GUIDELINES AND TECHNICAL REQUIREMENTS FOR UPGRADED REHABILITATION OF BOXN WAGONS TO BOXNR (WITH STAINLESS STEEL BODY)
FOR
BROAD GAUGE (1676 mm)

S.No. | Month/Year of Issue | Amendment No. | Page (s)
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RESEARCH DESIGN AND STANDARDS ORGANISATION
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MANAK NAGAR, LUCKNOW - 226 011

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Dated: 03rd December, 2010

Sub : “Guidelines and technical requirements for upgraded rehabilitation of BOXN wagons to BOXNR wagons (with stainless steel body)”

The following amendment is issued with the approval of the competent authority:

<table>
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<tr>
<th>Clause/Para</th>
<th>Amended from the existing to</th>
</tr>
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<td>Section B, Para 1.0</td>
<td><strong>Experience:</strong> Only firms having minimum experience of one year in fabricating stainless steel sub assemblies shall be considered. The firm should have experience in fabricating stainless steel sub-assemblies weighing a minimum of 1000 kg. The minimum annual output of the firm in any of the last three financial years should be 200 Tonnes of steel. A documentary proof for above shall be submitted by the firm.</td>
</tr>
<tr>
<td>Section B, Para 2.0 c)</td>
<td><strong>Skilled Artisans:</strong> Trained welders should be available who are either ITI passed (in welding trade) with minimum 2 years experience in welding or Have a minimum of 5 years experience in welding and trained in welding of steel. Welders should be certified as per IS: 7310 Part – I (1974 or latest) for steel welding by well recognized certifying agencies like Indian Institute of Welding or it’s certified agencies/Welding Research Institute etc. and the validity of their certification should be current. Only welders who meet these criteria shall be engaged in fabrication of side walls, end walls &amp; flap door. The firm should provide documentary evidence for the same.</td>
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1.0 SCOPE

This guideline is in two parts. Section A deals with the technical requirements of upgraded rehabilitation of BOXN wagons in Railway Workshops and Section B deals with the infrastructure and quality control requirements for manufacture and supply of body side wall, end wall and flap door of BOXNR wagons.

SECTION A

TECHNICAL REQUIREMENTS FOR UPGRADED REHABILITATION OF BOXN WAGONS TO BOXNR WAGONS IN RAILWAY WORKSHOPS

1.1 This guideline covers the technical requirements for the rehabilitation and upgradation of BOXN wagons to BOXNR for increasing capacity and resistance to corrosion. The work involves fabrication of new sidewalls, end walls, replacement of floor plate, doors and damaged under frame members.

Preferably BOXN wagons in age group 12-18 years should be taken up for rehabilitation and upgradation unless condition of a particular wagon so dictates. The wagons found with damaged centresill and camber less than 2 mm should not be considered for upgradation.

After the rehabilitation and upgradation, the wagon shall be marked as BOXNR in place of BOXN. The major differences in constructional features of BOXN & BOXNR are as under:

SIDE WALL

<table>
<thead>
<tr>
<th>BOXN</th>
<th>BOXNR</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Material mild steel</td>
<td>(i) Material stainless steel (IRS:M44)</td>
</tr>
<tr>
<td>(ii) Provided with 6 Nos. of side stanchions with 8mm thick hat section (on one side)</td>
<td>(ii) Provided with 9 Nos. of side stanchions with 6mm thick CRF hat section (on one side)</td>
</tr>
<tr>
<td>(iii) Side sheets of 5mm thickness</td>
<td>(iii) Side sheets of 3mm thickness.</td>
</tr>
<tr>
<td>(iv) Inside height of side wall is 1950mm from floor level.</td>
<td>(iv) Inside height is 2127mm from floor level.</td>
</tr>
<tr>
<td>(v) Two Nos. middle coping provided in sidewall.</td>
<td>(v) Middle copings are not provided in side walls, except at corner side panels.</td>
</tr>
<tr>
<td>(vi) Top coping provided with ISMC-100</td>
<td>(vi) Top coping provided with press section of BOX 100x100x6mm thick.</td>
</tr>
<tr>
<td>(vii) Side stanchion riveted with sole bar with two rows rivets.</td>
<td>(vii) Side stanchion huck bolted with sole bar with single row.</td>
</tr>
</tbody>
</table>
DOOR PLATE

(i) Door Plate provided with Mild Steel for 5 mm thickness

(ii) Door plate provided with stainless steel of 4 mm thickness.

