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Australian Standard®

**Earth-moving machinery—
Protective structures**



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Australian Mining Industry Council
Bureau of Steel Manufacturers of Australia
Construction Equipment Importers and Manufacturers of Australia
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Department of Conservation, Forests and Lands, Vic.
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Australian Standard®

**Earth-moving machinery—
Protective structures**

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PREFACE

The Standard was prepared by the Standards Australia Committee on Earth-moving Equipment, to supersede AS 2294—1979.

It is technically identical to SAE J1040 APR 88 and differs from the previous edition as follows:

- (a) New title.
- (b) Mobile cranes and side-boom cranes are no longer covered.
- (c) Longitudinal load requirements specified for various mass ranges within each machine classification have been added.
- (d) Lateral force and energy criteria have been specified for various mass ranges within each machine classification.
- (e) Vertical simulated ground plane (VSGP) is defined for rollbar ROPS.
- (f) Safety features, formerly in Appendix A, are now incorporated in the main text.
- (g) Some illustrations have been updated and new illustrations added.

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CONTENTS

	<i>Page</i>
SECTION 1. SCOPE AND GENERAL	
1.1 SCOPE	4
1.2 APPLICATION	4
1.3 REFERENCED DOCUMENTS	4
1.4 TESTS AND ACCEPTANCE	4
1.5 DEFINITIONS	5
1.6 ABBREVIATIONS AND SYMBOLS	6
1.7 REPLACEMENT OF ROLL-OVER PROTECTIVE STRUCTURE	6
1.8 REPLACEMENT OR REPAIR OF FALLING-OBJECT PROTECTIVE STRUCTURE	6
SECTION 2 DEFLECTION-LIMITING VOLUME	
2.1 SCOPE OF SECTION	13
2.2 APPLICATION OF SECTION	13
2.3 APPARATUS	13
2.4 POSITIONING OF DEFLECTION-LIMITING VOLUME	13
2.5 LATERAL SIMULATED GROUND PLANE (LSGP)	13
SECTION 3 ROLL-OVER PROTECTIVE STRUCTURES—LABORATORY TESTS AND PERFORMANCE REQUIREMENTS	
3.1 SCOPE OF SECTION	17
3.2 GENERAL	17
3.3 LABORATORY TESTS	17
3.4 PERFORMANCE REQUIREMENTS	20
3.5 MARKING	20
3.6 TEST REPORT	21
SECTION 4 FALLING-OBJECT PROTECTIVE STRUCTURES—LABORATORY TESTS AND PERFORMANCE REQUIREMENTS	
4.1 SCOPE OF SECTION	32
4.2 GENERAL	32
4.3 LABORATORY TESTS	32
4.4 PERFORMANCE REQUIREMENTS	33
4.5 MARKING	33
SECTION 5 MATERIALS, FABRICATION, AND WORKMANSHIP	
5.1 SCOPE OF SECTION	35
5.2 TEMPERATURE-MATERIAL REQUIREMENTS	35
5.3 FABRICATION AND WORKMANSHIP	35
APPENDICES	
A TEST REPORT FOR ROLL-OVER PROTECTIVE STRUCTURE	36
B ROLL-OVER PROTECTIVE STRUCTURE—INFORMATION TO BE RECORDED BY TESTING STATION	37

STANDARDS AUSTRALIA

Australian Standard

Earth-moving machinery—Protective structures

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies procedures for the laboratory evaluation of roll-over protective structures (ROPS) and falling-object protective structures (FOPS) for the protection of operators of earth-moving machines, and specifies the test procedures and minimum performance criteria for those structures. It also gives specifications for the deflection-limiting volume (DLV) to be used in the evaluation.

NOTE: ROPS and FOPS are structures whose primary purpose is to reduce the possibility of an operator who is wearing a seat belt complying with AS 2664 from being crushed or otherwise injured should the machine roll over or be struck by a falling object.

1.2 APPLICATION. This Standard applies to all operator-controlled earth-moving machines as defined in Clause 1.5.5. Examples of earth-moving machines it applies to are as follows:

- (a) Wheeled dozer (see Figure 1.1).
- (b) Wheeled loader (see Figure 1.2).
- (c) Crawler dozer (see Figure 1.3).
- (d) Crawler loader (see Figure 1.4).
- (e) Wheeled scraper prime mover (see Figure 1.5).
- (f) Self-propelled motor grader (see Figure 1.6).
- (g) Wheeled off-highway, non-trailed hauling units with rear or side dump bodies (see Figure 1.7).
- (h) Backhoe loader (see Figure 1.8).
- (i) Four-wheel drive skid-steer machines (ROPS only)* (see Figure 1.9).
- (j) Self-propelled road compactor/roller (see Figure 1.10).
- (k) Wheeled industrial tractors (see Figure 1.11).

The Standard is not intended to apply to machines having a power rating of less than 15 kW.

The Standard is not intended to apply to hydraulic excavators.

1.3 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS

1110 ISO metric hexagon precision bolts and screws

1112 ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts

2664 Earth-moving machinery—Seat belts and seat belt anchorages

2951 Earth-moving machinery—Nomenclature

2951.1 Part 1: Basic types

ISO

3449 Earth-moving machinery—Falling-object protective structures—Laboratory tests and performance requirements

3471/1 Earth-moving machinery—Roll-over protective structures—Laboratory tests and performance requirements—Part 1: Crawler, wheel loaders and tractors, backhoe loaders, graders, tractor scrapers, articulated steer dumpers

SAE

J231 Minimum performance criteria for falling object protective structure (FOPS)

J1040 Performance criteria for roll-over protective structures (ROPS) for construction, earth-moving, forestry, and mining machines

J1043 Performance criteria for falling object protective structure (FOPS) for industrial machines

1.4 TESTS AND ACCEPTANCE.

1.4.1 Matching of components. For optimum performance of ROPS and FOPS, it is desirable that each individual model and size of machine should have a matching design of protective structure. The same basic design of protective structure may be adapted to match a range of machines, provided each combination of protective structure/machine meets the requirements of the Standard.

* Appropriate FOPS requirements for four-wheel drive skid-steer machines are specified in SAE Standard J1043