

77 External projections

Refer to: R26 03-S2

77.1 Effective Date and Scope:

- 77.1.1 Effective date from 2018/1/1, the new vehicle variants of category symbols M1, effective date from 2020/1/1, the all vehicle variants of category symbols M1, shall comply with this regulation.
- 77.1.2 This regulation does not apply to exterior rear-view mirrors or to the ball of towing devices.
- 77.1.3 The applicants applying for low volume safety approval, the vehicle could exempt from regulation of paragraph 77.4.6, 77.5.1.1, 77.5.16.1 and 77.5.17.4.1.
- 77.1.4 The applicants applying for vehicle-by-vehicle low volume safety approval, the vehicle could exempt from regulation of paragraph 77.4.6, 77.5.1.1, 77.5.16.1 and 77.5.17.4.1.

77.2 Definitions

- 77.2.1 "External surface" means the outside of the vehicle including the bonnet, the lid of the luggage compartment, the doors, the wings, the roof, the lighting and light-signalling devices and the visible strengthening components.
- 77.2.2 "Floor line" means the line determined as follows: Successively position round a laden vehicle a cone with a vertical axis the height of which is not defined, and with a half angle of 30 deg. in such a way that it contacts, constantly and as low as possible, the external surface of the vehicle. The floor line is the geometric trace of these points of contact. In determining the floor line, the jacking points, exhaust pipes or wheels shall not be taken into consideration. The gaps of the wheel arches are assumed to be filled in by an imaginary surface forming a smooth continuation of the surrounding external surface. At both ends of the vehicle the bumper shall be taken into consideration when establishing the floor line. Dependent upon the particular vehicle the floor line trace may occur at the bumper section extremity or at the body panel below the bumper. Where two or more points of contact occur simultaneously, the lower point of contact shall be used to determine the floor line;
- 77.2.3 "Radius of curvature" means the radius of the arc of a circle which comes closest to the rounded form of the component under consideration;
- 77.2.4 "Laden vehicle" means the vehicle laden to the maximum permitted technical mass. Vehicles equipped with hydro pneumatic, hydraulic or pneumatic suspension or a device for automatic levelling according to load shall be tested with the vehicle in the most adverse normal running condition specified by the manufacturer;
- 77.2.5 "Extreme outer edge" of the vehicle means, in relation to the sides of the vehicle, the plane parallel to the median longitudinal plane of the vehicle coinciding with its outer lateral edge, and, in relation to the front and rear ends, the perpendicular transverse plane of the vehicle coinciding with its outer front and rear edges, account not being taken of the projection:
 - 77.2.5.1 Of tyres near their point of contact with the ground, and connections for tyre pressure gauges;

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77.2.5.2 Of any anti-skid devices which may be mounted on the wheels;

77.2.5.3 Of rear-view mirrors;

77.2.5.4 Of side direction indicator lamps, end outline marker lamps, front and rear position (side) lamps and parking lamps;

77.2.5.5 In relation to the front and rear ends, of parts mounted on the bumpers, of towing devices and of exhaust pipes;

77.2.6 "The dimension of the projection" of a component mounted on a panel means the dimension determined by the method described in paragraph 77.6.2 to this Regulation;

77.2.7 "The nominal line of a panel" means the line passing through the two points represented by the position of the centre of a sphere when its surface makes its first and last contact with a component during the measuring procedure described in paragraph 77.6.2.2 to this Regulation;

77.2.8 "Aerial" means any device used for transmitting and/or receiving electromagnetic signals;

77.2.9 "Bumper" means the front or rear, lower, outer structure of a vehicle. It includes all structures that are intended to give protection to a vehicle when involved in a low speed frontal or rear collision and also any attachments to this structure;

77.2.10 "Bumper cover" means the non-rigid outer surface of a bumper, generally extending across the full width of the front or rear of a vehicle.

77.3 The principles of applicable type and scope of the external projections shall be as below:

77.3.1 The same brand and vehicle type.

77.3.2 The same shape of external surface.

77.3.3 The same materials of external surface.

77.4 General specifications

77.4.1 The applicant shall provide at least one representative vehicle and submit the documents as below to technical services, confirmed the actual vehicle and documentation are consistency.

