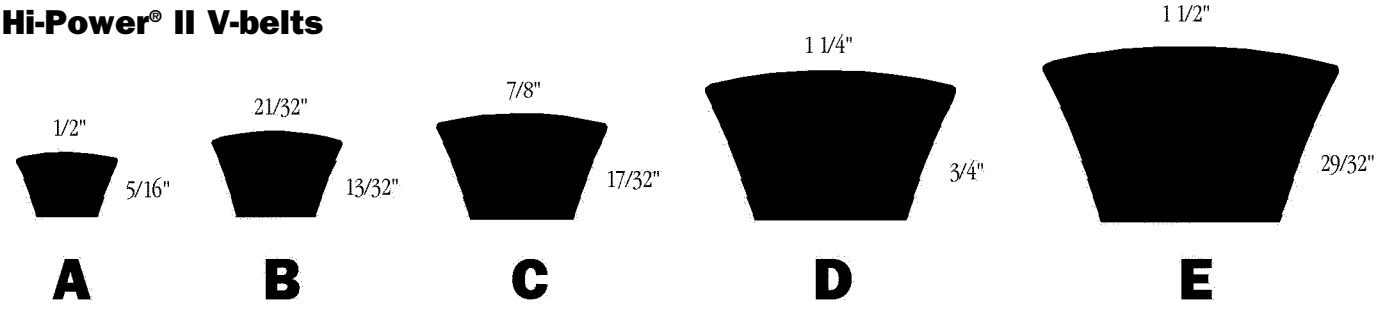
The information on the following pages will help identify the belt types used in industry. Gates makes a belt to fit nearly any application.

V-belts

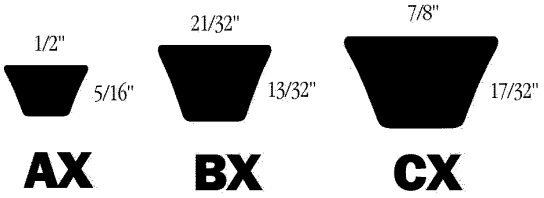
Super HC® V-belts



Hi-Power® II V-belts

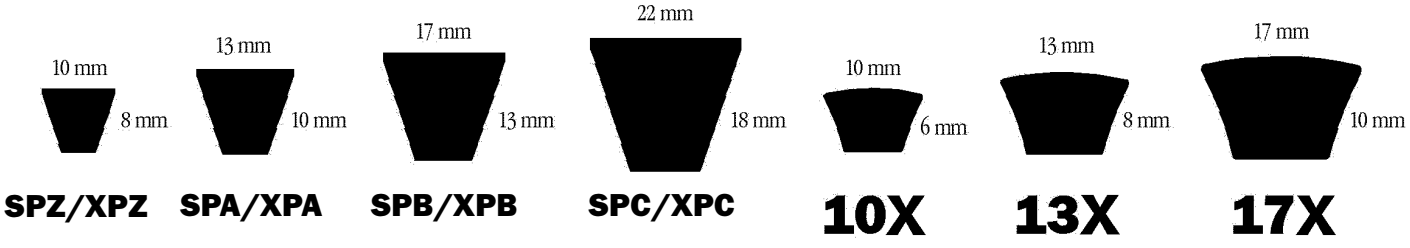


Tri-Power® V-belts



PowerBand® – Hi-Power® II and Super HC®

Metric Power™ V-belts



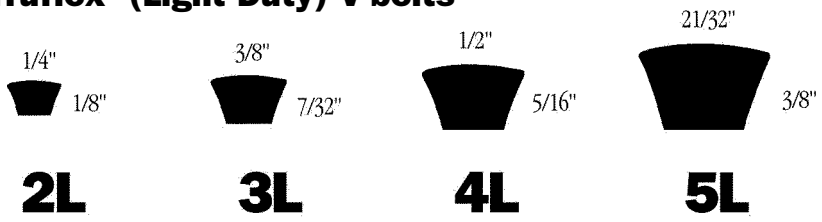
BELT IDENTIFICATION

Multi-Speed Belts
Top Width-Sheave Angle

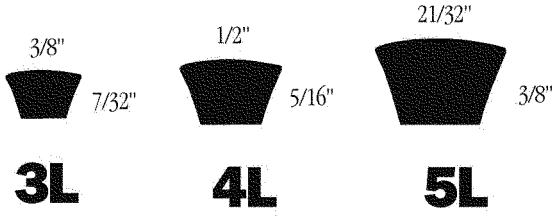
Example: Belt No. 2326V310 designates:

