

FACT SHEET

Use of oxygen candles in refuge chambers at underground mines

August 2019

What is an oxygen candle?

An oxygen candle is a chemical oxygen gas generator sealed in a steel cannister which contains a mix of sodium chlorate and iron powder. The generator is usually ignited by a firing pin. When ignited, a chemical reaction occurs which produces oxygen gas, suitable for breathing.

It may be used to provide an emergency oxygen supply when the primary air supply has been cut off or contaminated.

An oxygen candle is a single-use product. Once the chemical reaction starts, it cannot be stopped. The outer casing temperature may reach up to 600 degrees Centigrade.

An oxygen candle is not a prohibited item¹ for use in a refuge chamber in underground metalliferous mines as it does not have a naked flame. Of note, a naked flame will consume oxygen and will generate carbon monoxide along with other harmful by-products.

Use of an oxygen candle

The use of a damaged or contaminated candle may lead to a serious incident. The risks associated with this device should not be under-estimated. There have been recorded instances of fatalities.

A person conducting a business or undertaking must consider the risks associated with the supply and use of an oxygen candle, including storage and handling, and the proper management of those risks.

¹ Clause 34 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 prohibits or restricts the use of certain items and substances at a mine or petroleum site.

A risk assessment must be carried out prior to the procurement and introduction of an oxygen candle at a mine and should consider (as an absolute minimum) the following:

- the provision of an alternative arrangement for supply of oxygen to a refuge chamber and whether that alternative has a lower risk when compared to an oxygen candle
- the high surface temperature of the candle when ignited, and the controls required to manage the risk of ignition of other materials in the refuge chamber
- any manufacturer's warnings, with a copy of the manufacturer's warnings kept in the refuge chamber for reference
- information in the safety data sheet for the product, with a copy of the safety data sheet kept in the refuge chamber for reference
- care and maintenance of the candle, ensuring cleanliness, no discolouration and no apparent abnormality
- local mine conditions, including ambient temperatures and humidity
- the likely duration of an emergency in which workers may need to remain in the refuge chamber, including the maximum number of workers expected in the refuge chamber and the number of candles stored
- the provision of information, training and instruction to workers who may handle or are expected to use the oxygen candle
- potential risks due to oxygen enrichment on other equipment in the refuge chamber, including increased flammability of materials that may occur due to oxygen enrichment
- additional heat loading within the refuge chamber, caused by the temperature of the candle's chemical reaction and the time duration of the candle
- indicators/triggers when an oxygen candle is required to be activated.

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