

§ 1203.14

in the conditioning environment for a minimum of 2 minutes before testing is resumed. If the helmet is out of the conditioning environment beyond 3 minutes, testing shall not resume until the helmet has been reconditioned for a period equal to at least 5 minutes for each minute the helmet was out of the conditioning environment beyond the first 3 minutes, or for 4 hours, (whichever reconditioning time is shorter) before testing is resumed.

(d) Prior to being tested for impact attenuation, helmets 1-4 (conditioned in ambient, high temperature, low temperature, and water immersion envi-

ronments, respectively) shall be tested in accordance with the dynamic retention system strength test at §1203.16. Helmets 1-4 shall then be tested in accordance with the impact attenuation tests on the flat and hemispherical anvils in accordance with the procedure at §1203.17. Helmet 5 (ambient-conditioned) shall be tested in accordance with the positional stability tests at §1203.15 prior to impact testing. Helmets 5-8 shall then be tested in accordance with the impact attenuation tests on the curbstone anvil in accordance with §1203.17. Table 1203.13 summarizes the test schedule.

TABLE 1203.13—TEST SCHEDULE

	§ 1203.14 Peripheral vision	§ 1203.15 Positional stability	§ 1203.16 Retention system strength	§ 1203.17 Impact tests	
				Anvil	Number of Impacts
Helmet 1, Ambient	X	.....	X	X Flat	2
				X Hemi	2
Helmet 2, High Temperature .....	.....	.....	X	X Flat	2
				X Hemi	2
Helmet 3, Low Temperature .....	.....	.....	X	X Flat	2
				X Hemi	2
Helmet 4, Water Immersion .....	.....	.....	X	X Flat	2
				X Hemi	2
Helmet 5, Ambient .....	.....	X	.....	X Curb	1
Helmet 6, Low Temperature .....	.....	.....	.....	X Curb	1
Helmet 7, High Temperature .....	.....	.....	.....	X Curb	1
Helmet 8, Water Immersion .....	.....	.....	.....	X Curb	1

§ 1203.14 Peripheral vision test.

Position the helmet on a reference headform in accordance with the HPI and place a 5-kg (11-lb) preload ballast on top of the helmet to set the comfort or fit padding. (NOTE: Peripheral vision clearance may be determined when the helmet is positioned for marking the test lines.) Peripheral vision is measured horizontally from each side of the midsagittal plane around the point K (see Figure 6 of this part). Point K is located on the front surface of the reference headform at the intersection of the basic and midsagittal planes. The vision shall not be obstructed within 105 degrees from point K on each side of the midsagittal plane.

§ 1203.15 Positional stability test (roll-off resistance).

(a) Test equipment.

(1) Headforms. The test headforms shall comply with the dimensions of

the full chin ISO reference headforms sizes A, E, J, M, and O.

(2) Test fixture. The headform shall be secured in a test fixture with the headform's vertical axis pointing downward and 45 degrees to the direction of gravity (see Figure 7 of this part). The test fixture shall permit rotation of the headform about its vertical axis and include means to lock the headform in the face up and face down positions.

(3) Dynamic impact apparatus. A dynamic impact apparatus shall be used to apply a shock load to a helmet secured to the test headform. The dynamic impact apparatus shall allow a 4-kg (8.8-lb) drop weight to slide in a guided free fall to impact a rigid stop anvil (see Figure 7 of this part). The entire mass of the dynamic impact assembly, including the drop weight, shall be no more than 5 kg (11 lb).

(4) Strap or cable. A hook and flexible strap or cable shall be used to connect the dynamic impact apparatus to the

helmet. The strap or cable shall be of a material having an elongation of no more than 5 mm (0.20 in.) per 300 mm (11.8 in.) when loaded with a 22-kg (48.5 lb) weight in a free hanging position.

(b) *Test procedure.*

(1) Orient the headform so that its face is down, and lock it in that orientation.

(2) Place the helmet on the appropriate size full chin headform in accordance with the HPI and fasten the retention system in accordance with the manufacturer's instructions. Adjust the straps to remove any slack.

(3) Suspend the dynamic impact system from the helmet by positioning the flexible strap over the helmet along the midsagittal plane and attaching the hook over the edge of the helmet as shown in Figure 7 of this part.

(4) Raise the drop weight to a height of 0.6 m (2 ft) from the stop anvil and release it, so that it impacts the stop anvil.

(5) The test shall be repeated with the headform's face pointing upwards, so that the helmet is pulled from front to rear.

§ 1203.16 Dynamic strength of retention system test.

(a) *Test equipment.* (1) ISO headforms without the lower chin portion shall be used.

(2) The retention system strength test equipment shall consist of a dynamic impact apparatus that allows a 4-kg (8.8-lb) drop weight to slide in a guided free fall to impact a rigid stop anvil (see Figure 8 of this part). Two cylindrical rollers that spin freely, with a diameter of 12.5±0.5 mm (0.49 in.±0.02 in.) and a center-to-center distance of 76.0±1 mm (3.0±0.04 in.), shall make up a stirrup that represents the bone structure of the lower jaw. The entire dynamic test apparatus hangs freely on the retention system. The entire mass of the support assembly, including the 4-kg (8.8-lb) drop weight, shall be 11 kg±0.5 kg (24.2 lb±1.1 lb).

(b) *Test procedure.* (1) Place the helmet on the appropriate size headform on the test device according to the HPI. Fasten the strap of the retention system under the stirrup.

(2) Mark the pre-test position of the retention system, with the entire dy-

amic test apparatus hanging freely on the retention system.

(3) Raise the 4-kg (8.8-lb) drop weight to a height of 0.6 m (2 ft) from the stop anvil and release it, so that it impacts the stop anvil.

(4) Record the maximum elongation of the retention system during the impact. A marker system or a displacement transducer, as shown in Figure 8 of this part, are two methods of measuring the elongation.

§ 1203.17 Impact attenuation test.

(a) *Impact test instruments and equipment—(1) Measurement of impact attenuation.* Impact attenuation is determined by measuring the acceleration of the test headform during impact. Acceleration is measured with a uniaxial accelerometer that is capable of withstanding a shock of at least 1000 g. The helmet is secured onto the headform and dropped in a guided free fall, using a monorail or guidewire test apparatus (see Figure 9 of this part), onto an anvil fixed to a rigid base. The center of the anvil shall be aligned with the center vertical axis of the accelerometer. The base shall consist of a solid mass of at least 135 kg (298 lb), the upper surface of which shall consist of a steel plate at least 12 mm (0.47 in.) thick and having a surface area of at least 0.10 m² (1.08 ft²).

(2) *Accelerometer.* A uniaxial accelerometer shall be mounted at the center of gravity of the test headform, with the sensitive axis aligned within 5 degrees of vertical when the test headform is in the impact position. The acceleration data channel and filtering shall comply with SAE Recommended Practice J211 OCT88, Instrumentation for Impact Tests, Requirements for Channel Class 1000.

(3) *Headform and drop assembly—centers of gravity.* The center of gravity of the test headform shall be at the center of the mounting ball on the support assembly and within an inverted cone having its axis vertical and a 10-degree included angle with the vertex at the point of impact. The location of the center of gravity of the drop assembly (combined test headform and support assembly) must meet the specifications of Federal Motor Vehicle Safety Standard No. 218, Motorcycle Helmets, 49