DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 572

[Docket No. NHTSA–01–11111]

RIN 2127–AH02

Anthropomorphic Test Devices; 3-Year-Old Child Crash Test Dummy

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Final rule; response to petitions for reconsideration.

SUMMARY: On March 22, 2000, NHTSA published a final rule adding a new, more advanced 3-year-old child dummy to the regulation for Anthropomorphic Test Devices. Four organizations filed petitions for reconsideration of this rule. In response to these petitions, this document makes several minor changes to the final rule, including: Slightly raising the limit on the peak forces that occur in the transition compression zone referenced in calibration tests for the dummy's thorax response; revising the impact probe definition to include provisions for mounting suspension hardware if a cable system is used to suspend and guide the pendulum for impacts, to adopt a lower minimum mass moment of inertia, and to clarify the specification for free air resonant frequency; revising specifications in several drawings for the fabrication of load cells; and correcting several minor specification errors in these drawings. This document also denies a request to add a provision for post-test calibration of the dummy.

DATES: The amendment is effective on January 14, 2002.

Petitions for reconsideration of the final rule must be received by January 28, 2002.

ADDRESSES: Petitions for reconsideration should refer to the docket number of this document and be submitted to: Administrator, Room 5220, National Highway Traffic Safety Administration, 400 Seventh Street, SW., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: For nonlegal issues: Stan Backaitis, Office of Crashworthiness Standards (telephone: 202–366–4912). For legal issues: Deirdre R. Fujita, Office of the Chief Counsel (202–366–2992). Both can be reached at the National Highway Traffic Safety Administration, 400 Seventh St., SW, Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

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I. Background

On March 22, 2000, NHTSA published a final rule amending the regulation for Anthropomorphic Test Devices (49 CFR part 572), by adding specifications and calibration requirements for a new, advanced 3-year-old child dummy (65 FR 15254; docket number 2000–7051). The new dummy, part of the family of Hybrid III test dummies, is more representative of children than the existing 3-year-old child test dummy in Part 572, and allows the assessment of the potential for more types of injuries in automotive crashes. The new dummy is used to evaluate the effects of air bag deployment on out-of-position children, and can provide a fuller evaluation of the performance of child restraint systems in protecting young children. The new dummy is defined in part 572 subpart P (Sections 572.140–572.146).

The specifications for the Hybrid III type 3-year-old test dummy (hereinafter referred to as the H–III3C dummy) consist of three elements. First, there is a drawing package that shows the component parts, the subassemblies, and the assembly of the complete dummy. The drawing package also defines materials and, where practical, material treatment processes for all the dummy's component parts, including the dummy's crash sensors and their location and orientation in the dummy. Second, there is a manual containing disassembly, inspection, and assembly procedures, and a dummy parts list.

Third, there are the impact performance criteria and associated test procedures. These are specified to serve as calibration checks so as to assure the uniformity of the dummy's kinematics and impact response, and to reveal possible functional deficiencies from previous use. The tests address head, neck, and thorax impact responses and assess the resistance of the lumbar spine-abdomen region to upper torso flexion motion.

In addition, the final rule adopted generic specifications for all of the dummy-based sensors. For dummies incorporated into Part 572 through the 1990's, the agency specified sensors by make and model. However, the agency concluded that that approach was unnecessarily restrictive and limited innovation and competition. Accordingly, the final rule for the dummy, and those for all new dummies as of year 2000, specified sensors primarily by performance characteristics, and by their intended geometry, alignment and method of attachment within the dummy (see, NHTSA technical report ''Development and Evaluation of the Hybrid III 3-year-old Child Dummy'' (December 1998), Docket No. 99–5032).

NHTSA received petitions for reconsideration of the rule from First Technology Safety Systems (FTSS), Toyota Motor Corporation (Toyota); the Alliance of Automobile Manufacturers (Alliance) and Robert A. Denton, Inc. (Denton). The petitioners generally supported adopting the new dummy into Part 572, but believed that some technical issues, and one related to the agency's enforcement policy, had to be resolved. To support its suggested revisions, FTSS attached to its petition extracts from the Society of Automotive Engineers (SAE) Dummy Test Equipment Sub-Committee (DTES) meeting minutes pertaining to DTES's evaluation of the H–III3C dummy over the past several months. Similarly, the Alliance stated that its discussion of the calibration procedures of the final rule was based on the DTES's evaluation of the specifications of the rule and other data.

NHTSA has evaluated the petitions and is responding to the suggestions in this document. The agency is also correcting minor errors in the final rule and dummy drawings that we discovered during the review of these petitions.

II. Issues

a. Section 572.144 Thorax Assembly and Test Procedure

Section 572.144(b)(1) limited the peak force within a specified ''transition compression zone'' because excessively large force, or acceleration, spikes in that zone might be indicative of deficiencies in the chest structure. The agency stated in the preamble to the final rule that, based on an analysis of the H–III3C dummy's thorax responses, statistically, the peak force of a well-functioning dummy in the transition compression zone of the rib cage could be as high as 860 N. Accordingly, the final rule specified an 860 N peak force limit for the transition compression zone bounded between 12.5 mm and 32 mm of sternum deflection.

The Alliance questioned the need for limiting the peak allowable thorax force, ''as it does not make the dummy response fit better into the biomechanical corridor.'' FTSS requested that the agency change the thoracic peak force requirement from 860 N to 910 N. The petitioner stated that, based on 34 DTES tests and applying a two standard deviation tolerance and rounding to the nearest 10 N, the peak force criterion should be 910 N instead of 860 N. The Alliance suggested that, if the agency retained the additional peak force specification, then the peak force criterion should be changed to 912 N based on the average (mean) of data, plus two standard deviations. These force values, the Alliance notes, were provided by DTES participants (FTSS, TRW and General Motors) following an April 14, 2000 DTES meeting.

