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PUBLIC REVIEW DRAFT

This Draft Kenya Standard have been prepared by the Road Vehicles Technical Committee in accordance with the procedures of the Bureau, and they are now being circulated for public comments.

The Committee would appreciate any comments on these Draft Standard, which should be submitted before **30th October 2018** using the attached template. It will also be appreciated if those who have no specific comments to make but find the draft standard generally acceptable can notify us accordingly. **Absence of any reply or comments shall be deemed to be an acceptance of the technical contents of the draft Kenya standard and shall constitute an approval vote.**

Suggestions entailing amendments of the text should include wording preferred and the relevant clause number quoted against any comments made.

This draft standard is subject to change and should not be referred to or used as Kenya Standard.

All correspondence pertaining to this draft standard should be addressed to the Managing Director, Kenya Bureau of Standards for the attention of **Mr. Zacharia Lukorito Chepkania**.

Yours faithfully,

For: DIRECTOR

STANDARDS DEVELOPMENT AND TRADE

ZLC/

**Road vehicles — Passenger vehicle body
construction — Specification**

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Kenya Accreditation Service (KENAS)
Kenya Association of Bus Manufacturers (KABM)
Kenya Association of Motor Repairers (KEMRA)
Kenya Auto Bazaar Association (K.A.B.A)
Kenya Industrial Research and Development Institute (KIRDI)
Matatu Owners Association of Kenya
Ministry of Infrastructure, Transport, Housing and Urban Development – Transport and Mechanical Directorate
Mobius (K) Limited
Motor Assessors Association of Kenya
Nairobi Area Metropolitan Transport Authority (NaMATA)
National Transport and Safety Authority (NTSA)
Technical University of Kenya
Toyota Kenya Limited
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REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

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Road vehicles — Passenger vehicle body construction — Specification

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Foreword

This Kenya Standard was prepared by the Road Vehicle Technical Committee under the guidance of the Standards Projects Committee and it is in accordance with the procedures of the Kenya Bureau of Standards.

This standard was formulated to be of guidance to the rapid growing passenger vehicle transport system, for safety and comfort of passengers and general road safety requirements. This standard will help harmonize the various sizes of passenger vehicles.

This sixth edition cancels and replaces the fifth edition (2014 version) which has been technically revised. During the revision, requirements for classes IV, V and VI vehicles as defined in clause 4 for both urban and interurban were included. The aim of incorporating those requirements was to ensure mass, faster and safe transit of passengers through introduction of the Bus Rapid Transit Systems (BRTs).

During the development of this standard, reference was made to the following documents:

E/ECE/324: 2002, United Nations Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts, which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions.

AIS-052 (Revision -1), Automotive Research Association of India Automotive Industry Standard, Code of practice for bus body design and approval.

The Public Service Vehicles Accessibility Regulations 2000- UK

Acknowledgement is made for the assistance derived from these sources.

Road vehicles — Passenger vehicle body construction — Specification

1 Scope and field of application

- 1.1** This Kenya Standard specifies requirements for passenger vehicles body construction.
- 1.2** This standard applies to vehicles with bodies designed and constructed for carriage of persons.
- 1.3** This standard does not apply to saloon cars, station wagons and other public transport vehicles other than those defined in 4.1.

2 Normative references

The following referenced documents are indispensable for the application of this Kenya Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

KS ISO 898, *Mechanical properties of fasteners*

KS ISO 7165, *Fire fighting — Portable fire extinguishers— Performance and construction*

KS 376, *Specification for flexible polyurethane (polyester) foams*

KS 649, *Specification for automobile windscreens*

KS 664, *Specification for seat belt assemblies for motor vehicles*

KS 822, *Specification for anchorages for seat belts for automobiles*

KS 1017, *Specification for approval testing of welders working to approved welding procedures*

KS 1351, *Recommendation for fuel tank assembly for automotive*

KS 1515, *Code of practice for inspection of road vehicles*

3 Definition

For the purpose of this standard, the following definitions shall apply:

3.1

vehicle

a bus designed and equipped for the transport of seated or standing passengers

3.2

articulated bus or coach

a vehicle, which consists of two or more rigid sections, which articulate relative to one another. The passenger compartments of each section intercommunicate so that passengers can move freely and safely between them. The rigid sections are permanently connected so that they can only be separated by an operation involving facilities which are normally only found in a workshop

3.3**low floor vehicle**

a vehicle in which at least 35 % of the area available for standing passengers (or of its forward section in the case of articulated vehicles) forms a single area without steps, reached through at least one service door by a single step from the ground (Examples of low floor vehicles are airport service buses which have got very low floor and the passenger hops unto the floor directly).

3.4**vehicle type**

a vehicle, which do not differ essentially with regard to the constructional features specified in this standard

3.5**approval of a vehicle**

the approval of a vehicle type with regard to the constructional features specified in this standard

3.6**service door**

a door used by passengers in normal circumstances providing access to and from vehicle

3.7**double door**

a door affording two, or the equivalent of two access passages

3.8**emergency door**

a door additional to the service door(s) intended for use as an exit by passengers in an emergency only

3.9**emergency window**

a window, not necessarily glazed, intended for use as an exit by passengers in an emergency only

3.10**double emergency window**

an emergency window which, when divided into two by an imaginary vertical line (or plane), exhibits two parts each of which complies as to dimensions and access with the requirements applicable to a normal emergency window

3.11**escape hatch**

a roof provision intended for use as an exit by passengers in an emergency only

3.12**emergency exit**

an emergency door, emergency window or escape hatch

3.13**exit**

means a service door or emergency exit

3.14**floor or deck**

that part of the bodywork whose upper surface supports standing passengers, the feet of seated passengers and the driver, and the seat mountings

3.15**gangway**

the passage providing access by passengers from any seat or row of seats to any other seat or row of seats or to any access passage from or to any service door; it does not include:

- a) The space extending 30 cm in front of the passenger seats
- b) The space above the surface of any step or staircase; or
- c) Any space, which affords access solely to one seat or one row or seats.

3.16**access passage**

the space extending inwards into the vehicle from the service door up to the outermost edge of the upper step (edge of the gangway). Where there is no step at the door, the space to be considered as access passage shall be up to a distance of 30 cm from the starting position of the inner face of a dual panel

3.17**driver's compartment**

the space intended for the driver's exclusive use and containing the driver's seat, the steering wheel, controls, instruments and other devices necessary for driving the vehicle.

