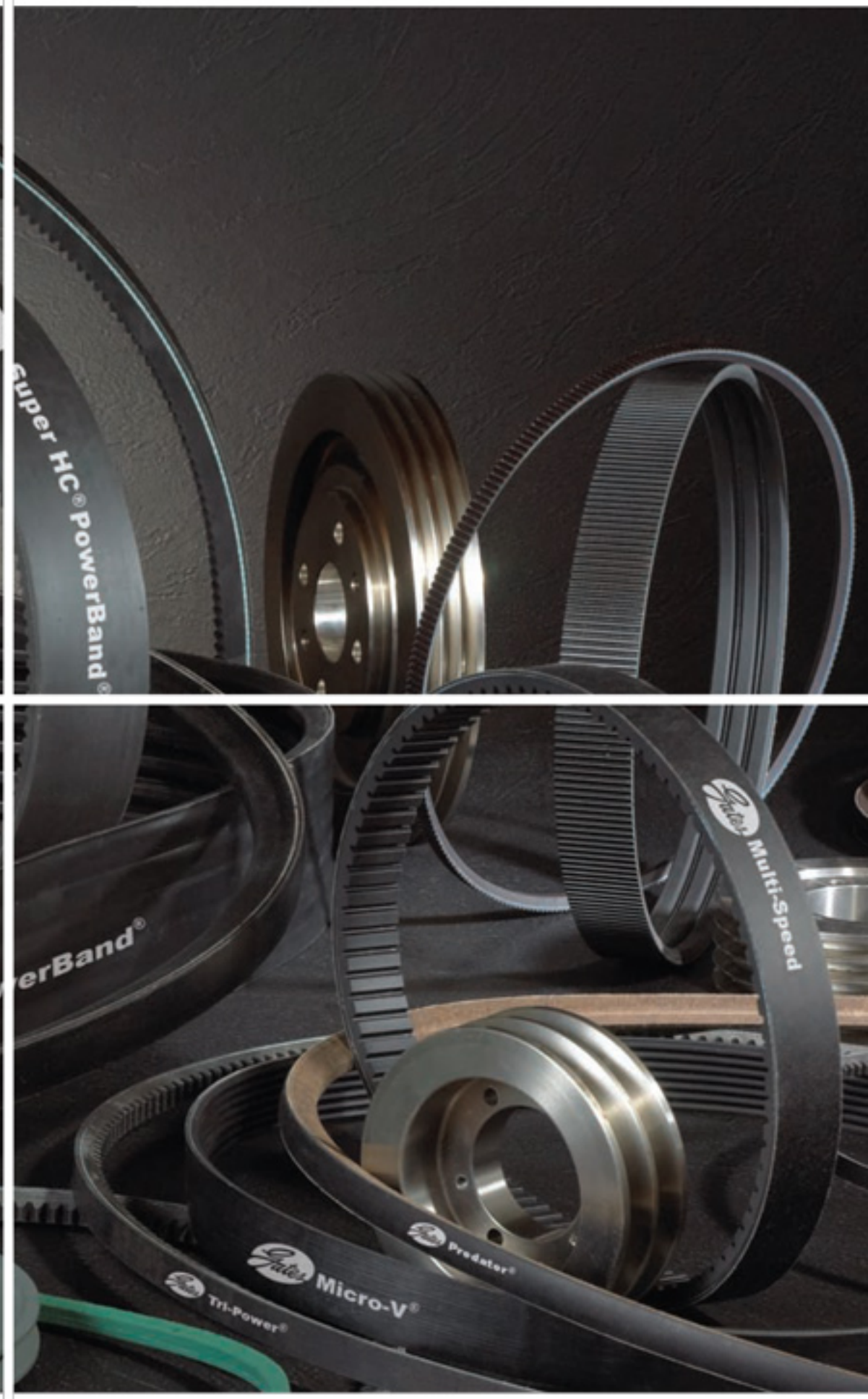
GATES FEATURES GUIDE

V-BELTS: ENGINEERED FOR PERFORMANCE



Not All Belts Are Created Equal

While two V-belts may look similar to the casual observer, the engineering and design processes used to create them can vary greatly, leading to vast differences in performance and belt life. With nearly 100 years of experience, Gates V-belt systems are constructed to outperform and outlast competitive products.

