NSW GOVERNMENT

NSW Resources Regulator

SAFETY ALERT

DATE: 9 October 2020

Anti-static materials in underground coal mines

This safety alert provides safety advice for the NSW mining industry.

Issue

Certain materials have the ability to accumulate and store an electrical charge. This charge can cause sparking, with enough energy to ignite methane gas. The sparking may come from the material or from metallic fittings attached to the material that forms part of a manufactured product.

Resources Safety and Health Queensland released safety alert No.381, on 29 September 2020, advising of issues associated with the use of products that have been assessed as anti-static, in accordance with Mining Design Guideline MDG 3608 for Fire Resistant Anti-Static (FRAS) materials.

The NSW Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (the Regulations) requires that any component of the ventilation system of an underground coal mine and any conveyor belting and conveyor accessories used at an underground coal mine or in a reclaim tunnel at a coal mine must be FRAS (clause 87).

Circumstances

Materials such as rubber, polyurethane, PVC, polyethylene, polypropylene and polyester are often used to make base materials that are then manufactured into products for use in underground coal mining. Fibre reinforced resin materials such as fibre glass and carbon fibre composite materials are also used. The products manufactured include ventilation sheeting (brattice) and ventilation stoppings, ventilation ducting (rigid and flexible), dust curtains, venturi blowers, air fans, pipes, conveyor belting and conveyor accessories.

These products, when subjected to friction, may accumulate a static charge that can cause spark ignition of methane gas. The friction may be generated by air movement, especially with higher air velocities from compressed air lines or from auxiliary ventilation fans or contact between a moving conveyor belt and associated accessories such as non-metallic conveyor idlers, scraper blades and skirting rubbers. The

presence of dust in the air may exacerbate the charging effect. It has also been identified that in some circumstances, sparking energies increase with increases in humidity and moisture.

Many of these products are supplied in different colours and sizes, and with different fixtures to allow for varying methods of suspension or attachment. The methods of mounting include the use of non-conductive materials, such as nylon rope, nylon straps, plastic cable ties and magnets, and conductive materials such chains.

Controls to prevent the build-up of a static charge include minimising surface area and bonding the materials to earth.

It is important to note that while chains are conductive, they may not provide reliable earthing and static discharge in all situations.

Investigation

SIMTARS undertook surface resistance and incendivity testing in accordance with MDG 3608 on samples of different materials and products, and with different colours of the same FRAS materials. Testing included samples of bare FRAS material and samples fitted with metallic components such as eyelets, rivets and channel.

The tests revealed the following:

- Products of lower surface resistivity (<300MΩ) were able to cause spark ignition when not bonded to earth. Once bonded to earth, the material did not accumulate adequate charge to cause spark ignition. There were no special requirements for the placement of the earthing point.
- Products of similar material, but of different colours, had significantly different surface resistances.
- Products of higher surface resistivity (>300MΩ) were able to cause spark ignition from metallic fittings when no earth bond was provided. Bonding of only one fitting, where multiple fittings were used, still caused spark ignition from other unbonded metallic fittings.

It should be noted that metallic objects such as pipes and metallic vent ducting, while not tested by SIMTARS, are considered as potential sources of static discharge when not provided with effective earthing.

Recommendations

Mine operators of underground coal mines must ensure that control measures are implemented for the use of products that may be subject to accumulation of static charge. The control measures should include:

- Products using materials with surface resistivity less than 300MΩ, should be provided with a means to prevent the accumulation of a static charge. This may be achieved by secure mounting to an earth bonded structure or through a dedicated earth lead.
- Products using FRAS materials with surface resistivity greater than 300MΩ and metallic components connected to the material, these metallic components should be provided with a means to prevent the accumulation of a static charge.
- Procedures to verify the products are installed in accordance with manufacturer's directions for discharge of static.
- Appropriate measures are implemented to ensure that properties of FRAS materials are maintained over time.

Manufacturers of FRAS rated materials must ensure that testing is undertaken in accordance with the relevant requirements of MDG 3608 by an independent testing facility for:

- all FRAS material intended for use in an underground coal mine
- any change of material composition or manufacturing technique for a FRAS rated material, including changes of colour, to verify suitability of the material.

Manufacturers and suppliers of products incorporating FRAS materials as components must ensure that:

- the design of the product incorporates suitable controls to prevent the accumulation of a static charge on the FRAS components
- instructions for the safe use of the product include mounting or suspension requirements to prevent the accumulation of a static charge on the FRAS components
- any change of material composition or change to the product design, including changes of colour, size or placement of eyelets, rivets or mountings are tested in accordance with the relevant requirements of MDG 3608
- the product is suitably marked to indicate compliance with MDG 3608.

NOTE: Please ensure all relevant people in your organisation receive a copy of this safety alert and are informed of its content and recommendations. This safety alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's common area, such as your notice board, where appropriate.

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