



## SPECIFICATIONS FOR TELUGU VELUGU BUS BODIES-2018 (Aluminium)

### 1.0 GENERAL DESIGN:

The general design shall be a streamlined body with passenger service door on LH side within wheel base, with two jack knife doors and passenger seats facing forward in 2x3 pattern.

### 2.0 REGULATION:

The general appearance, structure, seat layout etc., shall be in accordance with respective drawings. The bus body design should comply with the provisions of latest Central Motor Vehicle Rules, Andhra Pradesh Motor Vehicle Rules, AIS:052 and any other statutory requirement that may come in to force during execution of fabrication work order. The coach interior shall meet the standard of IS: 15061-2002.

2.1 The firms shall possess Bus Body Accreditation Certificate issued by CIRT /ARAI/or any other Agency approved by GOI.

### 3.0 MAIN BODY DIMENSIONS: (ALL DIMENSIONS ARE IN MILLIMETERS)

SL NO	CHASSIS MODEL DESCRIPTION	AL 222"WB	TATA 218"WB	EICHER 230"WB
1	Wheelbase	5639	5545	5840
2	Rear overhang	3214(57 %)	3327(60%)	3212(55%)
3	Overall length	10765	10647	10837
4	Overall width	2590	2590	2590
5	Pillar centers (std)	1130	1130	1130
6	Window sill(waist rail)height from top of the cross bearer	610	610	610
7	Waist rail height from Skirt level	1200	1200	1200
8	Cant rail height from waist level	1010	1010	1010
9	Interior saloon clear height (Minimum) after finishing	1900	1900	1900
10	Clear aperture of passenger service door(minimum when measured from the edge of door flap)	1100	1100	1100
11	Clear aperture of Driver door	650	650	650
12	Seating capacity	56+1 Driver	56+1 Driver	56+1 Driver

**4.0 DRAWINGS:** The list of drawings to be followed are shown at ANNEXURE-I

**5.0 MATERIAL:** The fabrication of bus bodies shall be as per the specifications and recommended sources / brands of material mentioned in ANNEXURE-II.

**6.0 CHASSIS POSITIONING:**

6.1 All chassis received by the firm for fabrication of bus bodies should be kept safely in a covered area. The chassis should not be kept open to atmosphere without any protection to avoid damage to chassis and its units due to rain, dust and heat.

6.2 Before commencement of bus body fabrication all important units of chassis viz. Alternator, self-starter, radiator, tyres and batteries should be protected by providing suitable covering to prevent from damages that may occur due to welding, drilling, cutting, hammering, riveting, falling of metal scrap or dust during the course of fabrication. Driver seats, steering wheel, hand brake valves etc., shall also be protected from any damage or paint spray.

6.3 Chassis number on long members and identification plates provided by the chassis manufacturer shall be properly covered and protected before commencing the fabrication work.

6.4 The Ashok Leyland, TATA and Eicher chassis are supplied with following items as OE fitment.

1. Cabin floor
2. Bulk head structure (AL/EICHER, TATA)
3. Front grill (AL)
4. Out riggers (AL/EICHER)
5. Anti-sag channel (TATA)
6. Bonnet and Front bumper (AL/TATA/EICHER)
7. Knitted Driver seat
8. Head lights E2
9. Front indicators E2
10. Tail Lamps E2
11. Battery cut off switch
12. Wiper motor with twin blades/linkages
13. Reflective warning triangles with stands
14. Wheel stoppers
15. Spare wheel carrier cage type
16. First aid kit
17. Tools as per CMVR
18. Rear view mirrors with brackets E2 plus 1 small mirror
19. Electrical horn
20. ELR safety belt

**7.0 PROTECTIVE TREATMENT:**

7.1 All Mild Steel components used for fabrication shall be carefully de-greased, de-rusted with three in one solution by dipping and wiped with dry cloth to remove all dirt/oil etc., Then the material shall be applied immediately (without any time lag) with Zinc Phosphate epoxy primer "Rust-O-Cap" (part no.24570608320) of M/s. Asian Paints or '60 **BT PRIME GREY**' of M/s.Akzo-Nobel Coatings before assembly.

7.2 All Aluminum Components shall be carefully cleaned with thinner. Self Etch primer paint shall be used at joints of dissimilar metals. The interior and exterior panels should be cleaned with thinner and then self etching primer shall be applied.

## 8.0 BODY STRUCTURE:

### 8.1 Aluminum Structure:

All principal structural members should be in Aluminum extruded sections of Alloy designation 64430, 63400 and 65032, condition WP as per IS: 733 - 1983. The structural joints shall be by riveting, bolting and combination of both. The rivets shall be of Aluminum alloy wire of IS: 740 - 1977. Alloy condition 64430 (HR-30) - OD. Aluminum 5-bar chequered plate with 3.0/2.0 mm base thickness shall conform to alloy designation 65032 and condition WP of IS:737 of 1986. All Aluminum sheets shall conform to alloy designation 19000, condition H2 of IS: 737 of 1986.

8.2 Chart no. CB18CTG132 and Drg.no. CB18AEG112 (sheet 1&2) containing the details of specifications of Aluminum extruded sections and sheets to be used, shall be followed.

### 8.3 Other Mild Steel structural members:

Galvanized steel sheets should be as per grade 175 of IS: 277-1985. Rolled sections should be as per IS-2062 of 2006. The structural joints shall be by riveting, bolting, combination of both and MIG welding in case of GI structural members. The welding should be for full length of joint. Welding slag to be removed and ground to smooth finish in order to avoid sharp edges.

8.4 All bolts used shall be of sizes reckoned in Metric system. The bolts shall be of high tensile hexagonal head bolts of fine thread, conforming to property clause 8.8 of IS: 1367 of 1979. The nuts shall be of approved anti-vibrate type such as nyloc conforming to IS: 1364 of 1983. All bolts nuts and washers should be galvanized. Each bolt and nut shall be provided with a flat washer. A spring washer should accompany every tapped bolt. The approved brands of bolts are TVS/STL/HINDUSTAN FASTENERS/KFL/UNBRAKO/IMPERIAL FASTENERS brands only.

## 9.0 PARTICULARS OF IMPORTANT STRUCTURAL MEMBERS

Sl.no.	Description	Material
1	Cross bearers	Rolled steel channel ISMC 100x50x6 mm
2	Anti sag bar	Rolled steel channel ISMC 75x40x6 mm
3	Floor longitudes	G.I 'U' section 25x75x25x3 mm thick (5 rows)
4	Pillars and Horizontal supports	Indal 2654 section, All pillars including wheel arch horizontal supports shall be reinforced with formed 'U' inserts of GI sheet 2.0 mm thick.
5	Roof sticks & roof longitudes	Indal 2651 Sections (5 rows)
6	Crib rail and seat rail	Indal 1756 section
7	Cant rail	Indal 2800 section
8	Waist rail	Indal 2613 section
9	Waist rail stiffener	Indal 3402 section & 3.0 mm Aluminium 5-bar chequered plate 100 mm wide with minimum joints one LH side and two on RH side with in wheel base
10	Panel stiffener	Indal 3405 section
11	Skirt rail	MS Angle 40x40x3 mm
12	Water channel a) On cant rail	a) Indal 6250 section