END WALL

(i) Made with mild steel.

(ii) End wall provided with four Nos. of End stanchions of ISMC-150mm.

(iii) End wall provided with two side stanchion in three pieces and two middle coping of Hat section 6 mm thickness.

(iv) End top coping provided with ISMC-150 channel.

(v) End top coping provided with CRF section of BOX 100x100x6mm thickness.

(vi) End Sheet provided with 5 mm thick

(vii) End Sheet provided with 3 mm thick

FLOOR PLATE

(i) Floor Plate provided with Mild Steel for 6 mm thickness

(ii) Floor plate provided with stainless steel of 4 mm thickness.

2.0 DESCRIPTION OF WORK:

The rehabilitation of BOXN wagon body by using of CRF section (to RDSO’s specification no. WD – 01 – CRF – 08 latest revision) and stainless steel (IRS:M 44: 97 latest revision) will provide additional strength to body and reduce corrosion. The volume will also increase to fully utilize the capacity up to 22.9 Tonne axle load for coal.

A list of construction drawings of BOXNR is as under:

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Latest Alteration as on Sep 15th 2010</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>WD-07001-S/01</td>
<td>2</td>
<td>Index</td>
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<td>WD-07001-S/02</td>
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<td>WD-07001-S/03</td>
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<td>WD-07001-S/04</td>
<td>2</td>
<td>Under frame Arrangement</td>
</tr>
<tr>
<td>WD-07001-S/05</td>
<td>4</td>
<td>Under frame Details sheet-1</td>
</tr>
<tr>
<td>WD-07001-S/06</td>
<td>1</td>
<td>Under frame Details sheet-2</td>
</tr>
<tr>
<td>WD-07001-S/07</td>
<td>1</td>
<td>Under frame Details sheet-3</td>
</tr>
<tr>
<td>WD-07001-S/08</td>
<td>8</td>
<td>Body side Arrangement</td>
</tr>
<tr>
<td>WD-07001-S/09</td>
<td>4</td>
<td>Body side stanchion</td>
</tr>
<tr>
<td>WD-07001-S/10</td>
<td>8</td>
<td>Body End Arrangement</td>
</tr>
</tbody>
</table>
2.1 The wagon underframe needs to be strengthened and additional cross members (cross ties) are to be provided to make integrated structure of body and under frame, as shown in drawing no-WD-07001-S/04.

2.2 As nos. of stanchions on side wall has been increased to 9 from 6, the location of holes for fitment has been changed. Hence, sole bar is to be strengthened to take additional load to compensate for the loss of strength due to additional holes, as per drawing no- WD-07001-S/05. In case solebar needs replacement with new one, proper fitment with cross members to be ensured.

2.3 Attention to components like bogie, coupler, draft gear etc. should be given as per extent instruction of Railway Board and RDSO on the subject.

2.3 Railway Workshops nominated to carryout upgradation can purchase side walls, end walls and flap doors from outside agencies having facilities as covered in Section B.

3.0 WORK DETAILS:

3.1 Stripping: The stripping of wagon's body structure (Side & End Panels, Door etc.) shall be carried out as per following:

- Stripping: Detach the doors of wagons by removing its cotter pins and other attachments to the body structure.
- Trim the Side and End top copings and disconnect the side and end panels joined at corner stanchion at top.
- Trim off the side and end panels from the crib angles.
- Cut all the rivets of corner stanchions, side and end stanchions by gas or other suitable mechanical means.
- Lower the body structure by means of crane or other suitable means and placed on the floor.
- Trim off the crib angles from the side and head stock.
- Remove the floor plate from the underframe.
3.2 Cleaning of Underframe:

Cleaning of the underframe can be carried out by placing the underframe on trestles. Both cleaning and derusting can be carried out simultaneously. The members are to be made rust free by scrapping and hammering so that it can be checked if any member is heavily corroded or deformed requiring rectification. Surface cleaning shall be to St3 as per IS 9954:1981(or latest).