77.4.1.1 Vehicle specification information, and vehicle drawings and / or photographs described in paragraph 77.3 below.

77.4.1.1.1 Photographs of the front, rear, and side parts of the vehicle taken at an angle of 30 deg. to 45 deg. to the vertical longitudinal median plane of the vehicle;

77.4.1.2 Drawings with dimensions of the bumpers and, where appropriate,

77.4.1.3 Drawings of certain external projections and if applicable drawings of certain sections of the external surface referred to in 77.5.9.1.

77.4.1.4 Assembly instructions for regard to luggage racks and radio receiving or transmitting aerials.

77.4.2 The provisions of this Regulation shall not apply to those parts of the external surface which, with the vehicle in the laden

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condition, with all doors, windows and access lids etc., in the closed position, are either:

77.4.2.1 At a height of more than 2 metres , or

77.4.2.2 Below the floor line, or

77.4.2.3 So located that, in their static condition as well as when in operation, they cannot be contacted by a sphere 100 mm in diameter.

77.4.3 The external surface of vehicles shall not exhibit, directed outwards, any pointed or sharp parts or any projections of such shape, dimensions, direction or hardness as to be likely to increase the risk or of bodily injury to a person hit by the external surface or brushing against it in the event of a collision.

77.4.4 The external surface of vehicles shall not exhibit, directed outwards, any part likely to catch on pedestrians, cyclists or motor cyclists.

77.4.5 No protruding part of the external surface shall have a radius of curvature less than 2.5 mm. This requirement shall not apply to parts of the external surface which protrude less than 5 mm, but the outward facing angles of such parts shall be blunted, save where such parts protrude less than 1.5 mm.

77.4.6 Protruding parts of the external surface, made of a material of hardness not exceeding 60 shore A, may have a radius of curvature less than 2.5 mm. The hardness measurement shall be taken with the component as installed on the vehicle. Where it is impossible to carry out a hardness measurement by the Shore A procedure, comparable measurements shall be used for evaluation.

77.4.7 The provisions of the above paragraphs 77.4.2 to 77.4.6 shall apply in addition to the particular specifications of the following paragraph 77.5., except where these particular specifications expressly provide otherwise.

77.5 Particular specifications

77.5.1 Ornaments

77.5.1.1 Added ornaments which project more than 10 mm from their support shall retract, become detached or bend over under a force of 10 daN exerted at their most salient point in any direction in a plane approximately parallel to the surface on which they are mounted. These provisions shall not apply to ornaments on radiator grilles, to which only the general requirements of paragraph 4. shall apply. To apply the 10 daN force a flat-ended ram of not more than 50 mm diameter shall be used. Where this is not possible, an equivalent method shall be used. After the ornaments are retracted, detached or bent over, the remaining projections shall not project more than 10 mm. These projections shall in any case satisfy the provisions of paragraph 77.4.3. If the ornament is mounted on a base, this base is regarded as belonging to the ornament and not to the supporting surface.

77.5.1.2 Protective strips or shielding on the external surface shall not be subject to the requirements of paragraph 5.1.1. above; however, they shall be firmly secured to the vehicle.

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77.5.2 Headlights

77.5.2.1 Projecting visors and rims shall be permitted on headlights, provided that their projection, as measured in relation to the external transparent surface of the headlight does not exceed 30 mm and their radius of curvature is at least 2.5 mm throughout. In the case of a headlamp mounted behind an additional transparent surface, the projection shall be measured from the outermost transparent surface. The projections shall be determined according to the method described in paragraph 77.6.3.

77.5.2.2 Retracting headlights shall meet the provisions of paragraph 77.5.2.1. above in both the operative and retracted positions.

77.5.2.3 The provisions of paragraph 77.5.2.1. above do not apply to headlamps which are sunk into the bodywork or which are "overhung" by the bodywork, if the latter complies with the requirements of paragraph 77.5.9.1. below.

77.5.3 Grilles and gaps

77.5.3.1 The requirements of paragraph 77.4.5 above shall not apply to gaps between fixed or movable elements, including those forming part of air intake or outlet grilles and radiator grilles, provided that the distance between consecutive elements does not exceed 40 mm and provided that the grilles and gaps have a functional purpose. For gaps of between 40 mm and 25 mm the radii of curvature shall be 1 mm or more. However, if the distance between two consecutive elements is equal to or less than 25 mm, the radii of curvature of external faces of the elements shall not be less than 0.5 mm. The distance between two consecutive elements of grilles and gaps shall be determined according to the method described in paragraph 77.6.4.