	b) Front & rear end	b) Hindalco WC-695 section
13	Step edge beading	Indal 5700 section
14	Flat beading	Indal 5505 section
15	Decorative beading a) Exterior waist level front b) interior waist level and ceiling	As per Drawing. a) Indal 2721 section b) Aluminium section as per drawing with plastic filler and ends
16	Window sections a. Window guide b. Split section 1. c. Split section 2 d. Sweep rubber section e. Finger pull	a. Hindalco 6482 section b. 'T' section c. 'F' section d. Hindalco 2691 section e. Indal 1752 section
17	Wire casing	Indal 2735 section
18	Rub rail on body side	Indal 2676 section
19	Cleats & Brackets a) Roof structure b) Cant to roof stick and cant to pillar c) Side structure	Indal 9638 section of 30 mm wide a) Indal 1760 section b) 'c' bracket formed in GI sheet 2.5 mm c) 'c' bracket formed in GI sheet 2.5 mm at wheel arches and Indal 1760 cleats
20	Roof grab rail brackets	Indal 9638 of 30 mm wide
21	Gussets for Cross bearer to Pillar joint	ISMC 100 X50
22	JK door frame	Indal 9124 section
23	Parcel rack tube	Hindalco TU-1274, 1 <sup>st</sup> and 2 <sup>nd</sup> Stainless steel tube of 16 mm dia

## 10.0 PRECAUTIONS:

- 10.1 Aluminum extrusions such as seat rail, crib rail, cant rail shall be joined Within wheelbase only.
- 10.2 "NEGATIVE TOLERANCES "are not allowed either for Aluminum Extruded sections or Aluminum sheets and GI sheets/tubes. However, tolerances within the limits of IS standards may be allowed subject to prior approval of Chief Mechanical Engineer(Chassis and Bodies)and recovery of difference of cost .
- 10.3 All welding shall be done with MIG welding process only. Under any circumstances, arc welding shall not be allowed. Welding of Stainless steel Components shall be done with TIG welding process only with same grade Stainless Steel filler rod.
- 10.4 All holes in cleats and roof longitudes shall be PUNCHED to close tolerances. Under any circumstances drilling of holes is not allowed.
- 10.5 The following workmanship must be carefully followed during The fabrication.
  - i. All castings must be truly formed and free from blow holes.
  - ii. All bolts and rivets should be well fastened
  - iii. Rigid water test shall be carried before fixing the interior ceiling without applying any sealant and tapes using pressurized water spray system. The fabricator shall equip water leak test facility confirming to IS: 11865-1982

at the firm for conducting leak test in two stages i.e., before fixing the interior ceiling and before dispatch of vehicle.

- iv. All welded joints must be chipped and well ground to get a Smooth surface and applied with Epoxy primer without any delay.
- v. Sharp corners shall be grounded and made smooth
- vi. Wherever pitch for rivets / bolts is not specified, it shall be 100 mm.
- vii. Bolt ends shall protrude at least 2 to 3 threads length above the nuts.
- viii. Roof stick, roof longitude, floor longitude and waist rail members shall butt properly at mating joints and shall not have gaps at the joints.
  - ix. All tapping bolts such as grab rail, handles and assist rail bolts etc., shall be tightened using thread lock adhesive of approved makes .
  - x. Roof stick, roof longitude, floor longitude and waist rail notching to be done on power press only.
  - xi. All fixed glasses shall be provided with ceramic coating of suitable width on periphery.

#### **11.0 CAB UNDERFRAME STRUCTURE:**

- 11.1 Cab under frame of Ashok Leyland 222” WB chassis shall be fabricated as per the drg.no.T2257UF18103. The OE structure shall be retained and modified accordingly to suit the fabrication. The cabin floor shall be made in line with saloon floor except at wheels. The OE floor on RH Side of cabin shall be connected to the 1<sup>st</sup> cross bearer by providing a ‘Z’ riser in GI sheet 3.00 mm. On LH Side, a raised wheel arch box shall be provided on front wheel duly fabricating in MS flats 40x6 mm and MS angles 40x40x6 mm. Gap between the top surface of the tyre and bottom of the wheel arch box shall be minimum 160 mm.
- 11.2 The Tata 218” WB chassis shall be fabricated as per the drg.no.T1860UF18303. The cabin floor longitudinal members shall be connected to a ‘Z’ raiser in GI sheet 3.00 mm provided on 1st cross bearer to make up the height difference of cabin and saloon floor. Suitable wheel arch boxes in rectangle shape fabricated in MS flat 40x6 mm and MS angles 40x40x6 mm shall be provided. Gap between the top surface of the tyre and bottom of the wheel arch box shall be minimum 160 mm.
- 11.3 The Eicher 230” WB chassis will be supplied with OE cab floor, bulk head structure, out riggers, driver seat and engine bonnet. The cab under frame shall be fabricated as per the drg.no.T3055UF18203. The OE structure shall be retained and modified accordingly to suit the fabrication. The cabin floor shall be made in line with saloon floor except at wheels. The OE floor on RH Side of cabin shall be connected to the 1<sup>st</sup> cross bearer by providing a ‘Z’ riser in GI sheet 3.00 mm. On LH Side, a raised wheel arch box shall be provided on front wheel duly fabricating in MS flats 40x6 mm and MS angles 40x40x6 mm. Gap between the top surface of the tyre and bottom of the wheel arch box shall be minimum 160 mm.
- 11.4 The dashboard frame shall be fabricated in MS angle 40x40x6 mm to the required profile and covered with GI sheet of 0.91mm thick. Flap door with suitable stainless steel hinges and stainless steel tower bolts shall be provided for easy access to fuse box, radiator and power steering reservoir.

#### **12.0 BODY FRAME STRUCTURE:**

The bus body frame structure should be fabricated as per the following drawings.

ASHOK LEYLAND 222" WB chassis - T2257SL18101 and T2257SR18102.

TATA 218" WB chassis -T1860SL18301 and T1860SR18302.

EICHER 230" WB chassis - T3055SL18201 and T3055SR18202.

- 12.1 The cant rail at the passenger entrance, driver door and emergency door area shall be reinforced with GI sheet formed channel in 2.0 mm thick and the joint of cant rail should not be exactly on any pillar or within door bay.
- 12.2 A & B pillars on both sides shall be provided in GI 3 mm thick formed section similar to Indal 2654. First and second roof sticks connecting A& B pillars shall also be provided in GI formed section similar to Indal 2651 in 2 mm thick. All the structural members in this bay (Waist rail, Intermediate rail and roof longitudes) shall be in GI formed sections of 2 mm thick with dimensions of corresponding Aluminum Sections.
- 12.3 An opening of size 250-mm x 250 mm, fabricated in MS Angles 40x40x6 mm finished with beading in Indal 5505 and a flap with ball catcher shall be provided at fuel oil tank mouth.
- 12.4 One peep window frame in first bay of left side structure is to be provided with MSL 40x40x3 mm. One fixed clear glass of 5.0 mm thick shall be provided in the size 490mm(H)X290mm(W) along with frame in Indal 6482.
- 12.5 MS tapping plates in 30x6 mm flat of 200 mm length shall be provided wherever tapping is to be done for fixing body components such as roof continuous beam, roof hand grab rail, window guard rail, assist rail, drivers' partition, windows etc.,
- 12.6 Pillars on both sides entrance shall be reinforced with MS angle 25x25x3 mm and riveted to the inner flange of pillars.
- 12.7 Cant rail on both sides full length shall be reinforced with M.S angle 30x30x3 mm. This angle shall be riveted to pillars flanges at cant level and connected to the cant rail duly providing two GI plates of size 75x30 mm of 2 mm thick welded to the angle and riveted to cant rail in every bay.
- 12.8 Luggage booths from crib level to skirt level are to be provided on left sides of vehicle as indicated in structural drawings with flap doors in 1.6 mm thick Aluminum sheet and locks.

