How-to

Wide Belt Back Types and Usage

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There are numerous backing types used in the manufacturing of coated abrasive products for wide belt applications. For clarity, Norton | Saint-Gobain Abrasives classifies wide belts in three different width categories, regardless of the backing or abrasive type, which may or may not be similar to other abrasive manufacturers:

1. Wide Belts: 15” wide up to 52” wide with a single joint

2. Extra Wide Belts: greater than 52” wide up to 67” wide with a single joint

3. Sectional Wide Belts: greater than 67” wide up to 130” wide with two or more joints

- The backing for this category is specifically designed with higher tensile strength in its width direction so that it can be turned on its side to be the running direction of the sectional wide belt.
- This category can be wider than 130”, but to the best of Norton's knowledge this is the widest belt size in the North American industrial market.

Abrasive belts for these categories are primarily made from different types of cloth such as rayon, cotton, polyesters, and blends. These various cloth types are made in several different weight classifications, which is a reference to what the raw cloth weighs per square yard prior to any treatments that make them suitable for use as abrasive backings.

Generally, the lightest weight cloth backing used for wide belt applications is an X-Weight which weighs ~6 ounces per square yard. Other wide belt backing weights include Y-Weight: ~8 ounces per square yard (most common), H-Weight: ~12 ounces per square yard, and HH-Weight: ~14 ounces per square yard.

Heavy paper backings are also used for wide belt applications. Historically, the weight of paper backings for abrasive products was measured in pounds per ream. This measurement is from the papermaking industry with a ream being 480 sheets of paper with dimensions of 24” x 36”.

In today’s industrial market Norton uses GSM (grams per square meter) as the weight measurement for these heavy paper backings, with 300 GSM paper being their primary backing for wide belt applications where paper backing can be used. These modern paper backings are far superior than previous generations with reinforcement fibers added to increase their tensile strength, tear resistance, and dimensional stability. They are also manufactured with anti-static properties which assists with dust extraction on wood working and other applications.

Different types of abrasive grains are used in the manufacturing of coated abrasive products for wide belt applications on both cloth and paper backings. These grains include aluminum oxide, silicon carbide, zirconia alumina, and ceramic, as well as some abrasive grain blends. There are certain wide belt applications that require specific grain types due to various reasons, yet there are other applications that can basically use any of these abrasive grains.

There are many factors to consider when determining the appropriate use of wide belt abrasive products, specifically with regards to their backings: type of material being ground or sanded and its relative hardness; material removal needs; surface finish requirements; equipment type: single or multiple sanding/grinding heads, contact rolls (steel or rubber), or platen heads or both; machine age and related condition: regularly maintained or not; wet (water soluble or straight oil) or dry application; etc.

Let’s cover some basics on coated abrasive backings from heavy paper to extremely heavy cloths utilized in wide belt form:

- All of these backing types can be used on dry applications, but they can also be used on applications that utilize straight oil for coolant and/or part quality and finish. This also includes heavy paper but is not very common. Only polyester backings can be used on applications utilizing water soluble oils as this is the only backing type that is naturally waterproof. Other backings can be treated to make them water resistant, but this process is generally not very cost effective.

- Heavy paper backings are most commonly used in wide belt form for finish upgrade and final finish in various wood-based product industries such as cabinets, furniture, hardwood flooring, moldings, architectural doors, and so on. These are also used for light grinding applications on metal, composites, specialty rubber-based products, and others. Because of the relative smoothness of the backing, abrasive products manufactured with heavy paper will always impart a better surface finish than a cloth backing with the same abrasive grain type and grit size. They also have a relatively significant cost advantage over cloth-backed abrasive products.

- Paper-backed abrasive belts cannot and should not be used on applications with high stock removal requirements, moderately heavy shock loads, or on equipment that may have significant wear and tear. All of these conditions will cause paper-backed abrasive belts to rupture while in use, which in turn causes machine damage, unplanned down time, and potential fire hazards. The vast majority of the time, these types of applications require the use of belts with cloth backing.

- Cloth-backed wide belts come into the picture for use on single or multiple head grinders, polishers, or sanders when the application is too aggressive for paper-backed wide belts. However, on moderately aggressive applications with multiple head sanders, it is common to see

X or possibly Y weight cloth-backed wide belts on the primary head(s) (most aggressive contact roll and highest horsepower motors) and the remaining heads utilizing paper-backed wide belts. There may be several reasons for this setup: 1). Incoming parts still require some dimensioning prior to finish upgrade from the paper-backed wide belts. 2) Dimensional variation in incoming parts with thicker parts having the potential of breaking paper-backed belts if used on the primary head(s).

- On more aggressive/severe applications such as grinding or polishing of various metals in coil or sheet form, sanding of engineered panels (medium-density fiberboard, particleboard, plywood, oriented strand board), laid up wood panels, truck flooring, architectural and commercial door cores, etc., Y-Weight and sometimes H-Weight cloth backing is required with the most common cloth type being polyester. To put the need for these heavy backings into perspective, these applications typically have anywhere from a single grinding/sanding head up to eight grinding/sanding heads, depending on the need, and includes wide belts, extra wide belts, and sectional wide belts with abrasive belt widths of 50" through 130". The drive motors for the grinding/sanding heads range from 50 HP to 250 HP, and the part feed speeds range from as low as ~20 fpm to as high as ~350 fpm with abrasive belt speeds ranging from ~5,000 sfpm (50 mph) to ~7,000 sfpm (80 mph). These application types also have high material removal rates and/or high shock loads put on the wide belts. Clearly these operational parameters make for very robust grinding and sanding applications that in turn require very robust wide belt backings.

- The most severe of the coated abrasive wide belt applications is rough lumber sanding. This is the process of dimensioning circular or band sawn lumber after it has gone through its kiln drying process. The very robust sanding equipment used on this application typically has one or two sets of sanding heads. Each of these sanding head sets are directly opposite one another with one top head and one bottom head or two top heads and two bottom heads. The contact rolls are commonly made of steel, and the abrasive belt speed for these machines is in the neighborhood of 8,000 plus sfpm (~90 mph). Part feed speeds range widely, but it is sufficient to say they are pretty fast considering the amount of material the abrasive belts are required to remove. Additionally, the shock load on the abrasive belts is staggering when the lumber enters these sanding heads due to high material removal, warped lumber, and loose knots (falling out of the lumber) being carried through the sanding process, etc. Due to the brutal nature of rough lumber sanding, it requires the heaviest available wide belt backings with an H-Weight being the most widely used along with some double H-Weights as well. Any lower weight backings would not survive the severity of this application and will severely fail in a very short period of time.

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