NHTSA's Response: The basis for limiting the peak force was explained in the final rule. While this final rule increases the force limit in the transition compression zone, NHTSA confirms the rationale given in the rule for establishing a limit. A limit is needed to better ensure that the dummy's overall responses are reliable and repeatable. Forces within the transition compression zone should be limited because excessively large force spikes are indicative of potential deficiencies in the chest structure, which could affect the results of a compliance test. Biomechanical response corridors indicate that high peaks in the transition compression zone would not be humanlike and not likely to occur in a well functioning physical spring-mass system, which is representative of the dummy's rib cage. An excessively high peak force occurring in the transition compression zone would indicate a mechanical deficiency within the rib cage structure, even though the peak force requirement within the specified maximum allowable compression corridor is met. Accordingly, an additional upper force peak limit prior to reaching the specified maximum displacement corridor would provide significant assurance that the dummy's rib cage has human-like response and adequate structural integrity.[1]

The final rule limited the peak forces that occur in the transition compression zone to 860 N. The agency's analysis of SAE data and NHTSA data generated at the agency's Vehicle Research & Test Center (VRTC) indicated that statistically the peak force of a well-functioning dummy in the transition compression zone could be as high as 860 N. In its petition for reconsideration, FTSS submitted data from 34 tests that supported the petitioner's suggested force value of 912 N. After analyzing the data, NHTSA agrees that the recommended upper peak thorax force in the transition deflection corridor should be changed to a rounded value of 910 N. The 860 N value specified in the final rule was based on tests performed by the SAE using a higher mass pendulum, but at a slightly lower impact speed, than the pendulum and speed specified in the final rule. The ratio of impact energies between the Part 572 calibration test and the SAE biomechanical tests is 1.136. Because the Part 572 calibration test is performed at an approximately 13.6 percent higher energy level than the SAE biomechanical tests, an increase up to 13.6 percent of force in the transition zone is justified. Thus, petitioner FTSS's suggestion to increase the force level to 910 N in the transition zone is reasonable.[2] NHTSA has determined that 910 N is a sufficient and justifiable peak force limit. It is within 12.3 percent of the peak force value allowed at maximum sternum deflection, and well within the data dispersion of +2 standard deviations from the mean of 806 N rounded to the nearest 10 N.

b. Section 572.145 Torso Flexion Test Procedure

Section 572.145(c)(1) specifies that the temperature range for the torso flexion test is at 66° to 78° F (18.9° to 25.6° C). FTSS and the Alliance believed that the range was too wide and could cause test variability because of the sensitivity of the dummy's thorax and lumbar spine/abdomen materials to temperature. FTSS and the Alliance recommended reducing the temperature range to 69° to 72° F. FTSS stated that the narrower range would be consistent with other dummy component tests (see, e.g., 572.144(c)(2), thorax assembly test procedure).

NHTSA's Response: NHTSA is denying the request to change the specified torso flexion temperature range. After receiving the petitions for reconsideration of the final rule on the H-III3C dummy, the agency tested whether the dummy's torso flexion sensitivity is significantly affected by temperatures in the specified temperature range. NHTSA's Vehicle Research & Test Center performed two series of temperature sensitivity tests: one at a temperature range between 66° to 78° F and the other between 69° and 72° F. The change in average force needed to flex the dummy, normalized for the temperature range for each test series, showed very little difference in the two test series: 0.18 lbf/°F for the 66° to 78° F range and 0.17 lbf/°F for the 69° to 72° F range. Thus, the agency concludes, the torso flexion force is virtually unaffected by temperature variation within the specified range and thus should not be a significant factor having effects on crash test measurements, particularly given that the compliance tests are performed at a temperature range between 69° to 72° F. NHTSA has placed a copy of a memorandum in the docket (Docket No. NHTSA–2000–7051–7) documenting details and results of torso resistance to flexion vs. temperature sensitivity tests conducted by the agency in response to this petition.

[1] NHTSA limited the peak force measured during the sternum-to-spine displacement interval in response to a comment from TRC on the NPRM for the Hybrid III fifth percentile female dummy. TRC had stated that the thorax force response for that dummy included several peaks before it gets to the specified corridor, and asked for clarification of which of the forces should be considered and which should be disregarded. TRC had recommended that the final rule limit the peak force that occurs in the deflection interval between the first inertial spike and the peak force at the minimum/maximum required sternum displacement (transition zone) to a value 5 percent or less above the peak force measured within the required minimum/maximum compression corridor. NHTSA agreed with TRC that the initial force spike, occurring within 12.5 mm of impact, is an artifact of the inertial mass interaction between the impactor and the dummy. It has no biomechanical significance, and thus it is not an indicator of a bad ribcage. Thus, the final rule for the fifth percentile female adult dummy accommodated the existence of the initial data spike by limiting peak force measurements only to a specified sternum displacement after the initial force spike has occurred. Because the agency determined that the approach taken in that final rule constituted a good definition of the response force in the transition zone and provided control of the thorax force response levels, the final rule for the H–III3C dummy used the same approach in discounting the significance of the initial data spike. Accordingly, the final rule excluded consideration of force data from the first 12.5 mm of sternum compression and limited the peak allowable force after 12.5 mm (to 860 N).

[2] The increase in thorax force response by 50 N may result at its extreme in only an increase of chest acceleration of less than 1 g in compliance tests based on the upper torso-neck-and head weight of approximately 14 lb (50/4.448/14.00 = 0.8g).

c. Section 572.146(a) Test Probe for Thoracic Impacts

Concentric and Symmetric in Shape: Section 572.146(a) specified generic characteristics for the test probe for thoracic impacts. It specified, among other things, that the test probe ''shall be * * * concentric in shape, and symmetric about its longitudinal axis.''

The Alliance said that it believes that the requirements for concentricity and symmetry about the longitudinal axis ''are unrealistic since the pendulum is often fitted with velocity vanes, causing asymmetry.'' FTSS stated that the meaning of ''concentric in shape'' was unclear. FTSS believes that ''[c]oncentric means 'having the same center', but does not define the shape of an object'' and that, in any event, specifying concentricity was unnecessary. FTSS notes that NHTSA adopted the concentricity and symmetry requirements to locate the probe center of gravity (CG) on the longitudinal axis, passing through the center of the impacting face, and that the rule should therefore simply specify the CG location of the probe. Further, similar to the Alliance, FTSS stated that the addition of cable attachments and velocity vanes does not allow the probe to be symmetric in any one plane. FTSS thus suggested that a tolerance of 3.5 mm should be specified for locating the CG, such as by the statement: ''The probe center of gravity shall lie within 3.5 mm of the longitudinal axis passing through the center of the impacting face.''

NHTSA's Response: NHTSA agrees with the petitioners that the definition of the probe should include provisions for mounting velocity vanes, suspension hardware, and cable system if and when it is used to guide the pendulum for impacts. NHTSA agrees with the concerns about specifying concentricity and symmetry and has revised the test probe definition by removing the words ''* * * in shape and symmetric'' from the first sentence in ''571.146(a) and has added ''except for attachments'' to assure that attachments are not considered in evaluating the concentricity of the probe along the longitudinal axis. The sentence now reads: ''The test probe for thoracic impacts, except for attachments, shall be of rigid metallic construction and concentric about its longitudinal axis.''

