

**STANDARD PERFORMANCE
SPECIFICATION FOR
NEWLY MANUFACTURED FOOTBALL HELMETS**

NOCSAE DOC (ND) 002 – 17m24a

Prepared By

NOCSAE®

**NATIONAL OPERATING COMMITTEE
ON STANDARDS FOR ATHLETIC EQUIPMENT**

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1. Scope

- 1.1 This standard specification establishes performance requirements for new football helmets as supplied by manufacturers. The requirements of this standard shall be subject to Level 3 compliance criteria unless otherwise stated herein.
- 1.2 **All testing and requirements of this standard specification must be in accordance with NOCSAE DOC (ND) 001 except where modified herein.**
- 1.3 **All testing and requirements of this standard specification must be in accordance with NOCSAE DOC (ND) 081 except where modified herein.**
- 1.4 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 NOCSAE DOC (ND) 001: *Standard Drop Test Method and Equipment Used in Evaluating the Performance Characteristics of Protective Headgear*
- 2.2 NOCSAE DOC (ND) 015: *Standard Test Method and Specification Used in Evaluating the Corrosion Characteristics and Effects on Metallic Hardware Disassembly.*
- 2.3 NOCSAE DOC (ND) 081: *Standard Pneumatic Ram Test Method and Equipment Used in Evaluating the Performance Characteristics of Protective Headgear and Faceguards*

3. Test Sample Size

- 3.1 For any standalone test report; at least four (4) of each model and size must be tested. Two helmets will be subjected to the drop test and two helmets will be subjected to the pneumatic ram test.

4. Helmet Preparation

- 4.1 Helmets shall be tested complete in the condition as offered for sale.
- 4.2 Helmets used for testing shall be selected in a random manner.
- 4.3 Faceguards: Helmets must be provided with faceguards and faceguard specific hardware when tested on the pneumatic ram and without faceguards and faceguard specific hardware when tested on the drop test system.
- 4.4 A separate set of samples shall be used for each test method.
- 4.5 To obtain a reasonable fit (as determined by the test technician) for testing purposes, helmets larger than size 7 5/8 **may** require "shim" pads to be inserted between the largest NOCSAE headform and the interior of the helmet, opposite from the impact site.
- 4.6 Helmets of a given model with a size smaller than 6 5/8 may not fit the smallest NOCSAE headform. In that event, testing of that size is waived so long as the other sizes of that model have been tested and meet all requirements.

- 4.7 The jaw pads in the helmet may be replaced with a different thickness than originally supplied so that those pads firmly contact the headform jaw area, but without spreading the shell. This would be done prior to securing the chin strap to the chin of the headform.
- 4.8 Conditioning Environments:
 - 4.8.1 Ambient Temperature: Expose product to conditioned temperature of $72^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ($22^{\circ} \pm 2^{\circ}\text{C}$) for a minimum of four hours.
 - 4.8.2 High Temperature: Expose product to conditioned temperature of $100 \pm 3^{\circ}\text{F}$ ($39 \pm 1^{\circ}\text{C}$) for at least four hours and a maximum of twenty-four (24) hours.
 - 4.8.2.1 When performing high temperature testing, the first impact shall occur between the first and second minute after removing the sample from the conditioning environment. Successive impacts in each location shall occur 75 seconds (± 15 sec) after the preceding impact. If the sample cannot be tested within these time constraints, the sample must be returned to the conditioning environment for a minimum of three minutes for each minute the sample is out of the conditioning environment. Conditioning must be complete before testing can resume on the sample.

5. Impact Attenuation Tests

- 5.1 Drop Impact Test
 - 5.1.1 Impact locations are described in Section 19, NOCSAE DOC 001. See Figures 1 and 2.
 - 5.1.2 Drop tests shall be conducted using the procedures and equipment described in ND 001.
 - 5.1.3 Each submitted sample designated for drop impact testing shall be impacted in accordance with Table 1 below and as depicted in Figure 1.
 - 5.1.3.1 Impacts must be conducted in sequence from the lowest drop velocity through the highest for each location specified in Table 1.
 - 5.1.4 Impacts shall be conducted on the 1/2" *Test MEP Pad*.
 - 5.1.5 At least two (2) locations, not to exceed four (4) locations, are to be selected for the high temperature impacts. This is accomplished by determining which of the 17.94 ft/s ambient temperature locations tested yielded the two highest severity indexes on each of the ambient samples. Those locations shall be tested at high temperature on both samples subjected to high temperature testing.
 - 5.1.5.1 The high temperature condition impacts must be done after the ambient temperature impacts.

