No. 4789. AGREEMENT CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS. DONE AT GENEVA ON 20 MARCH 1958 [1]

ENTRY INTO FORCE OF REGULATION NO. 21 (UNIFORM PROVISIONS CONCERNING THE APPROVAL OF VEHICLES WITH REGARD TO THEIR INTERIOR FITTINGS) ANNEXED TO THE ABOVE-MENTIONED AGREEMENT

The said Regulation came into force on 1 December 1971 in respect of Belgium and France, in accordance with article 1 (5) of the Agreement.

Authentic texts of the Regulation: English and French.

Registered ex officio *on 1 December 1971.*

1. SCOPE

This Regulation applies to the interior fittings of passenger cars with regard to:

1.1. the interior parts of the passenger compartment other than the rear-view mirror or mirrors;

1.2. the arrangement of the controls;

1.3. the roof and the sliding roof, and

1.4. the seat-back and the rear parts of seats.

2. DEFINITIONS

For the purposes of this Regulation,

2.1. " *approval of a vehicle* " means the approval of a vehicle type with regard to its interior fittings;

2.2. " *vehicle type* " means a category of power-driven vehicles which do not differ in such essential respects as:

2.2.1. the lines and constituent materials of the part of the body which constitutes the passenger compartment;

2.2.2. the arrangement of the controls;

2.3. " *reference zone* " means the head-impact zone as defined in annex 1 to this Regulation, except:

[1] United Nations, *Treaty Series*, vol. 335, p. 211; for subsequent actions, see references in Cumulative Indexes Nos. 4 to 9, as well as annex A in volumes 652, 656, 659, 667, 669, 672, 673, 680, 683, 686, 696, 723, 730, 740, 752, 754, 756, 759, 764, 768, 771, 772, 774, 777, 778, 779, 787, 788 and 797.

2.3.1. the area bounded by the forward horizontal projection of a circle circumscribing the outer limits of the steering control, increased by a peripheral band 127 mm (5 inches) in width; this area is bounded below by the horizontal plans tangential to the lower edge of the steering control when the latter is in the position for driving straight ahead;

2.3.2. the part of the surface of the instrument panel comprised between the edge of the area specified in paragraph 2.3.1. above and the nearest inner side-wall of the vehicle; this part of the surface is bounded below by the horizontal plane tangential to the lower edge of the steering control; and

2.3.3. the windscreen side pillars;

2.4. "*level of the instrument panel*" means the line defined by the points of contact of vertical tangents to the instrument panel;

2.5. "*roof*" means the upper part of the vehicle extending from the upper edge of the windscreen to the upper edge of the rear window and bounded at the sides by the upper framework of the side-walls;

2.6. "*belt line*" means the line constituted by the visible lower contour of the side windows of the vehicle;

2.7. "*convertible car*" means a vehicle which may, in certain cases, have no rigid structural element above the belt line other than the windscreen pillars or seat belt attachment or attachments;

2.8. "*car with opening roof*" means a vehicle of which only the roof or part of the roof can be folded back or removed, leaving the vehicle's structural elements above the belt line.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a vehicle type with regard to its interior fittings shall be submitted by the vehicle manufacturer or by his duly accredited representative.

3.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
a detailed description of the vehicle type with regard to the items mentioned in paragraph 2.2 above, accompanied by a photograph or an exploded view of the passenger compartment. The numbers and/or symbols identifying the vehicle type shall be specified.

3.3. The following shall be submitted to the technical service responsible for conducting the approval tests:

3.3.1. at the manufacturer's discretion, either a vehicle representative of the vehicle type to be approved or the part or parts of the vehicle regarded as essential for the checks and tests prescribed by this Regulation;

3.3.2. at the request of the aforesaid technical service, certain components and certain samples of the materials used.

4. APPROVAL

4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5. below, approval of that vehicle type shall be granted.

4.2. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another vehicle type.

4.3. Notice of approval or of refusal of approval of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in annex 2 to the Regulation and of either the exploded view or the photograph of the passenger compartment, both as referred to in paragraph 3.2. above and supplied, by the applicant for approval, in a format not exceeding A 4 (210×297 mm) or folded to that format and on an appropriate scale.

4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark consisting of:

4.4.1. a circle surrounding the letter " E " followed by the distinguishing number of the country which has granted approval; [1]

4.4.2. the number of this Regulation, followed by the letter " R ", a dash and the approval number, below the circle.

4.5. The approval mark shall be clearly legible and be indelible.

4.6. Annex 3 to this Regulation gives an example of the arrangement of the approval mark.

5. SPECIFICATION

5.1. *Forward interior parts of the passenger compartment*

5.1.1. The reference zone as defined in paragraph 2.3. above shall exhibit no dangerous roughness or sharp edge likely to increase the risk or gravity of injury to the occupants.

[1] 1 for the Federal Republic of Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for Czechoslovakia, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, and 12 for Austria; subsequent numbers shall be assigned to other countries in the chronological order in which they ratify the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, or in which they accede to that Agreement, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

5.1.2. The parts of the vehicle situated within the reference zone, with the exception of those situated at least 10 cm from glass surfaces which are not part of the instrument panel, shall be energy-dissipating as prescribed in annex 4 to this Regulation; any metal fittings with a supporting function shall have no protruding edges.

5.1.3. The lower edge of the instrument panel shall, unless it meets the requirements of paragraph 5.1.2. above, be rounded to a radius of curvature of not less than 19 mm (3/4 inch).

5.1.4. Knobs, levers and the like, made of rigid material, which project from 3.2 mm (1/8 inch) to 9.5 mm (3/8 inch) from the panel shall have a cross-sectional area of not less than 2 cm^2 (0.31 square inch), measured 2.5 mm (1/10 inch) from the point projecting furthest and shall have rounded edges with a radius of curvature of not less than 2.5 mm (1/10 inch).

5.1.5. If these components project by more than 9.5 mm (3/8 inch) beyond the surface of the instrument panel, they shall be so designed and constructed as to be able, under the effect of a forward-acting longitudinal horizontal force of 37.8 daN (38.6 kgf, 85 lb), either to retract into the surface of the panel until they do not project by more than 9.5 mm (3/8 inch) or to become detached; in the latter case no dangerous projections shall remain; a cross-section not more than 6.5 mm (1/4 inch) from the point of maximum projection shall be not less than 6.50 cm^2 (one square inch) in area.

