

1959

STANDARDS FOR RACING CRASH HELMETS

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## FORWARD

An endeavor has been made to design generally applicable standards for the fabrication of racing crash helmets, upon which certification can be made by the Snell Memorial Foundation. Previous certification by the Foundation of such crash helmets has been on the basis of comparative testing with the utilization of those found to be significantly superior as an "internal standard" against which other forms of head protection might be judged. It is now felt necessary that certain minimum standards for helmets intended for racing be established and adequately recorded. The need for this has become increasingly apparent with the progressively more keen interest in certification by overseas helmet manufacturers for whom the use of "internal standards" as in the past presents certain difficulties. Increased interest by manufacturers in this country and by progressively larger numbers of consumer groups has also made this need apparent.

It must be understood that these standards are of minimum nature and it is the sincere hope of the Foundation that manufacturer research will continue. Stimulation to this end should be attained by virtue of the Foundation's plan to annually revise these standards upward. It is expected that such revisions will be of a progressive nature.

It must be understood that protection given by any crash helmet cannot be complete and that the wearing of such helmet may not entirely prevent head injury or even death in certain severe accidents. The best crash helmet is but one link in a long chain of safety which includes seat belts, roll bars, adequate track supervision, etc. The weakening of any one link in this chain tends to destroy the basic value of the entire chain.

The attention of the consumer should be called to the fact that of necessity helmets are constructed so that the energy of a severe blow is absorbed in the partial destruction of the helmet. This damage may not be readily apparent and it is strongly recommended by the Foundation that consumer groups require that any helmet involved in a significant accident be returned to the manufacturer for competent inspection. If such inspection is not readily available, the helmet should be replaced.

## CONSTRUCTION

a). General: The helmet shall consist of a hard, smooth shell lined with protective padding material or fitted with other means of energy absorption and shall be strongly attached to a strap designed to fasten under the wearer's chin. The assembled helmet shall have a smooth external service without reinforcing ridges or other rigid external protections except that a goggle clip may be used at the rear of the helmet if desired and a ledge may be moulded at the front edge to support a visor. Such goggle clips shall not project more than one-half inch from the outer surface of the shell. Such ledge, if included, shall not project more than three-eighths inch from the outer surface of the shell, and shall not extend more than five inches from the midpoint in front towards either side.

b). Shell: The shell of the helmet shall be as nearly uniform in thickness and strength as is possible using normal manufacturing methods and shall not be specially reinforced at the test points. Ventilation holes, if used, shall not exceed one-half inch in diameter. Ventilation slots, if used, shall be placed over the ear area only, and must terminate in a rounded opening without any squaring of edges. Such slots shall not exceed one-quarter inch in width.

c). Helmet Height: The vertical dimension from the lower edge of the head band or other head fitting to the outside of the crown of the shell, at the mid-point of the helmet in a longitudinal axis shall not be less than five inches.

d). Extent and Form of Protective Material: The helmet shall be so constructed that any protective padding materials used shall cover the entire inner surface of the shell to a minimum lower trim line determined in the following fashion. At the mid-point in the front of the shell, the protective material shall extend to within five-eighths inch of the shell edge. Using this as a reference point, with the helmet in a normal upright position, the remainder of the protective material must extend to a plane running perpendicular to the vertical axis of the helmet and through the front reference point.

The lower limit of protective padding material delineated above is to be considered an absolute minimum; any additional extension below this plane is to be considered highly desirable. Specifically, if shell extensions are used below the lower edge of the head fitting, they should be lined with protective padding material similar to that used in the upper part of the shell, and of comparable thickness, except that cut-out areas may be used to clear the ears.

Over the entire area covered by such protective lining substance, the material used must be of uniform construction and of thickness at least equal to its thickness at the rear of the helmet. No gaps in the protective padding materials shall be of greater width than one-quarter inch except corresponding to ventilation holes, which may be used up to one-half inch diameter. No part of this protective padding material shall be readily detachable.

e). Headband or Other Head Fitting: The headband or other head fitting shall not project below the lower edge of the shell at any point and shall be suspended or well-cushioned from the shell itself. Attention is drawn to the necessity of protecting certain materials which may be used for this purpose against the effect of oil or grease from the wearer's hair.

f). Harness: The head fitting shall consist of a sweat resistant material. The manufacturers shall insure that the materials used in the harness are not of a kind known to cause skin diseases. In the case of a material not in general use for this purpose, advice as to its suitability should be sought from a competent medical authority.

g). Finish: All edges of the shell shall be smooth and rounded, and there shall be no metallic parts or other rigid projections on the inside of the shell which could injure the wearer's head in the event of a crash.