3.18**tare mass (MK) (kg)**

the mass of the vehicle in running order unoccupied and un-laden

3.19**technically permissible maximum mass**

the maximum mass declared by the manufacturer of the vehicle. (This mass may be greater than the "permissible maximum mass" to be prescribed by national administrations)

3.20**technically permissible maximum axle mass**

That part of the technically permissible maximum mass of the vehicle, declared by the manufacturer, which results in the vertical force at the road surface in the contact area on the wheel/wheels of an axle. This mass may be greater than the maximum permissible axle mass authorized by national administrations. The sum of all technically permissible maximum axle masses of the vehicle may be greater than the technically permissible maximum mass of that vehicle

3.21**passenger**

a traveler on a public or private road vehicle other than the driver or crew.

3.22**passenger with reduced mobility**

a passenger who has a special difficulty when using public transport, especially elderly and a person with disability.

3.23**passenger compartment**

the space intended for passengers use excluding any space occupied by fixed appliances such as bars, kitchenettes or toilets

3.24**automatically operated service door**

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a power-operated service door which can be opened (other than by means of emergency controls) only after a control is operated by a passenger, and after activation of the controls by the driver, and which closes again automatically

3.25

starting prevention device

a device, which prevents the vehicle from being driven away from rest when a door is not fully closed;

3.26

driver operated service door

a service door, which normally is opened and closed by the driver

3.27

RHS

Rectangular Hollow Section

3.28

M.S

Mild Steel

3.29

cant rail

longitudinal stiffeners that provide support over the side windows of the vehicle

3.30

MIG

Metal Inert Gas

3.31

TIG

Tungsten Inert Gas

3.32

double decker

a bus with two stories or decks for mass urban transit use and or city tourism use (where there may be no roof), not exceeding the road limit of height of 4.7m

4 Vehicle classification

4.1 For the purpose of this standard, passenger vehicles shall be categorized into the following six classes (See Annex C):

Class I	Micro Bus – upto 7m overall length,
Class II	Mini Bus – > 7m to 8m,
Class III	Midi Bus – >8 m to 10.5m,
Class IV	Large Bus – >10.5m
Class V	Single Articulated and bi-articulated buses (18 m to 26 m length).
Class VI	Double decker buses

4.2 Class VI shall be exclusively for urban use, while classes IV and V shall be separated into:

IVA and VA Urban type: This may include seated and standing passengers.

IVB and VB Interurban type: Fully seated

- 4.3 For urban type buses the passenger carrying capacity shall be as permitted by the Traffic Act and calculated as in Annex A.

5 Requirements

5.1 Conformity of production

5.1.1 Conformity assessment of body builders

Conformity assessment activities provided to all body builders shall be done by an organization accredited by Kenya Accreditation Service (KENAS). The National Transport and Safety Authority (NTSA) shall then designate the conformity assessment provider based on accreditation.

5.1.2 Authorization of vehicle designs (Structure)

Approvals for vehicle designs shall be authorized by relevant registered engineer(s) to specific vehicle type and shall ensure that vehicle bodies are constructed to manufacturer's specifications and safety, and meet all the requirements in this Standard.

5.1.3 Application for approval

Application for approval of a vehicle type, with regard to its constructional features, shall be submitted by the vehicle body builder or a duly accredited firm.

5.1.3.1 The application shall include a detailed description of the vehicle type, its structure, dimensions, configuration, and constituent materials. The following shall also be submitted:

- a) A specification sheet from the vehicle manufacturer.
- b) Drawings of vehicle and its interior arrangements;
- c) The unladen mass of the vehicle in kg;
- d) The technical maximum mass of each axle;
- e) The intended total number of passengers (N) as calculated in Annex A;
- f) The class for which approval is requested.

5.2 Vehicles shall be built by approved body builders and in accordance with requirements of this standard and shall conform to 5.1.

5.3 Drilling and welding of chassis

5.3.1 Vehicle chassis welding

The body structures shall not be welded to the chassis. The brackets shall be bolted to the chassis, on which the body structure can be welded. The structure may be welded in conformity to chassis manufacturer's body building manual, and in line with vehicle manufacture's specifications.

5.3.2 Welding of body structure and cladding

Welders shall be approved in accordance with KS 1017.

5.3.3 Arc welding

Arc welding shall be limited to the welding of angle iron or channel iron sections in excess of 6 mm, to chassis mounting brackets.

5.3.4 MIG and TIG equipment

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The MIG and TIG equipment shall be employed for welding all other material including RHS, lip channel and cladding sheets.

5.3.5 Vehicle chassis drilling

Chassis drilling shall follow manufacturer's recommendations and shall achieve a "push fit" with the fixings employed.

5.4 Body sections

The materials and dimensions of body sections shall be as specified in Annex B and Annex C.

5.5 Gangways

5.5.1 Floor to roof height

5.5.1.1 The minimum inside floor to roof height for vehicle classes II and III shall be minimum 1 700 mm, while for vehicles of classes IV B, VB and VI B (Interurban type fully seated) shall be minimum 1 800 mm.

5.5.1.2 For vehicles of classes IVA, VA and VI (Urban type, seated and standing passengers), the minimum floor to roof height shall be 1 900 mm.

5.5.1.3 In cases where the engine is fitted at the rear, the floor to roof height in this area shall not be less than 1 700 mm. Such areas shall only be designated for seating passengers, and shall not extend beyond the rear door.

5.5.2 Gangway measurements

5.5.2.1 For vehicles designed to include standing passengers, the gangway area between the front and rear passenger doors shall be dimensioned and classed as standing room and shall have no steps and the gangway width within this area shall be at least 800 mm.

5.5.2.2 The gangway area to the rear of the rear passenger door shall be so designed and constructed as to permit the free passage of gauging devices whose dimensions are as specified in Table 2 and as shown in Figure 1.