23 Top Width in 16ths of an Inch: 23/16" = 1-7/16"	**26** Sheave Angle in Degrees (26)	**V** Multi-Speed	**310** Pitch Circumference to the Nearest 10th Inch: 31.0"

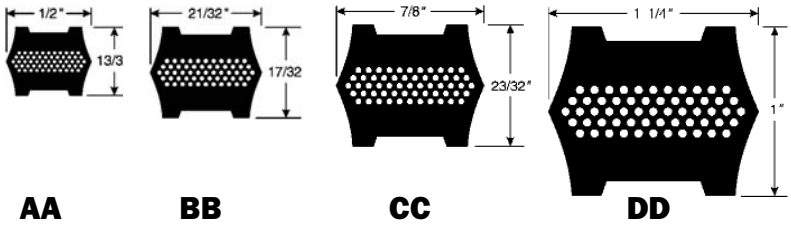
Truflex® (Light Duty) V-belts



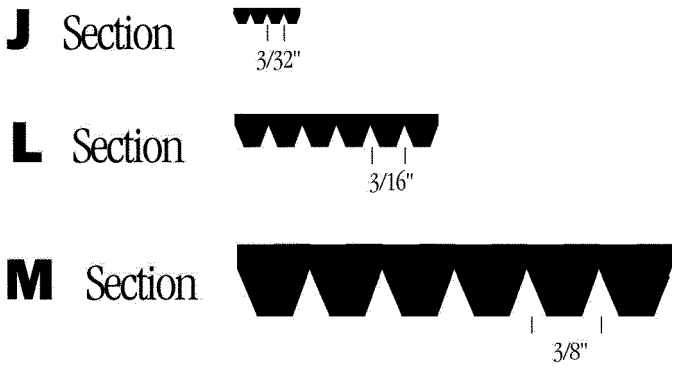
PoweRated® V-belts



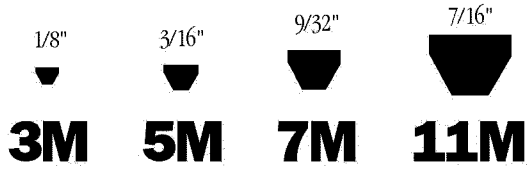
Dubl V-belts



Micro-V® Belts



Standard Polyflex® Belts



Polyflex® JB® Belts

BELT IDENTIFICATION

Synchronous Belts

All synchronous belts are identified in a similar manner, in either English or metric units. Belts are measured by:

1. **Pitch:** Distance in inches or millimeters between two adjacent tooth centers as measured on the belt pitch line.
2. **Pitch Length:** Total length (circumference) in inches or millimeters as measured along the pitch line. It is equal to the pitch multiplied by the number of teeth in the belt.
3. **Width:** Denoted in inches or millimeters.

