Australian Football Headgear Standards

AUSTRALIAN FOOTBALL LEAGUE
ABN 97 489 912 318

AUSTRALIAN FOOTBALL HEADGEAR STANDARDS

Basic Headgear Standard – AFL BHS 2024

Advanced Headgear Standard – AFL AHS 2024

Document Date: 12 December 2024

AFL Contact: Adj Assoc. Prof. Catherine Willmott,
AFL Head of Concussion Innovation and Research

Email: catherine.willmott@afl.com.au

Table of Contents

INTRODUCTION

Protecting the health and safety of all people who participate in Australian Football is of the highest importance to the Australian Football League (AFL). The AFL takes repetitive head impacts, concussion, and the protection of brain health, in all those playing our game extremely seriously. As articulated in the AFL Strategic Plan for Sport-Related Concussion in Australian Football, prevention is one of the key pillars of our approach. Evidence for the role of commercially available protective equipment for concussion prevention in Australian Football, and indeed other collision sports, is currently limited[1], although these products may assist with preventing cuts and abrasions. To date, there have been no padded headgear performance standards in Australia for application in Australian Football. The AFL, in seeking to redress this issue, has provisioned the development of the Australian Football Headgear Standards.

This document (Australian Football Headgear Standards) was prepared by an independent consultant in biomechanics, Dr Andrew McIntosh (McIntosh Consultancy and Research), in collaboration with the AFL and international experts in the field, to establish basic and advanced standards for the development and manufacturing of headgear suitable for Australian Football, which may provide protection against sport-related concussion by attenuating the impact force applied to the head and the head's acceleration.

Suppliers claiming compliance with any one of the Australian Football Headgear Standards shall require conformity assessment from a JAS-ANZ accredited certification body, using a certification scheme based on Type 5 described in AS/NZS ISO/IEC 17067 Conformity assessment – Fundamentals of product certification and guidelines for product certification scheme.

All testing to the standard shall be conducted at the Transport for NSW Crashlab in Sydney.

Use of the AFL logo on headgear is prohibited.

Steps to Certification of Headgear:

1. Supplier designs product to meet performance standards outlined herein.
2. Supplier contacts Intertek SAI Global to ensure that they understand the requirements for product certification (https://saiassurance.com.au/contact-us/)
3. Supplier funds the application for certification from Intertek SAI Global.
4. Supplier organises and funds testing of their headgear model(s) to the Australian Football Headgear Standards at the Transport for NSW Crashlab in Sydney (https://nata.com.au/accredited-organisation/transport-for-nsw-2305-2298/).
5. Intertek SAI Global acknowledges testing performance certification and issues Certificate and Schedule. Prominent display of the Intertek SAI Global Certified Product StandardsMark™ on headgear maximises the competitive advantage achieved through certification.

6. Supplier provides evidence of certification to AFL for inclusion on AFL website as a product certified in accordance with the Australian Football Headgear Standards and is responsible for annual certification updates to AFL.

In order to remain contemporaneous with current state of evidence, it is expected the Australian Football Headgear Standards will undergo revision in future to incorporate advances in science.

The AFL is not responsible or liable for the claims made by suppliers to meet these standards, nor is the AFL acting in a regulatory capacity regarding supplier claims. Nothing in these standards, nor in the headgear prototypes found to meet even the Advanced Head Standard, constitute a guarantee against a player using headgear approved under these standards from sustaining a head or brain injury whilst competing in the game of Australian football. Effectively protecting our players from brain trauma is a wide-reaching task that extends beyond the use of protective equipment, and includes players and the people around them being able to make informed choices while accepting that there is always a risk of contact injuries including head and brain injuries. This objective also includes coaching that promotes safe play, including protecting the head as much as possible in contested ball situations, and avoiding dangerous tackles, along with policy, rule and law changes.

[1] Eliason PH, Galarneau J-M, Kolstad AT, et al. Br J Sports Med 2023;57:749–761.

AFL BASIC HEADGEAR STANDARD – AFL BHS 2024

Foreword

Headgear that complies with the Basic Headgear Standard is considered suitable for Australian Football games and training sessions, where the wearer may fall or be struck in the head by another player and head impacts may occur multiple times. The injury prevention performance focus of the Basic Headgear Standard is on reducing: i) the magnitude of force and head acceleration associated with head impacts, ii) the likelihood and severity of sports-related concussion, and iii) superficial head injuries in areas covered by headgear.

The protection given by headgear depends on the circumstances and characteristics of the impact(s). The wearing of headgear cannot always prevent injury to the head and/or face. A proportion of the energy of an impact is absorbed by headgear, thereby reducing the impact force applied to the head and the acceleration of the head. The performance of headgear may be degraded for a period or permanently after it is exposed to an impact. For optimal headgear performance, headgear should be as close fitting as possible, securely fastened and properly adjusted. Headgear cannot prevent serious head injury, skull fractures or fatal head injuries. Headgear is unlikely to prevent neck and cervical spine injuries.

Headgear that has been damaged through impact loading, normal use and/or wear and tear should be replaced. At the time of preparing this standard, the in-use lifespan of headgear has not been established. The current recommendation is three seasons.

1. Scope

The Basic Headgear Standard specifies requirements for headgear for Australian Football players, designed to mitigate the adverse effect of an impact to the head.

The Basic Headgear Standard is written with particular reference to Australian Football players, but may also be applicable to players in other types of contact sports such as Rugby League and Rugby Union. The Basic Headgear Standard was not developed, however, in consideration for those sports or with the governing bodies of those sports.

Marking requirements and instructions for use and care are also included.

Headgear manufactured to be compliant with the Basic Headgear Standard are not intended for use in other activities.

2. Objective

The objective of the Basic Headgear Standard is to provide Australian Football players with headgear that may reduce the magnitude of force and head acceleration associated with head impacts, the likelihood and severity of sports-related concussion, and the occurrence of superficial head injuries (e.g. cuts and abrasions), which may occur during participation in Australian Football games and training sessions.

3. Referenced Documents

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 lest specimens and laboratory conditions
2512.3.1	Method 3.1: Determination of impact energy attenuation - Helmet drop test
2512.5.2	Method 5.2: Determination of strength of retention system - Dynamic strength
2512.7.2	Method 7.2 Determination of stability of protective helmets -Dynamic stability

4. Definitions

The definitions given in AS/NZS 2512.1 shall apply.

The word “shall” denotes that the requirement is mandatory or normative. The word “should” denotes voluntary or informative.

5. Construction

5.1 General

5.1.1 Components

The headgear shall –comprise:

(a) a means of absorbing impact energy; and

(b) a retention system.

All components of the headgear shall be permanently attached.

5.1.2 Attachment of components

Components of the headgear and any devices attached to the headgear shall be such that they are unlikely to cause injury to the wearer in the event of an impact to the head.

NOTE: The use of hard components, such as rivets or plastic clips, should be avoided unless these are covered by energy attenuating materials.

5.2 Materials

Except as specifically provided for in this Standard, the characteristics of the materials used in the manufacture of headgear shall be established by the supplier as being suitable for the purpose.

The headgear shall not have a hard shell.

The headgear shall not have internal or external rigid projections.

Materials coming into contact with skin or hair, which were known to have caused skin irritations or skin disorders, shall not be used.

NOTE: There is no commonly accepted definition of 'hard shell'. A normal motorcycle, cricket and American Football helmet each has a hard shell that is separate from the liner. It should require little physical strength to crumple or fold headgear meeting this standard.

5.3 Headgear opening(s)

The edges at the neck and eye openings shall be soft.

Note: The above requirement is intended to reduce or eliminate injury from contact with the edges of openings.

The headgear should have an ear aperture in order to minimise hearing limitations. The recommended ear aperture size is a diameter of 25 to 30 mm.

5.4 Retention system

The retention system shall be constructed so that when properly fastened the headgear cannot be easily dislodged from its normal position on the wearer's head under impact conditions or in normal game and training usage.

Compliance with the above requirement shall be determined during the stability test (Clause 7.4).

5.5 Ventilation

The headgear should allow adequate airflow around the head.

6. Testing

6.1 General

Headgear shall remain intact throughout the performance tests. Each size in a model range must be assessed. Headgear that has been tested shall not be offered for sale.

6.2 Samples

Headgear shall be supplied to the test facility in the condition in which they are offered for sale. At least six headgear units of the same model and size shall be submitted for testing. Headgear shall be accompanied by instructions for use and care (Clause 9).

6.3 Testing sequence

Before conditioning, one headgear unit shall be selected and the peripheral vision (Clause 7.1) and dynamic stability (Clause 7.2) determined. Four headgear units shall then be conditioned in accordance with Clause 6.4 and shall each be subjected to the impact energy attenuation (Clause 7.3) tests in the order specified in Table 1.

Note: If the strength of the retention system (Clause 7.4) is assessed, it is recommended that tests are performed after conditioning to 6.4 and assessment of impact energy attenuation.

Table 1: Test sequence for Basic headgear

Test Sample No	Test requirement
1	7.1 Peripheral vision 7.2 Dynamic Stability
1	Conditioned to 6.4 Ambient temperature 7.3 Impact energy attenuation
2	Conditioned to 6.4 Low temperature 7.3 Impact energy attenuation
3	Conditioned to 6.4 High temperature 7.3 Impact energy attenuation
4	Conditioned to 6.4 Water immersion 7.3 Impact energy attenuation

6.4 Conditioning

For each of the different conditioning procedures (specified in AS/NZS 2512.2 for ambient temperature, low temperature, high temperature, and water immersion), one headgear unit shall be conditioned according to the procedure. Each headgear shall then be subjected to the tests required by this Standard and shall satisfy the requirements of the tests.

6.5 Headforms

For the purpose of testing to the requirements of this Standard, impact energy attenuation and strength of retention system shall be conducted on headform sizes A, E, J, M and 0 specified in AS/NZS 2512.1, as appropriate to the size of the headgear. Where the headgear is intended for a range of sizes, the headgear shall be tested on the smallest and largest headforms appropriate for the headgear size range. For example, headgear intended for a head circumference in the range 535 mm to 605 mm would be tested on an E and M headform. The dynamic stability test shall be conducted using the headform sizes A, E, J, M and 0 specified in AS/NZS 2512.7.2.

The test laboratory shall select the headform size(s) that is the best fit for the size of the headgear.

6.6 Positioning

Headgear shall be positioned on the headform using the helmet positioning index as supplied by the supplier, which has been determined in accordance with the requirements of AS/NZS 2512.1.

NOTE: The helmet positioning index should be given by the supplier to any person requesting the information.

6.7 Test Sites

For the impact energy attenuation tests, headgear shall be tested at four sites marked prior to conditioning on or above the test line as defined in Figure 1 and Table 2. The distance between any two sites, measured over the surface of the headgear shall not be less than one fifth of the headform circumference, as measured at the nominal AA' line. Test sites shall include at least the frontal, temporal and occipital aspects of the head.

NOTE: Coverage of the rear of the head (occipital) is important in AFL. Where there is size adjustment at the rear of the headgear, e.g. with lacing, this shall not reduce the impact protection offered by the headgear. As per 6.5, for headgear where size and fit can modified with laces, hook-and-loop fasteners, or other methods, the headgear should be tested on the smallest and largest headforms within the headgear size range.

7. Testing Requirements

7.1 Peripheral vision

When measured at the basic plane in accordance with AS/NZS 2512.6, the peripheral vision clearance shall be not less than 105° on each side of the mid-sagittal plane. The brow opening of the headgear shall be at least 25 mm above all points in the basic plane that are within the specified angle of peripheral vision.

7.2 Dynamic stability

Headgear shall be tested in accordance with AS/NZS 2512.7.2, with a static pre-load of 3 kg $\pm$ 0.05 and drop mass of 4 kg. The drop height for the 4 kg mass shall be 500 mm. When subjected to this test, the headgear shall not rotate forward by more than 30° to the horizontal, determined by the angle between the reference plane on the external surface of the headgear and the reference plane on the headform. The headgear shall be tested rear-to-front.

7.3 Impact energy attenuation

When determined in accordance with AS/NZS 2512.3.1, the headform acceleration shall not exceed the following:

(a) Peak acceleration of 150 g in first impact test at each test site,

(b) Acceleration of 100 g for a cumulative duration of 3.0 ms,

(c) Peak acceleration of 200 g for either of the second and third successive tests.

NOTE: The acceleration due to gravity (g) should be taken as 9.81 m/s^2

The centre of impact shall be on or above the test line. As a result, areas below the test line may be contacted during a test.

None of the protective components of the headgear shall become detached as a result of a test impact.

Headgear shall be subjected to impacts at four sites with three successive impacts at two of the four sites. The three successive impacts shall be completed within five minutes of the first impact. The minimum time between tests shall be one minute. There is no requirement to place the headgear back into a conditioning environment between the three repeat tests.

The impact speed shall be 2.43 +0.1, 0 m/s. The nominal height for the guided free fall impact tests onto flat anvils is 300 mm.

NOTE: AS/NZS 2512.2 specifies in section 4 "If during testing the time out of conditioning environments…for a test helmet exceeds 5 min, the helmet shall be returned to the conditioning environment for a minimum of 3 minutes for each 1 minute out of the conditioning environment or 4 h, whichever is the lesser, before testing is resumed." Therefore, after the three repeat tests, it is likely that the headgear shall be returned to the conditioning environment for a period of at least 15 minutes if further impact tests are planned.

7.4 Strength of retention system

The retention system shall hold under normal wearing conditions and release to prevent excessive pressure on the neck.

It is recommended that the release of the retention system is non-destructive for the headgear and the retention system.

The following performance criteria for strength of retention system are informative. When the headgear is tested in accordance with AS/NZS 2512.5.2, the retention system should remain closed when loaded with the 7 kg guide bar assembly mass but should release when strained dynamically by the additional 10 kg cylindrical drop weight when the cylindrical drop weight is allowed to fall through 250 mm.

8. Marking

8.1 On the headgear

Each headgear unit shall be permanently and legibly marked in letters no less than 1.5 mm, in such a manner that the marking can be easily read without the removal of any permanent part, with the following:

(a) Name of supplier, brand or manufacturer, country of origin.

(b) Model designation.

(c) Month and year of manufacture (may be spelled out, e.g. 'July 2024', or in figures, e.g. '07/24') or serial number that provides traceability to date of manufacture.

(d) The certification mark (Intertek SAI Global Certified Product StandardsMark™).

(e) The words 'AFL Basic Headgear Standard 2024'

(f) Warning- Read instructions carefully before use, Headgear cannot protect wearer against all possible impacts or injuries

(g) Instructions to user:

i. Cleaning instructions in English or using standard icons.
ii. Fasten headgear securely.
iii. If there is significant damage to the headgear, destroy it and replace it.
iv. Make no modifications.
v. Headgear constructed of (identify type(s) of material).
vi. Headgear may be seriously damaged by substances such as petrol, paint, adhesives, or cleaning agents.

NOTE: Marking can be achieved through a sewn-in/glued label or printed onto the headgear.

8.2 Durability of marking

Marking on the headgear shall be durable with an expected in-use lifespan of up to three years from date of manufacture.

9. Labelling

Headgear shall be accompanied by a brochure, detachable label with QR code link to website and web address (URL), or detachable label which shall include the following, verbatim, in letters no less than 2 mm:

(a) Whilst meeting the Australian Football Headgear Standards, neither the standards or the headgear were designed to provide full protection against all possible head or brain injuries caused by impacts.

(b) Headgear must fit and be worn correctly to be effective.

(c) Do not modify the headgear. Do not add an attachment.

(d) Replace headgear if components of the headgear have separated (e.g. the retention strap has come off the body of the headgear), if the retention system can no longer be fastened or otherwise not functioning, or if there are any signs of damage to the headgear (permanently compressed, thinned or deformed), especially after a severe blow.

(e) Headgear has a limited lifespan. Replace the headgear if it shows obvious signs of wear or if more than three years old.

(f) This headgear is not intended for use other than in Australian Football

Headgear shall be accompanied by a brochure or detachable label which shall include information covering the following topics, in letters no less than 2 mm:

(g) Cleaning instructions in English or using standard icons.

(h) Headgear may be seriously damaged by substances such as petrol, paint, adhesives, or cleaning agents.

(i) Australian supplier's name and business address.

NOTE: Headgear supplier to modify 9(g) to (i) as required and add information as required by law or otherwise, e.g. place of manufacture, fitting instructions, images of how to fit and wear.

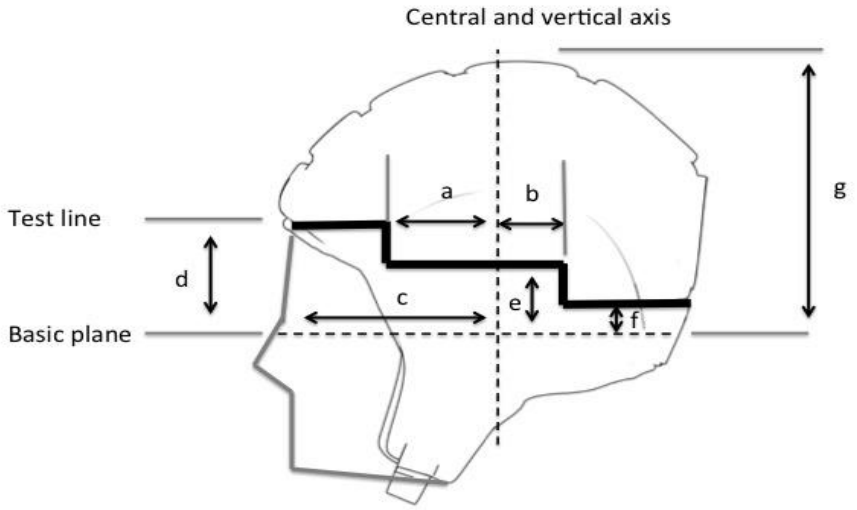

Figure 1: Extent of protection.

Table 2: Test line dimensions with reference to common headform sizes & Figure 1.

	Dimensions (mm)						
Headform Size	a	b	c	d	e	f	g
A	23	65	88	59	24.5	10	113.5
E	29.5	65	94.5	64	29	10	122
J	36	65	101	66	31	15	130
M	41	65	106	67	31.5	15	136
O	43.5	65	108.5	68	32	15	140

NOTE: At the time the standard was developed there was no extra-large headgear that was exclusively suitable for the 'O' headform.

AFL ADVANCED HEADGEAR STANDARD – AFL AHS 2024

Foreword

Headgear that complies with the Advanced Headgear Standard is considered suitable for Australian Football games and training sessions, where the wearer may fall or be struck in the head by another player or object, and head impacts may occur multiple times. The injury prevention performance focus of the Advanced Headgear Standard is reducing: i) the magnitude of force and head acceleration associated with head impacts, ii) the likelihood and severity of sports-related concussion, and iii) superficial head injuries in areas covered by headgear.

The Advanced Headgear Standard assesses directly the capacity of the headgear to mitigate angular head acceleration and velocity. Angular head acceleration and velocity are considered to contribute to the causation of concussion. Headgear complying with the Advanced Headgear Standard shall also meet all performance requirements of the Basic Headgear Standard.

The protection given by headgear depends on the circumstances and characteristics of the impact(s) and the wearing of headgear cannot always prevent injury to the head and/or face. A proportion of the energy of an impact is absorbed by headgear, thereby reducing the impact force applied to the head and the head's acceleration.

Headgear cannot prevent serious head injury, skull fractures or fatal head injuries. Headgear is unlikely to prevent neck and cervical spine injuries.

Headgear that has been damaged through impact loading, normal use and/or wear and tear should be replaced.

At the time of preparing this standard, the in-use lifespan of headgear has not been established. The current recommendation is three seasons.

1. Scope

The Advanced Headgear Standard specifies requirements for headgear for Australian Football players, designed to mitigate the adverse effect of a blow to the head.

The Advanced Headgear Standard is written with particular reference to Australian Football players, but may also be applicable to players in other types of contact football such as Rugby League and Rugby Union, however the Advanced Headgear Standard has not been developed in consideration for those sports or with the governing bodies of those sports.

Marking requirements and instructions for use and care are also included.

Headgear manufactured to be compliant with the Advanced Headgear Standard are not intended for use in other activities.

2. Objective

The objective of the Advanced Headgear Standard is to provide Australian Football players with headgear that may reduce the magnitude of force and head acceleration associated with head impacts, the likelihood and severity of sports-related concussion, and the occurrence of superficial head injuries (e.g. cuts and abrasions), which may occur during participation in Australian Football games and training sessions.

3. Referenced Documents

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 lest specimens and laboratory conditions
2512.3.1	Method 3.1: Determination of impact energy attenuation - Helmet drop test
2512.5.2	Method 5.2: Determination of strength of retention system - Dynamic strength
2512.7.2	Method 7.2 Determination of stability of protective helmets - Dynamic stability
AFL BHS 2024	AFL Basic Headgear Standard
SAE J211	Instrumentation for Impact Test - Part 1 - Electronic Instrumentation

4. Definitions

The definitions given in AS/NZS 2512.1 shall apply.

The word “shall” denotes that the requirement is mandatory or normative. The word “should” denotes voluntary or informative.

5. Construction

The headgear shall comply with the performance requirements of AFL BHS 2024 and common Marking and Labelling requirements.

6. Testing

6.1 General

The headgear provided for testing shall comply with the performance requirements of AFL BHS 2024. In addition to meeting the test requirements of AFL BHS 2024, headgear shall meet the test requirements specified here in sections 6 and 7.

6.2 Samples

Headgear shall be supplied to the test facility in the condition in which they are offered for sale. In addition to the minimum of six headgear units per size required in AFL BHS 2024, three headgear units of the same model and size shall be submitted for testing to AFL AHS 2024. The headgear size shall be suitable for a 50th percentile Hybrid III Anthropomorphic Test Device (ATD). The head circumference of a 50th percentile Hybrid III headform is 570 mm.

If a specific model has more than one size that fits the 50th percentile Hybrid III headform, all of these sizes shall be submitted separately (i.e. three units of each) for testing.

If there is no size that is suitable for a 50th percentile Hybrid III headform, because the model size is too small, a 5th percentile Hybrid III headform shall be used.

At least one headgear unit for each model in each size shall be submitted for visual assessment. The visual assessment shall be undertaken to determine whether headgear model sizes that do not fit the 50th percentile Hybrid III headform are constructed in accordance with those sizes that do fit the 50th percentile Hybrid III headform.

Headgear shall be accompanied by instructions for use and care (Clause 9).

6.3 Testing sequence

All headgear shall be tested in the ambient condition. Tests to clause 7.1 will then be performed on all three headgear units as described in Table 3

Table 3: Test sequence for Advanced headgear

Test Sample No	Test requirement
1	Visual assessment. Assessment of fit on 50th percentile Hybrid III headform
2	Conditioned to Ambient temperature 7.1 Impact energy attenuation
3	Conditioned to Ambient temperature 7.2 Linear impactor tests

6.4 Conditioning

All headgear shall be conditioned according to AS/NZS 2512.2 for ambient temperature. Each headgear unit shall then be subjected to the tests required by this Standard and shall satisfy the requirements of the tests.

6.5 Headforms

For the purpose of testing to the requirements of this Standard, impact testing shall be conducted using a calibrated 50th percentile Hybrid III ATD head and neck assembly. See 6.2 regarding headgear that is too small for the 50th percentile Hybrid III head.

6.6 Positioning

Headgear shall be positioned on the headform using the helmet positioning index as supplied by the supplier, which has been determined in accordance with the requirements of AS/NZS 2512.1, and interpreted by the testing house for the Hybrid III headform.

NOTE: The helmet positioning index should be given by the supplier to any person requesting the information.

6.7 Test Sites

For the impact energy attenuation tests (7.1), headgear shall be tested at four sites marked prior to conditioning on or above the test line as defined in clause 6.7 of AFL BHS 2024.

For the linear impactor tests (7.2), headgear shall be tested at six sites marked prior to conditioning on or within a zone 50 mm above the test line as defined in AFL BHS 2024. The distance between any two sites, measured over the surface of the headgear shall not be less than one seventh of the nominal 570 mm 50th percentile Hybrid III headform circumference. The centre of impact shall be in the area on or within the band 50 mm above the test line. The planes of the impactor head and area of headform shall as much as possible be parallel in the area of impact.

Note: The test zone requirement is intended to focus impact testing on sites commonly impacted in Australian Football and restrict the impact force vector orientation to an alignment largely with the head's transverse plane. The test zone also prevents testing to the top of the head, where extra padding may not be necessary due to impact exposure patterns in Australian Football, and where the biofidelity of the Hybrid III neck may confound the test results.

7. Testing Requirements

7.1 Impact energy attenuation

When determined in accordance with AS/NZS 2512.3.1, the headform acceleration shall not exceed the following:

(a) Peak acceleration 100 g in first impact test at each test site.

(b) Acceleration of 60 g for a cumulative duration of 3.0 ms.

(c) Peak acceleration of 140 g for either of the second and third successive tests.

Note: The acceleration due to gravity (g) should be taken as 9.81 m/s^2

The centre of impact shall be on or above the test line. As a result, areas below the test line may be contacted during a test.