5.1.6. In the case of a projection comprising a component made of non-rigid material of less than 50 shore scleroscope hardness A mounted on a rigid support, the requirements of paragraphs 5.1.4 and 5.1.5. shall apply only to the rigid support.

5.2. *Forward interior parts of the passenger compartment below the level of the instrument panel*

5.2.1. The provisions of this paragraph do not apply to components below the level of the instrument panel, such as switches, the ignition key and other controls which it is not possible to strike against because of the presence of the steering column, the steering control or the projecting part of the instrument panel. In cases where it is possible to strike against the aforesaid components, the latter shall have characteristics at least equal to those specified in paragraph 5.1.4. above. In addition,

5.2.1.1. if the said components are mounted on a panel they shall be so designed and constructed as to be able, under the effect of a forward-acting longitudinal horizontal force of 37.8 daN (38.6 kgf, 85 lb), either to retract into the surface situated below the instrument panel, or to become detached, or to bend; in the two latter cases no dangerous projections shall remain;

5.2.1.2. if the said components are mounted elsewhere, they shall be so designed and constructed as to be able, under the effect of a forward-acting longitudinal horizontal force of 37.8 daN (38.6 kgf, 85 lb), either to bend, or to become detached, or to break, without producing dangerous projections. The above requirements shall not apply to pedals or their mountings.

5.2.2. The hand-brake control, if mounted on or under the instrument panel, shall be so placed that when it is in the position of rest there is no possibility of striking against it in the event of a frontal impact. If this condition is not met, the surface of the control shall satisfy the requirements of paragraph 5.3.2.3. below.

5.2.3. Shelves and other similar items shall be so designed and constructed that the supports in no case have protruding edges; and they shall meet one or other of the following conditions:

5.2.3.1. The part facing inward into the vehicle shall present a surface not less than 25 mm (one inch) high with edges rounded to a radius of curvature not less than 3.2. mm (1/8 inch); in addition, this surface shall be covered with an energy-dissipating material as defined in annex 4 to this Regulation.

5.2.3.2. Shelves and other similar items shall be able, under the effect of a forward-acting horizontal longitudinal force of 37.8 daN (38.6 kgf, 85 lb), to become detached, to break up, to be substantially distorted or to retract without producing dangerous features and without dangerous edges arising on the rim of the shelf.

5.3. *Other interior parts of the passenger compartment*

5.3.1. *Scope*

The requirements of paragraph 5.3.2. below apply to control handles, levers and knobs and to any other protruding objects not referred to in paragraphs 5.1. and 5.2. above.

5.3.2. *Requirements*

If the objects referred to in paragraph 5.3.1. are so placed that occupants of the vehicle may strike against them, they shall meet the following conditions:

5.3.2.1. they shall, where possible, be streamlined and their surface shall terminate in rounded edges, the radii of curvature being not less than 3.2 mm (1/8 inch);

5.3.2.2. control levers and knobs shall be so designed and constructed that, under the effect of a forward-acting longitudinal horizontal force of 37.8 daN (38.6 kgf, 85 lb), either the projection shall in its most unfavourable position be reduced to not more than 25 mm (one inch) from the surface of the panel or the said devices shall become detached or bend; in the two latter cases no dangerous projections shall remain;

5.3.2.3. the gear-lever knob, if in forward-gear positions it is not situated within the area defined in paragraph 2.3.1. above, and the hand-brake grip shall have a surface area of not less than 6.50 cm^2 (one square inch), as measured at a cross-section at right angles to the longitudinal horizontal direction, up to a distance of 6.5 mm (1/4 inch) from the part projecting furthest; the radii of curvature shall be not less than 3.2 mm (1/8 inch).

5.3.3. The requirement in paragraph 5.3.2.3. shall not apply to floor-mounted hand-brake controls if the height of the grip in the position of rest is below a horizontal plane passing through the H point (see annex 5).

5.3.4. The other elements of the vehicle's equipment not covered by the above paragraph such as seat slide rails, devices for regulating the horizontal or vertical part of the seat, devices for rolling up safety belts, etc., are not subject to any regulation if they are situated below a horizontal line passing through the H point of each seat whose occupant is likely to come into contact with such elements.

5.4. *Roof*

5.4.1. *Scope*

5.4.1.1. The requirements of paragraph 5.4.2. below apply to the inner face of the roof.

5.4.1.2. However, they do not apply to such parts of the roof as cannot be touched by a sphere 165 mm (6½ inches) in diameter.

5.4.2. *Requirements*

5.4.2.1. That part of the inner face of the roof which is situated above or forward of the occupants shall exhibit no dangerous roughness or sharp edges, directed rearwards or downwards. The width of the projecting parts shall not be less than the amount of their downward projection and the edges shall have a radius of curvature of not less than 5 mm (1/5 inch). In particular, the rigid roof sticks or ribs shall not project downwards more than 19 mm (3/4 inch).

5.4.2.2. If the roof sticks or ribs do not meet the requirements of paragraph 5.4.2.1., they shall be covered with an energy-dissipating material as prescribed in annex 4 to this Regulation.

5.5. *Sliding roof*

5.5.1. *Requirements*

5.5.1.1. The following requirements and those of paragraph 5.4. above concerning the roof shall apply to the sliding roof when it is in a closed position.

5.5.1.2. In addition, the opening and operating devices shall

5.5.1.2.1. be so designed and constructed as to exclude accidental or inopportune operation as far as possible;

5.5.1.2.2. where possible, be streamlined and their surfaces shall terminate in rounded edges, the radii of curvature being not less than 5 mm (1/5 inch);

5.5.1.2.3. be accommodated, when in the position of rest, in areas which cannot be touched by a sphere 165 mm (6½ inches) in diameter. If this condition cannot be met, the opening and operating devices shall, in the position of rest, either remain retracted or be so designed and constructed that, under the effect of a force of 37.8 daN (38.6 kgf, 8r 1b) applied in the direction of impact defined in annex 4 to this Regulation as the tangent to the trajectory of the headform, either the projection shall be reduced to not more than 25 mm (one inch) beyond the surface on which the devices are mounted or the devices shall become detached; in the latter case no dangerous projections shall remain.

