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SAFETY CODE SERIES

SPECIFICATIONS OF LABORATORY TESTS FOR APPROVAL OF ELECTRIC HEADLIGHTING DEVICES FOR MOTOR VEHICLES

ILLUMINATING ENGINEERING SOCIETY
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PREFACE.

INTERIM REPORT OF COMMITTEE ON MOTOR VEHICLE LIGHTING.

The first specifications for tests of headlighting devices for approval by State authorities were put forth by this committee in 1918. These were admittedly of a very lenient and tentative character. On account of the meager amount of laboratory data and of practical experience on the road which were available at that time, it was necessary that the specifications should not be made too hard and fast, but that they should be drawn with a view to future improvement as experience might show necessary. Accordingly a further revision was effected in 1919, and a revised edition of the rules was put out under date of May, 1920. This revision showed marked improvements in the specifications, and was adopted by a considerable number of States.

Since that time further experience has accumulated in this field, particularly as a result of the adoption by the State of Massachusetts of specifications for laboratory tests which in some respects went further than those of the Illuminating Engineering Society committee, and the application of which was attended with good results. It became clear from the situation that the Illuminating Engineering Society specifications required further improvement, and that the data upon which such improvement could be based had become available as a result of a large number of tests made for various States, the results of which tests had become matters of public record. The committee on motor vehicle lighting has therefore gone over its specifications very thoroughly and presents herewith a revised edition of them.

It should be specifically pointed out that these revised rules prescribe tests which can be made only in a photometric laboratory equipped with precise measuring instruments and photometric standards. These rules for laboratory testing are much too complicated to be applied to tests of headlights on the road, and are not intended so to be applied. The present amplification of the acceptance test is a natural result of the development of the art and is designed as a more complete method of excluding inferior devices.

In putting forth this revision it is not the intent of the committee that headlighting devices which have passed tests under the older specifications and have been approved ought necessarily to be

removed summarily from approval lists. The committee, without of course having any jurisdiction in the matter, respectfully submits that in fairness to all a time interval should be allowed and announced, at the expiration of which all devices which do not comply with the revised specifications should no longer be permitted to be used.

COMMITTEE ON MOTOR VEHICLE LIGHTING 1921–1922.

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SPECIFICATIONS OF LABORATORY TESTS FOR APPROVAL OF ELECTRIC HEADLIGHTING DEVICES FOR MOTOR VEHICLES.

DEFINITION.

By headlighting device is meant either the integral and complete headlamp or a device intended to modify in a suitable manner the beam of the ordinary type of headlighting equipment.

(A) TESTS OF DEVICES USED IN PAIRS.

Samples for test.

The samples submitted to the testing authority shall be representative of the device as manufactured and as marketed. They shall be accompanied by printed instructions for their use as issued by the manufacturer of the device. The samples submitted shall include as much of the accessory equipment peculiar to the device (except batteries) as is necessary to operate the device in its normal manner. In the case of front glasses, the samples shall be one pair each of $8\frac{5}{8}$ (or Ford size), $8\frac{1}{2}$, 9, and $9\frac{1}{2}$ inch diameter when practicable.

Reflectors and incandescent lamps.

In the case of devices to be used in connection with standard parabolic reflectors, the reflectors used in making the laboratory tests shall be of standard high-grade manufacture, of 1.25-inch focal length, with clean and highly polished surfaces, and as nearly truly paraboloidal in form as practicable, and as approved for this purpose by the National Bureau of Standards.

The incandescent lamps used in connection with the laboratory test shall be of standard manufacture and as approved for this purpose by the National Bureau of Standards. In the case of devices involving the use of special incandescent lamps, such lamps, together with any necessary accessories, shall be submitted.

Marks of identification.

Each device submitted must bear a distinctive designation prominently and permanently indicating the name and type of the device. Special incandescent lamps submitted in connection with devices shall bear the manufacturer's normal clear-bulb rating.

Adjustment of devices.

The testing authority shall adjust the device in accordance with the printed instructions issued by the manufacturer, which instructions must be adequate for practical purposes. An exact description of the adjustment made for test shall be given in the report.

Focal adjustments of incandescent lamps.

The following designations of the focal adjustments of the incandescent lamp in the parabolic reflector are adopted:

Principal Focus. The beam, with bare reflector or plain front glass, is nearly parallel and of the smallest possible diameter.

Rear Focus. The beam, with bare reflector or plain front glass diverges as much as possible without having a dark center.

Front Focus. The beam, with bare reflector or plain front glass, converges and crosses near the lamp and then diverges as much as possible without having a dark center.

Special Focus. A special focal adjustment is allowed only when it can be clearly defined and described.

Photometric tests.

The tests shall be as follows:

TEST 1.

A pair of testing reflectors, mounted similarly to the headlamps on a car, shall be set up in a dark room at a distance of not less than 60 feet nor more than 100 feet from a vertical white screen. If a testing distance of 100 feet is taken, the reflectors shall be set 28 inches apart from center to center, and if a shorter testing distance is taken the distance between reflectors shall be proportionately reduced. The axes of the lamps shall be parallel and horizontal, or tilted in a vertical plane in accordance with manufacturer's adjustment. The intensity of the combined light shall then be measured with each pair of samples in turn, with the reflectors fitted with a pair of incandescent lamps of the gas-filled type, 6–8 volts, 21 scp. rating. The lamps shall be such as will give their rated candlepower when operated at their rated efficiency. They shall be operated at their rated candlepower.

