BUS NORDIC

COMMON NORDIC BUS PROCUREMENT REQUIREMENTS

2018

Version 1.0 – June 2018 - Approved by the Bus Nordic Steering Group for improved Public Transportation

THIS DOCUMENT IS DONE IN COLLABORATION BETWEEN PTA AND PTO NATIONAL ORGANISZATIONS IN THE NORDIC COUNTRIES AND THE NORDIC CAPITALS.

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1. INTRODUCTION

Bus Nordic is a collaboration between PTA and PTO national organizations in the Nordic countries and the Nordic capitals. The aim is to establish a common set of bus requirements; a bus Nordic recommended standard. The collaboration started in May 2017 and this first version of the common standard is ready to be implemented in 2018. Representatives from the participating capitals, PTA and PTO national organizations will continue to administer and develop the common standard in the Nordic Partner Cooperation Group.

This document specifies common sector recommendations for a Nordic bus standard to be used when tendering. A bus which meets these recommendations shall be accepted and function equally well among the PTAs throughout the Nordic countries. The recommendations only apply to new buses registered after the document has been implemented.

Bus Nordic requirements are based on the ECE Regulation R 107. It specifies the functional and technical demands of a Nordic bus, which apply over and above current legislation where adaptations to Nordic conditions and passenger needs in the Nordic countries are necessary. For items not described in Bus Nordic, the regulations in R 107 are applicable.

Emphasis has been put on ensuring that a Nordic bus standard will not hinder competition or innovation. The requirements are made in such a way that the market can meet the demands today. The Bus Nordic Management group will on an ongoing basis adjust the Bus Nordic standard to support changes such as new innovative solutions and new market regulations.

The purpose is to drive vehicle development forward and, in a cost-effective way, create even more attractive buses suiting the needs of the passengers. Common fleet procurement specifications should lower the cost for tendering as well as simplifying movement of buses between cities and across borders.

1 HOW TO USE THE DOCUMENT

Bus Nordic states requirements on buses and guidance for the actors in the value chain of bus transport. The purpose is to secure quality and efficiency in tendering of contracts and purchasing of buses.

The Bus Nordic collaboration team strongly recommends that purchasers do not make any exceptions but that they use this document in its entirety. Exceptions may risk extra costs and market inefficiencies. If exceptions are made the purchaser should make sure that they do not hinder the movement of buses between PTAs in the Nordic Countries.

The document is structured in the following parts:

- Check-box-list of requirements
- Bus class definitions and information tables
- Other definitions
- Bus requirements

The check-box-list of requirements is the document's first section. It is meant to be used as a help when purchasers state the requirements for a certain traffic tendering process. To emphasize the importance of Bus Nordic being used in its entirety by all participating organizations, all requirement boxes have been prechecked. For any options, the purchaser marks the corresponding boxes.

Bus Nordic has been built upon the ECE R 107 regulations. Therefore, the standard classification classes A, B, I, II and III are used as a base. Different requirements apply for the different classes. In the bus classification information section the base classes are explained with information about typical buses in each class. Bus Nordic does not apply for special buses such as BRT.

Use of a common set of requirements will help improve predictability for purchasers and suppliers through use of standardized functional and technical requirements. Standardization of materials and reduction in the selection criteria will reduce costs and streamline tendering processes nationally. It will also ensure greater utilization of second hand buses across the Nordic countries. The standard's form and content, with an emphasis on functional requirements, will help the industry develop innovative solutions that give passengers a better travel experience for a lower total cost.

2 LIST OF REQUIREMENTS AND OPTIONS

Bus Nordic strongly recommends that purchasers do not make any exceptions but that they use this document in its entirety.

Purchaser_____

Area/Contract_____

Chapter	Requirement/Option	Bus Nordic recommended requirements	Requirements used in this tender
5 – Security and safety	5.1 Seat belts	**X**	
	5.2 Audio-visual seat belt reminders	**X**	
	5.3 Camera surveillance - general	**X**	
	5.4 Camera surveillance – CCTV with recording (OPTION)		
	5.5 Safety surveillance – real time camera	**X**	
	5.6 Visual aid device	**X**	
	5.7 Additional viewing device	**X**	
	5.8 Viewing device – articulated buses	**X**	
	5.9 Reversing camera	**X**	
	5.10 Automatic sound signal when reversing	**X**	
	5.11 Alcolocks	**X**	
	5.12 Snow chains	**X**	
	5.13 Emergency equipment	**X**	
	5.14 Automatic fire extinguishing system	**X**	
	5.15 Automatic damping function (OPTION)		
6 – Seating and comfort	6.1 Minimum numbers of seats	**X**	
	6.2 Arm-rests	**X**	
	6.3 Visibility through window	**X**	
	6.4 Protection against the sun	**X**	
	6.5 Seat comfort	**X**	
	6.6 Seat positions	**X**	
	6.7 Seat heights	**X**	
	6.8 Seat dimensions	**X**	
	6.9 Reserved seats and space for passengers with impaired mobility	**X**	
	6.10 Seat for passenger with guide dog	**X**	