Poly Chain® GT®2 Belts

8M
8mm Pitch

14M
14mm Pitch

PowerGrip® HTD® Belts

3M
3mm Pitch

5M
5mm Pitch

PowerGrip® GT®2 Belts

2M
2mm Pitch

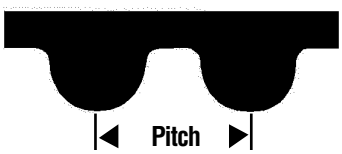
3M
3mm Pitch

5M
5mm Pitch

8M
8mm Pitch

14M
14mm Pitch

20M
20mm Pitch



PowerGrip® Timing Belts

MXL
.080" Pitch

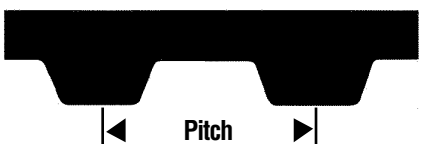
XL
.200" Pitch

L
.375" Pitch

H
.500" Pitch

XH
.875" Pitch

XXH
1.250" Pitch



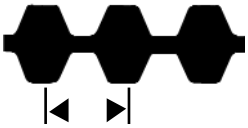
BELT IDENTIFICATION

Twin Power® Timing Belts

XL
.200" Pitch

L
.375" Pitch

H
.500" Pitch



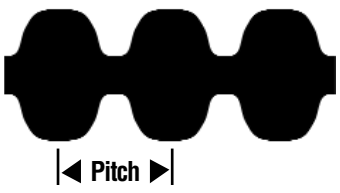
Twin Power® PowerGrip® GT®2 Belts

3M
3mm Pitch

5M
5mm Pitch

8M
8mm Pitch

14M
14mm Pitch



BELT IDENTIFICATION

Synchro-Power® Polyurethane Belts

MXL
.080" Pitch

XL
.200" Pitch

L
.375" Pitch

H
.500" Pitch

T2.5
2.5mm Pitch

T5
5mm Pitch

T10
10mm Pitch

T20
20mm Pitch

BELT IDENTIFICATION

Synchro-Power® Polyurethane Belts

AT5
5mm Pitch

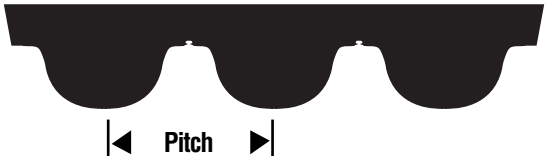
AT10
10mm Pitch

AT20
20mm Pitch

5M HTD
5mm Pitch

8M HTD
8mm Pitch

14M HTD
14mm Pitch

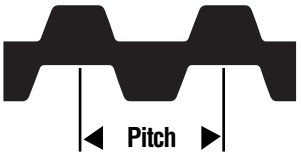


BELT IDENTIFICATION

Synchro-Power® Polyurethane Belts

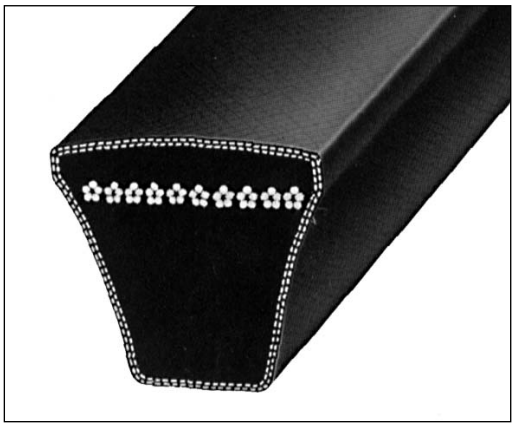
DT5
5mm Pitch

DT10
10mm Pitch



Narrow Section V-Belts

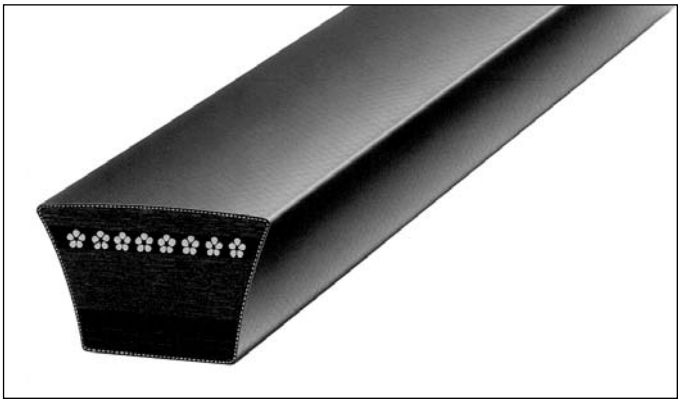
These high capacity belts are used to substantially reduce drive costs and decrease space requirements. This V-belt handles the complete range of drive horsepower recommended with three narrow cross sections instead of the five regular cross sections needed for classical heavy-duty belts. Specified by 3V, 5V or 8V cross sections. Specify Gates Super HC® V-Belts.