None of the protective components of the headgear shall become detached as a result of a test impact.

Headgear shall be subjected to impacts at four sites with three successive impacts at two of the four sites. The three successive impacts shall be completed within five minutes of the first impact. The minimum time between tests shall be one minute.

The impact speed shall be 2.43 +0.1, 0 m/s. The nominal height for the guided free fall impact tests onto flat anvils is 300 mm.

7.2 Linear impactor tests

7.2.1 Performance requirements

When determined in accordance with clauses 7.2.2 and 7.2.3, the headform accelerations shall not exceed the following:

(a) Peak resultant linear acceleration 75 g on first test at each test site.

(b) On repeat tests the peak resultant acceleration shall not exceed 115 g.

(d) Peak resultant angular acceleration 5000 rad/s^2.

(e) On repeat tests the peak resultant angular acceleration shall not exceed 7500 rad/s^2.

Note: The acceleration due to gravity (g) shall be taken as 9.81 m/s^2.

None of the protective components of the headgear shall become detached as a result of a test impact.

Headgear shall be subjected to impacts at six sites with three successive impacts at two of the six sites. The three successive impacts shall be completed within eight minutes of the first impact. The minimum time between tests shall be one minute.

The impact force vector shall be radial (centric) with regards to the head centre of mass.

Note: This is to ensure that the impact energy is fully transferred to the Hybrid III.

7.2.2 Test Device

The linear impactor shall comprise the following components:

a) The impactor assembly: an impactor rod, an impactor head and an impactor head interface (Figure 2).

b) A machine for propelling the impactor assembly to the specified speed +/- 5%.
c) A mechanism for guiding the impactor assembly, e.g. one or more linear bearings.
d) The linear impactor shall propel the impactor assembly to a target speed, shall permit guided free flight prior up to and during the entire contact phase with the Hybrid III and headgear, and shall brake the impactor assembly at the cessation of the contact phase.
e) A pedestal device is required for mounting the Hybrid III head and neck assembly. The pedestal device shall allow rotation of the Hybrid III head and neck assembly in the transverse plane and vertical height adjustment. The base of the pedestal shall be immobile during all impact tests.
f) A method for measuring the pre-impact speed of the impactor head within 25 mm of the point of contact with the headgear.

The total mass of the impactor assembly shall be 4 kg.

The dimensions of the impactor head shall be: mass $\geq$ 1.0 kg, thickness = 25 mm and diameter = 76.2 mm.

The dimensions of the impactor head interface shall be:

a) Thickness = 18 mm.
b) Diameter = 76.2 mm.
c) Planned angle on impactor striking face = 10 degrees (each side 5 degrees).
d) Polyurethane 70A Duro (Shore hardness 65 to 70).

The following instrumentation and signal conditioning are required:

(a) Three-axis linear accelerometer assembly mounted at the centre of mass of the Hybrid III headform.
(b) Instrumentation for measuring the three-axis angular acceleration of the Hybrid III headform. Acceptable methods are: nine linear accelerometer array, angular velocity transducers from which angular acceleration can be derived or angular accelerometers.
(c) Linear acceleration for the derivation of the peak centre of mass headform acceleration shall be conditioned according to SAE J211 Channel Frequency Class 1000 (CFC1000) filter.
(d) Angular acceleration shall be conditioned according to SAE J211 CFC180 filter.
(e) All data are to be acquired at 20 000 Hz.

7.2.3 Test conditions

The impactor assembly speed as measured within 25 mm of contact with the headgear shall be 4 m/s (+5%, 0%).