### **13.0 CABIN AND BODY MOUNTING:**

- 13.1 The OE Cabin floor and mounting arrangement shall be retained. The remaining portion of cabin floor connecting 1st-cross bearer and OE floor shall be fabricated as per drg.no. T2257UF18103 for AL 222" WB, T1860UF18303 for TATA 218" WB and T3055UF18203 for Eicher 230" WB chassis.
- 13.2 The OE anti-sag members shall be retained. If the chassis are not supplied with the anti-sag members a 3-piece anti sag channel in ISMC 75x40x6 shall be provided at front end of the chassis bottom frame connecting to the 'A' pillars on both sides.
- 13.3 Additional Out riggers in MS angles 50x50x6 mm shall be provided connecting 'B' pillars to the chassis long members with suitable fitment.
- 13.4 The body should be mounted on the chassis web duly providing 6 mm (inverted pressed "L" type) MS plate as per the size shown in the respective drawings over the chassis long members. These "L" plates shall be bolted together at every cross bearer mounting to Long

member web with M12x 50 H.T. bolts at least 4 nos. per plate. OE holes on the chassis long members shall only be picked up for mounting this plate. Wherever the holes are not matching holes shall be drilled on the web 40 mm below the top level of long member with prior approval. Over these plates, cross bearers in ISMC 100x50 channels shall be provided as per the respective drawings. At rear wheels the cross bearers shall be fastened with 16 mm dia. "U" bolts of approved make and with 150mm x 6 mm thick base plate welded to the bottom of cross bearer. Spacers made of Aluminum casting shall be placed between bottom flanges of chassis long member and "U" bolts. The "U" bolts are to be made out of EN-15/14B steel as per IS 5517-1978 (Tensile strength 80 kg/Sq.mm minimum). The "U" bolts should be galvanized and fitted with galvanized nyloc nuts as per drg.no. CB18UBG114. The length of bolt shall suit the depth of chassis long member and should not project more than 6 mm after tightening the nuts.

13.5 In ASHOK LEYLAND and EICHER vehicles the front bulkhead ends are to be connected to the A-pillar of the body duly giving the support members. A tie bar in front of radiator in 3-piece in ISMC 75x40 connecting A-pillars on both sides and chassis long members shall be provided. This tie-bar to be mounted on MSL 50x50x6 mm angle 'L' brackets connected to the chassis long members.

13.6 The body mounting must be easily detachable from the chassis during major overhauls. Pillar gussets on four sides of the body shall be provided with 32 mm dia hole to facilitate lifting of the body during major overhauls.

#### **14.0 CABIN AND SALOON FLOOR:**

14.1 The cabin and saloon floor shall be in Aluminum 5-bar cheq. plate of 3.0 mm base thickness conforming to alloy designation 65032, Temper WP of IS: 737-1986. The cheq. plate should be riveted with M.S rivets of 5mm dia. to the floor longitudes at a pitch of 100 mm and in Zig-Zag manner at joints. The cabin area and wheel arch boxes shall be riveted at 75 mm pitch. The riveting on crib rail shall be done with 6 mm Aluminum alloy solid rivets of HR -30 and condition OD as per IS: 740-1977. Intermediate bolting with M8 bolts shall be done on cross bearers and wheel arch frames.

14.2 The wheel arches shall be made rectangle shape. The height of rear wheel arch box frame shall be 160 mm minimum from top surface of the tyre.

14.3 The number of cheq. plates used for cabin and saloon flooring should be least in order to keep the joints at minimum possible. The floor cheq. plate shall be joggled at crib level to get proper seating.

14.4 In TATA and EICHER vehicles an inspection cover to be provided in saloon floor over fuel tank suction pipe of size 250x250 mm.

14.5 The floor longitudes should be in five rows excluding crib rails. They should be arranged in such a way that the seat legs are fixed on the floor longitudes. Dust proof rubber packing of 2mm EPDM quality shall be provided at the joints and ends of chequered sheet to avoid entry of water/dust in to the saloon from the joints. The floor cheq. plate laying shall ensure dust proof. Floor longitudes shall be provided wherever necessary for floor plate joints and stanchions.

14.6 Trap door of 580x 520 mm size must be provided in cabin flooring above gearbox with proper sealing and M6 tapping bolts.

- 14.7 Four drain holes of 25-mm diameter and 75 mm length ERW pipe shall be provided in saloon flooring corners below seat frames for draining of water while washing.
- 15.0 BODY PANELING:**
- 15.1 The exterior portion of body i.e., sides; front end, rear end, mud wings and roof exterior should be in Aluminum sheet 1.22 mm thick of alloy designation 19000 and condition H2 of IS: 737 of 1986.
- 15.2 Front radiator grill is to be provided in 1.22mm GI( AL type) as per drawing for Eicher and TATA vehicles.
- 15.3 Truss panel for body sides: Full height truss panel between waist to crib rail for entire length of body and at rear end including corners shall be provided in stainless steel sheet of 0.7 mm of 430 Grade and in scotch brite finish. These panels shall be riveted with 5 mm Aluminum alloy solid rivets to the structural members at waist rail together with 5 bar Aluminum chequered sheet and Indal 3402 stiffener at a pitch of 100 mm in zigzag manner. The riveting pitch on seat rail and crib rail shall be 75 mm. The riveting pitch on pillars shall be 100 mm.
- 15.4 Roof structure reinforcement: The roof structure above on each door opening i.e., passenger entrances, driver door and emergency door between roof longitude and cant rail shall be reinforced with a truss panel of 0.91 mm thick GI sheet and shall cover three bays in single piece. The GI sheet has to be formed to the required contour of roof prior to the assembly and shall be riveted to the roof longitudes and cant rail lower flange and also to the MS angle 30x30x3 provided above cant rail between 'C' brackets with MS flat head rivets at a pitch of 100mm.
- 15.5 The roof exterior sheet for center portion should be in full length of body and laid longitudinally in one single piece of 1220 mm wide. The riveting should be done on the roof longitudes in ZIGZAG manner. The exterior sides (LH & RH) of roof sheets have to be provided in single piece as required. The riveting on cant rail, front and rear end roof sticks should be with flat beading Indal 5505. The overlap of roof exterior panels should be equal to full width of roof longitude section and should be riveted by 5.0- mm dia. Aluminum alloy solid rivets (HR-30) at a pitch of 75 mm in two rows ZIG-ZAG manner. While riveting roof side sheet on cant rail, an Aluminum sheet of 1.6 mm thick and 75 mm wide full length of cant rail shall be provided on the cant rail for pasting top fixed glasses. The sides of roof shall also be provided with water channel in Indal 6250 and shall be riveted along with flat beading Indal 5505.
- 15.6 In order to avoid water leakage overlapping portion of roof panels joints, overlapping portion of roof panels should be provided with white lead. The edges along the roof joints shall also be applied with white lead for filling up the gaps. Roof joints should be water leak proof. Approved make weather shield strip of 150 mm wide and 2 mm thick shall be laid longitudinally covering roof center joints from front end to rear end to avoid water leakage from roof.
- 15.7 Exterior of roof sticks and longitudes shall be pasted with expanded polyurethane sheet (heatlan) of 6mm thick.
- 15.8 The interior roof up to cant should be in Aluminum sheet 0.91 mm thick of alloy designation 19000, condition H2 of IS: 737 - 1986.
- 15.9 The interior vertical finishers for pillars, horizontal finishers for windows at cant level, waist level and finishers for intermediate rail shall be in 0.5



