



INDIAN RAILWAYS

Guidelines and Technical Requirements for Upgraded Rehabilitation of BOXN wagons to BOXNR/ BOXNRM2/ BOXNRHS wagons (with stainless steel & micro-alloyed steel)

**For
Broad Gauge (1676 mm)**

S. No.	Month/year of issue	Amendment No.	Revision No.	Pages
1.	Dec.-2010	01	--	01
2.	June 2016	--	01	-
3.	January 2017	01	---	01
4.	December 2018	02	---	01
5.	September, 2022	--	02	20

ISSUED BY
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September, 2022

Price: Rs.

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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/BOXNRM2/BOXNRHS wagons.

All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 (titled “Vendor-Changes in Approved status”) and subsequent versions/ amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways. All the latest provisions/ conditions of RDSO's ISO policy documents shall be followed.

SECTION A**TECHNICAL REQUIREMENTS FOR UPGRADED REHABILITATION OF BOXN WAGONS TO BOXNR/ BOXNRM2/ BOXNRHS WAGONS IN RAILWAY WORKSHOPS**

- 1.1 This guideline covers the technical requirements for the rehabilitation and upgradation of BOXN wagons to BOXNR/ BOXNRM2/ BOXNRHS wagons for increasing capacity and resistance to corrosion. The work involves fabrication of new side walls, end walls, replacement of floor plate, doors, damaged under frame members and coupler to WD-70-BD-2010 in place of 48-BD-08.

Preferably BOXN wagons in age group 10 to 23 years should be taken up for this upgraded rehabilitation. Rehabilitation using RDSO STR WD-12-BOXN (Rehab.)-2006 (Rev.-1, latest) may be done for wagons in age group of 23 to 27 years on condition basis.

Rehabilitation of wagon to be taken up only if centre sill of wagon found to be in sound condition and meeting the parameters laid down in check sheet at **Annexure-II**.

After the rehabilitation and upgradation, the BOXN wagon shall be marked as BOXNR/ BOXNRM2/ BOXNRHS as per their bogies and suspension. The major differences in constructional features of BOXN to BOXNR/ BOXNRM2/ BOXNRHS are as under:

SIDE WALL

	BOXN		BOXNR/ BOXNRM2/BOXNRHS
(i)	Material mild steel	(i)	Material stainless steel(IRS:M44) and micro alloyed steel (IS :2062 E 450)
(ii)	Provided with 6 Nos. of side stanchions with 8mm thick hat section (on one side)	(ii)	Provided with 9 Nos. of side stanchions with 6mm thick CRF hat section (on one side)
(iii)	Side sheets of 5mm thickness	(iii)	Side sheets of 3 mm thickness.
(vi)	Inside height of side wall is 1950mm from floor level.	(iv)	Inside height is 2127mm from floor level.
(v)	Two nos. middle coping provided in sidewall.	(v)	One no. middle coping is provided only at middle panels, except at corner side panels.
(vi)	Top coping provided with ISMC-100	(vi)	Side top coping provided with CRF section of BOX 100x100x6mm thickness.
(vii)	Side stanchion riveted with sole bar with two rows rivets.	(vii)	Side stanchion Lock bolted with sole bar with single row.

DOOR PLATE

(i)	Door Plate provided with Mild Steel for 5 mm thickness	(i)	Door plate to be provided as per door drawing
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END WALL

(i)	Made with mild steel (IS: 2062 E 250).	(i)	Made with stainless steel (IRS: M44) and Micro alloyed steel (IS: 2062 E 450).
(ii)	Each End wall provided with 4 nos. of end stanchions of ISMC-150mm.	(ii)	End wall provided two side stanchion in three pieces and two middle coping of Hat section 6 mm thickness.
(iii)	End top coping provided with ISMC-150 channel.	(iii)	End top coping provided with CRF section of BOX 100x100x6 mm thickness.
(iv)	End Sheet provided with 5 mm thick	(iv)	End Sheet provided with 3 mm thickness.

