§ 572.188

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

<table>
<thead>
<tr>
<th>Upper boundary</th>
<th>Lower boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (ms)</td>
<td>Velocity (m/s)</td>
</tr>
<tr>
<td>30.0</td>
<td>$6.50$</td>
</tr>
</tbody>
</table>

(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.

§ 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 specified in § 572.36(a) and the impact probe has a minimum mass moment of inertia in yaw of 9,000 kg-cm$^2$, a free air resonant frequency not less than 1,000 Hz and the probe’s end opposite to the impact face has provisions to mount an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. All hardware attached directly to the impactor and one-third ($\frac{1}{3}$) of the mass of the suspension cables must be included in the calculations of the total impactor mass. The sum mass of the attachments and $\frac{1}{3}$ cable mass must not exceed 5 percent of the total pendulum mass. No suspension hardware, suspension cables, or any other attachments to the test probe, including velocity vane, shall make contact with the dummy during the test.

(b) Accelerometers for the head, the thoracic spine, and the pelvis conform to specifications of SA572–S4.
(c) Rotary potentiometer for the neck and lumbar spine certification tests conforms to SA572–53.

(d) Linear position transducer for the thoracic rib conforms to SA572–59.

(e) Load sensors for the abdomen conform to specifications of SA572–75.

(f) Load sensor for the pubic symphysis conforms to specifications of SA572–77.

(g) Load sensor for the lumbar spine conforms to specifications of SA572–76.

(h) Instrumentation and sensors conform to the Recommended Practice SAE J–211 (Mar. 1995)—Instrumentation for Impact Test unless noted otherwise.

(i) All instrumented response signal measurements shall be treated to the following specifications:

1. Head acceleration—Digitally filtered CFC 1000;

2. Neck and lumbar spine rotations—Digitally filtered CFC 180;

3. Neck and lumbar spine pendulum accelerations—Digitally filtered CFC 60;

4. Pelvis, shoulder, thorax without arm, and abdomen impactor accelerations—Digitally filtered CFC 180;

5. Abdominal and pubic symphysis force—Digitally filtered at CFC 600;


(j) Filter the pendulum acceleration data using a SAE J211 CFC 60 filter.

(k) Determine the time when the filtered pendulum accelerometer data first crosses the $-1.0 \text{ m/s}^2 (-0.102 \text{ g})$ acceleration level ($T_0$).

(l) Set the data time-zero to the sample number of the new $T_0$.

(m) Mountings for the head, spine and pelvis accelerometers shall have no resonance frequency within a range of 3 times the frequency range of the applicable channel class.

(n) Performance tests are conducted, unless specified otherwise, at any temperature from 20.6 to 22.2 degrees C. (69 to 72 degrees F.) and at any relative humidity from 10 percent to 70 percent after exposure of the dummy to those conditions for a period of not less than 4 hours.

(o) Certification tests of the same component, segment, assembly, or fully assembled dummy shall be separated in time by a period of not less than thirty (30) minutes unless otherwise specified.
Figure U1

NECK/LUMBAR SPINE ATTACHED TO HEADFORM

- Mounting base, lower (Part #175-9027),
- Fasten to top of lumbar spine using (3) 1/4-20 x 1 SHCS
- or
- Fasten to base of neck using (4) M6 x 40 SHCS

- Lumbar spine (Part #175-5500)
- or
- Neck assembly (Part #175-2000)

- (4) M6 x 20.5 SHCS

- Neck and lumbar spine mounting base (Part #175-9029)
- Fasten to base of spine
- or
- Fasten to top of neck using (4) M6 x 12 SHCS

ES-2nc headform assembly (Part #175-9000)
Figure U2-A
NECK/LUMBAR SPINE/HEADFORM ATTACHED TO PENDULUM

DIRECTION OF MOTION

(4) M6 x 12 SHCS
FORE BASE ANGLE POT ASSEMBLY (CONNECT TO HEADFORM ANGLE POT)

MOUNTING BASE LOWER

AFT BASE ANGLE POT ASSEMBLY

LUMBAR SPINE (PART #175-5500) OR NECK ASSEMBLY (PART #175-2000)

HEADFORM (PART #175-9000)

PART 572
SUBPART E
PENDULUM (FIGURE #22)
Figure U2-B

ANGLE MEASUREMENTS WITH HEADFORM SET-UP

DIRECTION OF MOTION

PENDULUM BASE PLATE

FORE BASE ANGLE POT ASSEMBLY

AFT BASE ANGLE POT ASSEMBLY

\[ \beta = d\theta_a + d\theta_c \]

WHERE:
- \( d\theta_a \) = CHANGE IN FORE BASE ANGLE
- \( d\theta_c \) = CHANGE IN HEADFORM ANGLE

HEADFORM FLEXION ANGLE EQUATION:

HEADFORM (PART #175-9000)
Figure U5

ABDOMEN IMPACT

PART 572
SUBPART E
PENDULUM

PENDULUM HORIZONTAL AT IMPACT ± 0.5°

SEE FIGURE U5-A

THORAX VERTICAL ±2°

LEGS HORIZONTAL

TWO SHEETS OF 2mm THICK PTFE (TEFLON®)

ANKLE-TO-ANKLE

150
Figure U5-A
ABDOMEN IMPACT - VIEW A

ABDOMEN TEST SET-UP
Figure U6
PELVIS IMPACT

- PART 572
- SUBPART E
- PENDULUM
- PENDULUM HORIZONTAL AT IMPACT ± 0.5°
- ANKLE-TO-ANKLE ± 5mm
- PENDULUM CENTERLINE ALIGNED WITH H-POINT CENTER ± 5mm
- ARMS HORIZONTAL
- THORAX VERTICAL ± 2°
- LEGS HORIZONTAL
- TWO SHEETS OF 2mm THICK PTFE (TEFLON®)

152
Subpart V, SID–IIIsD Side Impact Crash Test Dummy, Small Adult Female

Source: 71 FR 75370, Dec. 14, 2006, unless otherwise noted.

§ 572.190 Incorporated materials.

(a) The following materials are hereby incorporated into this Subpart by reference:


2. A drawings and inspection package entitled "Drawings and Specifications for the SID–IIIsD Small Female Crash Test Dummy, Part 572 Subpart V, July 1, 2008," consisting of:
   (i) Drawing No. 180–0000, SID–IIIsD Complete Assembly;
   (ii) Drawing No. 180–1000, 6 Axis Head Assembly;
   (iii) Drawing No. 180–2000, Neck Assembly;

Figure U7
RIB DROP TEST

CENTERLINE OF IMPACTOR ALIGNED WITH CENTERLINE OF RIB RAIL ASSEMBLY ±2.5mm

CABLE GUIDE
FREE FALL IMPACTOR MASS 7.78 ± 0.01 kg
FACE = 150.0 ± 1.0mm
DIAMETER EDGE RADIUS 12.0 ± 0.5mm

RIB RAIL ASSEMBLY
(2) M8 FASTENERS
SUPPORT BRACKET (TYPICAL)
TABLE

RIB MODULE ASSEMBLY (PART #175-4002)