TABLE 1
Drop Test Impact Schedule
Velocity +3% -0%

Conditioning Environment	IMPACT VELOCITY FT/S (M/S)	FRONT	SIDE	F. BOSS	R. BOSS	REAR	TOP	RANDOM
Ambient Temperature	11.34 (3.46)	X	X	X	X	X	X	X
	13.89 (4.23)	X	X					
	16.04 (4.88)	X	X					
	17.94 (5.46)	X	X	X	X	X	X	X
	17.94 (5.46)	X	X	X	X	X	X	X
High Temperature	17.94 (5.46)	Minimum of 2 Locations but no more than 4 Locations Based on Results from Ambient Testing. See Section 5.1.45						
	17.94 (5.46)							

5.2 Pneumatic Ram Tests

5.2.1 Pneumatic Ram tests shall be conducted using the procedures and equipment described in ND 081.

5.2.1.1 Impact locations are described in ND081 Section 8.

5.2.1.2 Impacts shall be conducted using the equipment described in ND081 Sections 6.1 through 6.12.

5.2.2 Each submitted sample helmet designated for pneumatic ram testing shall be impacted in accordance with Table 2 below.

5.2.2.1 Helmets designated by the manufacturer as “Youth” may be impacted in accordance with Table 3.

TABLE 2
Pneumatic Ram Impact Schedule
Velocity \pm 3%

Conditioning Environment	IMPACT VELOCITY FT/S (M/S)	SIDE	REAR BOSS CG	REAR BOSS NON CENTRIC	REAR	FRONT BOSS	RANDOM
Ambient Temperature	19.7 (6.0)	X	X	X	X	X	X

TABLE 3
Pneumatic Ram Impact Schedule - Youth
Velocity \pm 3%

Conditioning Environment	IMPACT VELOCITY FT/S (M/S)	SIDE	REAR BOSS CG	REAR BOSS NON CENTRIC	REAR	FRONT BOSS	RANDOM
Ambient Temperature	16.4 (5.0)	X	X	X	X	X	X

6. Test Requirements

- 6.1 The peak severity index of any impact shall not exceed 1200 SI.
- 6.2 The 11.34 ft/s impacts designated in Table 1 must not exceed 300 SI*.
- 6.3 The peak severity index of any pneumatic ram test shall not exceed 1200 SI.
- 6.4 The peak rotational acceleration of any pneumatic ram test conducted on the medium headform shall not exceed 6,000 rad/s²**.
- 6.5 Helmet repositioning during testing is anticipated. Any structural changes or other changes that take place during impact testing which result in un-restorable loosening of the fit shall be cause for failure. In the case of helmets "shimmed", the replacement or repositioning of shims is allowed.
- 6.6 A passing helmet model is able to withstand all impacts at an acceptable SI and/or peak rotational acceleration and meets all other requirements when tested in accordance with this performance specification.

7. Construction

- 7.1 General: Headgear is worn on the head in an effort to reduce or minimize injury to that portion of the head which is within the specified area of coverage. Headgear shall be constructed to reduce the risk of injury to the wearer and to remain on the wearer during impact. Optional devices fitted to the headgear/equipment shall be designed so that they are unlikely to cause injury during use. For example: wire face protectors must not be designed with weld junctions and/or wire terminus ends in the ocular area, such that in the event of a weld separation, the wire ends could come into contact with the ocular area.
- 7.2 The protective equipment must survive all test protocols substantially intact and ready for use.
- 7.3 Projections: Internal rigid projections that may contact the wearer's head during impact shall be covered to reduce the likelihood of injury. Pressure sensitive film or electronic methods may employed to evaluate the transmitted force of internal projections suspected to be a

* This requirement shall be subject to Level 2 compliance criteria.

** This requirement shall be exempt from the requirements set forth in NOCSAE DOC 001, Section 6.4.1.

likely source of injury, such forces shall be limited to a maximum of 750 lbs/in².