Chapter	Requirement/Option	Bus Nordic recommended requirements	Requirements used in this tender
	6.11 Reserv area for blind persons (OPTION)		
	6.12 High seat backs	**X**	
	6.13 Reclining high seats back (OPTION)		
	6.14 Child seats (OPTION)		
	6.15 Lighting	**X**	
	6.16 Ventilation and climate control	**X**	
	6.17 Air quality and comfort	**X**	
	6.18 Electrical sockets	**X**	
	6.19 Toilet (OPTION)		
7 –Embarking and disembarking and moving around inside the bus	7.1 Passenger-driver interaction when embarking	**X**	
	7.2 Door openings	**X**	
	7.3 Contrast marking on entrance and exit steps	**X**	
	7.4 Handrails and handles	**X**	
	7.5 Design of wheelchair area	**X**	
	7.6 Flex area	**X**	
	7.7 Anti-tip device	**X**	
	7.8 Door lighting	**X**	
	7.9 Luggage storage (OPTION)		
8 – Information and Communication	8.1 Programmable signs	**X**	
	8.2 Legible signs	**X**	
	8.3 Exterior route and destination signs - placement	**X**	
	8.4 Route sign on buses of Class II and III (OPTION)		
	8.5 Route sign in articulated bus (OPTION)		
	8.6 Route sign on the rear of the bus (OPTION)		
	8.7 Route sign left-hand side of the bus (OPTION)		
	8.8 Exterior loudspeakers	**X**	
	8.9 Exterior loudspeakers (OPTION)		
	8.10 Passenger information, ticketing and counting system	**X**	

Chapter	Requirement/Option	Bus Nordic recommended requirements	Requirements used in this tender
	8.11 Audiovisual	**X**	
	8.12 Interior loudspeaker	**X**	
	8.13 Muted when using audio equipment	**X**	
	8.14 Muted when opening the front door	**X**	
	8.15 Stop buttons	**X**	
	8.16 Signal buttons to attract driver's attention	**X**	
	8.17 Signal button outside vehicle	**X**	
	8.18 Wireless Internet access WiFi (OPTION)		
9 – Exterior/Outside	9.1 Bicycle holder	**X**	
	9.2 Bicycle holder (OPTION)		
	9.3 Flag holder (OPTION)		
	9.4 Nato Connector	**X**	
10 – Driver´s environment	10.1 Ergonomics	**X**	
	10.2 Climate	**X**	
	10.3 Hands-free mobile telephone	**X**	
	10.4 Warning systems for serious faults	**X**	
	10.5 Seat belts	**X**	
	10.6 Door interlock	**X**	
	10.7 Parking brake warning	**X**	
	10.8 Drivers security	**X**	
	10.9 Drivers Safety Screen	**X**	
	10.10 Lockable cabinet (OPTION)		

3 BUS CLASS INFORMATION AND DEFINITIONS

This chapter shall be seen as information only. The following vehicle classes definitions are A, B and I, II, III are from Regulations R 107.

For a bus having a capacity not exceeding 22 passengers in the addition to the driver; there are two classes of vehicles:

- CLASS A

  Vehicles designed to carry standing passengers; a vehicle of this class has seats and shall have provisions for standing passengers. For this bus class, only the driver´s seat should be equipped with seat belts.

- CLASS B

  Vehicles are not designed to carry standing passengers; a vehicle of this class has no provisions for standing passengers. For this bus class all seats should be equipped with seat belts.

For a bus having a capacity exceeding 22 passengers in the addition to the driver, there are three classes of vehicles:

- CLASS I

  Vehicles constructed with areas for standing passengers, to allow frequent passenger movements. For this bus class, only the driver´s seat should be equipped with seat belts.

- CLASS II

  Vehicles constructed principally for the carriage of seated passengers and designed to allow the carriage of standing passengers in the gangway and/or in an area which does not exceed the space provided for two double seats. For this bus class all seats should be equipped with seat belts.

- CLASS III

  Vehicles constructed exclusively for the carriage of seated passengers. For this bus class all seats should be equipped with seat belts.

LOW-FLOOR BUS

Is a vehicle of Class A, B, I or II or in which at least 35 % of the area available for standing passengers (or in its forward section in the case of articulated vehicles, or its lower deck in the case of double-decker vehicles) forms an area without steps and includes access to at least one service door.

LOW-ENTRY BUS (layout variation of low-floor)

A bus with one area that is without steps and has access to at least one service door used for entrance and one service door used for exit (can be one and the same door), and another area with a higher floor level which is reached with steps in the gangway. The low entry bus fulfills the formal R107 definition of a “low floor bus” as the formal definition includes both buses commonly described as low entry buses and also low floor buses where passage between all doors are possible without encountering steps in the gangway.

