

AS/NZS 1801:2024



Australian/New Zealand Standard™

Occupational protective helmets



AS/NZS 1801:2024

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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-018, Occupational Protective Helmets, to supersede AS/NZS 1801:1997.

The objective of this document is to specify protective helmets that are to be worn in a variety of occupations, in order to reduce the severity of head injury from hazards associated with such activities.

The major changes in this edition are as follows:

- (a) Introduction of a Type 4 helmet, the enhanced occupational protective helmet, that is intended to protect the front, side and rear of the wearer's head. Reflecting this change is the introduction of impact energy attenuation requirements, retention system strength and stability tests.
- (b) Elimination of mandatory harness dimensions and clearances for Type 1 helmets. A Type 1 helmet may be constructed using a conventional harness system, but it may also be constructed using an impact energy attenuation liner. The intention is to make the standard less design restrictive. [Appendix A](#) provides harness system details based on AS/NZS 1801:1997.
- (c) Specifications for the Type 3 helmet are now contained in AS/NZS ISO 16073.5 helmets intended for wildland firefighting.
- (d) The stiffness test for helmets is now optional. This is specified in [Clause 4.7](#).

The terms “normative” and “informative” have been used in this document to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

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Australian/New Zealand Standard

Occupational protective helmets

1 Scope and general

1.1 Scope

This document specifies requirements for occupational protective helmets typically used in building and construction, mining, shipbuilding, forestry and other industrial settings. The document specifies requirements for helmets intended to protect the wearer's heads from —

- (a) falling objects and similar hazards (Classifications Type 1 and Type 2); and
- (b) falling objects and similar hazards, as well as a fall from a standing or low height, e.g. elevated up to one metre (Classification Type 4).

The selection of a Type 4 helmet should be considered as one part of an overall safe system of work in the context of working at heights and managing the risks of falls. The Type 4 helmet is not intended to offer protection to the head in all falls and is unlikely to prevent serious head injury or death in uncontrolled falls from one level to another or from a position elevated on a ladder or scaffolding.

Requirements include —

- (i) the construction and materials of the helmet shell;
- (ii) harness system, and mechanical strength of the shell;
- (iii) impact energy attenuation performance; retention system performance; and
- (iv) the finish of the helmet.

This document does not specify requirements for helmets for motor vehicle users, pedal cyclists, horse riders, wildland firefighters or structural firefighters. Refer to AS/NZS 1800 for guidance on selection, use and maintenance of occupational protective helmets. A helmet conforming to this document should be retired after two years in operation or five years in office use.

During the electrical insulation test ventilation and other holes in the helmet shell are plugged. In-use electrical insulation for helmets with ventilation and other holes may be compromised. The end user should select the most suitable helmet for situations involving electrical hazards.

1.2 Classification

Four types of occupational protective helmets are specified in this document, as follows:

- (a) *Type 1*: General occupational protective helmets.
- (b) *Type 2*: Helmets intended for high temperature workplaces.
- (c) *Type 3*: Refer to AS/NZS ISO 16073.5 for helmets intended for wildland firefighting.
- (d) *Type 4*: Enhanced occupational protective helmets.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

AS 1815, *Metallic materials — Rockwell hardness test*

AS 2706, *Numerical values — Rounding and interpretation of limiting values*

AS/NZS 1906.1, *Retroreflective materials and devices for road traffic control purposes, Part 1: Retroreflective sheeting*

AS/NZS 2512.1, *Methods of testing protective helmets, Part 1: Definitions and headforms*

AS/NZS 2512.2, *Methods of testing protective helmets, Method 2: General requirements for conditioning and preparation of test specimens and laboratory conditions*

AS/NZS 2512.3.1, *Methods of testing protective helmets, Method 3.1: Determination of impact energy attenuation — Helmet drop test*

AS/NZS 2512.5.1, *Methods of testing protective helmets, Method 5.1: Determination of strength of retention system — Static strength*

AS/NZS 2512.5.2, *Methods of testing protective helmets, Method 5.2: Determination of strength of retention system — Dynamic strength*

AS/NZS 2512.7.2, *Methods of testing protective helmets, Method 7.2: Determination of stability of protective helmets — Dynamic stability*

AS/NZS 2755.1, *Textile fabrics — Burning behaviour, Part 1: Determination of ease of ignition of vertically oriented specimens*

ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

SAE J211b, *Recommended practice for instrumentation for impact tests*

1.4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1.4.1

basic plane

plane intersecting the inferior borders of the orbits and external auditory meatuses and represented on a test headform or reference headform

Note 1 to entry: The basic plane is also referred to as the Frankfurt plane. The mid-sagittal plane is equivalent to the vertical longitudinal plane defined in EN 960. The mid-sagittal plane is also known as the median plane. The mid-coronal plane is equivalent to the vertical transverse plane defined in EN 960. The coronal plane is also known as the frontal plane.

Note 2 to entry: See [Figure 1.1](#) and refer to AS/NZS 2512.1.