7.4 Metallic Hardware as defined in ND 001 shall meet the requirements of ND 015.

8. Materials

8.1 Materials used in the product shall be durable and resistant to exposure to sun, rain, cold, dust, vibration, perspiration, and products likely to be applied to the skin or hair. Materials known to cause skin irritation or disease shall not be used. Lining materials, if used, may be detachable for washing. If hydrocarbons, cleaning fluids, paints or transfers/decals or other additions may affect the equipment adversely, a warning shall be provided.

9. Labels and Warnings

9.1 Each helmet shall be permanently and legibly labeled or marked in a manner such that the following information can be easily read and is not obscured in any manner.

9.1.1 Name of Manufacturer

9.1.2 Model of Designation

9.1.3 Size

9.2 Each helmet shall be permanently and legibly labeled or marked in a manner such that the following additional information can be easily read without removing any permanent component. The following labels shall contain a signal word which shall not be obscured in any manner:

9.2.1 A label that warns the user that no helmet can protect against all possible impacts and the protective device must be fitted and attached properly in accordance with the manufacturer's fitting instructions.

9.2.2 A label that warns the user that the helmet can be damaged by accidental, incidental, or intentional contact with common substances (for example, certain solvents, cleaners, hair treatments, etc.) and that this damage may or may not be visible to the user. This label should also list any recommended cleaning agents or procedures, or both.

9.3 Helmets certified under the youth pneumatic ram impact level must be clearly, legibly, and permanently labeled "Youth" on the exterior of the helmet. Manufacturers shall define what level of play or age or other restrictions apply to the "Youth" designation.

9.4 Each helmet shall have permanently affixed to the exterior of the shell a clearly legible statement which can be easily read without removal of any decal tape, other temporary material or permanent part, which contains language which effectively communicates to the purchaser and user the following information, using the same or similar language:

WARNING

NO HELMET CAN PREVENT ALL HEAD OR ANY NECK INJURIES A PLAYER MIGHT RECEIVE WHILE PARTICIPATING IN FOOTBALL. HELMETS CANNOT PREVENT CONCUSSION/BRAIN INJURY. SEEK MEDICAL ADVICE BEFORE RETURNING TO PLAY IF YOU SUSPECT ANY INJURY.

DO NOT USE THIS HELMET TO BUTT, RAM OR SPEAR AN OPPOSING PLAYER. THIS IS IN VIOLATION OF THE FOOTBALL RULES AND SUCH USE CAN RESULT IN SEVERE HEAD OR NECK INJURIES, PARALYSIS OR DEATH TO YOU AND POSSIBLE INJURY TO YOUR OPPONENT.

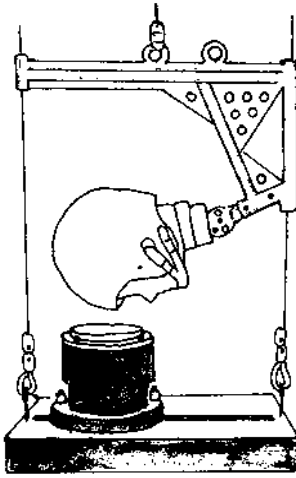
- 9.5 A permanent and legible label or mark that denotes the month and year of manufacture that can be easily read without removing any permanent component. If this mark or label requires a “code” to determine month and year, such code shall be made available upon request.
- 9.5.1 A label that denotes the first intended season of use may be used.
- 9.6. Headgear that are not to be recertified as mandated by the manufacturer shall bear a permanent and legible warning on the exterior of the headgear stating the following:
- 9.6.1. This headgear shall not be recertified
- 9.6.2. The life of certification, which shall be no longer than 5 years from the date of manufacture.
- 9.7. Manufacturers of headgear intended to be recertified shall have a recertification interval provided by the manufacturer.
- 9.8. Fitting instructions shall be provided including any attachment instructions for authorized accessories.
- 9.9. A permanent exact replica of this mark must appear legibly on the exterior of the shell.



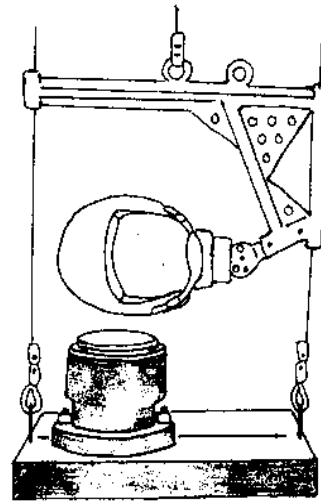
NOTE: You must have an executed, valid license agreement with NOCSAE to use any of the NOCSAE marks at any time. NOCSAE, the NOCSAE marks, and the National Operating Committee on Standards for Athletic Equipment are registered marks and the exclusive property of the Committee. Use of the marks in any manner is prohibited without prior written permission of the NOCSAE Board of Directors.

