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# Mechanical Design Guideline for the Construction of Continuous Miners

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MDG 17

Produced by Mine Safety Operations Division,  
New South Wales Department of  
Primary Industries

May 1989



## NSW DEPARTMENT OF PRIMARY INDUSTRIES

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# **MECHANICAL DESIGN GUIDELINES FOR THE CONSTRUCTION OF CONTINUOUS MINERS**

Second Issue:- Date: 11th May, 1989  
File Reference: M86/0308

**NOTE** These guidelines supersede guidelines issued 13th February, 1987

## **1 SCOPE**

Clause 27(c) of the Coal Mines Regulation (Electrical-Underground Mines) Regulation 1984 requires that mobile apparatus to be operated at an underground coal mine shall be approved by the Chief Inspector.

Any caterpillar tracked self propelled continuous miner is required to be approved.

The following guidelines are intended to help continuous miner designers by indicating those parameters which will be considered in an approval assessment of the mechanical safety features.

The guidelines do not generally give quantitative information as it is not intended to restrict innovative design. Where specific values or test procedure information or even changed guidelines are required advice should be sought from Inspectors of Mechanical Engineering, Department of Minerals and Energy, Coal Mining Inspectorate and Engineering Branch.

Please note that these guidelines do not in any way negate the requirements of the Coal Mines Regulation Act 1982.

### **1.0 OPERATOR'S COMPARTMENT AND CONTROLS**

- 1.1 The driver's seat shall be designed and positioned to provide a comfortable position for the driver and adequate vision and space. Headroom to be adequate for a 95 percentile male wearing a safety helmet e.g. 1000 mm between seat and canopy roof.
- 1.2 The area directly below the operator's seat must be kept clear of all intrusive objects to ensure that the seat is free to travel to the compartment floor level if necessary.
- 1.3 The compartment shall be of sufficient size so as to ensure that under normal operating conditions no part of the driver shall protrude past the envelope of the compartment.

MECHANICAL DESIGN GUIDELINES FOR THE CONSTRUCTION OF CONTINUOUS MINERS

- 1.4 A "dead-man" control shall be provided for operation by the foot of the seated driver. This should only prevent tramming and apply brakes when released.

This control shall be designed to minimise the possibility of being defeated.

A time delay of approximately two (2) seconds shall be provided upon release of the "dead-man" control before operation occurs.

- 1.5 An emergency stop switch shall be provided to cut the power from all functions of the miner.

In addition an additional emergency stop switch shall be provided on the side opposite the operator to de-energise the traction and cutter drives.

- 1.6 Means shall be provided for operation of a manually initiated audible warning device.

- 1.7 Provision shall be made to connect an external supply of air to the driver's compartment in the case of an emergency situation. e.g. the continuous miner is buried by a roof fall, whereby the driver is trapped in the compartment.

This may be achieved by utilising the continuous miner's water supply line. The valve or other means whereby the driver can access the Emergency air supply shall be accessible to the driver's hand from the normal seated position. The means of obtaining emergency air shall be suitably marked.

- 1.8 Controls shall be so located that they are within comfortable reach of the driver from his seat.

- 1.9 Provision shall be made within or adjacent to the compartment for the installation of an approved fire extinguisher having a minimum SAA rating of 80B:E.

- 1.10 The operating controls shall be clearly marked to show their function and the preferred direction of movement is as specified below:-

<u>FUNCTION</u>	<u>DIRECTION</u>
EMERGENCY STOP	Push (large red button)
ON	Down, right, forward, clockwise, pull (push/pull type switch)
OFF	Up, left, backward, anti-clockwise, push
RIGHT	Clockwise, right
LEFT	Anti-clockwise, left
FORWARD	Forward, down
REVERSE	Backward, UP
RAISE	Up, back
LOWER	Down, forward

RETRACT	Up, backwards, pull
EXTEND	Down, forward, push
INCREASE	Forward, away, right, clockwise
DECREASE	Backward, toward, left, anti-clockwise
OPEN VALVE	Anti-clockwise
CLOSE VALVE	Clockwise

- 1.11 Provision shall be made to protect the operator from injury likely to be caused by spillage falling from the conveyor into the operator's compartment.
- 1.12 All operating controls for systems powered hydraulically shall be designed to automatically return to the OFF position on loss of pressure. This is to avoid inadvertent start-up when the electrical power supply to the continuous miner is energised.
- 1.13 The compartment shall be equipped with a protective canopy of an approved type designed to protect the driver from a fall of coal or stone, or both, from above the vehicle.