5.6. *Convertible cars and cars with opening roof*

5.6.1. In the case of convertible cars, the requirements of paragraph 5.4. shall apply only to the upper parts of the seat belt attachments.

5.6.2. Cars with opening roof shall be subject to the requirements of paragraph 5.5., applicable to cars with sliding roof.

5.7. *Rear parts of seats*

5.7.1. *Requirements*

5.7.1.1. The surface of the rear parts of seats shall exhibit no dangerous roughness or sharp edges likely to increase the risk or gravity of injury to the occupants.

5.7.1.2. Except as provided in paragraphs 5.7.1.2.1., 5.7.1.2.2. and 5.7.1.2.3., that part of the seat-back of the front seat which is in the head-impact zone defined in annex 1 shall be energy-dissipating, as prescribed in annex 4 to this Regulation. For determining the head-impact zone the front seats shall, if they are adjustable, be in the rearmost driving position with their inclinable backs in the normal driving position.

5.7.1.2.1. In the case of separate front seats the rear passengers' head-impact zone shall extend for 10 cm (4 inches) on either side of the seat centreline in the top part of the rear of the seat-back.

5.7.1.2.2. In the case of front bench seats the impact zone shall extend between longitudinal vertical planes 10 cm (4 inches) outboard of the centreline of each designated outboard seating position.

5.7.1.2.3. In the head-impact zone outside the limits prescribed in paragraphs 5.7.1.2.1. and 5.7.1.2.2. the structural parts of the seat shall be padded to avoid direct contact of the head with the structural members, which in these zones shall have a radius of curvature of not less than 5 mm (1/5 inch).

5.7.2. These requirements shall not apply to the rearmost seats, to seats facing sidewards or rearwards, to back-to-back seats, or to folding or temporary seats.

5.8. *Miscellaneous provisions*

The requirements of paragraph 5. shall apply, *mutatis mutandis*, to such equipment not specifically mentioned as is fitted to and supplied with the vehicle by the manufacturer and is capable of being touched by a sphere 165 mm (6½ inches) in diameter.

6. MODIFICATIONS OF THE VEHICLE TYPE

6.1. Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:

6.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect; or

6.1.2. require a further test report from the technical service responsible for conducting the tests.

6.2. Notice of confirmation of approval, specifying the modifications, or of refusal of approval shall be communicated by the procedure specified in paragraph 4.3. above to the Parties to the Agreement which apply this Regulation.

7. CONFORMITY OF PRODUCTION

7.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform to the vehicle type approved.

7.2. In order to verify conformity as prescribed in paragraph 7.1. above, a vehicle bearing the approval mark required by this Regulation shall be taken from the series.

7.3. Production shall be deemed to conform to the requirements of this Regulation if the requirements of paragraph 5. above are met.

8. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

8.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 7.1. is not complied with or if the vehicle fails to pass the checks prescribed in paragraph 7. above.

8.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation thereof by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation " APPROVAL WITHDRAWN ".

9. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the Agreement applying this Regulation shall communicate to the Secretariat of the United Nations the names and addresses of the technical services conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal or withdrawal of approval, issued in other countries, are to be sent.

ANNEX 1

DETERMINATION OF THE HEAD-IMPACT ZONE

1. The head-impact zone comprises all the non-glazed surfaces of the interior of a vehicle which are capable of entering into static contact with a spherical head 165 mm (6½ inches) in diameter that is an integral part of measuring apparatus whose dimension from the pivotal point of the hip to the top of the head is continuously adjustable between 736 mm (29 inches) and 840 mm (33 inches).

2. The aforesaid zone shall be determined by the following procedure or its graphic equivalent:

2.1. The pivotal point of the measuring apparatus shall be placed as follows for each seating position for which the manufacturer has made provision:

2.1.1. In the case of sliding seats:

2.1.1.1. at the H point (see annex 5), and

2.1.1.2. at a point situated horizontally 127 mm (5 inches) forward of the H point and at a height resulting from the variation in the height of the H point caused by a forward shift of 127 mm (5 inches) or of 19 mm (3/4 inch).

2.1.2. In the case of non-sliding seats, at the H point of the seat considered.

2.2. For each value of the dimension from the pivotal point to the top of the head which the test apparatus and the interior dimensions of the vehicle jointly allow, all the points of contact situated above the lower edge of the windscreen and forward of the H point shall be determined.

2.3. If there is no point of contact in the case of adjustment within the above limits, with the test apparatus vertical, possible points of contact shall be determined by pivoting the measuring apparatus forwards and downwards through all arcs in vertical planes as far as 90° for the vertical plane perpendicular to the longitudinal vertical plane of the vehicle and passing through the H point.

3. A " point of contact " is a point at which the head of the apparatus touches a part of the interior of the vehicle. The maximum downward movement shall be downward movement to a position where the head is tangential to a horizontal plane situated 25.4 mm (one inch) above the H point.

ANNEX 2

(Maximum format: A 4 (210 × 297 mm))

NAME OF
ADMINISTRATION

Communication concerning the approval
(or refusal or withdrawal of approval)
of a vehicle type with regard to its interior fittings,
pursuant to Regulation No. 21

Approval No.

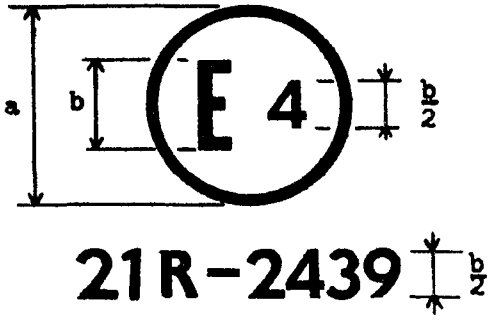
1. Trade name or mark of the power-driven vehicle . . . . . .
2. Vehicle type . . . . . .
3. Manufacturer's name and address . . . . . .
4. If applicable, name and address of manufacturer's representative . . . . . .
5. Brief description of vehicle . . . . . .
6. Vehicle submitted for approval on . . . . . .
7. Technical service conducting approval tests . . . . . .
8. Date of report issued by that service . . . . . .