Rather than itemizing all attachments, such as suspension hardware, suspension cables and velocity vanes, to specifications for concentricity, symmetry and dimensions, this rule specifies in a new paragraph in § 572.144(c)(7) that any attachments to the impactor (e.g., suspension hardware, suspension cables and velocity vanes) must not contact the dummy during the test.

The agency does not agree with FTSS that the CG offset from the longitudinal axis needs to be specified. To measure such an offset would be extremely difficult, and it would be virtually of no benefit to any user. The requirements in the final rule for moment of inertia in pitch and yaw and the specification of mass, as discussed immediately below, provide sufficient controls to assure stable kinematics during the probe's free flight and impact with the dummy.

Mass Moment of Inertia: Section 572.146(a) also specified that the probe must have a minimum mass moment of inertia 283 kg-cm^2 (0.25 lb-in-sec^2) in yaw and pitch about the CG of the probe, and a free air resonant frequency not less than 1000 Hz. The Alliance stated that it believes that NHTSA did not clearly explain the reason for these criteria. The Alliance stated that it could not determine the necessity of the criteria from data collected by the DTES following the April 2000 meeting. The Alliance further stated that, for thorax impact probes used at a number of test labs, the mass moments of inertia (MMI) values fell below the minimum requirement of 283 kg-cm^2. The petitioner said these probes were used to develop the data that formed the basis for the thorax calibration performance corridors of the final rule. The Alliance said that if NHTSA decides to retain the MMI specification, the impactor should be cylindrical since NHTSA had stated in a final rule for a previous dummy (fifth percentile female) that the ideal impactor is of cylindrical design, and that the following values should be specified: Mass 1.70 kg; MMI 138.4 kg-cm^2. FTSS stated that the specified values of MMI are arbitrary and that its thorax probe has a yaw MMI of 199 kg-cm^2 and pitch MMI of 201 kg-cm^2, which do not meet the specified criterion of 283 kg-cm^2. FTSS said that NHTSA presented no data to suggest that probes, such as those the petitioner uses, do not provide satisfactory performance.

NHTSA's Response: NHTSA defined the impactor in generic terms in response to industry comments on the NPRMs for both the 6-year-old and fifth percentile female dummies, stating that the impactor needed to be generic in definition and that the users desire to make them from building blocks, essentially, an assembly of multiple pieces. The commenters also requested that NHTSA not define the impactor by design. The agency believes that any impactor not defined by design to control its kinematics and response during impact, must be defined by engineering parameters, such as mass, stiffness, MMI and, if needed, CG location. As a result, the agency responded to the commenters' desire for a generic impactor and defined the impactor in engineering terms.

NHTSA notes that assembling impactors from multiple pieces may result in compositions with many forms and wide variations in the location of the CG, and the yaw and pitch MMI. These wide variations are evident in the Alliance's petition, in which the Alliance notes that its member companies have used different impactors with MMIs ranging from 122 to 572 kg-cm^2 (measured) and 138 to 199 kg-cm^2 (calculated).

To determine the effects on kinematics of low and high inertia impactors, in response to petitions for reconsideration of the final rules for the 6-year-old and fifth percentile female dummies, the agency studied the kinematics of impactors having low MMI and compared them with the kinematics of impactors having a much higher MMI. The evaluation revealed that low inertia impactors experienced considerable motion instability. In contrast, impactors with higher MMIs exhibited very stable free flight kinematics. This experiment shows that the use of impactors with low MMIs could lead to unstable kinematics. Inasmuch as the response of the dummy in calibration tests is used as a measure of the dummy's repeatability and objectivity, it is important that the impact probe kinematics not be a source of variability. (A discussion of NHTSA's evaluation of impact probes can be found at Docket No. NHTSA–00–6714–12.)

FTSS stated that its thorax probe has a yaw MMI of 199 kg-cm^2 and a pitch MMI of 201 kg-cm^2. We have determined that the FTSS measured MMI values reflect current industry practice, and, therefore, there are reasonably good grounds for their acceptance. In contrast, the agency believes that the calculated low MMI value of 138.4 kg-cm^2 suggested by the petitioner is considerably below the values of impactors currently used by the industry. The petitioner has not provided any evidence to support the validity of its suggestion. In a study related to moment of inertia specifications for impact probes, the agency found that a pendulum type impact probe must have at least 164 kg-cm^2 MMI value to assure stability during free flight and at impact with the dummy's sternum (ref. Technical Report, Docket No. NHTSA–1999–6714–12). Accordingly, the agency is specifying, as the minimum, a measured MMI value of 164 kg-cm^2 (0.145 lb-in-sec^2), but not the calculated MMI of 138 kg-cm^2 (0.122 lb-in-sec^2) suggested by the Alliance. The 164 kg-cm^2 value was also cited by the Alliance in its May 15, 2000 submission to docket NHTSA–2000–7052–6. It should be noted that impactors with lower MMI than the inertia value specified in the final rule may produce motion instability and thus could create unreliable test results. In contrast, the impactors with a higher MMI exhibited very stable free flight kinematics. Accordingly, as a matter of caution, the agency is advising that test facilities conducting tests with impactors having a lower MMI value than the minimum specified in this rule, should exercise great care in the design of the impactor suspension and guidance systems to assure stable and consistent impact kinematics.

Mass (Weight) Distribution: Section 572.146(a) also specified that the test probe shall have a mass of 1.70 ± .01 [kilograms] kg (3.75 ± 0.02 (pounds)(lb)). The Alliance and FTSS believed that a weight tolerance of 10 grams is too small to be practically measured. The Alliance requested that the tolerance be increased to ±0.02 kg (±0.05 lb). FTSS recommended ±0.023 kg.

NHTSA's Response: NHTSA agrees that the tolerance of ± 0.02 lb might be difficult to achieve because some of the accelerometers used on the crash test equipment weigh as much as 0.02 lb while others are as low as 0.002 lb. The agency believes that the total impactor weight tolerance should, to the extent possible, take into account the weight differences between many possible types of accelerometers used on impactors. Accordingly, we agree with the Alliance recommendation to increase the overall weight tolerance to ± 0.02 kg (± 0.05 lb), which allows less than 3 percent variation in the overall weight of the impactor. The weight specification is also changed in Figure P4 of Part 572, Subpart P, titled ''Thorax Impact Test Set-Up Specifications.''

Effects of Attachments on Concentricity: Section 572.146(a) also specified that: ''No concentric portions of the impact probe may exceed the diameter of the impact face.'' Since the pendulum is often fitted with velocity vanes and cable attachments, the Alliance considered this requirement unrealistic. The Alliance recommended revising the test probe definition to: ''The primary test probe, less any additional hardware, for [body region] impacts shall be of rigid metallic construction, concentric in shape, and symmetric about its longitudinal axis.'' FTSS claimed that it does not know the meaning of ''concentric in shape.'' FTSS noted that necessary addition of cable attachments and velocity vanes means that the requirement cannot be met.