This standard is subject to revision at any time by the responsible technical authority and must be reviewed every five years and if not revised either reapproved or withdrawn. Your comments are invited either for revision, modification or creation of additional standards and should be addressed to NOCSAE's Executive Director. Check the web at www.nocsae.org to obtain the latest version of a standard.

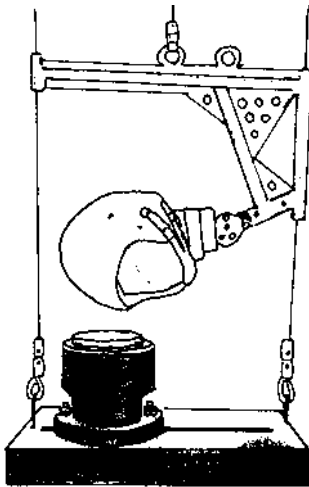
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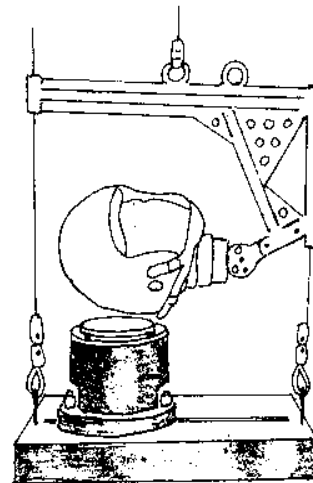
Front Impacts