Classical Section V-Belts

These are the original belts used in heavy duty applications. They are specified by cross section and standard length. The size is designated as A, B, C, D or E. The easiest way to select a replacement is by finding the belt number on the worn belt. If not legible, measure the belts outside circumference with a flexible tape, preferably while it is still on the drive.

Then, order the Gates **Hi-Power® II** V-belt which has the next shorter standard length. For example: For an "A" section belt with a 28.0" O.C., order an A26 replacement belt.



Banded and Bandless Belts

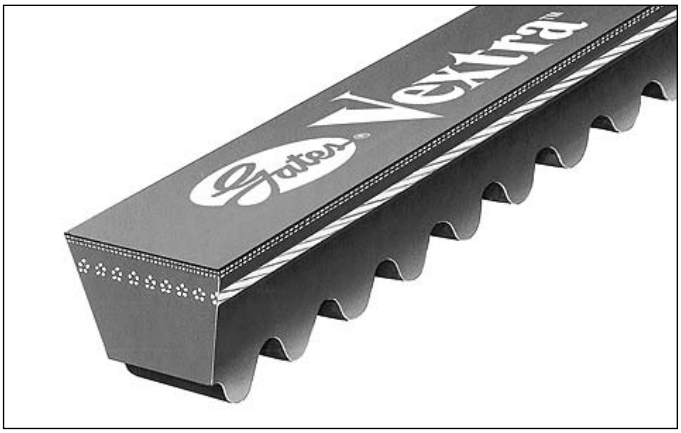
Banded belts, also called wrapped or covered belts, have a fabric cover. Un-notched and generally with concave sidewalls, banded belts have rounded bottom corners and arched tops.

Bandless belts have no fabric cover They have straight, cut-edge sidewalls and special molded notches.
The notches reduce bending stress which allows belts to run on smaller diameter sheaves than comparable non-notched banded belts.

Gates offers these two types in both the classical and narrow sections. In the classical section, Gates **Tri-Power®** molded notch is available in AX, BX and CX cross sections. Its length is specified by the same standard belt number as other classical section belts.

Gates also offers **Super HC® Molded Notch** V-belts in 3VX and 5VX sizes.

In both cases, an "X" is used in the belt number to designate a molded notch construction. For example: An AX26 is a bandless, molded notch classical section belt. A 5VX1400 is a narrow section, bandless, molded notch belt with a 140" O.C.

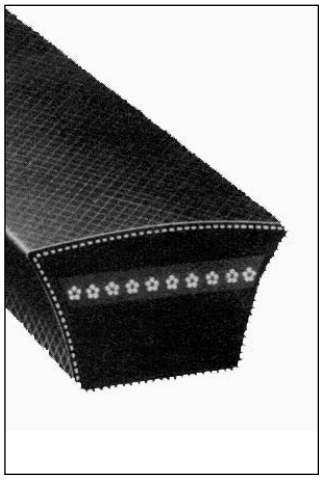


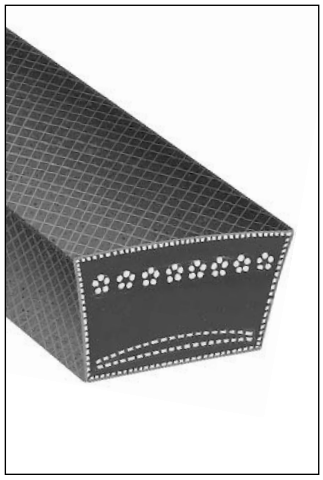
Note: The revolutionary Gates Vextra® construction is used in the notched belts.