NHTSA Response: NHTSA agrees with the Alliance that addition of suspension hardware and velocity vanes would violate the specification that ''No concentric portions of the impact probe may exceed the diameter of the impact face.'' The agency's concern was that use of an unusually shaped impactor or attachments to it might cause other portions than the impact face to come into contact with the dummy during the impact, which may distort or modify the dummy's impact response. To overcome this concern and those of commenters that they would not be able to meet the concentricity requirements, we are limiting the impactor body's length at which it must not exceed the diameter of the impact face, for a minimum of 1 inch (25.4 mm) to the rear of the impact face. Also, to assure that attachments to the impactor do not contact the dummy during impact, we are including a specification in § 572.144(c)(7) that states that any attachments to the impactor, such as suspension hardware and impact vanes, must not contact the dummy during the test.

Probe Diameter Edge Radius: Another provision of § 572.146(a) specifies that the impacting end of the probe has a diameter face with a maximum edge radius of 12.7 mm (0.5 in). FTSS and the Alliance were concerned that specifying a maximum radius allows for smaller radii which may affect the probe's interaction with the dummy, resulting in differences in the initial contact area. Both petitioners recommended deleting the word ''maximum,'' so that the specification would read ''* * * diameter face with an edge radius of 12.7 mm (0.5 in).''

NHTSA's Response: NHTSA agrees with the concern that specifying a maximum radius without a minimum allows for smaller radii, which may affect the probe's interaction with the dummy, resulting in differences in the initial contact area. Also, if a minimum radius were not specified, at the extreme of the specification, the edge of the impactor face could be a sharp edge. If the alignment of the probe face to the dummy's thorax were not perfect, such an edge could produce significant variability in the dummy's impact response. However, we believe that simply deleting ''maximum'' could raise questions about permissible variations in edge radius from 12.7 mm (0.5 in) in either direction. We see no need to either control the impactor's edge to a great precision or to allow it to be sharp. We find that a commercial tolerance of ±0.1 inches would have minimal effects on the surface area of the impactor, and would preclude use of impactors with a sharp edge. Accordingly, to preclude the potential of large variations, we are specifying a min/max edge radius of 7.6/12.7 mm (0.3/0.5 in). This radius is based on dimensional tolerance of ±0.1 in from the mean of 10.2 mm (0.4 in) as a practical allowance for manufacturing and inspection, without any effects on the performance of the impact probe.

Free Air Resonant Frequency: Section 572.146(a) specifies that the test probe must have a free air resonant frequency not less than 1000 Hz.

In its petition for reconsideration of the requirement, FTSS stated:

> Section 572.146(a) establishes a requirement for the free air resonant frequency without specifying the methods to measure this frequency or with a rationale for the need of this requirement. FTSS [First Technology] has analyzed the probes used in its calibration laboratories, and the results show the first resonant modes of these probes are bending modes, which causes a lateral translation at the accelerometer location. Typical accelerometers have less than 3% cross-axis sensitivity, so if a probe was excited during a dummy test (which is unproven), the affect [sic] on the acceleration signal would be minimal. It may be more appropriate to specify a 1000Hz resonant frequency limit in the sensitive axis of the accelerometer. * * * Although the FTSS H3–3 thorax probe meets the 1000Hz minimum requirement, we still do not agree with this specification. We therefore petition the mass moment of inertia and free air resonance response criteria should be held in abeyance for a period of six months to allow time to develop reasonable and rational criteria for the probes and to develop and manufacture re-designed probes as necessary. * * *

The Alliance raised similar concerns and also suggested deleting the free air resonance frequency requirement until data are available that justify the need for the requirement.

NHTSA's Response: Commentors on the NPRMs for the 6-year-old and fifth percentile adult female dummies expressed a desire for generic impactor specifications to allow users the freedom to design impactors in a variety of ways, including constructing them from building blocks. As a result, the agency developed a generic engineering specification and inserted it in the final rules for these dummies. For the sake of consistency, the agency carried over this ''generic'' specification into the final rule for the H–III3C dummy.

The resonant frequency is a vital part of the generic specification of an impactor. It is necessary for three reasons: (1) Because the intent of users is to build a non-defined shape and multiple piece impactor of unknown material, the natural resonant frequency of the impactor is a reliable indicator to assure that the impactor has sufficient structural rigidity, is capable of repeatable responses, and will not distort the responses produced by the dummy; (2) the specification will assure that a multiple piece impactor will not produce separate interactions between its constituent parts; and (3) the specification will ensure that the mounting structure for the accelerometer is sufficiently rigid and will not affect the accelerometer readings.

We agree with the FTSS argument that an impactor can have vibrations in several modes: The first mode of resonance is the bending mode of the probe transverse to the longitudinal axis and the second mode of resonance is the vibration along the longitudinal axis. We concur with the FTSS suggestion that it would be more appropriate to clarify the current specification by adding to the impactor definitions a note that the 1000 Hz minimum resonant frequency is limited only to the direction of the longitudinal axis of the impactor, rather than in any direction. The agency also agrees that a signal of low cross axis sensitivity accelerometer, whose sensitive axis is aligned with the longitudinal axis of the impactor, will be minimally affected by impactor vibrations in the first bending mode. To illustrate how the agency measures the free air second mode resonant frequency of an impactor, we have described a procedure in Docket No. NHTSA–6714–14 and have inserted it in the PADI (Procedures for Assembly, Disassembly and Inspection) document for this dummy.

However, NHTSA does not agree with the Alliance comment that the resonance specification is unnecessary. A multiple piece impact probe, if improperly constructed, may contain a series of resonances along its longitudinal axis which could affect the accelerometer measurement. The 1000 Hz minimum specification would preclude a user from using such a probe.

d. Section 572.146(l)(2) Instrumentation Filter Classes

FTSS and the Alliance stated that the rule did not specify a filter class for rotary potentiometers that some users employ in the pendulum neck test. They suggested adding a new paragraph (iv) to § 572.146(l)(2) to specify: ''(iv) Rotation potentiometer—Class 60''.