- mm stainless steel of 430 grade and scotch brite finish. The finishers are to be pasted to structural members with 'Metal to Metal' type PU sealants. There should not be any waviness in finishers and the sealant should not drip through the joints. All the horizontal finishers shall be in single piece per two bays and the overlap joints on pillars only. To avoid the expose of sharp edges and waviness of the SS sheet used, the inner edge of the finisher is to be bent inside.
- 15.10 The overlap joint for roof interior ceiling panels should be on the roof sticks. The overlap of the roof panels should be equal to the full width of roof stick section and should be riveted by 4.76 mm dia. Aluminum alloy multi grip blind rivets at a pitch of 100 mm. Riveting should be done on roof longitudes and cant rail also.
- 15.11 Interior ceiling panel joints on every roof stick, cant rail and on all sides of door openings shall be provided with decorative beading Indal 2684 with plastic filler and end covers.
- 15.12 Aluminum sheet 1.22 mm formed to 'Z' section (size 25x45x25) shall be provided on waist rail which shall be riveted to waist rail duly overlapping the exterior body panel at a pitch of 100 mm. The ends of 'Z' section shall be bent vertically upwards to overlap the pillar web. Suitable 30x3mm thick balata packing shall be provided below the 'Z' section to match the height of rivet heads of waist rail. Ends and corners shall be applied with P.U.sealant to avoid seepage of water in to saloon.
- 15.13 An Aluminum sheet formed 1.6mm thick 'Z' section (30x8x30) shall be riveted to intermediate rail with Aluminum flat head rivets of 5 mm to facilitate bonding of top fixed glass.
- 15.14 Two rows of panel stiffeners in Indal 3405 should be provided at seat Rail level and in between crib rail to skirt level.
- 15.15 In order to avoid rattling of exterior panels 6 mm Heatlan felt packing shall be provided on panel stiffeners.
- 15.16 The exterior body panels from waist to skirt should be without joints in 1.22 mm thick Aluminum Sheets of alloy designation 19000, condition H2 of IS: 737 of 1986. The vertical butt joint of panels should be on Structural members and to be pasted with approved make sealant of 'metal to metal' type and two sided VHB tape of 3M make on all sides i.e., vertical joint, on waist rail and on skirt rail. End portion of panels at wheel arches and skirt rail shall be folded inside by 20 mm and should be fixed with flat beading and Aluminum alloy head solid rivets of 5.0 mm dia. at a pitch of 100 mm.
- 15.17 Rear end exterior from waist to skirt and between end pillars shall be provided with Aluminum sheet 1.22 mm sheet in single piece. This panel shall be bonded to the rear end structure with PU sealant of 'Metal to Metal' type and two sided VHB tape. The rear end saloon glass frame shall be covered with 0.91mm finishers from outside and 0.5 mm stainless steel from inside. Body structural members and Aluminum sheet surfaces where the sealant has to be applied shall be cleaned thoroughly for oil/dirt etc., before applying sealant.
- 15.18 The body sides have to be provided with rub rail in Indal 2676 with EPDM rubber insert with end covers. The rub rail and ends shall be black powder coated.
- 15.19 The front end exterior panels shall be provided with decorative beading Indal 2721 at waist rail. The beading shall be anodized and fixed with

blind rivets. The rear end waist level shall be provided with Aluminium flat beading Aluminum flat beading in Indal 5505 with blind rivets.

- 15.20 The exterior corner dooms both at front and rear on off side and near side from cant rail to waist and waist to skirt rail shall be provided in 0.91 mm G.I sheet over laid with Aluminum sheet of 1.22mm thick and Indal5505 beading on full length of pillars.
- 15.21 The interior panels shall also be provided with decorative beading as per drawing at waist level with plastic filler and end covers.
- 15.22 The area between exterior and interior panels of waist rail to crib rail in side structure, cant rail to cant rail in roof structure shall be provided with 40 mm thick FR grade thermocole insulation.

#### **16.0 FOOT BOARD:**

The wider foot board within wheel base structure as shown in the drawing to suite two Jack Knife doors shall be in three steps built in MS. Angles 40x40x3 mm and over laid with Aluminum 5-bar chequered sheet of 2.0 mm base thickness on sides and 3.0 mm base thickness on tread and riser portion. The foot board should be given a support under the lowest tread by providing a 'U' type bracket made of MS angles 40x40x6 mm. The arms of 'U' bracket should be 230 mm long and secured to pillars with M10x 4numbers bolts on each pillar. Step edge beading in Indal 5700 shall be provided along the edges. The bottom tread height from ground shall not be more than 400 mm. The tread depth should not be less than 300mm. Maximum step height allowed is 250 mm.

#### **17.0 WHEEL ARCH FRAMES AND BOXES:**

The rear wheel arch box frames should be fabricated in M S angles40x40x6-mm and M S flats 40x6 mm in rectangle shape. The height of box frame shall be 160 mm above the top surface of the tyre. The boxes should be designed to accommodate 10.00 x 20 size tyres. Aluminum 5- bar chequered plate of 3.0-mm base thickness in single piece to be used on top for covering wheel arch box frames. Step edge beading shall be provided at the riser and along the edges of wheel arch.

Mud guard shall be provided in 1.22 mm thick Alu. sheet half round along wheel arch area with proper clamping and a clear gap of 160 mm from the edge of tyres.

#### **18.0 DRIVER'S PARTITION:**

The driver's partition shall be fabricated with stainless steel tube 30 x30x1.6 mm as per drg.no.CB18DRG119. It should be fixed behind driver seat and shall be supported on structural members duly reinforced in the floor as well as roof. The minimum distance from the Bonnet to partition wall shall be as per seat layout drawing. A timing board of size 450x300 mm shall be provided in Aluminum sheet 1.22mm duly painted white. The board should be provided in a sliding channel frame on 3 sides made of Indal 3620 section and fixed to the partition on saloon side.

## 19.0 DESTINATION BOXES AND BOARDS

- 19.1 For Ashok Leyland, Eicher and TATA vehicles the front and rear destination boxes shall be in roof as indicated in the structural drawings. The side destination board shall be in 1<sup>st</sup> 1130 mm bay on LH side at window top fixed glass area after middle passenger entrance. The size of the destination boards should be 910x210mm.
- 19.2 Front, Rear and side destination boards glasses shall be bonded to the destination board frame with PU sealant.
- 19.3 The destination boxes shall be fabricated in GI sheet 1.22 mm thick with flap door, full-length piano hinge and locking latches.
- 19.4 One flap door in 0.7 mm stainless steel sheet in size 1180 mm x330 mm is to be riveted with piano hinge for full length at bottom and to be blind riveted on intermediate rail in 1130 mm window adjacent to middle entrance on LH side of body. Bracket in Indal 3620 is to be fitted on inner face of the door for holding the destination board of size 910 mm x210 mm. LED type light is to be provided for illumination. Two locking latches and chain to be provided on both side for locking the door and to hold it at convenient angle to change board.
- 19.5 Six destination boards in GI sheet 1.22 mm have to be supplied along with the vehicle duly painted in white color. These destination boards shall be provided in a WS-415 frame attached to the flap door with provision for keeping two boards. The destination boards should be visible clearly from outside.
- 19.6 The front, rear and side destination boards shall be illuminated by LED lights of 600-mm length with luminosity of 150 to 200 lux.