BELT TYPES

Light Duty Belts

These are used on light duty fractional horsepower drives and are designed for use with backside idlers. **Gates Truflex**® and **PoweRated**® V-belts are offered in this category and are specified by cross section and outside circumference. **Truflex**® is recommended for the lower lighter duty range. **PoweRated**®, a special belt designed for clutching, heavier shock-load and backside idler drives, is recognized by its green color. Reinforced with an aramid fiber tensile (pound for pound stronger than steel). **PoweRated**® can interchange with **Truflex**®, but **Truflex**® cannot interchange with **PoweRated**®.





Synchronous Belts

These belts are also known as timing or positive drive belts and are used where driveN shaft speeds must be synchronized to the rotation of the driveR shafts. They can also be used to eliminate noise and maintenance problems caused by chain drives.

Synchronous belts, such as **Gates Poly Chain® GT®2**, can be used in high horsepower drives, drives where space is severely limited and where there is limited take up.

Synchronous drives are extremely efficient... as much as 98% with properly maintained **Poly Chain® GT®2** or **PowerGrip® GT®2** systems. By contrast, chain drives are in the 91-98% efficiency range, while V-belts average in the 93-98% range.

Distinctive tooth profiles (shapes) identify synchronous belts. Various sizes and constructions are available to meet a wide range of applications. The three important dimensions of a synchronous belt are pitch, width and pitch length. Tooth profiles must also be identified.

Belt Pitch - Distance in inches or millimeters between two adjacent tooth centers as measured on the belt's pitch line.

Belt Pitch Length - Circumference in inches or millimeters as measured along the pitch line.

Width - Top width in inches or millimeters.

Tooth Profile - See the Belt Identification section for the easiest way to identify tooth profile.

Synchronous belts run on sprockets, which are specified by the following:

Pitch - Distance between groove centers, measured on the sprocket pitch circle. The pitch circle coincides with the pitch line of the mating belt.

Number of Sprocket Grooves

Width - Face width.

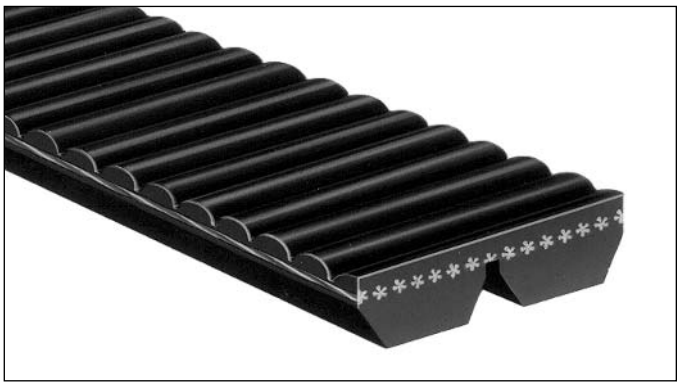
Note: The sprocket's pitch diameter is always greater than its outside diameter.

Note: PowerGrip® GT®2 belts must be used with PowerGrip® GT®2 sprockets for new designs.

Note: 8 and 14 mm pitch PowerGrip® GT®2 belts can be used as replacement belts at the next smaller width for the following: HTD, RPP®, RPP Plus®, HTB, HPT, HT100, HT150, HT200, ETH, HPR, HPPD, EHT or HTT.

Example: 14mm-170mm width – substitute a PowerGrip® GT®2-14mm-115 without any performance loss. Refer to page 32 for crossover information.

Polyflex® JB® Belts



Polyflex® is a unique belt with a distinctive 60° belt angle and ribbed top specifically designed for long life in small diameter sheave drives. **Polyflex® JB®** is ideal for compact drives, drives with high speed ratios, and drives requiring especially smooth operation.

The "JB" refers to the belt's configuration: two, three or five belts joined together to provide extra stability and improved performance. This joined belt style should be used instead of matched single belts whenever possible.