NHTSA's Response: In the regulatory text describing the H–III3C dummy, NHTSA did not specify use of mechanical test fixtures, including potentiometers to measure head rotation in the specified head-neck tests. The agency believed there were several methods for measuring this, and the method suggested in the regulatory text was not essential for the intended purpose. Subsequently, however, the Alliance noted in petitions for reconsideration of the final rules on the 6-year-old and fifth percentile adult female dummies that industry users have concluded that the CFC Channel Class 60 specification is appropriate if a potentiometer is used to measure head rotation. In addition, the agency's Vehicle Research and Testing Center (VRTC) used the CFC 60 to filter head rotations when rotary potentiometers are used in head-neck pendulum tests. VRTC review of raw data showed absence of high frequency signals which would obviate the need for a CFC specification greater than 60. In view of this information, NHTSA has no objection to specifying Channel Class 60 for this application if a potentiometer were used for measuring head rotation.

e. Changes to Drawings

This final rule changes six drawings of the drawing package for the H–III3C dummy in response to petitions for reconsideration and corrects minor errors and omissions in six other drawings that the agency uncovered on its own. Robert A. Denton, Inc. (Denton), a manufacturer of load cells used in crash dummies, petitioned to revise several specifications in the drawings of the load cells used in the dummy. The six drawings were: SA572–S17–L&R; SA572–S18; SA572–S19; SA572–S20; SA572–S21; and SA572–S22. Denton believed that each of the drawings had two problems. The first of these related to the output at capacity. The second related to a material specification requiring that the load cells be made of steel or similar material. NHTSA will address both of these issues below. Denton also pointed out other minor specification errors on drawings SA572–S18, SA572–S19, SA572–S20, and SA572–S21, which are addressed later in this section of the preamble. In its petition for reconsideration, the Alliance stated that it ''supports'' Denton's petition.

Load Cell Output at Capacity: The drawings had a specification that the output at capacity of the load cells must be 1.0 mV/V MIN. Denton requested that specification be changed to 0.75 mV/V. Denton stated that many of the load cells it has been producing for years have nominal 1.0 mV/V channels. However, the petitioner stated, due to manufacturing variations, load cells could have a sensitivity above or below the 1.0 mV/V level. Denton also believed that NHTSA has not provided data to justify the 1.0 mV/V specification. Denton stated that since load cells with outputs slightly below 1.0 mV/V have functioned satisfactorily for many years, the requirement should be changed to ''0.75 mV/V MIN.''

NHTSA's Response: NHTSA agrees to the suggested change. The agency has reviewed its data from VRTC and has determined that a minimum output of 0.75 mV/V will not affect the performance and quality of the resulting data channel or the quality and accuracy of the recorded data.

Load Cell Material: The drawings included a material specification indicating that the load cells are made of ''steel or similar material.'' Denton requested that the material specifications be removed from all load cell drawings. Denton questioned whether there was any point to specifying the material used to build load cells, as long as the load cells meet the functional, size and weight specifications listed in the drawings. The petitioner stated that most of the load cells used in the H–III3C dummy are made primarily from aluminum and asked whether NHTSA would consider aluminum to be a ''similar material'' to steel. Denton also asked: ''even if part of the load cell is steel, covers are usually made of aluminum or brass. Sometimes other materials are used internally to the load cells. Does this violate the material specification on the drawing?'' Denton stated that if the agency wanted to retain the material specification, the specification should be corrected (the petitioner did not describe the nature of the corrections).

NHTSA's Response: NHTSA does not agree with Denton's recommendation to remove the material specifications. Because the load cells have to be mounted within the structural part of the test dummy that interlinks the dummy's major body segments, load cells maintain a geometric relationship between the major body segments. Accordingly, the rigidity, strength and response of such connections must be compatible with the rest of the dummy. However, NHTSA does believe that specifying a specific load cell material may be too restrictive. The agency is aware that existing load-bearing structures of a load cell are based on metals with a high modulus of elasticity, such as aluminum and steel. As a result, instead of specifying one type of metal for a load cell, NHTSA is revising the load cell drawings to require that the load-bearing structure of the load cell, including provisions for mounting, be of metal or metal alloys. Further, the agency is specifying in the drawings that non-load bearing parts of the load cell, internally and/or externally, may be made of any material suitable for the intended use, providing they do not interfere with the performance of the load cell.

Other Errors With Drawings SA572–S18, SA572–S19, SA572–S20, and SA572–S21

1. Drawing SA572–S18: Drawing SA572–S18 listed the thermal sensitivity specification as 60° to 90°F. Denton stated that this was an error, and that the correct specification was 60° to 80°F. NHTSA agrees that the correct specification is 60° to 80°F.

2. Drawing SA572–S19: Denton reported five errors in drawing SA572–S19. First, the drawing specified a load cell weight of 0.52 lb maximum, which included a retaining washer, flat head cap screws, and 8 inches of cable. Denton stated that this weight was too low, and that existing load cells will be obsoleted by this specification since the existing load cells have a nominal weight of 0.53 lb with the specified hardware and cable. Denton requested NHTSA to change the specification in any one of three possible ways: (a) Change the weight specification to 0.55 lb max (Denton stated this would ''match the NPRM''); (b) change the notes on the drawing to indicate that no cable is included; or (c) change the notes to indicate that the retaining washer and flat head cap screws are not included.

NHTSA agrees that the 0.52 lb maximum is too low and has decided to change the weight specification to 0.55 lb maximum (which is option (a) suggested by Denton).

Second, drawing SA572–S19 also showed the height specification of 1.250 inches as 31.37 mm. Denton pointed out that the correct metric equivalent for 1.250 inches is 31.75 mm. The agency has made the correction.

Third, the drawing showed the 120 lb-in torque specification on the ¼-20 x ⅝″ socket head cap screws used to attach the load cell to the neck as 16.56 N-m. Denton stated that the correct metric equivalent to 120 lb-in is 13.56 N-m. NHTSA has made the correction.

Fourth, drawing SA572–S19 showed the bolt circle diameter for the holes used to attach the load cell to the dummy neck as 2.177 inches (55.295 mm). Denton said that the load cells use a bolt circle diameter of 2.125 inches (53.98 mm), which matches the bolt pattern in the mating neck plates 210–2060 and 210–2030. NHTSA agrees and has changed the bolt circle diameter from 2.177 in (55.295 mm) to 2.125 in (53.98 mm).

Fifth, the drawing showed the counterbore for the holes used to attach the load cell to the neck as 0.438 inch diameter with a depth of 1.00 inches. Denton stated that existing load cells, used for both the H–III3C dummy and ''the older 3-Year-Old airbag dummy,'' actually use a bore diameter of ⅜ inch with a depth of 0.91 inches. Denton stated, ''Using a 0.438 inch diameter counterbore will make the load cell much more difficult and expensive to manufacture, due to several issues internal to the load cell.'' (The issues were not specifically identified.) Denton requested that the counterbore diameter be specified as 0.37 minimum with a depth of 1.01 maximum. NHTSA agrees and has made the corrections.

