

Note: This test is only applicable for canopies with hydraulic height adjustment where the support cylinders are required to elastically support the test load without pressure relief occurring.

- (4) Re-extend canopy to maximum height and apply horizontal test load (per 5.5 (2)) along the middle one third of the canopy edge directing the load away from the centreline of the machine. Apply the preload and record deflection measurements as in 6.2 (3) (a).
- (5) Repeat test 4 (per 6.2 (4) but with the load applied towards the centreline of the machine. This test is only necessary if there is a significant difference in the strength of the canopy supports between the two directions. Apply the preload and record deflection measurements as in 6.2 (3) (a).
- (6) Apply horizontal test load along the middle one third of the canopy edge directing the load from the rear to the front of the machine. Apply the preload and record deflection measurements as in 6.2 (3) (a).
- (7) For canopies fitted with rear hydraulic cylinders, the cylinder must not be the component that stops any upward movement that may occur i.e. a mechanical stop should prevent over extension of the canopy.
- (8) Repeat test 6 (per 6.2 (6) but with the load applied directed from the front to the back of the machine. This test is only necessary if there is a significant difference in the strength of the canopy supports between the two directions. Apply the preload and record deflection measurements as in 6.2 (3) (a).

7. Performance standards

7.1 Except as provided in paragraph 7.4, all canopies on continuous miners used in underground coal mines must be designed to meet the performance requirements of paragraphs 7.2-7.3

7.2 Canopy performance

When tested in accordance with the test method in 6.2, the residual deflection “B” must be less than 10% of the maximum deflection “A” measured with the load applied. That is: $(B/A) \times 100\%$ is less than 10%.

7.3 Welded joints

All welded joints must be non-destructively examined in accordance with AS/NZS 1554.1:2014.

7.4 Where a design does not comply, in full or part, with the performance requirements of paragraphs 7.2-7.3, the designer must specify the published technical standards or the engineering principles used to identify controls, in the order of the hierarchy of risk controls in Part 3.1 of the *Work Health and Safety Regulation 2017*, incorporated in the design to achieve at least an equivalent level of safety as the requirements of paragraphs 7.2-7.3.

[n2018-4334]

WORK HEALTH AND SAFETY (MINES AND PETROLEUM SITES) REGULATION 2014

Registration of Braking Systems on Plant Used in Underground Coal Mine Transport Design Order 2018

I, Leigh Nicholls, Chief Inspector, with the delegated authority of the Secretary, Department of Planning and Environment, in pursuance of clause 177(5) of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* (“the Regulation”) make the following Order.

Dated this 14th day of December 2018.

Leigh Nicholls
Chief Inspector
NSW Department of Planning and Environment (by delegation)

1. Name of Order

This Order is the *Registration of Braking Systems on Plant Used in Underground Coal Mine Transport Design Order 2018*.

2. Commencement

This Order commences on 21 December 2018.

3. Interpretation

In this Order:

Australian Standard or AS is a reference to a standard published by or on behalf of Standards Australia.

AS/NZS is a reference to Australian/New Zealand Standards.

ISO is a reference to International Organisation for Standardisation.

MDG is a reference to mining design guidelines produced by the NSW Government and published on the Department of Planning and Environment's Resources Regulator website.

Regulation means the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

braking system includes all components which combine to stop or hold the transport.

transport means mobile plant used for the purpose of transporting persons, materials, coal or stone, whether by carrying, towing or otherwise and includes:

- (a) a locomotive, or
- (b) a rubber tyred or tracked vehicle capable of having a maximum speed of more than 4kph and propelled by electrical and/or mechanical means.

4. Revocation

The *Registration of Braking Systems on Plant Used in Underground Transport Design Order 2015* published in the NSW Government Gazette No 52 of 26 June 2015 at pages 1844-1845 is revoked.

5. Design requirements

5.1. All braking systems must be designed to meet the design requirements of:

- (a) Section 1 of MDG 39 February 2001 *Handbook for approval assessment of transport braking systems on free-steered vehicles in underground coal mines*, as amended by "Amendments No. 1 – MDG 39 December 2006",

or

- (b) Section 3 of MDG 2, December 1991 *Design Guidelines for the Construction of Locomotives*, as applicable.

5.2. The design of the braking system must control all reasonably foreseeable unintended movement events.

5.3. Safety related functions, which keep the transport under control by use of braking systems, must be designed and assessed using the following functional safety standards, as amended from time to time:

- (a) application of performance levels in accordance with:
 - (i) AS/NZS 4024.1503:2014 *Safety of machinery – Safety-related parts of control systems – General principles for design*, or
 - (ii) ISO 13849-1:2015 *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*.
- (b) application of safety integrity levels in accordance with:
 - (i) AS 61508.1:2011 *Functional safety of electrical/electronic/programmable electronic safety-related systems – General requirements*, or
 - (ii) IEC 61508.1:2010 *Functional safety of electrical/electronic/programmable electronic safety-related systems – General requirements*, or
 - (iii) AS 62061-2006 *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*, or
 - (iv) IEC 62061:2015 *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

5.4. All safety related functions must be tested and validated in accordance with the applicable functional safety standard referred to at clauses 5.3 (a) and (b) above.

5.5. Components that do not form part of a safety related control function must be designed and analysed using failure modes effects analysis, fault tree analysis or other similar methods to determine:

- (a) all reasonably foreseeable failure modes and to verify that the required level of reliability has been achieved, and

- (b) lifecycle inspection, maintenance, test and discard requirements, as required for lifecycle functionality.

Consideration must be given to fatigue testing or analysis, where applicable.

6. Alternative design options

Where a design does not comply, in full or part, with a prescribed risk control detailed in the guidelines listed in paragraphs 5.1, the designer must specify the published technical standards, or the engineering principles used to achieve an equivalent level of safety as the design requirements in the guidelines. In demonstrating an equivalent level of safety, controls shall be identified in accordance with the hierarchy of risk controls in Part 3.1 of the *Work Health and Safety Regulation 2017*.

7. Performance and testing standards

Braking system performance, and the testing to validate the performance, must comply with the relevant requirements set out in the following guidelines, as amended from time to time.

- (a) Sections 1 and 3 of MDG 39, February 2001 *Handbook for approval assessment of transport braking systems on free-steered vehicles in underground coal mines*, as amended by “Amendments No. 1 – MDG 39 December 2006”,

or

- (b) Section 3 of the MDG 2, December 1991 *Design Guidelines for the Construction of Locomotives*.

[n2018-4335]