Measurements shall be made at the following points at the surface of the screen:

A. In the median vertical plane parallel to the lamp axes, on a level with the lamps.

B. In the median plane one degree of arc below the level of the lamps.

C. In the median plane one degree of arc above the level of the lamps.

D. Four degrees of arc to the left of the median plane and one degree of arc above the level of the lamps.

PL and PR. One and one-half degrees of arc below the level of the lamps and three degrees of arc to the left and to the right, respectively, of the median plane.

QL and QR. Three degrees of arc below the level of the lamps and six degrees of arc to the left and to the right, respectively, of the median plane.

A diagram of test positions is shown in Fig. 1.

All pairs of samples tested under the conditions prescribed above shall conform to the following specifications for observed apparent candlepower:

Point A, not less than 1,800 candlepower nor more than 6,000 candlepower.

Point B, not less than 7,200 candlepower, and there shall not be less than 7,200 candlepower at any point on the horizontal line through B, one degree to the left and to the right of B.

Point C, not over 2,400 candlepower, and not less than 800 candlepower.

Point D, not over 800 candlepower.

Points PL and PR, at each of these points and at every point on the line between them, not less than 5,000 candlepower.

Points QL and QR, at each of these points and at every point on the line between them, not less than 2,000 candlepower.

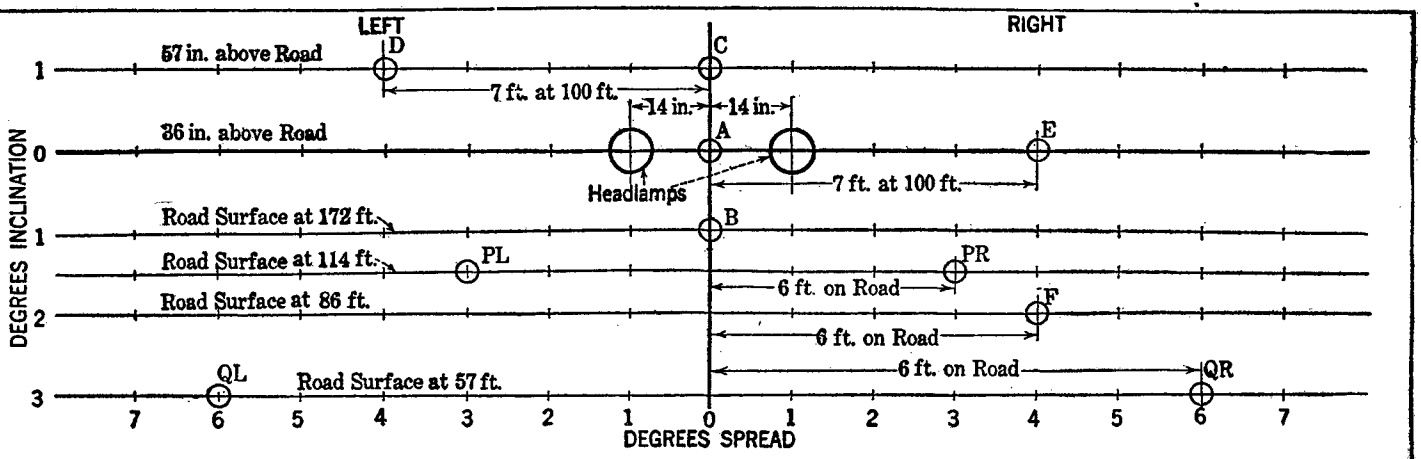
NOTE.—The above testing directions are drawn specifically to cover the case of devices accessory to parabolic reflectors of 1¼ inch focal length. In the case of other classes of devices where these directions evidently can not be applied literally, their intent must be adhered to and the testing positions and candlepower limitations shall govern in all cases.

TEST 2.

A single pair of samples taken as an average representative of the device as manufactured shall be submitted to a complete test with the same testing equipment as specified for Test 1. This test shall show the light distribution characteristics by actual measurements made in accordance with the best laboratory practice.

Distribution of samples.

One pair of the samples submitted shall be retained at the testing laboratory for the purpose of future reference and as samples of construction.



I.E.S. 1920 LIMITS.	
A-B	4800 cp Min.
C	2400 cp Max.
D	800 cp Min.
E-F	1200 cp Min.

I.E.S. 1922 LIMITS.		
A	1800 cp Min.	6000 Max.
B	1° Right & Left	7200 Min.
C	800 cp Min.	2400 Max.
D		800 Max.
PL to PR		5000 Min.
QL to QR		2000 Min.

Fig. 1.—Diagram of Test Positions.

(B) TESTS OF DEVICES USED SINGLY.

Motor-cycle headlamps are used singly, and not in pairs, and have commonly a reflector of smaller diameter and shorter focal length. Hence devices for use in connection with them are not included in the same classification as those for other motor vehicles. For the laboratory tests of such devices two samples of representative sizes shall be submitted. They shall be tested with representative motor-cycle headlamp reflectors. The numerical limitations of apparent candlepower for Test 1 with one lamp only shall be as follows:

Point A, not less than 1,800 candlepower.

Point B, not less than 3,600 candlepower, and there shall not be less than 3,600 candlepower at any point on the horizontal line through B, one degree to the left and to the right of B.

Point C, not more than 2,400 candlepower.

Point D, not more than 800 candlepower.

Points PL and PR, at each of these points and at every point on the line between them, not less than 2,500 candlepower.

Points QL and QR, at each of these points and at every point on the line between them not less than 1,000 candlepower.

Test 2 shall be made with one lamp, and not with two.

Other deviations from the details of procedure are obviously made necessary because of the fact that single devices instead of pairs are subjects of test.

Reports.

The report of the test shall be rendered in duplicate to the State authority, and shall be signed or initialed not only by the expert making the test, but also by an executive officer of the institution making the test.

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