3.3 Repair of Underframe: Please refer to “Maintenance Manual for Wagons” (March 2001 or latest).

Before taking up the repair work, the underframe is to be inspected in respect to the following:-

(i) Cracks  (ii) Alignment and  (iii) Replacement of members.

(i) Cracks:

If any crack is found in the member of the underframe, the same should be rectified as below:-

(a) In case of horizontal crack, it is to be drilled out at both ends and cracked portion gouged out and welded properly.

(b) In case of vertical cracks, strengthen the cracked portion by patching.

(ii) Alignment: The underframe is to be inspected for its proper alignment and any deflection of its member either in form of sagging or buckling should be rectified as per “Maintenance Manual For Wagons”(March 2001 or latest).

(iii) Replacement:- If any member of underframe is found beyond repair except centre sill, it should be replaced with the new one.

3.4 Repair of Head stock and Cross Bars:

i) Slightly bent members or portion as the case may be, are heated in position and straightened by means of straightening device or by applying blows with sledge hammer. To carryout this repair, the CBC assembly is to be stripped off.

ii) Strip the heavily bent members and sent to Smith Shop for alignment. The members are to be straightened.

iii) If any defect is noticed in sole bar of the underframe, then it should be rectified as below:-

Cracks at web/flange to be given proper repairs by electric arc welding. Cracks on flange extended up to web should be duly supported with plain or flanged patch, as the case may be.
In case there are more than two joints, the complete sole bar should be replaced.
Slightly bent sole bars should be repaired by local heating and straightening. If flanges are only bent, the same are straightening by a jawed crow bar.
In addition to above repair work, the underframe should be modified and strengthened (Solebar etc.) to RDSO drg. No WD-07001-S/04 with latest alteration.

4.0 DETAIL OF MATERIAL REQUIRED IN WORKSHOPS:

The following materials should be available at the time of rehabilitation work:

4.1 Body Side, End Wall & Flap Door assemblies to drg. No WD-07001-S/08, WD-07001-S/10 and WD-09081-S-01 respectively.

4.2 4 mm thick floor plate to Specn. IRS:M 44 (Ref. to RI WD-07001-S/04) (floor plates are to be welded at suitable location to provide backing of underframe members just below the weld seam).

4.3 Lock bolts of sizes ½", ¾" and 7/8" are to be provided as per Clause 5.1 & 5.2. Availability of proper tooling required for application of these bolts is to be ensured.

4.4 Adequate number of cross bars, should be available beforehand to drg. No WD-80007-S/15 so that these can be changed as and when required. In addition to this, adequate No. of C.P Top & C.P Bottom should be available so that on condition basis these can be changed.

4.5 Sufficient No. of electrodes for welding of bi-metal (IRS:M44 to IS:2062) should be available as prescribed in RDSO specification no. G -72 Rev.3. (Amendment no. 02 of Jan 2008)

4.6 Welders qualified for welding of stainless steel to stainless steel and stainless steel to mild steel should be deputed to work for this upgradation work.

5.0 ASSEMBLY OF BODY:

The assembly of body structure should be carried out as detailed below:-

(a) Manufacture body side wall, end wall and flap door assemblies to drg. No. WD-07001-S/08, WD-07001-S/10 and WD-09081-S-01 respectively. In case these are to be procured from outside agencies, the guidelines as mentioned in Section B should be followed.

(b) Make sure that holes for lock bolting are made at strengthened solebar location and headstock location to drg. No. WD-07001-S/05 and WD-07001-S/11 respectively.

(c) Put the side wall assembly and end wall assembly on underframe and be sure that holes of side and end stanchions coincide with the holes of sole bar and head stock. After ensuring it, fix the side and end stanchion
temporarily by means of nut and bolt then tag weld the side wall and end wall with the corner stanchion.

(d) Check all the controlling dimensions of side wall and end wall, if found satisfactory or within the limit, weld the side and end wall sheets to corner stanchion and lock bolt the side stanchions with the sole bar after replacing the nut and bolt.

(e) Weld the four corner stanchions underframe to drg. No. WD-07001-S/10.

(f) After completing the body assembly, provide top corner gusseting as per RDSO Drg. No. WD-07001-S/10. The tolerance on inside dimensions of wagon and on other dimensions shall be as per Appendix – I of G-72 (Revision 3) or latest.

