

OCCUPATIONAL HEALTH AND SAFETY ACT 2000**Notice under clause 112A of Occupational Health and Safety Regulation 2001****Requirements for design registration of canopies on continuous miners**

I, ROBERT REGAN, Chief Inspector under the *Coal Mine Health and Safety Act 2002*, pursuant to clause 112A of the *Occupational Health and Safety Regulation 2001* (the Regulation), by this notice, specify the requirements set out in the Schedule below as the requirements that must be met prior to canopies on continuous miners used in underground mines at a coal workplace (referred to in this notice as canopies) being registered under Subdivision 1 of Division 3 of Part 5.2 (as modified by Schedule 4A) of the Regulation.

Dated this 29th day of January 2007.

ROBERT REGAN

Chief Inspector

NSW Department of Primary Industries

(by delegation)

Schedule**1.0 DESIGN REQUIREMENTS**

Canopies must be designed by a qualified practicing structural or mechanical engineer who is registered on the National Professional Engineers Register (administered by Engineers Australia) or a qualified practicing engineer acceptable to the chief inspector and must be designed in accordance with the relevant Australian Standards, good engineering practice and the following requirements.

1.1 Definitions

For the purpose of these requirements, the following definitions apply:

Canopy roof means the platework and any associated bracing commonly utilised to provide protection above the driver's enclosure

Lateral edge means the edge of the canopy roof usually located at 90 degrees to the centreline running from the head to the tail of the continuous miner.

longitudinal edge means the edge of the canopy roof usually located parallel to the centreline defined above

Support includes the support legs and any associated steel work, other than the canopy roof, which interconnects the support legs.

Support leg means the vertical or near vertical member connecting the continuous miner chassis or driver's enclosure to the canopy roof

1.2 Conceptual Aspects

In the event of the canopy being subjected to a fall of roof which exceeds the elastic limit of the canopy design then yielding should be progressive and limited to the extent that the driver can safely remain within the operator compartment i.e. 1000mm minimum headroom space remains between the seat and canopy roof.

Note: Consideration should be given to suspending the driver's seat from the underside of the canopy roof.

It is acknowledged that there are practical limitations in the design of canopies. However, each canopy design together with the operator compartment should endeavour to provide an enclosure which will prevent driver injury in the event of a fall from the roof.

The canopy design should consider access into the operator compartment and the driver's visibility in all directions particularly to the driver's front and rear and as far as reasonably practical to the sides.

1.3 Canopy Design Material and Loading Criteria

1.3.1 Materials

All main load bearing components used in the construction of protective canopies must be in accordance with Standards Australia AS 4100:1998 '*Steel structures*' as amended or AS 3990:1993 '*Mechanical equipment – Steelwork*'.

1.3.2 Welding

All welding carried out during the construction of protective canopies must be in accordance with AS 1554.21:2004, '*Structural steel welding – Welding of steel structure*' and shall comply with Category SP welds.

All welded joints must be non-destructively examined in accordance with the above welding code.

There must be a minimum of four supports for the canopy roof.

It is preferred that the canopy roof be attached to the support legs by either bolted or welded-connections.

However, where pinned connections are used, maximum clearances must not exceed H7 and C9 to AS 1654.1:1995, '*ISO system of limits and fits*'.

The base of the canopy support legs must be securely bolted or welded to the main frame of the continuous miner or driver enclosure.

The canopy roof must be constructed by utilising a substantial one piece solid plate devoid of uneven structural protrusions above the roof line (including cable support structures etc).

The design of the canopy roof and seat should be such that when the driver leans slightly to the right, as is customary by many drivers, the driver's head remains underneath the canopy roof.

2.0 TESTING CRITERIA

Continuous miner canopy load testing shall be undertaken in the presence of an independent competent person.

2.1 Vertical Load Test

The protective canopy is required to have a minimum structural capacity to support elastically a static uniform load of 8.2 tonnes or a force equivalent to a static load of 105 kilopascals distributed uniformly over the greatest plan view area of the canopy roof, whichever is the lesser.

An acceptable method of test provides for the test load to be distributed within the middle ninth of the roof's plan view area.

2.2 Horizontal Load Test

The protective canopy is required to have a minimum structural capacity to support elastically a static uniform load of two (2) tonnes applied horizontally to the edge of the canopy roof.

An acceptable method of test provides for the test load to be distributed along the middle third of the longitudinal and lateral edge of the roof separately.

The horizontal loading must be applied in both the longitudinal and lateral directions separately and the results must be satisfactory in both directions.

2.3 Permanent Set

For all the load tests as per 2.1 and 2.2 above, the permanent set shall be less than 10% of the maximum deflection measured with the load applied.