This guide will walk you through the advanced features of Gates V-belts, offering tips and product information that illustrate how not all belts are created equal.

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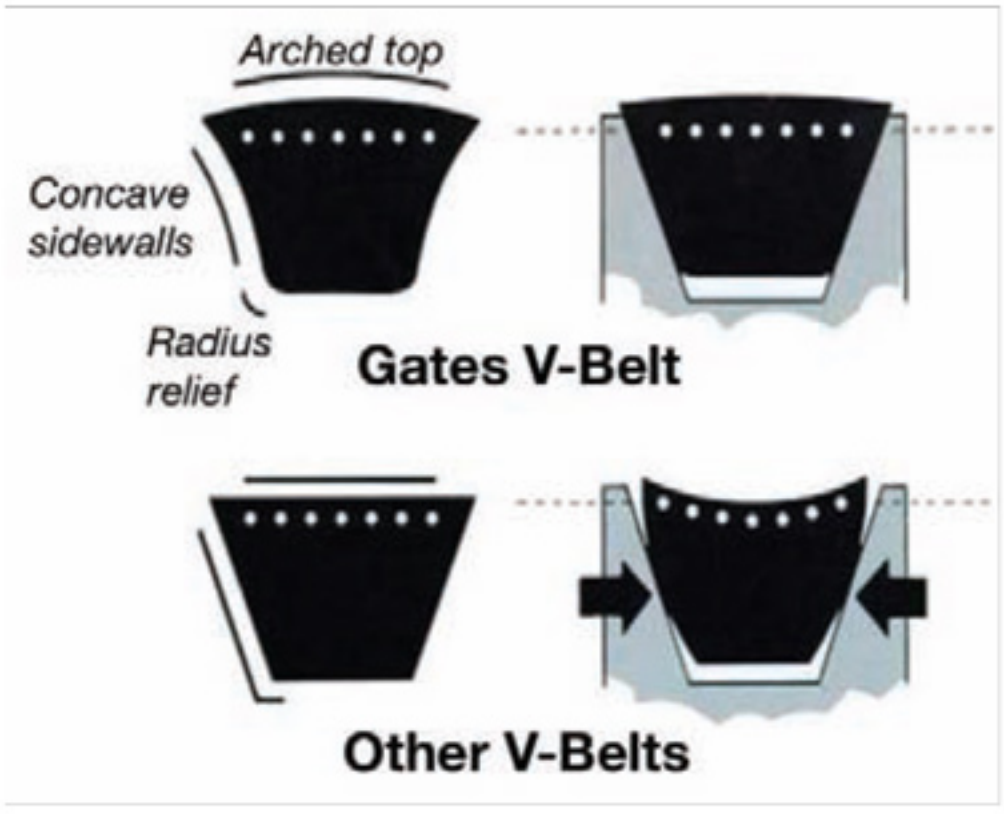
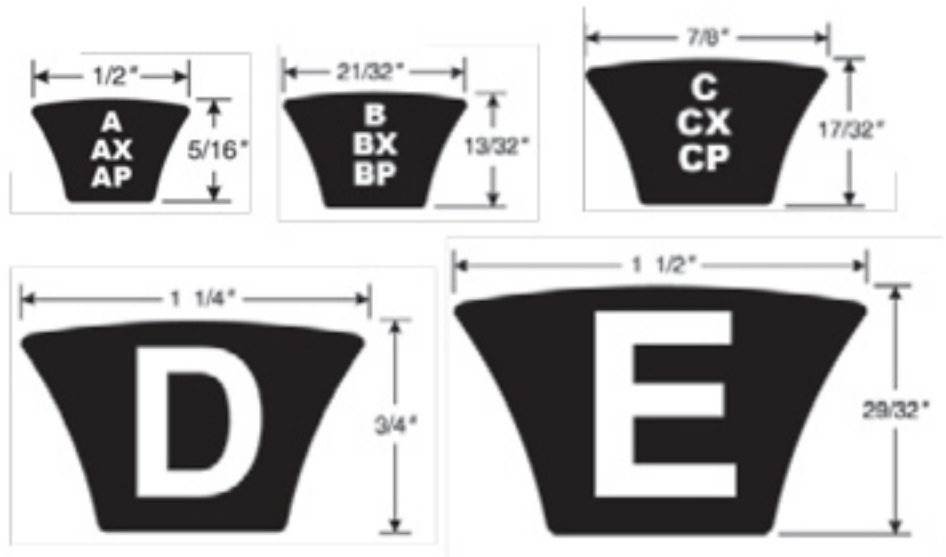
The Shape of Power

V-Belt Curves

When V-belts are under tension and running in a sheave they change shape. To optimize power transmission, many Gates V-belts are designed with the exclusive Gates Curves feature. Gates Curves consist of three key components: concave sidewalls, radius relief corners and an arched top.