GANGWAY

Means the space providing access by passengers from any seat or row of seats or each special area for wheelchair users to any other seat or row of seats or each special area for wheelchair users or to any access passage from or to any service door or intercommunication staircase and any area for standing passengers.

EXAMPLES OF BUS TYPES

The tables below show an overview of alternative bus types which cover more than 90 % of the tendered public transportation:

Class A & I – typically urban or suburban traffic

These vehicles are used mainly in urban or suburban traffic. Their low-floors allow for faster passenger flows and boarding. The vehicles are designed for standing passengers as well as seating passengers and are therefore not equipped with seat belts.

Class	Length [m]	Illustration of bus	Passenger capacity [approx number]	Floor type	Typical number of door openings
A	≤ 9,5		≤22 pax (approx.10 seats)	Low Floor/Low Entry	1-2
I	≤ 9,5		30-50 pax (approx. 20-30 seats)	Low Floor/Low Entry	1-2
I	≤ 13,5		50-80 pax (approx. 25-40 seats)	Low Floor/Low Entry	2-3
I	≤ 15		Around 100 pax (>40 seats)	Low Floor/Low Entry	2-3
I	≤ 18,75		Around 120 pax (>40 seats)	Low Floor/Low Entry	3-4
I	≤ 15		Around 120 pax (>60 seats)	Low Floor lower level	2-3

High capacity

Vehicles with low-floor throughout the whole passenger cabin and no steps between the ground and the floor of the bus for entrances and exits of the bus. These bus types are designed to enable a very good flow of passengers inside the bus.

These vehicles are used in urban or suburban traffic. Their low-floors and many doors allows for fast boarding. The seats on these vehicles are not equipped with seat belts.

Class	Length [m]	Illustration of bus	Passenger capacity [number]	Floor type	Typical door openings
I	≤ 18,75		<160 pax (30-40 seats)	Low Floor	4
I	> 18,75[1]		>160 pax (approx.40 seats)	Low Floor	4-5

[1] This type needs special permission

Class II – typically suburban and long-distance traffic

These vehicles are preferably used in long-distance bus traffic with mostly seated passengers and only a small number of standing passengers. The seats in these vehicles are equipped with safety belts.

Alternatively, the bus can be fitted with a normal floor but then with lift for wheelchair.

Class	Length [m]	Illustration of bus	Passenger capacity [number]	Floor type	Typical number of door openings
II	≤ 9,5		30-50 pax (approx. 20-30 seats)	Low Entry/Normal floor	1-2
II	≤ 13,5		Around 50-70 pax (approx. 35-45 seats)	Low Entry/Normal floor	2-3
II	≤ 15		Around 70-80 pax (approx. 45-55 seats)	Low Entry/Normal floor	2-3
II	≤ 18,75		Around 110 pax (approx. 60 seats)	Low Entry/Normal floor	2-3
II	≤ 15		Around 90 pax (approx. 80-90 seats)	Low Entry lower level	2

Class B & III – typically long-distance traffic

Vehicles that are fitted with normal floor but can have a lift for wheelchair.

These vehicles are mainly used in long-distance bus traffic where only seated passengers are accepted. The seats in these vehicles are equipped with safety belts and the vehicles are of a tourist coach type.

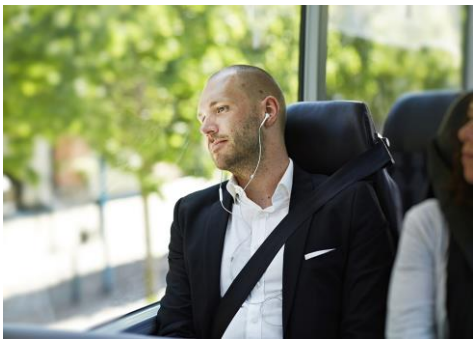
Class	Length [m]	Illustration of bus	Passenger capacity [number]	Floor type	Typical door openings
B	≤ 9,5		≤ 22 seating pax	Normal floor	1-2
III	≤ 13		35-50 seating pax	Normal Floor	1-2
III	≤ 15		50-65 seating pax	Normal Floor	1-2
III	≤ 15		70-85 seating pax	Low Floor lower level	1-2

4 GENERAL PARAGRAPHS

A) All buses must apply with national and EU regulations.

B) The transport operator shall ensure that those functions and requirements that are described in the document shall be fulfilled and have full function throughout the entire period of the agreement.

5 SECURITY AND SAFETY



Passengers shall experience the bus journey as safe, secure, comfortable and easy. Basic safety requirements are regulated in current local legislation through directives and regulations. The journey being safe and secure is important for all passenger groups.

5.1 SEAT BELTS

Buses of Class B, II and III shall be provided with belts so that sitting passengers can travel safely. Both two- and three-point belts are approved.

5.2 AUDIO-VISUAL SEAT BELT REMINDERS

Buses of Class B, II and III shall be fitted with audio-visual seat belt reminders. The seat belt reminders shall emit recurrent signals, and cannot be compared with those installed in cars, which sense when someone is sitting in a seat and is not wearing a seat belt. They should instead be regarded rather as a general information function in the bus.