Table 2 — Gangway measurements in mm

Dimensions	Class I & II (Micro and mini bus)	Class III (midi bus)	Class IV, V and VI (large bus)
Diameter of lower cylinder	300	350	450
Height of lower cylinder	900	900	900
Diameter of upper cylinder	450	550	550
Height of upper cylinder	500	500	500
Overall height	1 700	1 700	1 800

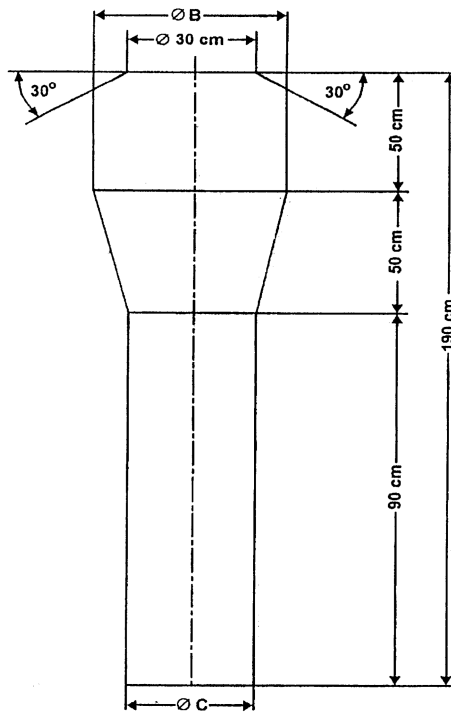


Figure 1 — Gangway gauging device

5.5.2.3 For class VI vehicles, the upper deck gangway of a vehicle shall be connected by one or more intercommunication staircases to the access passageway of a service door or to the lower deck gangway within 3 m of a service door.

5.5.2.4 The minimum width of any intercommunication staircase for class VI vehicles shall be so designed as to permit the free passage of the single door access template as shown in Figure 2. The panel shall be moved starting from the gangway of the lower deck up to the last step, in the probable direction of motion of a person using the staircase.

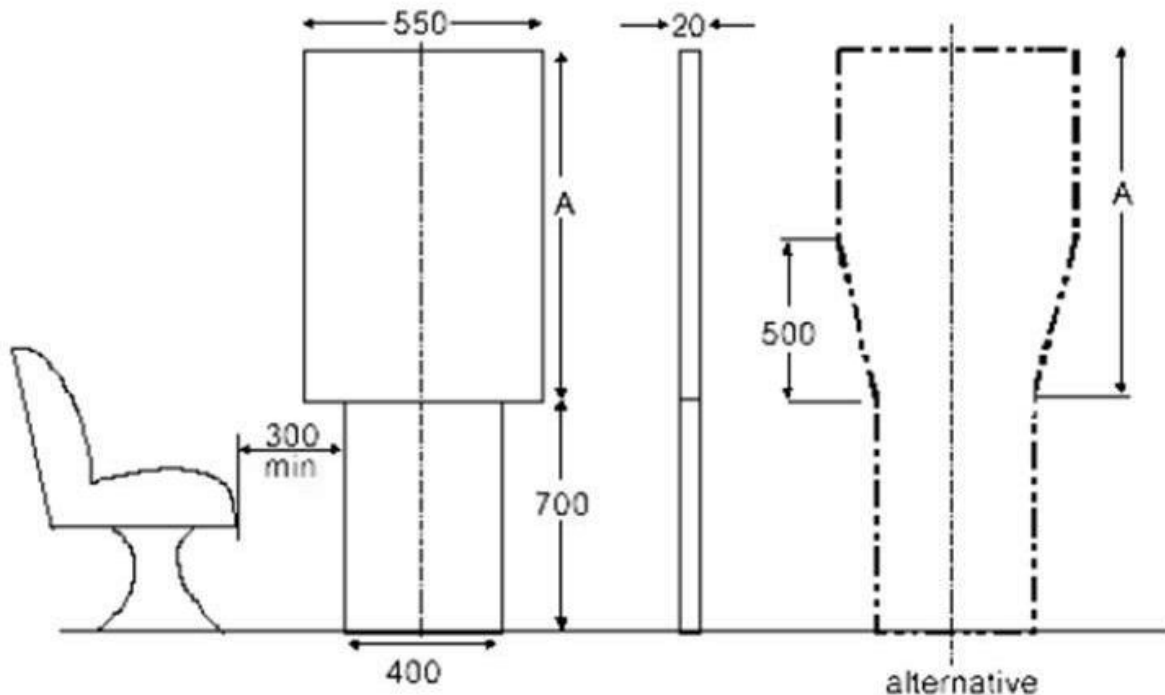


Figure 2 – Class VI vehicle single door passage template

5.5.2.5 Inter communication staircases shall be so designed, that, during heavy braking of the vehicle moving in the forward direction, there is no danger of a passenger being projected downwards.

NOTE: This requirement is considered to be fulfilled if at least one of the following conditions is met:

- a) No part of the staircase is forward descending;
- b) The staircase is equipped with guards or a similar provision;
- c) There is an automatic device that is easily operable in emergency, in the upper part of the staircase, which prevents the use of the staircase when the vehicle is in motion; this device should be easily operable in an emergency.

5.5.2.6 On articulated vehicles, the gauging device defined in paragraph 5.5.2.2 above shall be able to pass unobstructed through the articulated section on any vehicle where the two sections permit through passage by passengers. No part of the soft covering of that section, including parts of bellows, shall project into the gangway.

5.5.3 Standing room

The gangway area between the seats, may be dimensioned and classed as standing room. This area lodged in the design will exclude steps and areas swept by doors per 0.25 m² there will be a definition of number of passengers, and hand holds for them as they stand. These can be in the form of fixed and swinging handholds. The bus will be rated on the basis of the number of these planned standing passengers not exceeding the load limit of the chassis with a full fuel load, average passenger inner city having 5 kg luggage, 75 kg person.

5.6 Windows

5.6.1 Window design and construction

The recommended windows design for all vehicles shall be rectangular with minimum radius on edges

Pictorial for the
Window Shape.

5.6.1.1 The windows shall be fixed to the vertical pillars firmly.

5.6.1.2 Window fittings shall be of good quality and weather proof.

5.6.1.3 The windows shall be so designed and constructed as to allow proper view and ventilation.

5.6.1.4 All side passenger windows shall be capable of being opened. Opening windows shall be of the sliding type. Window fittings shall be weather proof when closed.

5.6.2 Compliance of window glass and windscreens

Window glass and windscreens shall comply with KS 649.

5.6.3 Front windscreen

5.6.3.1 The windscreen and side-windows of the driver's compartment shall be constructed as to give the driver adequate view ahead and to either side the centre line of the vehicle (See figure 3).