FLOOR PLATE

(i)	Floor Plate provided with Mild Steel for 6 mm thickness.	(i)	Floor plate provided with stainless steel of 4 mm thickness.
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COUPLER & DRAFT GEAR

(i)	High Tensile Non-Transition coupler to 48-BD-08 & Draft gear to 49-BD-08	(i)	High Tensile Non-Transition coupler to WD-70-BD-2010 & Draft gear to 49-BD-08.
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SUSPENSION DETAILS

Per Bogie Spring Group Composition, Friction Wedge & Side Bearer Details							
S. No	Wagon	Bogie	Outer	Inner	Snubber	Friction Wedge	Side Bearer
1	BOXNR	Obtained after rehabilitation of BOXN wagon with existing CASNUB 22 NLB Bogie	14	10	4	All cast metallic friction wedge	PU CCSB or metal bonded rubber Pad
		Obtained after rehabilitation of BOXNHS wagon with existing CASNUB 22HS Bogie	14	14	4	All cast metallic friction wedge	PU CCSB
2	BOXNRM2	With modified CASNUB 22 NLB Bogie as per WMI-001-BOXNRM2-UPGRADATION-2022 (LATEST)	12	8	4	Friction wedge to Spec. no. CONTR-02-MISC-2007(latest)	Variant "B" of Spec. WD-62-MISC-17 (latest)
3	BOXNRHS	With modified CASNUB 22HS Bogie as per WMI-001-BOXNRHS-UPGRADATION-2020 (LATEST)	14	12	4	Friction wedge to spec. no. CONTR-02-MISC-2007(latest)	Variant "B" of Spec. WD-62-MISC-17 (latest)

2.0 DESCRIPTION OF WORK:

The rehabilitation of BOXN wagon body by using of CRF section (to RDSO's specification no. WD – 01 – CRF – 12 (latest). Stainless steel (IRS: M 44: 97, latest) and Micro alloyed steel (IS: 2062 E450) will provide additional strength to body and reduce corrosion. The volume will also increase to fully utilize the capacity up to 22.9 ton axle load for coal.

List of construction drawings of BOXNR/ BOXNRM2/ BOXNRHS wagons is as per Index drawing no. WD - 07001-S-01(latest).

- 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 (latest).
- 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 (latest). In case sole bar needs replacement with new one, proper fitment with cross members to be ensured.
- 2.3 High Tensile Non-Transition coupler to RDSO specification no 48-BD-2008 shall be one time replaced with coupler to RDSO specification no WD-70-BD-2010 (latest) and the serviceable components of the removed coupler may be given to Division for further use. Attention to components like bogie, draft gear etc. should be given as per extent instruction of Railway Board and RDSO on the subject.
- 2.4 Railway Workshops nominated to carryout upgradation may purchase side walls, end walls and flap doors from RDSO approved vendors listed in vendor directory.

3.0 WORK DETAILS:

3.1 Identification of Repairs:

Every incoming wagon to a workshop should undergo a comprehensive incoming examination that should identify the repairs that need to be carried out before the wagon is turnout. Format for the same is placed at **Annexure-III**.

3.2 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.

3.3 Cleaning of Underframe:

Cleaning of the underframe can be carried out by placing the underframe on trestles. Both cleaning and de-rusting 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(latest).

3.4 Repair of Underframe:

Please refer to “Maintenance Manual for Wagons” (latest).

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

(i) Cracks (ii) Alignment (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 under frame 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”(latest).

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

A check sheet detailing measured/observed parameters of the underframe members is enclosed as **Annexure-IV**.

3.5 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 carry out 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 (Sole bar etc.) to RDSO drg. no. WD-07001-S/04(latest), WD-07001-S/05 (latest).

