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Technical Article
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Abrasion Resistance of Conveyor Belts

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Abrasion resistance of conveyor belt covers is one of the most important properties of a belt. As conveyor systems have improved in quality in recent years because of better maintenance, alignment, and rip detection systems, premature or catastrophic failure has been reduced and gradual wear of the belt covers has become a more common form of belt change out.

This technical note describes the different types of abrasion and common industry tests used for measuring abrasion.

In general, there are two types of abrasion occurring in belt applications. The first and more common type of wear is caused by the conveyed material rubbing against the rubber or thermoplastic cover. The belt covers tend to wear smoothly and evenly. The type of material conveyed affects wear, for example coal is relatively non-abrasive whereas in comparison, hard rock and taconite pellets wear covers extremely fast. Density of material and speed of material being conveyed affects the wear rate with heavier and faster speeds increasing the wear rate.

The second and more aggressive type of abrasion is cutting and gouging where jagged or sharp surfaces from materials like limestone, granite, and ores will cut the belt cover and remove the cover in “chunks”.

There are two common industry test methods used to measure belt cover wear under laboratory conditions. The first and more common test method is often referred to as the “DIN abrasion test method”. It is based on the German test method DIN53516 and also ISO4649 test methods A and B. The test involves preparing a “puck” of the cover and subjecting this sample to abrasion against a rotating drum covered with sandpaper. The sample is pushed against the drum with a specific force, the sandpaper is a specific type and the speed of the drum and number of revolutions are controlled. The sample is weighed before and after the test and the volume loss is calculated and expressed in cubic millimeters. The lower the number obtained, the better the abrasion resistance.

The test can be run two different ways—one in which the belt cover sample is rotated (ISO4649, method B) and one in which the belt cover sample is not rotated (ISO 4649, method A). It has been found that the rotating test method is more severe and also more accurate and reproducible.

This test is very reproducible and as an example, data is shown below for a belt manufacturer’s specific cover

measured monthly over a 12-month period. Each test used a different lot of cover and frequently used different lab technicians.

As can be seen, results are within +/- 10%, which is very good. A calibration test also exists which helps to ensure that the equipment is correct and reduces variation.

Typical belt covers obtain rotating abrasion values (ISO4649, method B) in the 100 to 300 range with highly abrasion-resistant covers less than 100.

This test is supposed to resemble the more common form of abrasion where rubbing of the conveyed material causes wear. In general, the trend is correct where a low lab number will give better abrasion resistance than a high lab number. In actual application, the actual number and percent of improvement varies considerably between the lab and field and needs to be validated.

The following example is shown where a belt manufacturer measured the wear of three different covers with different lab abrasion numbers. As can be seen, the wear trend is similar, where the lower the lab abrasion number, the less the actual wear in service.