

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
APPROVAL AND CERTIFICATION CENTER
R.R. 1, Box 201B
Industrial Park Blvd.
Triadelphia, West Virginia 26059

June 8, 1979

TO ALL INTERESTED PARTIES:

The Approval and Certification Center recently conducted an analysis of haulage and machinery fatalities for the years 1966 through 1977. The analysis shows that improvement to the braking systems of rubber-tired, self-propelled, electric face equipment has the potential to reduce such fatalities.

Accordingly, the Approval and Certification Center established Technical Criteria by which braking systems installed on rubber-tired, self-propelled, equipment submitted for approval under Part 18 of Title 30, Code of Federal Regulations, will be evaluated. It is our intent that braking systems meeting these Criteria will satisfy the requirements of Section 18.20.

A copy of the Technical Criteria is attached for your information and comments.

We propose that all equipment manufactured or rebuilt after June 8, 1981, must be provided with braking systems meeting these Criteria to be considered as approved under Part 18.

Detailed administrative requirements and test procedures are being prepared. Copies of the administrative requirements and test procedures will be forwarded as soon as available.

Your written comments on the Technical Criteria are desired. Please send them to the Approval and Certification Center, Attention: John L. Dahle, Rural Route 1, Box 201B, Industrial Park Boulevard, Triadelphia, WV 26059. Thank you.

Sincerely

Stephen G. Sawyer
Chief, Approval and Certification Center

Enclosure

TECHNICAL CRITERIA
FOR
CERTIFICATION OF PERFORMANCE
OF
EMERGENCY BRAKES AND AUTOMATIC PARKING BRAKES
FOR
RUBBER-TIRED, SELF-PROPELLED
ELECTRIC UNDERGROUND
MINING EQUIPMENT

**Technical Criteria For Certification Of Performance Of
Emergency Brakes And Automatic Parking Brakes
For Rubber-Tired, Self-Propelled Electrical Underground
Mining Equipment**

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Technical Criteria For Certification Of Performance Of
Emergency Brakes And Automatic Parking Brakes
For Rubber-Tired, Self-Propelled Electrical Underground
Mining Equipment

I. SCOPE

This criteria applies to emergency brakes and automatic parking brakes on rubber-tired, self-propelled electric underground mining equipment which requires an approval under Part 18 of Title 30, Code of Federal Regulations, unless otherwise specified. The criteria established performance and design specifications and limitations.

The following are exceptions:

- a. Mining equipment which is operated solely on rail tracks is exempted from this criteria.
- b. Mining equipment which is designed to operate both on and off rail tracks shall comply with this criteria in the off track mode of operation.
- c. Mining equipment with a maximum speed of less than or equal to 2.5 miles per hour is not required to comply with the emergency brake criteria.

Unique braking systems which cannot be evaluated using this criteria will be evaluated on an individual basis.

II. DEFINITIONS

- Automatic Parking Brake - a brake system which will hold the stopped mining equipment in a stationary position on a grade specified in the criteria and includes all parts of the system to actuate the brake and brake parts, but excludes all drive line components between the brake friction material and the roadway surface.
- Average Deceleration - is equivalent to the instantaneous deceleration averaged over the time interval of the braking portion of the emergency stop. This time interval does not include system response time.
- Common Components - parts which perform functions in two or more of the brakes.
- Emergency Brake - a brake system used for stopping the mining equipment in an emergency and includes all parts of the system to actuate the brake

and brake parts, but excludes the panic bar and all drive line components between the brake friction material and the roadway surface.

- Fully Released - no contact (no normal forces) between the brake friction material and its mating surface (such as a brake disc).
- Mining Equipment - rubber-tired, self-propelled electric underground machines which are subject to approval under Part 18 of Title 30, Code of Federal Regulations, unless otherwise specified.
- Peak Deceleration - the maximum instantaneous pure deceleration during a stop.
- Service Brake - the primary brake system for stopping the mining equipment and includes all parts of the system to actuate the brake and brake parts, but excludes all drive line components between the brake friction material and the roadway surface.
- System Response Time - the time interval from the panic bar actuation to the time the brake hydraulic release pressure is less than 75 percent of the designed brake release pressure.

