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Standards update
CSA M424 Series on Underground Mobile Mining Equipment

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MDEC 2022

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CSA Group

- Established in 1919
- Independent organization
- A leader in standards research, development, education and advocacy
- 12 areas of focus
- +3,000 Standards and codes
- Over 10,000 dedicated members
- Accredited by SCC in Canada and ANSI in USA

Enhance the lives of Canadians through the advancement of standards in the public and private sectors

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Standards Development

Standards Development Process

- Set of steps and stages to support the development of a quality standard.
- Consensus principle.

Committee participation

- Volunteer members.
- Relevant stakeholder groups will be represented in the matrix.
- Committee size determined so all necessary interests are represented in a balanced fashion, yet effective functioning is possible.

Balanced Matrix

- Each category has a minimum and maximum number of voting members.
- Ensures all points of view are represented, and that the proportion is maintained.

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Worker and Public Safety Program

Areas of Focus in Occupational Health and Safety (OHS)

- **OHS Management Systems**
- **Occupational Diving**
- **OHS Nanotechnology**
- **Machinery and Equipment Safety**
  - Forestry
  - Mining
  - Robotics
  - Workplace Electrical Safety
- **Personal Protective Equipment**
- **Elevation Hazards**
- **Worker Wellness**

Areas of Focus in Public Safety

- **OHS Standards for Public Safety Personnel**
- **Transportation Safety**

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CSA M424 Underground Mining Equipment Series of Standards

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CSA OHS Mining Portfolio of Standards

- **CSA-M424.1-16** *Flameproof non-rail-bound diesel-powered machines for use in gassy underground coal mines*
- **CSA-M424.2-16** *Non-rail-bound diesel-powered machines for use in non-gassy underground mines*
- **M424.3-M90 (R2016**) *Braking performance rubber tired, self propelled underground mining machines*
- **M421-16 (R2021)** *Use of electricity in mines*
- **M422-14 (R2019)** *Fire-performance and antistatic requirements for conveyor belting*
- **M423-M87 (R2021)** *Fire-resistant hydraulic fluids*
- **M427-M91 (R2021)** *Fire-performance and antistatic requirements for ventilation materials*
- **M430-90 (R2021)** *Roof and rock bolts, and accessories*
- **G4-15 (R2020)** *Steel wire rope for general purpose and for mine hoisting and mine haulage*

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CSA M424 Underground Mining Equipment Series of standards

CURRENT STATE

- CSA M424.1 Flameproof non-rail-bound diesel-powered machines for use in gassy underground coal mines
- CSA M424.2 Non-rail-bound diesel-powered machines for use in non-gassy underground mines
- CSA M424.3 Braking Performance Rubber-Tired, Self-Propelled Underground Mining Machines

REVISED STRUCTURE

- CSA M424.0 Underground Mining Mobile Equipment – General Requirements
- CSA M424.1 Flameproof non-rail-bound diesel-powered machines for use in gassy underground coal mines
- CSA M424.2 Non-rail-bound diesel-powered machines for use in non-gassy underground mines
- CSA M424.3 Braking Performance Rubber-Tired, Self-Propelled Underground Mining Machines
- CSA M424.4 Non-rail-bound electrically-powered machines for use in non-gassy underground mines

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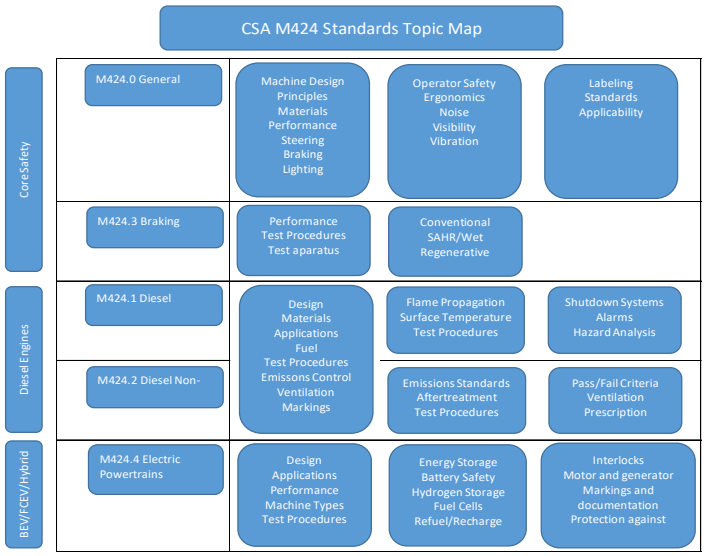
CSA M424 series of standards - Topic Map