(g) Modified doors of IRSM-44 to be fitted and ensure for proper opening and locking of the doors.

5.1 Lock Bolting:

Entire lock bolting is to be done with zinc plated/galvanized lock bolts (conforming to ASTM A 325 – 07a) having a minimum yield strength of 250 N/mm².

A list of lock bolts required for the work of upgradation is as under:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Locations</th>
<th>Existing Dia. Of Rivet</th>
<th>Proposed Dia. Of lock bolt</th>
<th>Qty./ Wagon</th>
<th>Grip</th>
<th>Grip range (App.)</th>
<th>Drawing Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Side stanchion with sole bar outer</td>
<td>12</td>
<td>½” (12.7)</td>
<td>180</td>
<td>23</td>
<td>18-25</td>
<td>WD-07001-S-09</td>
</tr>
<tr>
<td>2.</td>
<td>Standard plate with sole bar</td>
<td>10</td>
<td>½” (12.7)</td>
<td>4</td>
<td>28</td>
<td>24-31</td>
<td>W/ML-7 &amp; 14</td>
</tr>
<tr>
<td>3.</td>
<td>Door hinge foot with sole bar</td>
<td>16</td>
<td>½” (12.7)</td>
<td>48</td>
<td>37.15</td>
<td>37-44</td>
<td>WD-09081-S-01 WD-07001-S-05</td>
</tr>
<tr>
<td>4.</td>
<td>End stanchion with head stock</td>
<td>20</td>
<td>½” (12.7)</td>
<td>32</td>
<td>19</td>
<td>18-25</td>
<td>WD-07001-S-11</td>
</tr>
<tr>
<td>5.</td>
<td>Corner stanchion with sole bar</td>
<td>20</td>
<td>¾” (19.1)</td>
<td>12</td>
<td>19</td>
<td>18-25</td>
<td>WD-07001-S-11</td>
</tr>
<tr>
<td>6.</td>
<td>Corner stanchion with head stock</td>
<td>20</td>
<td>¾” (19.1)</td>
<td>12</td>
<td>23</td>
<td>18-25</td>
<td>WD-07001-S-11</td>
</tr>
<tr>
<td>7.</td>
<td>Door check spring with sole bar</td>
<td>20</td>
<td>¾” (19.1)</td>
<td>16</td>
<td>36.15</td>
<td>31-38</td>
<td>W/DW-305A WD-07001-S-05</td>
</tr>
<tr>
<td>8.</td>
<td>Centre Pivot top with Under frame</td>
<td>22</td>
<td>7/8” (22.2)</td>
<td>8</td>
<td>56</td>
<td>50-57 (30%) 57-64 (70%)</td>
<td>WD-92058-S-6</td>
</tr>
</tbody>
</table>

Summary:

<table>
<thead>
<tr>
<th>Size</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>264 Nos.</td>
</tr>
<tr>
<td>3/4”</td>
<td>40 Nos.</td>
</tr>
<tr>
<td>7/8”</td>
<td>08 Nos.</td>
</tr>
<tr>
<td>Total</td>
<td>312 Nos.</td>
</tr>
</tbody>
</table>

Add 5% in each category as contingency

Grand Total : 328 Nos.

Note: The lock bolts on sole bar are tabulated taking into account 8 mm plate stiffeners
5.2 Proper Installation of lock bolts:-

It should be ensured that:

(i) The collar of lock bolt are completely swaged. The collar of lock bolt fasteners not completely swaged may be causes of improper tool operation or worn anvil in nose.

(ii) The pintail of fastener break without fail. The pintail of fastener fails to break due to improper installation/incorrect fasteners.

(iii) After breaking of pintail, the extruded/projected portion of lock bolt should be in the range of 2.00 to 10 mm and collar should always be on annular groove of lock bolt.

(iv) Mismatch of holes to be reamed properly to align and gas cutting to match holes is strictly prohibited.

6.0 PRECAUTIONS AND QUALITY REQUIREMENTS

The following points are to be considered before and after assembly of the wagons:-

6.1 Ensure that underframe is well cleaned and rust free.

6.2 Repair of underframe should be carried out as per Clause 3.3 of this Specification.

6.3 After repairing the underframe, its alignment, squareness and tolerances should be checked and maintained as described in Specification G-72 Rev.-3 (with Amendment no. 2 of Jan'08) or latest.