Approval No. *(continued)*

9. Number of report issued by that service . . . . . .
10. Approval granted/refused * . . . . . .
11. Position of approval mark on vehicle. . . . . .
12. Place . . . . . .
13. Date . . . . . .
14. Signature . . . . . .
15. The following documents, bearing the approval number shown above, are annexed to this communication: . . . . . .
    ... drawings, diagrams and plans of the vehicle and of its passenger compartment; . . . . . .
    ... exploded view or photograph of the vehicle and of its passenger compartment. . . . . .

ANNEX 3

ARRANGEMENT OF THE APPROVAL MARK



	a	b
Minimum dimensions	12	5.6

(millimetres)

The above approval mark affixed to a vehicle shows that, pursuant to Regulation No. 21, the vehicle type concerned has, with regard to its interior fittings, been approved in the Netherlands (E 4) under approval number 2439.

* Strike out what does not apply.

ANNEX 4

PROCEDURE FOR TESTING ENERGY-DISSIPATING MATERIALS

1. *Setting up; test apparatus; procedure*

1.1. *Setting up*

1.1.1. The component made of energy-dissipating material shall be mounted and tested on the structural supporting member on which it is to be installed on the vehicle. The test shall preferably be carried out, where possible, directly on the body. The structural member, or the body, shall be firmly attached to the test bench so that it does not move under impact.

1.1.2. However, at the manufacturer's request the component may be mounted on a fitting simulating installation on the vehicle, on condition that the assembly comprising the component and the fitting has the same geometrical arrangement as, and a degree of rigidity not lower and an energy-dissipating capacity not higher than those of, the real assembly comprising the component and the structural supporting member.

1.2. *Test apparatus*

1.2.1. This apparatus consists of a pendulum whose pivot is supported by ball-bearings and whose reduced mass * at its centre of percussion is 6.8 kg (15 pounds). The lower extremity of the pendulum consists of a rigid headform 165 mm (6½ inches) in diameter whose centre is identical with the centre of percussion of the pendulum.

1.2.2. The headform shall be fitted with two accelerometers and a speed transducer all capable of measuring values in the direction of impact.

1.3. *Recording instruments*

The recording instruments used shall be such that measurements can be made with the following degrees of accuracy:

1.3.1. Acceleration:

— accuracy = ± 5 % of the real value;

— frequency response = up to 1,000 Hz;

— cross-axis sensitivity = 5 % of the lowest point on the scale.

1.3.2. Speed:

— accuracy = ± 2.5 % of the real value;

— sensitivity = 0.5 km/h (0.3 mph).

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* *Note:* The relationship of the reduced mass " m_r " of the pendulum to the total mass " m " of the pendulum at a distance " a " between the centre of percussion and the axis of rotation and at a distance " ℓ " between the centre of gravity and the axis of rotation is given by the formula: $m_r = m \frac{\ell}{a}$.

1.3.3. Indentation of the test component by the headform:

— accuracy = ± 5 % of the real value;

— sensitivity = 1 mm (0.04 inch).

1.3.4. Time recording:

— the instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one thousandth of a second;

— the beginning of the impact at the moment of first contact between the headform and the test component shall be noted on the recordings used for analysing the test.

1.4. *Test procedure*

1.4.1. At every point of impact on the surface to be tested the direction of impact is the tangent to the trajectory of the headform of the measuring apparatus defined in annex 1.

1.4.2. Where the angle between the direction of impact and the perpendicular to the surface at the point of impact is 5° or less, the test shall be carried out in such a way that the tangent to the trajectory of the centre of percussion of the pendulum coincides with the direction of impact. The headform shall strike the test component at a speed of 24.1 km/h (15 mph); this speed shall be achieved either by the mere energy of propulsion or by using an additional impelling device.

1.4.3. Where the angle between the direction of impact and the perpendicular to the surface at the point of impact is more than 5°, the test may be carried out in such a way that the tangent to the trajectory of the centre of percussion of the pendulum coincides with the perpendicular to the point of impact. The test speed shall then be reduced to the value of the normal component of the speed prescribed in paragraph 1.4.2.

2. *Results*

In tests carried out according to the above procedures, the deceleration of the headform shall not exceed 80 g continuously for more than 3 milliseconds. The deceleration rate taken shall be the average of the readings of the two decelerometers.

3. *Equivalent procedures*

3.1. Equivalent test procedures shall be permitted on condition that the results required in paragraph 2. above can be obtained.

3.2. Responsibility for demonstrating the equivalence of a method other than that described in paragraph 1. shall rest with the person using such a method.

ANNEX 5

PROCEDURE FOR DETERMINING THE H POINT AND CHECKING THE RELATIVE POSITION OF POINTS R AND H

1. *Definitions*

1.1. The H point, which indicates the position in the passenger compartment of a seated occupant, is the trace, in a longitudinal vertical plane, of the theoretical axis of rotation between the leg and the torso of the human body, represented by a manikin.

1.2. The R point, being the " seating reference point ", is the manufacturer's design reference point which:

1.2.1. establishes the rearmost normal driving or riding position of each seat provided by the vehicle manufacturer;

1.2.2. has co-ordinates established relative to the designed vehicle structure;

1.2.3. simulates the position of pivot centre of the human torso and thigh (the H point).

2. *Determination of H points*

2.1. An H point shall be determined for each seat provided by the vehicle manufacturer. When the seats in the same row can be regarded as similar (bench seat, identical seats, etc.), only one H point shall be determined for each row of seats, the manikin described in paragraph 3. below being seated in a place regarded as representative for the row. This place shall be:

2.1.1. in the case of the front row, the driver's seat;

2.1.2. in the case of the rear row (or rows), an outside seat.

2.2. When an H point is being determined, the seat in question shall be placed in the rearmost normal position provided by the manufacturer for driving or riding, the back, if adjustable, being locked in a position corresponding, as nearly as possible, to a 25° rearward inclination, in relation to the vertical, of the reference line of the torso of the manikin described in paragraph 3. below, unless otherwise specified by the manufacturer.

3. *Description of the manikin*

3.1. A three-dimensional manikin of a weight and contour corresponding to those of an adult male of average height shall be used. Such a manikin is depicted in figures 1 and 2 of the appendix to this annex.