77.5.3.2 The junction of the front with the side faces of each element forming a grille or gap shall be blunted.

77.5.4 Windscreen wipers

77.5.4.1 The windscreen wiper fittings shall be such that the wiper shaft is furnished with a protective casing which has a radius of curvature meeting the requirements of paragraph 77.4.5 above and an end surface area of not less than 150 mm². In the case of rounded covers, these shall have a minimum projected area of 150 mm² when measured not more than 6.5 mm from the point projecting furthest. These requirements shall also be met by rear window wipers and headlamp wipers.

77.5.4.2 Paragraph 77.4.5 shall not apply to the wiper blades or to any supporting members. However, these units shall be so made as to have no sharp angles or pointed or cutting parts.

77.5.5 Bumpers

77.5.5.1 The ends of the bumpers shall be turned in towards the external surface in order to minimize the risk of fouling. This requirement is considered to be satisfied if either the bumper is recessed or integrated within the bodywork or the end of the bumper is turned in so that it is not contactable by a 100 mm sphere and the gap between the bumper end and the surrounding bodywork does not exceed 20 mm.

77.5.5.2 If the line of the bumper which corresponds to the outline contour of the car vertical projection is on a rigid surface, that

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surface shall have a minimum radius of curvature of 5 mm at all its points lying from the contour line to 20 mm inward, and a minimum radius of curvature of 2.5 mm in all other cases. This provision applies to that part of the zone lying from the contour line to 20 mm inward which is situated between and in front(or rear in case of the rear bumper) of tangential points with the contour line of two vertical planes each forming with the longitudinal plane of symmetry of the vehicle an angle of 15 deg. (see Fig. 7).

77.5.5.3 The requirement of paragraph 77.5.5.2. above shall not apply to parts on or of the bumper or to bumper insets which have a projection of less than 5 mm, with special reference to joint covers and jets for headlamp washers; but the outward facing angles of such parts shall be blunted, save where such parts protrude less than 1.5 mm.

77.5.5.4 The requirement of paragraph 77.5.5.2. above does not apply to the bumper cover. The provisions of paragraph 77.4. remain applicable.

77.5.6 Handles, hinges and push-buttons of doors, luggage compartments and bonnets; fuel tank filler caps and covers.

77.5.6.1 The projection shall not exceed 40 mm in the case of door or luggage compartment handles and 30 mm in all other cases.

77.5.6.2 If lateral door handles rotate to operate, they shall meet one or other of the following requirements:

77.5.6.2.1 In the case of handles which rotate parallel to the plane of the door, the open end of handles must be directed towards the rear. The end of such handles shall be turned back towards the plane of the door and fitted into a protective surround or be recessed.

77.5.6.2.2 Handles which pivot outwards in any direction which is not parallel to the plane of the door shall, when in the closed position, be enclosed in a protective surround or be recessed. The open end shall face either rearwards or downwards. Nevertheless, handles which do not comply with this last condition may be accepted if:

- (a) They have an independent return mechanism;
- (b) Should the return mechanism fail, they cannot project more than 15 mm;
- (c) They comply, in such opened position, with the provisions of paragraph 77.4.5; and
- (d) Their end surface area, when measured not more than 6.5 mm from the point projecting furthest, is not less than 150 mm

77.5.7 Wheels, wheel nuts, hub caps and wheel discs

77.5.7.1 The requirements of paragraph 77.4.5 above shall not apply.

77.5.7.2 The wheels, wheel nuts, hub caps and wheel discs shall not exhibit any pointed or sharp projections that extend beyond the external plane of the wheel rim. Wing nuts shall not be allowed.

77.5.7.3 When the vehicle is travelling in a straight line, no part of the wheels other than the tyres, situated above the horizontal plane

passing through their axis of rotation shall project beyond the vertical projection, in a horizontal plane of the external surface or structure. However, if functional requirements so warrant, wheel discs which cover wheel and hub nuts may project beyond the vertical projection of the external surface or structure on condition that the radius of curvature of the surface of the projecting part is not less than 30 mm and that the projection beyond the vertical projection of the external surface or structure in no case exceeds 30 mm.