Audio-visual seat belt reminder shall not be a sound that will be perceived as a beep. Instead, it shall be informative so that the connection to the belt is understood.

5.3 CAMERA SURVEILLANCE - GENERAL

All buses shall be prepared for easy installation of camera surveillance system (CCTV Closed Circuit Television) covering the entire vehicle, both the passenger area including the front door and the driver compartment. This could, for example, entail pre-prepared wiring throughout the vehicle.

5.4 [OPTION] CAMERA SURVEILLANCE - CCTV WITH RECORDING

The Buses shall be fitted with mounted cameras for the security surveillance system covering the entire vehicle, which means that it is possible to video record events taking place in both the passenger and driver area.

The camera surveillance systems and recordings must take account of local regulations and permissions.

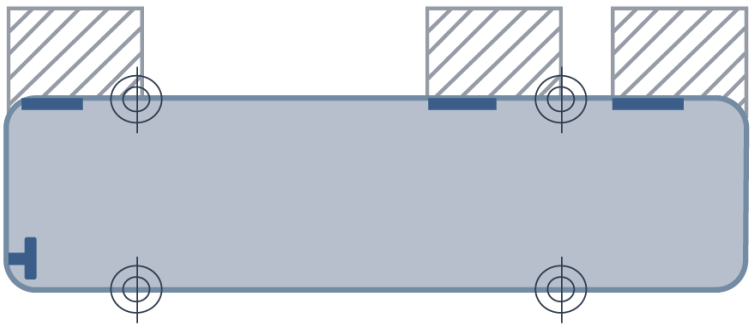
The quality of the video data shall have a resolution that secures identification of persons and incidents.

All data shall be stored digitally for at least 120-real hours. Usage of the storing system is subject to local permissions.

5.5 SAFETY SURVEILLANCE - REAL TIME CAMERA

It shall be possible to monitor the interior of the bus from the driver's seat. All door openings from door opening three (counted from the front of the bus) shall be displayed on screens for the driver in real time when doors are open. Split screens are accepted.

5.6 VISUAL AID DEVICE



The striped areas outside the doors of the bus should be able to be monitored.

There shall be a visual aid device, for example a mirror or a real time camera, that allows the driver, from the driver's seat, to monitor the exterior area immediately alongside all exit doors, irrespective of whether the doors are open or closed. The monitoring shall at least be activated when the bus is standing at a bus-stop and when it departs from the bus-stop. (One and the same visual aid device can monitor one or more doors).

The visual aid device must allow the driver to have a good view of passengers and road users outside the bus.

5.7 ADDITIONAL VIEWING DEVICE

All buses must have a viewing device to provide the driver with a good view of cyclists or other road users on the right side of the bus. This could be e.g. an additional mirror.

5.8 VIEWING DEVICE – ARTICULATED BUSES

In the case of articulated buses, viewing devices shall provide the driver with a good overview even when the bus is parked in such a way that the door sides on the front and rear sections of the bus, form an angle other than 0 degrees.

5.9 REVERSING CAMERA

All buses shall be equipped with a reversing camera that is automatically activated and gives real time surveillance for the driver of the area behind the bus when reversing.

5.10 AUTOMATIC SOUND SIGNAL WHEN REVERSING

All buses shall be equipped with an automatic sound signal when reversing. It shall be possible for the driver to override this function.

5.11 ALCOLOCKS

All buses must be equipped with an EU approved alcolock system.

5.12 SNOW CHAINS

All buses must be designed so that snow chains can be used and stored in the bus.

5.13 EMERGENCY EQUIPMENT

The emergency equipment in the bus shall be easy to access, well-marked, and comprises at least of fire extinguishers and first-aid boxes.

5.14 AUTOMATIC FIRE EXTINGUISHING SYSTEM

Buses with combustion engines shall be equipped with an automatic fire extinguishing system in the engine compartment and other relevant places where unintended fires can start. The system must meet the requirements of Swedish Fire Protection Standards: SBF-128:3 or the Finish SFS 5997, and the ECE R 107-6 regulations, which impose automatic fire extinguishing systems on all buses from 2021. This requirement also applies to supplementary heater units mounted outside the engine compartment.

The SBF-128:3 and the ECE R 107-6 regulations do not correspond to each other but are not contradictory, which means that extinguishing systems on buses need to be designed according to both SBF 128: 3 and ECE R 107-6.

Requirements for electric buses will be added in the future when standardized.

https://www.brandskyddsforeningen.se/webbshop/litteratur-och-produkter/e-norm-sbf-128-engelska/

5.15 [OPTION] AUTOMATIC DAMPING FUNCTION

Main lights shall have automatic damping function that changes to parking lights when opening doors.

6 SEATING AND COMFORT

6.1 MINIMUM NUMBER OF SEATS

For buses of class I low floor to be used in Finland, there must be the following minimum numbers of seats.

