

**STANDARD TEST METHOD AND
SPECIFICATION USED
IN EVALUATING THE
CORROSION CHARACTERISTICS
OF HARDWARE**

NOCSAE DOC (ND) 015- 08m09

Prepared By



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

Modified May 2009
Effective January 2010

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1. Scope

- 1.1. This standard test method and specification describes laboratory equipment, test methods and performance requirements pertinent to corrosion testing hardware. It is hoped this standard will facilitate emergent access to an injured player.
- 1.2. *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. STANDARD TEST METHOD AND EQUIPMENT USED IN EVALUATING THE PERFORMANCE CHARACTERISTICS OF PROTECTIVE HEADGEAR / EQUIPMENT, NOCSAE DOC.001.

3. Definitions

- 3.1. Hardware – Hardware: Any device, arrangement, or component (not otherwise defined) that facilitates an object to become attached to headgear/equipment, including those systems that are integral to or apart from any other headgear/component, including all components of any mounting system. Examples are bolts, t-nuts, washers, snaps, and other fasteners.

4. Sample Size

- 4.1. A statistically relevant sample must be tested, see NOCSAE DOC ND001 section 11. A minimum of two complete systems is required for each test.

5. Corrosion Test

5.1. Sample Preparation

- 5.1.1. Note the technique(s) required to assemble and unassembled the hardware as applicable before cleaning and corrosion testing.
- 5.1.2. Metallic components must be immersed and agitated in isopropyl alcohol (91%) for no less than 15 seconds, and allowed to air dry at ambient laboratory temperature, 72° F, $\pm 5^\circ$ F (22° C, $\pm 2^\circ$ C) for a minimum of one hour prior to testing. If the part does not appear to be free of surface lubricants or temporary preservatives or other foreign matter that may effect the test, then addition immersion and mechanical cleaning with a non metallic brush or cloth must be used. Forceps or equivalent device must be used to handle the metallic parts after they have been immersed/cleaned.
- 5.1.3. Hardware shall be assembled as intended for use prior to submersion. For example, t-nuts and fasteners shall be placed through a shell opening (a suitable size of shell surrounding the opening shall be used) and fastened through washers, hangers or other hardware as designed for use in attaching components to headgear/equipment.

5.2. Submersion

5.2.1. Obtain a minimum of 0.500 L saline solution, which is made with a ratio of 4 - 6% (by weight) table salt and warm (approximately 98 °F) sodium-free distilled water; agitate solution until all salt appears to be dissolved, there should be little or no sediment. To the saline solution just prior to using add an appropriate amount of 3% solution of hydrogen peroxide, to obtain an 8 – 10% (by weight) solution of hydrogenated saline solution.

5.2.2. Assemblies/components shall be submerged in the hydrogenated saline solution and placed in a nonmetallic chemically inert, lidded container. The metallic parts shall be totally covered by the saline solution. Hardware that is not intended to be joined shall be isolated from one another while submerged.

5.3. The lidded container, to reduce evaporation but not allow pressure buildup, shall be placed in a 120 ± 2 °F environment for a minimum of 120 hours. If evaporation to the point of exposing any part of any test component occurs, the test shall be invalid. Solution may not be added to the container during the test.

5.4. Performance Requirements

5.4.1. The hardware shall then be removed from the hydrogenated saline solution and allowed to air dry at ambient laboratory temperature for a minimum of 48 hours prior to inspection. Discard the used solution in an appropriate manner.

5.4.2. The metallic parts will be visually inspected for signs of corrosion and pitting under ordinary light using a low magnification glass (i.e. 10x loop or less) if necessary to determine the extent of corrosion and pits that may have formed in the metal. A probe may be used to investigate the extent of any pits that occur in a coating or plating to determine if the pits extends into the base material. Results of the examination are reported as simple comments and are not part of the performance criteria.

5.4.3. Verify that the hardware functions in the manner intended after exposure to the hydrogenated saline solution. This can be determined by observing the technique(s) required to operate the hardware before exposure as compared to the technique(s) required to perform the same operation after exposure. Hardware that functions in a manner that requires significant differences in technique(s) between the operation of the hardware prior to corrosion testing as compared to after corrosion testing, constitutes a failure.

6. Reports

6.1. Maintain complete test records for all testing. The records can be stored on paper, electronically or photographically. The test report shall contain the following information

6.1.1. Name and location of the test laboratory.

6.1.2. Name of Laboratory Technician.

6.1.3. Name/Part Number of each hardware tested, name of manufacturer and date of manufacture.

6.1.4. Observed temperatures in each conditioning and testing environment.

6.1.5. Results of visual inspection performed in section 5.4.2.

6.1.6. Results of hardware function performed in section 5.4.3.

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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MAY, 2009 MODIFICATIONS/REVISIONS

- Modified section 5.2.1 and 5.4.1 for clarity