77.5.8 Sheet-metal edges

77.5.8.1 Sheet-metal edges, such as gutter edges and the rails of sliding doors, shall not be permitted unless they are folded back or are fitted with a shield meeting the requirements of this Regulation which are applicable to it. An unprotected edge shall be considered to be folded back either if it is folded back by approximately 180 deg., or if it is folded towards the bodywork in such a manner that it cannot be contacted by a sphere having a diameter of 100 mm. The requirements of paragraph 77.4.5 above shall not apply to the following sheet metal edges: rear edge of bonnet and front edge of rear luggage boot.

77.5.9 Body-panels

77.5.9.1 Folds in body panels may have a radius of curvature of less than 2.5 mm provided that it is not less than one-tenth of the height "H" of the projection, measured in accordance with the method described in paragraph 77.6.1.

77.5.10 Lateral air or rain deflectors

77.5.10.1 Lateral deflectors shall have a radius of curvature of at least 1 mm on edges capable of being directed outwards.

77.5.11 Jacking brackets and exhaust pipes

77.5.11.1 The jacking brackets and exhaust pipe(s) shall not project more than 10 mm beyond the vertical projection of the floor line lying vertically above them. As an exception to this requirement an exhaust pipe may project more than 10 mm beyond the vertical projection of the floor line, so long as it terminates in rounded edges, the minimum radius of curvature being 2.5 mm.

77.5.12 Air intake and outlet flaps

77.5.12.1 Air intake and outlet flaps shall meet the requirements of paragraphs 77.4.3, 77.4.4 and 77.4.5 above in all positions of use.

77.5.13 Roof

77.5.13.1 Opening roofs shall be considered only in the closed position.

77.5.13.2 Convertible vehicles shall be examined with the hood in both the raised and lowered positions.

77.5.13.2.1 With the hood lowered, no examination shall be made of the vehicle inside an imaginary surface formed by the hood when in the raised position.

77.5.13.2.2 Where a cover for the linkage of the hood when folded is provided as standard equipment, the examination shall be made with the cover in position.

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77.5.14 Windows

77.5.14.1 Windows which move outwards from the external surface of the vehicle shall comply with the following provisions in all positions of use:

77.5.14.1.1 No exposed edge shall face forwards;

77.5.14.1.2 No part of the window shall project beyond the extreme outer edge of the vehicle.

77.5.15 Registration plate brackets

77.5.15.1 Supporting brackets provided by the vehicle manufacturer for registration plates shall comply with the requirements of paragraph 77.4.5 of this Regulation if they are contactable by a 100 mm diameter sphere when a registration plate is fitted in accordance with the vehicle manufacturer's recommendation.

77.5.16 Luggage racks and ski racks

77.5.16.1 Luggage racks and ski racks shall be so attached to the vehicle that positive locking exists in at least one direction and that horizontal, longitudinal and transverse forces can be transmitted which are at least equal to the vertical load-bearing capacity of the rack as specified by its manufacturer. For the test of the luggage rack or ski rack fixed to the vehicle according to the manufacturer's instructions, the test loads shall not be applied at one point only.

77.5.16.2 Surfaces which, after installation of the rack, can be contacted by a sphere of 165 mm diameter shall not have parts with a radius of curvature less than 2.5 mm, unless the provisions of paragraph 77.5.3 can be applied.

77.5.16.3 Fastening elements such as bolts that are tightened or loosened without tools shall not project more than 40 mm beyond the surfaces referred to in paragraph 77.5.16.2 above, the projection being determined according to the method prescribed in paragraph 77.6.2, but using a sphere of 165 mm diameter in those cases where the method prescribed in paragraph 77.6.2.2 is employed.

77.5.17 Aerials

77.5.17.1 Radio receiving and transmitting aerials shall be fitted to the vehicle in such a way that if their unattached end is less than 2 m from the road surface in any position of use specified by the manufacturer of the aerial, it shall be inside the zone bounded by the vertical planes which are 10 cm inside the extreme outer edge of the vehicle as defined in this Regulation.