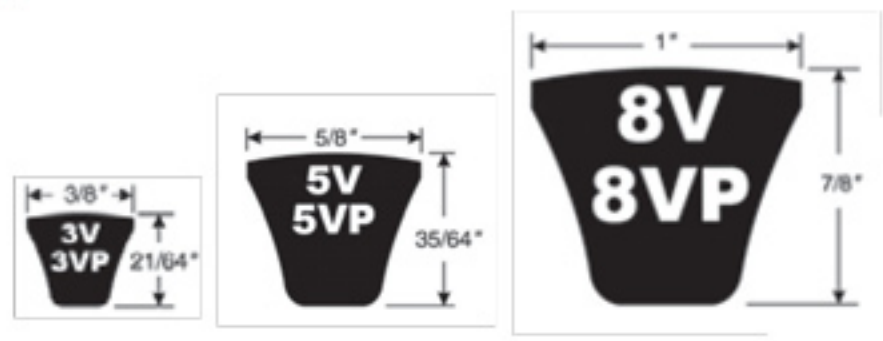
Concave sidewalls assure even contact with the sheave, evenly distributing wear for increased belt life. Radius relief reduces corner wear and works in conjunction with the concave sidewalls for uniform tensile loading. The arched top provides strength, preventing the "dishing" effect that is found in other belts not engineered for shape change. Because of this, the tensile members work together to carry the load evenly reducing internal stress. The superior Gates Curves work to evenly distribute wear and offer uniform cord support creating more efficient drives and increased service life.





Gates Classical V-Belt Profiles

Narrow profile (3V, 5V, 8V) V-belts are narrower than classical V-belts. With a steeper angle on their sidewalls they are easily wedged in compatible sheaves found on industrial equipment such as fans and pumps. They offer up to three times the power of classical profile V-belts, allowing users to decrease the number of belts needed in an application.



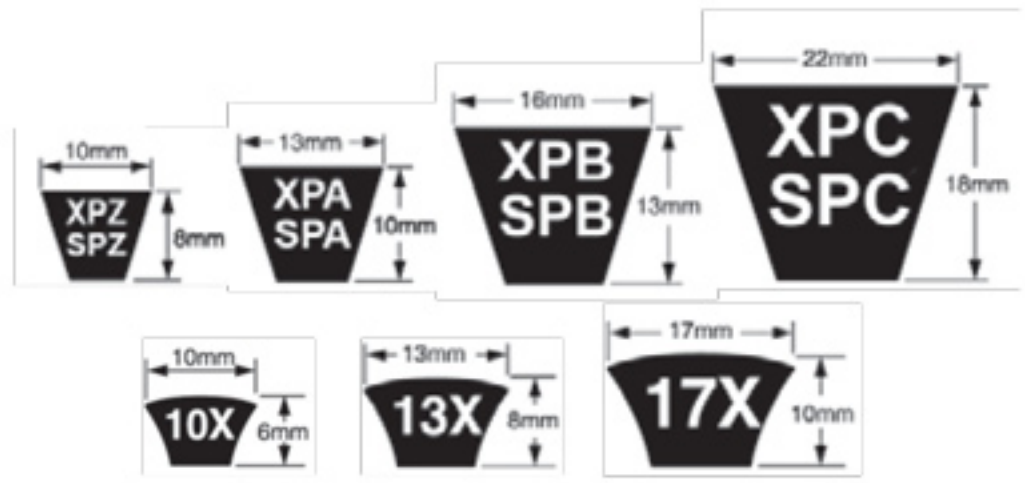
Gates Narrow V-Belt Profiles

Metric-Power™ belts have a profile compatible with equipment manufactured outside the United States. While most Gates V-belts are made to comply with RMA (Rubber Manufacturing Association) standards, Metric-Power™ V-belts are designed to adhere to overseas standards mandated by organizations such as ISO (International Standards Organization) and DIN (Deutsche Industrial Norme), making them the perfect option for replacing belts on international machines.

