



March 15, 2021

Mr. Ryan Posten  
Associate Administrator, Rulemaking  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue, S.E.  
Washington, D.C. 20590

**RE: Anthropomorphic Test Devices, HIII 5th Percentile Female Test Dummy; Incorporation by Reference**  
**REF: 85 Fed. Reg. 106 (June 2, 2020) (Docket No. NHTSA-2019-0023)**

Dear Mr. Posten:

On behalf of the members of the Alliance for Automotive Innovation (Auto Innovators)<sup>1</sup>, this letter is a supplemental submission providing recommendations supported by additional Hybrid III 5<sup>th</sup> Percentile Female Test Dummy (HIII-5F) chest jacket measurement data as well as Repeatability - Reproducibility assessments conducted by Ford, General Motors (GM), and Humanetics Innovative Solutions (HIS).

Recommendations:

Based on the attached chest jacket repeatability – reproducibility data and analysis, Auto Innovators provides the following recommendations:

1. Upon production, the jacket should be certified by its manufacturer on the mandrel and using a 3D measurement system such as a Faro arm.
  - The measurement parameters recommended by HIS should be used as well as the tolerances ( $\pm 7.6$  mm or  $\pm 1.0^\circ$  as appropriate).
2. A yearly inspection should be performed measuring a subset of parameters as specified by HIS.
  - This inspection may be conducted either on a HIII-5F or a mandrel using a 3D measurement system or manual measurements with tools (calipers, tape measures, etc.).

---

<sup>1</sup> Formed in 2020, the Alliance for Automotive Innovation is the singular, authoritative, and respected voice of the automotive industry. Focused on creating a safe and transformative path for sustainable industry growth, the Alliance for Automotive Innovation represents the manufacturers producing nearly 99 percent of cars and light trucks sold in the U.S. The newly established organization, a combination of the Association of Global Automakers and the Alliance of Automobile Manufacturers, is directly involved in regulatory and policy matters impacting the light-duty vehicle market across the country.

- The user of the ATD should use these results, in combination with the dynamic certification results, to decide whether or not to change the jacket.
3. This annual dimensional inspection has lower priority than the dynamic certification tests and should be a guide only, and not a certification requirement.

#### Repeatability - Reproducibility Assessment Methods:

Three SAE Harmonized Chest Jackets were tested:

- Ford – New
- GM & HIS – In use
- Jackets were measured by each member at their respective labs.

The jackets were tested on one Mandrel supplied by HIS and on five dynamically certified HIII-5Fs (Ford – 1 cabled, GM – 2 cabled & 1 iDAS, and HIS – 1 cabled). The Mandrel used by the three laboratories is the same as the version previously proposed by HIS to NHTSA except for changes in the shoulder/arm area which was not expected to affect the measurements of the jackets.

Five technicians conducted the measurements of the jackets (Ford – 2, GM – 2, and HIS – 1).

Two measurement methods were used (Ford, GM & HIS – manual measurements, HIS – Faro arm measurements). Faro arm measurements were only taken on the mandrel and fewer dimensions were measured.

#### General Observations:

Tolerances:

- Two average responses ( $D_{\text{bottom}}$  and  $D_{\text{neck}}$ ) frequently exceeded the specified tolerances regardless of whether they were measured on a mandrel or on a HIII-5F.
  - As HIS pointed out, the zipper may be affecting measurements.
  - Auto Innovators agrees with HIS's recommendation that the zipper should be avoided.
- Two other parameters ( $W_{\text{bottom}}$  and  $W_{\text{shoulders}}$ ) exceeded tolerances; however, this usually occurred when measured on a HIII-5F and in one specific lab.

Repeatability & Reproducibility:

- Repeatability (same lab, technician, jacket, and structure) was good with almost all CVs < 3% regardless of the underlying structure or measurement method.

- Reproducibility on the mandrel (various labs, technicians, jackets) was better than on the HIII-5Fs. However, it should be noted that only one mandrel was evaluated and five different ATDs were used.
  - The type of HIII-5F, cabled vs. iDAS, appeared to have an effect however, only one iDAS HIII-5F was evaluated.

Usability:

- Making jacket measurements on the mandrel was found to be easier than on the ATDs.

Additional supporting technical detail is provided in Attachments 1 and 2.

---

Auto Innovators appreciates the opportunity to provide our input to NHTSA on this important rulemaking. We look forward to any follow up with the agency to discuss our recommendations and supporting analysis further.

Sincerely,



Scott Schmidt  
Vice President, Safety Policy

Attachments:

Attachment 1 - 5th% Hybrid III Chest Jacket Study\_v2.pptx  
Attachment 2 - HIIIJacket\_woAnomalies\_NHTSA0202.xls