Class	Length [m]	Illustration of bus	Minimum number of seats	Floor type
I	approx. 12		31	Low entry
I	≤ 13,5		39	Low Entry
I	≤ 15		47	Low Entry

6.2 ARM-RESTS

Buses of Class B, II and III shall be fitted with retractable arm rests on seats between the seating position and the gangway. The armrest shall be designed it is not perceived as making it more difficult to use the seat belt.

6.3 VISIBILITY THROUGH WINDOWS

There shall be good visibility through windows for all passengers.

6.4 PROTECTION AGAINST THE SUN

For all buses, windows in passenger areas shall be fitted with sun protection. The protection can be for example, in form of curtains, blinds or tinted window panes. Tinting of the windows shall be the same for all passenger windows. If tinting is used, the light transmission through the windows must be between 50% to 70%.

6.5 SEAT COMFORT

Seats in Bus Class A and I should be comfortable and padded for journeys up to 20 minutes.

Seats in Bus Class B and II should be comfortable and padded for journeys up to 60 minutes.

Seats in Class III buses should be comfortable for journeys over several hours.

6.6 SEAT POSITIONS

Maximum 50 % of the seats in buses with low entrance layout may be positioned on pedestals that exceed the height of the central aisle by more than 250 mm.

No more than 70 % of the seats in other buses may be positioned on pedestals that exceed the height of the central aisle by more than 250 mm.

Seats should as far as possible be forward-facing.

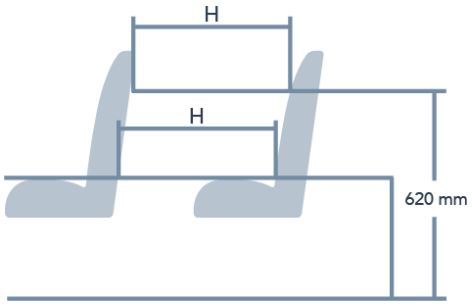
6.7 SEAT HEIGHTS

The height of seats above floor level shall be between 450 and 500 mm. Exceptions are possible according to R107, Annex III, 7.7.8.3.

Reserved seats are not to be excluded, they shall always be at least 450mm.

6.8 SEAT DIMENSIONS

Bus class	Minimum space between seats (H)
Class A, B	680 mm
Low floor class I **special demand for Finland*	680 mm *
Class II	710 mm
Class III	750 mm



The space between seats (H) facing in the same direction is measured horizontally from the forward section of the seat back to the rear section of the seat back in front at all heights above the floor between the upper surface of the seat cushion and a point 620 mm above the floor. The H-size also applies in the case of the clearance to a vertical surface that is higher than 350 mm.

An exception from the requirement of minimum space between seats is allowed for 15 % of the total number of seats. If this exception is used, those seats not fulfilling the requirement should meet the R107 requirements.

* For buses of class I low floor to be used in Finland, the minimum space between seats (H) is 710 mm.

6.9 RESERVED SEATS AND SPACE FOR PASSENGERS WITH IMPAIRED MOBILITY

For buses of class I or II with low floor, the number of reserved seats shall be minimum four (4). For buses of class A or B or class II or III with normal floor, the number of reserved seats shall be minimum two (2).
In vehicles with low floor levels, the reserved seats shall be positioned in the low floor level area and not on a pedestal.

6.10 SEAT FOR PASSENGER WITH GUIDE DOG

Buses in class I shall be designed so that two passenger seats can be installed immediately behind the driver. The seat next to the window must be a tip up seat if the leg room (from the front of the seat to the wall) is less than 450 mm. R107 requirement must always be fulfilled.

6.11 [OPTION] RESERV AREA FOR BLIND PERSONS

This area shall be reserved (and marked) for blind persons and their guide dog.

6.12 HIGH SEAT BACKS

In bus of classes B, II and III, the seats shall be fitted with high seat back supports, i.e. where the neck support is an integrated part of the back support. The height from which the seat back raises from the seat shall be minimum 700 mm.

6.13 [OPTION] RECLINING HIGH SEAT BACKS

Reclining high seat backs are an option in all buses of class B, II and III. This will affect the number of seats possible.

6.14 [OPTION] CHILD SEATS

Buses of class II and III shall have at least two child seats for children under 3 years of age. These seats must meet the requirements of ECE R44.03 or later version.

6.15 LIGHTING

Buses of class B, II and III shall be fitted with individual reading lamps for all passenger seats. This applies only to those parts of the bus with a normal floor level.

6.16 VENTILATION AND CLIMATE CONTROL

All buses shall be fitted with automatic climate control that provides a stable and comfortable indoor temperature in relation to the outdoor temperature and a good air quality. When outdoor temperature exceeds 25 degrees C, the temperature in the passenger area shall be decreased with at least 0-3 degrees. In cold temperatures the temperature in the passenger area shall not be lower than 13 degrees C, measured 30 minutes after start of operation.