Profiles: FHP, Classical, Narrow, Metric

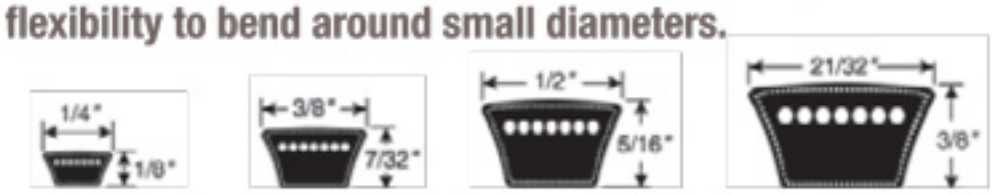
Gates manufactures V-belts with several profiles for various applications.

Gates classical V-belt profile is widely used and adheres to standards developed in the 1930's. Available in several sizes (A, B, C, D and E) and lengths, these belts are compatible with industry standard classical section drives and are ideal for replacing belts in older existing applications.



Gates Metric-Power™ V-Belt Profiles

Gates FHP (Fractional Horsepower) profile is ideal for light-duty applications such as lawnmowers. Its cross section is thinner than standard V-belt profiles, offering more flexibility to bend around small diameters.



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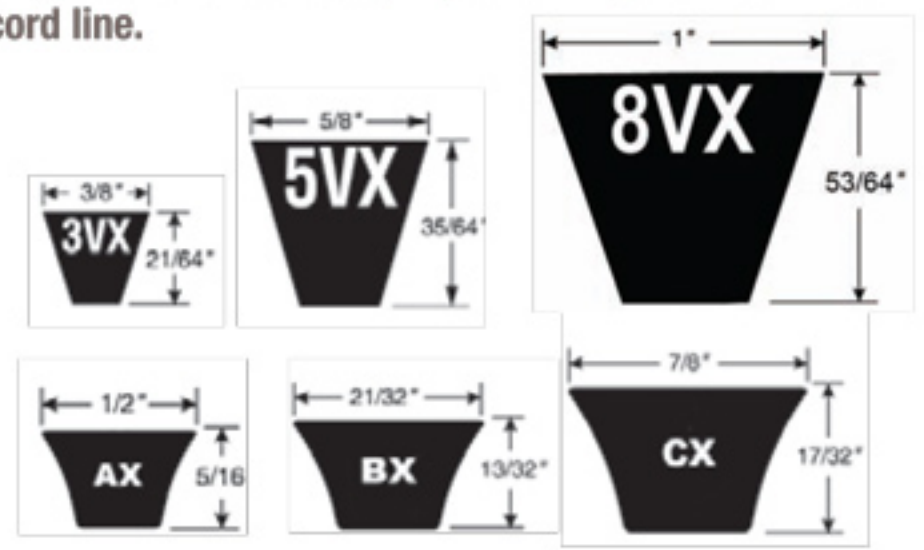
Gates FHP V-Belt Profiles

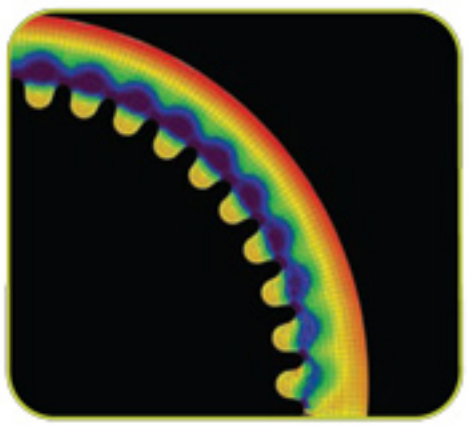
Notched V-Belts

Gates designs notches in belts to reduce the bending stress as the belt wraps around small diameter pulleys, thereby reducing the heat generated by rapid flexing which is one of the causes of premature belt failure. Since most drive systems have high load requirements, belts need more undercord material for tensile cord support. Available in all existing profiles, Gates notched V-belts are constructed to offer support for even load distribution and a longer life. A relatively large, deep notch provides excellent flexibility for bending around sheaves by implementing the notch near the cord line.



