

## Chapter MVD 18

PROTECTIVE HEADGEAR—STANDARDS  
AND SPECIFICATIONS

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**NOTE:** Section 347.485, Wis. Stats., provides for the approval of standards, specifications, and type of protective headgear and the manner of wearing such headgear.

Section 347.485 (1) (a), Wis. Stats. No person shall operate or ride upon a motor-driven cycle on any highway unless such person is wearing protective headgear of a type and in the manner approved by the commissioner.

Section 347.485 (1) (b), Wis. Stats. No person shall sell or offer for sale any protective headgear for use by a driver or passenger on a motor-driven cycle, not meeting the standards and specifications approved by the commissioner.

Section 347.485 (1) (c), Wis. Stats. The standards and specifications for protective headgear referred to in this section shall be such as to provide a high level of protection at reasonable cost to the consumer.

**MVD 18.01 Applicability.** (1) Every non-resident shall use protective headgear as prescribed, except that such headgear will be approved for usage in Wisconsin even though it does not comply with this order, but meets the standards and specifications of his state of residence. If his state of residence does not have standards or specifications for protective headgear, then such headgear shall be in compliance with this order.

(2) Protective headgear shall not be required of operators or passengers of three-wheeled vehicles which are equipped with cabs entirely enclosing the passenger compartment.

(3) Protective headgear purchased by a resident prior to the effective date of this order, which headgear can be identified as meeting these requirements, may be labeled as acceptable by the division.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.02 Definitions.** (1) AREA OF PROTECTION is defined as entire area of the head above the reference plane.

(2) BASIC PLANE is defined as a plane at the level of the external auditory meatus and the inferior margin of the orbit. Also referred to as the anatomical plane.

(3) DIVISION as used herein means the Division of Motor Vehicles of the Department of Transportation of the State of Wisconsin.

(4) EXTERNAL AUDITORY MEATUS refers to the external opening of the ear.

(5) **HARNESS** is defined as the complete assembly by means of which the protective headgear is maintained in position on the wearer's head.

(6) **INFERIOR MARGIN OF ORBIT** is the bottom of the bony rim of the eye opening.

(7) **ORBIT** is the bony rim of the eye socket.

(8) **PROJECTION** is any part that juts out or extends beyond the surface in abrupt fashion.

(9) **PROTECTIVE HEADGEAR** is a device primarily intended to protect the upper part of the wearer's head against a blow or from impacts.

(10) **REFERENCE PLANE** is a plane 2.36 in. (60 mm) above and parallel to the basic (anatomical) plane, which shall be located on each head form.

(11) **SHELL** is defined as the outer material that provides the general form of the headgear.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.03 Construction.** The construction of the protective headgear shall be such as to meet the performance standards, having the necessary means of absorbing impact energy. Any optional devices fitted to a protective headgear shall be so designed that they are unlikely to cause injury to the wearer in the event of an accident.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.04 Materials.** Materials used in the protective headgear shall be of durable quality. Their physical properties shall not change appreciably under normal use for the expected life of the protective headgear under exposure to sun, rain, temperature variations, dust, vibrations, contact with body tissues and fluids and products normally used on the skin and hair, nor shall they cause skin irritation or disease if they come into contact with the skin of the wearer.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.05 Extent of protection.** (1) The area of protection as defined shall be protected by the protective headgear so as to meet the requirements as to shock absorption and to withstand impact and penetration as prescribed.

(2) The protective headgear shall be designed so that no part will be inadvertently detached during normal use including impact conditions encountered in accidents.

(3) The protective headgear shall be designed to provide a range of peripheral vision of 120 degrees to each side of a focus line.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.06 Test samples.** (1) To qualify under these standards, protective headgear shall be tested in accordance with the procedures set forth herein. The tests shall be conducted on stock protective headgear as offered for sale.

(2) After a particular model has been approved by the administrator, further tests to verify continued satisfactory performance may be required from time to time. Consideration will be given to limiting further tests provided there is no change in materials or manufacture.

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(3) Four protective headgear will be required for qualification testing.

(4) The reference plane shall be marked on protective headgear prior to testing, and all tests shall be above the reference plane.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.07 Test conditions.** (1) **AMBIENT TEMPERATURE.** Ambient temperature tests will be conducted on the first protective headgear in a room in which the ambient temperature is  $75 \pm 5^\circ\text{F}$ . The protective headgear shall be maintained in the ambient temperature for a period of not less than 4 hours immediately prior to testing.