3. Drawing SA572–S20: Denton stated that drawing SA572–S20 contains two errors. First, Denton stated that the drawing showed the height of the load cell specified to a four decimal place dimension (1.5000 inches), which could be construed to imply a ±0.0005 inch tolerance. Denton states: ''That tight of a tolerance is not necessary for this application, is difficult to manufacture, and may obsolete many existing load cells.'' The petitioner requested that the specification be changed to a three decimal place dimension, 1.500 inches, which will have a default tolerance of ±0.005 inches. Second, Denton reported a typographical error in the thermal sensitivity specification. The range should be 15.6° to 26.7°C, not 15.6° to .7°C.

NHTSA agrees that the 1.5000 inches height specification is unnecessarily restrictive. Accordingly, the agency is changing the height specification to 1.500 inches. The agency also agrees that the metric range as well as the typographical error in the temperature sensitivity specification should be corrected as petitioner suggested.

In addition, during our review, we noticed that the diameter for the four through-holes for the mounting of the load cell to the lumbar spine was not specified. We measured the diameter of the through-holes and confirmed with the manufacturer that the hole diameters are 0.257 inch on the flange and in the body of the load cell. The holes in the body of the load cell are counterbored from the bottom with a diameter of 0.375 inch to a depth of 1.13 inches. A new drawing SA572–S20 incorporates this technical correction.

4. Drawing SA572–S21: This drawing specified that the center hole in the load cell is ''0.500 diameter thru.'' Denton stated that this will obsolete all existing load cells. In existing load cells, Denton reported, the hole diameter changes several times as the hole passes through the load cell. In addition, Denton states that the minimum diameter of the through-hole is 27/64 (0.422) inch. Thus, Denton requested that the diameter be changed to 0.410 inch minimum to allow for clearance to the mating part. This modification would not obsolete existing load cells. The petitioner stated that ''Since the dummy part which is inserted through the hole has a 0.390 inch diameter, the load cell [with a 0.410 hole] will provide sufficient clearance.'' Petitioner also noted that ''[t]hese load cells have been in use for years throughout the world.''

NHTSA is revising the drawing to specify that the minimum diameter of the through-hole is 0.410 in. However, the drawing retains the specification of a maximum diameter, because not having a maximum hole diameter could result in excessively large through-holes. A very large hole within the load cell would permit large variations in the placement of the arm on the dummy=s shoulder, which could produce problems in test repeatability. Accordingly, the upper limit to the hole diameter of 0.50 inches is needed to avoid the arm mis-location problem.

During the agency's review of the drawings following publication of the March 22, 2000 final rule, the agency identified a need to define four holes in the body of the load cell that are used to attach the load cell to the dummy. The drawing showed neither hole dimensions nor their alignment. This was an oversight by the originator of the drawing. New drawing SA572–S21 corrects this oversight by adding to the body of the load cell the note ''four 10–24 unc threaded holes equally spaced on a bolt circle of 1.062.''

Other Minor Changes in Drawings to Correct for Missing and/or Misplaced Dimensions and/or Notes: Uncovered During the Agency Review Process: The following minor changes are also made to some of the drawings, to correct for missing and/or misplaced dimensions and/or notes. The agency realized the need for these changes during a review of the drawings that we conducted in response to the petitions for reconsideration.

1. Drawing 210–4510. Added in top view to the specification ''machined after weldment'' the words ''parallel to surface B.''

2. Drawing 210–4511–1. Added radius dimension R.12 to the top corners of the iliac spine on the left side of the view of drawing.

3. Drawing 210–3731. Added missing dimensions: .99 and 5.68 to locate the center of cut-out radius on the right and left hand sides of the bib, respectively,

and 2.75 diameter dimension to define the head of the bib.

4. Drawings SA572–S4, –S17, –S18, –S19, –S20, –S21, –S22, –S23, –S50 and ''S80. Changed single place dimensional tolerance from ±0.1 inch (2.54 mm) to ±0.1 inch (2.5 mm), to correct for metric equivalence.

5. Drawings SA572–S80. Corrected location of accelerometer mounting holes and added dotted lines where those holes are located in all views.

f. Request To Add Provision for Post-Test Calibration

Toyota and the Alliance requested that a post-test calibration of the dummy be included in the performance specifications. A post-test calibration is an assessment of whether the dummy conforms to NHTSA specifications after it has been used in a crash test. Toyota and the Alliance said that a post-test calibration is necessary to provide an objective check of the validity of the test dummy data acquired during the test, particularly if the crash test results in an apparent non-compliance. Toyota and the Alliance argued that without a post-test calibration, ''neither a vehicle manufacturer nor a NHTSA test contractor can determine whether an apparent vehicle non-compliance is due to a test dummy anomaly during a test.''

Toyota and the Alliance previously raised the issue of post-test calibration of dummies in their comments on NHTSA proposals to establish Hybrid III dummies for a fifth percentile female (H–III5F), a six-year-old child (H–III6C), and a 12-month-old child (CRABI). Historically, NHTSA has provided that the structural properties of a dummy satisfy the specifications set out in the applicable regulation in every respect both before and after its use in any test in a Federal motor vehicle safety standard. However, in the notice of proposed rulemaking for the H–III5F dummy, the agency decided against a post-test dummy calibration provision for the following reasons:

> NHTSA is concerned that the post-test calibration requirement could handicap and delay its ability to resolve a potential vehicle or motor vehicle equipment test failure solely because the post-test dummy might have experienced a component failure and might no longer conform to all of the specifications. On several occasions during the past few years, a dummy has been damaged during a compliance test such that it could not satisfy all of the post-test calibration requirements. Yet the damage to the dummy did not affect its ability to accurately measure the performance requirements of the standard. The agency is also concerned that the interaction between the vehicle or equipment and the dummy could be directly responsible for the dummy's inability to meet calibration requirements. In such an instance, the failure of the test dummy should not preclude the agency from seeking compliance action. Thus, NHTSA has tentatively concluded that removal of the post-calibration requirement would be in the public interest, since it would permit the agency to proceed with a compliance investigation in those cases where the test data indicate that the dummy measurements were not markedly affected by the dummy damage or that some aspect of vehicle or equipment design was responsible for the dummy failure.

(63 FR 46981, 46983, September 3, 1998).