Gates Notched V-Belt Profiles

While tensile cord support and flexibility are important, proper notch shape and spacing also affect the distribution of stress when the belt bends and can prevent undercord cracking and extend belt life. It is simple to design exclusively for flexibility or cord support, but Gates engineers have devised a belt that addresses both to perform under a wide range of conditions.



Molded Notch Bending Stress

Quick Tip

To see if there is wear on the sidewall of a sheave use a Gates sheave gauge. Slide this plastic template of a V-belt cross section into the sheave groove and shine a flashlight behind it to decide if it's time to replace your drive's parts.

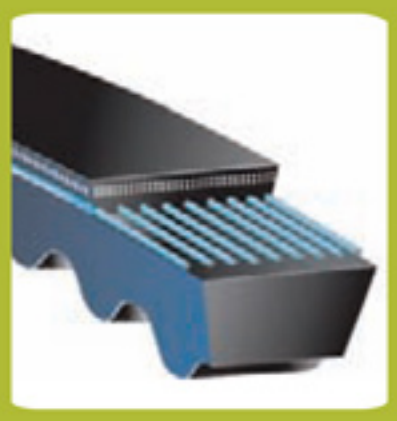
› Not Just Rubber

EPDM

While it is important for V-belts to have high-performing physical attributes, it is essential that they are made out of material that that can withstand high temperatures and resist wear. Gates molded notch V-belts are now exclusively constructed with EPDM, a high-performance synthetic rubber compound. Belts made with EPDM offer a 70% broader temperature range compared to other belts and resist hardening to avoid cracking. They meet the Rubber Manufacturers' Association (RMA) standards for oil and heat resistance as well as static conductivity.

Expanded Belt Temperature Range

Tri-Power® Belts



Made with Gates exclusive EPDM construction, Tri-Power® V-belts can withstand a high temperature threshold while resisting oil, ozone and heat damage. Their specially-designed molded notches offer flexibility and reduced bending stress, especially on small diameter sheaves. Fiber-loaded undercord stocks provide transverse rigidity for maximum tensile cord support, while precision-machined sidewalls provide smooth operation to reduce vibration and extend component life.

Quick Tip

To easily measure belt tension, use the Gates Sonic Tension Meter. Simply enter the belt mass constant, belt width and span length into the handheld meter using the built-in keypad. Then hold the meter next to the belt span and strum the belt to make it vibrate. Belts, like strings, vibrate under tension at a particular natural frequency based on mass and span length. When you press the "measure" button, Gates unique Sonic Tension Meter converts the frequency into a measurement of tension providing a fast and accurate reading.

Transverse Rigidity

Every V-belt must have a high level of rigidity across its width so that load is equally transferred by all of the tensile cords. It is equally important that there is a high level of flexibility along the length of the belt to reduce heat build-up and bending stresses. Gates belts are constructed with a parallel alignment of fibers in the rubber compound that allows for this duality. This is especially key in wide variable speed belts due to the lateral force extended by the spring-loaded sheaves found on a typical variable speed drive. The transverse rigidity on Gates V-belts is engineered to allow for better load life capacity and maximum efficiency from the belt.

