

*Pennsylvania Bureau of Mine Safety Equipment Specifications for Battery Powered  
Rubber Tire Personnel Carriers*

Prepared by: The BMS Equipment Task Force

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Revision: Final

**Purpose:**

This document specifies requirements for battery powered rubber-tire personnel carrier vehicles used underground in Pennsylvania Bituminous Mines. These requirements will apply only to new approvals submitted after the date signed.

**Basic Configuration:**

- Four-wheel rubber tire
- Battery powered
- Propulsion unit: Electric motor (AC or DC)
- Open type equipment (BOTE)

**Electrical and Controller System:**

- A motor control contactor shall be provided that will interrupt all current carrying motor supply conductors.
- UL listed internal or external motor overload protection.
- Controller must have a dead man function and/or self-centering/spring return throttle control
- A three (3) position direction switch: Forward-Off-Reverse shall be provided.
- All exposed conductors or cables shall be protected from mechanical damage by PA/MSHA approved conduit. Hose type conduit is acceptable. All power cables, primarily battery, motor and charging circuits shall be PA/MSHA or another listing agency approved cable. Non PA/MSHA approved cable must be enclosed in PA/MSHA approved conduit when exposed.

**Batteries:**

- The battery shall be protected by fuse or circuit breaker.
- Battery terminations shall be as recommended by the vehicle manufacturer.
- There shall be a visual indication the battery disconnect is closed. A light *or* clearly labeled switch shall be acceptable.
- A manual operated battery disconnect shall be provided. It must be located to prevent inadvertent or accidental disconnection. It shall be labelled "BATTERY DISCONNECT".
- Battery charging must inhibit vehicle movement.
- Battery compartment shall be of metal construction and lined with an approved and rated insulating material. It shall have provisions for drainage and ventilation. The compartment must provide clearance to prevent shorting of the battery terminals. Batteries must be secured to prevent movement.

**Braking Systems:**

The following systems shall be provided:

- A pedal actuated hydraulic or mechanically actuated primary service brake system shall be provided.
- When a hydraulic system is utilized it shall have a dual reservoir master cylinder with independent circuits

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- Vehicle shall be equipped with a park brake. The park brake shall be capable of holding a fully loaded vehicle at rest on a 15% grade. On vehicles with dual axle cable actuated primary service brakes these may serve dual service as the park brake.

-Regenerative and/or plug braking shall be provided. The controller shall have the ascending roll back protection enabled if available on the controller. This function will work in conjunction with, and supplemental to, the primary and park brake systems. If plug braking is utilized it will be designed to prevent automatic reversing of the vehicle. This function shall also be actuated by either an "EMERGENCY STOP" button or by a throttle pedal actuated switch/potentiometer. This system will not be required to bring the vehicle to a complete stop. This function shall be engaged when over-speed is detected.

Operational Requirements:

The controller shall prevent unintended vehicle motion if power is applied when any of the following conditions exist:

- Accelerator pedal is operated or any motion control is switch actuated.
- E-Stop is set
- Battery reconnected
- When the charger is connected

When a change of direction is requested the car must come to a full stop before changing direction and an intermediate operator control input made, i.e., cycling the directional switch to off/neutral, cycling the accelerator pedal or some other method.

-Placing the directional switch in Neutral (other than Forward or Reverse) shall allow regeneration to remain enabled.

General:

- Front and rear electric lighting shall be provided.
- Two (2) 10 lb. or one (1) 20 pound fire extinguisher(s) shall be provided. Automatic fire suppression shall be acceptable in lieu of extinguishers.
- Vehicles shall be provided with an audible warning device.
- Reflective materials shall be provided on the front, rear and sides
- The controller and electrical components shall be enclosed and have provisions for drainage and ventilation.
- The steering system shall be direct acting.
- A name plate with the PA Approval Number and load rating
- Guards or covers shall protect all rotating parts.

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*Submitted by the Task Force [Established by authority of ACT 55 Section 350 (d)]*

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