77.5.17.2 Furthermore, aerials shall be so fitted to the vehicle, and if necessary their unattached ends so restricted, that no part of the aerials protrude beyond the extreme outer edge of the vehicle as defined in paragraph 77.2.5.

77.5.17.3 Shafts of aerials may have radii of curvature of less than 2.5 mm. However, the unattached ends shall be fitted with fixed cappings, the radii of curvature of which are not less than 2.5 mm.

77.5.17.4 The bases of aerials shall not project more than 40 mm when determined according to the procedure of paragraph 77.6.2.

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77.5.17.4.1 In cases where by the absence of a flexible shaft or part it is not possible to identify what the base is of an aerial this requirement is deemed to be met if, after a horizontal force of not more than 50 daN in forward and rearward direction is applied by a flat-ended ram of not more than 50 mm diameter at the most salient part of the aerial:

(a) The aerial bends towards the support and does not project more than 40 mm, or

(b) The aerial breaks off and the remaining part of the aerial does not show any sharp or dangerous part that can be contacted by the 100 mm sphere and does not project more than 40 mm.

77.5.17.4.2 Paragraphs 77.5.17.4. and 77.5.17.4.1. above shall not apply to aerials located behind the vertical transversal plane passing through the "R" point of the driver, provided that the maximum projection of the aerial including its housing does not exceed 70 mm when determined according to the procedure of paragraph 77.6.2. If the aerial is located behind that vertical plane but projects more than 70 mm, paragraph 77.5.17.4.1 above shall apply using a projection limit of 70 mm instead of 40 mm.

77.5.18 Assembly instructions

77.5.18.1 Luggage racks and radio receiving or transmitting aerials that shall be provided assembly instructions. The assembly instructions shall contain sufficient information to enable the approved components to be mounted on the vehicle in a manner that complies with the relevant provisions of paragraphs 77.4 and 77.5 of this Regulation. In particular, the positions of use must be indicated for telescopic aerials.

77.6 Methods of determining the dimensions of projections and gaps

77.6.1 Method of determining the height of the projection of folds in body panels

77.6.1.1 The height H of a projection is determined graphically by reference to the circumference of a 165 mm diameter circle, internally tangential to the external outline of the external surface at the section to be checked.

77.6.1.2 H is the maximum value of the distance, measured along a straight line passing through the centre of the 165 mm diameter circle between the circumference of the aforesaid circle and the external contour of the projection (see Fig.1).

77.6.1.3 In cases where it is not possible for a 100 mm diameter circle to contact externally part of the external outline of the external surface at the section under consideration, the surface outline in this area will be assumed to be that formed by the circumference of the 100 mm diameter circle between its tangent points with the external outline (see Fig.2).

77.6.1.4 Drawings of the necessary sections through the external surface shall be provided by the manufacturer to allow the height of the projections referred to above to be measured.

77.6.2 Method of determining the dimension of the projection of a component mounted on the external surface

77.6.2.1 The dimension of the projection of a component which is mounted on a convex surface may be determined either directly or

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by reference to a drawing of an appropriate section of this component in its installed condition.

77.6.2.2 If the dimension of the projection of a component which is mounted on a surface other than convex cannot be determined by simple measurement, it shall be determined by the maximum variation of the distance of the centre of a 100 mm diameter sphere from the nominal line of the panel when the sphere is moved over and is in constant contact with that component. Figure 3 shows an example of the use of this procedure.

77.6.3 Method of determining the projection of headlamp visors and rims

77.6.3.1 The projection from the external surface of the headlamp shall be measured horizontally from the point of contact of a 100 mm diameter sphere as shown in Figure 4.

77.6.4 Method of determining the dimension of a gap or the space between elements of a grille

77.6.4.1 The dimension of a gap or space between elements of a grille shall be determined by the distance between two planes passing through the points of contact of the sphere and perpendicular to the line joining those points of contact. Figures 5 and 6 show examples of the use of this procedure.