6.17 AIR QUALITY AND COMFORT

Draughts among the passengers and the driver should be avoided. To achieve the required level of comfort, fresh air should be introduced into the vehicle at an appropriate rate. Fogging of the side windows (condensation on cold windows) must be prevented as far as possible by means of suitable technical measures. Buses shall be equipped with pollen and particle purifying filter.

Class III buses shall have air ducts in ceilings above each seat.

6.18 ELECTRICAL SOCKETS

For buses of all classes, at least 85 % of the seats shall have access to an electrical power socket for charging of mobile phones, etc. At least one power socket shall be placed in the wheel chair area. USB-type sockets or similar are accepted.

6.19 [OPTION] TOILET

Buses of class II and III shall be equipped with a toilet and the possibility to install a wash-basin.

7 EMBARKING AND DISEMBARKING, AND MOVING AROUND INSIDE THE BUS

7.1 PASSENGER-DRIVER INTERACTION WHEN EMBARKING

Interaction between the driver and the passenger, e.g. ticket inspection, shall be possible in a simple way when embarking the bus. This requirement does not apply for BRT buses.

7.2 DOOR OPENINGS

All buses longer than 9,5 meters shall have at least two door openings.

For buses of class I low entry to be used in Finland, there must be the following number of service door openings.

Class	Length [m]	Illustration of bus	Passenger capacity [approx number]	Floor type	Number of service door openings
I	>13		50-80 pax (approx. 30-40 seats)	Low Entry	3
I	≤ 15		Around 100 pax (>40 seats)	Low Entry	3

7.3 CONTRAST MARKING ON ENTRANCE AND EXIT STEPS

For improved safety the floor at doors, the door mechanism, all steps and pedestals inside the bus must be marked with a contrast marking. The contrast in relation to surrounding surfaces must be at least at 0.4 NCS, based on the Natural Colour System standard.

7.4 HANDRAILS AND HANDLES

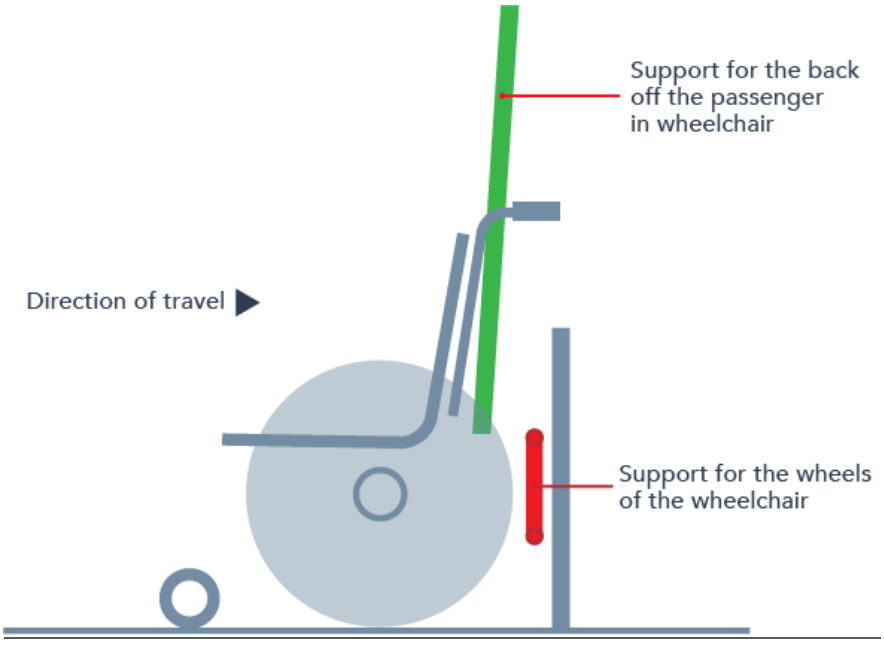
R107 is a minimum requirement. Handrails and handles should be contrast colored with at least 0.4 NCS in relation to the remainder of the bus interior for easy visibility.

Requirements are specified in R107 point 7.11.2, 7.11.3 and Annex 4, figure 20.

7.5 DESIGN OF WHEELCHAIR AREA

Buses of all classes (not only class I) that have a wheelchair area shall fulfil the requirements of Enclosure 8 in ECE Regulation 107.

DESIGN OF WHEELCHAIR IN BACKWARD DIRECTION FOR LOW ENTRY AND LOW FLOOR BUSES IN CLASS A & I & II



. For further information see ECE-Regulation 107, Enclosure 8, Clauses 3.8.4-3.8.6.

WHEELCHAIR RAMP AND PRAM ENTRY/EXIT

7.6 FLEX AREA

There shall be room available inside the bus for unfolded prams, push-chairs, and standing passengers (can be part of the wheel chair area) preferably on the left side. The area may be divided in several parts. If so, each area must be at least 1 300 mm.