## 20.0 PARCEL RACKS:

Tubular type Parcel racks shall be provided on both sides of saloon above windows. 1<sup>st</sup> & 2<sup>nd</sup> rows of tubes should be in 16 mm dia. and 1.6 mm thick stainless steel tubes of 304 grade and other tubes should be in 16 mm dia. and 2.25 mm thick (Hindalco TU1274) placed longitudinally at a pitch of 65 mm in the Stainless Steel (304 grade) rectangular tube brackets of 40x20x1.6 mm provided at each pillar. Intermediate brackets in same material, shall be provided in between two main brackets. These brackets shall be connected to the Cant angle 30x30x3 mm and roof sticks. Rubber grommets of EPDM quality have to be provided around the tubes wherever the tubes are passing through the tubular bracket.

The interior width of the racks shall not be less than 460 mm. There shall be a clear vertical gap of 230 mm between roof ceiling and parcel rack end tube. Parcel rack end brackets shall be provided with a stay bar in same tube.

- 20.1 One parcel courier box to be provided at right side of Parcel rack first Bay with suitable locking system.

## 21.0 CONTINUOUS BEAM:

A longitudinal continuous beam in pressed top hat section of GI sheet of 2.0 mm thick similar to roof stick profile should be provided. This beam in inverted position shall connect all the roof sticks from front end to the rear as shown in the seat layout drawing. The joints should not be more than three with reinforcement using 30x25x2 mm thick, 50 mm long 'U'

channel welded at joints from inside. The cross sectional dimensions of each extended top hat section should coincide without mismatching. Welded joints to be ground for even surface and ends should be tapered to a length of 150 mm. Reinforcement is to be provided in the beam with 30x6mm in 200mm length flats for fitment of stanchions. This beam shall be fitted with M6 tapping bolt at every roof stick on both sides and the remaining beam shall be revited in Zig-Zag manner at 100 mm pitch.

#### **22.0 STANCHIONS:**

Four stainless steel tube stanchions in 304 grade and 2B finish of 38 mm OD x 1.6mm thickness as per IS: 6913-1992 should be provided in between the saloon continuous beam and saloon floor as per seat layout plan. Suitable SS plate of 6 mm with balata packing shall be provided at bottom ends of the stanchions and to be fitted on floor longitudinal members with through bolts and with tapped bolts on roof continuous beam of M6 size with SS 40X40X6 angle.. The stanchions shall be fitted rigidly.

#### **23.0 CONTINUOUS ROOF HAND RAIL:**

Two rows of continuous roof hand rails (grab rails) in stainless steel tube of 25 mm OD x 1.6 mm thick in 304 grades and to be finish has to be provided as shown in seat layout drawing. The intermediate support brackets to be in Aluminum extruded section Indal 9638 of 30mm width. These brackets are to be grey powder coated. These hand poles are to be provided with 18 nos. plastic moulded swiveling type hand holds with nylon ribbon arm slings in green/Yellow colour, one per bay. Ends of these pipes shall be joined together duly inserting a pipe of 100mm long.

#### **24.0 WINDOW GUARD RAIL:**

Two rows of guard rails in stainless steel tube in 304 grade and 2B finish of 20mm OD x 1.6 mm thick as per IS: 6913-1992 has to be provided from outside on both sides of the vehicle at a height of 75 mm and 175 mm above waist level. The pipes shall be bolted to the pillars with M6 bolts and intermediate, end sockets as per drg.no.CB16LB115. Tapping plates in GI flat 30x6 mm x 125-mm long shall be provided inside the pillar for fitment of guard rails.

#### **25.0 CABIN FRONT WINDSCREEN, SALOON REAR GLASSES AND WINDOWS:**

25.1 The cabin front-end shall be fitted with two-curved wind screen glasses of size 1220x1020 mm. The windshield glass frame assembly shall be made in MSL 25x25x3 mm to match the profile of the curved glasses. The wind shield frame shall be provided between front cant rail and dash structure duly welded on all sides. A center post reinforcement of formed 'U' section in GI sheet 25x75x25x3.00 mm shall be provided duly welding on the dash structure and front cant. The complete frame to be covered with 0.91 mm Aluminum sheet from outside and 0.5 mm stainless steel sheet from inside. The curved laminated glasses shall be of 5.76 mm thick with minimum 0.76 mm PVB film, select float quality, safety clear WAVE FREE as per IS: 2553 - 1971 and to be fitted with 47.5 mm EPDM synthetic rubber extruded section. The approved brands for glasses are DURASAFE, DURATUF, ATULTEMP, REALSAFE, SEKURE, SEKURIT, and GSC. All corners of windshield glasses shall be provided with clamps in Aluminum sheet 1.6 mm in black powder coating.

25.2 The saloon rear end glass shall be bonded to the MS angle 30x30x3 mm frame provided in the rear body structure with P.U. sealant. The single piece glass shall be of 1760(L) x 800(H) mm size in 5.0 mm thick, toughened safety bronze tinted glasses as per IS: 2553 - 1990 & IS: 2835 - 1987. The lettering work to be done on the glasses and at cant level as mentioned below:

“BREAK THE GLASSES IN EMERGENCY FOR EXIT “

In Telugu:

" అత్యవసర సమయంలో ఏ అడ్డముస్తానను వారుగొట్టము"

- 25.3 The window frames in Hindalco 6482 extruded section as per drg no: CB18WDG128 shall be provided between waist rail and intermediate rail. For a standard bay of 1130 mm, the window frame size shall be 1125 x673 mm. The window frame shall have two horizontal sliding glasses of 600(H)x540(L)mm size with flock channel of EPDM rubber quality. The area between cant rail to intermediate rail shall be provided with 5.0 mm toughened bronze tinted fixed glass of size 1127x330 mm. The glass shall be bonded to the 1.6 mm Aluminum sheet on cant rail and 1.6 mm Aluminum sheet 'Z' flange on the intermediate rail by applying PU sealant of approved make/ brands. The window glasses shall be of 5.0 mm thick toughened float quality, safety bronze tinted glasses as per IS:2553 - 1990 & IS: 2835 - 1987. Window frames shall be black powder coated.
- 25.4 The edges of all sliding glasses shall be ground, chamfered and polished to smooth surface. All sliding shutters are to be provided with finger pulls in Indal 1752 section 100 mm long.
- 25.5 Vertical overlap of window frames on pillars shall be provided with a sealing rubber profile as shown in the drawing. The fixed glasses are to be secured intact.
- 25.6 Approved makes of EPDM rubber profiles are Rubber Extrusions & Moulding/ASP/ALP.
- 25.7 Approved makes of P.U sealants are Total seal/Sikaflex/3M India/Bostik/ Anabond and Henkel.