Polyflex® JB® belts are ideal for these applications:

- Milling, grinding or drilling machines
- Lathes
- Machine spindle drives
- Centrifuges
- Blowers
- High speed compressors

Polyflex® JB® belts are specified by Top Width and Effective Length

Multi-Speed Belts

(Variable Speed Drives)

Multi-Speed belts have a distinct shape. Multi-Speed belt top widths are usually greater than their thicknesses. This permits a greater range of speed ratios than standard belts. Usually cogged or notched on the underside, **Multi-Speed** belts are specified for equipment which require changes in driveN speed during operation.

Multi-Speed belts are specified by **Top Width**, **Outside Circumference**, and the required **Groove Angle**. The groove angle can be measured from the drive pulleys.

Micro-V® or V-Ribbed Belts

Gates Micro-V® belts outperform other V-ribbed belts because the tips of the "V" are truncated (shorter). This shorter profile gives the new **Micro-V belts** increased flexibility, reduced heat buildup and allows them to operate at extra high speeds on smaller diameter sheaves.

Additional advantages of the truncated tips are: (1) the belt does not bottom in the sheave, therefore providing a higher degree of wedging and (2) the belt can better tolerate debris in the sheave groove. They are extremely smooth running and highly resistant to oil, heat and other adverse conditions.

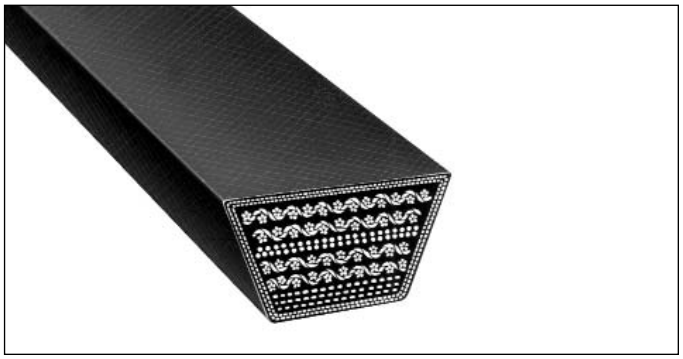
Three cross sections are available for industrial applications: J, L and M.

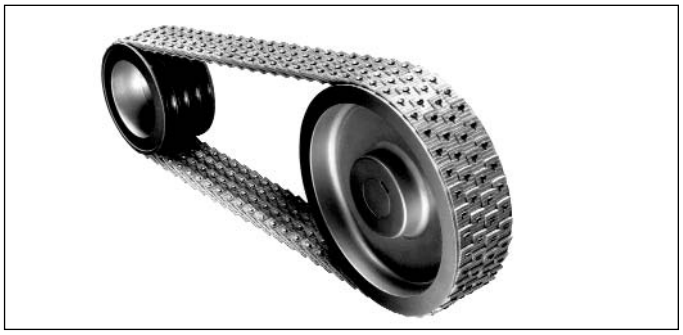
Spliced Belting

Used on drives with little or no take-up, or as an emergency belt replacement.

Belting is sold on reels in standard V-belt cross sections. Ends are spliced with fasteners that require special assembly tools. Always use the correct fasteners with the correct belt type and cross section.

Nu-T-Link*, a high performance, spliced belt, is also available for use as emergency belting, and for drives where conditions are detrimental to rubber belts.





*Nu-T-Link® is a Registered Trademark of Fenner-Manheim.