4.0 DETAIL OF MATERIAL REQUIRED IN WORKSHOPS:

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

4.1	Body Side wall, End Wall & Flap Door assemblies to latest drg. no. WD-07001-S-08, WD-07001-S-10 and WD-09034-S-07 respectively.
4.2	4 mm thick floor plate to specification IRS:M 44 (as per RDSO drg. No WD-07001- S-04, item-18), are to be welded at suitable locations so as to provide backing of underframe members just below the weld seam.
4.3	Lock bolts of sizes $\frac{1}{2}$ "(12.70 mm), $\frac{3}{4}$ " (19.05 mm)and $\frac{7}{8}$ " (22.22 mm) 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 before hand to drg. no. WD-80007-S-15(latest), 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	High Tensile Non-Transition coupler to RDSO specification no WD-70-BD-2010(latest) to replace existing coupler to RDSO specification no 48-BD-08.
4.6	Sufficient no. of electrodes for welding of bi-metal (IRS:M44 to IS:2062) should be available as prescribed in RDSO Welding Procedure Specification WD-WPS-BOXNR-2010(Rev.1)(latest).
4.7	Welders qualified for welding of stainless steel to stainless steel and stainless steel to mild steel/micro-alloyed 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:-

- Manufacture body side wall, end wall and flap door assemblies to drg. no. WD-07001-S-08, WD-07001-S-10 and WD-09034-S-07 with latest alteration respectively.
- Make sure the holes for lock bolting are made at strengthened sole bar location and headstock location to drg. no. WD-07001-S-05 and WD-07001-S-11 latest alteration respectively.
- 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.
- 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.
- Weld the four corner stanchions underframe to drg. no. WD-07001-S-10(latest).

- (f) After completing the body assembly, provide top corner gusseting as per RDSO drg. no.WD-07001-S-10(latest). The tolerance on inside dimensions of wagon and other dimensions shall be as per Appendix – I of G-72,Revision 3(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 lock bolts & collars conforming to RDSO standard "IS/RDSO-WD/0001:2022", Indian Railway Standard for Lockbolt & collar (for Railway transportation sector in India). A list of lock bolts required for the work of upgradation is as under:

S. No	Locations	Existing Dia. of Rivet	Proposed Dia. of lock bolt	Qty./ Wagon	Req. Grip (mm)	Grip No.	Grip range (Approx.)	Drawing Nos.
1.	Side stanchion with sole bar outer	12	1/2" (12.70 mm)	180	23	12	19.05 - 25.40	WD-07001-S-09
2.	Standard plate with sole bar	10	1/2" (12.70 mm)	4	28	16	25.40 - 31.75	W/ML-7 & 14
3.	Door hinge foot with sole bar	16	5/8" (15.88 mm)	48	37.15	20	31.75 - 38.10	WD-09034-S-07 WD-07001-S-05
4.	End stanchion with head stock	20	1/2" (12.70 mm)	32	19	12	19.05 - 25.40	WD-07001-S-11
5.	Corner stanchion with sole bar	20	3/4" (19.05 mm)	12	19	12	19.05 - 25.40	WD-07001-S-11
6.	Corner stanchion with head stock	20	3/4" (19.05 mm)	12	23	12	19.05 - 25.40	WD-07001-S-11
7.	Door check spring with sole bar	20	3/4" (19.05 mm)	16	36.15	20	31.75 - 38.10	W/DW-305A WD-07001-S-05
8.	Centre Pivot top with Under frame	22	7/8" (22.22 mm)	8	56	32 36	50.80-57.15 (30%) 57.15-63.50 (70%)	WD-92058-S-6
Summary :		1/2" (12.70 mm) Size		:	216 Nos.			
		3/4" (19.05 mm) Size		:	40 Nos.			
		7/8" (22.22 mm) Size		:	08 Nos.			
		5/8" (15.88 mm) Size		:	48 Nos			
		Total		:	312 Nos.			
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 collars of lock bolts 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, as per condition, the inside lockbolt pin shall not be more than 1.6 mm from collar outer edge and the extruded/projected portion of lock bolt pin shall be not more than 9.52 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 & 3.4 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 (Latest Amendment/ Revision).
6.4	Ensure that consumable items used for different combinations of welded materials should be as detailed/ prescribed in RDSO Welding Procedure Specification WD-WPS-BOXNR-2010(Rev.1)(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 per Marking Drawing no. WD-07001-S-12(latest) or WD-20018-S-01(latest), as applicable.
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(latest).
6.11	Existing hand brake wheel (Ø 610) drg no. W/BG-6226 is to be replaced with lesser dia hand wheel (Ø380) as per drg. no. WD-10087-S-01(latest)..
6.12	Maintain the “A” and “E” dimension in brake rigging arrangement to Clause 7.4 of RDSO Specification no. WD – 11 – BOXN – 2001(latest).
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(latest).