## 26.0 PASSENGER ENTRANCE, ASSIST RAILS AND DRIVER'S DOOR:

- 26.1 The passenger entrance cum exit on LHS side as shown in the drawings shall be provided with two Jack knife doors.
- 26.2 The Jack Knife door design with manual operation should be as per drawing No.CB18JKG121. The door glasses shall be 5.0 mm clear toughened float glass in 1500 mm x 190 mm size and to be pasted with PU sealant to the door frame. Two railway type latches in MS flat 30x6 mm shall be provided from inside for locking the door in closed and open position. The latch items shall be galvanized. Two Aluminum handles 100mm long shall also be provided for the JK doors. The JK doors mounting shall be with 3 forged hinges on both side pillars. Two flaps shall be joined with 3 forged hinges with reinforcement of 3.00 mm GI sheet.
- 26.3 At entrance on both sides of step well, assist rails in stainless steel tube in 304 grade 38 OD x 1.6 mm thick shall be fitted from roof stick to floor with approved make Nylon sockets and tapped bolted to the tapping

plates provided in roof sticks at top and on cross bearers at bottom. Two horizontal support pipes and one diagonal support pipe in stainless steel tube 304 grade 32 OD x1.6 mm thick shall be provided on both sides of step well. One additional stanchion in 304 grade 38 OD x 1.6 mm thick is to be provided at center of step well on floor. One assist rail in 32mm dia is to be provided on 2<sup>nd</sup> step and to be connected to step well middle stanchion as per the design given. The pipes shall be fitted with approved make suitable SS flats. The joints of stanchions and assist rails shall be provided with M6 steel bolts and steel doom nuts.

**26.4 DRIVER'S DOOR:**

The driver's cabin door shall be provided with a full drop type window duly extending up to floor level as per sketch no.CB18DRG119. The window frame shall be in Hindalco 6482 section as per the window design. The door shall have one heavy-duty door lock with outer handle, one locking latch from inside, striking plates and dovetail catches. The door shall be fitted with two forged hinges on 'A' pillar. Driver door frame shall be provided with one horizontal bar in stainless steel 25x1.6 pipe from inside for holding.

**26.5 EMERGENCY DOOR:**

One Emergency door extending from intermediate cant rail to saloon floor on right side shall be provided as per the layout and drawings. The door is to be provided with one horizontal sliding window and one heavy duty lock operable from inside, dovetail catches. The location of the emergency door is to be exhibited from inside & outside with Vinyl stickers and outer periphery is to be provided with red color reflective radium sticker.

**27.0 LUGGAGE CARRIER AND LANDING PLATFORM:**

A luggage carrier fabricated on the lines of drawing no. CB18LCG124 covering four bays including a landing platform up to rear end shall be provided on the roof top. The Luggage carrier frame and side railing shall be provided in MS angle 30x30x3 mm. The cat walk arrangement 270 mm wide to be on the LH side. The floor of luggage carrier and catwalk should be covered with 2.0mm base thickness 5-bar Aluminum cheq.sheet conforming to alloy 65032, Temper WP of IS: 737-1986 and riveted to Cross members and frame work of luggage carrier with MS solid rivets . The luggage carrier legs to be mounted on the galvanized MS 6mm base plates attached to the roof sticks. The mounting of the luggage carrier shall be by means of bolting to the galvanized formed 'L' bracket that is welded to the base plate. PU sealant to be applied around mounting legs to prevent water entry.

**27.1 Landing Platform:** A landing platform on the rear side of roof top should be provided as per drawing no.CB18LDG113. The platform floor should be in 5-bar Aluminum cheq. plate of 2.0 mm base thickness.

**27.2 ACCESS LADDERS:** One access ladders at the rear end should be provided as per Drg.no. CB18LDG113up to skirt level only.

27.3 UNLOADER GRILL: An un-loader grill on LH side above rear wheels has to be provided in ERW 19 OD x 1.6 mm as per drawing no. CB18LDG113 .It shall be covered with 1.22 mm chequered sheet.

#### 28.0 PASSENGER SEATS:

The seat layout plan and seating arrangement shall be as per the respective drawings.no.T2257SG18104 for AL, T1860SG18304 for TATA and T3055SG18204 for Eicher.

#### 28.1 SEAT FRAMES:

The seat frames for single, twin and triple seater shall be as per the drg.no.CB18SFT130.The legs of seat frames should be located on floor longitudines and seat rail only. Belting fabric 3 mm thick (one piece) shall be provided in between the floor and seat leg foot piece. The seat legs shall be fastened with M8 X 1.0 mm hexagonal head bolts using plain washers and Nyloc nuts. Provision to be made for advertisement on back of the seat as shown in the drg. The seat frames should be powder coated.

#### 28.2 SEAT BOTTOM CUSHIONS:

Seat bottom cushions shall be provided in P.U. moulded foam conforming to grade "J" of IS: 8255 - 1976. The density of P.U.foam shall be between 45 to 50 kg/cu.m. and indentation hardness shall be between 15-17 Kgf at 25% deflection.

Sizes:	Three seater	:	1200x 380x 90/65 mm
	Twin seater	:	813 x 380 x 90/65 mm
	Single seat	:	406 x 380 x 90/65 mm

The cushions to be mounted on 8.0 mm thick ply wood conforming to Grade-MR, type-AA, as per IS: 303 - 1989. The upholstery shall be with expanded vinyl coated fabrics as per RDSO specifications. The color of rexine shall be in charcoal grey with prior approval of CME(C&B) only. The bottom plywood shall have 4 vent holes of 10 mm dia. Per passenger seat. The bottom of plywood should be pasted with 1.0 mm thick ABS panel. The bottom should be fitted 25 mm ahead of seat frame level.

#### 28.3 SEAT BACK SQUABS:

The P.U. moulded foam back cushion of 30mm base thickness as shown in the drawing and conforming to grade "E" of IS: 8255-1976 shall be mounted on 8.0 mm thick plywood of grade - MR, type-AA, of IS: 303-1989 and upholstered with same expanded vinyl coated fabric mentioned above. The back of plywood shall be pasted with 1.0 mm ABS sheet of matching shade and to be fitted with fibre grab handles on the back side of seat back ie, . 2 for two seater and 3 for three seater

28.4 A sample seat shall be produced for approval of Chief Mechanical Engineer (C&B) before manufacturing in bulk and fitting in the vehicles.

28.5 All upholstery work shall be carried out with 3mm piping at all joints. A margin of 12 mm shall be provided for Rexene along the stitching lines and double stitching to be provided duly folding the Rexene edge by 6 mm. The tacking of Rexene to plywood to

be by folding the Rexene by 12 mm with a pitch of 50mm in between nails.

- 28.6 The sewing thread makes to be of “MODI/COATS”, variety No.38 as per IS: 1720-1978.

**29.0 DRIVER’S SEAT:**

The OE knitted type driver seat supplied with chassis shall be retained. The driver seat frame mounting on cabin floor shall match the OE mounting position.

- 29.1 In case of non-supply of OE knitted driver seat with the chassis, HDPE knitted driver seat of approved make shall be fitted. The seat shall have fore and aft, up and down adjustment of 100mm with reclining back and to be fitted 350 mm away from steering wheel edge when the seat is fully forwarded.
- 29.2 The height of driver seat bottom shall be 450 mm when measured in fully lowered position.
- 29.3 There shall be a thigh clearance of 200 to 260mm between steering wheel edge and driver seating position
- 29.4 The driver seat shall be so located that the center line of driver seat shall be 705 mm away from the center line of body.
- 29.5 The driver seat shall be provided with “ELR” type safety belt of M/s.Autoliv or Rane make. (Conforming to AIS 05). The middle seat in six seater and single seat shall be provided with static type belts.
- 29.6 The driver seat frame mounting on cabin floor shall match the OE Mounting position.

