



A Tomkins Company

# White Paper

## Proper metric belt replacement is important for dependable drive performance

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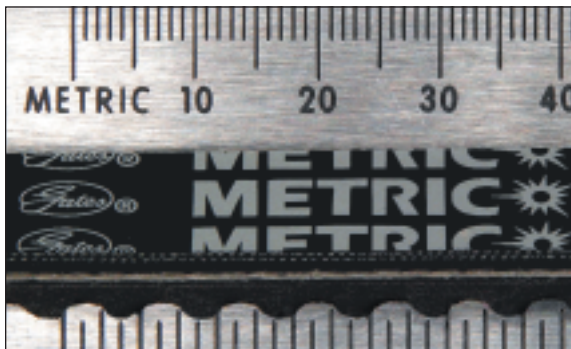
### Introduction

Industrial equipment used in industries such as machine tool, packaging, food processing and textile may have been designed abroad and imported to the United States. Belt drive components used in this equipment are generally manufactured to meet ISO (International Standards Organization) or DIN (Germany) standards. Equipment manufactured in the U.S. typically uses belt drive components that meet RMA (Rubber Manufacturer's Association) standards.

Belts manufactured to different industry standards have different cross sectional nomenclature as well as dimensional differences. Metric V-belt cross-sections are specified as SPZ, SPA, SPB, and SPC (DIN and ISO narrow), Y, Z, A, B, C, D, and E (ISO classical), and 10X, 13X, and 17X (DIN classical). The nominal dimensions for ISO and DIN type belts are metric based (millimeters). Standard RMA belt sections include 3V, 5V, and 8V (narrow) and A, B, C, and D (classical). The nominal dimensions for RMA type belts are based on the English system (inches).

It may be tempting to replace imported OEM metric V-belt drive components directly with U.S. (RMA) standard components, as interchange guides may recommend. However, Gates Power Transmission Product Application engineers recommend replacing a metric belt with the same metric belt cross section if available (for example, with a Gates Metric Power™ V-belt). Replacing an ISO or DIN type belt directly with a RMA type belt may alter speed ratios as well as reduce drive performance.

### Metric belt identification



Classical V-belt sizes in the metric (DIN based) system are designated by a number followed by an "X" (10X, 13X, and 17X) followed by the length in millimeters (for example, 10X530).

Narrow metric ISO and DIN type belts are designated with identifying cross section letters (SPZ, SPA, SPB, SPC) followed by length in millimeters (for example, SPZ1500). An "X" in place of the "S" in these part numbers (for example, XPZ1500) generally designates that the belt is notched. However, not all manufacturers follow this convention. When ordering a replacement, it is best to specify whether or not the belt is notched.

Various belt length conventions may be used in a metric part number. Possible length designations include La (outside length), Lp/Lw (pitch length), Ld (datum length), and Li (inside length). Many times this designation is included in the part number (for example, 10X530Li). When replacing a metric belt with a metric belt from a different manufacturer, the user should verify that the belt length is equivalent, or make the necessary length conversion to ensure the proper replacement belt length is ordered.

Also, ISO length tolerance ranges are quite broad, creating a potentially sizable length difference amongst different manufacturers. Caution should be taken when replacing a belt from one manufacturer with another. The next larger or smaller length could actually be closer to the original.

## Using interchange guides

Many belt manufacturers publish interchange catalogs, or crossover guides that identify the closest equivalent RMA type belt to a metric belt type. These guides identify metric belt cross-sections and lengths included in ISO and DIN standards and provide the nearest RMA equivalent.

Gates engineers caution that an RMA belt may have different cross sectional dimensions or length than a “comparable” metric belt, even though the guides indicate interchangeability. Further, it's common to find metric belts in nonstandard cross sections and lengths that can't be easily interchanged with stock RMA type belts.

Some interchange catalogs allow length differences between “equivalent” U.S. (RMA) and metric (ISO or DIN) belts, typically above one inch for the longest belts. The length difference that can be tolerated depends on the application and the amount of take-up or adjustment available in the system. It is usually up to the equipment operator or maintenance engineer to decide if the length difference is acceptable for a particular application.

*The user should keep in mind that belts identified in these interchange guides are not exact replacements. The belts identified as “interchangeable” have dimensional differences in cross section, length, included angle and belt ride-out (distance a belt extends beyond the sheave outside diameter). These differences between “equivalent” RMA and metric belts can adversely affect the speed ratio of the drive, as well as the overall drive performance.*

## The Gates alternative

There is an alternative to using the “closest equivalent” RMA type belt:

Gates Metric Power™ V-belts.

With nearly 400 part numbers, Metric Power belts are available in both classical and narrow cross sections (10X, 13X, 17X, XPZ/SPZ, XPA/SPA, XPB/SPB, and XPC/SPC).

Several constructional features reduce equipment maintenance and down time. Many of the sizes utilize a molded notch construction that reduces bending stresses in the belt. Lengths of 530 to 3,000 mm have a molded notch construction; lengths above 3,000 mm are not notched. Straight sidewalls provide uniform wedging action and specially treated tensile cords resist flexing forces, fatigue, stretching and shock loads. All Metric Power belts feature the Gates V80® matching system. This means each belt size is manufactured within a finite length tolerance so that any V80 belt will match and perform with any other V80 belt of the same length and cross section.



## Conclusion

If you're unsure about the affect of any dimensional differences in belts on your metric equipment application, consult the belt manufacturer. Failure to use compatible replacement belts can reduce belt service life and lead to lost production due to equipment downtime. Using an incorrect replacement belt can also alter speed ratios, which is especially important on speed-sensitive machinery typically used in the textile, packaging and machine tool industries.

## Additional resources

To obtain Gates Metric Power literature or contact a Gates power transmission engineer call 1-800-777-6363 or go to [www.gates.com/metric](http://www.gates.com/metric).