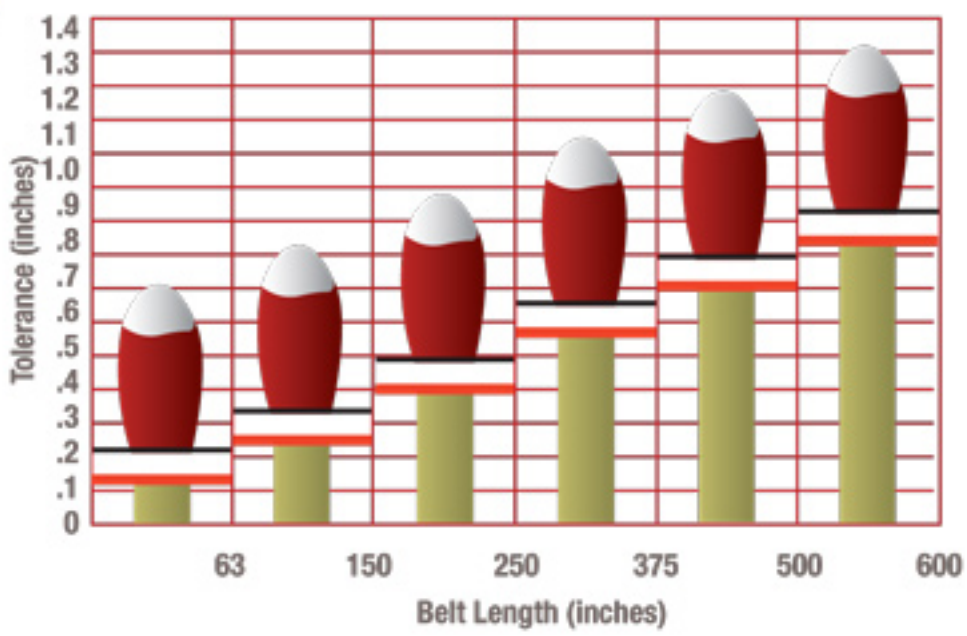
Gates Transverse Rigidity

V80® Series Matched Belts

RMA tolerances for matched belts are stringent. For example, 0.15 inch (roughly the size of a typical match head) is the exact tolerance for a set of matched belts up to 63 inches in length. To meet these requirements, manufacturers have typically used a complex system of labeling matched belts with numbers, making users search through massive inventories to find the correct belts.

To prevent users from going through this cumbersome task, Gates applied proven statistical process control (SPC) methods to material and assembly processes, creating the V80® series of belts that are tighter than RMA tolerances in each size category.

Each V80 belt is manufactured with a finite length tolerance so that any V80 belt will match and perform with any other V80 belt of the same size and type. Made with high-modulus polyester tensile cords, Gates V80 belts exhibit extremely low stretch, saving maintenance time and money.



Belts included in the V80 series include the Hi-Power® II, Tri-Power®, Super HC® and Super HC® Molded Notch Belts.

Match Tolerance

RMA Standard Matching Tolerances

Gates Manufacturing Tolerances

Gates tolerances are stricter then RMA tolerances in each size category

Hi-Power® II Belts

Gates Hi-Power® II Belts are perfect for new applications or replacement on heavy-duty conventional V-belt drives. Engineered with Gates Curves, Flex Bonded cords and the Flex-Weave® cover, these V-belts offer even load distribution, flexibility and minimum corner wear for longer service life. Available in A, B, C, D and E sizes.

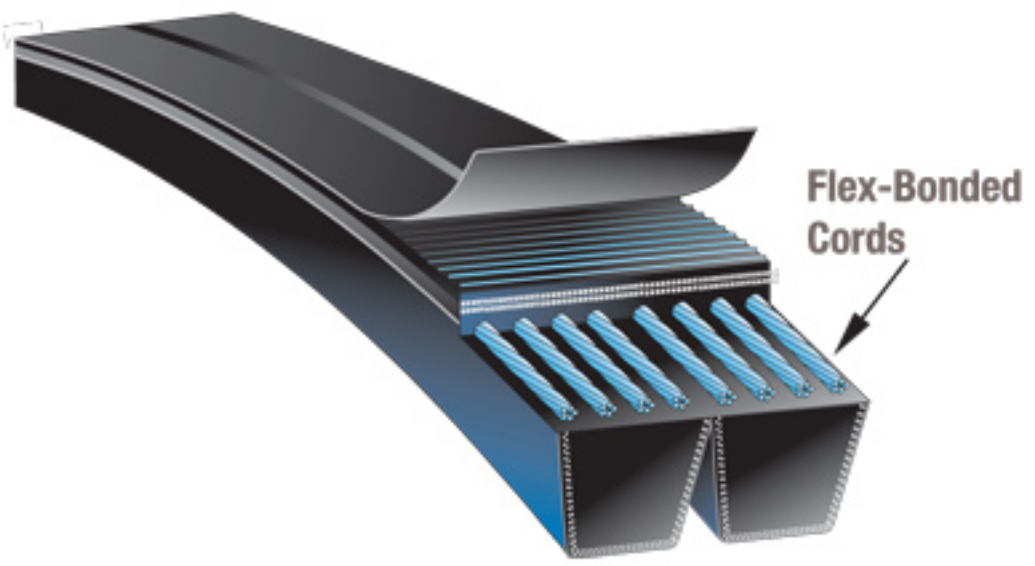
Quick Tip

Want to align all of your industrial belt drives with just one tool? Gates EZ Align® precision laser alignment device quickly identifies common types of misalignment. The transmitter emits a thin laser line to the reflector on the opposite pulley for easy identification of offset and vertical-angle misalignment. The laser line is also reflected back to the transmitter, indicating horizontal-angle misalignment. It's simple to use; a single operator can identify pulley misalignment in just a few minutes with no formal training.