**30.0 BATTERY BOX:**

The battery box with flap door shall be provided on LHS side below floor level at front of front wheel to accommodate two 12V batteries of size 521Lx292Wx248H mm with slider arrangement. The battery box is to be fabricated with MSL 40X40X6mm and MS Flat 40x6 and is to be paneled with 0.91 mm GI sheet on floor and three vertical sides. Interior of the battery box is to be overlaid with 0.5 mm stainless steel sheet of 430grade. Wood packing shall be provided between holding clamps and batteries to prevent vibrations while the vehicle is in operation. Four rows of single -length battery cables to be connected to the battery cut-off switch terminals to self starter and batteries. The terminals and cables should be firmly clipped in position with cable tie. A flap door in 1.6 mm aluminum sheet with proper reinforcement, locking arrangement and stay rod is to be hinged with stainless steel piano hinge at top level.

**31.0 ELECTRICAL WIRING AND OTHER FITMENTS:**

- 31.1 The earth return system of wiring should be used. All automotive cables used shall be of IS: 2465 - 1984 quality covered with PVC sleeve as per IS:1951-1961. Wherever PVC sleeves carrying the cables have to pass through panels suitable rubber grommets of EPDM quality shall be inserted in the holes of such panels and structural members and shall be securely clipped as near as practicable to such rubber grommets to minimize chaffing.
- 31.2 All wiring shall be carried through Aluminum extruded section wire casing Indal 2735 in two rows along the cant rail offside and near



- side in such a way that it shall be easily accessible at all points without the need to strip major paneling of body. The extruded section shall be so located and fitted as not to affect the appearance of body. Any wiring, which has to run along the chassis frame shall be securely, clipped to ensure that there shall be no chaffing with any of the moving parts. Further care shall be taken to route such wiring in such a way that it is not subjected to splashing of oil, water, mud etc.,
- 31.3 The battery main cable of size 398/0.40 mm shall be provided as required duly using good quality lugs with proper soldering, bolting and insulation etc., there shall be no joint in battery cables.
  - 31.4 The saloon and cabin are to be provided with 8 nos. of 390x130 mm long LED light assemblies of approved makes as per layout drawing. Out of these two shall be with in-built night lamp of blue colour.
  - 31.5 One LED type light with separate switch of approved Design shall be provided at conductor seat.
  - 31.6 All OE electrical fitments shall be retained and kept in working Condition. Any extension of wiring harness should be done by providing male female connectors only. Tapping of power for saloon lighting etc., shall be taken from the OE female sockets provided by the chassis manufacturers. There should not be any tapping of power by slashing the main harness.
  - 31.7 The OE wiper machine, arm and blade supplied with the chassis shall be provided at cant level. Washer tank, if included in the system and supplied with chassis, is to be fitted on left side of front end structure at a convenient location. In case wiper assemblies are not supplied with the chassis 17 W Lucas TVS electrical wiper machine with blade of 610 mm length (min) shall be provided by the fabricator.
  - 31.8 One single tone Air horn of Roots/ELGI make shall be provided. In addition to the OE electrical horn one more electrical horn conforming to type -3 of IS 1884- 1993 shall be provided for AL vehicles. The noise levels of these horns should be between 93 dB to 112dB.
  - 31.9 Piano switches as per IS: 9433 -1980, 230Vx5 amps shall be used. A 6-pole disc type fuse box with independent fuse designated for every electrical circuit shall be fitted on switch board provided at cant level. Maximum current capacity of a circuit shall not exceed 15 Amps. The current carrying capacity shall be 1.5 times the load current of the electrical circuit. The fuses used shall conform to IS-4063 /1982. Switches and fuse box are to be fitted on hylam/decolam sheet of 3 mm thick and to be fitted on sunken tray located above the driver door with non metallic shielding to avoid short circuits.
  - 31.10 Cable ends shall be suitably crimped with lugs/soldered so as to with stand vehicle vibrations. The inter connections shall be made through couplers/junction boxes/ terminal blocks only. Weather proof connectors shall be used for connecting cables which are exposed to atmosphere to avoid water/moisture ingress during use.
  - 31.11 Two additional head light assemblies of 8” dia with suitable reinforcement for fitment on front end structure, are to be

- provided with OE head lamp assemblies. They shall be fitted at a distance not more than 400 mm from the extreme outer edge body and not more than 1200 mm height from the ground.
- 31.12 In Ashok Leyland buses, OE front direction indicator lamps shall be retained and to be provided below 1500 mm height on the outer edge of body in amber color. For TATA and Eicher buses, approved type front indicators shall be provided. In addition to this, four more LED type direction indicator lamps (flat type) in amber color shall be provided on the lateral side of the body at wheels and below 1500 mm height from the ground.
- 31.13 LED type height marker lamps in white color at front and in red at rear shall be provided. The marker lamps shall be above windshield glass at front and above cant level at rear on maximum possible outer edges.
- 31.14 LED type tail lamps in 5" dia 3 no's on each side (one -red, one-white and one -amber) shall be provided. The mounting shall be below 1500 mm from ground and 400 mm from the outer edge. The red lights shall have individual circuits for parking and brake lights.
- 31.15 Rear number plates shall be provided with LED type light assembly of 300 mm length
- 31.16 Flat type LED blinkers in amber colour shall be provided at cant level on all four corners.
- 31.17 OE battery cut-off switch supplied with chassis shall be provided with separate fuse control. In case of non supply of battery cut-off switch along with the chassis, IGSA-552 or part no. LP-134/3 of Lucas India Services Ltd., make shall be fitted in drivers cabin with a label "Battery Cut-off switch". The battery cut-off switch to be located 300mm above the cabin floor on 3.00 mm GI plate provided in side structure.
- 31.18 Two 24V, 3-pin plug sockets are to be provided, one on the dash board in driver's cabin and one near conductor seat for connecting inspection lamp/TIMS
- 31.19 Six speakers of approved make shall be provided (one in cabin and five in saloon) along with approved make Amplifier. The speakers shall be fitted in parcel rack at cant level duly mounting on FRP speaker box of approved design. Amplifier shall be fitted in Alu/SS box with lid and locking arrangement is to be fitted in driver cabin at suitable location.
- 31.20 Conductor's buzzer with bell switches 4 nos. to be provided.
- 31.21 One reverse gear horn / alarm (4 tone) shall be provided with noise level not more than 100 dB if not supplied with the chassis.
- 31.22 All LED type lights shall comply with the specifications furnished at Annexure-III
- 31.23 In the driver cabin Instrument panel with all gauges, OE switches & indicators with labels shall be provided at 45-degree angle and shall be within the reach of driver from his seat. The frame shall be fabricated in MS angle 25x25x3 mm covered with 0.91 mm thick GI. sheet.
- 31.24 Power for connecting Wiper, Indicators, Fog lamps shall be drawn From the fuse box provided by Chassis manufacturer with male/ female connectors.

- 31.25 Never connect the circuits with twists & knots. Never tap power by slashing the main harness.
- 31.26 LED Lights shall be provided in luggage booths (two nos), in battery box (one no ) and in spare wheel carrier(one no).