3.2. The manikin shall comprise:

3.2.1. Two components, one simulating the back and the other the seat of the body, pivoting on an axis representing the axis of rotation between the torso and the thigh. The trace of this axis on the side of the manikin is the manikin's H point;

3.2.2. two components simulating the legs and pivotally attached to the component simulating the seat;

3.2.3. two components simulating the feet and connected to the legs by pivotal joints simulating ankles;

3.2.4. in addition, the component simulating the seat shall be provided with a level enabling its transverse orientation to be verified.

3.3. Body segment weights shall be attached at appropriate points corresponding to the relevant centres of gravity, so as to bring the total weight of the manikin up to about 75.8 kg (167 lb). Details of the various weights are given in the table on figure 2 of the appendix to this annex.

4. *Setting up the manikin*

The three-dimensional manikin shall be set up in the following manner;

4.1. The vehicle is levelled and the seats are adjusted as prescribed in paragraph 2.2. above.

4.2. The seat to be tested is covered with a piece of cloth to facilitate correct setting up of the manikin.

4.3. The manikin is placed on the seat concerned, the pivotal axis being perpendicular to the longitudinal plane of symmetry of the vehicle.

4.4. The feet of the manikin are placed as follows:

4.4.1. in the front seats so that the level verifying the transverse orientation of the seat of the manikin is restored to the horizontal;

4.4.2. in the rear seats, the feet are as far as possible so arranged as to be in contact with the front seats. If the feet then rest on parts of the floor which are at different levels, the foot which first comes into contact with the front seat serves as a reference point, and the other foot is so arranged that the level verifying the transverse orientation of the seat of the manikin is restored to the horizontal;

4.4.3. if the H point is being determined at a centre seat, the feet are placed one on each side of the tunnel.

4.5. The weights are placed on the thighs, the transverse level of the seat of the manikin is restored to the horizontal, and the weights are placed on the seat of the manikin.

4.6. The manikin is moved away from the seat back by means of the knee-pivot bar, and the back is tilted forwards. The manikin is re-positioned on the seat of the vehicle by being slid backwards on its seat until resistance is encountered, the back of the manikin then being replaced against the seat back.

4.7. A horizontal load of 10 ± 1 daN (10 ± 1 kgf, 22 ± 2 lb) is applied to the manikin twice. The direction and point of application of the load are shown by a black arrow on figure 2 of the appendix.

4.8. The weights are installed on the right and left sides, and the torso weights are then placed in position. The transverse level of the manikin is kept horizontal.

4.9. The manikin being kept horizontal in the transverse direction, the back is tilted forwards until the torso weights are above the H point, so as to eliminate any friction with the seat back.

4.10. The back of the manikin is gently moved rearwards so as to complete the setting-up operation; the transverse level of the manikin must be horizontal. If it is not, the procedure described above is repeated.

5. *Results*

5.1. When the manikin has been set up as described in paragraph 4. above, the H point of the vehicle seat concerned is the H point on the manikin.

5.2. Each of the co-ordinates of the H point shall be measured as accurately as possible. The same applies to the co-ordinates representing specific points of the passenger compartment. The projections of these points on a vertical longitudinal plane shall then be plotted on a graph.

6. *Checking of the relationship between the R and the H points*

6.1. The results obtained under paragraph 5.2. for the H point must be compared with the co-ordinates of the R point as supplied by the vehicle manufacturer.

6.2. The checking of the relationship between the two points will be considered satisfactory for the particular seating position in question, provided the H point co-ordinates lie within a longitudinal rectangle whose horizontal and vertical sides are 30 mm (1.2 inch) and 20 mm (0.8 inch) respectively, and whose diagonals intersect at the R point. If this condition is met, the R point will be used for the test and, if necessary, the manikin will be so adjusted that the H point coincides with the R point.

6.3. If the H point does not lie within the rectangle described in paragraph 6.2. above, two further determinations of the H point shall be carried out (three in all). If two of the three points so determined lie within the rectangle, the result of the test will be considered satisfactory.

6.4. If at least two of the three points determined lie outside the rectangle, the result of the test will be considered unsatisfactory.

6.5. In the situation described in paragraph 6.4. above, or when verification is not feasible because the vehicle manufacturer has failed to provide data on the position of the R point, the mean result of three determinations of the H point may be used and considered applicable in all cases where the R point is mentioned in this Regulation.

6.6. When checking the relationship of the R and the H points in a vehicle in current production, the rectangle mentioned in paragraph 6.2. above shall be replaced by a 50 mm (2 inches) square.