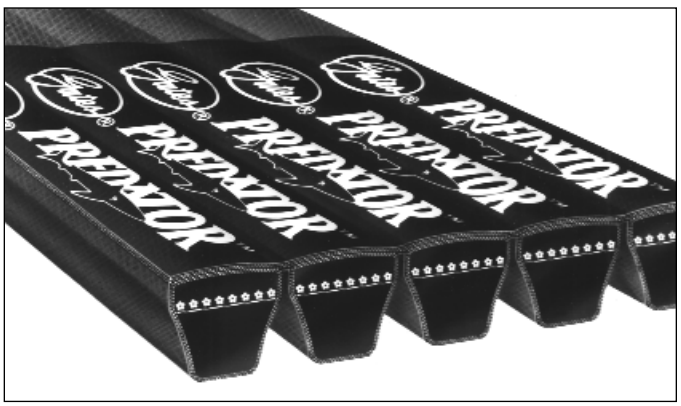
PowerBand® Belts

PowerBand belts were developed by Gates for drives subjected to pulsating loads, shock loads or extreme vibrations where single belts could flip over on the pulleys. A high-strength tie band permanently joins two or more belts to provide lateral rigidity. This keeps the belts running in a straight line in the pulley grooves. PowerBand® construction is offered with **Gates Hi-Power® II**, **Super HC®** and **Super HC® Molded Notch Belts**.

The Gates Predator® V-belt is a multi layered **PowerBand®** construction that adds strength, durability, shear and tear resistance and lateral rigidity to handle the toughest shock-loaded applications. It is available in **Super HC®** and **Hi- Power® II** profiles.

Predator® V-belts primary features:

- Aramid tensile cords for extraordinary strength, durability and virtually zero stretch.
- Chloroprene rubber compounds for superb oil and heat resistance.
- Specially-treated extra tough cover withstands slip and shear forces at peak loads without generating excessive heat. It also fends off penetration by foreign materials.
- Gates curves that compensate for effects that occur when belts bend around a sheave for uniform loading and maximum life.
- Matched by request to maximize power absorption and belt life.



BELT STYLES

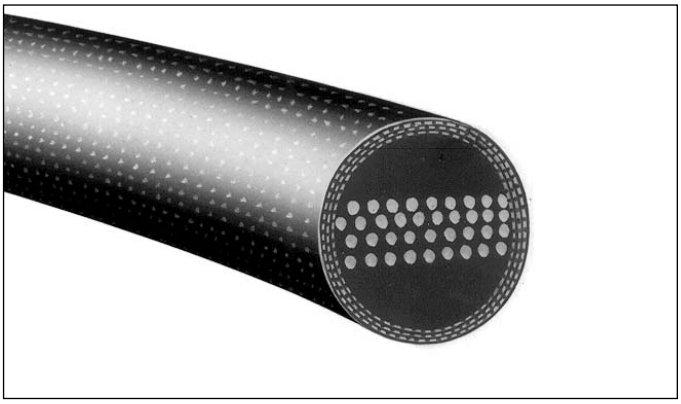
Dubl-V Belts

A special version of Gates Hi-Power® II for serpentine drives where power is transmitted by both the top and bottom of the belt. Dubl-V belts are specified by A, B, or C cross sections, and by Effective Length.

Round Endless Belts

Recommended for replacing leather belting on serpentine or quarter-turn drives. They are specified by **Diameter** and **Inside Length**.

If your current drive has leather or round endless belting, you should consider a new drive design. V-belt drives offer many advantages in performance, even on serpentine or quarter-turn drives.



PowerBack™ Belts

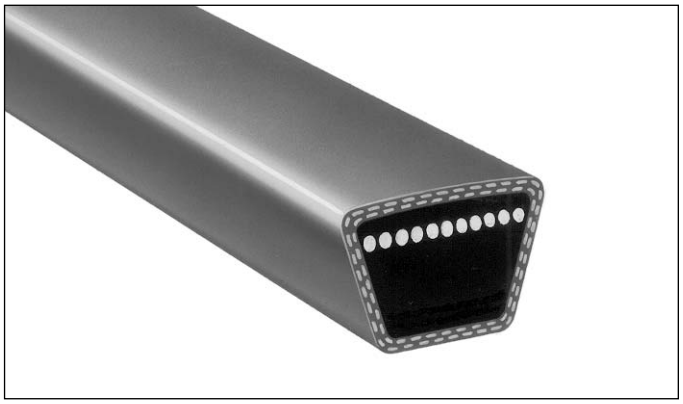
PowerBack™ belts are "B" section V-belts with a flat back surface. The flat back surface makes PowerBack™ belts ideal for driving roll-to-roll conveyor applications.