The agency believes this reasoning remains valid. Further, in their comments on this rulemaking, the Alliance and Toyota have not produced any new information that would support the reversal of the decision not to include a post-test calibration provision. Thus, the agency is denying the Toyota petition and that part of the Alliance petition relating to the requirement.

g. Availability of Drawings and PADI Document

The drawings and specifications package and the Procedure for Assembly, Disassembly and Inspection (PADI) document referenced in this final rule are accessible for viewing and copying at the DOT Docket Management System office, Plaza 401, 400 Seventh St., SW., Washington, DC 20590, and are downloadable at DMS.DOT.GOV. Upon access of the website, click ''search,'' under Search click ''Search Form,'' under Agency click ''NHTSA,'' under Category click ''Rulemaking,'' under Subcategory click ''Crashworthiness Drawings and Test Equipment Specifications,'' then click on search and select the desired file. The drawings and specifications package and the PADI document are also available from reprographic Technologies, 9107 Gaither Rd., Gaithersburg, MD 20877, telephone (301) 419–5070.

III. Regulatory Analyses and Notices

a. Executive Order 12866 and DOT Regulatory Policies and Procedures

This rulemaking document was not reviewed by the Office of Management and Budget under EO 12866, ''Regulatory Planning and Review.'' The rulemaking action is also not considered to be significant under the Department's Regulatory Policies and Procedures (44 FR 11034, February 26, 1979). This document amends 49 CFR part 572 by making relatively minor changes to the design and performance specifications for a 3-year-old child dummy. This rule affects only those businesses which choose to manufacture or test with the dummy, in that the agency will only use dummies for compliance testing that meet all of the criteria specified in this rule. It affects vehicle and air bag manufacturers only insofar as they choose to test with a dummy that meets all of the criteria specified in the agency's regulation. It may indirectly affect child restraint manufacturers in the same manner, if the dummy is incorporated into the child restraint system standard. (NHTSA anticipates publishing an NPRM in the near future that proposes to adopt the dummy into agency compliance tests.) Even then, the amendments made by this rule for the most part correct or clarify existing specifications for the dummy and will not have a significant impact on dummy manufacturers, or on manufacturers of motor vehicles, air bags or child restraints. Because the economic impacts of this final rule are minimal, no further regulatory evaluation is necessary.

b. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

I have considered the effects of this rulemaking action under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) and certify that this rule will not have a significant economic impact on a substantial number of small entities. This rule only clarifies or corrects specifications for the H–III3C dummy. The rule does not impose or rescind any requirements for anyone. The Regulatory Flexibility Act does not, therefore, require a regulatory flexibility analysis for this action.

c. Executive Order 13132 (Federalism)

Executive Order 13132 requires NHTSA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Executive Order 13132, the agency may not issue a regulation with Federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, the agency consults with State and local governments, or the agency consults with State and local officials early in the process of developing the proposed regulation. NHTSA also may not issue a regulation with Federalism implications and that preempts State law unless the agency consults with State and local officials early in the process of developing the proposed regulation.

We have analyzed this rule in accordance with the principles and criteria set forth in Executive Order 13132 and have determined that this rule does not have sufficient Federal implications to warrant consultation with State and local officials or the preparation of a Federalism summary impact statement. The rule will not have any substantial impact on the States, or on the current Federal-State relationship, or on the current distribution of power and responsibilities among the various local officials.

d. Executive Order 13045

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be ''economically significant'' as defined under EO 12866, and (2) concerns an environmental, health or safety risk that NHTSA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by us.

This rule is not subject to the Executive Order because it is not economically significant as defined in E.O. 12866. As noted above, the impacts of this rule are minimal. It also does not involve decisions based on health risks that disproportionately affect children. This rule only clarifies or corrects specifications for the H–III3C dummy.

e. Executive Order 12778

Pursuant to Executive Order 12778, ''Civil Justice Reform,'' we have considered whether this rule will have any retroactive effect. This rule does not have any retroactive effect. A petition for reconsideration or other administrative proceeding will not be a prerequisite to an action seeking judicial review of this rule. This rule does not preempt the states from adopting laws or regulations on the same subject, except that it does preempt a state regulation that is in actual conflict with the federal regulation or makes compliance with the Federal regulation impossible or interferes with the implementation of the Federal statute.

f. National Environmental Policy Act

We have analyzed this amendment for the purposes of the National Environmental Policy Act and determined that it will not have any significant impact on the quality of the human environment.

g. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995, a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. This rule does not have any new information collection requirements.

h. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, section 12(d) (15 U.S.C. 272) directs us to use voluntary consensus standards in regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as the Society of Automotive Engineers (SAE). The NTTAA directs us to provide Congress, through OMB, explanations when we decide not to use available and applicable voluntary consensus standards.

The H–III3C dummy was developed under the auspices of the SAE. (All relevant SAE standards were reviewed as part of the development process: SAE Recommended Practice J211, Rev. Mar95 ''Instrumentation for Impact Tests''; and SAE J1733 of 1994–12 ''Sign Convention for Vehicle Crash Testing.'') In responding to the petitions for reconsideration, NHTSA made some of its decisions based on test data developed by the SAE Dummy Test Equipment Sub-Committee (DTES). In so doing, the agency complied with the NTTAA to the fullest extent possible.

i. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal agencies to prepare a written assessment of the costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of more than $100 million in any one year (adjusted for inflation with base year of 1995). Before promulgating a NHTSA rule for which a written statement is needed, section 205 of the UMRA generally requires us to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule.

This rule does not impose any unfunded mandates under the Unfunded Mandates Reform Act of 1995. This rule does not meet the definition of a Federal mandate because it does not impose requirements on anyone. Further, it will not result in costs of $100 million or more to either State, local, or tribal governments, in the aggregate, or to the private sector. Thus, this rule is not subject to the requirements of sections 202 and 205 of the UMRA.

Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

List of Subjects in 49 CFR Part 572

Motor vehicle safety, Incorporation by reference.

In consideration of the foregoing, NHTSA amends 49 CFR Part 572 as follows:

PART 572—ANTHROPOMORPHIC TEST DUMMIES

1. The authority citation for Part 572 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

2. Revise § 572.140(a)(1) introductory text, (a)(2), and (b)(1) to read as follows:

§ 572.140 Incorporation by reference.

(a) * * *

(1) A drawings and specifications package entitled, ''Parts List and Drawings, Subpart P Hybrid III 3-year-old child crash test dummy, (H–III3C, Alpha version) September 2001,'' incorporated by reference in § 572.141 and consisting of:

* * * * *

(2) A procedures manual entitled ''Procedures for Assembly, Disassembly and Inspection (PADI), Subpart P, Hybird III 3-year-old Child Crash Test Dummy, (H–III3C, Alpha Version) September 2001,'' incorporated by reference in § 572.141;

* * * * *

(b) * * *

(1) The drawings and specifications package referred to in paragraph (a)(1) of this section and the PADI document referred to in paragraph (a)(2) of this section are accessible for viewing and copying at the Department of Transportation's Docket public area, Plaza 401, 400 Seventh St., SW., Washington, DC 20590, and downloadable at *dms.dot.gov*. They are also available from Reprographic Technologies, 9107 Gaither Rd., Gaithersburg, MD 20877, (301) 419–5070.

