

## § 572.7

for an interval not less than 0.9 milliseconds and not more than 1.5 milliseconds. The lateral acceleration vector shall not exceed 10g.

(c) Test procedure:

(1) Suspend the head as shown in Figure 2, so that the lowest point on the forehead is 0.5 inches below the lowest point on the dummy's nose when the midsagittal plane is vertical.

(2) Drop the head from the specified height by means that ensures instant release onto a rigidly supported flat horizontal steel plate, 2 inches thick and 2 feet square, which has a clean, dry surface and any microfinish of not less than 8 microinches (rms) and not more than 80 microinches (rms).

(3) Allow a time period of at least 2 hours between successive tests on the same head.

[38 FR 20451, Aug. 1, 1973, as amended at 42 FR 7152, Feb. 7, 1977]

## § 572.7 Neck.

(a) The neck consists of the assembly shown as number SA 150 M020 in Figure 1 and conforms to each of the drawings subtended by number SA 150 M020.

(b) When the neck is tested with the head in accordance with paragraph (c) of this section, the head shall rotate in reference to the pendulum's longitudinal centerline a total of  $68^{\circ} \pm 5^{\circ}$  about its center of gravity, rotating to the extent specified in the following table at each indicated point in time, measured from impact, with a chordal displacement measured at its center of gravity that is within the limits specified. The chordal displacement at time T is defined as the straight line distance between (1) the position relative to the pendulum arm of the head center of gravity at time zero, and (2) the position relative to the pendulum arm of the head center of gravity at time T as illustrated by Figure 3. The peak resultant acceleration recorded at the location of the accelerometers mounted in the head form in accordance with § 572.11(b) shall not exceed 26g. The pendulum shall not reverse direction until the head's center of gravity returns to the original zero time position relative to the pendulum arm.

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Rotation (degrees)	Time (ms) $\pm(2+.08T)$	Chordal Dis- placement (inches $\pm 0.5$ )
0 .....	0	0.0
30 .....	30	2.6
60 .....	46	4.8
Maximum .....	60	5.5
60 .....	75	4.8
30 .....	95	2.6
0 .....	112	0.0

(c) Test procedure: (1) Mount the head and neck on a rigid pendulum as specified in Figure 4, so that the head's midsagittal plane is vertical and coincides with the plane of motion of the pendulum's longitudinal centerline. Mount the neck directly to the pendulum as shown in Figure 4.

(2) Release the pendulum and allow it to fall freely from a height such that the velocity at impact is  $23.5 \pm 2.0$  feet per second (fps), measured at the center of the accelerometer specified in Figure 4.

(3) Decelerate the pendulum to a stop with an acceleration-time pulse described as follows:

(i) Establish 5g and 20g levels on the a-t curve.

(ii) Establish  $t_1$  at the point where the rising a-t curve first crosses the 5g level,  $t_2$  at the point where the rising a-t curve first crosses the 20g level,  $t_3$  at the point where the decaying a-t curve last crosses the 20g level, and  $t_4$  at the point where the decaying a-t curve first crosses the 5g level.

(iii)  $t_2 - t_1$  shall be not more than 3 milliseconds.

(iv)  $t_3 - t_2$  shall be not less than 25 milliseconds and not more than 30 milliseconds.

(v)  $t_4 - t_3$  shall be not more than 10 milliseconds.

(vi) The average deceleration between  $t_2$  and  $t_3$  shall be not less than 20g and not more than 24g.

(4) Allow the neck to flex without impact of the head or neck with any object other than the pendulum arm.

[38 FR 20451, Aug. 1, 1973, as amended at 42 FR 7152, Feb. 7, 1977; 42 FR 12176, Mar. 3, 1977; 45 FR 40596, June 16, 1980]

## § 572.8 Thorax.

(a) The thorax consists of the assembly shown as number SA 150 M030 in Figure 1, and conforms to each of the

drawings subtended by number SA 150 M030.

(b) The thorax contains enough unobstructed interior space behind the rib cage to permit the midpoint of the sternum to be depressed 2 inches without contact between the rib cage and other parts of the dummy or its instrumentation, except for instruments specified in paragraph (d)(7) of this section.

(c) When impacted by a test probe conforming to §572.11(a) at 14 fps and at 22 fps in accordance with paragraph (d) of this section, the thorax shall resist with forces measured by the test probe of not more than 1450 pounds and 2250 pounds, respectively, and shall deflect by amounts not greater than 1.1 inches and 1.7 inches, respectively. The internal hysteresis in each impact shall not be less than 50 percent and not more than 70 percent.

(d) Test procedure: (1) With the dummy seated without back support on a surface as specified in §572.11(i) and in the orientation specified in §572.11(i), adjust the dummy arms and legs until they are extended horizontally forward parallel to the midsagittal plane.

(2) Place the longitudinal center line of the test probe so that it is  $17.7 \pm 0.1$  inches above the seating surface at impact.

(3) Align the test probe specified in §572.11(a) so that at impact its longitudinal centerline coincides within 2 degrees of a horizontal line in the dummy's midsagittal plane.

(4) Adjust the dummy so that the surface area on the thorax immediately adjacent to the projected longitudinal center line of the test probe is vertical. Limb support, as needed to achieve and maintain this orientation, may be provided by placement of a steel rod of any diameter not less than one-quarter of an inch and not more than three-eighths of an inch, with hemispherical ends, vertically under the limb at its projected geometric center.

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

(6) Guide the probe during impact so that it moves with no significant lateral, vertical, or rotational movement.

(7) Measure the horizontal deflection of the sternum relative to the thoracic spine along the line established by the longitudinal centerline of the probe at the moment of impact, using a potentiometer mounted inside the sternum.

(8) Measure hysteresis 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.

[38 FR 20451, Aug. 1, 1973, as amended at 42 FR 7152, Feb. 7, 1977]

**§572.9 Lumbar spine, abdomen, and pelvis.**

(a) The lumbar spine, abdomen, and pelvis consist of the assemblies designated as numbers SA 150 M050 and SA 150 M060 in Figure 1 and conform to the drawings subtended by these numbers.

(b) When subjected to continuously applied force in accordance with paragraph (c) of this section, the lumbar spine assembly shall flex by an amount that permits the rigid thoracic spine to rotate from its initial position in accordance with Figure 11 by the number of degrees shown below at each specified force level, and straighten upon removal of the force to within 12 degrees of its initial position in accordance with Figure 11.

Flexion (degrees)	Force (±6 pounds)
0 .....	0
20 .....	28
30 .....	40
40 .....	52

(c) Test procedure: (1) Assemble the thorax, lumbar spine, pelvic, and upper leg assemblies (above the femur force transducers), ensuring that all component surfaces are clean, dry, and untreated unless otherwise specified, and attach them to the horizontal fixture shown in Figure 5 at the two link rod pins and with the mounting brackets for the lumbar test fixtures illustrated in Figures 6 to 9.

(2) Attach the rear mounting of the pelvis to the pelvic instrument cavity rear face at the four ¼" cap screw holes and attach the front mounting at the femur axial rotation joint. Tighten the