#### SAMPLING FOR CERTIFICATION

Samples of helmets for testing shall be made by taking at random pairs of the same size as offered for sale. No helmet which has been subjected to any test described in this standard shall actually be offered for sale after testing.

#### LABELING AND MARKING

There shall be securely attached to each helmet offered for sale a label bearing an inscription to the following effect:

(1) For maximum protection this helmet must be of good fit and the chin strap must be securely fastened.

(2) This helmet is so constructed that the energy of a severe blow is absorbed through the partial destruction of this shell and/or lining, although damage may not be visible to the naked eye. If it suffers such an impact, it should be either returned to the manufacturer for competent inspection or discarded and replaced by a new one.

Helmets which comply with the requirements of this standard shall be marked as follows:

(a) With the name, trademark, or other means of identification of the manufacturer.

(b) With the month and year of manufacture.

(c) With the certification mark of the Snell Memorial Foundation, which may be used by the manufacturer only under license from the Snell Memorial Foundation. Particulars of the conditions under which licenses are granted may be obtained from the Foundation.



In addition, the manufacturer's name or trademark and the month and year of manufacture must be indelibly marked in an agreed code on the inside of the helmet in a position where this marking is protected from obliteration.

### TESTING

All helmets certified by the Snell Memorial Foundation must pass the following tests of shock absorption, harness and strap strength, and resistance to penetration. In addition to the initial testing prior to certification, random samples will be obtained by the Foundation from the open market, such samples to be replaced to the vendor by the manufacturer and these will be tested by the Foundation in similar fashion. Subsequent to certification, such random sample testing as is deemed necessary may be done by the Foundation or by an independent laboratory acceptable to the Foundation.

I. Shock Absorption Test: A test shall be instituted to establish a performance level in attenuating acceleration as a measure of the shock-absorption property of the complete helmet. The helmet, mounted on an instrumented 12 lb head form, will be subjected to impacts on front, rear and side with an impacting mass weighing 1/2 slug (16.08 lbs). The impacting surface configuration will be of spherical nature, with a radius of 1.9 inch, and the impacting test velocity shall be 20 ft per second.

At this velocity "bottoming" shall not occur, nor shall the imparted acceleration exceed 400 G's. In this test the head form shall be suspended in such manner as to approximate a free mass.

The helmet must withstand a minimum of two blows at this energy level without failing the above conditions.

Details of the test equipment, methods of calibration, etc., may be obtained from the Director of Research, Snell Memorial Foundation.

II. Test for Attachment of Harness: The fastened chin strap will be subjected to a test of tensile strength. The helmet shall be supported on a head form so that the points of attachment of the chin strap will be subject to the same test as the strap itself. The strap and its attachments shall support a weight of 300 pounds without parting and without greater than one inch increase in the vertical distance of the chin strap from the helmet crown.

III. Test for Resistance to Penetration: After the preceding tests, sufficient exposure of the inner shell surface shall be made so as to allow unpadded shell to rest upon a rigid head form. A striker weighing 4 lbs and having a conical point with an included angle of 60 degrees, and a maximum tip radius of 0.020 inch, is dropped a clear distance of 3 feet so as to strike the crown of the helmet in the vertical axis of the head form.

The head form shall contain a cylindrical cavity 1.75 inches in diameter whose vertical axis shall be centered with that of the striking point. This cavity shall contain a means of recording the instantaneous vertical deflection of the inner surface of the shell within  $3/8$  inch of the axis.

When tested in the above fashion, the maximum vertical deflection shall not exceed  $3/8$  inch.

It is contemplated that at the next revision of these Standards, additional specifications will be added covering resistance to increased humidity, aging and abrasion, performance under various temperature conditions, initial rates of acceleration and coefficients of dynamic friction, etc.