Note: Specific requirements for canopy design, minimum load capability and test procedure are attached as Appendix I - "Mechanical Design Guidelines for the Construction of Continuous Miner Protective Canopies" dated 8th May, 1989.

## 2.0 **BRAKES**

If the continuous miner is to be operated primarily on level gradients traction braking is optional, however the approval will be limited accordingly. It is acknowledged that the design of a continuous miner may incorporate traction braking for the purpose of assisting the miner's cutting capability.

The following requirements for traction drive braking systems are specifically confined to mechanical systems and are additional to any alternative methods of braking.

- 2.1 Each traction drive assembly shall be fitted with an oil immersed multidisc, spring applied brake.
- 2.2 The brake system shall be fail safe.
- 2.3 The brake system shall be interlocked to ensure that traction cannot be energised with brakes applied.

NOTE An emergency override of this interlock requirement may be permitted provided its inclusion is justified and that it is not convenient to use it during normal cutting operations.

- 2.4 The "dead-man" control (refer to Clause 1.4) shall apply the brake(s) as part of its operation.

- 2.5 The brake (s) shall be capable of bringing the continuous miner to a controlled stop with the miner travelling at maximum speed down a 1:3 grade.

3.0 **NOISE**

Noise level at the position of the driver's head during normal underground operation of the miner should not exceed 85dB(A), for normal exposure.

4.0 **HYDRAULIC SYSTEMS**

- 4.1 Flexible pipes shall be compatible with the hydraulic fluid used and the maximum system pressure and temperature.
- 4.2 Hydraulic hose shall comply with provisions of AS B226-1972 Hydraulic Hose particularly in relation to the burst to working pressure ratio of 4:1 for hose and fitting assembly and the flame test requirements of the U.S.A Code of Federal Regulations Title 30 Part 18 Section 18.65.
- 4.3 Where a hydraulic system incorporates an accumulator the attachment to the accumulator shall be via a fitting which does not include a tube section.
- 4.4 A notice shall be provided on all continuous miners with the hydraulic system under accumulator pressures requiring that the pressure be released before working on the equipment.
- 4.5 Pressure vessels in excess of 0.03 cubic metre capacity shall comply with the requirements of AS1210-1982 - Unfired Pressure Vessels.
- 4.6 All hydraulic fluid reservoirs shall be fitted with self-locking filler caps.
- 4.7 Cutter and discharge conveyor booms raised and lowered by hydraulic power shall be fitted with a device which will hold the boom stationary should a loss of hydraulic pressure occur.

A typical device fitted directly to hydraulic lift cylinders is called a load locking valve.

It is preferred that these devices be fitted directly to the cylinders. If this is not feasible the connection between the device and the cylinder shall be made with steel pipe.

In all respects the device shall comply with the requirements of the Mine Safety and Health Administration of the U.S. Department of Labour issued on 17th October, 1980 attached as Appendix II.

5.0 **GENERAL**

5.1 No external surface shall exceed a temperature of 150 degrees C under any condition of continuous miner usage, e.g. hydraulic pumps, motors, gearboxes, clutch housings, etc.

5.2 Mechanical stops shall be provided for the cutter and discharge conveyor booms to enable safe access under the booms when maintenance is required. The stops shall be capable of being installed without requiring access beneath the boom.

The mechanical stops shall be stored on the continuous miner and be easily accessible. Notices shall be provided stating that stops shall be used to support booms prior to access.

5.3 Exposed aluminium or light metal alloys shall not be permitted in the construction of the continuous miner.

For specific guidelines refer Appendix III.

5.4 The continuous miner shall so far as practicable, be constructed of nonflammable material.

5.5 Lights shall be fitted to the continuous miner. The number of lights and their location shall be so as to provide sufficient illumination under all conditions of continuous miner operation.