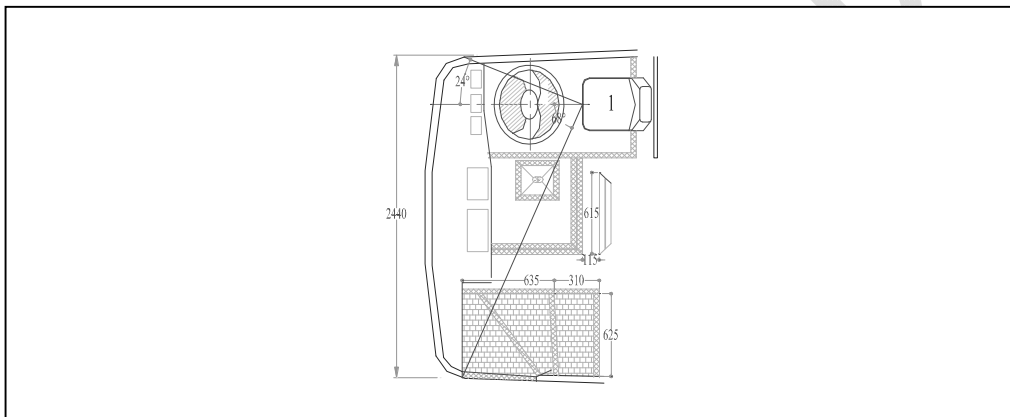


Figure 3 — Drivers angle of view

5.6.3.2 The corner posts and pillars supporting the windshield shall be 100 mm max. and 50 mm max. respectively. They shall be so designed and constructed such that they do not impair driver's visibility as in 5.6.6.1.

5.6.3.3 The top portion of the front windscreen shall be shielded to no more than 20% of the windscreen height to protect the driver from direct sunshine. The same shall be done for side top windows where the top windows are provided.

5.7 Hand-rails and hand-holds

Every public service passenger vehicle shall be provided with hand-rails and handholds which are of adequate strength and so designed and installed as to present no risk of injury to passengers. Every hand-rail shall provide a length of at least 10 cm to accommodate a hand. The hand-rails shall have a diameter greater than 20 mm and less than 45 mm except for hand-rails on doors and seats.

Hanging straps shall be installed in each bus in accordance with the standing capacity. The hanging straps mounted to the longitudinal hand rails shall equate to a minimum of 65% of the total standing capacity.

For class VI vehicles, suitable handrails or handholds shall be provided at each side of all intercommunication staircases.

5.8 Emergency exits/entrances

All vehicles shall be provided with an unhindered emergency exit with a clearly marked direction of opening at the back of the vehicle of height not less than 1 220 mm and width not less than 457 mm.

5.8.1 Emergency doors

Emergency doors shall be capable of being easily opened from inside and from outside when the vehicle is stationary.

5.8.1.1 Emergency doors shall not be of the power-operated or the sliding type.

5.8.1.2 The driver shall make sure that all emergency doors are securely closed.

5.8.2 Entrance/exit doors

5.8.2.1 Entrances and exits of the vehicle shall be through service doors or double doors situated on the left side of the vehicle, whose minimum height for class I, II and III shall be 1650mm and for classes IV, V and VI shall be 1800mm, while the minimum width for single door shall be 600mm wide and for double doors shall be 1200mm.

5.8.2.2 For classes IVA, VA and VI entrances and exits of the vehicle shall be through service doors or double doors situated on either the right side or on both left and right hand sides, and dimensions shall be as in 5.8.2.1. The minimum number of doors shall be two on either side.

5.8.2.3 For vehicles with doors on both sides, the opening and closing of the doors shall be done by a mechanism operated by the driver.

5.8.2.3 The minimum number of service doors required is as follows:

- a) Class I, II and III vehicles shall have minimum one door;
- b) For seated or standing passengers over 70, minimum of 2 doors as stipulated in 5.8.2.2.
- c) For 105 passengers or more, minimum 3 doors on the left hand side or on both right side and left hand sides.
- d) Notwithstanding the requirements in 5.8.2.2 and 5.8.2.3 c), for class V vehicles each coach shall have a minimum of one door on the right hand side or on both sides.

5.8.2.4 The two passenger doors shall be separated such that the distance between transverse vertical planes through their centres of area is not less than 40% of the overall length of the passenger compartment.

5.8.2.5 Seats behind entrance doors shall have decency boards fitted in front.

5.8.2.6 All classes IVA, VA and VI vehicles, shall be fitted with a suitable and safe ramp or a suitable alternative to allow for universal access/disembarking of passengers including persons with disabilities and using wheel chairs. Such buses shall have a docking space for wheelchairs with flip down seats that can be used when there is no person with disability on a wheel chair. Any entrance or exit which is intended to provide access for a wheelchair user shall have a clear unobstructed width of not less than 800mm.

5.8.2.7 Entrance and service doors shall not be deemed to be an emergency doors.

5.8.5 Emergency windows

5.8.5.1 Emergency windows shall be rectangular, measuring 700 mm x 500 mm minimum.

5.8.5.2 Every hinged emergency window shall open outwards.

5.8.5.3 Every emergency window shall be capable of being easily and instantaneously operated from inside and from outside the vehicle by means of a device recognized as satisfactory by the authority, or shall be made of readily breakable safety glass. This shall preclude the possibility of using panes of laminated glass or plastic material.

5.9 Ventilation

Each bus shall be fitted with adequate ventilation for passengers without the need to open windows and doors, and constructed such that under normal use, it shall not leak rainwater into the vehicle.

5.10 Passenger seats (including folding seats and space for seated passengers)

5.10.1 The passenger seats shall be designed in a way to provide safety and protection to the passengers in case of an accident. Sharp corners and/or protrusions of bolts, nuts or threads shall be avoided or covered by all means. The general shape of the passenger seats backrest shall be rounded and/or curved so that passengers injury is mitigated during an impact.

5.10.2 Passenger seat shells can be fabricated out of steel frames covered with steel sheets, steel frames covered with plywood or fiberglass. The seat shells can also be fabricated out of complete fiberglass. These seat shells will be covered with foam to create adequate cushioning and covered by adequate materials for long lasting hygiene and cleanliness. The anchoring of the seat shells onto the seat stand shall be strong enough to prevent cracking and avoid sharp corners and protrusions.

5.10.3 The legroom of passenger seats shall be fabricated without sharp corners in the materials and without protruding components.

5.10.4 The seatbelt anchoring has to be fabricated in a way that no bolts, nuts or threads endanger passengers.

In case that fixed or foldable armrests or passenger support handles are used also at these components rounded shapes without sharp corners and protrusions shall be used.

5.10.5 The ideal passenger seat provides firm sideward hold for the seated passenger and can flex in case of an impact forward to eat up the impact energy.