Bus type	Length of the flex area
Class A	1300 mm
Class I	1800 - 2500 mm
Class I articulated	1800 - 2500 mm + 1300 mm
Class II	1300 - 1800 mm, adjustable by e.g. collapsible seat rows or removable seats

7.7 ANTI-TIP DEVICE

Anti-tip devices (or pram straps) shall be fitted for prams/push-chairs. There should be at least three pram straps.

7.8 DOOR LIGHTING

All buses must be fitted with door lighting according to R107 point 7.6.12.

7.9 [OPTION] LUGGAGE STORAGE

For buses of class II and III the luggage space outside of the passenger area can be ordered according to local demands.

8 INFORMATION AND COMMUNICATION

EXTERIOR INFORMATION

8.1 PROGRAMMABLE SIGNS

All signs for route and destination shall be programmable. Changing route number and other information should be done automatically or from the driver's seat to guarantee flexibility in connection with route changes.

8.2 LEGIBLE SIGNS

All signs for route and destination shall be clearly legible. The contrast between characters and background shall be at least 0.4 NCS.

8.3 EXTERIOR ROUTE AND DESTINATION SIGNS - PLACEMENT

There shall be route and destination signs on the front of all buses.

On buses of class I, there shall be route number and destination signs near the front door on the right-hand side of the bus.

8.4 [OPTION] ROUTE SIGN ON BUSES OF CLASS II AND III

On buses of class II and III, there shall be route number and destination signs near the front door on the right-hand side of the bus.

8.5 [OPTION] ROUTE SIGN ON ARTICULATED BUS

Articulated buses shall have a sign behind the articulation.

8.6 [OPTION] ROUTE SIGN ON THE REAR OF THE BUS

On buses of class I, II and III, there shall be a route sign on the rear of the bus.

8.7 [OPTION] ROUTE SIGN ON THE LEFT-HAND SIDE OF THE BUS

On buses of class I and low floor Class II, there shall be route and destinations signs on the left-hand side of the bus according to local requirements.

8.8 EXTERIOR LOUDSPEAKERS

All buses shall be prepared to have exterior loudspeakers, where the sound will be directed downwards, at the front door and for articulated buses also at the rear door for announcements of the route number, destination or other messages.

8.9 [OPTION] EXTERIOR LOUDSPEAKERS

All buses shall have exterior loudspeakers at the front door and the rear door on articulated bus, to permit announcements to be made of the route number, destination and other messages. The sound from the loudspeakers shall be directed downwards.

ON-BOARD INFORMATION

8.10 PASSENGER INFORMATION, TICKETING AND COUNTING SYSTEM

Buses shall be equipped with passenger information system(s). Systems may differ from PTA to PTA and may change due to technical development.

To facilitate the change of systems during lifetime of a bus following preparations of buses shall be made:

A) All buses must be equipped with cable tubes allowing easy installation and replacement of cables necessary for connection of different information, ticketing and passenger counting systems, including internal and external loudspeakers

   This includes criteria for implementation of future communication platform ITxPT (according to S01-Installation Requirements specifications and G01-Vehicle installation Guidelines).

8.11 AUDIOVISUAL

The system shall provide good audibility and readability for all passengers, irrespective of where they are sitting or standing in the vehicle.

8.12 INTERIOR LOUDSPEAKER

All buses must be equipped with a hands-free microphone connected to a loudspeaker system so that the driver can announce information to the passengers.

The loudspeaker system in the passenger compartment must be separate from the loudspeaker system in the driver compartment.

8.13 MUTED WHEN USING AUDIO EQUIPMENT

When using microphone and/or audiovisual equipment, the loudspeaker system in the driver's compartment must be muted automatically.

8.14 MUTED WHEN OPENING THE FRONT DOOR

The audio equipment in the driver's compartment should be automatically muted when the front door is open.

8.15 STOP BUTTONS

Stop buttons shall be red with white text in relief.

When a stop button is pressed, both audio and visual signals shall be generated.

Stop buttons shall be evenly distributed throughout the entire vehicle, shall be easily accessible by each seated passenger and be easy to press.

Stop buttons at reserved seat, in each wheelchair area and the flex area, shall be mounted on the wall under the window and shall in these places be located at a height of 700 – 1000 mm above floor level.

8.16 SIGNAL BUTTONS TO ATTRACT DRIVERS' ATTENTION

Signal buttons to attract the driver's attention, for example to extend the period in which the doors remain open when passengers are disembarking from the bus, shall be blue in color with the intended function illustrated in relief like following example:

When a signal button is pressed, both audio and visual signals shall be generated.

Signal buttons shall be placed close to each reserved seat and in each wheelchair area, and shall in these places be located at a height of 700 – 1000 mm above floor level

8.17 SIGNAL BUTTON OUTSIDE OF VEHICLE

All buses must have signal buttons that are located outside the vehicle to attract the driver's attention. These shall be clearly visible with a pram/push-chair symbol on the actual button, as shown in Figure x. When the button is pressed, acknowledgement shall be received by the activation of diodes positioned around the button and audiovisual signal to the driver.

