

**OCCUPATIONAL HEALTH AND SAFETY ACT 2000**

Notice under Clause 107(2)(ii) of Occupational Health and Safety Regulation 2001

Requirements for Design Registration of Shot Firing Apparatus used Underground at a Coal Workplace

I, ROBERT REGAN, Chief Inspector under the Coal Mine Health and Safety Act 2002, pursuant to Clause 107(2)(a)(ii) of the Occupational Health and Safety Regulation 2001 (the Regulation), by this notice:

1. revoke the notice made under Clause 112A of the Regulation titled "Requirements for design registration of shot firing apparatus used underground at a coal workplace" dated 29 January 2007, published in the *New South Wales Government Gazette* No. 24 of 2 February 2007, pages 688-692, and
2. specify in the Schedule the requirements that must be met for registration of a plant design for shotfiring apparatus used in underground mines at a coal workplace:

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

**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 duty.

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

**SCHEDULE**

1. Design and performance requirements

- 1.1 The following tests must be carried out prior to design registration.

The design registration will only remain valid for shotfiring apparatus manufactured during a set period, typically five (5) years, and where there is no change in the design, or change in the location or method of manufacture.

Should the manufacture of design registered plant be required beyond the set registration period, a further application will be required and the application is to be accompanied with a report detailing the compliance status of the plant with contemporary gazetted requirements and associated compliance standard.

Note: Electrically powered shotfiring apparatus that are required for use in the hazardous zone must also meet the Chief Inspector's requirement for electrical plant.

- 1.2 Only shotfiring apparatus that conforms to the following requirements in respect to construction and performance will be considered suitable for design registration and permitted for use underground at a coal workplace:

1.2.1 General shotfiring apparatus requirements

Shotfiring apparatus must be constructed to:

- 1.2.1.1 withstand without damage or impairment to correct operational performance the arduous nature of use below ground; and
- 1.2.1.2 prevent its dismantling without the use of special tools; and
- 1.2.1.3 provide an insulation resistance between the shotfiring circuit and the exploder case of greater than 50 MΩ at 1000 V when measured after conditioning for 24 hours in an ambient temperature of maximum 20 degrees C and relative humidity of at least 90%; and
- 1.2.1.4 exclude external parts of the enclosure made of –
  - aluminium or
  - 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
- 1.2.1.5 if constructed of non-metallic materials, be suitably anti-static or be contained within a leather carrying case having provision to prevent its unauthorized removal; and
- 1.2.1.6 provide means of carrying that does not involve the use of hand. This may be incorporated on a case provided to contain the shotfiring apparatus; and
- 1.2.1.7 display any essential operating and safety instructions via inscription on the apparatus.

1.2.2 Specific requirements for Exploders

Only exploders that conform to the following requirements in respect to construction and performance (in addition to the general requirements of clause 1.1 above) will be considered suitable for design registration and permitted for use underground at a coal workplace. Exploders must be constructed to:

- 1.2.2.1 be prominently inscribed with the shot limit capacity to 100 or less shots; and
- 1.2.2.2 where integrated with a continuity circuit testers, have a circuit tester which conforms with the requirements of clause 1.2.3 below, in respect to the construction and performance of the circuit tester. The exploder circuits must also be adequately segregated from the circuit tester and prevent electrical leakage and/or interference to the circuit tester circuits; and