6.14	After assembly brake rigging shall be checked as per RDSO drawing no. WD-80007-S-09(latest).
6.15	<p>A central database of Rehab wagons is required to be created in FMM and WISE. Till such time FMM and FOIS database are ready, Rehab information shall be updated on current wagon master .FOIS will be customized by adding more fields to ensure updation of maintenance history by workshops.</p> <p>Any maintenance activity on the rehab wagons should be taken up after perusing the past rehab/maintenance details and the maintenance input provided should be fed into the database.</p>
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 shaped Rehab plate to RDSO drawing no WD-07001-S-06, item no. 10 & 11 (similar to the one used by wagon builders after new manufacture of wagon) must be rivetted/welded to the sole bar at suitable location as mentioned in marking diagram drawing no WD-07001-S-12/ WD-20018-S-01(as applicable), 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/ BOXNRM2/ BOXNRHS.
6.17	Rehab wagon needs to give trouble free residual service, over their stipulated codal life. Any major repairs/ NPOH marking, in rehab wagons, needs, be reported to the shop which had undertaken the rehab and these repairs also reporting to CRIS to include this in FMM and WISE. Till such time FMM is fully functional, these repairs reports send to rebuilding Workshop and RDSO.

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 Painting of wagon body, underframe, bogie, coupler and air brake equipment shall be done as per Marking Drawing no. WD-07001-S-12 (latest) or WD-20018-S-01(latest) as applicable.
- 8.2 Precautions before and after painting shall be observed as detailed in para 11.2.2, 11.2.3 and 11.2.4 of G 72, Rev. 3 (latest).
- 8.3 **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(latest).

1. It should not be contaminated by contact with mild steel or alloy steel during the fabrication process.
2. All sources of carbon contamination should be eliminated e.g. varnish, paint, wax marking pencils, etc.
3. Identification markings, usually written on the plate, must be removed from the weld area.
4. 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)
5. 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.
6. 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.
7. 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 (latest) or WD-20018-S-01(latest), as applicable and wagon old number to be retained thereon.

X-X-X-X

SECTION B

Infrastructure and Quality Control Requirements for Manufacture and Supply of Body Side Wall, End Wall and Flap Door of BOXNR/ BOXNRM2/ BOXNRHS 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 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 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 (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 & 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 in-house facilities/arrangement with outside agencies for conducting non-destructive testing for welding as per requirement of the purchaser.
- (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:

