

## § 572.154

## 49 CFR Ch. V (10–1–06 Edition)

### § 572.154 Thorax assembly and test procedure.

(a) Thorax Assembly (refer to § 572.150(a)(1)(iv)). The thorax consists of the part of the torso assembly shown in drawing 921022-060.

(b) When the thorax of a completely assembled dummy (drawing 921022-000) is impacted by a test probe conforming to § 572.155(a) at  $5.0 \pm 0.1$  m/s ( $16.5 \pm 0.3$  ft/s) according to the test procedure in paragraph (c) of this section, the peak force, measured by the impact probe in accordance with paragraph § 572.155(a), shall be not less than 1514 N (340.7 lbf) and not more than 1796 N (404.1 lbf).

(c) *Test procedure.* (1) Soak the dummy in a controlled environment at any temperature between 20.6 and 22.2 °C (69 and 72 °F) and at any relative humidity between 10 and 70 percent for at least four hours prior to a test. These temperature and humidity levels shall be maintained throughout the entire testing period specified in this section.

(2) The test dummy is clothed in a cotton-polyester based tight fitting sweat shirt with long sleeves and ankle long pants whose combined weight is not more than 0.25 kg (.55 lbs).

(3) Seat and orient the dummy on a level seating surface without back support as shown in Figure R5 of this subpart, with the lower limbs extended forward, parallel to the midsagittal plane and the arms 0 to 5 degrees forward of vertical. The dummy's midsagittal plane is vertical within  $\pm 1$  degree and the posterior surface of the upper spine box is aligned at  $90 \pm 1$  degrees from the horizontal. (Shim material may be used under the upper legs to maintain the dummy's specified spine box surface alignment).

(4) Establish the impact point at the chest midsagittal plane so that the impact point of the longitudinal centerline of the probe coincides with the dummy's midsagittal plane, is centered on the torso  $196 \pm 2.5$  mm ( $7.7 \pm 0.1$  in) vertically from the plane of the seating surface, and is within 0.5 degrees of a horizontal plane.

(5) Impact the thorax with the test probe so that at the moment of contact the probe's longitudinal center line falls within 2 degrees of a horizontal line in the dummy's midsagittal plane.

(6) Guide the test probe during impact so that there is no significant lateral, vertical or rotational movement.

(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.

[65 FR 17188, Mar. 31, 2000, as amended at 66 FR 45784, Aug. 30, 2001]

### § 572.155 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, impact vanes, etc., must meet the requirements of § 572.154(c)(7). The impactor shall have a mass of  $2.86 \pm 0.02$  kg ( $6.3 \pm 0.05$  lbs) and a minimum mass moment of inertia of  $164 \text{ kg-cm}^2$  ( $0.145 \text{ lb-in-sec}^2$ ) in yaw and pitch about the CG of the probe. One-third 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  $101.6 \pm 0.25$  mm ( $4.00 \pm 0.01$  in) diameter face with an edge radius of  $7.6/12.7$  mm ( $0.3/0.5$  in). The impactor shall have a 101–103 mm (4–4.1 in) diameter cylindrical surface extending for a minimum of 12.5 mm (0.5 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 shall have a free air resonant frequency of not less than 1000 Hz measured in line with the longitudinal axis of the impactor, using the test method shown in the Procedures for Assembly, Disassembly and Inspection (PADI) document referenced in § 572.151.

(b) Head accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and be mounted in the head as shown in drawing 921022-000.

(c) The neck force-moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572-S23 and shall be mounted for testing as shown in drawing 921022-000 and in figures R3 and R4 of this subpart.

(d) The shoulder force transducers shall have the dimensions and response characteristics specified in drawing SA572-S25 and are allowed to be mounted as optional instrumentation in place of part No. 921022-022 in the torso assembly as shown in drawing 921022-000.

(e) The thorax accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and be mounted in the torso assembly in triaxial configuration as shown in drawing 921022-000.

(f) The lumbar spine and lower neck force/moment transducer shall have the dimensions and response characteristics specified in drawing SA572-S23 and are allowed to be mounted as optional instrumentation in the torso assembly in place of part No. 910420-003 as shown in drawing 921022-000.

(g) The pelvis accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572-S4 and are allowed to be mounted as optional instrumentation in the pelvis in triaxial configuration as shown in drawing 921022-000.

(h) The pubic force transducer shall have the dimensions and response characteristics specified in drawing SA572-S24 and is allowed to be mounted as optional instrumentation in place of part No. 921022-050 in the torso assembly as shown in drawing 921022-000.

(i) The outputs of acceleration and force-sensing devices installed in the dummy and in the test apparatus specified by this part are recorded in individual data channels that conform to the requirements of SAE Recommended Practice J211/1, Rev. Mar95

“Instrumentation for Impact Tests—Part 1—Electronic Instrumentation” (refer to §572.150(a)(3)), with channel classes as follows:

(1) Head and headform acceleration—Class 1000.

