

Australian/New Zealand Standard™

Methods of testing protective helmets

Method 7.1: Determination of stability of protective helmets—Static stability

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CS-097, Testing of Helmets and Visors, to supersede AS/NZS 2512.7.1:1998, *Methods of testing protective helmets*, Method 7.1: *Determination of stability of protective helmets—Static stability*.

This Standard is the first of two methods on the determination of stability of protective helmets.

Method 7.2: *Determination of stability of protective helmets—Dynamic stability*, was developed in order to determine the likelihood of effective retention in an accident, as this method is not intended for that purpose.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

The Standard is republished, without technical alteration.

FOREWORD

This test method was devised to detect those helmets which, even when correctly fitted, move on the head during normal use to the extent that they might endanger a user by obscuring vision or exposing a forehead to impact. The test is not intended to determine the likelihood of effective retention in an accident, in which case AS/NZS 2512.7.2, *Methods of testing protective helmets*, Method 7.2: *Determination of stability of protective helmets—Dynamic Stability*, should be used.

The most 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 must be taken 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.

The headforms specified in this test vary from those specified in the other methods in this series because the test requires the use of a headform with a modified chin.

METHOD

1 SCOPE

This Standard sets out a method for determining the stability of a protective helmet on a test headform under static load.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

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

Two headforms are specified, one adult-size and one child-size. A test band is marked on each headform around the eye area. A helmet judged to be a good fit on the appropriate headform is selected, placed on the headform and subjected to static force in the forward and rearward directions. Stability of the helmet is assessed by whether the test band is completely exposed or completely obscured during the test.

5 APPARATUS

The following apparatus is required:

- (a) Headform(s) complying with Appendix A.
- (b) Mounting stand to secure the test headform for test, with the basic plane essentially horizontal, in both forward facing and rearward facing directions.
- (c) Means of applying a static, vertical force of $45.0 \pm 0, -0.5$ N to the apex of the helmet.
- (d) Means of applying a static force, as specified in the product Standard, at a horizontal attitude to the helmet on the headform.
- (e) Spacer, flexible but substantially incompressible, approximately 150 mm long by 50 ± 1 mm wide by 2 ± 0.2 mm thick.

NOTE: Material such as low density polyethylene is suitable.

Typical apparatus is illustrated in Figure 1.

6 TEST BAND

A test band shall be marked on the front of the test headform and shall be a region bounded by—

- (a) a line indicating the location of the basic plane;
- (b) a line above and parallel to the basic plane as follows:

Headform	Distance above the basic plane, mm
A_{mod}	74
J_{mod}	85

- (c) two vertical lines 25 mm either side of the mid-sagittal plane through the vertical axis.

NOTE: The basic plane and the mid-sagittal plane through the vertical axis are defined in AS/NZS 2512.1.

7 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 is that which 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. The helmet should be loose enough to be readily rotated back and forth on the headform.

- (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 ± 0.5 N vertically downwards onto the apex of the helmet. Centre the helmet laterally and in accordance with its positioning index and adjust the retention system to achieve optimum fit.

NOTE: Once optimum fit is achieved, the position of all retention system components, except the retaining strap, must be maintained without further adjustment for both the forward and rearward tests.

- (e) With the vertical force still in place, insert the spacer between the chin and the retaining strap; tension so that the strap is firm but the helmet is not distorted.
- (f) Remove the spacer and the vertical force.
- (g) Attach the loading device to the rear edge of the helmet and place it over the apex of the helmet (see Figure 1(a)). Apply the specified force in a forward horizontal direction for the specified period.

NOTE: The magnitude of the force and length of the time period are specified in the product Standard.

- (h) Note whether or not the helmet has completely obscured the test band when viewed from the front at the same level as the basic plane.
- (i) Reposition the helmet and readjust the retaining strap tension in accordance with Step (e).
- (j) Attach the loading device to the front edge of the helmet and place it over the apex of the helmet (see Figure 1(b)). Apply the specified force in a rearward horizontal direction for the specified period.
- (k) Note whether or not the helmet has completely exposed the test band when viewed from the front at the same level as the top line of the test band.

8 REPORT

The report shall include the following:

- (a) Identity of the helmet under test.
- (b) Size of the helmet.
- (c) Size of the headform used, i.e. A_{mod} or J_{mod} .
- (d) Whether or not the helmet obscured or exposed the test band after each test.
- (e) Reference to this test method, i.e. AS/NZS 2512.7.1.