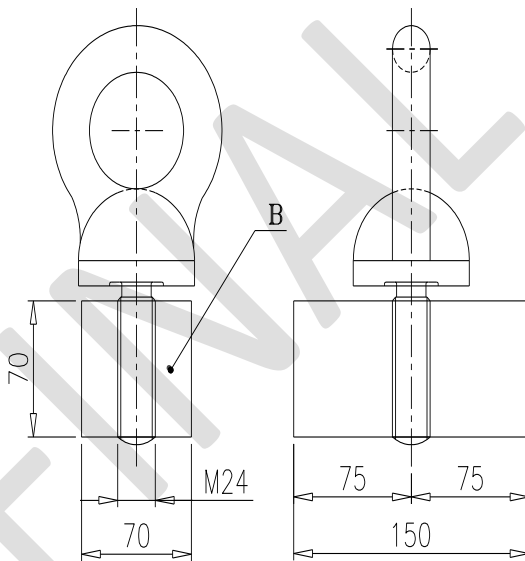
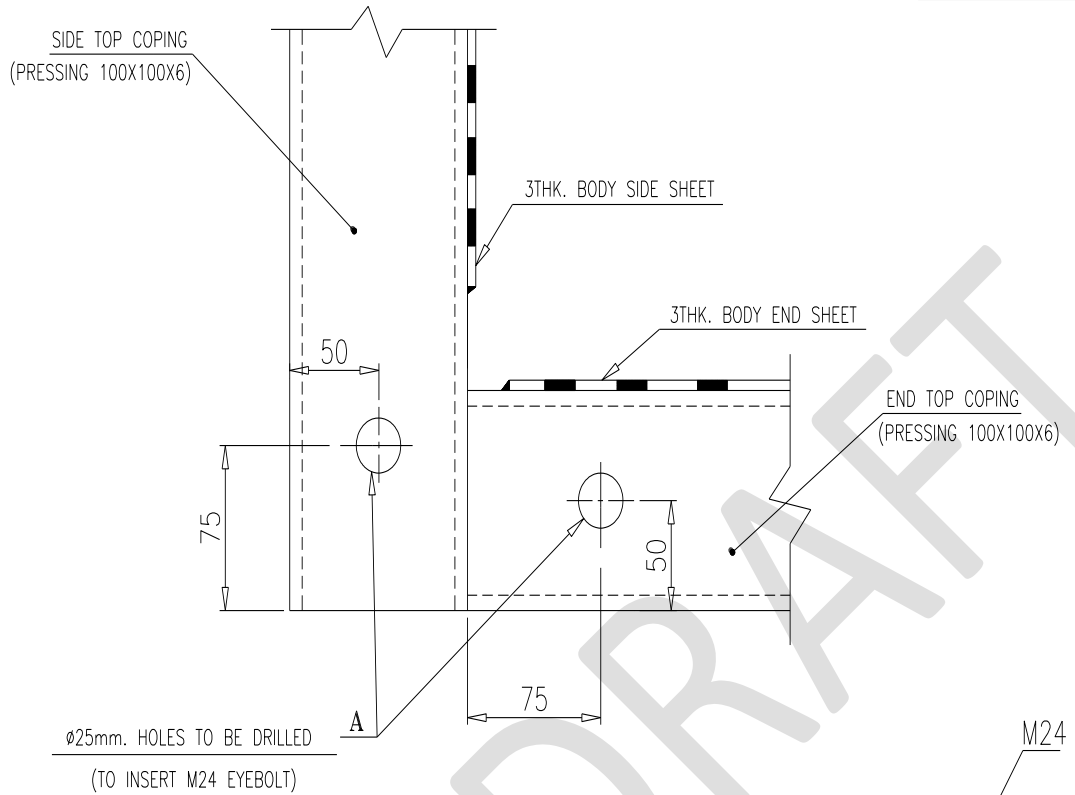
(i)	<p>There should be a system to ensure the trace-ability of the product from raw material stage to finished product stage. This system should also facilitate identification the raw material composition from the finish product stage. The system should ensure that proper documentation such as purchase orders, inspection certificate, test certificate etc. is available.</p> <p>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.</p> <p>For manufacturer's identification, alphabetical code that shall be issued after vendor registration by RDSO may be used.</p>
(ii)	A system shall exist to ensure control of receipt and issue of stainless steel & micro-alloyed steel [as per IRS: M 44–97(latest) & IS:2062 E450(latest)] 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 RDSO Welding Procedure Specification WD-WPS-BOXNR-2010(Rev.1)(latest), regarding selection of welding consumables like filler wire for MIG/MAG welding.
(x)	The firm shall ensure that all the relevant IS standard, RDSO standards/specifications are available with them.
(xi)	<p>It has to be ensured that there is a QAP for the product detailing various aspects:-</p> <p>a) Organizational chart indicating the Quality control set-up including qualification/ experience of personals and responsibilities of key personals.</p> <p>b) Flow Process Charts/ description of manufacturing process.</p>