**32.0 BODY PAINTING AND COLOR SCHEME:**

- 32.1 Body to be painted on the exterior and interior with synthetic air-drying coat type enamel paints. The body under frame and chassis shall be painted with anti corrosive rubberized paint. The exterior painting process shall consist of carefully cleaning and etching followed by self etch primer coat, an under coat, finish coat and glaze coat.
- 32.2 Approved paint(SE) brands are: ‘Autostar’ of Akzo Nobel Ltd / ‘Aspa’ of Asian Paints/‘Nova plus’ of Kansai Nerolac.
- 32.3 Color Scheme - Color scheme should be as per Sketch furnished. The paints shade reference is given below:

a)Exterior portion

Shade	Shade reference
Crystal white	ICI-169037
Satin black	ICI-169003
Pista green	ASPA-0G03
Lemon Yellow	ASPA-0317

c) Interior portion

i. Interior roof, including front and rear destination boxes	Franchoise white	ICI-169012
ii. Seat frames	SE black	ICI-169002
iii. Destination boards, inside portion of boxes	White	ICI-169001
iv. Number plates	Golden Yellow back ground and black color letters/numbers	size 65Hx10TH and 10 mm spacing

The color scheme may be modified or changed at the time of execution of bus body fabrication as per the instructions of Chief Mechanical Engineer (C&B).

- 32.4 APSRTC monogram shall be provided on both sides of body as Per SKETCH1516 in image transfer stickers.

**33.0 MISCELLANEOUS FITTINGS TO BE PROVIDED:**

- 33.1 Two Fiber handles of 100 mm size are to be provided at waist level of cabin front end. Two footsteps on the bumper shall be provided for cleaning of front windshield. Footsteps should not protrude outside the bumper.
- 33.2 Two OE fully adjustable rear view mirrors of convex type supplied with chassis shall be fitted with brackets of as per drawing CB18RBG139, one

convex mirror to be fitted inside driver cabin and one convex type mirror shall be fitted at outside of front end (center) for near vision of road at front. The location of rear view mirrors shall be so located to have at least 2500 mm wide vision from the body line of vehicle when viewed from driver seat.

- 33.3 The front Registration number plate in Aluminum sheet 1.6 mm to be provided on the front bumper with Indal 5505 beading around registration number plate. The size of the number plate shall be 450x250 mm. The rear registration number plate shall be on rear bumper.
- 33.4 Two fire extinguishers of approved make and dry chemical type 2.0 kg capacity conforming to IS: 2171 of 1985 suitable for ABC class of fires shall be provided with suitable MS clamping , arrangement.
- 33.5 Rubber mud splashguards of size 650x456 mm for rear and front wheels to be provided.
- 33.6 First aid box of stainless steel in size 310x220x128 mm with leather straps and locking arrangement shall be provided in driver cabin. First aid medicine kit containing the items mentioned under Rule 138(d)(4) of the latest M.V.Rules shall be provided in the box.
- a. Antiseptic cream of 5.0% centrimide I.P  
In non-greasy base 5 mg ...2 pcs.
  - b. Sterile Surgical gauge dressing ...1 pack of 4 pcs.
  - c. Wash proof plaster ... 5 pcs.
  - d. Sterile elastic plaster - size 6cmx30 cm ... 1 pc.
  - e. Gauge rollede - size 7.5 cm x 2.5 mtr. ... 3 pcs.  
Elastic bandage for wounds and burns  
Size - 8 cm x 1.5 mtr. ... 1 pc.
- 33.8 One pair of towing hooks with 36 mm eye dia.punched in MS flat 75x12 shall be provided at the rear end, to be attached to chassis long member with 4 nos.M12 bolts.
- 33.9 All lettering work in vinyl stickers shall be done as per the guidelines.
- 33.10 The rear bumper should be in GI sheet 3.0 mm thick-formed channel section of size 50x175x50 mm in single piece with brackets in MSL40x40x6mm and to be fitted to the chassis long members. The ends of the bumper to be curved. The right side portion of bumper shall be made sunken to accommodate a registration number plate and Number plate light.
- 33.11 The OE front bumper supplied with the chassis shall be retained. Front bumper length shall be increased to suite the body width i.e., 2590 mm. If the chassis is not supplied with front bumper, the bumper shall be fabricated in GI. sheet 3 mm of size 40x300x40 mm to suite the body width. The mounting shall be attached to chassis long members with MS angle 50x50x6 mm 400 mm long.
- 33.12 Two sunken footsteps of size 150x150mm shall be provided below the driver door one at 700 mm height from the ground and another at 950 mm.
- 33.13 The entrance and driver's doors shall be provided with water drain canopies at cant level in Aluminum sheet 1.22mm.
- 33.14 Pure rubber matting of 3.0mm thick shall be provided for foot

- control pedal in driver's cabin.
- 33.15 A footstool for driver to be provided in Aluminum 5-bar cheq.sheet 3.00mm and Indal 2651 as legs.
- 33.16 Tapping of compressed air for windscreen wiper and air horn should be from port no.24 of system protection valve with proper unions, 'T' joints. Metallic pipeline of 5.0-mm dia. with copper coated interior shall be used for tapping air. The pipeline shall be firmly clamped in position.
- 33.17 One safe locker for keeping conductor's cash, tickets etc., with locking arrangement shall be provided at 1<sup>st</sup> two seater immediately after middle passenger entrance.
- 33.18 One roller type sun visor of 24" size to be provided in driver cabin
- 33.19 The OE spare wheel carrier if supplied with the chassis shall be located as shown in the structural drawing. In case of non-supply of carrier type bracket, one Spare wheel carrier arrangement shall be provided as per Drg.no.CB18SWG131 on LHS at rear of rear wheels. If the chassis are not supplied with carrier type bracket, the firm shall provide one spare wheel carrier fabricated in MS flat 75x12 mm and 6.0 mm MS sheet. Care shall be taken to avoid fouling of spare tyre with any of chassis units/parts under any circumstances. The Spare Wheel carrier shall be provided with flap door with full length stainless steel hinge 1.6 mm thick and 30 mm wide from the bottom of the cross bearer to skirt rail with locks and stay rod in MS rod 6 mm. The spare wheel carrier shall suit 10R20 size Tyre.
- 33.20 Driver & engine bonnet to be separated from passengers by providing one row of stainless steel pipe in 304 grade, 25 OD x 1.6 mm thick vertical supports and Steel sockets with balata packing.
- 33.21 All unutilized chassis components to be returned at the time of delivery of bus.
- 33.22 The seats earmarked for Ladies, PHC persons, Senior citizens are to be very clearly exhibited on seat back rests.
- 33.23 Retro-Reflective Conspicuity Marking tapes of Diamond grade 50 mm wide conforming to AIS: 90 of approved make shall be bonded to the body sides as per the sketch provided. The cumulative length of tapes provided shall not be less than 80% of length of that side. These tapes shall be white in color at front, yellow on sides and in red at rear of the body.
- 33.24 Driver's cabin shall be suitably ventilated. One Aluminum disc ventilator shall be provided below dash structure.
- 33.25 One stainless steel assist rail of 32x1.6 OD up to a height of 600 mm from floor shall be provided on rear pillar from inside at driver door bay.
- 33.27 One Guard rail in SS of size 25x1.6 mm shall be provided in side luggage booths.
- 33.28 G.I. sheet 0.50 mm thickness shall be provided inside the bonnet.
- 33.30 One 200 mmSS handle to be provided on outer side of driver door.
- 33.32 Stainless steel sheets, tubes, pipes etc. should be of Jindal make/any other source approved by APSRTC.
- 33.33 "Break any glass in Emergency" stickering to be displayed on rear saloon glass both in English and Telugu
- 33.26 A slogan in Telugu to be exhibited as follows on the back side of Front destination box flap door.

“ఈ బిస్సు మనందరిది !  
దీనిని పరిక్షుభంగా వుంచుదాం !! ”

---