Annex 5 - Appendix

COMPONENTS OF THREE-DIMENSIONAL MANIKIN

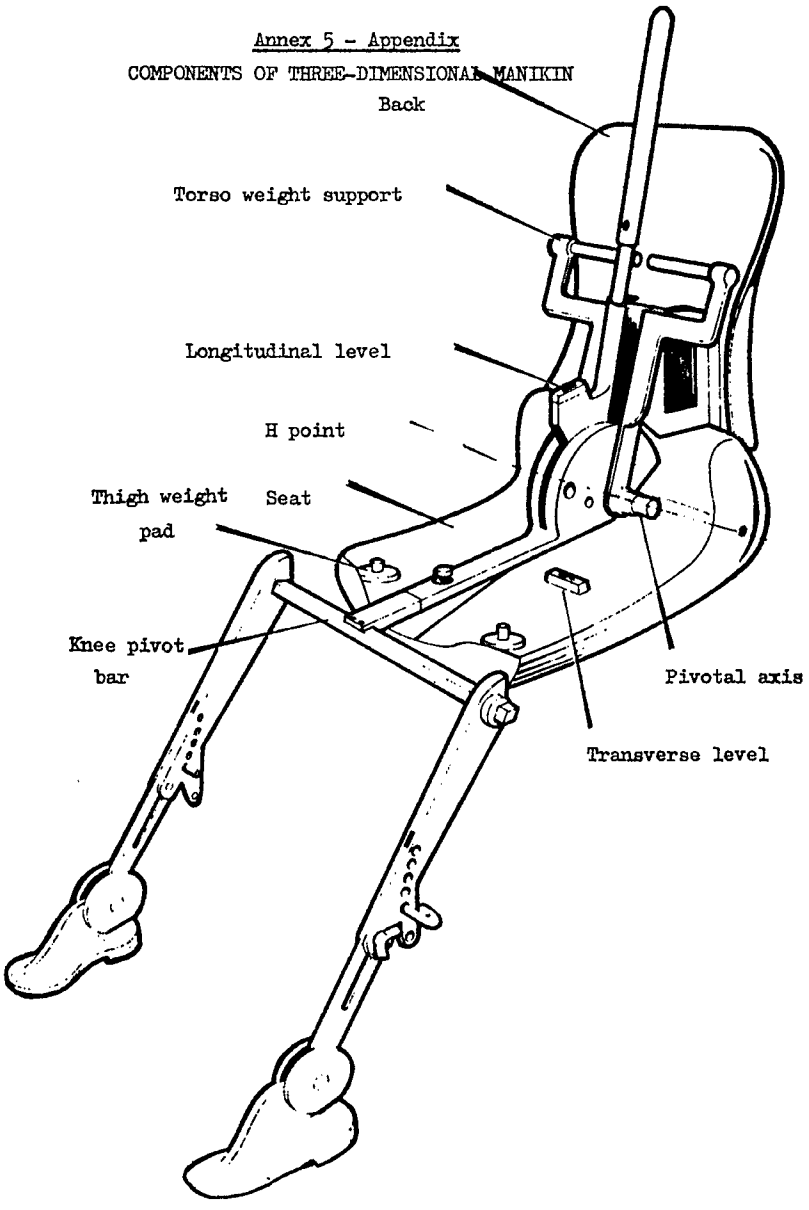


Fig. 1

DIMENSIONS AND WEIGHT OF MANIKIN

Weight of manikin	kg	lb
Components simulating back and seat of body	16.6	36.6
Torso weights	31.2	68.9
Seat weights	7.8	17.3
Thigh weights	6.8	15.1
Leg weights	13.2	29.1
Total :	75.6	167.0

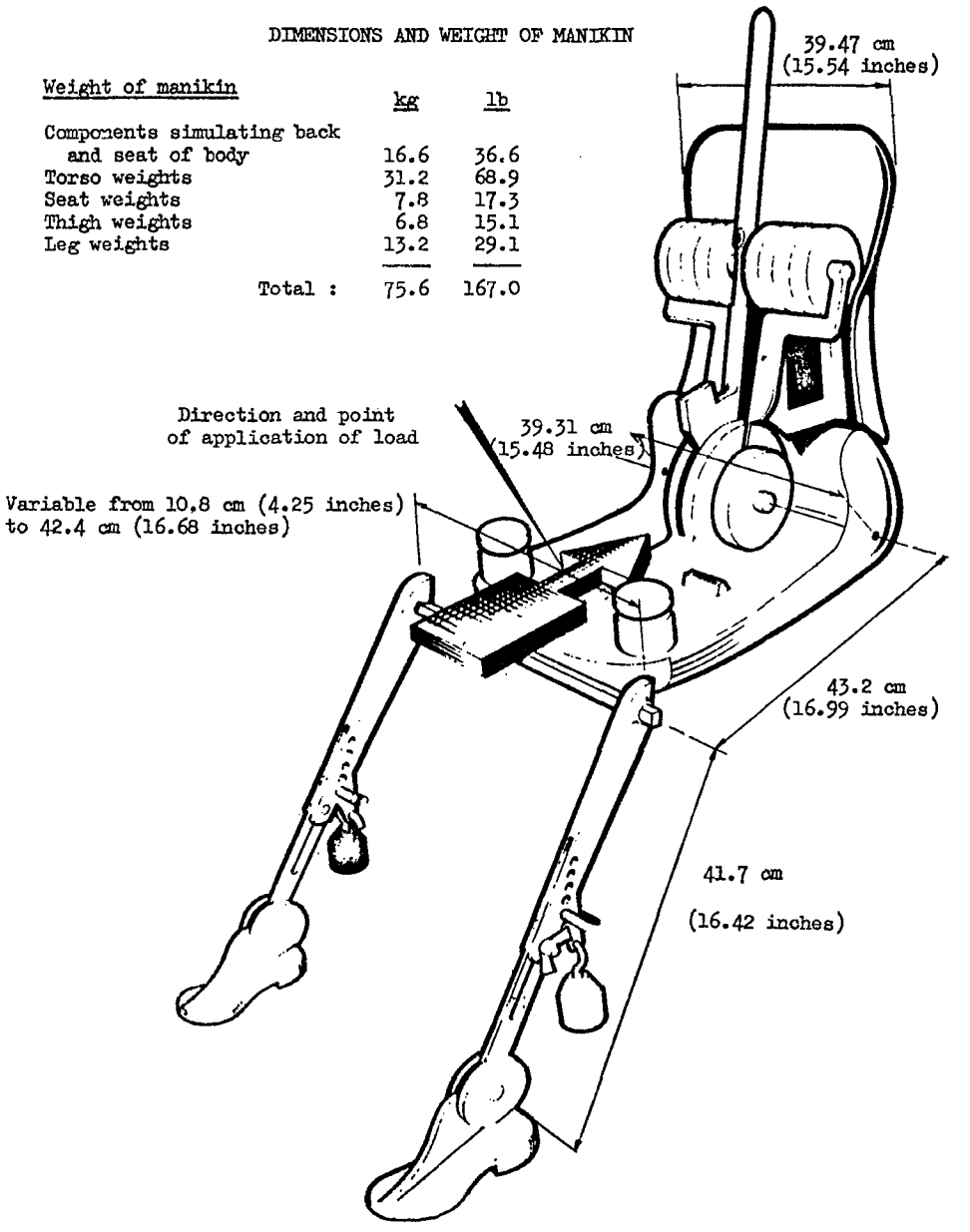


Fig. 2

ENTRY INTO FORCE OF REGULATION NO. 23 (UNIFORM PROVISIONS CONCERNING THE APPROVAL OF REVERSING LIGHTS FOR POWER-DRIVEN VEHICLES AND THEIR TRAILERS) ANNEXED TO THE AGREEMENT OF 20 MARCH 1958 [1] CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS

The said Regulation came into force on 1 December 1971 in respect of Belgium and Spain, in accordance with article 1 (5) of the Agreement.