Example of opening button for special needs

8.18 [OPTION] WIRELESS INTERNET ACCESS (WIFI)

All buses shall be fitted with wireless internet access (wifi) for the passengers, the capacity of which shall be at least sufficient to gain access to mobile data traffic.

9 EXTERIOR/OUTSIDE

9.1 BICYCLE HOLDER

Buses of Class I and II with no luggage space accessible from the outside to transport bicycles, should be prepared to have an external bicycle holder for two standard bicycles.

9.2 [OPTION] BICYCLE HOLDER

Buses shall be fitted with bicycle holders for two bikes in Class I and II.

9.3 [OPTION] FLAG HOLDER

Each front corner of the bus shall be fitted with a flag holder. Applies to buses in all classes except class III and double-deckers.

9.4 NATO CONNECTOR

Buses of class I, II and III must be equipped with nato connector.

10 DRIVER´S ENVIRONMENT

In general, the driver's environment shall be designed to comply with ISO Standard, SS-ISO 16121-3,4, ECE Regulation 107, Clause 7.6.4.6. However, the ISO-standard gives no consideration to certain aspects of the driver's environment in low-floor buses.

10.1 ERGONOMICS

The driver's compartment shall be designed so that the driver can perform his job in a safe and secure manner.

The driver's compartment should be designed as large as technically possible. The driver's compartment shall be so dimensioned that the driver's seat and steering wheel can be adjusted. Switches, pressure shields and other technical devices should be placed appropriately, according to ISO standards.

Other requirements for ergonomics at the driver's seat must also comply with ISO standards 4040, ISO 16121-1 and ISO 16121-3.

10.2 CLIMATE

In situations where the capacity for heating or cooling is insufficient, the driver's compartment shall be prioritized in relation to the passenger area.

The driver's compartment must have its own climate zone, which must be operable independently of the passenger compartment. The driver should be able to regulate his own climate zone, with steady and stable temperature independent of outdoor temperature.

Wintertime: The temperature in the driver's compartment may not fall below +15 degrees C during continuous driving (after 30 minutes' driving) at a measuring point in the driver's compartment as specified in ISO 6549.

Summertime: At an outdoor temperature that exceeds +25 degrees C, it shall be possible for the temperature in the driver's compartment to be lowered by at least 3 K in relation to the outdoor temperature

The defroster must be dimensioned so that the defroster keeps the windscreen and side windows free from dew and ice, according to ISO 16121-4.

There should be adjustable sun shielding for front and side windows.

10.3 HANDS-FREE MOBILE TELEPHONE

If mobile telephone has been fitted in the driver's compartment, it must be of the hands-free type.

10.4 WARNING SYSTEMS FOR SERIOUS FAULTS

Warning systems that indicate serious faults shall only be possible to reset manually.

Serious faults in this context refers to faults that are normally indicated with a red warning light that could adversely affect the bus stability and braking, communication and control systems in such a way that there is a risk of personal injury.

10.5 SEAT BELTS

Buses of all classes shall be fitted with a three-point seat-belt on the driver's seat. It shall be possible for the upper fixing point for the belt to be vertically adjusted.

10.6 DOOR INTERLOCK

There must be a door interlock which ensures that the bus cannot move away until the doors are properly closed, and the doors cannot be opened until the bus has stopped.

10.7 PARKING BRAKE WARNING

The parking brake warning system consists of three independent warning systems that warn the driver if he/she exits the bus without having applied the parking brake:

1. A buzzer signal if the engine is switched off and the parking brake has not been applied.
2. An additional buzzer if the driver is leaving the driver's booth and the parking brake has not been applied.
3. An attempt to de-activated the door brake from the outside of the bus (e.g. by turning off main switch or closing the door(s)) without the parking brake being engaged, the warning system shall ensure that
    a. the door brake remains activated and the door(s) remain open
    b. the horn shall be sounded
    c. the 4-way hazard indicators will flash

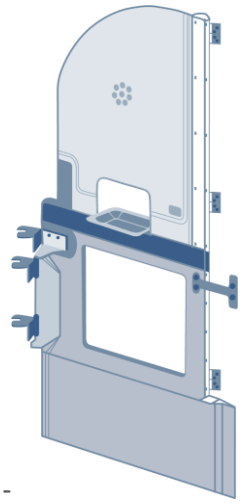
The buzzer signals shall be perceived as separate sounds and should not depend on the order on which the moments are performed.

10.8 DRIVERS SECURITY

All buses must be fitted with an assault alarm in the driver's compartment connected to an alarm center. The device(s) shall, as far as possible, be fitted so that they are easily accessible for the driver but are concealed or not visible to a person who is standing immediately outside the driver's compartment. It is important that the driver shall not be able to activate the alarm unintentionally.

10.9 DRIVERS SAFETY SCREEN

In class I buses, it should be possible to install, or remove, a drivers' safety screen.



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10.10 [OPTION] LOCKABLE CABINET

All buses must be fitted with a lockable storage cabinet available to the driver.