

**LABORATORY PROCEDURAL GUIDE
FOR CERTIFYING NEWLY MANUFACTURED
CHEST PROTECTORS FOR COMMOTIO CORDIS**

NOCSAE DOC (ND) 201 – 18

Prepared By



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ON STANDARDS FOR ATHLETIC EQUIPMENT**

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1 Scope

- 1.1 This procedural guide establishes recommended practices for the certification of chest protectors to commotio cordis.
- 1.2 **All testing and requirements of this standard specification must be in accordance with NOCSAE DOC 200, NOCSAE DOC 021, and NOCSAE DOC 001.**
- 1.3 *This recommended practice 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 recommended practice 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) 200: *Standard Test Method and Performance Specification Used in Evaluating the Performance Characteristics of Chest Protectors for Commotio Cordis*
- 2.2 NOCSAE DOC (ND) 021: *Standard Projectile Impact Test Method and Equipment Used in Evaluating the Performance Characteristics of Protective Headgear/Projectiles*
- 2.3 NOCSAE DOC (ND) 001: *Standard Test Method and Equipment Used in Evaluating the Performance Characteristics of Headgear/Equipment*

3 Test Equipment Required

- 3.1 NOCSAE Thoracic Surrogate (NTS) comprising three 750 lb-f maximum capacity single axis load cells.
- 3.2 Recommended Air Cannon Assembly with Linear Bearing Table (See NOCSAE DOC 021, Figures 1 and 2)
- 3.3 Data acquisition capable of capturing and recording the three individual load cell traces
- 3.4 Baseball or lacrosse ball that complies with the requirements of Section 13, NOCSAE DOC 200. Projectile selection shall be determined by the manufacturer and shall be appropriate for the chest protector's intended activity.
- 3.5 Miscellaneous hand tools

4 System Set-up

- 4.1 The NTS must be tightly connected to a free sliding linear bearing table.
- 4.2 Position the NTS so the base of the surrogate is perpendicular (± 2.5 degrees) to the projectile's line of travel.
- 4.3 Verify the response of the NTS by performing the procedure in Appendix 1 of NOCSAE DOC 200.

5 Laboratory Environment

- 5.1 Expose chest protectors to ambient laboratory environment for a minimum of four hours (see section 12, NOCSAE DOC 001).

6 Chest Protector Preparation

- 6.1 The manufacturer's fitting instructions shall be used to fit the chest protector to the NTS. In the event that these instructions are unclear or result in a fit that is likely to yield erroneous test results, the technician shall fit the chest protector to the best of their ability
- 6.2 The manufacturer may provide a chest protector positioning index. If so specified, then that resulting position shall be used instead of the fitting instructions. In any case, the final decision as to reasonableness of fit rests with the test technician/laboratory.
- 6.3 Sections that are not critical to the performance of the chest protector may be removed to facilitate a proper fit.
- 6.4 A "shim" may be used to take up space between the chest protector fitting system and the back of the NTS to facilitate a proper fit.
- 6.5 Chest protectors used for testing must be selected in a random manner.

7 Sample Selection

- 7.1 See Section 11, NOCSAE DOC 001
- 7.2 Each certifier must test an adequate and representative sample size to be reasonably sure that chest protectors released to use, but not actually tested, will meet the requirements as set out in NOCSAE DOC 200.
- 7.3 Certifiers may be faced with processing chest protectors manufactured from variable raw materials. Sample selection must be random yet demonstrate that raw material variabilities have been accounted for.

8 Testing Procedure for Certification

- 8.1 Perform the pre-test impacts to the unprotected NTS as described in Section 11 of NOCSAE DOC 200.
- 8.2 Chest protectors selected for testing must be tested at the center of the cardiac silhouette ($\pm \frac{1}{4}$ inch) and two random locations at both 30 mph and 50 mph ($\pm 3\%$).
 - 8.2.1 There are no constraints on Random Location #1. Random Location #2 must be a minimum of 4 inches away from the initial point of contact for Random Impact #1.
- 8.3 Prior to each test, position the NTS such that the impact site is located within 24 inches from the point that the projectile is in free flight.
- 8.4 Testing may begin at any location or velocity. It is not necessary to complete all impacts on a given sample before removing the sample from the NTS.
- 8.5 Chest protectors may be repositioned after the completion of an impact.
- 8.6 Once all tests have been completed, perform the post-test impacts to the unprotected NTS as described in Section 11 of NOCSAE DOC 200. The pre-test and post-test system check peak force values (lb-f) must be within 7% to validate the test results.

9 **Reports**

9.1 All reports must comply with Section 14 of NOCSAE DOC 001.