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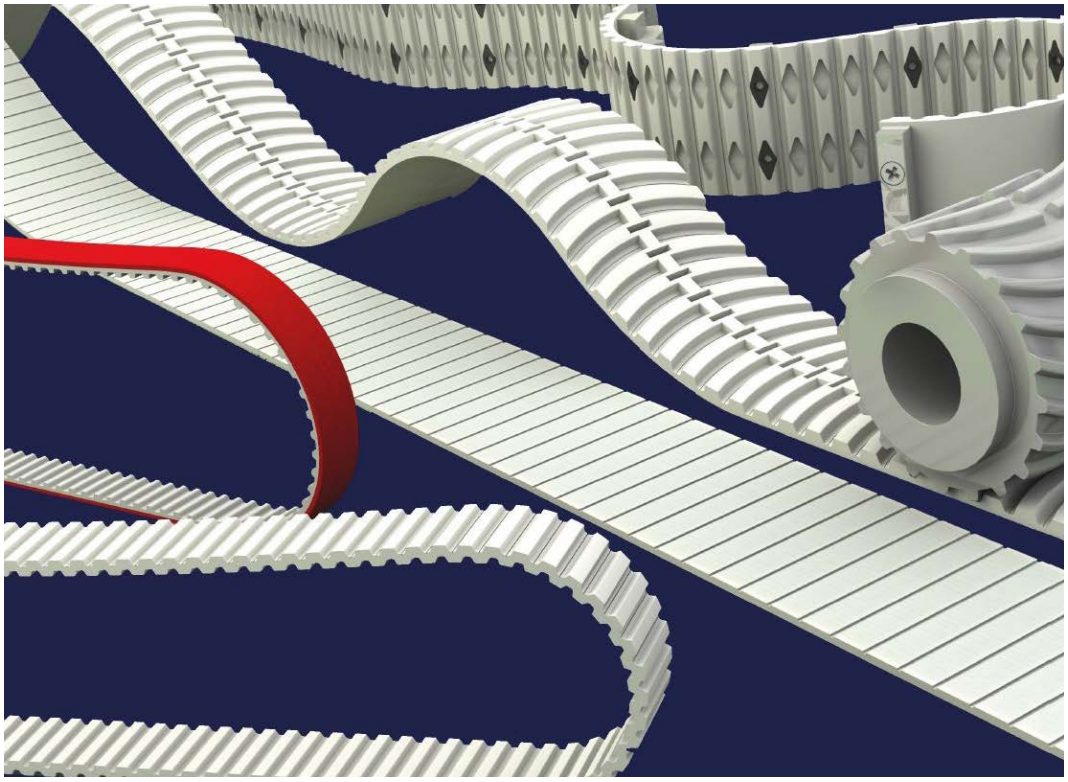


Handling and using of BRECO® and BRECOFLEX® timing belt

In this whitepaper you will find valuable information and instructions on handling, storage and use of your timing belts. Also read the important guide and the recommendations for pre-tension settings from BRECO®.

Aratron have delivered linear systems and transmissions to Swedens manufacturing industry since 1971. This not only makes us to one of the markets leading application experts - with agency for many brands - it also makes us the clear choice when aquiring products that are customized after your needs, not the other way around.

Aratron
Sätt dina tankar i rörelse

Storage and transport

Upon receipt, immediately unpack timing belts and store according to the following instructions.

- Store the timing belts in a dry place, at room temperature and protect against light.
- Store timing belts in a circular position and do not bend.

Storage

Store timing belts in a circular position and do not bend.

Installation and commissioning

- The type and pitch of timing belts and toothed pulley must coincide.
- Fit the belts onto the toothed pulley without applying force or bending them.
- Adjust the drive pretension force according to the default values specified in the product documents or the technical advice.
- Do not clamp the timing belts between machine or housing parts or the timing belt flanges.
- The drive bearing has to be of a rigid design to prevent bending. Ensure that the toothed pulley are arranged flush and in parallel.
- Prior to commissioning the drive, secure all axis and shaft positions against displacement.

Use

- BRECO® and BRECOFLEX® timing belts are temperature resistant with ambient temperatures from -30°C to +80°C. Applications close to the limit temperatures (< -10 °C and > +50°C), however, might require adapted dimensions and the use of special materials.
- Never exceed the admissible load stated in the product documentation for the timing belts, e.g. for belt speed, circumferencial force and span force.
- Adhere to the minimum values for the number of teeth of the toothed pulley and the diameters of return and tensioning rollers stated in the product documentation.
- Protect the drives against dust and dirt, hot water and steam as well as aggressive surrounding media, such as acids and lyes.

