

Australian/New Zealand Standard™

Methods of testing protective helmets

Method 7.2: Determination of stability of protective helmets—Dynamic stability

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CS-097, Testing of Helmets and Visors, to supersede (in part) AS/NZS 2512.7.2:1998, *Methods of testing protective helmets*, Method 7.2: *Determination of stability of protective helmets—Dynamic stability*.

This test method was devised to determine the likelihood of effective retention in an accident. An important variable in this method is the fit of the helmet on the headform. Because an objective method of measuring fit has not yet been developed, great care is needed to ensure that the helmet chosen for the test is the one which, when seated on the headform and correctly adjusted, most closely resembles an acceptable fit on a person's head.

This test method may also provide a suitable means for testing the dynamic strength of retention systems, depending on the drop height specified in the product Standard.

METHOD

1 SCOPE

This Standard sets out a method for determining the stability of a protective helmet on a test headform when subjected to a dynamic force.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

2512 Methods of testing protective helmets

2512.1 Part 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 helmet judged to be a good fit on the appropriate headform is selected, placed on the headform and subjected to a dynamic force in the forward and rearward directions, as specified in the product Standard. Stability of the helmet is assessed by whether or not the helmet comes off the headform during the test or by the degree of helmet rotation on the headform.

5 APPARATUS

The following apparatus is required:

- (a) A complete headform, as specified in AS/NZS 2512.1, with the additional dimensions for a headform support as shown in Figure 2. Any substantially incompressible material and any method of construction may be used, provided that the surface of the headform is smooth.
- (b) Rigid mount to hold the headforms.
- (c) Drop weight with a mass of 10 ± 0.1 kg.
- (d) Guiding system with a total mass of 3.0 ± 0.1 kg allowing the drop weight to drop in a guided free fall.
NOTE: The apparatus should accommodate drop heights up to 300 mm.
- (e) Flexible strap and a hook attached to the guiding system running over a pulley with a diameter of 100 ± 2 mm. The extension of the strap shall be less than 18 mm/m under a static load of 1000 N. The hook shall have a width of 25 ± 2 mm.
- (f) Means of applying a static, vertical force of $45.0 +0, -0.5$ N to the apex of the helmet.
- (g) The stop shall be covered with a 1.5 mm rubber pad with a Shore A Durometer hardness of 50–70.

Typical apparatus is illustrated in Figure 1. The apparatus shall be arranged according to the dimensions specified in Figure 1.

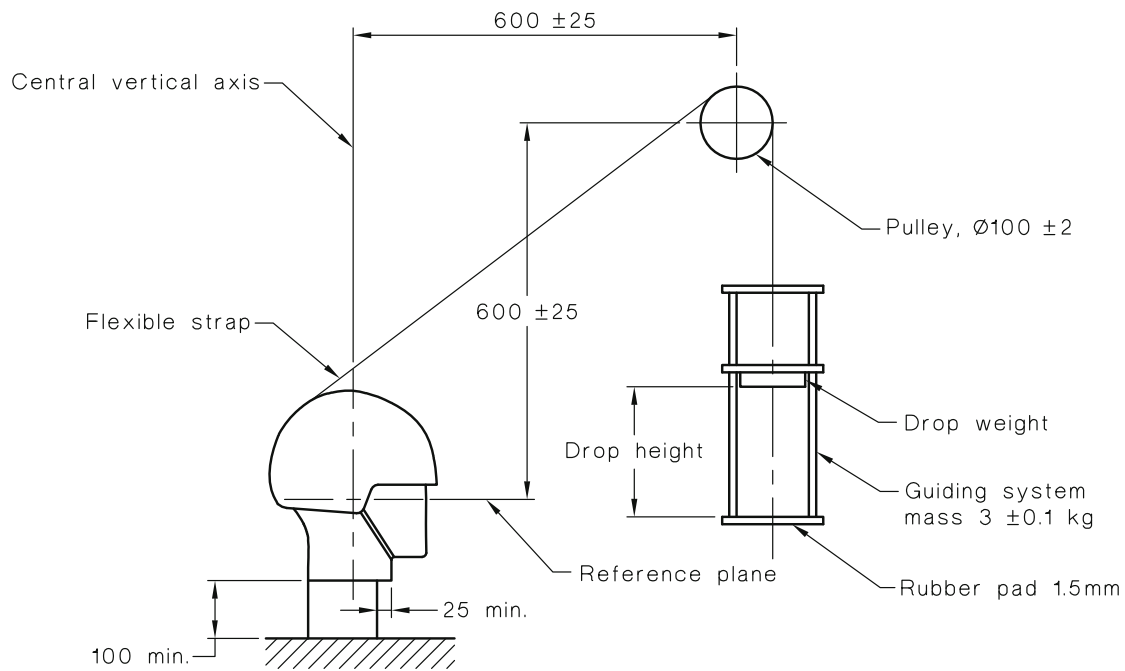
6 PROCEDURE

The procedure shall be:

- (a) Ensure that the laboratory conditions are as specified in AS/NZS 2512.2.
- (b) Mount the headform so that the basic plane is horizontal.
- (c) Select a helmet judged to be an appropriate fit on the headform.
NOTE: An 'appropriate fit' most closely resembles an acceptable fit on a user's head. The helmet should not be forced onto the headform in a way that the normal force between the helmet liner and the headform surface is artificially increased.
- (d) Place the helmet on the headform. To ensure that the helmet is properly seated on the headform, apply a static force of $45.0 +0, -0.5$ N vertically downwards onto the apex of the helmet. Centre the helmet laterally and in accordance with its positioning index.
- (e) Remove all slack from the retention system.
- (f) Remove the vertical force.
- (g) Attach the strap to the rear edge (the front edge for the forward to rear test) of the helmet such that it is in line with the mid-sagittal plane.
- (h) Release the drop weight and allow it to fall the distance specified in the product Standard.

- (i) Note whether or not the helmet came off of the headform and the degree of helmet rotation, if required by the product Standard.
- (j) If a forward-to-rear test is specified, rotate the base of the headform 180° so that the headform is facing away from the drop assembly, and follow Steps (d)–(h).

If this test is required refer to, the product Standard to determine if it is to be conducted on the same helmet or a different helmet as the rear to forward test.



NOTE: A flat strap is recommended for the loading device since it is less likely to slip when placed across the apex of the helmet than a round cord.

DIMENSIONS IN MILLIMETRES

FIGURE 1 TYPICAL APPARATUS FOR HELMET STABILITY TEST