

WORK HEALTH AND SAFETY (MINES AND PETROLEUM SITES) REGULATION 2022

Registration of Shotfiring Apparatus Design Order 2022

I, **Garvin Burns**, Chief Inspector, with the delegated authority of the Secretary, Regional NSW, pursuant to section 187(5) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022, make the following Order.

Dated this 29th day of August 2022

Garvin Burns
Chief Inspector
Regional NSW

1. Name of Order

This Order is the *Registration of Shotfiring Apparatus Design Order 2022*.

2. Commencement

This Order commences on the day it is published in the NSW Government Gazette.

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 :2011 *Explosive atmospheres-Part 11: equipment protection by intrinsic safety (i)* (as amended from time to time) for use in Group I applications.

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

The *Registration of Shotfiring Apparatus Design Order 2018* published in the NSW Government Gazette No.130 of 30 November 2018 at pages 9148-9151 is revoked.

5. Design outcomes

5.1 All shotfiring apparatus used in underground coal mines must be designed to achieve the following outcomes:

- (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 6.1(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; and
- (f) achieve, as a minimum, the performance requirements as detailed in the relevant sections of paragraphs 6.1—6.4.

5.2 If the design of shotfiring apparatus that is registered under Part 5.3 of the Work Health and Safety Regulation 2017 is altered and the alteration may affect health or safety:

- (a) the altered parts of the shotfiring apparatus must be designed to achieve the design requirements in paragraph 5.1 of this Order
- (b) an assessment must be undertaken, and documented, by the designer to assess the impact that the design alteration has on unaltered parts of the shotfiring apparatus.

- (c) where the assessment undertaken in paragraph 5.2(b) shows there has been a reduction in the effectiveness of existing control measures of any other parts of the shotfiring apparatus, that is, there has been a detrimental effect on health and safety caused by the alteration, these parts must comply with the design requirements in paragraphs 5.1 of this Order.
- (d) any parts of the shotfiring apparatus which are not affected by the alteration must continue to comply with the design requirements of the design order that was in effect on the date that the registration for the design of the shotfiring apparatus was granted.

6. Testing and performance requirements

6.1 General requirements:

The design of the shotfiring apparatus used in underground coal mines must be tested and achieve, as a minimum, the following performance requirements:

- (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 MΩ at 1000V 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) aluminium, or
 - (ii) an aluminium alloy containing more than 15% by mass of aluminium, 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 60079.0:2019 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 ingress 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.

6.2 Specific requirements for exploders:

In addition to the requirements of 6.1, 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 6.4 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 unintended 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:
 - electric current is prevented from being available to the output terminals until the capacitor is adequately charged, and

- when fired, provide a 4 millisecond 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 6.2(h) 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; and

Note: 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.
- (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.

6.3 Specific requirements for exploder testers:

In addition to the requirements of 6.1, all exploder testers must be designed to achieve the performance measures detailed in 6.2(h), (i) and (j).

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

6.4 Specific requirements for circuit testers:

In addition to the requirements of 6.1, 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 section 81(1) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022, 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.

6.5 If the design of shottfiring apparatus that is registered under Part 5.3 of the Work Health and Safety Regulation 2017 is altered, and the alteration may affect health or safety, the altered parts of the shottfiring apparatus, including those parts that may have been redesigned due to detrimental effects identified in the assessment undertaken in paragraph 5.2(b) above, must be tested and achieve the performance requirements in paragraphs 6.1—6.4, as applicable, of this Order.

6.6 Any parts of the shottfiring apparatus which are not affected by the alteration must continue to comply with the performance requirements of the design order that was in effect on the date that the registration for the design of the shottfiring apparatus was granted.

7. Test facility

7.1 The test facility used for testing the shottfiring apparatus must be a test facility which is independent of the designer, manufacturer or supplier.

7.2 The test facility must have test equipment with calibration traceable to the International System of Units (SI) by reference to national measurement standards, quality processes and work methods for performing the specific tests described in the standards referred to in this Order. This must be demonstrated through:

- (a) accreditation by the National Association of Testing Authorities (NATA); or
- (b) where demonstrated to the regulator that a NATA-accredited facility is not available,

- (iii) through accreditation by an organisation that is a signatory to the ILAC MRA (International Laboratory Accreditation Cooperation Mutual Recognition Arrangement); or
- (iv) a suitably qualified and experienced testing facility along with past test experience with shot firing apparatus, which has been independently audited within the last 2 years.

8. Determination of applications for registration of design made before commencement of this Order

If an application for the registration of design of shotfiring apparatus made in accordance with clause 250 of the Work Health and Safety Regulation 2017 to which the standards specified in the *Registration of Shotfiring Apparatus Design Order 2018* applies is made before the commencement of this Order, and the application has not been finally determined before that commencement, the application is to be determined as if this Order had not commenced.