III. CRITERIA FOR EMERGENCY BRAKES

A. Performance of the Emergency Brake

1. The emergency brake shall provide system response time and deceleration as stated in paragraphs b and c below throughout the service life of the friction material without manual adjustments for both the loaded and empty conditions:
 - a. During an emergency brake stop, the average deceleration of the mining equipment should not exceed 0.55 G.
 - b. During an emergency brake stop, the average deceleration of the loaded (of applicable) mining equipment shall be g greater than or equal to .25 G at the end of the friction material service life.
 - c. Emergency brake system response time resulting from panic bar actuation shall be less than or equal to 0.3 seconds throughout the service life of the brake without manual adjustments.

B. Application of the Emergency Brake

1. The emergency brake shall function when the emergency deenergization device (ie. panic bar) required by 30CFR75.523 through 75.523.2 is actuated.
2. When the mining equipment is deenergized by an interruption of the power supply to the equipment, the emergency brake need not be automatically applied if service braking capability is available. However, if the emergency brake is automatically applied an inherent time lag greater than the required system response time must be incorporated into the system design to delay the automatic application.

C. Release of the Emergency Brake

1. Once applied the emergency brake shall be released by a distinctly separate action.
2. The emergency brake shall be designed to ensure that brake is fully released at all time while the mining equipment is being trammed or repositioned. A continuous pressure supply in excess of 150 percent of the designed brake release pressure constitutes fully released.
3. A means shall be provided to release the emergency brake from the operator's compartment to allow movement of the mining equipment without energization of the equipment. However, the emergency brake shall not be release unless immediate reapplication can be made from the operator's compartment.
4. For hydraulically released emergency brakes, the pressure required to fully release the brake shall be less than two-thirds the normal system pressure supplied.

D. Emergency Brake Friction Material

1. For disc type brakes sufficient friction material thickness shall be provided to ensure a minimum service life of 0.125 inches individual pad wear. The performance of the mining equipment shall be in compliance with paragraph A-1 throughout the service life of the friction material without manual adjustments for both the loaded and empty conditions.
2. A means shall be provided to audibly or visually indicate the end of the service life of the friction material and the need for replacement.
3. Brake systems incorporating designs other than disc type brakes will be evaluated on an individual basis regarding minimum service life.

E. Emergency Brake Stored Energy Devices

1. An emergency brake using stored energy devices other than a mechanical device for application of the brake shall be designed in such a way that the mining equipment cannot be trammed unless the stored energy device is fully charged.

IV. CRITERIA FOR AUTOMATIC PARKING BRAKES

A. Performance of the Automatic Parking Brake

1. The automatic parking brake shall hold the loaded (if applicable) mining equipment stationary on at least a 25 percent grade or up to the maximum grade for which the equipment is rated by the manufacturer if greater than 25 percent.
2. The automatic parking brake, while applied, shall hold the mining equipment stationary despite any contraction of the brake parts, exhaustion of any nonmechanical source of energy or leakage of any kind.

B. Application of the Automatic Parking Brake

1. The parking brake shall be applied automatically whenever the mining equipment has been stopped and the line side of the tram motor contactors has been deenergized by any means or the mining equipment has been stopped by panic bar actuation.
2. A means shall be provided to apply the automatic parking brake manually without deenergizing the mining equipment.

C. Release of the Automatic Parking Brake

1. Once applied, the automatic parking brake shall be released by a separate control which may only be used for manually applying and/or releasing the brake.
2. The automatic parking brake shall be designed to ensure the brake is fully released at all times while the mining equipment is being trammed or repositioned. A continuous pressure in excess of 1 50 percent of the designed brake release pressure constitutes fully released.
3. A means shall be provided to release the automatic parking brake from the operator's compartment to allow movement of the mining equipment without energization of the equipment. However, the automatic parking brake shall not be released unless immediate reapplication can be mad from the operator's compartment.

4. For hydraulically released parking brakes, the pressure required to fully release the brake shall be less than two-thirds the normal system pressure supplied.

V. CRITERIA FOR COMMON COMPONENTS

A. Performance of Common Components

1. The service brake, emergency brake, and automatic parking brake may use components which are common to any of the systems.
2. A failure of a common component shall not reduce the mining equipment peak deceleration below .20 G. This minimum peak deceleration can be attainable from application of either service brake, emergency brake, or automatic parking brake.