

Recognised Standard 04

Underground non flameproof fire protected diesel engines
Coal Mining Safety and Health Act 1999

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This document is issued in accordance with **PART 5—RECOGNISED STANDARDS** of the *Coal Mining Safety and Health Act 1999* (the Act).

Part 5 Recognised standards

71 Purpose of recognised standards

A standard may be made for safety and health (a **recognised standard**) stating ways to achieve an acceptable level of risk to persons arising out of coal mining operations.

72 Recognised standards

- (1) The Minister may make recognised standards.
- (2) The Minister must notify the making of a recognised standard by gazette notice.
- (3) The chief executive must keep a copy of each recognised standard and any document applied, adopted or incorporated by the recognised standard available for inspection, without charge, during normal business hours at each department office dealing with safety and health.
- (4) The chief executive, on payment by a person of a reasonable fee decided by the chief executive, must give a copy of a recognised standard to the person.

73 Use of recognised standards in proceedings

A recognised standard is admissible in evidence in a proceeding if—

- (a) the proceeding relates to a contravention of a safety and health obligation imposed on a person under part 3; and
- (b) it is claimed that the person contravened the obligation by failing to achieve an acceptable level of risk; and
- (c) the recognised standard is about achieving an acceptable level of risk.

Also relevant to the application of a Recognised Standard is Section 37(3) of the Act.

37 How obligation can be discharged if regulation or recognised standard made

- (3) if a recognised standard states a way or ways of achieving an acceptable level of risk, a person discharges the person's safety and health obligation in relation to the risk only by—
 - (a) adopting and following a stated way; or
 - (b) adopting and following another way that achieves a level of risk that is equal to or better than the acceptable level.

Where a part of a Recognised Standard or other normative document referred to therein conflicts with the *Coal Mining Safety and Health Act 1999* or the *Coal Mining Safety and Health Regulation 2017*, the Act or Regulation take precedence.

This guideline is issued under the authority of the Minister for Natural Resources, Mines and Energy

[Gazetted August 2018]

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1 Purpose

The purpose of this standard is to establish the minimum standards for the construction and management controls for a non-flameproof fire protected diesel vehicle in an underground coal mine.

2 Scope

This standard applies to diesel powered vehicles that are non-flameproof fire protected, but not explosion protected, in the underground operations of a coal mine. This standard does not apply to vehicles for use on the surface of an underground coal mine.

3 Application framework

Underground non flameproof fire protected diesel vehicles must comply with the requirements of the Coal Mining Safety and Health Act and Regulations and should comply with the requirements of this recognised standard.

4 Definitions

NERZ: Negligible explosive risk zone of an underground coal mine.

Note! Other areas of the mine are designated ERZ1 and ERZ0, and are areas where methane is present or is likely to be present in concentration in excess of 0.5% and 2% respectively.

5 Technical guidance

5.1 General

Vehicles that are restricted to the NERZ of an underground coal mine do not have to conform to explosion protection requirements. However, there are other risks introduced by this class of vehicle and this standard identifies management strategies and construction requirements that will effectively control these risks. The identified controls are the minimum requirements and must be complemented by a risk assessment conducted by the mine, prior to introduction of this class of vehicle. The risk management process may require the use of additional control measures refer to AS/NZS 4871.6:2013 and AS/NZS 3584.1:2008. The risk management process should also include a review of site controls when standards are updated. A gap analysis should be undertaken and plans implemented to address gaps identified.

5.2 Management controls

Each mine or user is to undertake a risk assessment, using an industry accepted approach, which will address the special risks of operating this class of vehicle. The risk assessment and any related investigation shall specifically address the following:

- 1) The likelihood of an unexpected change in the Explosion Risk Zone classification.
- 2) Restrictions on the use of this class of machine in emergency situations, including emergency evacuation or loss of ventilation.
- 3) The use of signage and safety interlocking systems to prevent the vehicles operating in a zone other than a NERZ.
- 4) A system to make the vehicle operator aware of ventilation stoppages or other environmental changes that might pose a risk to the operation of the vehicle.
- 5) Maximum vehicle speeds.

- 6) Means where the engine can be started from an external power source.

5.3 Operational controls

Each mine is to implement management systems that address the output of the risk assessments and have documented systems that:

- 1) Ensures operators and users are trained in the operation and maintenance of this class of vehicle.
- 2) Ensures any vehicle modifications are supported by a risk assessment that has included a review of any previous risk assessment.
- 3) Ensures the maintenance system includes;
 - a) Dynamometer testing of the vehicle.

Note! To ensure that exhaust gas emission concentrations are below acceptable limits and surfaces, requiring temperature control, do not exceed 150°C.

- b) Examinations to ensure electrical systems are maintained to their design standards.
 - c) Tests to ensure the location control system remains functional.
 - d) Routine testing of the installed methanometer and its related engine shutdown system.
 - e) Periodic tests of the vehicle speed management system.
 - f) Systems to control computer software including;
 - i) Version in use and upgrades
 - ii) Security and modification
 - g) Routine removal of accumulated coal dust from surfaces requiring temperature control.
- 4) Ensures that the vehicle battery is not replaced while the vehicle is underground.
- 5) Provides means to remove a vehicle to the surface where the vehicle is unable to be driven from the mine.
- 6) Provides a permanent record of events where the vehicle was automatically stopped whilst attempting to enter an ERZ1 or ERZ0.