(2) Neck :

(i) Forces—Class 1000;

(ii) Moments—Class 600;

(iii) Pendulum acceleration—Class 180;

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

(3) Thorax:

(i) Spine and pendulum accelerations—Class 180;

(ii) Shoulder forces—Class 600;

(4) Lumbar:

(i) Forces—Class 1000;

(ii) Moments—Class 600;

(5) Pelvis:

(i) Accelerations—Class 1000;

(ii) Pubic—Class 1000.

(j) Coordinate signs for instrumentation polarity shall conform to SAE J1733, 1994-12, “Sign Convention For Vehicle Crash Testing, Surface Vehicle Information Report,” (refer to §572.150(a)(4)).

(k) The mountings for sensing devices shall have no resonance frequency within a range of 3 times the frequency range of the applicable channel class.

(l) Limb joints shall be set at 1 g, barely restraining the weight of the limb when it is extended horizontally. The force required to move a limb segment shall not exceed 2 g throughout the range of limb motion.

(m) Performance tests of the same component, segment, assembly, or fully assembled dummy shall be separated in time by period of not less than 30 minutes unless otherwise noted.

(n) Surfaces of dummy components may not be painted except as specified in this subpart or in drawings referenced in §572.150.

[65 FR 17188, Mar. 31, 2000, as amended at 66 FR 45784, Aug. 30, 2001]