A dial indicator is suitable for measurement of the maximum deflection and the permanent set caused by the application of the test load.

3.0 TEST DATA SHEET

CONTINUOUS MINER PROTECTIVE CANOPIES

Date.....

Organisation

Organisation Address

Test carried out at

Canopy for continuous miner type:

Model number

Drawing Number(s)

Manufacturer's stated strength (based on U.T.S.)

in vertical direction

in lateral horizontal direction

in longitudinal horizontal direction

Notes

1. A canopy will only be registered if it can elastically resist a minimum test load of 8.2 tonnes applied vertically and a minimum test load of 2.0 tonnes applied horizontally in both longitudinal and transverse directions independently.

2. Larger test loads should be considered by applicant where considered appropriate for conditions where canopy is to be used. The registration document will record the maximum load for which tests are successful.

3.1 Test Method

With canopy fully extended unless otherwise stated the following tests must be conducted:-

1. Apply vertical test load to middle ninth plan view area i.e. to one third span of width and length.

- a) For fixed type canopy apply preload of between 300-500 Kg to remove slack from joints, set dial indicator to zero then apply test load. Record deflection "A" under the test load and the residual deflection "B" on removal of the test load.

"B" divided by "A" must be less than 10% for the canopy to be satisfactory.

Note: It may be necessary to repeat this test or other tests in order to further eliminate any initial movement in pinned or bolted connections.

- b) For canopies initially supported by hydraulic cylinders measure pressure and load at hydraulic cylinders when full test load is applied then increase test load till cylinders yield, record yield pressure and load. Ensure that pressure relief system reseats when load is reduced i.e. reload a second time.

Note: If the yield testing of the hydraulics requires a load which is beyond the elastic limit of the canopy then separate bench testing of the hydraulics will be permitted.

With canopy lowered to its minimum height and oil removed from the support cylinders i.e. canopy resting on its mechanical stops apply test load and record deflections as for fixed canopy previously mentioned.

2. Re-extend canopy to maximum height and apply horizontal test load along the middle one third of the canopy edge directing the load away from the centreline of the machine.

Preload and deflection measurements are as in 1(a) above.

3. Repeat test 2 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 2 directions.

4. 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.

Preload and deflection are as in 1(a) above. For canopies fitted with rear hydraulic cylinders the cylinder should not be the item that stops any upward movement that may occur i.e. a mechanical stop should prevent over extension of the canopy.

5. Repeat test 4 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 2 directions.

Note: Test 1(b) above 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. Canopies having different philosophy of hydraulic system design will require an alternative test procedure. This procedure will be determined by the Senior Inspector of Mechanical Engineering Department of Primary Industries, Mine Safety upon request.

3.2 Test Results

Test **Remarks**1. *Vertical test*

test load (KN) | |

initial deflection "A" (mm) | |

residual deflection "B" (mm) | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

Additional Vertical test-hydraulic supported canopies

- test load (KN) | |

pressure in cylinders (kPa) | |

effective area of canopy cylinders mm² | |

calculated load on canopy cylinders (kN) | |

yield pressure on canopy cylinders (kPa) | |

calculated yield load on canopy cylinders (kN) | |

does relief system reseal | |

2. *Horizontal test away from machine centreline*

test load - (KN) | |

initial deflection "A" (mm) | |

residual deflection "B" (mm) | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

3. *Horizontal test towards machine centreline*

test load - (KN) | |

initial deflection "A" m.m. | |

residual deflection "B" m.m. | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

4. *Horizontal test towards front of machine*

test load - (KN) | |

initial deflection "A" m.m. | |

residual deflection "B" m.m. | |

 $\frac{B}{A} \times 100$ (%) | |

A | |

5. *Horizontal test towards rear of machine*

test load - (KN)		
initial deflection "A" m.m.		
residual deflection "B" m.m.		
$\frac{B}{A} \times 100$ (%)		
A		

6. Distance from underside of canopy in the vicinity of a man’s head to the top of the horizontal section of the drivers seat with the canopy in its lowest position (must be +lm).

Comments

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7. Welding specifications as per Design Guidelines.

Comments

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8. Spatial and other relevant requirements as per Design Guidelines.

Comments

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Note: Pass or fail must be nominated in remarks column for each test.

4.0 CERTIFICATION

The design and testing must be certified to comply with these requirements by a qualified structural or mechanical engineer who is registered on the National Professional Engineers Register (administered by Engineers Australia).

5.0 ASSESSMENT

The following documents must be provided for assessment with the application under clause 107 of the Regulation for registration of plant design:

- a) detailed manufacturing drawings and technical specifications signed by a qualified engineer,
- b) performance and testing certificate, and
- c) a certification document stating that the design complies with these requirements by a qualified engineer.