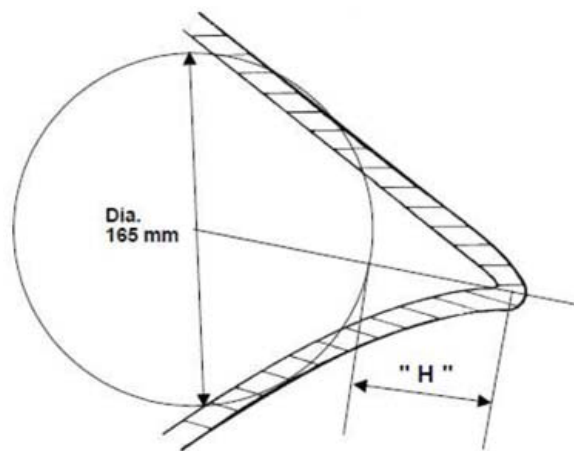


Figure 1

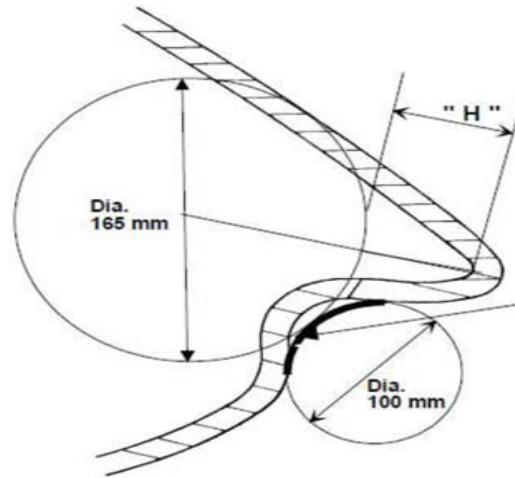


Figure 2

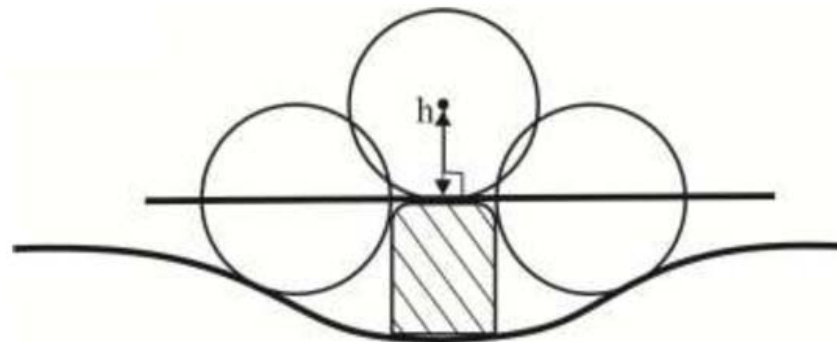


Figure 3

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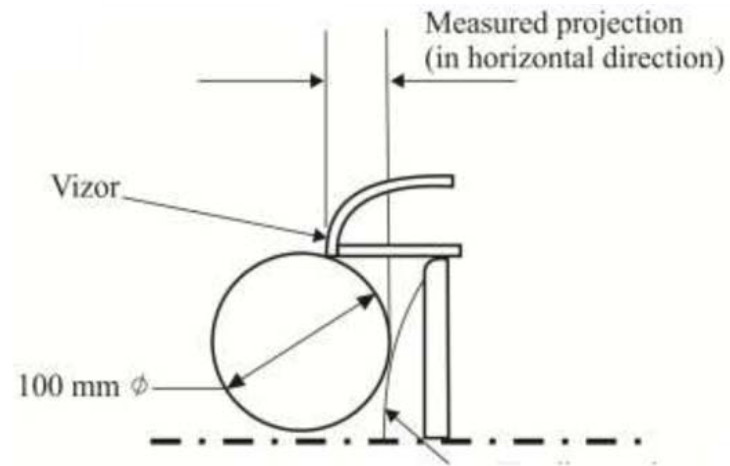