6.4 Ensure that consumable items used for different combinations of welded materials should be as detailed in G-72, Rev. 3 (with Amendment no. 02 of Jan 2008) or latest.

6.5 All the welds shall be visually inspected. Any cracks, porosity, blow holes shall be repaired.

6.6 Precautions must be taken by welder to control moisture content, where high humidity exists. The electrodes shall be taken out from the drying oven as per the requirement of work, i.e. electrodes should not be taken out for work in bulk.

6.7 All the welding operations should be down hand welding operations.

6.8 The existing holes of rivets at head stock location should be
plugged before drilling the new one for end stanchions.

6.9 Ensure that painting of underframe is carried out as explained in para 11.2 of G-72, Rev.-3 (with Amendment no. 2 of Jan’08) or latest

6.10 Ensure that brake rigging, including hand brake, and empty load device are according to Clause 7.2 & 7.5 of RDSO Specification no. WD – 11 – BOXN - 2001

6.11 Existing hand brake wheel (Ø 610) drg no. W/BG-6226 is to be replaced with lesser dia hand wheel (Ø356) as per drg. no. W/BG-1100. The (Ø356) hand wheel slot to be increased accordingly to match existing spindle for hand brake.

6.12 Maintain the “A” and “E” dimension in brake rigging arrangement to Clause 7.4 of RDSO Specification no. WD – 11 – BOXN - 2001

6.13 Ensure that the gap between the wheel flange to brake block is as per standard practice as specified in Clause 7.4 of RDSO Specification no. WD – 11 – BOXN - 2001

6.14 After assembly brake rigging shall be checked as per RDSO drawing no. WD-80007-S-09.

6.15 Workshops must keep a wagon wise record (preferably in MS excel) of fitment of side walls, end walls and flap doors being used for this work including, among others, the supplying agency for these items. The record must be e-mailed to RDSO on a quarterly basis for RDSO’s Master Database.

6.16 In order to identify the workshop that did the work of upgraded rehabilitation on a particular wagon for times to come, an oval plate (similar to the one used by wagon builders after new manufacture of wagon) must be rivetted/welded to the sole bar at suitable location identifying the name of the workshop (UST Code allotted to the workshop may be used), month and year of upgraded rehabilitation of the wagon into BOXNR.

7.0 HANDLING OF BODY SIDE WALL, END WALL AND FLAP DOOR:

For handling, following precautions are to be taken during packing of body side wall, end wall and flap door:-

7.1 Drill 1” (25 mm) dia holes on each end on top coping of side wall and end wall on top face middle and use eye bolts as per IS:4190 along with solid threaded block for lifting purpose as per Annexure I. Each side, end wall requires two solid threaded block with eye bolt for lifting each assembly.

7.2 To prevent damage to corners of walls, all the four corners of Side and End walls during handling should be well covered by 100 x 10 x 25mm thick wooden pieces before lifting of walls.

7.3 As the overall length of side/end stanchion is larger than the vertical height of side/end wall, the bottom portion of stanchion, to be joined shall always be projecting beyond end/side walls. During handling of end wall/ side wall, care must be taken to avoid any damage to bottom portion of side stanchion to be joined with sole bar, by covering with gunny bag filled with
suitable cushioning material.

7.4 If walls are stacked one on other or side by side, be sure that suitable packings are provided to avoid tilting, damage etc.

7.5 Side wall and end walls should not be stacked together.

8.0 PAINTING AND FINISHING:

8.1 Body (IRSM-44) & Underframe:

(i) Degrease with petroleum hydrocarbon solvent to IS:1745-78 (or latest), low aromatic grade 145/205 or any other degreaser (suitable for IS:2062/IRSM-44).

(ii) **Surface preparation**: Clean the parts to achieve surface finish to Min. St3 as per IS 9954:1981(or latest) and clean the surface by using compressed air or any other suitable means like brush etc. Apply one coat of Etch primer to IS: 5666-70 (or latest) to minimum DFT of 10 microns and air dry.

