

§ 7.31 **New technology.**

MSHA may approve brattice cloth and ventilation tubing that incorporates technology for which the requirements of this subpart are not applicable, if the Agency determines that the product is as safe as those which meet the requirements of this subpart.

Subpart C—Battery Assemblies

§ 7.41 **Purpose and effective date.**

This subpart establishes the specific requirements for MSHA approval of battery assemblies intended for incorporation in approved equipment in underground mines. It is effective August 22, 1988. Applications for approval or extensions of approval submitted after August 22, 1989, shall meet the requirements of this part.

§ 7.42 **Definitions.**

The following definitions apply in this subpart:

Battery assembly. A unit or units consisting of cells and their electrical connections, assembled in a battery box or boxes with covers.

Battery box. The exterior sides, bottom, and connector receptacle compartment, if any, of a battery assembly, excluding internal partitions.

§ 7.43 **Application requirements.**

(a) An application for approval of a battery assembly shall contain sufficient information to document compliance with the technical requirements of this subpart and include a composite drawing with the following information:

- (1) Overall dimensions of the battery assembly, including the minimum distance from the underside of the cover to the top of the terminals and caps.
- (2) Composition and thicknesses of the battery box and cover.
- (3) Provision for securing covers.
- (4) Documentation of flame-resistance of insulating materials and cables.
- (5) Number, type, and rating of the battery cells.
- (6) Diagram of battery connections between cells and between battery boxes, except when connections be-

tween battery boxes are a part of the machine's electrical system.

(7) Total weight of the battery, charged and ready for service.

(8) Documentation of materials and configurations for battery cells, intercell connectors, filler caps, and battery top:

- (i) If nonmetallic cover designs are used with cover support blocks; or
 - (ii) If the cover comes into contact with any portion of the cells, caps, filler material, battery top, or intercell connectors during the impact test specified by § 7.46.
- (b) All drawings shall be titled, dated, numbered, and include the latest revision number.

[53 FR 23500, June 22, 1988, as amended at 60 FR 33723, June 29, 1995]

§ 7.44 **Technical requirements.**

(a)(1) Battery boxes and covers constructed of AISI 1010 hot rolled steel shall have the following minimum thicknesses based on the total weight of a unit of the battery assembly charged and ready for service:

Weight of battery unit	Minimum required thickness
1,000 lbs. maximum	10 gauge or 1/8" nominal
1,001 to 2,000 lbs	7 gauge or 3/16" nominal
2,001 to 4,500 lbs	3 gauge or 1/4" nominal
Over 4,500 lbs	0 gauge or 5/16" nominal

(2) Battery boxes not constructed of AISI 1010 hot rolled steel shall have at least the tensile strength and impact resistance of battery boxes for the same weight class, as listed in paragraph (a)(1) of this section.

(3) Battery box covers constructed of materials with less than the tensile strength and impact resistance of AISI 1010 hot rolled steel or constructed of nonmetallic materials shall meet the acceptable performance criteria for the impact test in § 7.46. Nonmetallic covers shall be used only in the battery assembly configuration in which they pass the impact test.

(4) Nonmetallic materials for boxes and covers shall—

- (i) Be accepted by MSHA as flame-resistant material under part 18 of this chapter; and
- (ii) Meet the acceptable performance criteria for the deflection temperature test in § 7.47.

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(b) All insulating material shall have a minimum resistance of 100 megohms at 500 volts d.c. and be accepted by MSHA as flame resistant under part 18 of this chapter.

(c) Battery box and cover insulating material shall meet the acceptable performance criteria for the acid resistance test in § 7.48.

(d) Covers shall be lined with insulating material permanently attached to the underside of the cover, unless the cover is constructed of insulating material.

(e) Covers, including those used over connector receptacle housings, shall be provided with a means of securing them in a closed position.

(f) Battery boxes shall be provided with vent openings to prevent the accumulation of flammable or toxic gases or vapors within the battery assembly. The size and location of openings shall prevent direct access to cell terminals and other uninsulated current carrying parts. The total minimum unobstructed cross-sectional area of the ventilation openings shall be no less than the value determined by the following formula:

$$\frac{(N)(R)}{950} = M$$

N = Number of cells in battery box.

R = Rated 6 hour battery capacity in ampere hours.

M = Total minimum ventilation area in square inches per battery box.

(g) Battery boxes shall have drainage holes to prevent accumulation of water or electrolyte.

(h) Battery cells shall be insulated from the battery box walls, partitions and bottom by insulating material, unless such part of the battery box is constructed of insulating material. Battery box wall insulating material shall extend to the top of the wall.

(i) Cell terminals shall be burned on, except that bolted connectors using two or more bolts may be used on end terminals.

(j) Battery connections shall be designed so that total battery potential is not available between adjacent cells.

(k) Cables within a battery box shall be accepted by MSHA as flame resistant under part 18 of this chapter or approved under subpart K of this part.

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The cables shall be protected against abrasion by insulation, location, clamping, or other effective means.

(l) When the battery plug and receptacle are not located on or within the battery box, strain on the battery terminals shall be prevented by a strain-relief device on the cable. Insulating material shall be placed between the strain-relief device and cable, unless the device is constructed of insulating material.

(m) At least a ½-inch air space shall be provided between the underside of the battery cover and the top of the battery, including the terminals and connectors.

[53 FR 23500, June 22, 1988, as amended at 57 FR 61220, Dec. 23, 1992]

§ 7.45 Critical characteristics

The following critical characteristics shall be inspected or tested on each battery assembly to which an approval marking is affixed:

- (a) Thickness of covers and boxes.
- (b) Application and resistance of insulating material.
- (c) Size and location of ventilation openings.
- (d) Method of cell terminations.
- (e) Strain relief devices for cables leaving boxes.
- (f) Type, location, and physical protection of cables.

§ 7.46 Impact test.

(a) *Test procedures.* (1) Prepare four covers for testing by conditioning two covers at -13 °F (-25 °C) and two covers at 122 °F (50 °C) for a period of 48 hours.

(2) Mount the covers on a battery box of the same design with which the covers are to be approved, including any support blocks, with the battery cells completely assembled. If used, support blocks must contact only the filler material or partitions between the individual cells. At the test temperature range of 65 °F -80 °F (18.3 °C-26.7 °C), apply a dynamic force of 200 ft. lbs. to the following areas using a hemispherical weight with a 6" maximum radius:

- (i) The center of the two largest unsupported areas;
- (ii) The areas above at least two support blocks, if used;