



NIBA—The Belting Association
6737 W. Washington St. #1300
Milwaukee, WI 53214
Ph: 414-389-8606
www.niba.org

Tech Note

Technical Notes from the Technical Committee, NIBA – The Belting Association

#10 Impact Resistance of Belting

Many different methods exist to measure the impact resistance of belting. *However, there is no standard test method for measuring impact... consequently, there are no minimum standards.*

Generally, a conveyor belt sample is mounted in the horizontal plane and tensioned at maximum working tension, or something less. A javelin (impact) weighing anywhere up to 80 lbs. may be used. The distance that javelin is dropped onto the belt can vary anywhere up to 10 feet (and more) in order to provide the appropriate amount of foot pounds of impact energy required. Impact idlers opposite the point of impact may or may not be used.

To make the test representative of a specific application, **various types of javelin points** are used.

The **object** of the impact resistance test may be any or all of the following:

1. Visual damage to the belt.
2. Visual damage to one or more carcass plies.
3. The point at which the ultimate tensile strength of the belt itself is compromised.

Since there are many, many different conveyor belt applications, there is no single impact resistance test which is universally accepted or which is representative of belt performance, in general.

One can argue that the javelin point should be sharpened and spear-like since some materials which are conveyed on conveyor belts have that property. Others may argue that a rounded javelin point (billiard ball-like) might be more appropriate, since it would be more representative of 3 or 4 inch stone impacting onto the belt. Still, others may argue that maximum impact rating of the belt will not be tested except with very large materials.

Consequently, a rounded javelin point (the size of a billiard ball, or larger) might be more appropriate. Further, those same folks would argue that under high-impact conditions, impact idlers would normally be used.

This, of course, brings in another variable. What type of impact idler should be used, and should more than one be appropriate?

The preceding discussions suggest *comparing two different conveyor belts by reference to published impact resistance tables is highly suspect*. If impact is of real concern to the end user, the various conveyor belts under consideration for that particular application should be tested **comparatively**, using identically the same test and



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using test conditions which are representative of the end use application, *and which are meaningful to the end user.*

IN THE FINAL ANALYSIS:

The best indication of appropriate conveyor belt impact resistance is success in the application involved. There is no laboratory test that will duplicate all of the specific conditions involved in a given end use application. Success of a given belt construction in a given application should be highly indicative of the success of a replacement belt of similar construction.

WHAT CAN WE DO ABOUT IMPACT IN TERMS OF:

- A. Belt Design
- B. Belt Support, and
- C. System Design?

The most common factors considered in designing to combat impact are described briefly in the sections that follow:

1. Belt Design for Impact Conditions

- A. **Low modulus belts** generally have better impact resistance. Low modulus implies higher elongation or stretch.
- B. **Breakers** in the belt covers, or an extra ply, usually will enhance impact resistance.
- C. **Increased cover thickness** usually will enhance impact resistance.

2. Belt Support for Impact Resistance

- A. **Impact idlers** will reduce the severity of impact. The worst possible condition is impacting material striking the belt directly over a steel idler or steel bed.
- B. A **system design** in which the impacting material strikes the belt between idlers, **in an open, unsupported span**, provides excellent impact protection.



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3. **Material Flow Considerations for Minimizing Impact**

- A. The weight of the lumps of material being loaded on the conveyor belt is a major factor in the severity of impact. **Minimizing the size and/or weight of the material** will help control impact conditions.
- B. The severity of impact is directly related to the distance impacting lumps fall while being loaded on the conveyor belt. **Breaking the fall of impacting lumps with bars, chains, etc.**, will reduce impact.
- C. **The trajectory of material being loaded on conveyor belts should be in the direction of belt travel.** This will help reduce impact.
- D. **Loading lumps on a bed of fines** will reduce impact.