1.4.2

brim

rim surrounding the shell which may form a gutter

1.4.3

chin strap

adjustable strap that is intended to pass under the wearer's chin with two or more points of attachment to the helmet used with Type 1 helmets

Note 1 to entry: A chin strap is an accessory. It is not a retention system.

1.4.4

comfort padding

material provided for comfort but not intended to offer impact energy attenuation during impact

1.4.5**external vertical distance**

vertical distance between the top of the headform on which the helmet is mounted and the highest point on the outside surface of the helmet shell

Note 1 to entry: This represents the height of the outer surface of the shell above the head when the helmet is worn and relates to clearance under low roofs and other similar hazards.

1.4.6**harness assembly**

complete assembly by means of which Types 1 and 2 helmets may be maintained in position on the head and which may provide a means of attenuating impact energy

1.4.7**helmet accessories**

any additional parts for special purposes such as retaining strap, neck protector, nape strap, hearing protectors, eye protector, faceshield, lamp bracket, cable clip

1.4.8**helmet conspicuity**

extent to which a helmet is more easily noticed than anything else in the visual field

1.4.9**helmet positioning index****HPI**

helmet positioning index is the vertical distance, measured in the mid-sagittal plane, between the basic plane of the reference headform and the front brim

Note 1 to entry: HPI, provided by the supplier, indicates the intended position of the helmet when worn.

1.4.10**high temperature workplace**

workplace where exposure to high temperatures is likely, such as in the molten metal industry

1.4.11**impact energy attenuating liner**

material that provides the inner form of the helmet and functions to attenuate impact energy

1.4.12**lateral clearance**

horizontal distance between the headband and the inside of the shell

1.4.13**occupational protective helmet**

helmet, including all component parts necessary for proper functioning, intended to protect at a minimum the upper part of a wearer's head against impact

Note 1 to entry: For the purposes of this document, the term "helmet" is taken to refer to occupational protective helmets, including the type that was formerly known as an industrial safety helmet.

1.4.14**peak**

permanent or detachable extension of the shell above the eyes

1.4.15**reference plane**

plane above and parallel to the basic plane on a reference head form or test headform

Note 1 to entry: See [Figure 1.2](#) and refer to AS/NZS 2512.1.

1.4.16**retention system**

assembly that maintains the position of the Type 4 helmet on the head during use

Note 1 to entry: A retention system will have at least three points of permanent attachment to the helmet.

1.4.17**shall**

indicates that a statement is mandatory

1.4.18**shell**

material that provides the general outer form of the helmet

1.4.19**should**

indicates a recommendation

1.4.20**ventilation holes**

holes provided in the shell to permit circulation of air inside the helmet

1.4.21**vertical clearance**

minimum vertical distance, between the top of the head or headform and the inside of the helmet shell in a Type 1 or 2 helmet

1.4.22**wearing height**

vertical distance from the lower edge of the headband to the highest point of the head or headform on which the helmet is mounted, measured at the front (midway between the sides of the headform) and at the sides (midway between the front and the back of the headform), whichever gives the greater distance, in a Type 1 or 2 helmet

1.5 Nominal values and tolerances

Unless otherwise specified, the values stated in this document are expressed as nominal values. Except for temperature limits, values which are not stated as maxima or minima shall be subject to a tolerance of $\pm 5\%$. Unless otherwise specified, temperature limits in this document shall be subject to a tolerance of $\pm 1\text{ }^{\circ}\text{C}$. Unless otherwise specified, the ambient temperature for testing shall be within the range of $18\text{ }^{\circ}\text{C}$ to $25\text{ }^{\circ}\text{C}$. The laboratory shall be conditioned to an ambient temperature within the range of $18\text{ }^{\circ}\text{C}$ to $25\text{ }^{\circ}\text{C}$ in accordance with AS/NZS 2512.2.

1.6 Interpretation of specified limiting values

For the purpose of assessing conformance to this document, the specified limiting values shall be interpreted in accordance with the "rounding method" described in AS 2706. The observed or calculated value shall be rounded to the same number of figures as in the specified limiting value and compared with the specified limiting value. For example, for specified limiting values of 2.5, 2.50 and 2.500, the observed or calculated value would be rounded to the nearest 0.1, 0.01 or 0.001 respectively.