At least two pairs of forward-facing seats nearest to the front passenger door shall be designated as priority seats for elderly and passengers with disability, and clearly marked with an appropriate notice, incorporating a pictogram, to indicate their purpose. There shall be an extended space at knee level of at least 450 mm in front of these priority seats.

5.10.1 Minimum seat width shall Minimum seat width shall be 400 mm as illustrated in Figure 4.

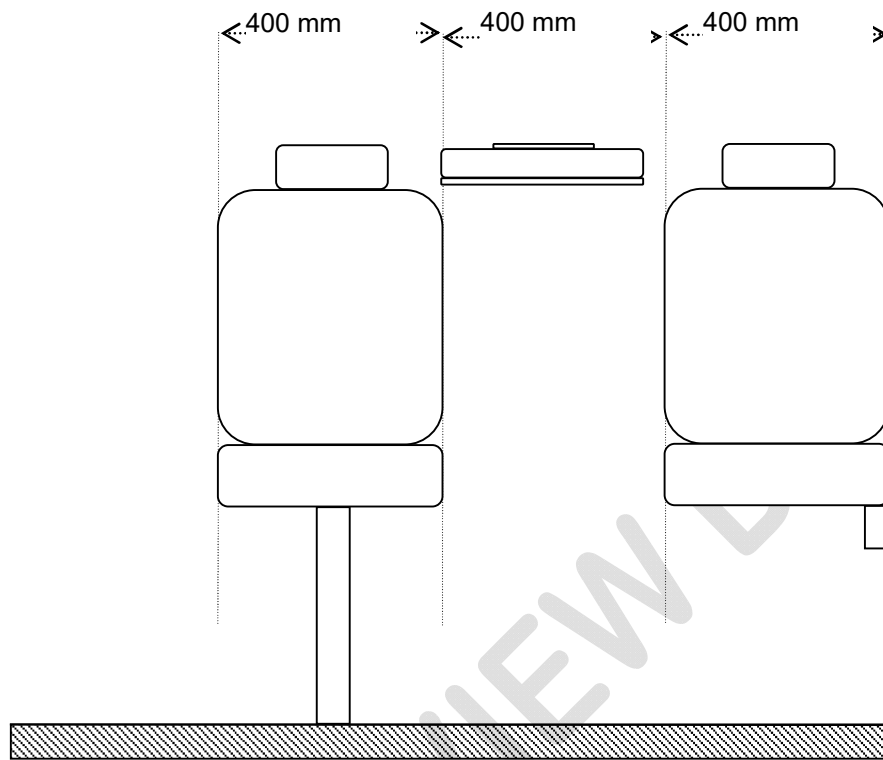


Figure 4 — Seat arrangement and maximum width

5.10.2 Seats, seat spacing and cushion height

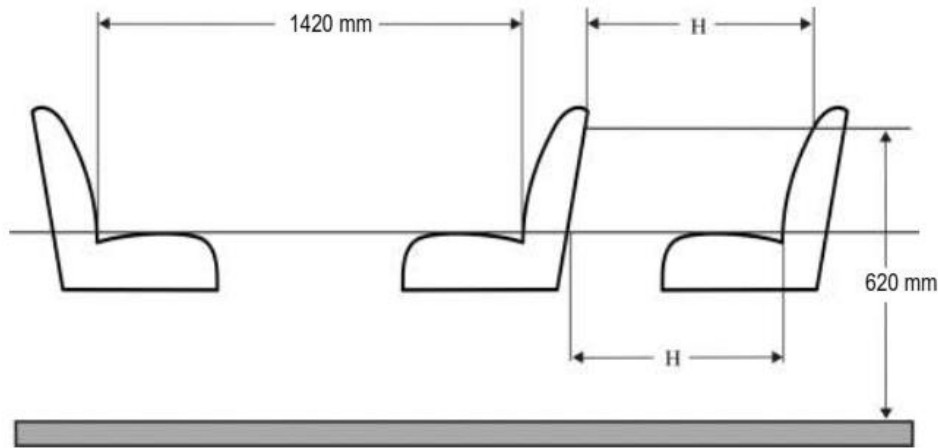
5.10.2.1 The general seat construction shall be as illustrated in Figure 5. The minimum seat spacing for legroom (H) shall be 660 mm when the seats are arranged one behind the other.

5.10.2.2 The cushion height shall be minimum 330 mm for infants in school buses and maximum 450 mm for tall persons.

5.10.2.3 The seats shall be firmly bolted on the floor steel framework and not on floor sheets with bolts complying with KS ISO 898. The bolting shall be done from underneath the floor of the passenger cabin so that no bolts, nuts or threads endanger passengers.

5.10.2.4 The tubes used in the construction of seat stands shall be hollow section and of minimum 25 mm diameter/width and minimum 2 mm thickness.

5.10.2.5 In case a sliding rail is used for the anchoring onto the floor and/or side walls these sliding rails shall be anchored firmly by bolting from underneath of the floor to the floor grid/side grid respectively from the side away from the seated passenger.



where,

H is the seat spacing

I is the Cushion height

Figure 5 — Seat spacing and cushion height

5.10.3 Free height over seating position (Head Room)

5.10.3.1 Each seating position shall have free height of not less than 900 mm measured from the highest point of the uncompressed seat cushion. This free height shall extend over the vertical projection of the whole area of the seat and the associated foot space. However in the case of Class I and II vehicles, the free height shall not be less than 800 mm.

5.10.3.2 In case of class VI vehicles, the free height over seating position for upper deck shall be 850 mm.

5.10.4 Seat belts anchorage

The seat belts and their anchorage fitted in vehicles shall meet the requirements specified in KS 664, and KS 822.

5.10.4.1 All vehicles shall be provided with 3-point seat belts for the driver's seat, and all other exposed seats as shown in Figure 6. The other seats may be provided with 2-point seat belts.

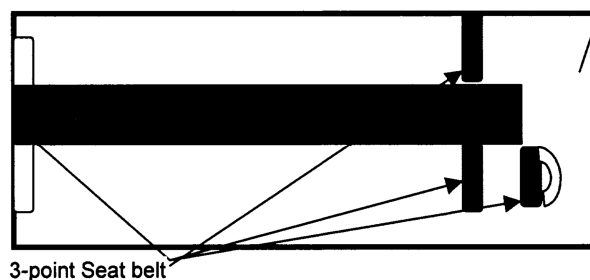


Figure 6 — Seat belt anchorage for vehicles

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5.10.4.2 All other classes of vehicles shall be provided with seat belts for each seat.