- 1.2.2.3 initiate the firing current only by operation of a key or similar device. It must be possible to remove this key or other initiation device only in the "off" or "safe" position; and
  - 1.2.2.4 provide a mechanism that causes the firing key to return to the off position, when not physically held in the alternate position or contain equivalent safety features; and
  - 1.2.2.5 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 contact with the output connections; and
  - 1.2.2.6 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
  - 1.2.2.7 ensure that removal of the firing handle or key or failure to promptly initiate the firing sequence causes all stored energy within the exploder, excluding supply batteries, to be promptly discharged; and
  - 1.2.2.8 ensure adequate firing energy is available, typically:
    - 1.2.2.8.1 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 milliseconds burst of firing current at 1.25 amperes  $\pm$  15%; or
    - 1.2.2.8.2 ensure, for rotating armature excited type exploders, an RMS current is provided that achieves 1.6 amperes and sustain an output current of 1.4 amperes for at least 1 millisecond; and
  - 1.2.2.9 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 shall equal 12); and
  - 1.2.2.10 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
  - 1.2.2.11 prevent any possible manipulation of the firing controls to produce a firing output less than specified in 1.2.2.8; and
  - 1.2.2.12 once fired, prevent additional firing charge being produced before the firing control is returned to the "off" position; and
  - 1.2.2.13 where integrated with a continuity circuit tester, ensure no output higher than continuity test is available at the firing terminals, when a single component malfunction occurs. For the purpose of this paragraph malfunction includes mechanical or electrical maloperation 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
  - 1.2.2.14 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
  - 1.2.2.15 provide a test function, or test accessory, that unambiguously verifies a healthy exploder output.
- 1.2.3 Specific requirements for circuit testers
- Only circuit testers that conform to the following requirements in respect to construction and performance shall be considered suitable for design registration and permitted for use underground at a coal workplace. Circuit tester must be constructed to:
- 1.2.3.1 be intrinsically safe as defined in AS/NZS 60079.0:2005 Electrical apparatus for explosive gas atmospheres for Group I applications, or alternately meet the requirements and only be used in accordance with any gazetted requirements pursuant to clause 19(1)(m) of the Coal Mine Health and Safety Regulation; and
  - 1.2.3.2 be incapable of firing a low tension detonator, that is a maximum short-circuit current output of less than 50 milliamperes; and
  - 1.2.3.3 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
  - 1.2.3.4 ensure the electrical circuit is adequately insulated from the outer case; and
  - 1.2.3.5 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. Simultaneous operation of the circuit tester and exploder output must be inhibited and fail safe design.

## 2. Testing requirements

- 2.1 The following examinations and tests shall be carried out on a sample of the shotfiring apparatus to ensure compliance with the above requirements:
- 2.1.1 Each item of shotfiring apparatus and associated documentation will be examined to ensure compliance with manufacturing drawings and design requirements; and
  - 2.1.2 Each item of shotfiring apparatus will be subjected to drop tests from heights of 1 metre onto a concrete floor. Each test will be carried out five times and as a result of each test the safety of the shotfiring apparatus is not to be impaired physically or electrically; and
  - 2.1.3 Each item of shotfiring apparatus will be subjected to a vertical impact test with energy of 20 joules. As a result of this test the shotfiring apparatus must not sustain mechanical damage likely to affect the safe operation of the equipment; and
  - 2.1.4 Each item of shotfiring apparatus case will be subject to suitable testing to ensure a degree of protection of not less than IP54; and
  - 2.1.5 The correct functioning of each item of shotfiring apparatus will be checked to ensure compliance with appropriate requirements of section 1 of this notice.
- 2.2 All testing and assessment must be carried out by:
- 2.2.1 a laboratory in Australia that is accredited by the National Association of Testing Authorities Australia (NATA), or
  - 2.2.2 an equivalent organisation acceptable to the Chief Inspector.

## 3. Registration assessment

The following documents must be provided for assessment with the application under clause 107 of the Regulation for registration of plant design:

- 3.1 a technical description and specification of the apparatus; and
- 3.2 an explanation of the manner of operation and the intended field of use of the apparatus; and
- 3.3 details of the apparatus routine testing recommended by the manufacturer; and
- 3.4 apparatus operating instructions; and
- 3.5 apparatus life cycle (within the meaning of the Coal Mine Health and Safety Regulation 2006) maintenance instructions; and
- 3.6 if the apparatus is designed to be field function tested by a separate device, details of this device; and
- 3.7 a statement of any special or limiting conditions of use specified by the manufacturer; and
- 3.8 testing certificate(s), accredited by NATA or by an otherwise acceptable equivalent, for each test design and performance criteria stipulated in section 1 and 2 above; and
- 3.9 all supporting documentation specified in test certificate(s) that was used for product identification and performance evaluation; and
- 3.10 where the plant is of a type as gazetted under clause 19(1)(c) Coal Mine Health and Safety Regulation 2006:
  - 3.10.1 a copy of the Certificate of Conformity, or Approval,
  - 3.10.2 a copy of the test report(s) referenced in the Certificate of Conformity or approval, and
  - 3.10.3 a copy of all the drawings referenced in the test report(s).

Dated this 17th day of December 2010.

ROBERT REGAN,  
Chief Inspector,  
Department of Industry & Investment