Figure R 1  
FRONTAL HEAD DROP TEST SET-UP SPECIFICATIONS

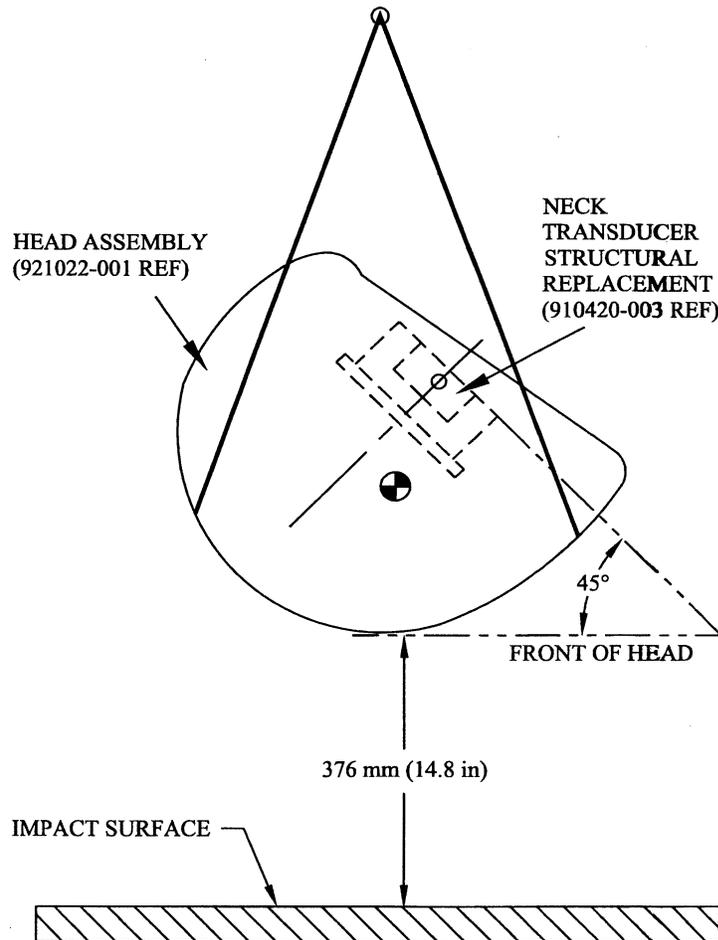


Figure R 2  
REAR HEAD DROP TEST SET-UP SPECIFICATIONS

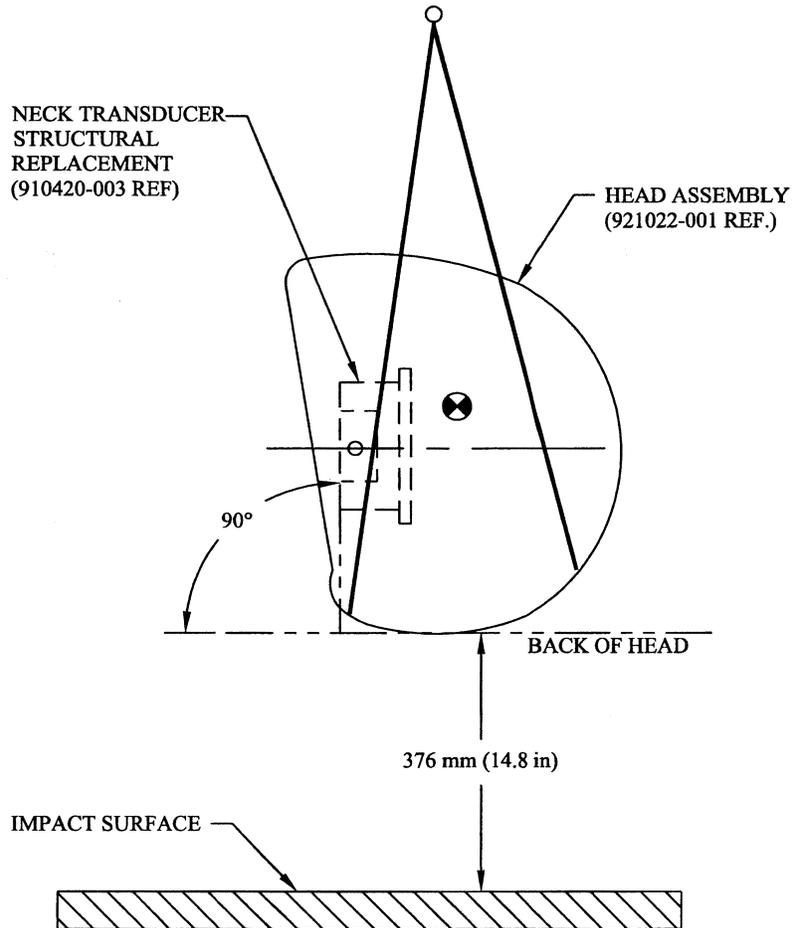
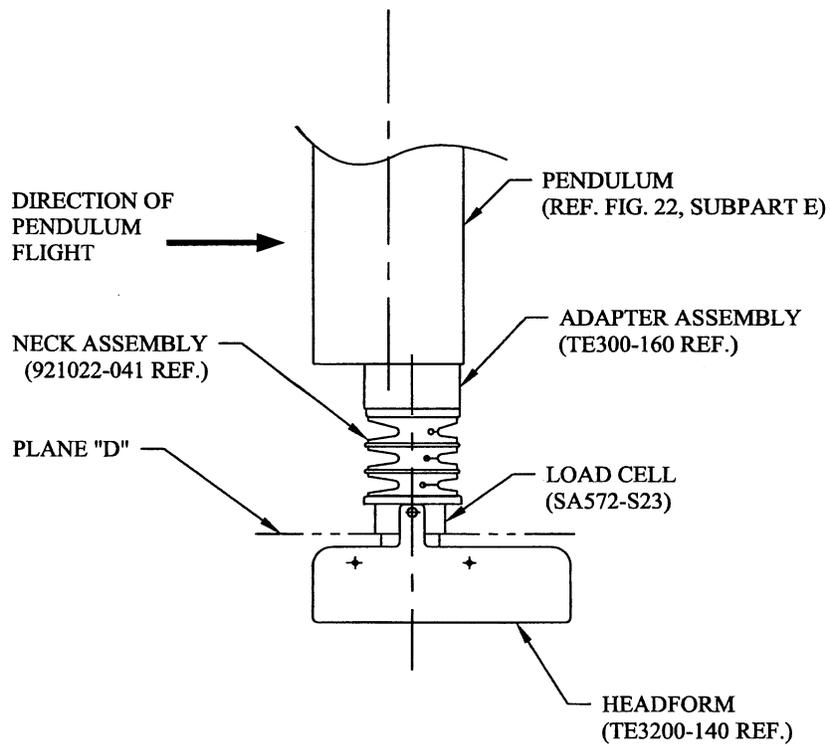
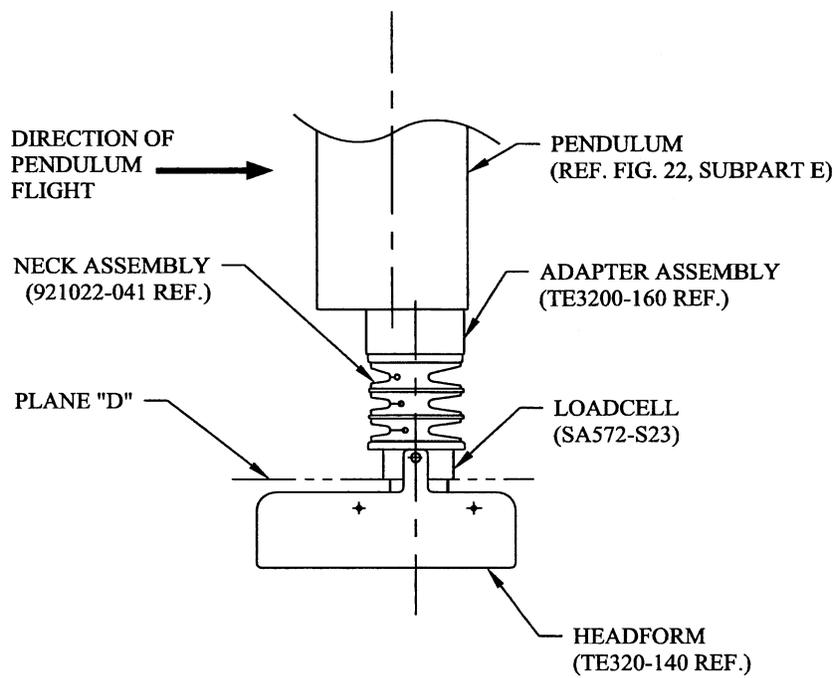


