

Dated this 27th day of November 2018

Leigh
Chief
NSW Department of Planning and Environment (by delegation)

Nicholls
Inspector

1. Name of Order

This Order is the *Registration of Breathing Apparatus to Assist Escape (including Self-Rescuers) Design Order 2018*.

2. Commencement

This Order commences on 7 December 2018.

3. Interpretation

In this Order:

MDG is a reference to mining design guidelines produced by the NSW Government and published on the Department of Planning and Environment's Resources Regulator website.

4. Revocation

The *Registration of Breathing Apparatus to Assist Escape (including self-rescuers) Design Order 2015* published in the NSW Government Gazette No 52 of 26 June 2015 at page 1845 is revoked.

5. Design, testing and performance requirements

5.1 Except as provided in paragraph 5.2, all breathing apparatus to assist escape (including self-rescuers) used in underground coal mines must be designed in accordance with, and meet the testing and performance requirements of, sections 2 to 4 of the MDG 3609 *Escape Breathing Apparatus for Underground Mining Applications* (as amended from time to time).

5.2 Where a design does not comply, in full or part, with the requirements in paragraph 5.1, the designer must specify the published technical standards or the engineering principles used to identify controls, in the order of the hierarchy of risk controls in Part 3.1 of the *Work Health and Safety Regulation 2017*, incorporated in the design to achieve at least an equivalent level of safety as the requirements of paragraph 5.1.

5.3 The test facility used for testing the breathing apparatus to assist escape (including self-rescuers) must be a test facility which is unrelated to the designer, manufacturer or supplier.

(1) The test facility must either be:

- (a) the Department of Planning and Environment, Mine Safety Technology Centre, Thornton, NSW, or
- (b) a facility in Australia that is accredited by the National Association of Testing Authorities (NATA) for performing the specific tests described in the standards referred to in this Order, or
- (c) where a NATA-accredited facility is not available, a suitably qualified and experienced independent testing facility with regard to test equipment, equipment calibration, quality processes, work methods, past test experience and independent technical verification.

[n2018-4064]

WORK HEALTH AND SAFETY (MINES AND PETROLEUM SITES) REGULATION 2014

Registration of Shotfiring Apparatus Design Order 2018

I, Leigh Nicholls, Chief Inspector, with the delegated authority of the Secretary, Department of Planning and Environment, in pursuance of clause 177(5) of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* ("the Regulation") make the following Order.

Dated this 27th day of November 2018.

Leigh Nicholls
Chief Inspector
NSW Department of Planning and Environment (by delegation)

1 Name of Order

This Order is the *Registration of Shotfiring Apparatus Design Order 2018*.

2 Commencement

This Order commences on 7 December 2018.

3 Interpretation

In this Order:

AS is a reference to Australian Standards.

AS/NZS is a reference to Australian/New Zealand Standards.

circuit tester means apparatus for testing the continuity, and indicating the condition (resistance), of a detonator circuit.

exploder means a self-contained portable apparatus designed and constructed for producing an electric current for firing detonators.

exploder tester means apparatus for testing the output characteristics of an exploder on a routine basis as a means of assessing its continued ability to perform its design function.

intrinsically safe means being certified as explosion protected using intrinsic safety techniques as identified in AS/NZS 60079.11:2009 *Explosive atmospheres – Part 11: equipment protection by intrinsic safety (i)* (as amended from time to time) for use in Group I applications.

Regulation means the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

shotfiring apparatus is a collective term encompassing circuit testers, exploders and exploder testing devices.

special tool means a tool that is designed to be used with a specific type of fastener and which is intended to discourage unauthorised interference with the apparatus (not a general purpose tool that is intended to be used on a range of fasteners for instance, pliers, multigrip pliers, shifting spanners, adjustable wrenches, etc.).

4 Revocation of Requirements for Design Registration for Shotfiring Apparatus

The *Registration of Shotfiring Apparatus Design Order 2015* published in the NSW Government Gazette No 52 of 26 June 2015, at page 1855 is revoked.

5 Design outcomes

All shotfiring apparatus used in underground coal mines will have design outcomes to:

- (a) withstand the arduous nature of use below ground, without damage or impairment to correct operational performance, and
- (b) be reliable in performance, and
- (c) not sustain mechanical or electrical damage likely to affect the safe operation of the equipment, when dropped or impacted, and
- (d) ensure that the electrical circuits within the apparatus are adequately insulated, as specified in 7.1 (b), from the outer case of the apparatus, and
- (e) ensure that where the exploder and the circuit tester are integrated into a single unit, it is provided with adequate segregation between the circuits of the exploder and the circuit tester, to prevent electrical leakage and/or interference from the exploder to the circuit tester circuits.

6 Testing requirements

6.1 Test facility

All testing and assessment must be carried out by:

- (a) a laboratory in Australia that is accredited by the National Association of Testing Authorities Australia for performing the specified tests, or
- (b) where a NATA accredited laboratory is not available, a suitably qualified and experienced independent testing facility having regard to test equipment, equipment calibration, quality processes, work methods, past test experience and independent technical verification should be used.

6.2 All shotfiring apparatus

- (a) Except as provided in paragraph 7.5, the design of the shotfiring apparatus shall be demonstrated by type test to achieve, as a minimum, the performance requirements as detailed in the relevant sections of paragraphs 7.1-7.4.