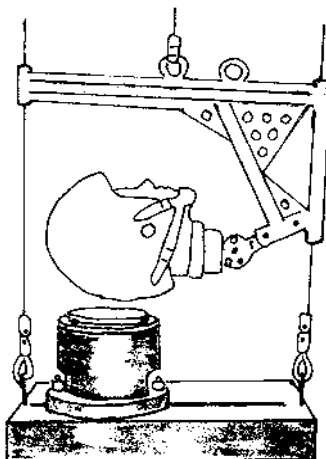
Side Impacts



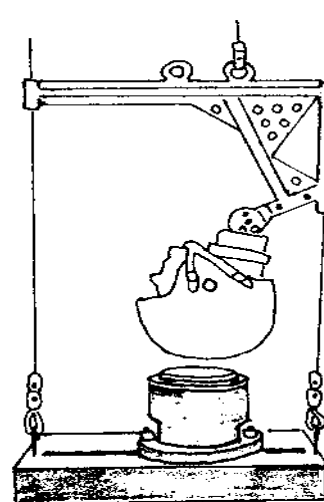
Front Boss Impacts



Rear Boss Impacts



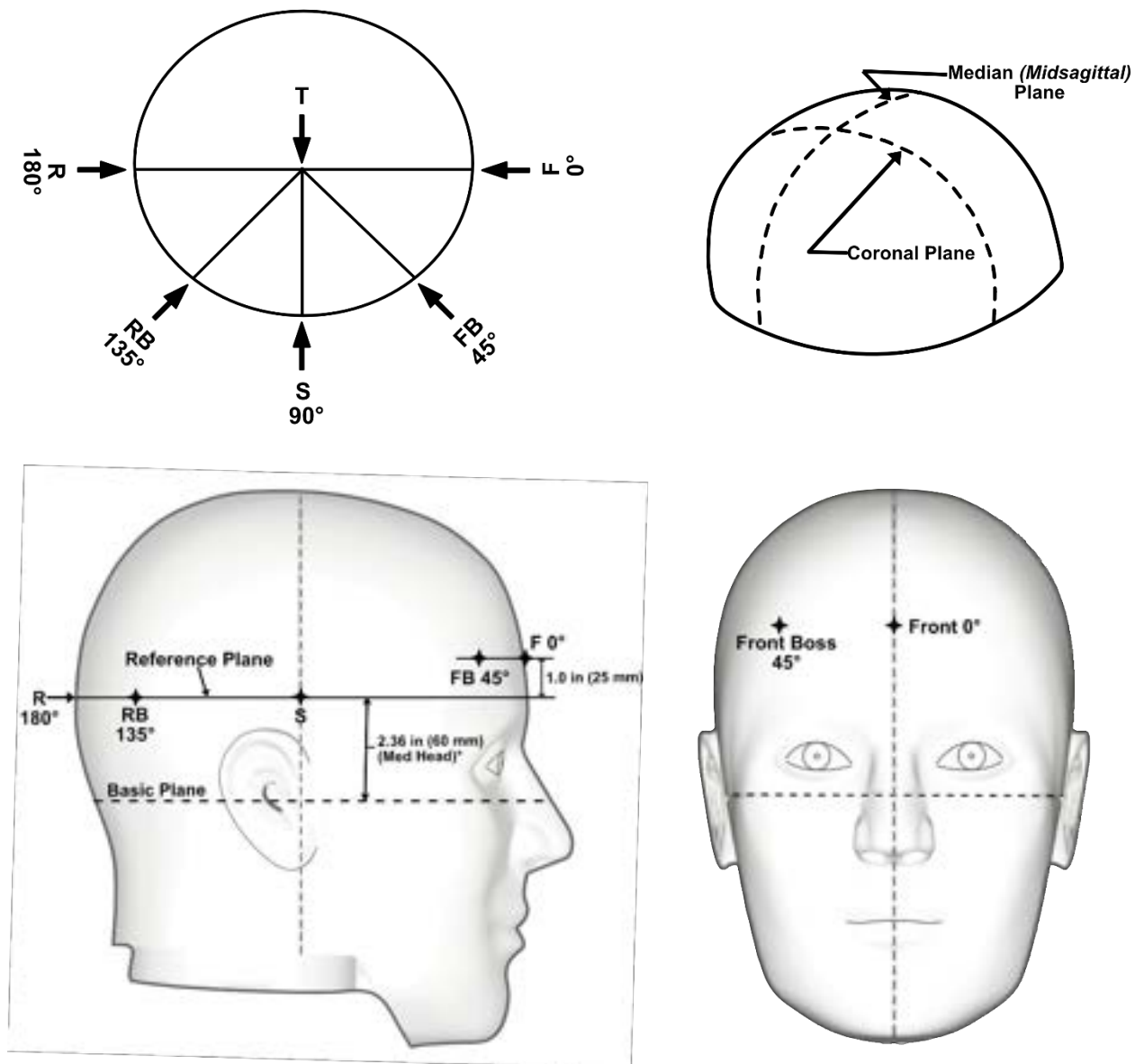
Rear Impacts



Top Impacts

FIGURE 1

IMPACT AREA – DROP TEST



*For the small headform, the REFERENCE PLANE is 2.16 inches above the BASIC PLANE. For the large headform, the REFERENCE PLANE is 2.48 inches above the BASIC PLANE.

Impact Area – For a helmet that is to be tested on the medium headform** the impact area must include all locations on the headform above the BASIC PLANE rearward of a location 2.5 inches (64mm) forward of where the BASIC PLANE intersects with the CORONAL PLANE and any point on or above the REFERENCE PLANE in front of that same intersection.

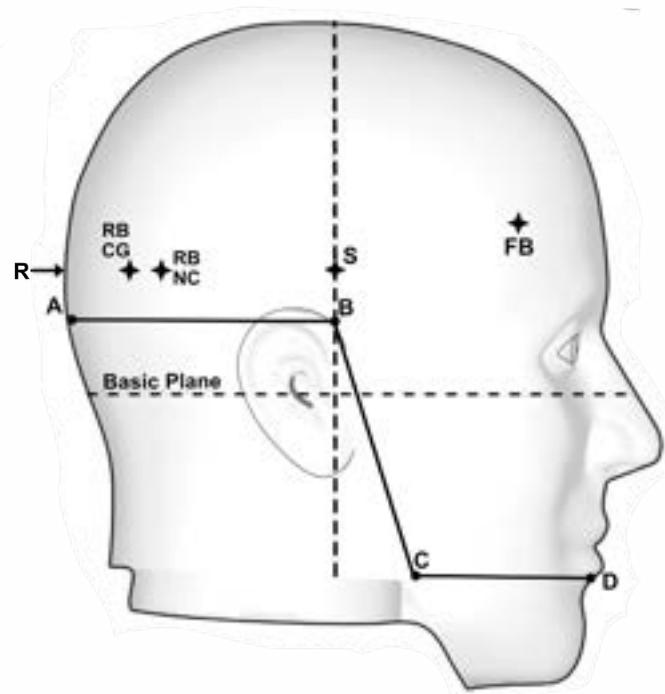
**For the small headform use 2.25 inches and for the large headform use 2.75 inches.