Strength Meets Flexibility

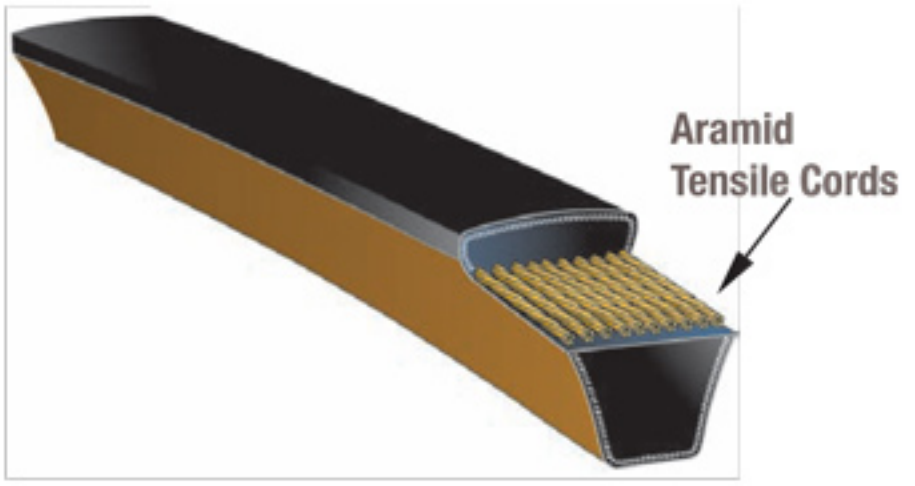
Flex-Bonded Cords

Gates V-belts are constructed with flex-bonded cords, which are characterized by a strong chemical bond between the tensile cord and the rubber body of the belt, allowing all of the belt materials to function as one unit. When the belt's cords are pulled apart the rubber remains attached to them. In other competitor's belts, cords can pull away from the rubber, indicating a weak adhesion and a potentially shorter belt life. Gates flex-bonded cord construction allows for equal load distribution and the absorption of bending stress without deterioration. That helps Gates V-belts outlast others.



Aramid Cords

Many belts are made with standard polyester cords, but Gates offers V-belts made with Kevlar® or aramid tensile cords. Aramid cords offer a higher tensile strength and can handle a heavier shock load than traditional polyester tensile cords. The fibers reinforce the belt resulting in less stretch over time and less time for retensioning, saving both valuable production time and money.



