plane with the distance between the innermost point on the opposite ankle at 100 ±5 mm;

(iii) The impactor is the same as defined in § 572.189(a);

(iv) The impactor is guided, if needed, so that at contact with the thorax its longitudinal axis is within ±0.5 degrees of horizontal and perpendicular ±0.5 degrees to the midsagittal plane of the dummy and the centerpoint of the impactor's face is within 5 mm of the impact point on the dummy's middle rib shown in Figure U4 in appendix A to this subpart;

(v) The impactor impacts the dummy's thorax at 5.5 m/s ±0.1 m/s.

(vi) Time zero is defined in § 572.189(k).

(2) *Performance Criteria.* (i) The individual rib modules shall conform to the following range of deflections:

(A) Upper rib not less than 34 mm and not greater than 41 mm;

(B) Middle rib not less than 37 mm and not greater than 45 mm;

(C) Lower rib not less than 37 mm and not greater than 44 mm.

(ii) The impactor force shall be computed as the product of the impact probe acceleration and its mass. The peak impactor force at any time after 6 ms from time zero shall be not less than 5100 N and not greater than 6200 N.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

§ 572.186 Abdomen assembly.

(a) The abdomen assembly (175–5000) is part of the dummy assembly shown in drawing 175–0000 including load sensors specified in § 572.189(e). When subjected to tests procedures specified in paragraph (b) of this section, the abdomen assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.*

(1) Soak the dummy assembly (175–0000), without suit (175–8000) and shoulder foam pad (175–3010), as specified in § 572.189(n);

(2) The dummy is seated as shown in Figure U5 in appendix A to this subpart;

(3) The abdomen impactor is the same as specified in § 572.189(a) except that on its rectangular impact surface

is affixed a special purpose block whose weight is 1.0 ± 0.01 kg. The block is 70 mm high, 150 mm wide and 60 to 80 mm deep. The impact surface is flat, has a minimum Rockwell hardness of M85, and an edge radius of 4 to 5 mm. The block's wide surface is horizontally oriented and centered on the longitudinal axis of the probe's impact face as shown in Figure U5–A in appendix A to this subpart;

(4) The impactor is guided, if needed, so that at contact with the abdomen its longitudinal axis is within ± 0.5 degrees of a horizontal plane and perpendicular ± 0.5 degrees to the midsagittal plane of the dummy and the centerpoint on the impactor's face is aligned within 5 mm of the center point of the middle load measuring sensor in the abdomen as shown in Figure U5;

(5) The impactor impacts the dummy's abdomen at 4.0 m/s ± 0.1 m/s;

(6) Time zero is defined in § 572.189(k).

(c) Performance criteria.

(1) The maximum sum of the forces of the three abdominal load sensors, specified in 572.189(e), shall be not less than 2200 N and not more than 2700 N and shall occur between 10 ms and 12.3 ms from time zero. The calculated sum of the three load cell forces must be concurrent in time.

(2) Maximum impactor force (impact probe acceleration multiplied by its mass) is not less than 4000 N and not more than 4800 N occurring between 10.6 ms and 13.0 ms from time zero.

§ 572.187 Lumbar spine.

(a) The lumbar spine assembly consists of parts shown in drawing 175–5500. For purposes of this test, the lumbar spine is mounted within the headform assembly 175–9000 as shown in Figure U1 in appendix A to this subpart. When subjected to tests procedures specified in paragraph (b) of this section, the lumbar spine-headform assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.* (1) Soak the lumbar spine-headform assembly in a test environment as specified in § 572.189(n);

(2) Attach the lumbar spine-headform assembly to the Part 572 pendulum test fixture per procedure in § 572.183(b)(2)

and as shown in Figure U2–A in appendix A to this subpart. Torque the lumbar hex nut (p/n 9000057) on to the lumbar cable assembly (175–5506) to 50 ± 5 in-lb;

(3) Release the pendulum from a height sufficient to allow it to fall freely to achieve an impact velocity of 6.05 ±0.1 m/s measured at the center of the pendulum accelerometer (Figure 22) at the time the pendulum makes contact with its decelerating mechanism. The velocity-time history of the pendulum falls inside the corridor determined by the upper and lower boundaries specified in Table 1 to paragraph (b) of this section;

(4) Allow the lumbar spine to flex without the lumbar spine or the headform making contact with any object;

(5) Time zero is defined in §572.189(j).

TABLE 1 TO PARAGRAPH (b)—ES–2RE LUMBAR SPINE CERTIFICATION PENDULUM VELOCITY CORRIDOR

Upper boundary		Lower boundary	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	−0.05
3.7	−0.24	2.7	−0.425
27.0	−5.80	24.5	−6.50
		30.0	−6.50

(c) *Performance criteria.* (1) The pendulum deceleration pulse is to be characterized in terms of decrease in velocity as determined by integrating the filtered pendulum acceleration response from time-zero.

(2) The maximum rotation in the lateral direction of the reference plane of the headform (175–9000) as shown in Figure U2–B in appendix A to this subpart, shall be 45 to 55 degrees with respect to the longitudinal axis of the pendulum occurring between 39 and 53 ms from time zero. Rotation of the headform-neck assembly shall be measured with potentiometers specified in §572.189(c), installed as shown in drawing 175–9000, and calculated per procedure specified in Figure U2–B in appendix A to this subpart.

(3) The decaying headform rotation vs. time curve shall cross the zero angle with respect to its initial position at impact relative to the pendulum centerline between 37 ms to 57 ms after the time the peak translation-rotation value is reached.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

§572.188 Pelvis.

(a) The pelvis (175–6000) is part of the torso assembly shown in drawing 175–0000. The pelvis is equipped with a pubic symphysis load sensor in conformance with §572.189(f) and mounted as shown in drawing (175–0000 sheet 4). When subjected to tests procedures specified in paragraph (b) of this section, the pelvis assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.*

(1) Soak the dummy assembly (175–0000) without suit (175–8000) and shoulder foam pad (175–3010) as specified in §572.189(n);

(2) The dummy is seated as specified in Figure U6 in appendix A to this subpart;

(3) The pelvis impactor is the same as specified in §572.189(a);

(4) The impactor is guided, if needed, so that at contact with the pelvis its longitudinal axis is within ±0.5 degrees of a horizontal plane and perpendicular to the midsagittal plane of the dummy and the centerpoint on the impactor's face is within 5 mm of the center of the H-point in the pelvis, as shown in Figure U6 in appendix A to this subpart;

(5) The impactor impacts the dummy's pelvis at 4.3 ±0.1 m/s.

(6) Time zero is defined in §572.189(k).

(c) *Performance criteria.* (1) The impactor force (probe acceleration multiplied by its mass) shall be not less than 4,700 N and not more than 5,400 N, occurring between 11.8 ms and 16.1 ms from time zero;

(2) The pubic symphysis load, measured with load cell specified in §572.189(f) shall be not less than 1,230 N and not more than 1,590 N occurring between 12.2 ms and 17.0 ms from time zero.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

§572.189 Instrumentation and test conditions.

(a) The test probe for lateral shoulder, thorax without arm, abdomen, and pelvis impact tests is the same as that