5.6 Reflective medium shall be provided at each end and sides of the continuous miner.

5.7 An automatic reversing alarm shall be provided to warn workmen nearby when the miner is being trammed in reverse.

5.8 Provision should be made for storage of "Danger Tags."

5.9 Safe access shall be provided to the top of the miner for the purpose of erecting roof supports. This shall include steps and handgrips on both sides of the machine and suitable areas of non-slip material on top of the machine.

5.10 All water supplied to the miner shall pass through an effective reverse flush filter mounted on the miner as specified by the Joint Coal Board.

5.11 Where there is a requirement for personnel other than the driver to work on or adjacent to the continuous miner e.g. for the purpose of erecting roof supports or operating ancillary equipment mounted on the continuous miner, and where an unacceptable risk to their safety can be identified then appropriate interlocks shall be provided for the protection of personnel, e.g. isolation of conveyor and/or cutting head drives whilst roof bolting is in progress.

## APPENDIX I

### MECHANICAL DESIGN GUIDELINES FOR THE CONSTRUCTION OF CONTINUOUS MINER PROTECTIVE CANOPIES

Issue Date: 24th May, 1989

#### SCOPE

Clause 32(1) of the Coal Mines Regulation (Mechanical-Underground Mines) Regulation, 1984 requires that all continuous mining machines operating at the mine and designed to carry a driver shall be equipped with a protective canopy of an approved type.

The following guidelines are intended to assist continuous miner canopy designers by indicating those parameters which will be considered in an approval assessment of the protective canopy.

The guidelines do not generally give quantitative information as it is not intended to restrict innovative design.

Where specific values or tests procedure information, or even changes to the guidelines are required advice should be sought from Inspectors of Mechanical Engineering, Coal Mining Inspectorate of the Department of Mineral Resources.

#### BACKGROUND

The installation of approved protective canopies on continuous miners was made mandatory in 1979 under General Rule 49, Section 54 of the Coal Mines Regulation Act, 1912.

The requirements for approval which have been applied since the inception of canopies were adopted from the U.S. Bureau of Mines. Basically the canopy had to be capable of elastically withstanding a vertical load of 8.2 tonnes applied to the canopy roof. It is to be noted that the ultimate strength of the canopy to withstand vertical loading had not been incorporated in the assessment of canopies submitted for approval.

From a review of damage to canopies as a result of roof falls it has been verified that the criteria of an 8.2 tonne load test provides for canopy designs that will allow protection to a practical degree. The review however established that resistance against side loading was warranted. The design criteria for canopies now includes in these guidelines provision for the additional evaluation of the design to elastically withstand a side load of 2.0 tonne applied both laterally and longitudinally.



INTERPRETATION

In these guidelines, except in so far as the context or subject matter otherwise indicates or requires -

- |                     |  |
|---------------------|--|
| "canopy roof"       | includes the platework and any associated bracing commonly utilised to provide protection above the driver's enclosure.                        |
| "lateral edge"      | defines 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" | defines 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"       | is the vertical or near vertical member connecting the continuous miner chassis or driver's enclosure to the canopy roof.                      |

1.0 **CONCEPTUAL ASPECTS**

- 1.1 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.

- 1.2 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.
- 1.3 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.

## 2.0 **CANOPY DESIGN MATERIAL AND LOADING CRITERIA**

### 2.1 Materials

All main load bearing components used in the construction of protective canopies shall be in accordance with Standards Australia AS1250 - Steel Structures Code.

### 2.2 Welding

2.2.1 All welding carried out during the construction of protective canopies shall be in accordance with Standards Australia AS1554-Part 1 - Structural Welding Code for Weld Category SP.

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

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

2.4 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 shall not exceed Standards Australia AS1654-H7 and C9.

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

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

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

### 3.0 **TESTING CRITERIA**

All types of continuous miner canopy shall be load tested either in the presence of an Inspector of Mechanical Engineering of the Coal Mining Inspectorate or by a N.A.T.A. Laboratory registered for the tests specified under this section.

#### 3.1 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.

#### 3.2 Horizontal Load Test

The protective canopy is required to have a minimum structural capacity to support elastically a static uniform load of 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.

#### 3.3 Test Criteria

For all the load tests as per 3.1 and 3.2 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.

