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

#5 Fire Resistant or Flame Retardant

Safety requirements in conveyor/elevator belting applications where fire and/or explosion are a consideration frequently involve:

Slippage switches
Sequence switches
Zero-slip controls
Automatic fire warning sensors
Thermal sensors (bearings) and
Fire suppression systems.

Further, they inevitably bring us to a consideration of the (fire or flame) resistant or retardant properties of the belting to be used.

WHAT IS MEANT BY *FLAME RETARDANT*?

The term **Flame Retardant**, when applied to belting, refers to the burning properties of the belting, but also includes application, political, and economic considerations. In the U.S. a flame resistant belt is one that meets the flame resistant standards of the U.S. Department of Labor, Mine Safety and Health Administration, Schedule 2G. It presumes a mine belting application.

WILL A *FIRE RESISTANT* BELT BURN?

YES. UNDER SOME SETS OF CONDITIONS, EVERY flame resistant belt will burn (and even propagate flame). If the defenses against fire built into the belt are overwhelmed, the belt will burn. NOTE: for purposes of this discussion, the following terms are synonymous:

Flame Resistant	Flame Retardant
Fire Resistant	Fire Retardant

ARE THERE DIFFERENT KINDS OR TYPES OF *FLAME RESISTANCE*?

Yes, depending upon the governing body involved. Each such body will define Fire Resistance or Flame Retardance by some set of test criteria involving:

1. An honest attempt to simulate their own most pressing problems.
2. An honest difference of opinion.
3. Economic and political considerations.

Test criteria currently used can include some or all of the following:

1. Small scale flame tests.
2. Large scale (gallery) flame tests.
3. Drum friction.
4. Electrical resistance tests.

WHAT CRITERIA DOES MSHA (2G) USE TO DEFINE FLAME RESISTANCE?

MSHA uses a small scale flame test.

NOTE: The code of Federal Regulations, Title 30, currently describes a test method and acceptance criteria for approval of conveyor belts used in underground coal mines. The test method defines: number of specimens tested, specimen orientation, ventilation conditions, ignition source, and exposure time. Measurements are made of the afterflame time and afterglow time of each specimen. Acceptable performance is an average afterflame time of less than 60 seconds, and an average afterglow time of less than 180 seconds.

Other countries vary some or all of the parameters of this type of test to suit their needs. This type of test generally distinguishes between belts that will continue to burn once the ignition source is removed and those that are self-extinguishing.

HOW ABOUT LARGE SCALE FLAME TESTS?

Some authorities have argued that small scale flame tests are too limited by scale (approximately 500 watts of energy) and that they are not designed to provide information on flame spread rate.

Large scale flame tests are an attempt to put a full-sized belt (full width and varying lengths up to 60 meters) into a simulated mine gallery under so-called real end-use conditions. An ignition source in the range of 100 kw (or more) of energy is used.

Conditions of acceptance are that the belting shall be self-extinguishing after the flame is removed and that some length of the belt sample shall remain undamaged across its full width.

Here, again, each country may very well vary some or all of the parameters involved... if indeed they choose to use such a test.

DOES FRICTIONAL HEATING HAVE A ROLE IN FIRE RESISTANT CONSIDERATIONS?

Both the small scale and large scale (gallery) tests involve a flame heating source. In conveyor/elevator applications, frictional heating is frequently cited as the sources of belt fires. This may be the result of a frozen idler, a poorly tracked belt, or slippage between the belt and the drive pulley.

Some countries have attempted to augment their flame tests with some sort of drum friction test. Others, like the U.S., may depend upon zero-slip controls.

Typically, a belt sample is wrapped around and held fixed while applying pressure to a revolving drum. The test is run to destruction or limited to some time period. An acceptable belt will show no sign of flame or glow and the drum will not exceed some temperature (325 degrees Centigrade for Canada).

WHAT IS THE BEST DEFINITION OF *FIRE RESISTANCE/FLAME RETARDANCE*?

Because of the application, economic, and political considerations that go into any definition of *fire resistance*, there is **no best definition**.

Be aware of any specific *fire resistant* specifications which are mandated for the end-use belt application under consideration... whether mandated by governmental decree, or industry custom. **Do consult with your belting manufacturer**.