







## NOTES

Australian Standard™

**Underground mining—Shaft equipment**  
**Part 3: Drum winding gripper systems**

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## PREFACE

This Standard was prepared by the Standards Australia Committee ME-018, Mining Equipment, to supersede AS 3785.3—1990.

The objective of this Standard is to provide requirements for the safe application of gripper systems used in vertical mine shafts where timber conveyance guides and drum winders are used.

This Standard is Part 3 in a series of Standards on shaft equipment for underground mines, as follows:

AS 3785    Underground mining—Shaft equipment

AS 3785.1    Part 1: Drilling and hoisting equipment

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## FOREWORD

Gripper systems are used in vertical hoisting installations that incorporate a drum winder and timber guides.

A gripper system is designed to engage on the guides and support the conveyance when either—

- (a) the conveyance is unintentionally impeded while descending; or
- (b) the hoist rope or suspension equipment fails while the conveyance is ascending.

In either case the grippers will engage with the guides at relatively low speeds.

The design and testing of the gripper system may be subject to the review of the relevant statutory authority.



**STANDARDS AUSTRALIA****Australian Standard****Underground mining—Shaft equipment****Part 3: Drum winding gripper systems****1 SCOPE**

This Standard specifies requirements for gripper systems fitted to conveyances used in vertical mine shafts that have timber conveyance guides and drum winders.

This Standard does not apply to the following:

- (a) Vertical shaft friction winding installations.
- (b) Vertical mine shafts that have steel conveyance guides or rope guides.

**NOTES:**

- 1 Guidelines on information to be provided by the purchaser are given in Appendix A.
- 2 Guidelines on information to be provided by the supplier are given in Appendix B.

**2 REFERENCED DOCUMENTS**

The following document is referred to in this Standard:

AS

3785 Underground mining—Shaft equipment

3785.6 Part 6: Guides and rubbing ropes for conveyances

**3 DEFINITIONS**

For the purpose of this Standard, the definitions below apply.

**3.1 Conveyance**

Any car, carriage, cage, skip, kibble or stage in which persons, minerals, or materials are wound through a shaft or any counterweight.

**3.2 Dead load**

The load due to the mass of all permanent conveyance structures, ropes and attachments.

**3.3 Gripper system**

A mechanism that is mounted on a conveyance and which is designed to engage with the timber guides in response to a loss of hoist rope tension.

**3.4 Guides**

Structural timber members arranged and secured in a shaft to limit lateral movement of the conveyance.

**3.5 Shall**

Indicates that a statement is mandatory.

**3.6 Should**

Indicates a recommendation.

### **3.7 Statutory authority**

An authority having statutory powers to review mine hoisting installations in the State or Territory within the Commonwealth of Australia.

### **3.8 Working load limit**

The maximum static load permitted to be carried by the conveyance suspension equipment.

## **4 MATERIALS**

The materials selected for the manufacture of the gripper system components shall have appropriate impact properties at the lowest expected temperatures of the operating environment. Consideration should also be given to environmental conditions existing in the shaft.

NOTE: For the specifications of the timber guides, see AS 3785.6.

## **5 DESIGN**

### **5.1 Design criteria**

The gripper system shall be designed to—

- (a) remain in the disengaged position under normal hoisting conditions and emergency stops;
- (b) effectively grip the guides and support the conveyance following an abnormal hoisting event that causes the hoist rope to slacken; and
- (c) automatically disengage when tension is restored to the hoist rope.

### **5.2 Loads**

The gripper system shall fulfil the design criteria for the following extremes of loading:

- (a) Dead load.
- (b) Working load limit.
- (c) Dynamic loads due to action of grippers.

### **5.3 Guide tolerances**

The gripper system shall be designed to operate within the wear limits appropriate for the timber guides.

NOTE: For the specification of the timber guides see AS 3785.6.

### **5.4 Stability**

The gripper systems shall be positioned to ensure stability of the conveyance during its operation.

### **5.5 Energy-absorbing device**

Energy absorption devices may be required to be provided within the gripper system to ensure that impact loads fall within the design criteria for the extremes of loading (see Clause 5.2).

### **5.6 Release**

A method shall be provided for releasing the conveyance from a gripper system following its operation.



## 6 TESTING

### 6.1 General

Each new type of gripper system shall be subjected to the type test specified in Clause 6.2, and each component of every gripper system shall be subjected to the component test specified in Clause 6.3.

### 6.2 Type test

#### 6.2.1 Purpose

The type test is intended to ensure that each type of gripper system will act in conjunction with the timber guides to stop and safely support the conveyance in response to a loss of hoist rope tension.

#### 6.2.2 Procedure

A gripper system shall be type tested by free-fall testing using timber guides of the specified material and with the minimum cross-section dimensions, and drop weights equal in mass to—

- (a) dead load; and
- (b) working load limit.

For each of the above drop weights, the gripper system shall be attached to the drop weight in the same manner as it would be attached to the conveyance. The assembly shall then be suspended within timber guides using the same attachment point as would be used to suspend the conveyance.

A suitable quick-release mechanism of adequate capacity shall be incorporated above the gripper/drop weight assembly being tested. This release mechanism shall be released and, for each drop weight, the distance through which it falls as the gripper system engages the guides and stops the drop weight shall be recorded.

### 6.3 Component test

#### 6.3.1 Purpose

The component test is intended to ensure that each component of every gripper system is free from defects that could significantly affect its mechanical properties and performance.

#### 6.3.2 Procedure

Each component of every gripper system shall be subjected to non-destructive test procedures and other tests as appropriate.

## 7 TEST CERTIFICATES

### 7.1 Certificates required

The following certificates shall be provided with each gripper system:

- (a) A type test certificate for the gripper system.
- (b) Component certificates for each component of the gripper system.

Each certificate shall bear the name and address of the manufacturer, the date of test and the name, qualification, and status of the signatory of the testing organization. A copy of each certificate shall be retained by the manufacturer and the supplier.

## **7.2 Type test certificate**

The type test certificate shall state the following:

- (a) Type of equipment.
- (b) Test procedure.
- (c) Results of tests.
- (d) Dead load.
- (e) Working load limit.

The certificate shall declare that the assembly has been inspected by a responsible and competent person and that it complies with the requirements of the type test.

## **7.3 Component test certificate**

Each component certificate shall state the following information:

- (a) Serial number of component.
- (b) Description of component.
- (c) Material specification including impact properties (see Clause 4).
- (d) Details and results of tests.

Each certificate shall declare that the component has been inspected by a responsible and competent person and complies with the requirements of the component test.

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- (b) Description of component.
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- (d) Details and results of tests.

Each certificate shall declare that the component has been inspected by a responsible and competent person and complies with the requirements of the component test.



APPENDIX B  
INFORMATION TO BE PROVIDED BY THE SUPPLIER  
(Informative)

The following information should be provided by the supplier:

- (a) Dimensioned arrangement drawings of those parts of the gripper system that are attached to the conveyance.
- (b) Assembly drawings showing the installation and operational tolerances of the gripper system including condemning size limits of the timber guides.
- (c) The magnitudes, directions and points of application of the maximum forces that will be transmitted to the conveyance and to the guides during operation of the gripper system.
- (d) The recommended inspection and maintenance procedures for the gripper system and timber guide interface.
- (e) The method of releasing the conveyance from the gripper system.
- (f) Proposed component tests and acceptance criteria.

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