L.J. Roberts  
Senior Inspector of Mechanical Engineering

APPENDIX 2

MECHANICAL DESIGN GUIDELINES FOR HYDRAULIC VALVES  
ON CONTINUOUS MINERS AND LOADING MACHINES

Issue Date:. 26th May, 1989  
File Reference:. M81/198

NOTE This is an extract of the Mine Safety and Health Administration of the U.S. Department of Labour issued on 17th October, 1980

**SCOPE**

All hydraulic cylinders used to elevate cutting heads and conveyor booms on loading machines and continuous mining machines shall be equipped with hydraulic load locking valves meeting this criteria.

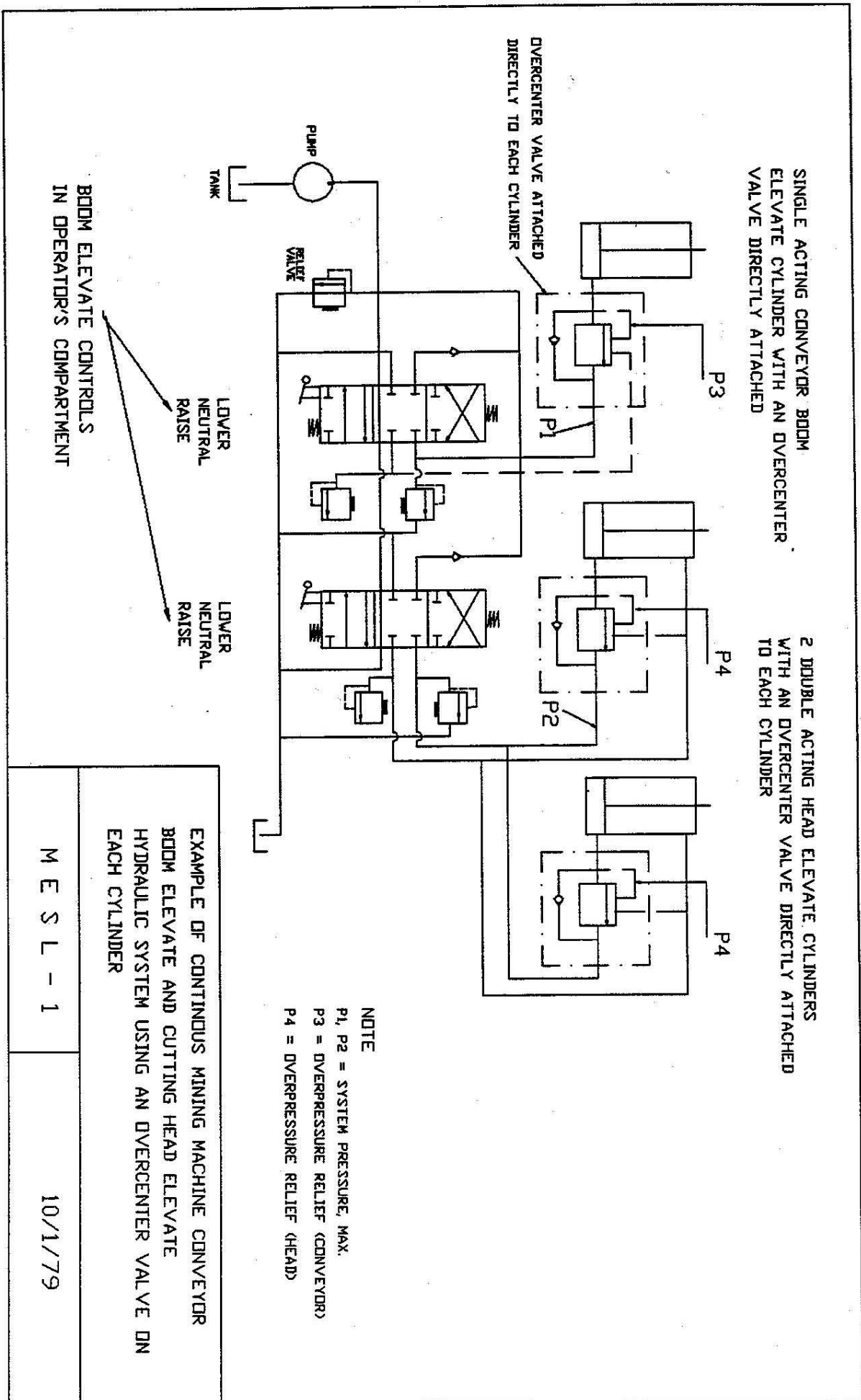
**REQUIREMENTS**

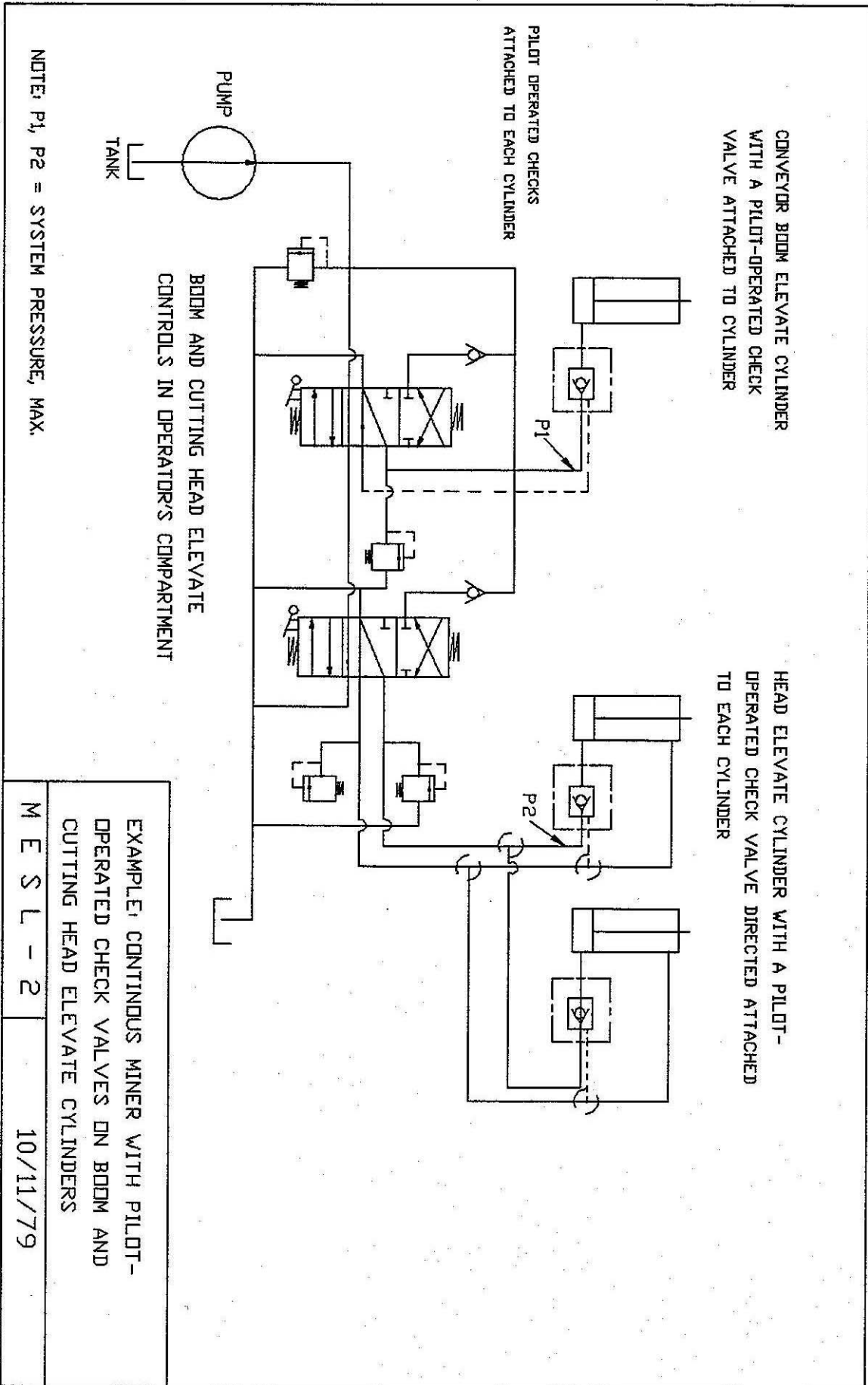
The hydraulic cylinder assemblies which elevate conveyor and cutting head shall be equipped with load locking valves to prevent unintentional fall of the boom or cutting head in the event of hydraulic circuit failure. If the boom or cutting head is elevated by more than one cylinder, each cylinder shall be equipped with a load locking valve capable of holding the boom or cutting head in position.

