Firewater Demand for Conveyor system

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Abstract: The Intent of this paper is to provide a overview of firewater demand requirement for conveyor system protected with deluge spray system.

Keywords: Fire Water, spray, conveyor, Etc

I. Introduction

The aim of the fire protection system is to minimize loss of life or serious injury, contain and prevent the spread of a fire, extinguishing it in the early stages if it is possible and thus minimize the damage and financial loss caused by such an incident.

The fire protection system shall be provided by automatically and manually operated fixed systems, in conjunction with portable and mobile firefighting equipment.

II. Spray System for Conveyors

Fixed water deluge systems should be installed to provide cooling or fire intensity control by absorbing the heat developed during a fire and to protect personnel. Spray system in general is operated through a deluge valve. Operation of the deluge valve shall be automatic (upon confirmed fire detection in the fire zone where the fire has been detected) or manual (valve within the deluge valve assembly), remote (push buttons located on the control room matrix panel).

As per NFPA-15, The water spray system shall be provided to automatically wet the top belt, its contents, and the bottom return belt.

Assuming the product transfer conveyor length as 800meters, three adjacent deluge systems shall be activated upon detection of a fire (the zone of alarm origin, and one adjacent zone on each side of the zone of alarm origin). Each deluge zone will in general shall cover 100 linear meters, with nozzles provided above the carry and return belts.

The conveyor deluge zone length is based on the following criteria:
Conveyor speed = 2.5 m/s
Maximum time desired to detect fire = 10 seconds (typical)
Maximum fire alarm response time per applicable codes/standards = 10 seconds
Maximum time until full conveyor stop = 17 seconds
Detection time + response time + stop time = 37 seconds.
After 37 seconds, the conveyor contents would have travelled 92.5 m (37 s x 2.5 m/s = 92.5 m). The typical conveyor deluge zone will be 100 m.

III. Firewater Demand for Conveyor System

Fire Water Demand Calculation for Transfer Conveyors	
Application rate for Conveyors	10.2 lpm / m2
Conveyor Dimensions	100 m (L) x 1m (W) x 2 (Note-1)
Area of Conveyor	200 m2
Fire Water Demand for Conveyor (Single Zone)	200 x 10.2 = 2040 lpm
Fire Water Demand for Conveyor (zone of alarm origin, and one adjacent zone on each side)	2040 x 3 = 6120 lpm
30% Wind Loss (A)	7956 lpm (477.36 m3/hr)
2 Hydrant (Two way) (B)	(2 x 60) = 120 m3/hr
Total Fire Water Demand (A +B)	477 + 120 = **597 m3/hr**

IV. Conclusion

Based on the above calculation, Total fire water demand for spray system of product transfer conveyor is 597m3/hr.

References

[1]. NFPA20 – Standard for the Installation of Stationary Pumps for Fire Protection
[2]. NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection