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**ECONOMIC COMMISSION FOR EUROPE**

**INLAND TRANSPORT COMMITTEE**

World Forum for Harmonization of Vehicle Regulations

One-hundred-and-forty-third session  
Geneva, 13 - 16 November 2007  
Item 4.2.32. of the provisional agenda

**1958 AGREEMENT**

Consideration of draft amendments to existing Regulations

Proposal for Supplement 1 to the 02 series of amendments to Regulation No. 107  
(Buses and coaches)

Submitted by the Working Party on General Safety (GRSG)

The text reproduced below was adopted by GRSG at its one ninety-second session. It is based on paragraph 5 of the report, on ECE/TRANS/WP.29/GRSG/2006/7 and Add. 1, as amended in Annex II to the report, on ECE/TRANS/WP.29/GRSG/2007/15, not amended, and on ECE/TRANS/WP.29/GRSG/2007/7 as amended in para. 15 of the report. It is submitted to WP.29 and AC.1 for consideration (ECE/TRANS/WP.29/GRSG/71, paras. 5, 7, 8 and 15).

Insert a new paragraph 1.4., to read:

- "1.4. Pending the addition of appropriate provisions, nothing in this Regulation shall prevent a Contracting Party from specifying requirements for vehicles to be registered in its territory for the fitting and technical requirements for audible and/or visual route and/or destination display equipment, whether fitted internally or externally."

Paragraph. 2.33., amend to read:

- "2.33. "Ramp" means a device to bridge the gap between the floor of a passenger compartment and the ground or kerb. In its position for use, it includes any surface that may move as part of the ramp deployment or be available for use only when the ramp is in its deployed position and over which a wheelchair is intended to travel."

Insert a new paragraph 2.40., to read:

- "2.40. "Service-door lighting" means a lighting device(s) of the vehicle designed to illuminate the exterior vicinity of service doors and wheels."

Paragraph. 5.2., amend to read:

- "5.2. Vehicles of Class I shall be accessible for people with reduced mobility, including at least one wheelchair user, according to the technical provisions laid down in Annex 8."

Paragraph. 5.3., amend to read:

- "5.3. Contracting Parties shall be free to choose the most appropriate solution to achieve improved accessibility in vehicles other than those of Class I. However, if vehicles other than those of Class I are equipped with features or devices for people with reduced mobility and/or wheelchair users, those features or devices shall comply with the relevant requirements of Annex 8."

Insert new paragraphs 5.5. and 5.6., to read:

- 5.5. Unless otherwise stated, all measurements shall be made when the vehicle is at its mass in running order and it is standing on a smooth and horizontal ground surface and in the normal condition for travel. If a kneeling system is fitted, it shall be set so the vehicle is at its normal ride height for travel. In the case of approval of bodywork as a separate technical unit the position of the body relative to the flat horizontal surface shall be specified by the manufacturer.
- 5.6. Wherever there is a requirement in this Regulation for a surface in the vehicle to be horizontal or at a specific angle when the vehicle is at its mass in running order, in the case of a vehicle with mechanical suspension, the surface may exceed this slope or possess a slope when the vehicle is at its mass in running order, provided that this

requirement is met when the vehicle is in the loading condition declared by the manufacturer. If a kneeling system is fitted to the vehicle, it shall not be in operation.

Annex 1,

Part 1, Appendix 1, items 5.3.1. to 5.3.3. and 5.4.1. to 5.4.3., insert a reference to a new explanatory note "3/"

Part 1, Appendix 1, insert a new explanatory note "3/", to read:

"3/ If the vehicle is equipped to carry wheelchairs, indicate here the maximum number to be carried. If passenger capacity is dependent on the number of wheelchairs to be carried, indicate permissible combinations of seated, standing and wheelchair passengers."

Part 1, Appendix 2, items 5.3.1. to 5.3.3. and 5.4.1. to 5.4.3., insert a reference to a new explanatory note "3/"

Part 2, Appendix 1, SECTION II, items 1.7.1. to 1.7.3. and 1.7.4.1. to 1.7.4.3., insert a reference to the new footnotes "5/ 6/"

Part 2, Appendix 1, insert new footnotes 5/ and 6/ to read:

"5/ In the case of an articulated vehicle, specify the number of seats in each rigid section.

6/ If the vehicle is equipped to carry wheelchairs, indicate here the maximum number to be carried. If passenger capacity is dependant on the number of wheelchairs to be carried, indicate permissible combinations of seated, standing and wheelchair passengers."

Part 2, Appendix 2, SECTION II, items 1.4.1. to 1.4.3. and 1.4.4.1. to 1.4.4.3., insert a reference to the new footnotes "5/ 6/"

Part 2, Appendix 2, add at the end:

"Footnotes: see Part 2, Appendix 1."

Part 2, Appendix 3, footnotes 1/, 2/, 3/ and 4/, should be deleted and replaced by text:

"Footnotes: see Part 2, Appendix 1."

Annex 3,

Paragraphs 7.1.1. and 7.1.2., should be deleted.

Paragraph 7.1.3., renumber as paragraph 7.1.1.

Insert a new paragraph 7.2.2.2.10., to read:

"7.2.2.2.10. the surface of any wheelchair space(s) dedicated solely for the use of wheelchair user(s)."

Paragraph 7.6.2.7., amend to read:

"7.6.2.7. If escape hatches are fitted, they shall be positioned as follows: if there is only one hatch, it shall be situated in the middle third of the passenger compartment, if there are two hatches, they shall be separated by a distance of at least 2 m measured between the nearest edges of the apertures in a line parallel to the longitudinal axis of the vehicle."

Paragraph 7.6.5.1., amend to read:

"7.6.5.1. In the event of an emergency, every power-operated service door shall be capable, when the vehicle is stationary or driving at a speed less than or equal to 5 km/h, of being opened from inside and, when not locked, from outside by controls which, whether or not the power supply is operating:"

Paragraph 7.6.5.1.5., amend to read:

"7.6.5.1.5. cause the door to open to a width that the gauge as defined in paragraph 7.7.1.1. can pass through within 8 seconds after the operation of the control, or enable the door to be easily opened by hand to a width that the gauge as defined in paragraph 7.7.1.1. can pass through within 8 seconds after the operation of the control;"

Insert a new paragraph 7.6.5.1.8., to read:

"7.6.5.1.8. The doors shall be prevented from opening if the vehicle moves at a speed higher than 5 km/h."

Paragraph 7.6.8.2.2., amend to read:

"7.6.8.2.2. be made of readily-breakable safety glass. This latter provision precludes the possibility of using panes of laminated glass or of plastic material. A device shall be provided adjacent to each emergency window, readily available to persons inside the vehicle, to ensure that each window can be broken. The device for breaking the glass for the emergency windows at the rear of the vehicle shall be positioned either centrally above or below the emergency window or, alternatively, a device shall be positioned adjacent to each end of the window."

Paragraph 7.6.11.1., amend to read:

"7.6.11.1. Each emergency exit and any other exit that meets the prescriptions for an emergency exist shall be marked, inside and outside the vehicle, by an inscription reading "Emergency Exit" and supplemented, where appropriate, by one of the relevant pictograms described in ISO standard 7010:2003."

Insert new paragraphs 7.6.12. to 7.6.12.2.6., to read:

"7.6.12.      Service-door lighting

- 7.6.12.1.      Service-door lighting may be provided to illuminate the flat, horizontal portion of the ground defined in paragraph 7.6.12.2.2. so as to aid passengers boarding and alighting the vehicle and to enable the presence of a passenger within this portion of the ground to be detected by the driver from his seat.
- 7.6.12.2.      Service-door lighting, if fitted, shall:
  - 7.6.12.2.1.    be of white colour;
  - 7.6.12.2.2.    illuminate a flat, horizontal portion of the ground having a width of 2 m measured from a plane parallel to the median longitudinal vertical plane of the vehicle which passes through the outermost point of the closed service door and over a length extending from a transverse plane which passes through the foremost edge of the closed service door to a transverse plane passing through the centre line of the foremost wheels situated to the rear of the service door, or, in the case where there are no such wheels, to a transverse plane passing through the rear of the vehicle;
  - 7.6.12.2.3.    have limited dazzle outside a zone on the ground having a maximum width of 5 m measured from the side of the vehicle and a maximum length limited by a transverse plane passing through the front of the vehicle and a transverse plane passing through the rear of the vehicle;
  - 7.6.12.2.4.    if the lower edge of the lighting device is less than 2 m from the ground, not project more than 50 mm beyond the overall width of the vehicle measured without this device and have radii of curvature of not less than 2.5 mm;
  - 7.6.12.2.5.    be activated and deactivated manually by a separate switch, and
  - 7.6.12.2.6.    be installed so that the device can only be switched on when a service door is operated and the vehicle speed does not exceed 5 km/h and is switched off automatically before the vehicle reaches a speed exceeding 5 km/h."

Paragraph 7.7.7.1., amend to read:

- "7.7.7.1.      The maximum and minimum height, and the minimum depth, of steps for passengers at service and emergency doors, and within the vehicle, are specified in Annex 4, figure 8."

Paragraph 7.7.7.4., amend to read:

"7.7.7.4. Where there is more than one step, each step may extend into the area of the vertical projection of the next step by up to 100 mm and the projection over the tread below shall leave a free surface of at least 200 mm (see Annex 4, figure 8) with all step nosings being designed such as to minimize the risk of tripping. All step nosings shall contrast visually with their immediate surroundings."

Paragraph 7.7.8.1.1., amend to read:

"7.7.8.1.1. The minimum width of the seat cushion, dimension "F" (Annex 4, figure 9), measured from a vertical plane passing through the centre of that seating position, shall be:

7.7.8.1.1.1. 200 mm in the case of Class I, II, A or B; or

7.7.8.1.1.2. 225 mm in the case of Class III."

Paragraph 7.7.8.1.2., amend to read:

"7.7.8.1.2. The minimum width of the available space for each seating position, dimension "G" (Annex 4, figure 9), measured from a vertical plane passing through the centre of that seating position at height between 270 mm and 650 mm above the uncompressed seat cushion, shall be not less than:

7.7.8.1.2.1. 250 mm in the case of individual seats; or

7.7.8.1.2.2. 225 mm in the case of continuous rows of seats for two or more passengers."

Para. 7.7.8.2.1., amend to read:

"7.7.8.2.1. 350 mm in vehicles of Class I, A or B; or"

Paragraph 7.7.8.2.2., amend to read:

"7.7.8.2.2. 400 mm in vehicles of Class II or III."

Paragraph 7.7.8.5.3., amend to read:

"7.7.8.5.3. The minimum number of priority seats complying with the requirements of Annex 8, paragraph 3.2. shall be four in Class I, two in Class II and one in Class A. A seat that folds out of the way when not in use shall not be designated as a priority seat."

Paragraph 7.7.8.5.3.1., should be deleted.

Paragraph 7.7.9.1., amend to read:

"7.7.9.1. On vehicles of Classes I, II and A, a means shall be provided to enable passengers to signal that the driver should stop the vehicle. The controls for all such communication devices shall be capable of being operated with the palm of the hand. There shall be appropriate communication devices distributed adequately and evenly throughout the vehicle and no more than 1,500 mm from the floor; this does not exclude the possibility of installing higher additional communication devices. Controls shall contrast visually with their immediate surroundings. Activation of the control shall also be indicated to the passengers by means of one or more illuminated signs. The sign shall display the words "bus stopping" or equivalent, and/or a suitable pictogram and shall remain illuminated until the service door(s) open. Articulated vehicles shall have such signs in each rigid section of the vehicle. Double-deck vehicles shall have them on each deck. The provisions of paragraph 7.6.11.4. apply to any textual markings used."

Paragraph 7.8.1.3., amend to read:

"7.8.1.3. the access to any exits and the area immediately around the service door(s) including, when in use, any boarding device fitted;"

Paragraph 7.8.3., amend to read:

"7.8.3. Provisions shall be made to protect the driver from the effects of glare and reflections caused by artificial interior lighting. Any lighting likely to affect adversely and significantly the driver's vision shall be capable of being operated only while the vehicle is at rest."

Paragraph 7.11.1.5., amend to read:

"7.11.1.5. The surface of every handrail, handhold or stanchion shall contrast visually with their immediate surroundings and be slip-resistant."

Paragraph 7.11.4., amend to read:

"7.11.4. (Reserved)"

Paragraph 7.11.4.1., should be deleted.

Annex 4,

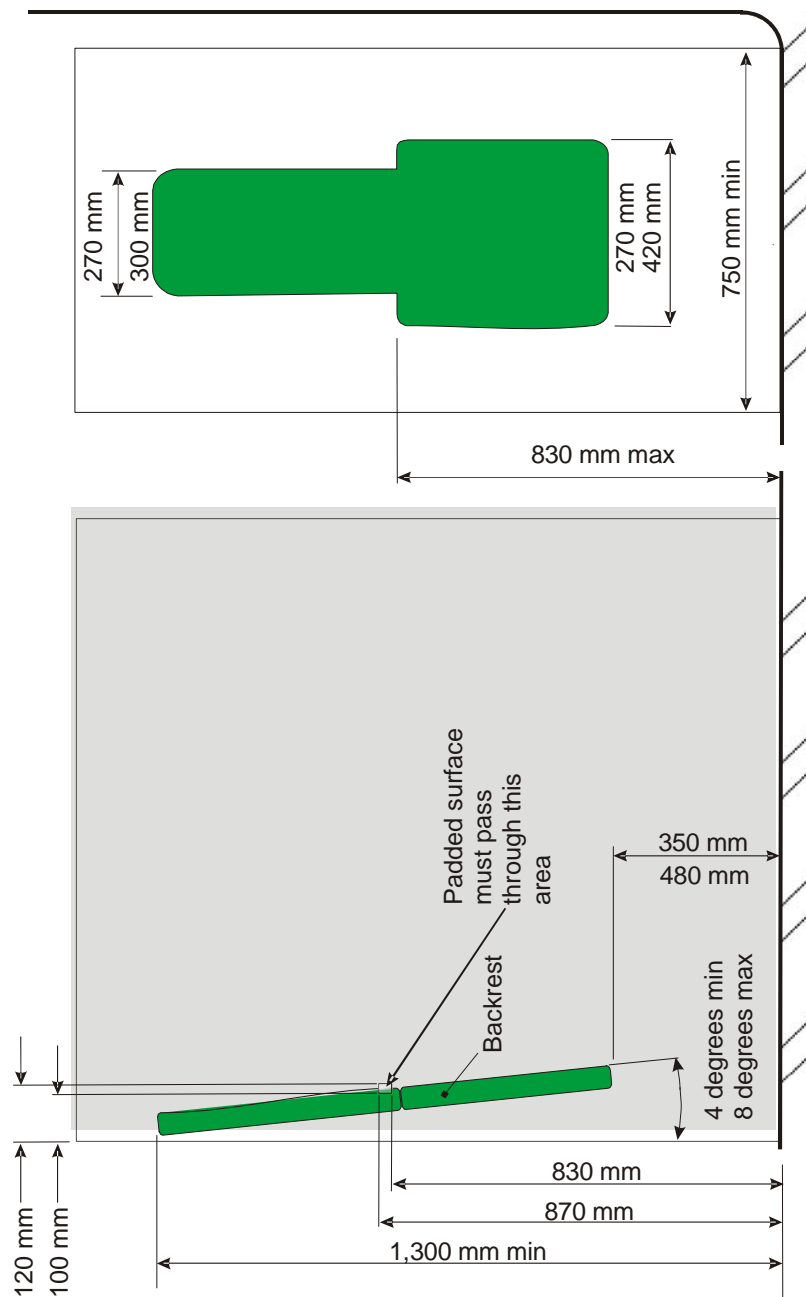
Figure 23, the text in brackets "(see Annex 8, paragraph 3.4.)", amend to read "(see Annex 8, paragraphs 3.2.8. and 3.6.6.)"

Insert a new Figure 30, to read:

"Figure 30

EXAMPLE OF A BACKREST FOR A REARWARD-FACING WHEELCHAIR

(see Annex 8, paragraph 3.8.6.)





Annex 6, amend to read:

"Annex 6

GUIDELINES FOR MEASURING THE CLOSING FORCES OF POWER-OPERATED DOORS  
(see Annex 3, paragraph 7.6.5.6.1.1.)  
AND THE REACTIVE FORCES OF POWER-OPERATED RAMPS  
(see Annex 8, paragraph 3.11.4.3.3.)

1. General

The closing of a power-operated door and the operation of a power-operated ramp are dynamic processes. When a moving door or ramp hits an obstacle, the result is a dynamic reaction force, the history of which (in time) depends on several factors (for example, mass of the door or ramp, acceleration, dimensions).

2. Definitions

2.1. Closing or reactive force  $F(t)$  is a time function, measured at the outer edge of the door or ramp (see paragraph 3.2. below).

2.2. Peak force  $F_S$  is the maximum value of the closing or reactive force.

2.3. Effective force  $F_E$  is the average value of the closing or reactive force related to the pulse duration:

$$F_E = \frac{1}{T} \int_{t_1}^{t_2} F(t) dt$$

2.4. Pulse duration  $T$  is the time between the  $t_1$  and  $t_2$ :

$$T = t_2 - t_1$$

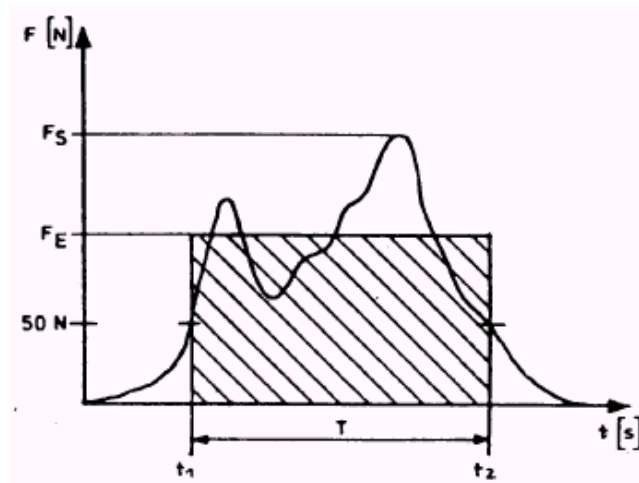
where,

$t_1$  = threshold of sensitivity, where the closing or reactive force exceeds 50 N;

$t_2$  = fade-away threshold, where the closing or reactive force becomes less than 50 N.

- 2.5. The relation between the above parameters is shown in figure 1 below (as an example):

Figure 1



- 2.6. Clamping or mean reactive force  $F_c$  is the arithmetical mean value of the effective forces, measured at the same measuring point subsequently more times:

$$F_c = \frac{\sum_{i=1}^{i=n} (F_E)_i}{n}$$

### 3. Measurements

#### 3.1. Conditions of measurement:

##### 3.1.1. Temperature range: 10 ° - 30 °C

##### 3.1.2. The vehicle shall be standing on a horizontal surface. In the case of ramp measurements, this surface shall be fitted with a rigidly mounted block or other similar device having a face against which the ramp can react.

#### 3.2. Measurement points shall be:

##### 3.2.1. in the case of doors:

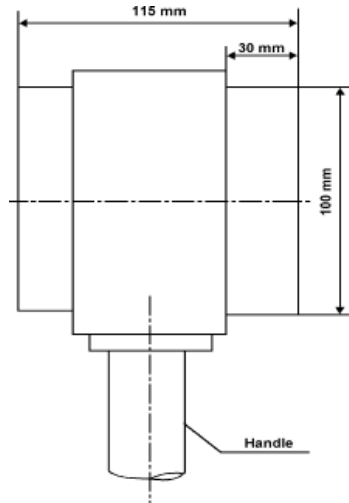
##### 3.2.1.1. at the main closing edges of the door:

one in the middle of the door;

one 150 mm above the lower edge of the door.

- 3.2.1.2. if equipped with clamping prevention devices for the opening process:
  - at the secondary closing edges of the door at that point which is considered to be the most dangerous place of clamping.
- 3.2.2. in the case of ramps:
  - 3.2.2.1. at the outer edge of the ramp situated perpendicularly to its direction of movement:
    - one in the middle of the ramp;
    - one 100 mm inboard from each of the edges parallel to the direction of travel of the ramp.
- 3.3. At least three measurements shall be taken at each of the measuring points to determine the clamping or mean reactive force according to paragraph 2.6.
- 3.4. The signal of the closing or reactive force shall be recorded by means of a low-pass filter with a limiting frequency of 100 Hz. Both the threshold of sensitivity and the fade-away threshold to limit the pulse duration shall be set at 50 N.
- 3.5. The deviation of the reading from the rated value shall not be more than  $\pm 3$  per cent.
- 4. Measuring device
  - 4.1. The measuring device shall consist of two parts: one handle and one measuring part which is a load cell (see figure 2).
  - 4.2. The load cell shall have the following characteristics:
    - 4.2.1. It shall consist of two sliding housings with the outer dimension of 100 mm in diameter and 115 mm in width. Inside the load cell a compression spring shall be fitted between the two housings such that the load cell can be pressed together if an appropriate force is applied.
    - 4.2.2. The stiffness of the load cell shall be  $10 \pm 0.2$  N/mm. The maximum spring deflection shall be limited to 30 mm so that a maximum peak force of 300 N is achieved.

Figure 2



Annex 8, amend to read:

"Annex 8

REQUIREMENTS FOR TECHNICAL DEVICES FACILITATING ACCESS FOR  
PASSENGERS OF REDUCED MOBILITY

1. GENERAL

This Annex contains the provisions which apply to a vehicle designed for easy access for passengers with reduced mobility and wheelchair users.

2. SCOPE

These requirements shall apply to vehicles permitting easier access for persons with reduced mobility.

3. REQUIREMENTS

3.1. Steps

The height of the first step from the ground of at least one service door shall not exceed 250 mm for vehicles of Class I and A and 320 mm for vehicles of Class II, III and B. In the case where only one service door meets this requirement there must be no barrier or sign which prevents that door from being used as both an entrance and an exit.

As an alternative for vehicles of Class I and A, the first step from the ground shall not exceed 270 mm in two door openings, one entrance and one exit.

A kneeling system and/or retractable step may be engaged.

The height of steps in an access passage at the above-mentioned door(s), and in the gangway, shall be not more than 200 mm for vehicles of Class I and A and 250 mm for vehicles of Class II, III and B.

The transition from a sunken gangway to a seating area shall not be considered to be a step.

3.2. Priority seats and space for passengers with reduced mobility

3.2.1. (Reserved)

3.2.2. There shall be adequate space for a guide dog under, or adjacent to, at least one of the priority seats. This space shall not form a part of the gangway.

3.2.3. Armrests shall be fitted on seats between the seating position and the gangway and shall be capable of being moved easily out of the way to permit clear access to the seat. In the case of seats facing each other one of the gangway seats may alternatively be fitted with a vertical stanchion. This stanchion shall be positioned so that the seat occupant is kept securely on the seat and easy access to the seat is possible.

3.2.4. The minimum width of a priority seat cushion, measured from a vertical plane passing through the centre of that seating position, shall be 220 mm on each side.

3.2.5. The height of the uncompressed seat cushion relative to the floor shall be such that the distance from the floor to a horizontal plane tangent to the front upper surface of the seat cushion is between 400 mm and 500 mm.

3.2.6. The foot space at priority seating positions shall extend forward of the seat from a vertical plane through the forward edge of the seat cushion. The foot space shall not have a slope in any direction of more than 8 percent.

3.2.7. Each priority seating position shall have a free height of not less than 1,300 mm for vehicles of Class I and A and 900 mm for vehicles of Class II, measured from the highest point of the uncompressed seat cushion. This free height shall extend over the vertical projection of the whole of the seat and the associated foot space.

Intrusion of a seat back or other object into this space shall be permitted provided that a minimum clear vertical space extending 230 mm in front of the seat cushion is maintained. Where the priority seat is positioned facing a bulkhead more than 1,200 mm in height this space shall be 300 mm. From the edges of the free space defined above, intrusions are permitted in accordance with paragraphs 7.7.8.6.3.1. to 7.7.8.6.3.4. of Annex 3 as if reference to the clear space in paragraphs 7.7.8.6.1. and 7.7.8.6.2. of Annex 3 is a reference to the clear space defined above. The provisions of paragraph 7.7.8.1.4. of Annex 3 may apply.

Intrusions of handholds or handrails as mentioned in paragraph 3.4.2. may protrude by a maximum of 100 mm from the sidewall into the clear space over the vertical projection of the foot space.

- 3.2.8. Vehicles fitted with a priority seat shall have pictogram(s) in accordance with Annex 4, figure 23B visible from the outside, both on the front nearside of the vehicle and adjacent to the relevant service door(s). A pictogram shall be placed internally adjacent to the priority seat.

3.3. Communication devices

- 3.3.1. Communication devices shall be placed adjacent to any priority seat and within any wheelchair area and shall be at a height between 700 mm and 1,200 mm above the floor.

- 3.3.2. Communication devices situated in the low floor area shall be at a height between 800 mm and 1,500 mm where there are no seats.

- 3.3.3. (Reserved)

- 3.3.4. If a vehicle is fitted with a ramp or lift, a means of communication with the driver shall be fitted outside, adjacent to the door, and at a height between 850 mm and 1,300 mm from the ground. This requirement shall not apply to a door situated in the direct field of vision of the driver.

3.4. Handrails to priority seating

- 3.4.1. A handrail at a height of between 800 mm and 900 mm above the floor level shall be provided between the priority seats as described in paragraph 7.7.8.5.3. of Annex 3 and at least one service door suitable for boarding and alighting. A break is permitted where it is necessary to gain access to a wheelchair space, a seat located at a wheel arch, a staircase, an access passage or a gangway. Any break in the handrail shall not exceed 1,050 mm and a vertical handrail shall be provided on at least one side of the break.

- 3.4.2. Handrails or handholds shall be placed adjacent to priority seating positions to facilitate entry and exit of the seat, and shall be designed in such a way as to allow the passenger to grasp them easily.

3.5. Floor slope

The slope of any gangway, access passage or floor area between any priority seat or wheelchair space and at least one entrance and one exit or a combined entrance and exit shall not exceed 8 per cent. Such sloping areas shall be provided with a slip-resistant surface.

3.6. Wheelchair accommodation provisions

- 3.6.1. For each wheelchair user provided for in the passenger compartment there shall be a special area at least 750 mm wide and 1,300 mm long. The longitudinal plane of the special area shall be parallel to the longitudinal plane of the vehicle and the floor surface of the special area shall be slip-resistant.

In the case of a wheelchair space designed for a forward facing wheelchair, the top of preceding seat-backs may intrude into the wheelchair space if a clear space is provided as shown in Annex 4, figure 22.

- 3.6.2. There shall be at least one doorway through which wheelchair users can pass. In the case of vehicles of Class I, at least one wheelchair access door shall be a service door. The wheelchair access door shall bear a boarding device complying with the provisions of paragraph 3.11.3. (a lift) or 3.11.4. (a ramp).

- 3.6.3. A door for wheelchair access, that is not a service door, shall have a minimum height of 1,400 mm. The minimum width of all doors providing wheelchair access to the vehicle shall be 900 mm which may be reduced by 100 mm when the measurement is made at the level of handholds.

- 3.6.4. It shall be possible to move from the outside of the vehicle through at least one of the doors for wheelchair access into the special area(s) with a reference wheelchair of the dimensions shown in Annex 4, figure 21.

In the case of vehicles of Class I and A fitted with more than one wheelchair space this test shall be completed for each wheelchair space with all other wheelchair spaces occupied by the reference wheelchair.

- 3.6.5. In vehicles of Class I and A fitted with a ramp for wheelchair access, it shall be possible for a reference wheelchair having the dimensions shown in Annex 4, figure 21 to enter and exit a vehicle with the wheelchair moving in a forward direction.

- 3.6.6. Vehicles fitted with a wheelchair space shall have pictogram(s) in accordance with Annex 4, figure 23A visible from the outside, both on the front nearside of the vehicle and adjacent to the relevant service door(s).

One of these pictograms shall be placed internally adjacent to each wheelchair space indicating whether the wheelchair is to be positioned facing the front or the rear of the vehicle.

- 3.7. Seats and standing passengers in the wheelchair space

- 3.7.1. Folding seats may be fitted in a wheelchair space. However, such seats when folded and out of use shall not intrude into the wheelchair space.

- 3.7.2. A vehicle may be equipped with demountable seats fitted in the wheelchair space provided that such seats may be easily removed by the driver or a crew member.

- 3.7.3. For vehicles of Class I, II and A, where the foot space of any seat, or part of a folding seat when in use, intrudes into a wheelchair space, those seats shall have signs fixed on or adjacent to them with the following text, equivalent text or pictogram:

"Please give up this space for a wheelchair user".

The provisions of paragraph 7.6.11.4. of Annex 3 apply to any textual markings used.

- 3.7.4. In vehicles where any wheelchair space is designated for use exclusively by a wheelchair user as provided for in paragraph 7.2.2.2.10. of Annex 3, those spaces shall be clearly marked with the following text, equivalent text or pictogram:

"Area designated for use exclusively by a wheelchair user"

The provisions of paragraph 7.6.11.4. of Annex 3 apply to any textual markings used.

3.8. Stability of wheelchairs

- 3.8.1. In vehicles required to have occupant restraint systems fitted, the wheelchair space shall be designed for the wheelchair user to travel facing forwards and shall be fitted with restraint systems complying with either the requirements specified in paragraph 3.8.2. or those specified in paragraph 3.8.3.

In vehicles not required to have occupant restraint systems fitted, the wheelchair space shall be fitted with restraint systems complying with the requirements specified in paragraph 3.8.2. or 3.8.3., or shall comply with the requirements specified in paragraph 3.8.4.

3.8.2. Forward-facing wheelchair - static test requirements

- 3.8.2.1. Each wheelchair space shall be provided with a restraint system capable of restraining the wheelchair and the wheelchair user.

- 3.8.2.2. This restraint system and its anchorages shall be designed to withstand forces equivalent to the ones required for the passenger seats and occupant restraint systems.

- 3.8.2.3. A static test shall be carried out in accordance with the following requirements:

- 3.8.2.3.1. the forces referred hereto shall be applied in forward and rearward directions, separately and on the restraint system itself;

- 3.8.2.3.2. the force shall be maintained for a period of not less than 0.2 seconds;

- 3.8.2.3.3. the restraint system shall be capable of withstanding the test. Permanent deformation, including partial rupture or breakage of the restraint system shall not constitute failure if the required force is sustained for the specified time. Where



applicable, the locking device enabling the wheelchair to leave the vehicle shall be operable by hand after removal of the traction force.

- 3.8.2.4. In forward direction in the case of a separate wheelchair and wheelchair user restraint system
  - 3.8.2.4.1. For category M<sub>2</sub>:
    - 3.8.2.4.1.1.  $1,110 \pm 20$  daN in the case of a lap belt. The force shall be applied on the wheelchair user restraint system in the horizontal plane of the vehicle and towards the front of the vehicle if the restraint system is not attached to the floor of the vehicle. If the restraint system is attached to the floor, the force shall be applied in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle;
    - 3.8.2.4.1.2.  $675 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and  $675 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
    - 3.8.2.4.1.3.  $1,715 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
    - 3.8.2.4.1.4. the forces shall be applied simultaneously.
  - 3.8.2.4.2. For category M<sub>3</sub>:
    - 3.8.2.4.2.1.  $740 \pm 20$  daN in the case of a lap belt. The force shall be applied on the wheelchair user restraint system in the horizontal plane of the vehicle and towards the front of the vehicle if the restraint system is not attached to the floor of the vehicle. If the restraint system is attached to the floor, the force shall be applied in an angle  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle;
    - 3.8.2.4.2.2.  $450 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and  $450 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
    - 3.8.2.4.2.3.  $1,130 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
    - 3.8.2.4.2.4. the forces shall be applied simultaneously.
- 3.8.2.5. In forward direction in the case of a combined wheelchair and wheelchair user restraint system.
  - 3.8.2.5.1. For category M<sub>2</sub>;

- 3.8.2.5.1.1.  $1,110 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair user restraint system in the case of a lap belt;
- 3.8.2.5.1.2.  $675 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and  $675 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
- 3.8.2.5.1.3.  $1,715 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
- 3.8.2.5.1.4. the forces shall be applied simultaneously.
- 3.8.2.5.2. For category  $M_3$ :
  - 3.8.2.5.2.1.  $740 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair user restraint system in the case of a lap belt;
  - 3.8.2.5.2.2.  $450 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and  $450 \pm 20$  daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
  - 3.8.2.5.2.3.  $1,130 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
  - 3.8.2.5.2.4. the forces shall be applied simultaneously.
- 3.8.2.6. In rearward direction:
  - 3.8.2.6.1.  $810 \pm 20$  daN in an angle of  $45 \pm 10$  degrees to the horizontal plane of the vehicle and towards the rear of the vehicle on the wheelchair restraint system.
- 3.8.2.7. In every case the forces shall be applied to the wheelchair user restraint system by means of a traction device appropriate to the belt type as specified in Regulation No. 14.
- 3.8.3. Forward-facing wheelchair - hybrid test requirements
  - 3.8.3.1. A wheelchair space shall be fitted with a wheelchair restraint system suitable for general wheelchair application and shall allow the carriage of a wheelchair and a wheelchair user facing the front of the vehicle;
  - 3.8.3.2. A wheelchair space shall be fitted with a wheelchair user restraint system which shall comprise of a minimum of two anchorage points and a pelvic restraint (lap belt)

designed and constructed of components intended to perform in a similar manner to those of a seat belt conforming to Regulation No. 16;

- 3.8.3.3. Any restraint system fitted to a wheelchair space shall be capable of being easily released in the case of an emergency;
- 3.8.3.4. Any wheelchair restraint system shall either:
  - 3.8.3.4.1. meet the dynamic test requirements described in paragraph 3.8.3.8. and be securely attached to vehicle anchorages meeting the static test requirements in paragraph 3.8.3.6.; or
  - 3.8.3.4.2. be securely attached to vehicle anchorages such that the combination of restraint and anchorages meets the requirements of paragraph 3.8.3.8.
- 3.8.3.5. Any wheelchair user restraint shall either:
  - 3.8.3.5.1. meet the dynamic test requirements described in paragraph 3.8.3.9. and be securely attached to vehicle anchorages meeting the static test requirements in paragraph 3.8.3.6.; or
  - 3.8.3.5.2. be securely attached to vehicle anchorages such that the combination of restraint and anchorages meets the dynamic test requirements described in paragraph 3.8.3.9. when attached to anchorages set up as described in paragraph 3.8.3.6.7.
- 3.8.3.6. A static test shall be carried out on the anchorage points for both the wheelchair restraint system and the wheelchair user restraint in accordance with the following requirements:
  - 3.8.3.6.1. the forces specified in paragraph 3.8.3.7. shall be applied by means of a device reproducing the geometry of the wheelchair restraint system;
  - 3.8.3.6.2. the forces specified in paragraph 3.8.3.7.3. shall be applied by means of a device reproducing the geometry of the wheelchair user restraint and by means of a traction device specified in Regulation No. 14.
  - 3.8.3.6.3. the forces in paragraph 3.8.3.6.1. and paragraph 3.8.3.6.2. shall be applied simultaneously in the forward direction and at an angle of  $10 \pm 5$  degrees above the horizontal plane;
  - 3.8.3.6.4. the forces in paragraph 3.8.3.6.1. shall be applied in the rearward direction and at an angle of  $10 \pm 5$  degrees above the horizontal plane;
  - 3.8.3.6.5. the forces shall be applied as rapidly as possible through the central vertical axis of the wheelchair space; and
  - 3.8.3.6.6. the force shall be maintained for a period of not less than 0.2 seconds.

- 3.8.3.6.7. the test shall be carried out on a representative section of the vehicle structure together with any fitting provided in the vehicle which is likely to contribute to the strength or rigidity of the structure.
- 3.8.3.7. The forces specified in paragraph 3.8.3.6. are:
  - 3.8.3.7.1. in the case of anchorages provided for a wheelchair restraint system fitted to a category M<sub>2</sub> vehicle:
    - 3.8.3.7.1.1.  $1,110 \pm 20$  daN applied in the longitudinal plane of the vehicle and towards the front of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space, and
    - 3.8.3.7.1.2.  $550 \pm 20$  daN applied in the longitudinal plane of the vehicle and towards the rear of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space;
  - 3.8.3.7.2. in the case of anchorages provided for a wheelchair restraint system fitted to a category M<sub>3</sub> vehicle
    - 3.8.3.7.2.1.  $740 \pm 20$  daN applied in the longitudinal plane of the vehicle and towards the front of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space, and
    - 3.8.3.7.2.2.  $370 \pm 20$  daN applied in the longitudinal plane of the vehicle and towards the rear of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space;
  - 3.8.3.7.3. in the case of anchorages provided for a wheelchair user restraint system the forces shall be in accordance with the requirements of Regulation No. 14. The forces shall be applied by means of a traction device as appropriate to the belt type as specified in Regulation No. 14.
- 3.8.3.8. A wheelchair restraint system shall be subject to a dynamic test carried out in accordance with the following requirements:
  - 3.8.3.8.1. a representative wheelchair test trolley of mass 85 kg shall, from a speed of between 48 km/h to 50 km/h to rest, be subject to a deceleration-time pulse:
    - 3.8.3.8.1.1. exceeding 20 g in the forward direction for a cumulative period of at least 0.015 seconds;
    - 3.8.3.8.1.2. exceeding 15 g in the forward direction for a cumulative period of at least 0.04 seconds;
    - 3.8.3.8.1.3. exceeding a duration of 0.075 seconds;
    - 3.8.3.8.1.4. not exceeding 28 g and for not more than 0.08 seconds;