Each cylinder load locking valve must meet the following requirements:

1. The load locking valve must be attached directly to the cylinder port that is subject to the hydraulic pressure induced by the weight of the boom or cutting head.
2. The rated working pressure of the load locking valve must be greater than the system operating pressure.
3. If the load locking valve has overpressure relief capability, the pressure needed to support the static weight of the boom.
4. If the load locking valve is pilot operated, the hydraulic system shall ensure that the residual pilot pressure will not hold the load locking valve open when the control valve (located in the operator's compartment) is in the neutral position.

L.J. Roberts  
Senior Inspector of Mechanical Engineering





APPENDIX 3

**INDUSTRY GUIDELINES FOR THE USE OF ALUMINIUM UNDERGROUND**

**COAL MINES REGULATION ACT, 1982**

**Issue Date:.** 26th May, 1989

**File Reference:.** M84/5001

The prohibition on use of aluminium and light metal alloys in underground coal mines is covered under Clause 39 of "Coal Mines Regulation (Mechanical-Underground Mines) Regulation, 1984."

This clause is as follows:

(1) The Manager of a mine shall ensure that no aluminium or light metal alloy as specified shall be used on the external parts of any machinery, equipment or other item underground at the mine.

(2) Notwithstanding subclause (1), aluminium or light metal alloys may be used where it is determined by the Chief Inspector that there is no reasonable alternative to such use and such use has been approved."

A copy of the Notice of Specification No. 845001 covering Aluminium and Light Metal Alloys as published in the Government Gazette No. 86 of 1st June 1984 is attached.

In relation to Clause 39(2) the following guidelines shall be applied, for the use of aluminium and light metal alloys in underground coal mines.

1. Aluminium or light metal alloy is not permitted where a reasonable alternative can be found. An applicant to use aluminium or light metal alloy must first demonstrate "no reasonable alternative".
2. Where no reasonable alternative exists:-
  - (a) for apparatus of a portable nature, normally kept in possession of a person, then this apparatus may be approved to be taken and used underground subject to being protected or enclosed other than during actual use, so as to prevent contact with other metal

- (b) for other apparatus, approval may be given provided that the aluminium or light metal alloy is covered by an approved metal spray coating and is protected by a substantial guard, so arranged e.g. by the use of limit switches that the guard must be in place for the equipment to carry out its function
- (c) and (a) or (b) cannot be applied e.g. diesel engine fuel pump, then approval may be given for installations in which the component is well protected by reason of its location in the apparatus.

L.J. Roberts  
Senior Inspector of Mechanical Engineering

Department of Industrial Relations  
Sydney, 3rd May, 1984

**COAL MINES ACT, 1982-  
NOTICE OF SPECIFICATION**

Specification: 845001  
File No.: 84-5001

**ALUMINIUM AND LIGHT METAL ALLOYS**

IT is hereby notified that the Chief Inspector of Coal Mines, for the purposes of the Regulation cited as the "Coal Mines Regulation (Mechanical-Underground Mines) Regulation 1984" under the Coal Mines Regulation Act, 1982, has specified that the material described below is aluminium or light metal alloy for the purposes of clause 39 of the Regulation.

Any metal or alloy which includes Aluminium and/or magnesium and/or titanium in which the total content of these three constituents exceed 15 per cent by weight but in any case in which the content of magnesium and titanium together exceeds 6 per cent by weight.

M.J. MUIR, Chief Inspector of Coal Mines



Our reference: M86/308

Your reference:

For further  
information ring: L.J. Roberts

17th May, 1990

Telephone: (02) 901 8550  
Fax No.: (02) 901 8584

Dear Sir,

**RE: REMOTE CONTROL OF CONTINUOUS MINERS**

The Coal Mining Inspectorate has recently been involved in the approval of the installation of radio systems on continuous miners to provide for remote control operation of these machines.

It has become apparent that differing criteria have been utilised for the introduction of this type of technology on machines currently being modified for various coal mines by equipment manufacturers. The different philosophies encountered have varied from complete radio remote control only to provision of dual operation systems comprising remote and conventional manual control systems.