Authentic texts of the Regulation: English and French.
Registered ex officio *on 1 December 1971.*

1. DEFINITIONS

For the purposes of this Regulation,

1.1. " *reversing light* " means the light of the vehicle designed to illuminate the road to the rear of the vehicle and to warn other road users that the vehicle is reversing or about to reverse;

1.2. " *axis of reference* " means a characteristic straight line, specified by the manufacturer, which intersects the illuminating surface of the light. This axis is horizontal and parallel to the median longitudinal plane of the vehicle when the device is fitted to it. It serves as a reference line for the measurement of photometric characteristics:

1.3. " *centre of reference* " means the intersection of the axis of reference with the illuminating surface. It is indicated by the manufacturer of the light;

1.4. reversing lights of different " *types* " are reversing lights which differ in such essential respects as

1.4.1. the trade name or mark;

1.4.2. the characteristics of the optical system;

1.4.3. the inclusion of components capable of altering the optical effects by reflection, refraction or absorption; and

1.4.4. the type of lamp.

2. APPLICATION FOR APPROVAL

2.1. The application for approval shall be submitted by the holder of the trade name or mark or by his duly accredited representative.

2.2. For each type of reversing light, the application shall be accompanied by:

[1] United Nations, *Treaty Series*, vol. 335, p. 211.

2.2.1. drawings, in triplicate, in sufficient detail to permit identification of the type of the reversing light and showing in what geometrical position the reversing light is to be mounted on the vehicle; the axis of observation to be taken as the axis of reference in the tests (horizontal angle H = O, vertical angle V = O); and the point to be taken as the centre of reference in the said tests;

2.2.2. a brief technical specification stating, in particular, the type of the lamp or lamps prescribed; this type shall be one of those recommended, in connexion with the international standardization of motor-vehicle lamps other than headlight lamps, by the Inland Transport Committee of the Economic Commission for Europe or such other body as may replace it;

2.2.3. two samples.

3. MARKINGS

The samples of a type of reversing light submitted for approval shall:

3.1. bear the trade name or mark of the applicant; this marking shall be clearly legible and be indelible;

3.2. bear a clearly legible and indelible marking showing the type or types of lamp prescribed;

3.3. if necessary in order to prevent any mistake in mounting the reversing light on the vehicle, bear the word " TOP " marked horizontally on the uppermost part of the illuminating surface;

3.4. provide adequate space for the approval mark and for the additional symbols prescribed in paragraph 4.4. below; the said space shall be shown in the drawings referred to in paragraph 2.2.1. above.

4. APPROVAL

4.1. If the two samples of a type of reversing light meet the requirements of this Regulation, approval shall be granted.

4.2. If several lights are part of the same reversing light, approval shall not be granted unless each of the said lights meets the requirements applicable to it.

4.3. An approval number shall be assigned to each type approved; the number so assigned may not subsequently be assigned by the same Contracting Party to another type of reversing light covered by this Regulation. Notice of approval or of refusal of approval of a type of reversing light shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in annex 1 to this Regulation and of an attached drawing, supplied by the applicant for approval, in a format not exceeding A 4 (210 × 297 mm) and, if possible, on a scale of 1:1.

4.4. Every reversing light conforming to a type approved under this Regulation, shall bear in the space referred to in paragraph 3.4. above, in addition to the mark and the particulars prescribed in paragraphs 3.1., 3.2. and 3.3. above:

4.4.1. an international approval mark consisting of:

4.4.1.1. a circle surrounding the letter " E " followed by the distinguishing number of the country which has granted the approval; [1] and

4.4.1.2. the approval number, below the circle;

4.4.2. the following additional symbol: a square, above the circle, surrounding the letters " AR ".

4.5. The mark and symbol referred to in paragraphs 4.4.1. and 4.4.2. shall be indelible and shall be clearly legible even when the reversing light is mounted on the vehicle.

4.6. Annex 2 gives an example of the arrangement of the approval mark and the additional symbol referred to above, in which the letters A and R are mingled.

5. GENERAL SPECIFICATIONS

5.1. Each sample shall conform to the specifications set forth in the paragraphs below.

5.2. Reversing lights shall be so designed and constructed that in normal use, despite the vibration to which they may then be subjected, they continue to function satisfactorily and retain the characteristics prescribed by this Regulation.

6. INTENSITY OF LIGHT EMITTED

6.1. The intensity of the light emitted by each of the two samples shall be not less than the minima and not greater than the maxima specified below and shall be measured in relation to the axis of reference in the directions shown below (expressed in degrees of angle with the axis of reference).

6.2. The intensity along the axis of reference shall be not less than 80 candelas.

[1] 1 for the Federal Republic of Germany; 2 for France; 3 for Italy; 4 for the Netherlands; 5 for Sweden; 6 for Belgium; 7 for Hungary; 8 for Czechoslovakia; 9 for Spain; 10 for Yugoslavia; 11 for the United Kingdom and 12 for Austria; subsequent numbers shall be assigned for other countries in the chronological order in which they ratify the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, or in which they accede to that Agreement, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

6.3. The intensity of the light emitted in all directions in which the light can be observed shall not exceed

300 candelas in directions in or above the horizontal plane; or

600 candelas in directions below the horizontal plane.

6.4. In every other direction of measurement shown in annex 3 to this Regulation the luminous intensity shall be not less than the minima specified in that annex.

7. TEST PROCEDURE

All measurements shall be carried out with a colourless standard lamp of the type prescribed for the reversing light adjusted to produce the normal luminous flux prescribed for this type of lamp.

8. COLOUR OF LIGHT EMITTED

The colour of the light emitted shall be white. In case of doubt, the colour may be checked on the basis of the definition of the colour of white light given in annex 4 to this Regulation.

9. CONFORMITY OF PRODUCTION

Every reversing light bearing an approval mark as prescribed under this Regulation shall conform to the type approved and shall comply with the photometric conditions specified in paragraphs 6 and 8. Nevertheless, in the case of a reversing light selected at random from series production, the requirements as to minimum intensity of the light emitted (measured with a standard lamp as referred to in paragraph 7. above) shall be limited in each relevant direction to 80 per cent of the minimum value prescribed in paragraph 6. above.