* * * * *

3. In § 572.144, revise paragraph (b)(1) and add paragraph (c)(7) to read as follows:

§ 572.144 Thorax assembly and test procedure.

* * * * *

(b) * * *

(1) Maximum sternum displacement (compression) relative to the spine, measured with the chest deflection transducer (SA–572–S50), must not be less than 32mm (1.3 in) and not more than 38mm (1.5 in). Within this specified compression corridor, the peak force, measured by the probe-mounted accelerometer as defined in § 572.146(a) and calculated in accordance with paragraph (b)(3) of this section, shall be not less than 680 N and not more than 810 N. The peak force after 12.5 mm of sternum compression but before reaching the minimum required 32.0 mm sternum compression shall not exceed 910 N.

* * * * *

(c) * * *

(7) No suspension hardware, suspension cables, or any other attachments to the probe, including the velocity vane, shall make contact with the dummy during the test.

4. In § 572.146, revise paragraph (a), add paragraph (l)(2)(iv), and revise Figure P4 to read as follows:

§ 572.146 Test conditions and instrumentation.

(a) The test probe for thoracic impacts, except for attachments, shall be of rigid metallic construction and concentric about its longitudinal axis. Any attachments to the impactor such as suspension hardware, and impact vanes, must meet the requirements of § 572.144(c)(7) of this part. The impactor shall have a mass of 1.70 ± 0.02 kg (3.75 ± 0.05 lb) and a minimum mass moment of inertia 164 kg-cm^2 (0.145 lb-in-sec^2) in yaw and pitch about the CG of the probe. One-third (1⁄3) of the weight of suspension cables and any attachments to the impact probe must be included in the calculation of mass, and such components may not exceed five percent of the total weight of the test probe. The impacting end of the probe, perpendicular to and concentric with the longitudinal axis of the probe, has a flat, continuous, and non-deformable 50.8 ± 0.25 mm (2.00 ± 0.01 inch) diameter face with an edge radius of 7.6/12.7 mm (0.3/0.5 in). The impactor shall have a 53.3 mm (2.1 in) dia. cylindrical surface extending for a minimum of 25.4 mm (1.0 in) to the rear from the impact face. The probe's end opposite to the impact face has provisions for mounting an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. The impact probe has a free air resonant frequency not less than 1000 Hz limited to the direction of the longitudinal axis of the impactor.

* * * * *

(1) * * *

(2) * * *

(iv) Rotation potentiometer response (if used)—CFC 60.

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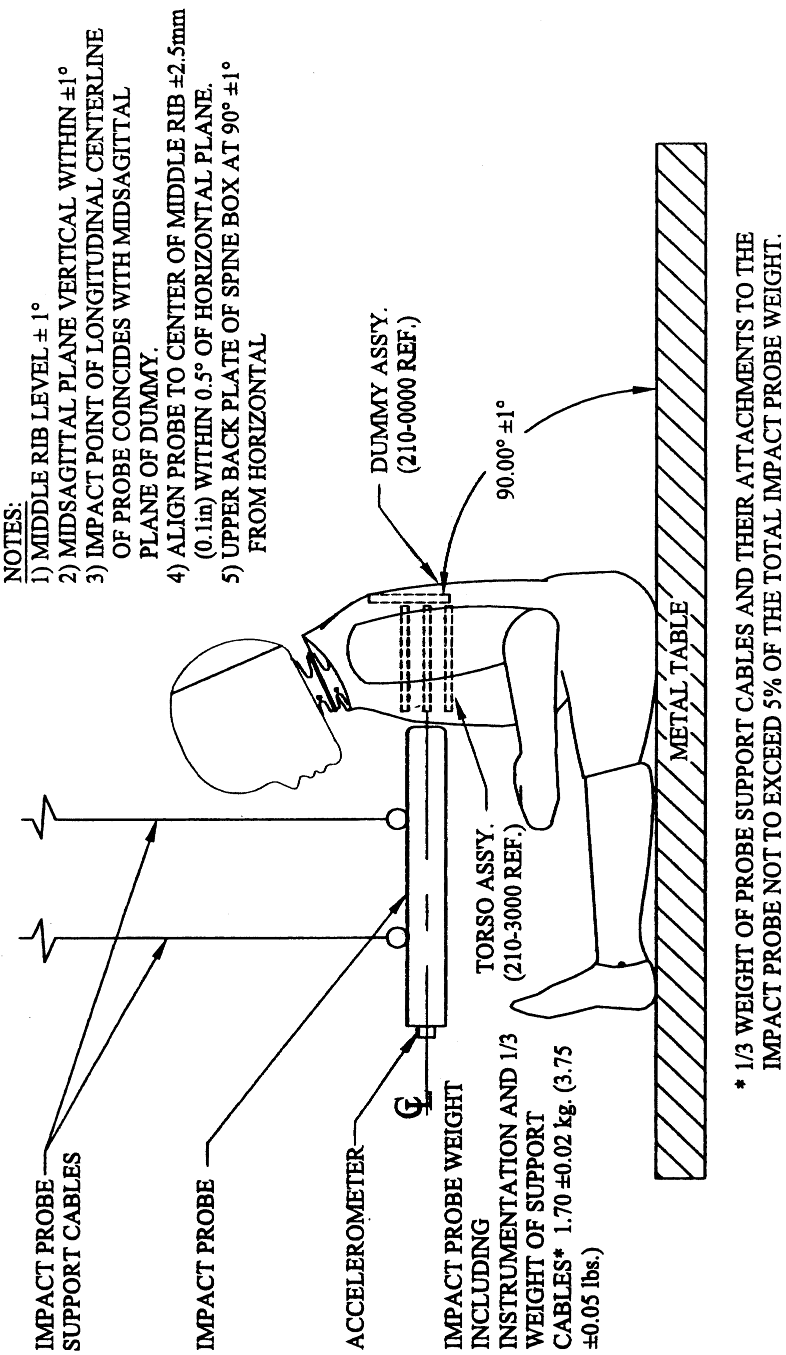
Figure P4

THORAX IMPACT TEST SET-UP SPECIFICATIONS



Issued: December 5, 2001.

Jeffrey W. Runge,

Administrator.

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