Consequently it is considered necessary to specifically identify some of the issues which should be considered in the introduction of remote control.

The issues involved are as follows:-

1. Systems for control of the operation of continuous miners which are required to be duplicated i.e. retention of the existing manual controls with the installation of a radio remote control should be provided with the following features:-
  - (a) The selection of either mode of control shall be designed with an effective interlock to prevent the inadvertent operation of any controls associated with the unselected mode.
  - (b) Visual indication shall be provided at each mode of control to indicate which mode has been selected.
  - (c) A single means of isolating both modes of control shall be provided.

2. The Mechanical Design Guidelines for the Construction of Continuous Miners issued on 11th May, 1989 do not specifically relate to remote controlled machines. Consequently the guidelines should be reviewed to ascertain if any alterations or additions to the mechanical safety features should be considered with operation by remote control e.g. installation of an additional emergency stop switch on the driver side of the machine to duplicate the switch nominated in Section 1.5 to deenergise the traction and cutter drives.
3. The requirements for remote control systems incorporated in Section 5 of AS2595.1 - 1985: "Electrical Equipment for Coal Mines - Electrical Requirements for Underground Mining Machines and Accessories - Part 1 - EQUIPMENT FOR USE IN EXPLOSIVE ATMOSPHERES" should be complied with.

All continuous miners fitted with remote control delivered to mines after 1st July, 1990 shall be in accordance with these requirements where applicable.

Yours faithfully,

L.J. Roberts  
Senior Inspector of Mechanical Engineering

File Ref.  
Approval No.:

**TEST DATA SHEET  
CONTINUOUS MINER PROTECTIVE CANOPIES**

Date.....

Mine or Company .....

Mine or Company Address .....

.....

Test Carried out at .....

Canopy for continuous miner type: .....

..... model number .....

Drawing Number .....

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

in lateral horizontal direction .....

in longitudinal horizontal direction .....

- Note
1. A canopy will only be approved 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 approval document will record the maximum load for which tests are successful.

Test Method

With canopy fully extended unless otherwise stated the following tests shall 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) 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 Inspectorate of Mechanical Engineering upon request.

**Test Results**

	<u>Test</u>	<u>Remarks</u>
1. <u>Vertical test</u> - test load (KN) initial deflection "A" (mm) residual deflection "B" (mm) $\frac{B}{A} \times 100$ (%) A		
<u>Additional Vertical test-hydraulic supported canopies</u>		
- test load (KN) pressure in cylinders (kPa) effective area of canopy cylinders mm <sup>2</sup> calculated load on canopy cylinders (kN) yield pressure on canopy cylinders (kPa) calculated yield load on canopy cylinders (kN) does relief system reset		
2. <u>Horizontal test away from machine centreline</u> test load - (KN) initial deflection "A" (mm) residual deflection "B" (mm) $\frac{B}{A} \times 100$ (%) A		
3. <u>Horizontal test towards machine centreline</u> test load - (KN) initial deflection "A" m.m. residual deflection "B" m.m. $\frac{B}{A} \times 100$ (%) A		
4. <u>Horizontal test towards front of machine</u> test load - (KN) initial deflection "A" m.m. residual deflection "B" m.m. $\frac{B}{A} \times 100$ (%) A		
5. <u>Horizontal test towards rear of machine</u> 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 mans head to the top of the horizontal section of the drivers seat with the canopy in its lowest position (must be +1m)		
7. Welding specifications as per Design Guidelines <b>comment</b>		
8. Spatial and other relevant requirements as per Design Guidelines. <b>comment</b>		

NOTE pass or fail must be nominated in remarks column for each test.

Tests may be carried out by a NATA Registered Testing Laboratory or alternatively witnessed by an Inspector of Mechanical Engineering from the Coal Mining Inspectorate and Engineering Branch.

Name and Number of NATA registered testing laboratory

Signed: Authorised NATA signatory

OR

-----  
Signed:

Inspector of Mechanical Engineering

Date:

-----  
Approval recommended: YES/NO

Signed:

Inspector of Mechanical Engineering

Date:

revised 6th March, 1990  
Guideline reference No M86/308/152