



February 6, 2013

## **Chief Inspector's Directive Guideline for the Approval of Diesel-Powered Equipment for Use in Gassy Underground Mines in British Columbia**

### **Objective:**

To provide direction on the required standards for approval of the use of diesel equipment in gassy underground mines in British Columbia.

### **Background:**

Due to significant differences in requirements for diesel-powered equipment between the United States Department of Labour's Mine Safety and Health Administration (MSHA) and Canadian Standards Association (CSA) Group, Natural Resources Canada's CANMET Materials Technology Laboratory (MTL) will no longer certify machines and equipment for underground coal mine application. It will, however, continue to deliver its diesel-engine emissions certification program for equipment to be used in non-underground coal mines in Canada.

### **Requirement:**

Part 4.7.1(1) of the Health, Safety and Reclamation Code for Mines in British Columbia requires all diesel-powered equipment used in underground mines to comply with CSA Standard CAN/CSA-M424.1-88 (R2011), "Flameproof Non-Rail-Bound Diesel-Powered Machines for Use in Gassy Underground Coal Mines". The following passages taken directly from CANMET-MTL's "Equipment Approval Guide for Underground Coal Mining Equipment" [CERL Report 2009 19 (TR)] outline the full Canadian requirements for diesel-powered equipment:

#### ***Diesel Equipment for Underground Coal Mines***

*There are significant differences between the MSHA and Canadian requirements for diesel-powered equipment, some of the significant ones are listed below. The Canadian requirements are as stated in CSA standard CAN/CSA-M424-88, and the MSHA requirements are in 30CFR Part 36.*

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- *MSHA does not require an exhaust flame arrester if tests demonstrate that the exhaust cooling system can arrest and internal explosion, whereas the Canadian requirement is to have an exhaust flame arrester under all circumstances;*
- *Aluminum Components that could be subject to frictional impact are permitted by MSHA;*
- *A shutdown system is not required by MSHA, other than a scrubber low-water shutdown system, whereas the Canadian requirements include a more comprehensive shutdown system which monitors several key areas on the machine;*
- *Diesel exhaust emissions requirements differ to the extent that the MSHA test is not acceptable and dynamometer emissions testing to the Canadian requirements must be carried out. These tests are conducted by the Diesel Emissions Laboratory, part of NRCAN – CANMET Minerals and Metals Sciences Laboratories;*
- *MSHA does not have a requirement for a protective structure around the operator's compartment.*

*Because in this case there are significant differences, manufacturers of MSHA-compliant diesel-powered equipment are obliged to make extensive modifications to their Canada destined products, and required to submit engine packages to NRCAN for emissions testing at the NRCAN diesel test facility.*

*NRCAN will continue to deliver its diesel engine emissions certification program for non-underground-coal applications. This program, delivered by the NRCAN diesel emissions groups, operates under a different mandate and is not affected by the changes described in this document. This group does not certify machines or engines for underground coal application.*

The following steps shall be taken to ensure diesel-powered equipment for use in gassy underground mines in B.C. meets the standards of CAN/CSA M424.1-88:

1. The engine package shall meet all the requirements of permissible mobile diesel-powered transportation equipment as per MSHA 30 CFR Part 36. The certification plate(s) shall be clearly displayed on the engine package. (Please note, engines equipped with a power package must display three approval plates as per MSHA 30 CFR Part 7, Subpart E).
2. The engine package shall then be shipped to NRCAN to complete the Canadian emission testing.
3. All safety shutdown devices as required in CAN/CSA M424.1-88 Section 4.3.7 and listed in Table 1 (“Instrument, Warning and Shutdown Requirements”) shall be installed on the equipment and tested.

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4. Electrical components shall be sufficiently protected as per CAN/CSA M424.1-88 Section 4.4.1 and approved by NRCAN or MSHA as per Part 5.2.3(1) of the Health, Safety and Reclamation Code for Mines in British Columbia.
5. The lighting system shall be MSHA approved and bear the certification decal on the fixtures as per CAN/CSA M424.1-88 Section 4.3.1. (Please note, red and amber reflective, non-light-alloy material must be attached to both ends of the equipment).
6. The equipment shall meet the provision of CAN/CSA M424.1-88 Section 4.4.1.2 (“Restricted Use of Aluminum and Aluminum Alloys”).
7. The oil filler and oil dipstick shall be secured as per CAN/CSA M424.1-88 Section 4.4.5.3.
8. The MSHA allows for the surface temperature of the engine and other components of certified engine packages to reach to 400°F (245°C), but the Canadian requirements are different. As per CAN/CSA M424.1-88 Section 4.4.4(c), the maximum surface temperature of the engine at a full sustained load must not exceed 300°F (150°C).
9. Fire protection shall be installed as per CAN/CSA M424.1-88 Section 4.5, and fire suppression shall be installed as per CAN/CSA M424.1-88 Section 4.5.5.
10. As per CAN/CSA M424.1-88 Section 4.3.4, the driver’s control station shall be equipped with driver protection and a protective structure.
11. Emergency steering shall be installed as per CAN/CSA M424.1-88 Section 4.3.6.
12. All pressure vessels shall meet or exceed CSA Standard B51 as per CAN/CSA M424.1-88 Section 4.3.2.5.

Once diesel-powered equipment for use in a gassy underground mine is ready for delivery, the Inspector of Mines, Mechanical shall be notified, and a date will be set aside to inspect the equipment. The machine shall not be put in service until the inspector has verified that all components that affect explosion protection have been suitably assessed, and determined that the equipment is in compliance with the *Mines Act* and the Health, Safety and Reclamation Code for Mines in British Columbia.



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