Figure 4

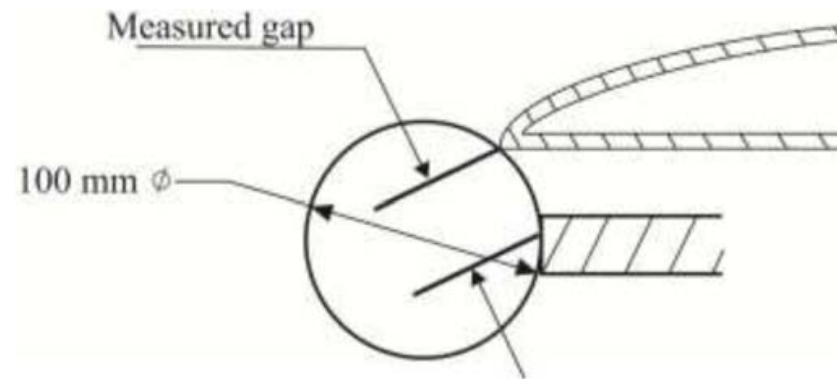


Figure 5

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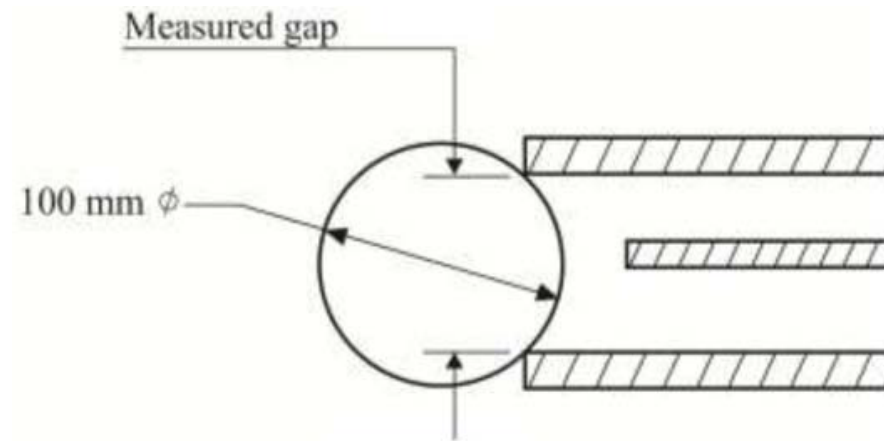


Figure 6

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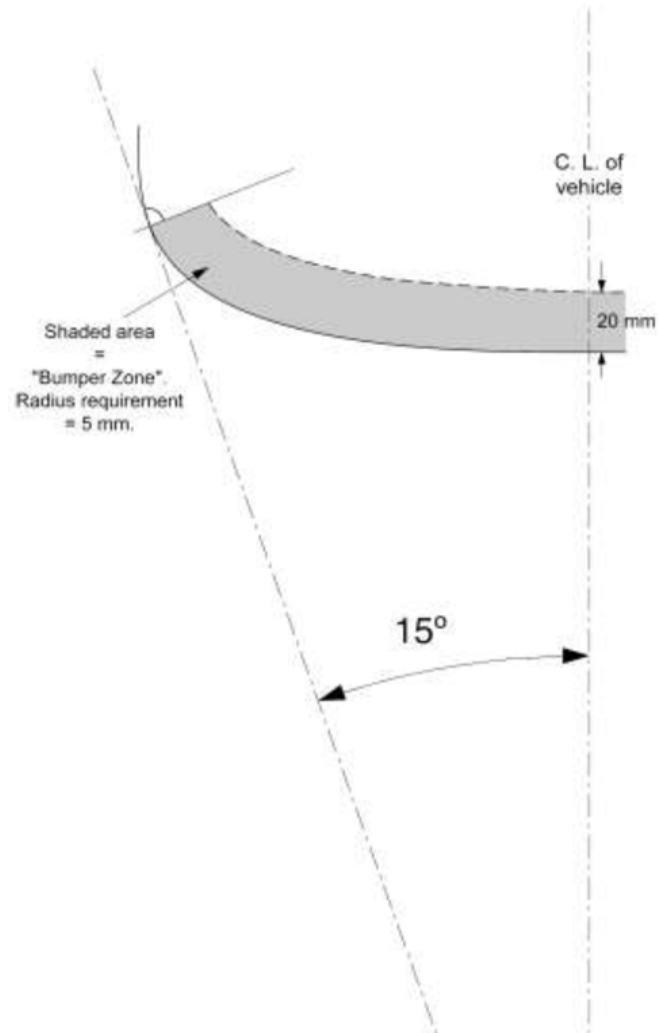


Figure 7

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