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Australian Standard®

**Earth-moving machinery—
Protective structures**

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The following interests are represented on Committee ME/63:

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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**

First published as AS 2294—1979
Second edition 1990.

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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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:

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|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 | |
| J1201 | Minimum performance criteria for falling object protective structure (FOPS) |
| J1043 | 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