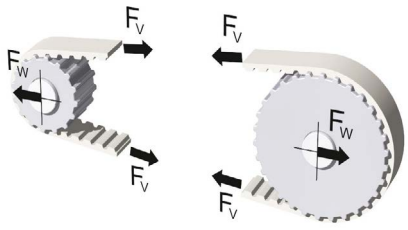
Pre-tension force

Pre-tension is intended to guarantee a minimum tensioning force at the slack span side to ensure smooth tooth meshing into the driven pulley.

Generally, the pre-tension should only be set as high as necessary. The necessary pretension force of the spans FV depends on the max. circumferential force FU, the belt length LB (number of teeth zB) and the drive configuration.

The recommendations shown in the table refer to the pre-tension force setting per span.

In every case, the tension cord strength is the top limit of the span load. Take into consideration that especially with multiple-shaft and linear drives, an addition of the pre-tension force and the circumferential force in relation to the load span force is to be expected.



Drive configuration	Pre-tension force of each individual span
Two-shaft drive $z_B < 60$	$F_V = 1/3\ F_U$
Two-shaft drive $60 \leq z_B < 150$	$F_V = 1/2\ F_U$
Two-shaft drive $z_B > 150$	$F_V = 2/3\ F_U$
Multiple-shaft drive $l_{Load\ span} = l_{Slack\ span}$	$F_V = F_U$
Multiple-shaft drive $l_{Load\ span} > l_{Slack\ span}$	$F_V > F_U$
Linear drive	$F_V = F_U$

Influence variables

Stiffness of the belt

Friction forces created by the interaction of the tooth mesh (especially at the slack span) intensify the span forces, which in turn increase the degree of elongation. This influence may lead to the slack span tooth mesh butting against the driven pulley, thereby causing the belt to jump. Elongation being directly depending on the belt stiffness, the high stiffness of the steel cord tension members permits a comparably low pre-tension.

Circumferential force

The circumferential force acts in proportion to the elongation of the load span, i.e. excessive slackening of the slack span can be counter-acted by a pre-tension matched to the circumferential force.

Belt length

Belt elongation resulting from the effect of the circumferential force and the friction forces is also approximately in proportion to the belt length. Therefore, the tendency of running up or jumping is considerably influenced by the belt length. Even under high circumferential forces with the resulting friction forces, a very short timing belt will elongate to only a small degree, so that even when subject to low pre-tension forces there will be no danger of running up or jumping of teeth. On the contrary, with short timing belts circumferential deviations of the pulleys could cause heavy pre-tension fluctuations and, as a result, extreme peak values.

Proportion of the span lengths

Especially with multiple-shaft drives the load span is often markedly longer than the slack span side. For this reason, a slight elongation of the load span results in a very unfavourable slack on the span side. Therefore, the pre-tension force of spans of such gearings should be higher than the circumferential force.

Precise transmission of movement

There is a high transmission accuracy possible in the reverse operation with BRECO® and BRECOFLEX® timing belts, when the span pre-tension forces are selected in the same size of the circumferential force.

Consequences of faulty pre-tension setting

Too low pre-tension

- The teeth of the slack span side run up on or override the teeth of the driven pulley
- Wear on the faces caused by the friction force during meshing
- Forced breakage by excessive elongation due to full overriding

Excessive pre-tension

- High bearing load of the shafts
- Reduction of the transmissionable power
- Wear and tear at the belt tooth he type and pitch of timing belts and toothed pulley must coincide.

Source and photo: BRECO Antriebstechnik Breher GmbH & Co KG

For more information:
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Measuring with frequency measuring meter

The intrinsic frequency of a vibrating belt span can be measured by means of various Mulco belt tension measuring meters. The pre-tension force of the span can be calculated from the measured intrinsic frequency:

$$F_V = 4 \cdot m \cdot l_T 2 \cdot f2$$

The corresponding intrinsic frequency can be calculated, if the pre-tension is preset:

$$f = \sqrt{\frac{F_V}{4 * m * l_T^2}}$$

f: Frequency of the variations in hertz
m: Mass of the belt per meter length in kg/m
l_T: drum span length subject to vibration in m
F_V: Span force in N