



Mines Safety Bulletin No. 127

Subject: Maintaining the effectiveness of water-mist fire suppression systems on mobile plant

Date: 09 October 2015

Background

High-pressure water-mist fire suppression systems are used widely in the Western Australian mining industry. Such systems are commonly fitted to mobile plant, heavy vehicles, generators and compressors with enclosed engine spaces that typically require suppression of Class B fires (flammable and combustible liquids).

The systems are used instead of conventional aqueous film-forming foam (AFFF), gaseous and water sprinkler systems. Water, typically with a very low concentration of low toxicity AFFF additive, is rapidly discharged from fine spray nozzles at high pressure, forming a mist to extinguish the fire. The advantages of these systems include low system costs and efficiency in suppressing certain types of fires, particularly in enclosed spaces.

Water-mist fire suppression systems are permitted by Australian Standard AS 5062 provided they comply with AS 4587 or National Fire Protection Association Standard NFPA 750. Although not referenced in Western Australia's mines safety and inspection legislation, AS 5062 may be used as a guide to good practice.

The Department of Mines and Petroleum has become aware of potential issues with pre-engineered water-mist systems that use pressurised piston and cylinder (multi-chamber) type containers to store the water. The issues mainly relate to:

- the design of the system
- competency and actions of the original installer, ongoing service provider or service personnel.

Summary of hazard

With regard to water-mist fire suppression systems, there may be an increased risk of:

- systems not discharging correctly or completely in the event of a fire, and therefore failing to adequately suppress or extinguish the fire
- extinguisher cylinders not fitted with fusible plugs on the propellant gas (e.g. nitrogen) end rupturing if a cylinder is incinerated during a fire or inadvertently over-pressured by other means.

These risks are of particular concern when the purpose of the fire suppression system is to help safeguard life. For example, if the fire suppression system on a haul truck does not discharge correctly or completely, it may not give the driver sufficient time to evacuate safely.

Contributory factors

Factors that may contribute to risks associated with water-mist fire suppression systems include:

- pistons jamming in the bore of the extinguisher cylinder during or after servicing.
- issues with piston o-rings, such as substitution with non-original equipment manufacturer (OEM) o-rings and use of non-OEM lubricants
- heat-affected extinguisher cylinders inadvertently re-charged and returned to service
- competency issues with regard to installation and service personnel
- defects not adequately reported to the manufacturer by service providers or otherwise not properly resolved.

Actions required

For duty holders relying on fire suppression systems on mobile plant to safeguard life, the following actions are recommended.

- The fire suppression system should be:
 - selected and designed based on sound fire risk management principles using a methodology consistent with AS 5062 Section 2
 - designed and manufactured by competent persons to an industry-recognised standard such as AS 5062 or an international equivalent

Note: Assurance of conformity is typically provided by one or more industry-recognised certifying bodies.

 - installed, tested and commissioned by competent persons in accordance with the designer's, manufacturer's or supplier's instructions
 - periodically tested, inspected and serviced (typically six-monthly) by competent persons in accordance with the designer's, manufacturer's or supplier's instructions
- Installers and service personnel should be adequately trained, assessed and accredited by the fire suppression system manufacturer.
- Report any perceived equipment failures or defects to the fire suppression system manufacturer so they may be properly investigated and, if necessary, appropriate advice provided regarding corrective action.

Further information

- Standards Australia, www.standards.org.au

AS 5062 Fire protection for mobile and transportable equipment

AS 4587 Water mist fire protection systems – System design, installation and commissioning

- National Fire Protection Association, www.nfpa.org/codes-and-standards

NFPA 750 Standard on water mist fire protection systems

Note: This Safety Bulletin, originally issued on 09 October 2015, was modified on 23 March 2017 to correct the ambiguity regarding the toxicity of AFFF.

