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PROGRAM INFORMATION BULLETIN NO. P06-17

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SUBJECT: Delayed Application of Spring Applied-Hydraulically Released Brakes; Rubber-Tired Diesel and Electric-Powered Equipment, Additional Information Related to Public Information Bulletin Number P06-04

Who needs this information?

Mine Safety and Health Administration (MSHA) personnel, underground coal mine operators, miners' representatives, diesel and electric-powered rubber-tired machine manufacturers, and repair shop facilities should have this information.

Why is MSHA issuing this bulletin?

This Program Information Bulletin (PIB) provides additional information related to PIB06-04. MSHA is issuing this PIB to explain practical methods to field test the brake engagement time of rubber-tired, self-propelled diesel or electric-powered machines that use spring applied-hydraulically released wet or caliper-disk brakes. PIB06-04 indicated a brake engagement time of 0.3 seconds is both practical and recommended for rubber-tired, self-propelled diesel or electric-powered machines that use spring applied-hydraulically released wet or caliper-disk brakes. Although a brake system engagement time of 0.3 seconds is still recommended, testing for an engagement time of 0.3 seconds requires special instrumentation and therefore is not practical for field testing equipment. This PIB has practical test methods for determining if a machine has a brake engagement time of 1 second or less. The results obtained by using these test methods can be used to determine if a machine should be removed from service for further testing and evaluation. This PIB also discusses modifications to reduce the brake engagement time.

Why is engagement time important?

The automatic emergency-parking brake and supplemental brake systems are required to safely bring the equipment to a complete stop in emergency situations and to hold the equipment stationary when parked. A delay in the brake engagement may create a hazard by allowing the equipment to drift unexpectedly while parked and would require an increased stopping distance.

How can the brake engagement time of a spring applied-hydraulically released brake system be checked?

All rubber-tired, self-propelled diesel and electric-powered equipment should be tested to ensure the brake engagement time is not excessive. The following test methods can be used to check the brake engagement time.

If the test methods reveal a brake engagement time greater than 1 second, the equipment should be removed from service for evaluation. Modifications to decrease the brake engagement time are discussed later in this PIB.

Note: The engagement time for these brake systems decrease as the hydraulic oil reaches normal operating temperature. If these test methods are used after the hydraulic oil reaches normal operating temperature and the results indicate an engagement close to exceeding the desired result, the equipment should be retested when the hydraulic oil is cold to ensure the brake engagement is still acceptable.

TEST NO. 1
TEST METHOD FOR EQUIPMENT WITH A PRESSURE GAUGE IN THE BRAKE RELEASE CIRCUIT

1. Use the service brake to park the machine on level ground.
2. Locate the pressure gauge in the brake release circuit.
3. While observing the pressure gauge, manually activate the brake control and check the time for the pressure to reach zero.
4. The pressure should reach zero within one second. A stop watch can be used or the operator can count to one thousand one to check if the engagement time exceeds 1 second.
5. For electric equipment, repeat the test by applying the brake using the panic bar.

TEST NO. 2
TEST METHOD FOR EQUIPMENT WITHOUT A PRESSURE GAUGE IN THE BRAKE RELEASE CIRCUIT
(Test Method No. 1 can be used by adding a pressure gauge to the brake release circuit)

1. Park the machine on a slope using the service brake.
2. Release the service brake.

3. If the machine starts to move the service brake can be reapplied and this location can be used to continue the test.
4. Apply the spring applied brake.
5. Release the service brake and if the machine stays in place the test can be continued. If the machine moves it must be removed for service for repair of the spring applied brake.
6. Apply the service brake.
7. Release the spring applied brake.
8. Activate the control for the spring applied brake, wait one second then release service brake. A stop watch can be used or the operator can count to one thousand one to determine when 1 second has passed.
9. The machine should not move.
10. For electric equipment, repeat the test by applying the brake using the panic bar.

MSHA's Approval and Certification Center can also assist in tests of the brake's engagement time. Contact Eugene Hennen at 304-547-2057 or Hennen.Eugene@dol.gov.

What modifications can be made to the brake system to reduce the brake engagement time?

One or more of these modifications may be necessary to achieve an acceptable brake engagement time. The necessary modifications may vary between different equipment models. Therefore, each model of rubber-tired, self-propelled diesel or electric-powered equipment should be tested.

- Increase the hose diameter. An increased hose diameter will allow a larger volume of hydraulic oil to escape the brake unit, which will decrease the engagement time of the brake.
- Decrease the viscosity of the hydraulic oil. A lower viscous hydraulic oil exhibits less resistance versus a higher viscous fluid. Therefore, a decrease in viscosity of the hydraulic oil will increase the flow rate of fluid through the hose.
- Use the shortest length of hose possible. The hydraulic oil will take less time to travel through a short hose versus a longer hose.
- Use valves with larger ports. Using valves with larger ports increases the flow rate though the valve.
- Use brake units that require less fluid for release. Using brake units with less volume decreases the time required for the hydraulic oil to flow from the brake unit.
- Use brake units with larger ports. Larger ports increase the flow rate of the hydraulic oil exiting the brake units.

Does the rapid brake engagement time apply to an engine shutdown or if the equipment deenergizes?

NO - For diesel equipment, a 5.0 second engagement time in Title 30 Code of Federal Regulations (30 CFR) 75.1909 (c) (1) is allowed for the automatic activation of the supplemental brake upon engine shutdown.

For electric equipment, a 5.0 second engagement time in 30 CFR 75.523-3 (b) (2) is allowed for the automatic activation of the emergency-parking brake when the equipment is deenergized by a means other than the panic bar.

What is the authority for this PIB?

The authority for this PIB is 30 CFR §§ 75.1907 (b) (3); 75.1909 (c) (3) and (d); and 75.523-3 (b) (1) and (d).

Who are the MSHA contact persons for this PIB?

Technical Support, Approval and Certification Center
Eugene Hennen, (304) 547-2057
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Coal Mine Safety and Health, Safety Division
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Is this PIB available on the internet?

This PIB may be viewed on the World Wide Web by accessing MSHA's home page at (http://www.msha.gov) and choosing "Compliance Info," and "Program Information Bulletins."

Who will receive this PIB?

Program Policy Manual Holders
Miners' Representatives
Underground Coal Mine Operators
Manufacturers of rubber-tired, self-propelled diesel or electric-powered equipment
Owners of rubber-tired, self-propelled diesel and electric-powered equipment
Special Interest Groups