(iii) Apply two coats of R/M Red Oxide Zinc Chromate primer to IS: 2074-92 (or latest) to a minimum DFT of 25 microns per coat.

(iv) Apply two coats of R/M Red Oxide (ISC: 446), brushing, finishing, glossy to RDSO specification No. M&C/PCN/122/2006 (or latest) to a minimum DFT of 35 microns per coat.

8.2 The painting of bogies, couplers and air brake equipments shall be as given in para 11.2.5 & 11.2.6 of G 72, Rev.3 (with Amendment no. 02 of Jan’08) or latest.

8.3 Precautions before and after painting shall be observed as detailed in para 11.2.2, 11.2.3 and 11.2.4 & 11.2.6 of G 72, Rev. 3 (with Amendment no. 02 of Jan’08) or latest.

8.4 **General Guidelines for ensuring quality during upgradation using Stainless Steel Body (IRS: M 44 – 97)**

i) **Steps to be taken in work area while dealing with IRS: 44 – 97**

   a. It should not be contaminated by contact with mild steel or alloy steel during the fabrication process.

   b. All sources of carbon contamination should be eliminated e.g. varnish, paint, wax marking pencils, etc.

   c. Identification markings, usually written on the plate, must be removed from the weld area.
d. When carbon steel lifting lugs are used for handling heavy components, IRS:M44 pads should be used between the lugs and the component. (This prevents dilution of the IRS:M44 and carbon pick up, both of which cause deterioration in the mechanical and corrosion properties of the steel)

e. Oil or greases deposits on, or near a weld joint should be removed using suitable degreasing agents as otherwise they can cause weld related problems.

f. Prevent carry over of mild steel grinding swarf onto IRS:M 44 as otherwise it can cause significant discolouration and under some conditions, loss of corrosion resistance.

g. Before using guillotines, bending brakes etc, the equipment should be wiped clean of any adhering mild steel particles.

Most of these potential contamination problems can be avoided if separate work areas for IRS:M 44 exist that is remote from those used for mild steel.

ii) Precautions to be taken in storage of IRS: M 44 steels

a) IRS:M 44 should be stored in a dry area, separate from carbon steels.

b) The storage racks used should be made of IRS:M 44 or wood.

c) Prevent accumulation of dirt, dust and greasy deposits on the IRS:M 44’s surface as otherwise it will prevent oxygen from ensuring the integrity of the protective film beneath the deposit and localized staining can take place after lengthy shielding from the air.

d) Grinding tools, stainless steel wire brushes and other tools and equipments used for IRS:M 44 should be stored separately to avoid mild steel contamination. Marking inks free of chlorides, lead and sulphur should only be used.

9.0 MINIMUM FACILITIES REQUIRED IN RAILWAY WORKSHOPS:

The workshop should have infrastructure capability to upgrade BOXN wagon to BOXNR wagon (stainless steel).

9.1 In case the workshop intends to get side wall, end walls & flap doors fabricated from outside agencies, then following additional facilities should be available in Workshops:

- Complete tooling, power units and lock bolts required for assembly of side, end wall & flap door with solebar/head stock.

- Manipulator/Suitable means for assembly of under frame with body side wall, end wall & flap door.
• Other detailed facilities required for repair /replacement and welding of underframe members, facilities for stripping, cleaning and painting of wagons.

9.2 In case, side wall, end walls & flap door are to be fabricated by the workshop itself, the minimum facilities mentioned under Section B should be available.

10.0 MARKING OF WAGONS:

The marking of the wagon shall be done as per RDSO Drg. No. WD- 07001-S/12 and wagon old number to be retained thereon.
SECTION B

INFRASTRUCTURE AND QUALITY CONTROL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF BODY SIDE WALL, END WALL AND FLAP DOOR OF BOXNR WAGONS

1.0 Experience: Only firms having minimum experience of one year in fabricating stainless steel sub-assemblies shall be considered. The firm should have experience in fabricating stainless steel sub-assemblies weighing a minimum of 1000 kg. The minimum annual output of the firm in any of the last three financial years should be 200 Tonnes of stainless steel. A documentary proof for above shall be submitted by the firm.

