

# Australian/New Zealand Standard™

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## Methods of testing protective helmets

### Method 4: Determination of penetration resistance

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#### PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CS/97, Testing of Helmets and Visors, to supersede AS 2512.4—1986.

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#### METHOD

**1 SCOPE** This Standard sets out a method for determining the penetration resistance of a protective helmet.

**2 REFERENCED DOCUMENTS** The following documents are referred to in this Standard:

AS

2512 Methods of testing protective helmets

2512.3.1 Method 3.1: Determination of impact energy attenuation—Helmet drop test

AS/NZS

2512 Methods of testing protective helmets

2512.1 Method 1: Definitions and headforms

2512.2 Method 2: General requirements for the conditioning and preparation of test specimens and laboratory conditions

**3 DEFINITIONS** For the purpose of this Standard, the definitions given in AS/NZS 2512.1 apply.

**4 PRINCIPLE** A penetration test striker is dropped onto the outer surface of a helmet positioned on a rigidly mounted test headform in a direction essentially normal to the outer surface of the helmet.

**5 APPARATUS** The following test apparatus is required:

- (a) Headform of the dimensions and design specified in AS/NZS 2512.1, made from any substantially incompressible material, e.g. metal, plastic or hardwood.

The contactable surfaces of the test headform shall be finished to readily permit detection should contact by the striker occur. Contactable surfaces of metal headforms shall have a Brinell hardness not greater than 55 HBS 2/20. The surface shall be refinished if necessary prior to each penetration test blow to permit detection should contact by the striker occur.

- (b) Penetration striker complying with the following requirements:
  - (i) The mass of the test striker is  $3 +0.045, -0$  kg.
  - (ii) The point of the striker shall be conical with an included angle of  $60 \pm 0.5$  degrees and a cone height of not less than 38 mm.
  - (iii) The radius of the striking point is  $0.5 \pm 0.1$  mm.
  - (iv) The striking tip has a hardness of not less than 60 Rockwell (Scale C).
- (c) Rigid mount as specified in AS 2512.3.1.

NOTE: It is intended that the headform position be adjustable so that any point within the helmet test area required by a product Standard which uses this test method can be presented to the penetration striker.
- (d) A means to control the direction of the free fall.

**6 PROCEDURE** The procedure shall be as follows:

- (a) Condition and prepare the helmet(s) in accordance with AS/NZS 2512.2.
- (b) Ensure that the laboratory conditions are as specified in AS/NZS 2512.2.
- (c) With the adjusting components fully relaxed, position the helmet as specified in AS/NZS 2512.2.
- (d) Perform the penetration test(s) as specified in the product Standard. With its axis aligned vertically, drop the penetration test striker from the height specified in the product Standard onto the outer surface of the helmet in the direction essentially normal to that surface, unless otherwise specified in the product Standard.

NOTE: The height is measured from the striker point to the impact point on the outer surface of the helmet.

**7 TEST REPORT** The test report shall include the following:

- (a) Identity of the helmet under test.
- (b) Details of the headform.
- (c) Whether or not the striker contacted the surface of the headform and the degree of penetration if applicable.
- (d) Reference to this Australian/New Zealand Standard, i.e. AS/NZS 2512.4.