Power Curve® Belts

Power Curve® belts are "B" section V-belts offering increased flexibility for demanding power turn conveyor applications. The belts "bend" around corners and drive the rollers in most conveyor applications.

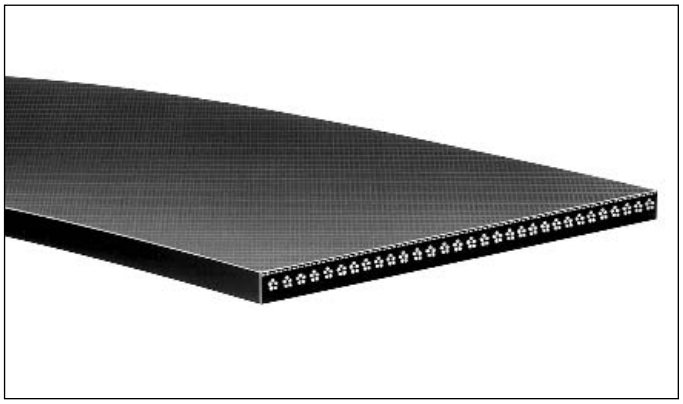
Power Cable® Belts

Recommended for the toughest shock load applications, especially on drives that can't be shut down for retensioning after initial belt run-in. Reinforced with an aramid fiber tensile (pound for pound stronger than steel), Power Cable® belts last longer and cost less than steel cable belts.



Flat Belts

Gates Speed- Flex® Belts, are designed for high speed applications such as drill presses, lathes, grinders and other woodworking equipment. Gates Powercord® Belts are designed for general purpose, lower speed applications. Flat belts are specified by belt **Width** and required **Inside Diameter**.



Static Conductive Belts

Static discharge can pose a hazard on belt drives that operate in potentially explosive environments. Static discharge can also interfere with radios, electronic instruments, or controls used in a facility. While uncommon, static discharge can also cause bearing pitting if the discharge occurs through the bearing. Static conductivity is a required belt characteristic in these cases in order to prevent static discharge.

The **Rubber Manufacturer's Association** (RMA) has published **Bulletin IP 3-3** for static conductivity. Static conductivity testing involves using an ohmmeter to pass an electrical current with a nominal open circuit 500 volt potential through a belt. The test should be performed with the belt off of the belt drive. The belt's resistance is measured by placing electrodes 8.5 inches apart on the clean driving surface of the belt. A resistance reading of six (6) megohms or more constitutes a test failure. Belts that measure a resistance of 6 megohms or more are considered to be non-conductive. Belts that measure a resistance of less than 6 megohms are considered to be static conductive. A static conductive belt with a resistance of 6 megohms or less has sufficient conductivity to prevent measurable static voltage buildup, thus preventing a static discharge.

V-belts are generally manufactured to be static conductive in accordance with the RMA IP 3-3 bulletin, but it is important to confirm with the belt manufacturer that a specific belt product or product line is static conductive.

Gates Hi-Power® II, Tri-Power®, Super HC®, Super HC® Molded Notch, Metric Power™, Micro-V®, and Truflex® V-belts are all static conductive when new as defined by RMA Bulletin IP 3-3. Belts that have been in operation can be checked for static conductivity by using an ohmmeter and following the inspection recommendations given in the RMA IP 3-3 bulletin.

PowerGrip®Timing, PowerGrip® GT®2, Poly Chain® GT®, Poly Chain® GT®2, Polyflex®, Polyflex® JB®, Power Cable®, PoweRated®, and Predator™ belts do not meet the static conductivity requirements specified in RMA Bulletin IP 3-3 and are not considered to be static conductive.

PowerGrip® GT®2 and PowerGrip® Timing belts can be manufactured in a static conductive construction on a made-to-order basis.

When a belt is used in a hazardous environment, additional protection must be employed to assure that there are no accidental static spark discharges. The portion of the belt that contacts the sheave or sprocket must be