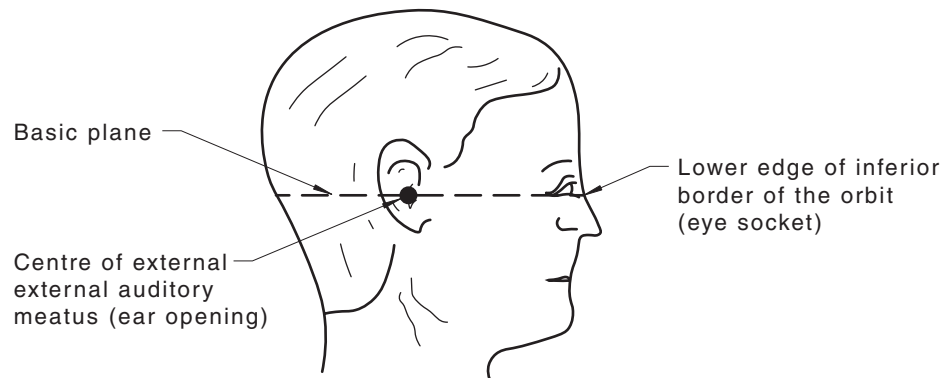


Figure 1.1 — Location of basic plane

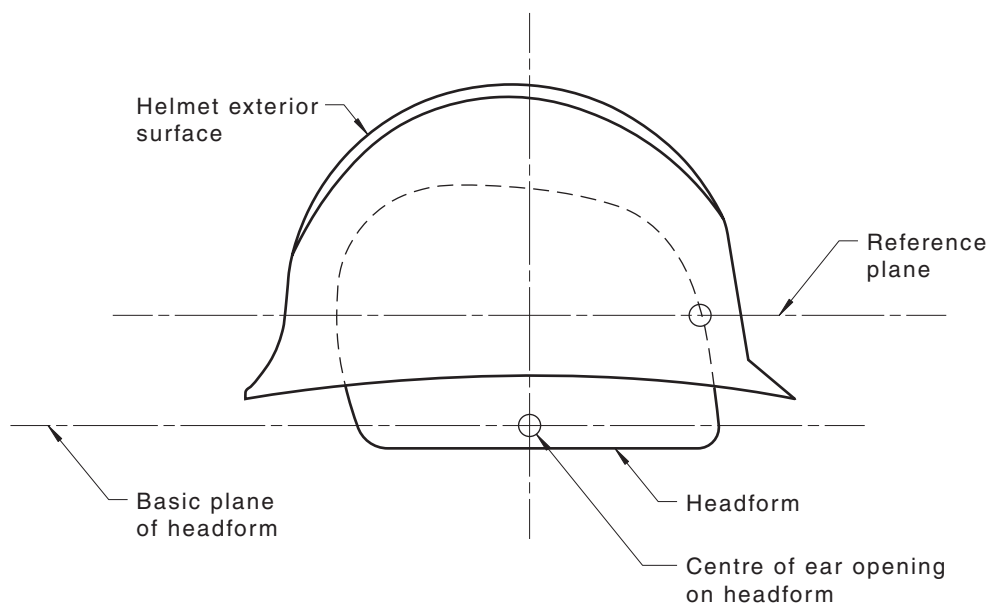


Figure 1.2 — Reference plane

2 Materials

2.1 Shell materials

The shell of the helmet shall be made of materials that are hard, durable and inherently moisture-resistant. The shell shall be capable of passing the resistance to ignition test given in [Clause 4.13.1](#).

2.2 Harness system, impact energy attenuation liner and retention system materials

2.2.1 General

The characteristics of the materials used in the manufacture of the harness system, impact energy attenuation liner and retention system shall be established as being suitable for the purpose.

NOTE Materials used should not undergo appreciable alteration arising from contact with perspiration, or skin or hair toiletries. Materials known to cause skin irritations or disorders should not be used.

2.2.2 Optional requirement for dusty work environments

Where required, helmets should have sweatbands that are of a material and design which minimizes retention of dust and grit.

3 Design and construction

3.1 Types 1 and 2 helmets

3.1.1 General

The helmet shall consist of at least a shell and one of following components —

- (a) harness system; or
- (b) means to attenuate impact energy and provide a secure fit on the wearer's head.

The components, e.g. harness system, shall be securely attached to the shell. Means of attachment for accessories shall not project into the space enclosed by the shell by more than 5 mm, measured from the internal surface of the shell. All edges shall be smooth and radiused. No part of the helmet or helmet accessories shall have sharp protruding edges.

Where electrically conducting materials pass through the shell, they shall be designed or protected to allow the system to conform to [Clause 4.6](#). Metals and other conductive materials shall not be employed in components which will come in direct contact with the wearer's head while the helmet is being worn in the normal way.

NOTE A chin strap may be mandatory in selected occupations.

3.1.2 Shell

3.1.2.1 Shell construction

The shell shall be of one-piece construction, with or without a brim or peak unless it is constructed of more than one component permanently attached to another. In the latter case, the performance of the helmet shall not be diminished by the fact that the shell was constructed from more than one component and the components of the shell shall have been shown by testing not to separate as a result of any of the performance tests within this document. The shell shall be smoothly finished and be of a uniform strength and thickness as far as is practicable.

NOTE 1 This requirement does not exclude a gradual increase in shell thickness, ribs or means for attaching the harness or accessories but does exclude highly localized reinforcement.

NOTE 2 The edges of any brim or peak should, where practicable, form a bead.

3.1.2.2 Shell conspicuity

Specific colouring of helmet shells is not mandatory.

NOTE The exterior surface of the helmet should be a colour, or combination of colours, that is conspicuous.

3.1.2.3 Retroreflective material

Retroreflective materials intended for application to the shell exterior shall have a coefficient of luminous intensity per square metre (CIL/m²) of not less than 85 cd/lux/m² when measured in accordance with AS/NZS 1906.1, with an observation angle of 0,2 ° and an entrance angle of -4 °.