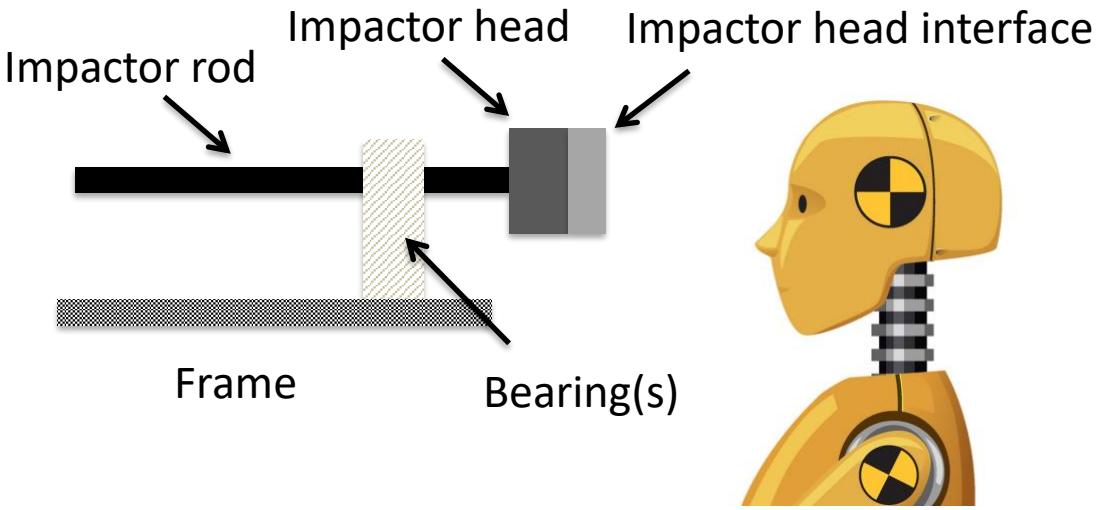

Figure 2: Schematic diagram of linear impactor.

8. Marking

Each headgear unit and packaging shall be marked as per clause 8 of AFL BHS 2024, with the following exception at 8.1 (e): The headgear is to be labelled with the words 'AFL AHS 2024'

9. Labelling

Labelling shall comply with clause 9 of AFL BHS 2024.

APPENDIX A – AFL BHS 2024 PRODUCT CONFORMITY AND BATCH TESTING

Claims of conformance to the Basic Headgear Standard shall be based on tests conducted to a defined batch testing schedule.

A 'batch' is a quantity of headgear (same make, model and size) which is manufactured consecutively under the same conditions, design and materials.

The following tests shall be conducted according to the following sample frequency:

- 7.2 Dynamic stability
- 7.3 Impact energy attenuation
- 8.1 Marking

Level 1 (initial stage of new headgear)

Batch size = 504.

Four units per batch to be tested after conditioning (as per table 1)

Level 2

After the successful testing of the first ten batches of 504, the batch size shall increase to 1004.

Batch size = 1004.

Four units per batch to be tested after conditioning (as per table 1)

Level 3

After successful testing of twenty Level 2 batches (n=1004), batch testing reduced to testing one size per batch.

Batch size = 1004.

The headgear sizes selected for testing at Level 3 batch shall be alternated, e.g. small, medium, large, small etc.

Four units per batch to be tested after conditioning (as per table 1)

Batch failure

If batch test failures detected, a retest of four units per size shall be performed from the batch, e.g. at level 1 an additional four units per 504 and at level 2 an additional four units per 1004.

If the additional four units pass, the headgear shall be deemed compliant with the standard, but the batch testing schedule will reset to Level 1.

If there are one or more failures on the additional four units, the batch shall be deemed a failure and the manufacturer shall take necessary actions in accordance to the requirement of the certification body.

APPENDIX B – AFL AHS 2024 PRODUCT CONFORMITY AND BATCH TESTING

Claims of conformance to the Advanced Headgear Standard shall be based on tests conducted to a defined batch testing schedule.

The following tests shall be conducted according to the sample frequencies described below:

- 7.1 Impact energy attenuation
- 8. Marking

Level 1 (initial stage of new headgear)

Batch size = 504.

Four units per batch to be tested after conditioning (as per table 1)

Level 2

After the successful testing of the first ten batches of 504, the batch size shall increase to 1004.

Batch size = 1004.

Four units per batch to be tested after conditioning (as per table 1)

Level 3

After successful testing of twenty Level 2 batches (n=1004), batch testing reduced to testing one size per batch.

Batch size = 1004.

The headgear sizes selected for testing at Level 3 batch shall be alternated, e.g. small, medium, large, small etc.

Four units per batch to be tested after conditioning (as per table 1)

Batch failure

If batch test failures detected, a retest of four units per size shall be performed from the batch, e.g. at Level 1 an additional four units per 504 and at Level 2 an additional four units per 1004.

If the additional four units pass, the headgear shall be deemed compliant with the standard, but the batch testing schedule will reset to Level 1.

If there are one or more failures on the additional four units, the batch shall be deemed a failure and the manufacturer shall take necessary actions in accordance to the requirement of the certification body.