7 **Performance standards**

7.1 General

Except as provided in paragraph 7.5, all shotfiring apparatus must be designed to:

- (a) prevent being disassembled without the use of special tools, and
- (b) provide an insulation resistance between the shotfiring circuit and the exploder case of greater than 50 M Ω at 1000 V when measured after conditioning for 24 hours in an ambient temperature of maximum 20 degrees Celsius and relative humidity of at least 90%, and
- (c) ensure that external parts of the enclosure must not be made of:
 - (i) aluminum, or
 - (ii) an aluminum alloy containing more than 15% by mass of aluminum, magnesium and titanium, provided that the content of magnesium and titanium does not exceed 6% by mass, and
- (d) ensure that if constructed of non-metallic materials, all shotfiring apparatus must be:
 - (i) anti-static in accordance with clause 7.4.2 of AS/NZS 60079.0:2012 *Explosive atmospheres – Equipment – General requirements* (as amended from time to time), or
 - (ii) contained within a leather carrying case having provision to prevent its unauthorised removal, and
- (e) provide means of carrying that does not involve the use of the hand(s). This may be incorporated on a case provided to contain the shotfiring apparatus, and
- (f) display any essential operating and safety instructions via inscription on the apparatus, and
- (g) withstand, without physical or electrical impairment, a vertical drop of 1 metre onto a concrete floor. Each test must be carried out five times, and
- (h) withstand, without sustaining mechanical damage likely to affect the safe operation of the equipment, a vertical impact test with energy of 20 joules, and
- (i) have a degree of protection of not less than IP54 in accordance with AS 60529:2004 *Degrees of protection provided by enclosures (IP Code)*, as amended from time to time.

7.2 Specific requirements for Exploders

Except as provided in paragraph 7.5, all exploders must be designed to:

- (a) be prominently inscribed with the shot limit capacity. The shot limit must not exceed 100, and
- (b) where integrated with a continuity circuit tester, have a circuit tester which conforms with the requirements for performance as detailed at 7.3 below, and
- (c) initiate the firing current only by operation of a key or similar device, and the removal of this key or other initiation device must only be permitted when in the “off” or “safe” position, and
- (d) provide a mechanism that causes the firing key to return to the off position when not physically held in an alternate position, or contain equivalent safety features, and
- (e) provide output connection terminals that allow a convenient and secure attachment of the shotfiring cable and are arranged so that the exploder can be operated without making deliberate contact with the output connections, and
- (f) allow the firing sequence to be abandoned at any point up to the final firing position without producing an output greater than 50 milliamperes, and
- (g) ensure that removal of the firing handle or key or failure to promptly initiate the firing sequence, must cause all stored energy within the exploder, excluding supply batteries, to be promptly discharged, and
- (h) ensure adequate firing energy is available:
 - (i) for capacitor-discharge type exploders:
 - (1) electric current is prevented from being available to the output terminals until the capacitor is adequately charged, and
 - (2) when fired provide a 4millisecond burst of firing current at 1.25 amperes \pm 15%, or
 - (ii) for rotating armature excited type exploders, an RMS current is provided that achieves 1.6 amperes and sustains an output current of 1.4 amperes for at least 1 millisecond, and

- (i) provide the required firing current with a connected resistance of $2.2n + 4L$ ohms, where n is the number of shots the unit is rated to fire and L is the number of 100 metre lengths (for test purposes L must equal 12), and
- (j) after initiation of the firing output, limit the output in the shotfiring circuit so that no firing currents exist for greater than 5 milliseconds, and that no energy greater than two thirds of Group I intrinsically safe ignition energy exist after 12 milliseconds, and
- (k) prevent any possible manipulation of the firing controls to produce a firing output less than specified in 7.2 (8) above; and
- (l) once fired, prevent additional firing charge being produced before the firing control is returned to the “off” position, and
- (m) where integrated with a continuity circuit tester, ensure no output other than the continuity test is available at the firing terminals, when a single component malfunction occurs. For the purpose of this paragraph malfunction includes the mechanical or electrical malfunction of a switch, an earth fault on any part of the equipment, and an open circuit or short circuit occurring on any component or any part of the electrical circuit, and
- (n) ensure that any circuit or component contained within the exploder that produces open sparking during normal operation is intrinsically safe or contains equivalent explosion protection safeguards, and

7.3 Specific requirements for exploder testers

Except as provided in paragraph 7.5, all exploder testers must be designed to demonstrate the performance measures detailed in 7.2 (h), (i) and (j).

Note: The exploder tester may be an integral part of the exploder or a standalone test unit.

7.4 Specific requirements for circuit testers

Except as provided in paragraph 7.5, all circuit testers must be designed to:

- (a) be intrinsically safe or alternately meet the requirements to allow use in accordance with any requirements pursuant to clause 79 (1) of the Regulation, and
- (b) be incapable of firing a low-tension detonator, that is, the maximum short-circuit current output must be less than 50 milliamperes, and
- (c) be reliable in performance, accurate to 1 ohm or within 5% of true resistance and capable of indicating the condition of a detonator circuit and provide a suitable range to indicate an external resistance exceeding $3n$ ohms, where n is the maximum number of detonators the exploder is designed to fire, and
- (d) ensure the electrical circuit is adequately insulated from the outer case, and
- (e) where housed within the same enclosure as the exploder ignition circuit, be constructed with adequate segregation to prevent electrical leakage or interference from a charged exploder circuit transferring to the terminals of the circuit tester; and
- (f) ensure that simultaneous operation of the circuit tester and exploder output must be inhibited and fail safe in design.

- 7.5 Where a design does not comply, in full or part, with the requirements of paragraphs 7.1-7.4, the designer must specify the published technical standards or the engineering principles used to identify controls, in the order of the hierarchy of risk controls in Part 3.1 of the *Work Health and Safety Regulation 2017*, incorporated in the design to achieve at least an equivalent level of safety as the performance requirements of paragraphs 7.1-7.4.

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