Resources Regulator
Department of Regional NSW

Safety Bulletin

Date: April 2023

Ignition risks from rare earth magnets

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

Issue

An underground coal mine in Queensland has reported an incident where a spark was observed when a drill steel impacted a rare earth magnet. The magnet was part of the drill steel holder for storage of the drill steels when not in use. The magnet was normally embedded in a polyurethane assembly but became exposed due to wear and tear of the polyurethane.

A rare earth magnet is a permanent magnet made from rare earth alloys, often neodymium. A standard ferrite magnet is composed mainly of iron. These magnets are up to 10 times stronger than standard ferrite magnets.

Areas of concern

Following the reported sparking, testing was undertaken by the original equipment manufacturer and a test laboratory that specialises in hazardous area (explosive gas atmospheres) testing. The testing was undertaken in accordance with IEC/ISO 80079.38 and identified that when struck by hardened steel, such as that used in drill steels, sparks were generated that were capable of igniting a flammable gas atmosphere.

Material safety data sheets (MSDS) for neodymium magnets identify dry powders from a magnet will oxidise, smoulder and burn rapidly in the presence of air. The MSDS also states that magnets may spark on impact.

Additional risks

Impacting magnets can cause chipping or shattering of the magnets and result in flying shrapnel, sharp edges and metallic splinters.

Recommendations

- Designers of equipment intended for use in underground coal mines must ensure that if rare earth magnets are used, they are provided with suitable protection from impact.
- Operators of underground coal mines should identify if these types of magnets are installed on equipment underground.
- Where these types of magnets are found to be in use and it is not reasonably practical to provide protection from impact or to remove them from service, operators of underground coal mines should undertake a risk assessment to consider the suitability of existing control measures and determine if additional control measures are required.

- Operators of underground coal mines should ensure that maintenance and inspection procedures include checks to ensure the magnets are mechanically protected and where that protection is found to be compromised, that the magnet is removed from service.
- Operators of underground coal mines should implement controls to prevent the unauthorised introduction of rare earth magnets on equipment to be used underground.

Additional Information:

- Komatsu Global Safety Alert GSA0067

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 bulletin 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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