The random impact location may be selected from any point within the allowed impact area but not closer than 1 inch (25mm) from the edge of the helmet nor less than 1 inch (25mm) from any previous impact.

Random impact locations chosen must allow the rotator assembly to be locked in the position selected.

FIGURE 2

IMPACT AREA – PNEUMATIC RAM



Impact Area – for a headgear that is to be tested on the medium headform*, the impact area must include all locations on the headform which lie on or above a line (AB) $1 \frac{3}{16}$ inches above and parallel to the BASIC PLANE posterior to the CORONAL PLANE and on or above a line (CD) $2 \frac{3}{8}$ inches below and parallel to the BASIC PLANE forward of a point $1 \frac{3}{16}$ inches anterior to the CORONAL PLANE, and forward and above line (BC) which connects these two lines.

* For the large head forms line AB is $1 \frac{7}{16}$ " above and line CD is $2 \frac{5}{8}$ " below the basic plane. For the small headform line AB is $\frac{15}{16}$ " above and line CD is $2 \frac{1}{8}$ " below the basic plane.

For additional impact location information see ND081

FIGURE 3

MAY 1998 MODIFICATIONS/REVISIONS

- Added depictions of the helmet impacts and referenced them in 5.3.

JANUARY 2002 MODIFICATIONS/REVISIONS

- Simplified document references within document.

APRIL 2003 MODIFICATIONS/REVISIONS

- Changed naming convention and added NOCSAE logo to cover page.

JULY 2005 MODIFICATIONS/REVISIONS

- Added Figure 2, Impact Locations.

MAY 2009 MODIFICATIONS/REVISIONS

- Modified section 5.5 for clarity.

JANUARY 2011 MODIFICATIONS/REVISIONS

- **REVISION-** Change drop heights to drop velocities. Clarified attachment of component requirement.

FEBRUARY 2011 MODIFICATIONS/REVISIONS

- **REVISION-** Added low level impact requirement. Clarified test requirements.

MAY 2012 MODIFICATIONS/REVISIONS

- Clarified section 3 for standalone test report
- Moved requirements to section 4 from section 3 for clarity

DECEMBER 2013 MODIFICATIONS/REVISIONS

- **REVISION-** Reduced high temperature conditioning range. Added impacts conducted at high temperature.

OCTOBER 2014 MODIFICATIONS/REVISIONS

- Updated document to include level of compliance requirements.
- Added Date specification becomes effective
- Updated title name of NOCSAE DOC. 001
- Added SEI Certification NOCSAE Logo to Section 7, "Labels and Warnings"

JUNE 2015 MODIFICATIONS/REVISIONS

- Updated NOCSAE seal/logo artwork

JANUARY 2017 MODIFICATIONS/REVISIONS

- REVISION: Added pass/fail criteria of 1200 SI for the pneumatic ram test.
- REVISION: Removed rotational acceleration pass/fail criteria for the 6 ⁵/₈ and 7 ⁵/₈ headform sizes.

FEBRUARY 2017 MODIFICATIONS/REVISIONS

- Changed “linear impactor” to “pneumatic ram” in section 2.2

JULY 2017 MODIFICATIONS/REVISIONS

- Changed effective date from July 1, 2018 to November 1, 2018
- Added tolerance of +/-3% to pneumatic ram impact velocities

JULY 2018 MODIFICATIONS/REVISIONS

- Changed effective date from to November 2018 to May 2019

JANUARY 2019 MODIFICATIONS/REVISIONS

- Changed effective date from May 2019 to November 2019

DECEMBER 2019 MODIFICATIONS/REVISIONS

- Corrected typo in section 7.2

AUGUST 2021 MODIFICATIONS/REVISIONS

- Added equipment specification reference for pneumatic ram test

JUNE 2024 MODIFICATIONS/REVISIONS

- Replaced references to Sections of ND 001 with the referenced language
- Moved Conditioning Environment, Construction, and Materials requirements from ND 001
- General formatting
- Added ND 015 as a referenced document

DECEMBER 2024 MODIFICATIONS/REVISIONS

- Corrected section reference in Table 1