Conveyor Risks in Mining

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Conveyors, why do we need them?

FM Global loss history with conveyors

- Over a recent 10-year period, FM Global had almost 200 losses involving conveyors.
- Fires were the leading cause of conveyor losses
- After fire, the second most common cause of loss was wind, followed by collapse.

FM Global loss history with conveyors

- The loss history clearly shows that the combustibility of the ore being conveyed isn't the driver.

- Noncombustible ores present the same fire exposure as combustible ores, although frequency is reduced slightly.

- The fuel load for the fire is the conveyor belt, not the ore on the belt.

But what is the failure mechanism?

Existing Guidance

Fire Test Research: USBM & FM Global 1967 - 1978

- Objective
  - To determine fire resistance and burning characteristics of conveyor belts
  - To develop data to design reliable bench scale fire test
  - To discriminate between low, moderate and high fire resistance materials
- Method
  - 55 tests, 7.6 m (25 ft) long belt
  - Varied ignition source, belt material and width, roof clearance, and belt orientation

Time to update the guidance!

Fire Test Research: FPI

- FM 4910; ASTM E2058
- Examine fire propagation behavior
  - FPI ≤ 7 non-propagating
- Correlate to large-scale fire propagation tests
  - 9.1 m (30 ft) length of belt
  - 1.5 m/s air flow
  - Passing results
    - Damage does not extend to end of belt

Baseline, Free Burn

Testing with protection in place

The fire test video will play on this slide while I explain what is happening, but the video is too large to include in the emailed version. It is provided to the organizers through a secure file share.

Revised guidance based on testing

Table 3. Automatic Sprinkler Spacing for Outdoor Conveyors

Belt Width	*Style of Sprinkler*	*Sprinkler Spacing*	*Sprinkler Location*
2 ft (0.6 m) to 6 ft (1.8 m)	Pendant or Upright[1]	20 ft (6.0 m)	Along the center line of the belt
	Sidewall[2]	20 ft (6.0 m)	Along one side of the belt
> 6 ft (1.8 m)	Pendant or Upright[1]	20 ft (6.0 m)	Along the center line of the belt
	Sidewall[2]	20 ft (6.0 m)	Staggered along both sides of the belt (i.e., sprinkler on one side are spaced 40 ft [12.2 m] apart)

Table 4. Sprinkler Protection Options for Outdoor Conveyors

		Sprinkler Demand			
Belt Orientation	*Sprinkler System Type*	Number of Sprinklers Operating	Flow per Sprinkler, Sprinkler Density	*Water Duration*	*Hose Demand*
< 10°	Wet, dry, pre-action	5	25 gpm (95 L/min) per sprinkler	60 min	250 gpm (946 L/min)
10° - 30°	Wet, dry, pre-action	7	25 gpm (95 L/min) per sprinkler		
> 30°	Deluge	All sprinklers on a single system	0.3 gpm/ft^2 (12 mm/min) along the length of conveyor the system covers		

Iron Ore Shiploader Conveyor

Property Loss Prevention Data Sheet 7-11

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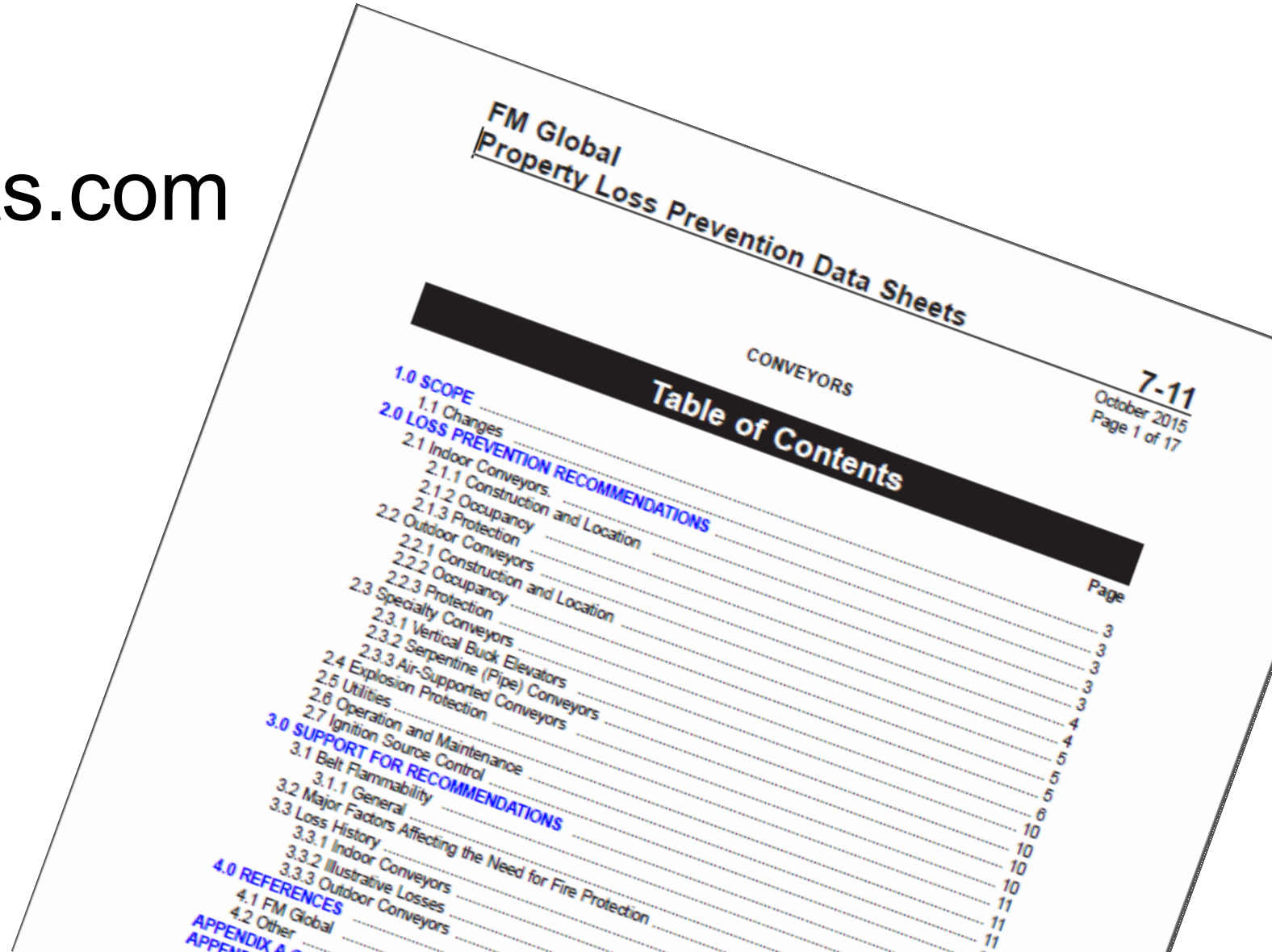
FMGlobalDataSheets.com

All FM Global Data Sheets are free to download on the website.



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Property Loss Prevention Data Sheets

CONVEYORS

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Thank you. Any questions?

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