5.10.4.3 Each seat shall have a height difference of 25 mm between the front and rear legs to facilitate inclination.

5.10.5 Cushions

5.10.5.1 If used, cushions for the seat and backrest shall be made of high-density foam conforming to KS 376.

5.10.5.2 The combination of the plywood and foam shall be reinforced with steel sections or flat bar of 25 mm x 3 mm.

5.11 Interior lighting and bell switches

All vehicles shall have interior lights spaced not more than 3m apart, operated by the driver and two or more bell switches placed inside the bus above the passenger seats height at an approachable height by the passenger to alert the driver to stop.

The bell switches shall be at about 610 mm from the rear emergency door and the front at a distance of about 300 mm from the driver's partition, the distance between any two of them not more than 2 m.

The bell switches shall be not more than 300 mm from the edge of the passenger door.

5.12 Height above ground and steps for passengers

5.12.1 The lowest step for entering into the vehicle shall not exceed a height of 460 mm from the ground on unladen weight. Mechanical suspensions shall solely be maximum 430 mm.

5.12.2 This ensures that persons with disabilities can gain access to the priority seat(s) without having to negotiate any further steps.

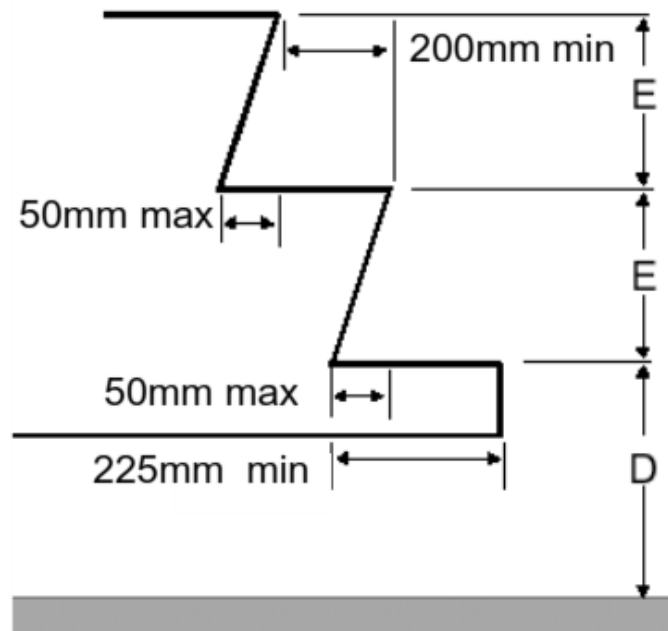


Figure 7 — Height above ground and steps for passengers

5.12.3 Height of the steps (dim. E) shall be 265 mm maximum, and the slant angle dimension shall be 50 mm. Depth of the step shall be a minimum of 225 mm on the step face (if the steps are done straight).

5.12.4 The maximum height (dim. D) from the ground to the point of entry for classes IVA, VA and VI shall be 350 mm while for all other classes shall be 460 mm when the vehicles are unladen.

5.13 Fire extinguisher

5.13.1 Space shall be provided for fitting one or more fire extinguishers, such that one is near the driver's seat and the space provided for each measuring not less than 600 mm x 200 mm x 200 mm.

5.13.2 The fire extinguishers shall be atleast one in number for classes I, II and III and shall be atleast two for classes VI, V and VI, and atleast one in each coach for classes VB and VIB. The capacity of the fire extinguisher shall be ranging from 1.5 kg to 2.0 kg and conforming to KS ISO 7165. The space for the fire extinguisher should be one near the driver partition and the other at the rear within the reach of passengers

5.14 Emergency first aid equipment

5.14.1 Space shall be provided for fitting one or more first aid kits. The space provided shall be not less than 7 dm³; the minimum dimension shall be not less than 80 mm.

5.14.2 Every vehicle shall be provided with a fully equipped first aid box.

5.15 Locks

Every vehicle shall be fitted with quality passenger door locks, boot locks and window locking devices shall hold the window firmly preventing it from sliding.

5.16 Maneuverability

5.16.1 The vehicle shall be able to maneuver on either lock, inside a circle of 12.5 m radius, without any of its outermost points projecting outside the circumference of the circle.

5.16.2 When the outer points of the vehicle are moving on either lock on a circle of 12.5 m radii, the vehicle shall be able to move within the limits of a circular track 7.2 m wide (see Figure 8).

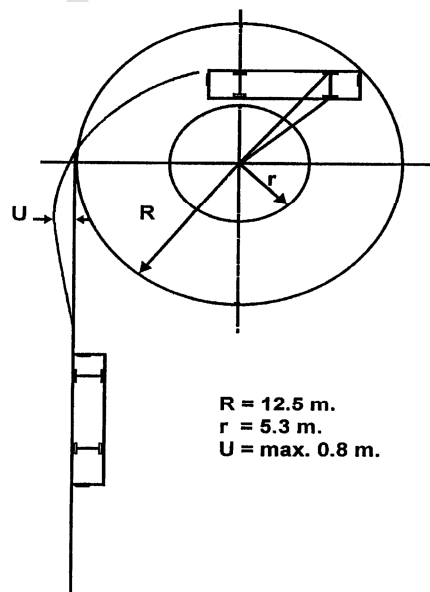


Figure 8 — Vehicle maneuverability

5.17 Engine compartment and noise

5.17.1 Vehicles shall be constructed such that engine noise shall be limited to 90 decibels inside the vehicles.

5.17.2 Non-flammable sound-proof material or materials, which are not liable to be impregnated with fuel or lubricant, shall be used in the engine compartment to minimize fire risks, heat and noise levels within the passenger compartment.

5.18 Protection against fire risks

A partition of heat-resistant material shall be fitted between the engine compartment as per the manufacturers specification for fire proofing.

5.19 Fuel tanks

Fuel system assembly shall be in accordance with KS 1351.

5.19.1 Every fuel tank shall be securely fixed. No part of a fuel tank shall be less than 600 mm from the front of the vehicle or less than 300 mm from the rear of the vehicle so as to provide protection in the event of front or rear impact.

5.19.2 No part of the fuel tank shall project beyond the overall width of the bodywork.

5.19.3 Fuel tanks shall be made so as to be corrosion resistant.

5.20 Fuel-feed systems

5.20.1 No apparatus used for the fuel feed shall be placed in the driver's compartment or the passenger compartment.

5.20.2 Fuel lines and all other parts of the fuel-feed system shall be accommodated in the positions on the vehicle where they have the fullest reasonable protection.

