

TITLE: Test Procedure To Determine the Permissibility of Powder Actuated Devices Used in Underground Coal and other Gassy Mines

MSHA Mine Safety and Health Administration, Approval & Certification Center

1.0 PURPOSE

This document establishes the Mine Safety and Health Administration's (MSHA) test procedure for determining the permissibility of a powder actuated device (PAD) under 30CFR Part 15 New Technology for use in underground coal and other gassy mines.

2.0 SCOPE

This test procedure applies to hand held tools used to install fastenings, powered by a powder actuated cartridge. Since the powder actuated cartridge is the critical part of the explosion-proof integrity of the PAD, it is typically the item that will be explosion tested. Other parts of the PAD may be tested as necessary.

Since all equipment designs cannot be foreseen, MSHA reserves the right to require additional information and/or test(s) to insure product safety.

3.0 REFERENCES

- 3.1. Application Procedure for the Approval of Powder Actuated Devices Used in Underground Coal and Other Gassy Mines - ASAP 55015
- 3.2. Title 30 Code of Federal Regulations - 30CFR, Part 15 New Technology and Part 18, Section 18.62

4.0 DEFINITIONS

Powder Actuated Device (PAD) - A hand held tool that is used to install fastenings powered by the energy developed from the firing of a powder actuated cartridge.

Explosion Test Gallery - A protective enclosure designed to contain an explosive gas atmosphere surrounding the cartridge which is fired in a series of tests.

5.0 TEST EQUIPMENT

- 5.1. An explosion test gallery for conduct of the tests.
- 5.2. Instrumentation to determine the methane concentration of the explosive natural gas-air test mixture. If natural gas is used, the content of methane

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and ethane shall total at least 98.0 by volume per centum with nitrogen and propane the remainder.

- 5.3. Instruments to determine temperature and humidity.
- 5.4. Visual recording equipment.
- 5.5. The applicant must supply a "cartridge holder/jig" that will allow the cartridge to be secured and "fired" within the explosion test gallery with the gas expulsion end of the cartridge directly exposed to the gallery atmosphere.

6.0 TEST SAMPLES

The applicant will provide at least 64 cartridges (boosters) of each variation (caliber / strength). The 64 cartridges should come from several production lots. The applicant should provide the designation of each production lot. Test cartridges will be randomly selected from those provided.

7.0 PROCEDURES

- 7.1. A minimum of sixteen (16) explosion tests of each strength/caliber will be conducted. The tests will be visually recorded with the front of the cartridge monitored. The cartridge must fire for the test to be valid.
 - 7.1.1. Fourteen tests will be conducted at a methane concentration of 7 to 7.4 percent in air. Two tests will be conducted at a methane concentration of 9.3 to 9.6 in air.
 - 7.1.2. Additional tests, including variant concentrations, may be conducted.
- 7.2. The "cartridge holder/jig" will be secured inside the test gallery.
 - 7.2.1. A cartridge is loaded into the firing mechanism.
 - 7.2.2. A means to be provided to initiate the firing mechanism from outside the test gallery.
 - 7.2.3. The visual recording instrument is positioned.
- 7.3. The gallery is sealed and natural gas is injected into the closed gallery.

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7.3.1. The desired concentration of the natural gas-air mixture is reached and allowed to circulate.

7.3.2. The visual recording instrument is activated.

7.3.3. The firing mechanism is activated causing the cartridge to fire.

7.3.4. The inside of the gallery is observed to determine if the firing of the cartridge ignited the surrounding natural gas-air mixture.

8.0 TEST DATA

8.1. The following data shall be recorded:

8.1.1. Ambient conditions (temperature and humidity)

8.1.2. Caliber or Cartridge size and strength or power level/designation

8.1.3. Test number

8.1.4. Pass/Fail

9.0 PASS/FAIL CRITERIA

A strength/caliber group fails the explosion test criterion if any one test within that group results in the ignition of the surrounding explosive gas mixture in the gallery.