(2) **LOW TEMPERATURE.** The second protective headgear shall be tested under low temperature conditions after being cooled in a mechanically cooled apparatus to a temperature of  $-10 \pm 2^\circ\text{C}$ . for a period of not less than 4 hours nor more than 24 hours.

(3) **WATER IMMERSION.** The third protective headgear shall be tested after immersion in water at a temperature of  $25 \pm 5^\circ\text{C}$ . for a period not less than 4 hours nor more than 24 hours.

(4) **HIGH TEMPERATURE.** The fourth protective headgear shall be tested after being heated in a suitable oven at a temperature of  $50 \pm 2^\circ\text{C}$ . for a period not less than 4 hours nor more than 24 hours.

(5) **TIME.** Testing shall begin within 5 minutes after removal from the environments specified in (2), (3), and (4), and shall be completed before the temperature and/or moisture content has changed appreciably from the specified conditions.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.08 Shock absorption test (impact test).** (1) Shock absorption shall be measured by imparted acceleration to an appropriately instrumented movable head form, by either of the following means:

(a) Dropping in guided fall upon a fixed, rigid anvil, or

(b) Mounted on a freely pivoting arm, and being impacted by an appropriate bobweight dropped in guided fall.

(2) **Acceptable acceleration levels:**

(a) Any peak acceleration exceeding 400 G's shall be cause for rejection of the protective headgear.

(b) Accelerations between 200 and 400 G's shall be cause for rejection of the protective headgear if the total time of such acceleration measured at the 200 G level exceeds 2 milliseconds.

(c) Accelerations in excess of 150 G's for more than 4 milliseconds shall be cause for rejection of the protective headgear.

(d) The acceptable acceleration levels set forth in this section shall apply to ambient temperature impact, low temperature impact, high temperature impact, and water immersion impact tests.

(3) Each protective headgear shall be impacted with 2 identical impacts in not less than 4 sites. The impact sites shall be above the reference plane, and separated from each other by a distance equal to one-fifth or more of the maximal circumference of the protective headgear.

(4) Two steel impactor or anvil configurations shall be used. One shall be flat, the other hemispherical.

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(5) The flat impactor shall have a minimum surface area of 19.6 square inches (127 square centimeters) i.e., 5-inch diameter face; the hemispherical impactor shall have a 1.9-inch (4.8 centimeter) radius.

(6) An equal number of paired impacts shall be applied with each configuration.

(7) The test head form shall be of low resonance magnesium alloy (K-1A), and shall weigh  $11 \pm 0.2-0.0$  pounds (5 kilograms  $\pm 0.091-0$ ). This weight shall include the supporting arm if testing by dropping upon a rigid anvil. The same weight shall be used for the impacting bobweight if testing is done according to the pivoting head form system.

(8) The impact energy utilized shall be 50 foot pounds (7.42 kilogram meters) with the hemispherical anvil face (54 in. or 134 cm drop) and 66 foot pounds (9.8 kilogram meters) with the flat anvil face (72 in. or 183 cm drop) if testing is in accordance with (a) of 18.08 (1).

It shall be 120 foot pounds (17.8 kilogram meters) with the hemispherical striker (131 in. or 332 cm) and 160 foot pounds (23.8 kilogram meters) with a flat striker (175 in. or 443 cm) if testing is in accordance with (b) of 18.08 (1).

(NOTE: This test is identical with section 9, Tests for Helmets, in USA standard Z90.1-1966.)

A copy of the standard is on file in the office of the secretary of state, the revisor of statutes, and the division of motor vehicles of the department of transportation, and may be obtained for personal use from USA Standards Institute, 10 East 40th Street, New York, N. Y. 10016.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.09 Penetration test.** (1) The complete protective headgear shall be placed on a rigid head form covered with an electrically-conducting material. Penetration tests shall be conducted by dropping a 6-pound, 10-ounce (3 kilogram) penetration striker a distance of 39.37 inches (1 meter) measured from the outer surface of the protective headgear to the tip of the striker. The impact tip of the striker shall be a cone with an included angle of  $60^\circ$  and an altitude of at least 1.5 inches. The radius of the striking point shall be .0197 in. (0.5 mm) and its hardness 60 Rockwell (scale C).

