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National Highway Traffic Safety Administration
Docket Management Facility, M-30
U.S. Department of Transportation
1200 New Jersey Avenue S.E.
West Building Ground Floor, Room W12-140
Washington, DC 20590-0001

Subject: NHTSA NPRM HIII 5F Request for Comments
Docket No. NHTSA-2019-0023

Humanetics Innovative Solutions appreciates the opportunity to comment on NHTSA's Notice of Proposed Rulemaking (NPRM) announced December 26, 2019 to update the Hybrid III 5th Female ATD chest jacket and spine box specifications.

Humanetics is the world's largest supplier of Anthropomorphic Test Devices (ATDs or crash test dummies) and works with all of the automotive OEM's, Tier 1 suppliers, and regulatory bodies to produce the most advanced crash related products and services.

Humanetics continues to advance new crash test dummy designs and related tools that further the science of crash testing and safety evaluation. We are proud that we are an industry partner that brings advanced technology to market and allows the further development of all vehicle safety standards.

We appreciate our role as an integral part of a safety industry that helps consumers make wise decisions and feel safer in the vehicles that they drive.

The comments and suggestions that we outline herein are based solely on the Hybrid III 5th Female ATD and focus on the design, manufacture, and usability of the crash test device.

Hybrid III 5th Percentile Female ATD (HIII-5F)

1. *NPRM Page 6: We propose to adopt the SAE (spine box) modification, details of which are specified within engineering drawings provided in the J2915 information report.*

   Humanetics supports the inclusion of the SAE reinforced spine box, 880105-1045, as detailed in SAE J2915.

   Since the Hybrid III 5th Female was first adopted into CFR Part 572 in March of 2000 (amended in 2002), some users observed mechanical noise artifacts from the chest accelerometers. SAE Hybrid III Dummy Family Task Force began discussing this problem in 2007 and concluded their analysis in 2009, linking the noise to the rocking of the spine box on the thorax load cell mounting bolts.

   The screws can loosen during testing and the spine box can contact the sides of the screws. This causes high frequency mechanical noise within the accelerometers. Another result of this rocking is that the spine box can move approximately one degree off axis, altering the head position relative to the pelvis.

   Humanetics fully supports the design as shown in the NPRM as it has been proven to eliminate the noise while preserving the dynamic response.

2. *NPRM Page 14: We propose to adopt the specifications in SAE J2921 (Figures 4-6, which are engineering drawings of the SAE jacket design).*

   Humanetics supports the inclusion of the SAE harmonized jacket as shown in J2921. The Auto Alliance petitioned NHTSA in February 2014 to adopt this jacket as it addresses performance differences observed between the chest jackets available (FTSS and DATD) for the HIII-5F.

   As the original manufacturer of the SAE recommended jacket, Humanetics has been exclusively supplying the harmonized SAE chest jacket, 880105-355-H, since 2015 in response to issues identified with variation between FTSS and DATD jackets. This jacket is built to fully comply with SAE J2921. The SAE jacket also complies with the CFR Part 572 stipulations and was shown to be an interchangeable solution across both FTSS and DATD brands of ATDs. Adjustments to the rib damping material (retuning) when retrofitting jackets on existing dummies is sometimes required to meet performance specifications for the thorax impact testing.

3. *NPRM Page 14: Our proposed additional specifications for the jacket's contour adds breadth, depth, and circumference dimensions at different section levels of the jacket on the main assembly drawing of the dummy (880105-000, Rev. J, Sheet 5).*

   Humanetics cannot support the enhanced physical dimensional check of the jacket as proposed at this time. Humanetics welcomes the efforts of NHTSA to further define the jacket geometry to ensure no barriers are in place for new suppliers. However, we need to fully investigate if this is a practical dimensional check that can realistically be met using the procedural updates provided, both on and off the ATD.

We have concerns regarding lab to lab R&R when measuring the completely assembled ATD on the bench as proposed. The use of the mandrel can serve as a precision tool to constrain the torso and provide a more repeatable setup. With the torso portion of the dummy constrained, users are then able to focus on the jacket and gather measurements with a higher level of certainty than if measuring the jacket while on the ATD, especially when using a CMM.

We welcome the opportunity to provide data comparing measurements taken as prescribed in the NPRM and with the chest jacket mounted on a mandrel. We request a ninety day extension to the NPRM comment period to collect data regarding the additional specifications while also ensuring a sufficient sample size.

As the manufacturer, we will measure a population of new jackets for this data set. We suggest a collaborative effort be taken to ensure that older SAE J2921 compliant jackets in the field meet the specification and are measured as well.

4. *NPRM Page 17: NHTSA has considered the need for the mandrel and has tentatively decided not to incorporate the mandrel or the fit check procedure outlined in J2921. We seek comment on this.*

   The HIII-5F mandrel test fixture was designed to represent the nominal condition of the thorax, shoulder and rib region of the dummy's upper torso. A three-dimensional fixture provides a superior representation of the ATD's underlying structure than can be achieved using the assembled dummy and two-dimensional drawing. The fixture provides a repeatable method to support and orient the chest jacket for dimensional checks and assessment of the fit to determine whether a replacement is recommended.

   In an effort to create a standardized chest jacket that is consistent across suppliers, Humanetics is willing to provide the 3D model of the mandrel for public use. Work on developing a procedure for use to measure jacket dimensions as an alternative to taking measurements as part of the external dimensions procedure is ongoing.

   The mandrel can be made available for external use under part number TF-880105-3100.

**Data is forthcoming

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