Figure R3  
NECK FLEXION TEST SET-UP SPECIFICATIONS



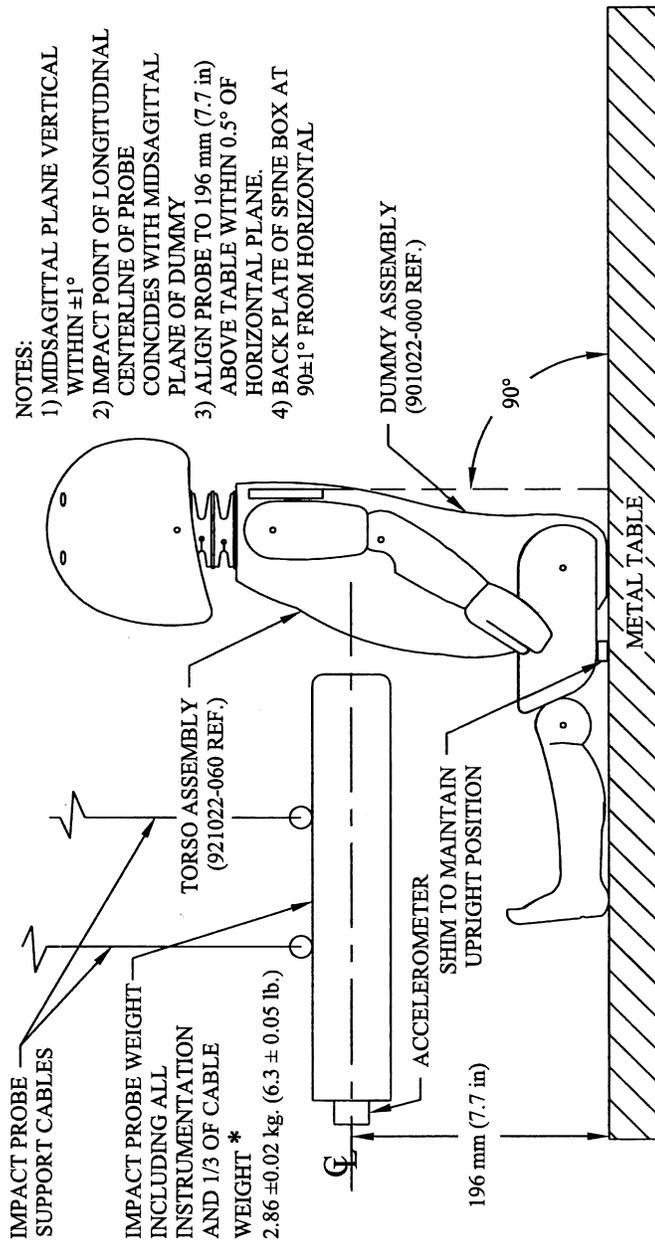
NOTE: MOUNT NECK AT LEADING EDGE OF PENDULUM TO  
AVOID INTERFERENCE.

**Figure R4**  
**NECK EXTENSION TEST SET-UP SPECIFICATIONS**



NOTE: MOUNT NECK AT LEADING EDGE OF PENDULUM TO  
AVOID INTERFERENCE.

Figure R 5  
THORAX IMPACT TEST SET-UP SPECIFICATIONS



- NOTES:
- 1) MIDSAGITTAL PLANE VERTICAL WITHIN ±1°
  - 2) IMPACT POINT OF LONGITUDINAL CENTERLINE OF PROBE COINCIDES WITH MIDSAGITTAL PLANE OF DUMMY
  - 3) ALIGN PROBE TO 196 mm (7.7 in) ABOVE TABLE WITHIN 0.5° OF HORIZONTAL PLANE.
  - 4) BACK PLATE OF SPINE BOX AT 90±1° FROM HORIZONTAL

\* 1/3 OF CABLE WEIGHT NOT TO EXCEED 5% OF THE TOTAL IMPACT PROBE WEIGHT.