Gates Predator® V-Belts

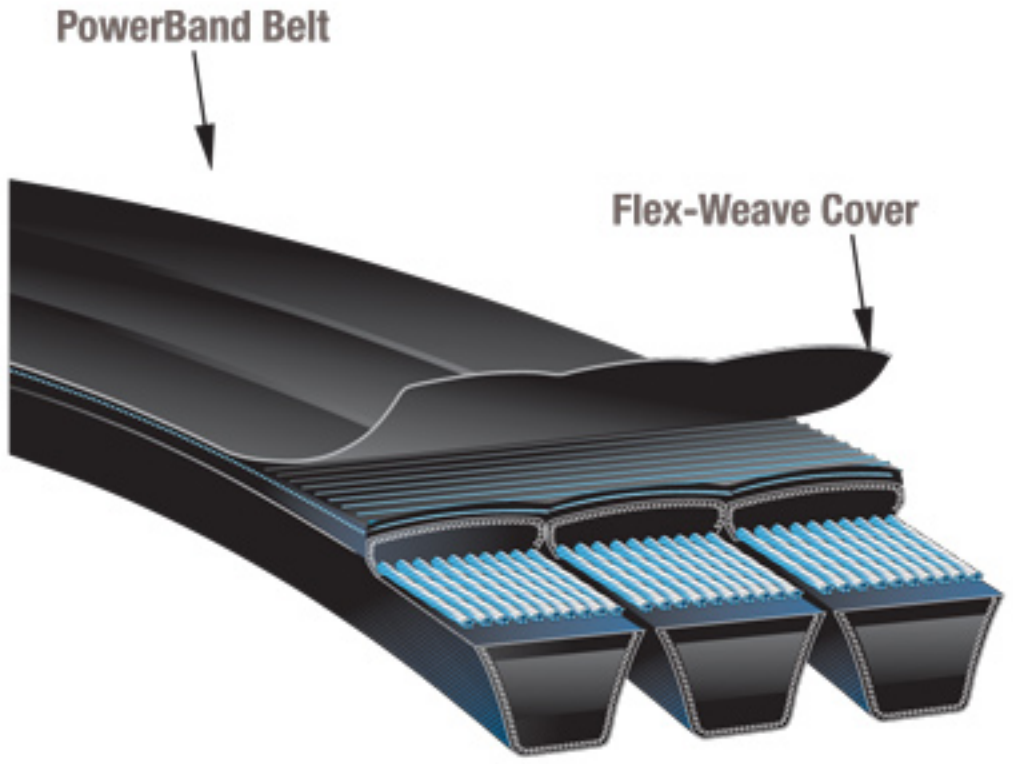
Gates specifically designed Predator® V-belts for harsh environments and demanding applications where other V-belts may fail. They are extremely robust, have the highest power density of any V-belt and stretch one half as much as standard construction belts making them an ideal choice for use on heavy-duty oilfield applications, wood and lumber mill equipment and rock crushers.

Kevlar® is a registered trademark of DuPont.

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 and allow all of the strands to work together as one unit. This keeps the belts running in a straight line in the pulley grooves and eliminates jumped, flipped, tangled or separated belts. The tie band on Predator® PowerBand V-belts also has a self-protective feature that allows potentially damaging debris to penetrate through the top without tearing the bands apart.

- Built for lateral rigidity, belts pull together and run in a straight line on drives with pulsating or shock loads for long-lasting, trouble-free operation.
- Unique cross cord tie band allows belts to seat in pulley grooves independently but still pull together for powerful performance.
- PowerBand® construction is currently available on Gates Predator®, Hi-Power® II, Super HC® and Super HC® Molded Notch belts.



Judge a Belt by Its Cover

Flex-Weave® Cover

Belt covers should shield the belt core from destructive forces such as oil, dirt and heat. Gates patented Flex-Weave® cover takes that protection to the next level. Made out of flexible fabric treated to sustain a strong chemical bond to the belt core materials, the Flex-Weave cover can withstand the stress of constant bending over an extended period of time, offering longer cover life and greater protection of the core. Other belts are typically made with a bias-cut fabric which has a mechanical bond to the belt core that isn't as flexible, making them more likely to split. Gates Flex-Weave® cover is engineered to keep belts running longer for less downtime.

Super HC® and Super HC® Molded Notch Belts

Super HC® and Super HC® Molded Notch V-belts transmit more horsepower on drives where greater speeds, higher-speed ratios or smaller-sheave diameters are required. Super HC® belts feature flex-bonded cords and Flex-Weave® covers for enhanced load-carrying capacity. Super HC® Molded Notch belts are constructed with EPDM for higher heat resistance and greater efficiency. They have specially designed notches and lateral rigidity to support the cord with precision-machined sidewalls for better product uniformity and consistency.

Bare Back Clutching Cover

Many V-belt covers are made with a fabric wrap impregnated with rubber, but Gates Bare Back cover consists of raw cotton nylon blend fabric on the outside and rubber that adheres and sticks on the inside. Ideal for clutching drives, Gates Bare Back cover allows belts to spin freely until engaged, resulting in less heat build-up and less wear.

Conclusion

Gates V-belts are constructed with the most advanced and cost-effective technology available today. With features like the patented Flex-Weave® cover, Gates curves and exclusive EPDM construction, Gates belts are designed for longer service lives, eliminating costly downtime for retensioning, repair and replacement.

From cords to covers, Gates is continuously innovating new ways to keep your applications up and running.

Additional Resources

For more information on Gates V-belts, visit www.gates.com/epdm. To learn more about ways to use Gates belts in your application visit www.gates.com/ptcasestudies. Or contact a Gates engineer at ptpasupport@gates.com.

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