

specified in Standard 208, *Occupant Crash Protection*, and Standard 213, *Child Restraint Systems*.

**§ 572.142 Head assembly and test procedure.**

(a) The head assembly (refer to § 572.140(a)(1)(i)) for this test consists of the head (drawing 210-1000), adapter plate (drawing ATD 6259), accelerometer mounting block (drawing SA 572-S80), structural replacement of ½ mass of the neck load transducer (drawing TE-107-001), head mounting washer (drawing ATD 6262), one ½-20x1" flat head cap screw (FHCS) (drawing 9000150), and 3 accelerometers (drawing SA-572-S4).

(b) When the head assembly in paragraph (a) of this section is dropped from a height of 376.0+/-1.0 mm (14.8+/-0.04 in) in accordance with paragraph (c) of this section, the peak resultant acceleration at the location of the accelerometers at the head CG shall not be less than 250 g or more than 280 g. The resultant acceleration versus time history curve shall be unimodal, and the oscillations occurring after the main pulse shall be less than 10 percent of the peak resultant acceleration. The lateral acceleration shall not exceed +/-15 G (zero to peak).

(c) *Head test procedure.* The test procedure for the head is as follows:

(1) Soak the head assembly in a controlled environment at any temperature between 18.9 and 25.6 °C (66 and 78 °F) and at any relative humidity between 10 and 70 percent for at least four hours prior to a test.

(2) Prior to the test, clean the impact surface of the head skin and the steel impact plate surface with isopropyl alcohol, trichlorethane, or an equivalent. Both impact surfaces must be clean and dry for testing.

(3) Suspend the head assembly with its midsagittal plane in vertical orientation as shown in Figure P1 of this subpart. The lowest point on the forehead is 376.0±1.0 mm (14.76±0.04 in) from the steel impact surface. The 3.3 mm (0.13 in) diameter holes, located on either side of the dummy's head in transverse alignment with the CG, shall be used to ensure that the head transverse plane is level with respect to the impact surface.

(4) Drop the head assembly from the specified height by a means that ensures a smooth, instant release onto a rigidly supported flat horizontal steel plate which is 50.8 mm (2 in) thick and 610 mm (24 in) square. The impact surface shall be clean, dry and have a finish of not less than  $203.2 \times 10^{-6}$  mm (8 micro inches) (RMS) and not more than  $2032.0 \times 10^{-6}$  mm (80 micro inches) (RMS).

(5) Allow at least 2 hours between successive tests on the same head.

**§ 572.143 Neck-headform assembly and test procedure.**

(a) The neck and headform assembly (refer to §§ 572.140(a)(1)(ii) and 572.140(a)(1)(iii)) for the purposes of this test, as shown in Figures P2 and P3 of this subpart, consists of the neck molded assembly (drawing 210-2015), neck cable (drawing 210-2040), nylon shoulder bushing (drawing 9001373), upper mount plate insert (drawing 910420-048), bib simulator (drawing TE-208-050), urethane washer (drawing 210-2050), neck mounting plate (drawing TE-250-021), two jam nuts (drawing 9001336), load-moment transducer (drawing SA 572-S19), and headform (drawing TE-208-000).

(b) When the neck and headform assembly, as defined in § 572.143(a), is tested according to the test procedure in paragraph (c) of this section, it shall have the following characteristics:

(1) Flexion.

(i) Plane D, referenced in Figure P2 of this subpart, shall rotate in the direction of preimpact flight with respect to the pendulum's longitudinal centerline between 70 degrees and 82 degrees. Within this specified rotation corridor, the peak moment about the occipital condyle may not be less than 42 N-m and not more than 53 N-m.

(ii) The positive moment shall decay for the first time to 10 N-m between 60 ms and 80 ms after time zero.

(iii) The moment and rotation data channels are defined to be zero when the longitudinal centerline of the neck and pendulum are parallel.

(2) Extension.

(i) Plane D referenced in Figure P3 of this subpart shall rotate in the direction of preimpact flight with respect to the pendulum's longitudinal centerline

between 83 degrees and 93 degrees. Within this specified rotation corridor, the peak moment about the occipital condyle may be not more than -43.7 N-m and not less than -53.3 N-m.

(ii) The negative moment shall decay for the first time to -10 N-m between 60 and 80 ms after time zero.

(iii) The moment and rotation data channels are defined to be zero when the longitudinal centerline of the neck and pendulum are parallel.

(c) *Test procedure.* (1) Soak the neck assembly in a controlled environment at any temperature between 20.6 and 22.2 °C (69 and 72 F) and a relative humidity between 10 and 70 percent for at least four hours prior to a test.

(2) Torque the jam nut (drawing 9001336) on the neck cable (drawing 210-2040) between 0.2 N-m and 0.3 N-m.

(3) Mount the neck-headform assembly, defined in paragraph (a) of this section, on the pendulum so the midsagittal plane of the headform is vertical and coincides with the plane of motion of the pendulum as shown in

Figure P2 of this subpart for flexion and Figure P3 of this subpart for extension tests.

(4) Release the pendulum and allow it to fall freely to achieve an impact velocity of 5.50±0.10 m/s (18.05 + 0.40 ft/s) for flexion and 3.65±0.1 m/s (11.98±0.40 ft/s) for extension tests, measured by an accelerometer mounted on the pendulum as shown in Figure 22 of this part 572 at time zero.

(i) The test shall be conducted without inducing any torsion twisting of the neck.

(ii) Stop the pendulum from the initial velocity with an acceleration vs. time pulse which meets the velocity change as specified in Table B of this section. Integrate the pendulum acceleration data channel to obtain the velocity vs. time curve as indicated in Table B of this section.

(iii) Time-zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. The pendulum data channel shall be zero at this time.

TABLE B.—PENDULUM PULSE

Time ms	Flexion		Time ms	Extension	
	m/s	ft/s		m/s	ft/s
10 .....	2.0–2.7	6.6–8.9	6	1.0–1.4	3.3–4.6
15 .....	3.0–4.0	9.8–13.1	10	1.9–2.5	6.2–8.2
20 .....	4.0–5.1	13.1–16.7	14	2.8–3.5	9.2–11.5

**§572.144 Thorax assembly and test procedure.**

(a) *Thorax (upper torso) assembly (refer to §572.140(a)(1)(iv)).* The thorax consists of the upper part of the torso assembly shown in drawing 210-3000.

(b) When the anterior surface of the thorax of a completely assembled dummy (drawing 210-0000) is impacted by a test probe conforming to §572.146(a) at 6.0±0.1 m/s (19.7±0.3 ft/s) according to the test procedure in paragraph (c) of this section.

(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 paragraph

§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 860 N.

(2) The internal hysteresis of the ribcage in each impact, as determined from the force vs. deflection curve, shall be not less than 65 percent and not more than 85 percent. The hysteresis shall be calculated by determining the ratio of the area between the loading and unloading portions of the force deflection curve to the area under the loading portion of the curve.

(3) The force shall be calculated by the product of the impactor mass and its deceleration.