5.4 Vehicle construction controls

- 1) Each diesel engine system classified as a heavy duty application shall comply with the requirements of AS/NZS 3584.1:2008.
- 2) Each vehicle type must be subjected to extensive dynamometer testing under load to confirm suitability of vehicle design and identify any parts of the vehicle where temperatures in excess of 150°C may occur. Refer AS/NZS 3584.1:2008 for further details.
- 3) A temperature monitoring and control system must be fitted to ensure the surface temperatures on the vehicle do not exceed 150°C.
- 4) Exhaust gases must not exceed 150°C at their point of exit.
- 5) An automated engine shutdown system, independent of the operator, if 150°C is exceeded at any temperature monitor fitted to the vehicle.
- 6) A location control system to prevent the vehicle entering a zone other than a NERZ. The system components may be installed in the mine or mounted on the vehicle. This system must include automatic engine shutdown on vehicles such as man transports and LHDs which have a greater potential to enter an ERZ zone.
- 7) Permanently mounted, automatically operating, engine bay fire suppression system.
- 8) Hand held fire extinguisher mounted on the vehicle.

- 9) Oil immersed brakes braking system that limits the surface temperature to less than 150°C.
- 10) Vehicle horn(s) rated at 95 dBA minimum.
- 11) Audible vehicle reversing alarm.
- 12) Where operating speed may present a hazard, facilities shall be provided for speed limitation. The means of limitation may be electrical or mechanical.
- 13) Engine shutdown in an emergency refer AS/NZS 4871.6:2013 cl 2.3.11 and AS/NZS 3584.1:2008 cl 2.16.
- 14) Seat belts fitted at all vehicle seating positions.
- 15) A system to prevent engine start while the vehicle is in gear.
- 16) Electrical circuits and protection systems to conform to the appropriate parts of AS 4242-1994 and AS/NZS 4871.6:2013. Electrical equipment shall be certified as having explosion protection, or have a degree of protection of, or equivalent to, at least IP55 under AS 1939. This does not apply to electrical cables.
- 17) All electrical parts of a machine shall be adequately protected against damage that might reasonably be expected to result from mechanical impact, vibration, and exposure to weather, water, excessive dampness, corrosive substances, accumulation of dust or debris, steam, oil, grease, fuel, high temperature, or other adverse conditions to which the machine may be exposed.
- 18) Alternators shall comply with the requirements of AS/NZS 4871.6:2013 cl 2.3.4.
- 19) Battery isolation to be fitted and comply with AS/NZS 4871.6:2013 cl 2.2.7.2.
- 20) Battery to be enclosed, to limit access and provide short circuit protection. The isolator will be hazardous area protected to AS/NZS 60079 series requirements. The battery box shall comply with the requirements of AS/NZS 4871.5:2010.
- 21) Permanently mounted vehicle headlights and reversing lights.
- 22) The bulb wattage must be selected to ensure that the glass temperature cannot exceed 150°C or physical and dust protection is to be provided. A label to be attached, in proximity to each bulb, stating the maximum bulb wattage.
- 23) All unused parts of an electrical installation on a machine shall be completely disconnected from the source of supply. Disconnected wiring that remains in association with wiring that is in use shall be terminated or insulated at both ends in a satisfactory manner.
- 24) Alternative engine stop/isolation switch to be fitted.
- 25) An external power source connection shall include an isolator and means to prevent inadvertent reverse polarity. Refer to AS/NZS 4871.6:2013 cl 2.3.2 for details of jump start facilities.
- 26) The system for temperature control, vehicle mounted location control and speed control must be fail safe.
- 27) Methane monitoring
 - a) Automatic methane monitoring shall be provided on fire-protected machines.
 - b) Specific requirements for methane monitoring are as follows:
 - i. Engine cranking shall be prevented if a methane level of 0.25% or greater is present prior to the start.
 - c) A visual alarm of low level at 0.25% methane detection shall be fitted to allow the machine to be shut down or driven away from any gassy area.
 - d) Methane detection greater than 0.5% shall cause the machine to immediately shut down.
 - e) Failure of the methane monitoring system shall ensure the complete shutdown of the machine in accordance with (c).

NOTE: Indication of failure should be provided.

- f) The installation of the methane monitoring system shall be in compliance with its certification including connection to a compliant power supply, if so certified.
- g) Any circuits that remain powered after a methane monitor triggered shutdown shall be hazardous area protected to Ex 'ia', as defined in AS/NZS 60079.11:2011.

6 Reference standards

The following documents are referred to in this standard:

- AS/NZS 3584.1:2008 Diesel engine systems for underground coal mines – Fire protected – Heavy duty
- AS 4242 – 1994 Earth moving machinery and ancillary equipment for use in mines - Electrical wiring systems at extra-low voltage
- AS/NZS 4871.5:2010 Electrical equipment for mines and quarries – battery powered electrical mobile machines
- AS/NZS 4871.6:2013 Electrical equipment for mines and quarries – Diesel powered machinery and ancillary equipment.
- AS/NZS 60079 series Equipment for explosive atmospheres