5.20.3 Twisting or bending movements and vibrations of the vehicle structure or the power unit shall not subject the fuel lines to abnormal stress.

5.20.4 Fuel leaking from any part of the system shall be able to flow away freely to the road surface, but never onto the exhaust system.

5.21 Fuel filler holes

5.21.1 Fuel filler holes shall be accessible only from outside the vehicle.

5.21.3 Fuel filler holes shall be not less than 500 mm from any door aperture when the fuel tank is intended to contain petrol, and not less than 250 mm when it is intended to contain diesel fuel; they shall moreover not be in the passenger compartment, nor in the driver's compartment.

5.22 Fuel filler hole caps

Fuel filler hole caps shall be so designed and constructed that they cannot be opened accidentally.

5.23 Electrical equipment and wiring

5.23.1 All cables shall be well insulated and all cables and electrical equipment shall be able to withstand the temperature and humidity conditions to which they are exposed. Cables used in the engine compartment shall be able to withstand the environmental temperature, oil and vapor.

5.23.2 All cables shall be well protected and shall be held securely in position in such a way that they cannot be damaged by cutting, abrasion or chafing.

5.23.3 There shall be at least two internal lighting circuits such that failure of one will not affect the other.

5.23.4 Every electrical circuit feeding an item of equipment other than the starter, the ignition circuit (positive ignition), the glow-with, the engine-stopping device, the battery-charging circuit and the battery, shall include a fuse or a circuit breaker.

5.24 Batteries

5.24.1 All batteries shall be secured and easily accessible.

5.24.2 The battery compartment shall be separated from the passenger compartment and driver's compartment and ventilated to outside air.

6 External dimensions

6.1 Overall length

6.1.1 The overall length of classes IVB, VB and VIB including any projections from front to rear shall not exceed 12.5 Metres.

6.1.2 Classes IVA, VA and VI vehicles shall be extended to 24 m with single articulation, and up to 26 metres for double articulations. The overall length of any coach shall not exceed 12.5 m.

6.2 Overall width

The overall width of all classes of vehicles shall not exceed 2.65 m.

6.3 Floor height

For classes IVA, VA and VI the maximum height from ground to the top of the door steps, when the vehicle is unladen, shall not be more than 900 mm.

6.4 Approach and departure angles

For all classes IV, V and VI vehicles, the minimum approach angle shall be 11° and the minimum departure angle shall be 7°.

7 Layout

Each bus shall be right hand drive

8. Inspection and criteria of conformity

8.1 Every vehicle shall have an approval mark as prescribed in this standard after undergoing sufficient random inspection in accordance with 8.2. Approval granted shall be withdrawn if this requirement is not complied with and production discontinued.

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8.2 Every vehicle shall be inspected in accordance with requirements of KS 1515. Dimension inspections shall ensure that vehicle external dimensions are in accordance with this standard. A vehicle shall be inspected if it has front and rear bumpers and external reflectors.

9 Luggage carriers

No luggage carrier on the roof shall be there. The space under the floor and between the chassis shall be used for heavy luggage. In the passenger compartment the luggage carriers shall be provide for carrying the light weight or the necessary items by the passenger for use during the travel. The size of the parcel rack shall be defined on the category of the bus as follows:

Category of bus	Depth (from side of the bus towards the aisle) maximum	Height (from roof of bus to the bottom of shell) maximum	Opening (inlet) minimum
Class II (mini bus)	400 mm	300 mm	225 mm
Class III (midi bus)	450 mm	325 mm	225 mm
Classes IV, V and VI	600 mm	350 mm	250 mm

9 Re-validation

All vehicles covered in this Kenya Standard shall be subjected to a revalidation process after every 5 years from the date of manufacture. The revalidation process shall involve checking on the structural integrity and appropriate actions taken to return the vehicle to its original state.

10 Marking

The following information shall be legibly and indelibly marked on a plate permanently affixed on the side of the vehicle body:

- manufacture/body builder's name, address and trade mark;
- year of manufacture;
- capacity;
- batch number;
- reference to this standard.

Annex A (normative)

Passenger capacity

A.1 There shall be on the vehicle a number (P_s) of seating places other than folding seats, which conform to this standard. If the vehicle is of class III and IV, the number P_s shall be at least equal to the number of square metres of floor available for passengers and crew (S_o) rounded down to the nearest whole number; the required number may be reduced by 10 % in the case of Class V vehicles ($0.9 S_o$).

A.2 The total number N of seating and standing places in the vehicle shall be calculated such that both of the following conditions are fulfilled:

$$N \leq P_s + \frac{S_1}{S_{sp}}$$

and

$$N \leq \frac{MT + MV + L \cdot V + R \cdot VX}{Q}$$

where,

- P_s is the number of seating places;
- S_1 is the surface area (m^2) available for standing passengers;
- S_{sp} is the area assumed for one standing passenger (m^2 /standing passenger);
- MT is the technically permissible maximum mass (kg);
- MV is the unladen mass
- L is the specific load of baggage (kg/m^2) in the baggage compartment(s);
- V is the total volume (m^3) of the baggage compartments;
- R is the specific mass of baggage in the roof area (kg/m^2);
- VX is the total surface area (m^2) available for baggage to be carried on the roof;
- Q is the mass (kg) assumed for the load on each passenger seating and standing place, if any.

A.3 In the case of Class I & II, vehicles $S_1 = 0$.

A.4 The values of Q , S_{sp} , L and R for every class of vehicle are as follows:

Class	Q (kg)	S _{sp} (m ² /standing passengers)	L (kg/m ³)	R (kg/m ²)
III	70 ¹⁾	(No standing passengers)	100	75
IV	70 ¹⁾	0.150*	100	75
¹⁾ Including 5 kg of hand baggage. *The space is measured as a square.				

A.5 Additionally the total number N of seating and standing passengers in the vehicle shall be calculated as follows:

$$N = (GVW - TW)/70$$

and

$$N_{st} = N - S$$

where,

N_{st} is the Number of standing passengers;

LC is the Load capacity;

GVW is the Gross Vehicle Weight in Kg;

TW is the Tear Weight, in Kg;

S is the Number of seating passengers.