2.0 Manpower resources at firm’s Works:

At the contractor’s works place, there should be following personnel:

a) Plant Manager: He shall be a Graduate Engineer in mechanical/production/industrial engineering (with minimum 3 years experience) or diploma holder in mechanical/production/industrial etc. (with minimum 8 years experience) and shall be responsible for overall production and implementation of QAP (Quality Assurance Plan) during manufacturing of components. Name and qualification of such person shall be displayed at place of work suitably.

b) Shop Floor Managers: Minimum two nos of diploma holder engineers with minimum 3 years experience should be deployed on shop floor for ensuring proper quality during manufacture. One of the diploma holder engineers should be exclusively responsible for welding. He should have been trained in welding of stainless steel sub-assemblies. Documentary proof to be shown. Name and qualification of such persons shall be displayed at place of work suitably.

c) Skilled Artisans: Trained welders (Minimum Ten) should be available who are either

ITI passed (in welding trade) with minimum 2 years experience in welding or

Have a minimum of 5 years experience in welding and trained in welding of stainless steel.

Welders should be certified as per IS: 7310 Part – I (1974 or latest) for stainless steel welding by well recognized certifying agencies like Indian Institute of Welding or it’s certified agencies/Welding Research Institute etc. and the validity of their certification should be current. Only welders who meet these criteria shall be engaged in fabrication of side walls, end walls & flap door. The firm should provide documentary evidence for the same.
d) All managerial and supervisory personnel and at least 75% of the total Welders used for this work should be regular employee of the firm & should be covered by PF rules. The firm should provide documentary evidence for the same.

3.0 Minimum Requirement of M&Ps:

(i) Firm should have at least one shearing machine of sufficient capacity so as to cut IRS M-44 sheet of thickness up to 8 mm.

(ii) Firm should have minimum 5 nos. of plasma cutting machine with minimum 12 mm thick plate cutting capacity or minimum 2 nos. CNC plasma cutting machine with minimum 12 mm thick plate cutting capacity.

(iii) Firm should have adequate number of drilling machines and grinders for ensuring smooth working.

(iv) Firm should have at least one EOT crane of at least 3 ton capacity so as to transfer side wall/end wall assembly from one place (or stocking yard) to another.

(v) One Fork Lift truck/mobile crane of at least 3 ton capacity should be available for transportation of metal sheets from one place or stock yard to another.

(vi) The firm shall have at least one straightening machine for straightening of Steel sheets.

(vii) One compressor (Min. 300 cfm) for Plasma Cutting machine.

(viii) Minimum 20 nos. MIG/MAG welding plants of minimum 400 Amps capacity should be available. **Electrode welding (Manual Metal Arc Welding) is not to be resorted to while fabricating end wall/side wall/flap door. In case, robotic welding is used for such fabrication, the minimum requirement of standalone MIG/MAG welding plants will not be insisted upon.**

(ix) Firm should have adequate number of jigs and fixtures for manufacturing of end wall, side wall & flap doors. **Power Fixtures/Modular Fixtures/Hydraulic Fixtures shall be preferred.**

(x) Firm should have adequate space under cover for fabrication and packing of panels. Fabrication and packing in open space is not permitted.
4.0 **Storage and Material Handling Requirements:**

1. Covered area with adequate space underneath for storage of raw material e.g. sheets, plates, pipes and bars etc. should be available.
2. The covered area should have display board showing different colour codes nominated to different grades of steel to avoid mix up of materials.
3. Arrangement of painting the plates, pipes, etc. with particular paint code previously nominated according to the grade of steel should be available.
4. The finished product (side wall, end wall & flap door) should be stored in covered area which should have displayed boards showing different products.

5.0 **Testing Facilities:**

(i) **Chemical Lab:** The firm should either have a spectrometer or should have permanent arrangement with a NABL certified Lab or a reputed steel making company for arranging the spectro analysis of the raw material on a regular basis.

(ii) The firm shall have facilities/arrangement for conducting non-destructive testing for welding as per requirement of the purchaser. Records of in house testing of welding must be maintained.