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CSA M424 Series key updates

- **CSA-M424.0, *Underground mining mobile equipment – General requirements***
  - Adoption with Canadian deviations of ISO 19296:2018
  - Requirements common to a variety of underground mining mobile equipment Describes the technical aspects and procedures necessary for the design, performance, and testing of core design and safety requirements
  - Intended to be used in conjunction with the additional M424 suite of standards as applicable
- **CSA-M424.3, *Braking performance - Rubber-tired, self-propelled underground mining machines***
  - Maximum rated speed and rated gross mass limitation removed.
  - Service braking requirements added for hydrostatic drive systems, systems with combined brake and steering function, machines designed to tow trailers
  - Requirement for test report
  - New Annex on maximum force levels for braking system controls during performance tests
  - New Annex with calculated values for stopping distances

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CSA M424 Series key updates cont'd

- **CSA-M424.1, *Flameproof non-rail-bound diesel-powered machines for use in gassy underground coal mines***
  - Ignition hazard assessment introduced with Annex added for guidance
  - Compatibility with MSHA and ISO requirements
  - Generally applicable machine requirements removed/ retained only those that pertain to machines for gassy underground mines
  - Several types of flame arrester technologies allowed
- **CSA-M424.2, *Diesel-powered machines for use in non-gassy underground mines***
  - Scope expanded to include larger/ more varied diesel-powered machines
  - Non-engine related general machine safety requirements transferred to CSA M424.0
  - Engine emissions testing pass/fail criteria lowered to reflect modern technologies
  - EQI concept for ventilation rate determination removed
  - Ventilation rate determination for retrofit emission control devices enabled

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CSA M424 Series key updates cont'd

- **CSA-M424.4, *Self-propelled, electrically-driven, non-rail-bound, mobile machines for use in underground non-gassy mines***
  - Considers battery electric as the base system configuration
  - Hydrogen fuel-cell-electric and diesel-electric systems are also considered as on-board sources of electrical energy supply and addressed
  - Other energy storage technologies are also considered for application as possible sources for electric propulsion
  - Applies for on-board voltages 50 V-1.5 kV AC at any frequency and 75 V-2.1 kV DC
  - Voltages contained within on-board devices are not considered
  - Hazards relevant to the voltage range for underground mobile machines within its scope when the machinery is used as intended.
  - Specifies appropriate technical measures for eliminating or reducing risks arising from significant hazards during commissioning, operation, and maintenance

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CSA M424 Series status and application

- Current status
  - English publication – March 2022
  - French publication – August 2022
- Next steps – Research Projects
  - Addressing Gaps in M424.3 Brake Standard
  - Addressing Gaps in M424.0 Battery Handling
- Referenced in regulations
- CSA M424.0, CSA M424.1, M424.2 and M424.4 referenced in CanmetMINING engine approval program

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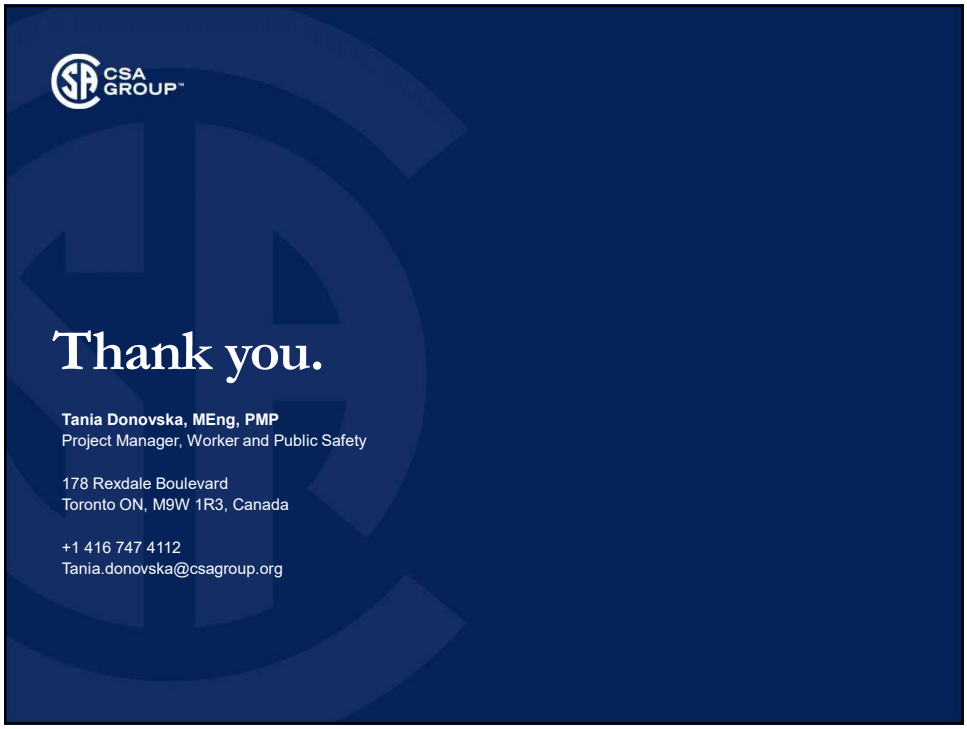
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Thank you.
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