- 3.8.3.8.1.5. not exceeding a duration of more than 0.12 seconds, and
- 3.8.3.8.2. a representative wheelchair test trolley of mass 85 kg shall, from a speed of between 48 km/h to 50 km/h to rest, be subject to a deceleration-time pulse:
  - 3.8.3.8.2.1. exceeding 5 g in the rearward direction for a cumulative period of at least 0.015 seconds;
  - 3.8.3.8.2.2. not exceeding 8 g in the rearward direction and for not more than 0.02 seconds;
- 3.8.3.8.3. the test in paragraph 3.8.3.8.2. shall not apply if the same restraints are used for the forward and rearward direction or if an equivalent test has been conducted;
- 3.8.3.8.4. for the above test, the wheelchair restraint system shall be attached to either:
  - 3.8.3.8.4.1. anchorages fixed to the test rig which represents the geometry of the anchorages in a vehicle for which the restraint system is intended, or
  - 3.8.3.8.4.2. anchorages forming part of a representative section of the vehicle for which the restraint system is intended, set up as described in paragraph 3.8.3.6.7.
- 3.8.3.9. A wheelchair user restraint shall comply with the test requirements specified in Regulation No. 16 or an equivalent test to the deceleration-time pulse in paragraph 3.8.3.8.1. A seat belt approved to Regulation No. 16 and so marked shall be deemed to comply.
- 3.8.3.10. A test in paragraph 3.8.3.6., 3.8.3.8. or 3.8.3.9. shall be deemed to have failed unless the following requirements are met:
  - 3.8.3.10.1. no part of the system shall have failed, or shall have become detached from its anchorage or from the vehicle during the test;
  - 3.8.3.10.2. mechanisms to release the wheelchair and user shall be capable of release after completion of the test;
  - 3.8.3.10.3. in the test in paragraph 3.8.3.8. the wheelchair shall not move more than 200 mm in the longitudinal plane of the vehicle during the test;
  - 3.8.3.10.4. no part of the system shall be deformed to such an extent after completion of the test that, because of sharp edges or other protrusions, the part is capable of causing injury.
- 3.8.3.11. Its operating instructions shall be clearly displayed adjacent to it.
- 3.8.4. Rearward facing wheelchair - static test requirements

- 3.8.4.1. Vehicles not required to have occupant restraint systems fitted may, as an alternative to the provisions of paragraph 3.8.2. or 3.8.3., be provided with a wheelchair space designed for the wheelchair user to travel unrestrained with the wheelchair facing rearwards against a support or backrest, in accordance with the following provisions:
- 3.8.4.1.1. one of the longitudinal sides of the space for a wheelchair shall rest against a side or wall of the vehicle or a partition;
- 3.8.4.1.2. a support or backrest perpendicular to the longitudinal axis of the vehicle shall be provided in the forward end of the wheelchair space;
- 3.8.4.1.3. the support or backrest shall be designed for the wheels or the back of the wheelchair to rest against the support or backrest in order to avoid the wheelchair from tipping over and shall comply with the provisions of paragraph 3.8.5.;
- 3.8.4.1.4. a handrail or handhold shall be fitted to the side or wall of the vehicle or a partition in such a way to allow the wheelchair user to grasp it easily. This handrail shall not extend over the vertical projection of the wheelchair space, except by not more than 90 mm and only at a height not less than 850 mm above the floor of the wheelchair space;
- 3.8.4.1.5. a retractable handrail or any equivalent rigid device shall be fitted on the opposite side of the wheelchair space in order to restrict any lateral shift of the wheelchair and to allow the wheelchair user to grasp it easily;
- 3.8.4.1.6. a sign shall be fixed adjacent to the wheelchair area with the following text:

"This space is reserved for a wheelchair. The wheelchair must be placed facing rearwards resting against the support or backrest with the brakes on".

The provisions of paragraph 7.6.11.4. of Annex 3 apply to any textual markings used.

3.8.5. Backrest and support requirements

- 3.8.5.1. A backrest fitted to a wheelchair space in accordance with paragraph 3.8.4. shall be fitted perpendicular to the longitudinal axis of the vehicle and shall be capable of bearing a load of  $250 \pm 20$  daN applied to the centre of the padded surface of the backrest, at a height of not less than 600 mm and of not more than 800 mm measured vertically from the floor of the wheelchair space, for a minimum of 1.5 seconds by means of a block 200 mm x 200 mm in the longitudinal plane of the vehicle towards the front of the vehicle. The backrest shall not deflect more than 100 mm or suffer permanent deformation or damage.

- 3.8.5.2. A support fitted to a wheelchair space in accordance with paragraph 3.8.4. shall be fitted perpendicular to the longitudinal axis of the vehicle and shall be capable of withstanding a force of  $250 \pm 20$  daN applied to the centre of the support, for a minimum of 1.5 seconds in the horizontal plane of the vehicle towards the front of the vehicle in the middle of the support. The support shall not deflect more than 100 mm or suffer permanent deformation or damage.
- 3.8.6. Example of a backrest meeting the requirements of paragraph 3.8.4.1.3.
  - 3.8.6.1. The bottom edge of a backrest shall be at a height of not less than 350 mm and of not more than 480 mm measured vertically from the floor of the wheelchair space.
  - 3.8.6.2. The top edge of a backrest shall be at a height of not less than 1,300 mm measured vertically from the floor of the wheelchair space.
  - 3.8.6.3. A backrest shall have a width of:
    - 3.8.6.3.1. not less than 270 mm and of not more than 420 mm up to a height of 830 mm measured vertically from the floor of the wheelchair space, and
    - 3.8.6.3.2. not less than 270 mm and of not more than 300 mm at heights exceeding 830 mm measured vertically from the floor of the wheelchair space.
  - 3.8.6.4. A backrest shall be fitted at an angle of not less than four degrees and of not more than eight degrees to the vertical with the bottom edge of the backrest positioned closer to the rear of the vehicle than the top edge.
  - 3.8.6.5. The padded surface of a backrest shall form a single and continuous plane.
  - 3.8.6.6. The padded surface of a backrest shall pass through any point on an imaginary vertical plane situated to the rear of the front end of the wheelchair space and situated not less than 100 mm and not more than 120 mm from the front end of the wheelchair space measured horizontally and not less than 830 mm and not more than 870 mm from the floor of the wheelchair space measured vertically.
- 3.9. Door controls
  - 3.9.1. If a door referred to in paragraph 3.6. is fitted with opening controls for use under normal circumstances, these controls shall:
    - 3.9.1.1. in the case of exterior controls, be on or adjacent to that door at a height between 850 mm and 1,300 mm from the ground and be not more than 900 mm from the door, and
    - 3.9.1.2. in the case of interior controls in vehicles of Class I, II and III, be on or adjacent to that door at a height of between 850 mm and 1,300 mm from the upper surface of the

floor nearest the control and be not more than 900 mm in any direction from the door aperture.

3.10. (Reserved)

3.11. Provisions for boarding devices

3.11.1. General requirements:

3.11.1.1. The controls actuating the boarding devices shall be clearly marked as such. The extended or lowered position of the boarding device shall be indicated by a tell-tale to the driver.

