

Specification for Exploders

IS 9836:1981

Exploders are electrical devices designed to initiate the detonation of explosive charges used in underground locations where flammable gas hazard may be present. Such locations are coal mines, non-coal mines or underground civil works. They are crucial for controlled blasting operations and ensuring safety in such environments.

Primarily mining and construction industries, expect exploders to meet the following expectations:

- **Enclosure:** The exploder must have a strong, dust-tight, and splash-proof enclosure (IP54 protection). For permitted types, the enclosure should also prevent ignition hazards from frictional sparks, static charges, or leakage current.
- **Carrying Strap:** A sturdy carrying strap should be securely attached, capable of withstanding additional weight without breaking.
- **Operation Mechanism:** The operating spindle, used to trigger the exploder, should extend from the top or side and work with a detachable handle or key to prevent unauthorized use. It should be designed for a comfortable grip.
- **Connection Terminals:** The output terminals must allow secure, easy connections and prevent the connecting device from being removed easily.
- **Safety Features:** The exploder should not allow the handle or key to be removed unless the device is in a safe position. It should also eliminate any residual energy at the terminals after operation.
- **Additional Requirements for Permitted Types:** For permitted exploders, there must be a device to stop the output energy pulse within 4 milliseconds. If it has a circuit-testing feature, this feature must meet specific safety standards.
- **Internal Construction:** All electrical connections inside should be either mechanically secured or soldered for robustness, allowing the device to pass impact and drop tests without compromising functionality

IS 9836:1981 addressed the above mentioned expectation by the following tests as specified in the standard.

- **Testing the Enclosure for Durability and Safety:**
 - **Dust and Splash Protection:** The enclosure must meet IP 54 standards, which means it should be dust-tight and resistant to water splashes. Testing includes exposing it to dusty and wet conditions to confirm compliance.
 - **Ignition Prevention:** For permitted exploders, the enclosure design should minimize risks of ignition from friction, static charges, or leakage currents.

· **Carrying Strap Strength:**

- **Weight Endurance Test:** The carrying strap must endure 1.5 times the exploder's weight for 15 minutes without breaking. This confirms it can reliably support the device under normal and slightly heavier loads.

· **Operation Mechanism and Security:**

- **Design for Authorized Use:** The operating spindle and handle/key should be designed to prevent unauthorized operation. Tests should confirm that the spindle operates only with the appropriate handle or key, and the handle cannot be removed until the device is in a safe, "off" position.

· **Connection Terminals:**

- **Secure Connection:** Output terminals must securely hold connections, preventing accidental detachment. Testing involves connecting and disconnecting firing cables multiple times to confirm durability and reliability.

· **No Residual Energy:**

- **Firing Sequence Completion:** After firing, the design should ensure no residual energy remains at the terminals. This is verified by measuring the terminal output immediately after the firing sequence.

· **Special Requirements for Permitted Exploders:**

- **Quick Pulse Termination:** Permitted exploders need a mechanism to stop the output energy within 4 milliseconds of triggering. Testing measures the output pulse duration to ensure it meets this requirement.
- **Circuit Continuity Tester:** If included, the tester should meet safety standards and use low current (below 50 mA) to avoid accidental detonation. Testing verifies that it can check circuit continuity safely without triggering explosives.

· **Internal Construction Testing:**

- **Drop and Impact Tests:** The device should withstand a 1-meter drop onto concrete and impacts from a 1-kg steel hemisphere dropped from 2 meters to confirm structural strength.
- **Electrical Connections:** All internal connections should be mechanically secured or soldered, and the device should maintain functionality after drop and impact tests, with no damage affecting electrical isolation.

Markings provided should be clear and legible on the exploder to identify its **type, voltage rating, operating instructions, illustrations, testing instructions** and **safety precautions** to ensure proper operation