(2) The protective headgear shall be subjected to impact of the striker dropped (free fall) onto the outside surface of the protective headgear in a direction essentially perpendicular to the surface. The points of impact shall be one in each  $60^\circ$  quadrant of the protective headgear at radial distance  $4.5 \pm 0.5$  in. from the apex and also at the apex. Ten impacts in these quadrants shall be accomplished on the four sample protective headgear with at least one impact on each sample.

(3) The protective headgear shall be rejected if electrical contact is made between the impactor and the conducting surface of the head form during any of the ten impacts supplied in subsection (2).

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.10 Retaining system test.** (1) The retention system of the protective headgear shall be tested by placing the protective headgear on a rigid head form. The chin strap or other chin restraining device shall be placed around a movable anvil approximating the size of the human jaw. The simulated jaw shall be located in approximately the correct relative position on the head form.

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(2) The movable simulated jaw bone shall be moved downward with respect to the head form until a force of 300 pounds (136 kilograms) is applied to the simulated jaw bone. The retention system and its attachments shall support this force without failure and without greater than 1 in. (2.54 cm) increase in vertical distance from the top of the protective headgear to the bottom of the simulated jaw bone.

(3) If the extension between the simulated jaw and the top of the protective headgear is greater than 1 in. (2.54 cm) or if any part of the retention system fails, the protective headgear shall be rejected.

(4) The retention system shall be tested as specified herein at ambient temperature.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.11 Test equipment and preparation of such equipment.**

(1) All equipment shall be turned on and allowed to warm up for at least 30 minutes or until equilibrium is reached, whichever time is greater, prior to any testing.

(2) The instrumentation shall be calibrated according to the manufacturer's recommendation prior to and after each series of tests. If the system is out of calibration at the end of a test series, the entire series shall be discarded.

(3) A record shall be made of each impact and retained as a permanent record of the acceleration-time history.

(4) The test equipment shall be identical or equivalent to that specified in section 13 of USA standard Z90.1-1966, with the exception that the head form and penetration striker shall be modified to conform to section MVD 18.09 (1).

**NOTE:** A copy of the standard is on file in the office of the secretary of state, the revisor of statutes, and the division of motor vehicles of the department of transportation, and may be obtained for personal use from USA Standards Institute, 10 East 40th Street, New York, N. Y. 10016.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.12 Calibration of test equipment.** (1) The equipment shall be calibrated in accordance with the procedure recommended by the manufacturer. It shall be allowed to warm up until equilibrium is reached prior to any testing.

(2) The instrumentation shall be recalibrated after each series of tests. Any change in the calibration before and after testing shall be cause for rejection of the test series.

(3) In addition to the manufacturer's component calibration specified in subsection (1), the entire system shall be checked before and after each series of tests for calibration by dropping the head form on a section of rigid foam plastic and comparing this calibration with previous calibrations on the same or identical foam plastic. This calibration must be within predetermined tolerance prior to and after testing. If it is out of tolerance, the test series shall be discarded.

(4) A permanent acceleration-time history record of each impact shall be made.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.13 Certification and approval.** (1) Tests to demonstrate compliance with requirements of these specifications and standards shall be performed by independent testing agencies considered by

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the division of motor vehicles to be qualified to conduct such tests. Test reports shall be complete showing test results as against minimum or maximum values prescribed by the applicable standards and specifications and shall be certified by the testing agency with respect to accuracy and compliance with the requirements for approval.

(2) A manufacturer desiring approval of a protective headgear shall submit to the Administrator of the Division of Motor Vehicles, Department of Transportation, Madison, Wisconsin, a test report, from an independent testing laboratory acceptable to the state, certified as required in subsection (1). A sample of the protective headgear will not be required by the division.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.14 Manner of wearing.** The protective headgear shall be worn on the head with chin strap properly fastened, and in contact with the chin or jaw.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.15 Reflectorized headgear.** Protective headgear may have a reflectorized surface or have reflectorized material affixed on the left and right side of the protective headgear.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.

**MVD 18.16 Identification requirements.** Each make and model protective headgear approved by the division shall be labeled on the outside of the protective headgear above the base of the rear of the protective headgear with letters and/or numbers of at least  $\frac{1}{4}$  inch in height with the manufacturer's tradename and model name or number under which the protective headgear has been approved.

**History:** Cr. Register, June, 1968, No. 150, eff. 7-1-68.