Annex B
(normative)

Comparison Chart for Available Option / Equivalents of grades of Q 345

Comparison/equivalent chart										
Structural steel plates		Chemical properties					Physical properties			
		C	Mn	S	P	Si	Y.S (MPa) (min)	UTS (MPa) (min.)	EI (%)	Impact (min.)
India	IS 2062 GR.A	0.23	1.50	0.05 0	0.05 0	0.4 0	for thk<20mm-250, for thk 20-40mm-240, for thk>40mm-230	410	23	N.A
	IS 2062 GR.B	0.22	1.50	0.04 5	0.04 5	0.4 0	for thk<20mm-250, for thk 20-40mm-240, for thk>40mm-230	410	23	27J at 0 ° C
U.S.A	ASTM A36	0.25	0.80- 1.20	0.05 0	0.05 0	0.4 0	250	400-550	18	27J at 0 ° C
Europe	EN 10025 S235	0.17	1.40	0.03 5	0.03 5	-	235	340-470	23	27J at - 20°C
	EN 10025 S275	0.18	1.50	0.03 5	0.03 5	-	275	410-560	21	27J at - 20°C
Germany	ST 37.2	0.17	1.60	0.04 0	0.04 0	0.5 5	235	360-510	26	27J at 20°C
	ST 44.2	0.20	1.60	0.04 0	0.04 0	0.5 5	275	430-580	22	27J at - 20°C
China	Q 235	0.14- .22	0.30- 0.65	0.05 0	0.04 5	0.0 3	for thk<16mm-235, for thk 16-40mm-225, for thk>40mm-215	375-500	for thk<16mm- 26, for thk 16- 40mm-25, for thk>40mm- 24	27J at 20°C
Japan	JIS 3101 SS400	0.22	1.30	0.03 5	0.03 5	0.3 5	for thk<16mm-245, for thk 16-40mm-235, for thk>40mm-225	400-510	for thk<5mm- 21, for thk 5- 16mm-17, for thk>16mm- 21	N.A

High tensile plates		Chemical properties					Physical properties			
		C	Mn	S	P	Si	Y.S (MPa) (min)	UTS (MPa) (min.)	El (%)	Impact (min.)
India	SAILMA 350/350 HI	0.20	1.50	0.040	0.040	0.50	355	490-610	21	40J at 0°C
	SAILMA 410/410 HI	0.20	1.50	0.040	0.040	0.50	410	540-660	20	35J at 0°C
Europe	EN 10025 S355J2G3	0.20	1.60	0.035	0.035	0.55	355	490-630	19	27J at -20°C
China	Q 345	0.20	1.00-1.60	0.040	0.040	0.55	for thk<16mm-345, for thk 16-35mm-325, for thk>35mm-295	470-630	22	34J at -20°C
Germany	ST 52.3	0.20	1.60	0.040	0.040	0.55	355	510-680	22	27J at -20°C

Annex C
(normative)

The materials and dimensions of body sections

C.1 The structure shall have gussets and diagonals joining side verticals with the roof sticks, to re-enforce the strength between the side walls and roof and to prevent passenger cabin collapse in case of an accident. Both gussets and diagonals to be of the same size and material as the roof sticks.

C.2 The structure shall have anti-roll bars that shall be continuous from the cross members up to the roof (See side verticals in Table C.1).

Table C.1 — Materials and dimensions of body sections

		Upto 7 m	From 7m - 8 m	From 8m - 10.5 m	> 10.5m	
Chassis Length						
Approx No. of Passengers						
Proposed Classification						
BODY SECTIONS	Body cross members		Monocoque	RHS - 100 x 50 x 3	RHS 100 x 50 x 3 & at rear axle - Channel Section - 100 x 50 x 6	Channel Section - 100 x 50 x 6 or I - Section - 100 x 50 x 6
	Seat anchorage		Continous Angle Iron - 40 mm x 40 mm x 4mm or optional Use of Extruded Section where required by the client.			
	Floor covering		M. S. Chequer Plate - 2.5mm Thk / M. S. Flat Plate - 2.0 mm with anti Skid Covering, / Water Proof Plywood min. 12 mm thickness with anti skid covering. The dimensions for the chequered plate shall be taken up to and including the chequer.			
	Side verticles (Anti-roll bars)		S.H.S - 40 X 40 X 2		R.H.S 60 X 40 X 2 or S. H. S. 40 x 40 x 3	R.H.S 60 X 40 X 3 3 sets of double pillars (At the front, middle and rear)
					Spacing between the pillars should be placed in a way that they come in line with the cross members Placed on the Chassis and with a Maximum spacing of 1.55 m	
	Side horizontals		Above Cross Member - SHS 40 x 40 x 2, Below Cross Members either SHS 40 x 40 x 2 or SHS 30 x 30 x 2		Above Cross Member Level - SHS 40 x 40 x 2, Below Cross Member SHS 40 x 40 x 2 and if no Boots are done then SHS 30 x 30 x 2	
	Window spacings	min.	No Window shall exceed the aspect ratio of 2. This means one dimension can only be a maximum of twice the other dimension.			
		max.				
	Window height	Sliding				
		Fixed				

BODY SECTIONS

Sliding window position	Window Position shall be decided on the Geography and climatic conditions of the area where the Bus shall be used. All School Buses shall be provided with minimum of 2 (Two) Guard Rails (Aluminium Pipe Min. Dia 19mm and thickness 1.2mm). The First Guard Rail shall be Provided at a Height of 100 mm from the lower window sill. The distance between the two guard rails shall be 75 to 200 mm.		
Cant rail		RHS 40 mm x 40 mm x 2 mm supported by an angle line 40 mm x 40 mm x 3 mm minimum on the Top.	
Roof sticks		SHS 30mm x 30 mm x 2mm thickness minimum, spaced according to the vertical pillars	SHS 40 mm x 40 mm x 2 mm thickness minimum and spaced according to the vertical pillars.
Roof longitudinals		Shall be of the same material as used on the roof sticks and spaced equally so as to form a nest structure.	
Outer cladding		M. S. Galvanised 0.8 mm or aluminium alloy 1.5 - 2.0 mm	
Inner cladding		M. S. Galvanized 0.6 mm or Aluminium 0.8 mm, or Fiber Glass minimum 2.0 mm thickness. Full coverage inside with no sharp edges	
Front and rear sections	Shall have strong supporting structure with a minimum of SHS 40 x 40 x 2 reinforced with Angle Iron - 40 x 40 x 3 at front frame. At rear frame a minimum of SHS 30 x 30 x 2 and where needed Angle Iron 40 x 40 x 3, for either metal sheeting (20 gauge) or fibreglass		