10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

10.1. The approval granted for a type of reversing light may be withdrawn if the foregoing requirements are not complied with or if a reversing light bearing the mark referred to in paragraphs 4.4.1. and 4.4.2. does not conform to the type approved.

10.2. If a Contracting Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation " APPROVAL WITHDRAWN ".

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement which apply this Regulation shall communicate to the Secretariat of the United Nations the names and addresses of the technical services conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval and refusal or withdrawal of approval, issued in other countries, are to be sent.

ANNEX 1

(Maximum format: A 4 (210×297 mm))

NAME OF
ADMINISTRATION

Communication concerning the approval
(or refusal or withdrawal of approval)
of a type of reversing light pursuant to Regulation No. 23

Approval No.

1. Trade name or mark . . . . . .
2. Manufacturer's name . . . . . .
3. Name of his representative (if applicable) . . . . . .
4. Address . . . . . .
5. Type of lamp (lamps) . . . . . .
6. Submitted for approval on . . . . . .
7. Technical service conducting approval tests . . . . . .
8. Date of report issued by that service . . . . . .
9. Number of report issued by that service . . . . . .
10. Approval granted/refused * . . . . . .

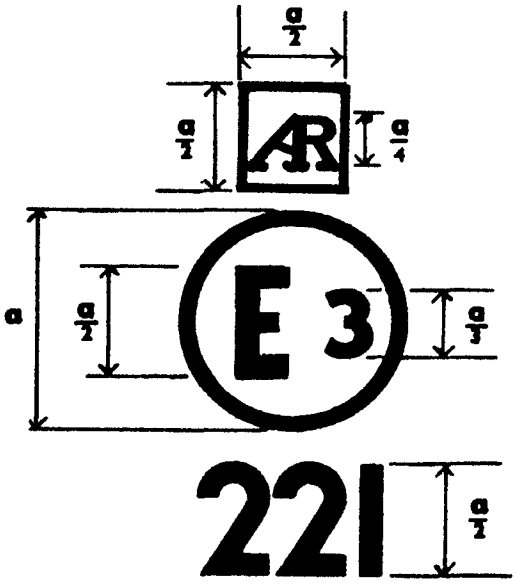
* Delete what does not apply.

Approval No. *(continued)*

11. Place. . . . . .
12. Date . . . . . .
13. Signature . . . . . .
14. The attached drawing No. . . . shows the characteristics; in what position, geometrically, the reversing light is to be mounted on the vehicle; and the axis of reference and centre of reference of the reversing light.

ANNEX 2

ARRANGEMENT OF THE APPROVAL MARK



The reversing light bearing the approval marking shown above is a reversing light approved in Italy (E3) under the number 221.

ANNEX 3

PHOTOMETRIC MEASUREMENTS

1. *Measurement methods*

1.1. When photometric measurements are taken, stray reflexions shall be avoided by appropriate masking.

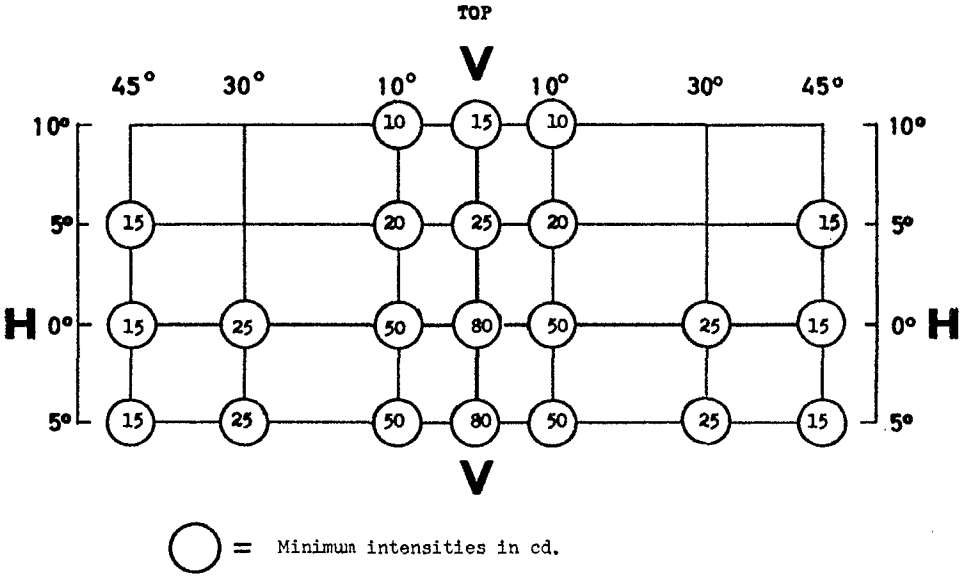
1.2. In the event that the results of measurements are challenged, measurements shall be taken in such a way as to meet the following requirements:

1.2.1. the distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;

1.2.2. the measuring equipment shall be such that the angle subtended by the receiver from the reference centre of the light is between 10′ and 1°,

1.2.3. the intensity requirement for a particular direction of observation shall be satisfied if the required intensity is obtained in a direction deviating by not more than one-quarter of a degree from the direction of observation.

2. *Measuring points expressed in degrees of angle with the axis of reference and values of the minimum intensities of the light emitted*



2.1. The directions $H = 0^0$ and $V = 0^0$ corresponds to the axis of reference. On the vehicle it is horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility. It passes through the centre of reference. The values shown in the table give, for the various directions of measurement, the minimum intensities in cd.

2.2. If visual examination of a light appears to reveal substantial local variations of intensity, a check shall be made to ensure that no intensity measured between two of the directions of measurement referred to above is below 50 per cent of the lower minimum intensity of the two prescribed for these directions of measurement.

ANNEX 4

COLOUR OF WHITE LIGHT
(Trichromatic co-ordinates)

Limit towards blue	: $x \geqslant 0.310$
Limit towards yellow	: $x \leqslant 0.500$
Limit towards green	: $y \leqslant 0.150 + 0.640x$
Limit towards green	: $y \leqslant 0.440$
Limit towards purple	: $y \geqslant 0.050 + 0.750x$
Limit towards red	: $y \geqslant 0.382$

For checking these colorimetric characteristics, a source of light at a colour temperature of $2{,}854^{\circ}$ K corresponding to illuminant A of the International Commission on Illumination (ICI) shall be used.