(iii) **Other Testing Facilities:** The firm shall possess the following:

1. Adequate number of fine punches for stamping marking particulars on finished components.
2. Adequate numbers of measuring instruments such as:
   - Digital Vernier Calipers of range 0 mm to 300 mm.
   - Screw Digital Gauges for checking thickness of plates
   - Measuring scales and other working and measuring tools required from time to time.
6.0 Quality Control Requirements:

(i) There should be a system to ensure the trace-ability of the product from raw material stage to finished product stage. This system should also facilitate identification the raw material composition from the finish product stage. The system should ensure that proper documentation such as purchase orders, inspection certificate, test certificate etc. is available. Side Walls, End Walls and Flap Doors should be punched for manufacturer’s identification details, month and year of manufacture at the upper left corner of the assembly so that traceability of the firm is ensure even during the running of the wagons.

For manufacturer’s identification, alphabetical code that shall be issued after vendor registration by RDSO may be used.

(ii) A system shall exist to ensure control of receipt and issue of stainless steel material (as per IRS: M 44 - 97) with detailed records e.g. Original copy of P.O. placed, Bill/Challan form as a proof of purchase from authorized vendor of stainless steel etc., to facilitate traceability of raw material used.

(iii) Down hand welding for side wall / end wall / flap door should be ensured.

(iv) Suitable procedure for accountal of receipt, storage & consumption of all materials should be available

(v) A system to monitor the items required to be purchased from RDSO approved sources shall be available and proper control is exercised in ensuring that it is updated regularly

(vi) The manufacturing should be done using modern production planning techniques

(vii) All welding equipment and accessories should meet the requirements of the corresponding Indian Standard Specification (or International Specifications where IS Specifications do not exist). The firm shall be responsible for satisfying the Inspecting Officer that all welding equipment and accessories being used to meet these requirements

(viii) Post weld cleaning should be done through a suitable process.

(ix) The firm shall comply with G 72, Rev. 3 (with Amendment no. 02 of Jan 2008), regarding selection of welding consumables like filler wire for MIG/MAG welding

(x) The firm shall ensure that all the relevant Specifications of IS standard/RDSO Specifications are available with them.

(xi) It has to be ensured that there is a QAP for the product detailing various aspects:-

- QA Organizational Chart
- Flow Process Charts
- Stage inspection details
- Various quality parameters and to checks to ensure control over them.
Firm having valid ISO: 9001 series certification with scope of certification including fabrication of stainless steel items shall only be considered. The firm should provide documentary evidence for the same.

**Inspection:**

1. The contractor shall submit details of the purchase documents, and test certificate of materials which will be used for fabrication.

2. The Stainless steel (IRSM-44), as raw material, has to be procured from RDSO approved sources with inspection by RITES.

3. CRF sections used for the manufacture of side walls and end walls for this work must be procured to RDSO’s specification no. WD – 01 – CRF – 08 latest revision. These CRF sections must be inspected/got inspected as per extant instructions of Railway Board and RDSO on the subject.

4. The RDSO approved class of filler wire for MIG/MAG welding for the relevant applications have to be procured.

5. Sources for CRF Section and filler wire are available in the latest RDSO Vendor directory which is available for free download at RDSO’s website [www.rdso.gov.in](http://www.rdso.gov.in)

6. The inspecting agency can check composition of material any time in the premise of manufacturer using the in house facilities of spectrometer or send samples to the NABL approved spectro lab with which the firm has a contractual agreement. Samples can also be sent to any other NABL approved spectro lab in case the need is felt by the inspection agency.

7. The side wall assembly, end wall assembly and flap door assembly may be inspected by the representative of consignee during manufacturing stages (as per RDSO’s approved and verified QAP for the vendor) and super checks may be done by RDSO before final dispatch.

**7.0 Other requirements and General Guidelines:**

(iii) The general guidelines mentioned in the RDSO Pamphlet entitled “ Guidelines for Fabrication of Stainless Steel wagons” of October 2007 dealing with Cutting, Forming, Welding may be used as per need.

(iv) The manufacturer must have a copy of Indian Railways Condition of Stores Contract (latest) and General Condition of Works Contract on Indian Railways (latest).
ANNEXURE-I

PROCEDURE:
1. Insert threaded solid block inside square cross-section of top coping.
2. Match the holes already drilled at top face of each end of top coping.
3. Tighten the eyebolt from the top.
4. For holding and lifting these two eyebolts on each assembly are to be utilized.
5. After placing assembly these eyebolts are to be ungrounded and taken out along with solid block and can be utilized for others.