3.11.1.2. In the event of the failure of a safety device, lifts, ramps and kneeling systems shall be incapable of operation, unless they can be safely operated by manual effort. The type and location of the emergency operating mechanism shall be clearly marked. In the event of power failure, lifts and ramps must be capable of manual operation.

3.11.1.3. Access to one of the service or emergency doors on the vehicle may be obstructed by a boarding device providing the following two conditions are satisfied from both inside and outside the vehicle.

3.11.1.3.1. The boarding device does not obstruct the handle or other device for opening the door.

3.11.1.3.2. The boarding device can be readily moved to leave the doorway clear for use in an emergency.

3.11.2. Kneeling system

3.11.2.1. A switch shall be required to enable operation of the kneeling system.

3.11.2.2. Any control which initiates the lowering or raising of any part or the whole of the bodywork relative to the road surface must be clearly identified and be under the direct control of the driver.

3.11.2.3. The lowering process shall be capable of being stopped and immediately reversed by a control both within the reach of the driver, whilst seated in the cab, and also adjacent to any other operating controls provided for the operation of the kneeling system.

3.11.2.4. Any kneeling system that is fitted to a vehicle shall not allow the vehicle to be driven at a speed of more than 5 km/h when the vehicle is lower than the normal height of travel.

3.11.3. Lift

3.11.3.1. General provisions



- 3.11.3.1.1. Lifts shall only be capable of operation when the vehicle is at standstill. Any movement of the platform shall be prevented unless a device preventing the wheelchair from rolling off has been activated or has automatically come into operation.
- 3.11.3.1.2. The lift platform shall not be less than 800 mm wide, and not less than 1,200 mm long and shall be capable of operating when carrying a mass of at least 300 kg.
- 3.11.3.2. Additional technical requirements for power-operated lifts
- 3.11.3.2.1. The operating control shall be designed in such a way that, if released, it automatically returns to the off position. As it does so the movement of the lift shall immediately be stopped and it shall be possible to initiate a movement in either direction.
- 3.11.3.2.2. A safety device (e.g. reversing mechanism) shall protect areas not visible to the operator, where the movement of the lift might trap or crush objects.
- 3.11.3.2.3. In the event of one of these safety devices coming into operation, the movement of the lift shall immediately be stopped and movement in the opposite direction initiated.
- 3.11.3.3. Operation of power operated lifts
- 3.11.3.3.1. Where the lift is at a service door situated within the direct field of vision of the driver of the vehicle, the lift may be operated by the driver when in the driver's seat.
- 3.11.3.3.2. In all others cases, the controls shall be adjacent to the lift. They shall be capable of being activated and deactivated only by the driver from his seat.
- 3.11.3.4. Manually operated lift
- 3.11.3.4.1. The lift shall be designed for operation by controls adjacent to the lift.
- 3.11.3.4.2. The lift shall be so designed that excessive forces are not required to operate it.
- 3.11.4. Ramp
- 3.11.4.1. General provisions
- 3.11.4.1.1. The ramp shall only be capable of operation when the vehicle is at standstill.
- 3.11.4.1.2. Edges on the outside shall be rounded to a radius of no less than 2.5 mm. Corners on the outside shall be rounded to a radius of not less than 5 mm.
- 3.11.4.1.3. The useable surface of a ramp shall be at least 800 mm wide. The slope of the ramp, when extended or folded out on to a kerb of 150 mm in height, should not

exceed 12 per cent. The slope of the ramp, when extended or folded out to the ground, should not exceed 36 per cent. A kneeling system may be used to achieve this test.

3.11.4.1.4. Any ramp which when ready for use exceeds 1,200 mm in length shall be fitted with a device to prevent the wheelchair rolling off the sides.

3.11.4.1.5. Any ramp shall be capable of operating safely with a load of 300 kg.

3.11.4.1.6. The outer edge of ramp surfaces available for use by a wheelchair shall be clearly marked with a band of colour 45 mm to 55 mm in width which contrasts visually with the remainder of the ramp surface. The band of colour shall extend along the outermost edge and along both edges parallel to the direction of travel of the wheelchair.

Marking of any trip hazard or where part of the ramp surface also forms part of the step is permissible.

3.11.4.1.7. A portable ramp must be secure when in its position for use. A portable ramp must be provided with a suitable position where it can be safely stowed and where it is readily available for use.

3.11.4.2. Modes of operation

3.11.4.2.1. Deployment and stowage of the ramp may be either manual or power-operated.

3.11.4.3. Additional technical requirements for power-operated ramps

3.11.4.3.1. Deployment and stowage of the ramp shall be indicated by flashing yellow lights and an audible signal.

3.11.4.3.2. Deployment and stowage of the ramp that may create a risk of injury shall be protected by a safety device(s).

3.11.4.3.3. These safety devices shall stop the movement of the ramp when the ramp is subject to a mean reactive force not exceeding 150 N. The peak force may be higher than 150 N for a short time provided that it does not exceed 300 N. The reactive force may be measured by any method to the satisfaction of the competent authority. Guidelines for measuring the reactive forces are given in Annex 6 to this Regulation.

3.11.4.3.4. The horizontal movement of a ramp shall be interrupted when a mass of 15 kg is placed upon it.

3.11.4.4. Operation of power-operated ramps

3.11.4.4.1. Where the driver has adequate view of the ramp sufficient to monitor its deployment and use, to ensure the safety of passengers, the ramp may be operated by the driver when in the driver's seat. This requirement may be met by a suitable indirect vision device(s).

- 3.11.4.4.2. In all others cases, the controls shall be adjacent to the ramp. They shall be capable of being activated and deactivated only by the driver from his seat.
- 3.11.4.5. Operation of manually-operated ramp
- 3.11.4.5.1. The ramp shall be so designed that excessive forces are not required to operate the ramp."

Annex 11,

Paragraph 2.4.2., amend to read:

" .... on guided bus systems, if not retracted,  
- service-door lighting devices."

Paragraph 7.4.3.3.2.1., amend to read:

"7.4.3.3.2.1. with all possible seats occupied followed by the remaining area for standing passengers (up to the standing capacity limit declared by the manufacturer, if reached, excluding areas designated for use exclusively by wheelchair users) and, if space remains, any wheelchair spaces occupied;"

Paragraph 7.4.3.3.2.2., amend to read:

"7.4.3.3.2.2. with all possible standing areas occupied (up to the standing capacity limit declared by the manufacturer, excluding areas designated for use exclusively by wheelchair users), followed by the remaining seats available for seated passengers and, if space remains, any wheelchair spaces occupied;"

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