	<p>c) Incoming raw material & in process(stage)/ final inspection details including various quality parameters and to checks to ensure control over them.</p> <p>d) Calibration details of testing/ measuring equipment.</p> <p>e) System of maintaining the customer complaints/ warranty failures.</p> <p>f) Requirement of M&P, Testing/ measuring equipment as per specification/STR/ IS.</p>
(xii)	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.
(xiii)	<p>Inspection:</p> <ol style="list-style-type: none"> 1. The contractor shall submit details of the purchase documents, and test certificate of materials which will be used for fabrication. 2. Steel will be procured by the contracting firms from the integrated steel plants from whom Railway Board is procuring these items on the basis of their Mill's test certificate. Documentary evidence in this regard is to be submitted at the time of inspection of wagons. 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-12 (Rev.-1)latest. 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 are available in the latest RDSO Vendor directory which is available for free download at RDSO's website https://ireps.gov.in. 6. The inspecting agency can check composition of material any time in the premises 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. Stage and final inspection of the side wall assembly, end wall assembly and flap door assembly may be inspected by the representative of consignee (as per RDSO's approved and verified QAP for the vendor).

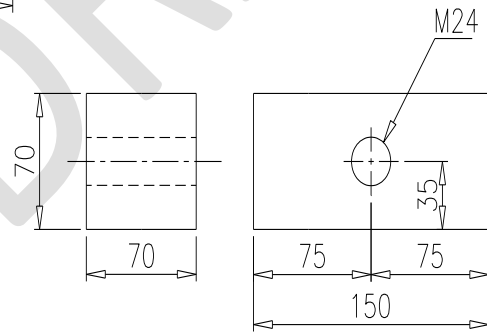
7.0 Other requirements and General Guidelines:

- (i) 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.
- (ii) 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



A
(M24 EYEBOLT IS:4190-1984)



B
(SOLID BLOCK 70x70x150)

PROCEDURE:-

1. FIRST 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 EYEBOLT ARE TO BE UNSCREWED AND TAKEN OUT ALONG WITH SOLID BLOCK AND CAN BE UTILIZED FOR OTHERS.

Parameters of Center Sill that need to be checked/ inspected & condition recorded before BOXN wagons are marked for being taken-up for Rehab to BOXNR/ BOXNRM2/ BOXNRHS.

1. Should not be cracked at any portion.
2. Should not be patched/ repaired at any portion.
3. Should not be bent/ hogged/ permanently distorted in any portion/ part. The camber should not be less than 2 mm for considering the wagon for upgradation.
4. The Draft Gear portion should be inspected & those wagons should not be marked for Rehab that have hole/ pockets cut in the center sill & the same are covered/ repaired/ patched using cover/ patch plate.
5. Wagons wherein any bulging is noticed at the draft gear location (owing to lateral hitting of the draft gear) or section thinning of center sill at the draft gear locations is noticed, should not be selected for Rehab.
6. The Thickness should not have reduced below 7mm.
7. Weld Joints of the Two Z section should be intact & satisfactory.

Annexure-III

**Parameters/ Structural Members of BOXN that need to be checked/ inspected,
Condition recorded & the required repairs identified**

Part Of Wagon Incoming	Condition Warranted	Repairs
End Body		
End Body Buldging		
Body End Stanchion		
End Body Corner Angle		
Corner Top Gusset		
Ladder		
Side Body		
Side Body Buldging - Both Side		
Body Side Stanchion		
Body Side Middle Coving		
Door Way Crossbar Pressing		
CBC		
CBC with Yoke Pin		
Knuckle with Pin & APD		
Back Stop		
Wear Plate (Striker casting)		
Yoke Pin Support Plate		
Yoke Support Plate		
Uncoupling Rod Arrangement		
Under Frame		
Central Brake Rigging including SAB		
Centre Pivot Top		
Center Sill		
Sole Bar - Pillar to Pillar		
Sole Bar/Head Stock Patch		
L/E Change - over arrangement		
Main Transom/ Bolsters		
Hand Brake Wheel		
Hand Brake Gear with Gear Box		
Head Stock		
Head Stock & Sole Bar – Joint		
DOOR		
Door Check Spring		
Door Patch (Full Length)		
Door Locking Pin		
Door Hinge Long/ Short		
Door Hinge Foot		
Doorway Buldge (Both side)		
Door Gravity Catch/Chainless cotter		
Floor		
Crib angle & End angle		
Floor Sheet/Floor Patch		

Annexure-IV

Parameters/ Structural Members of Under frame that need to be checked/ inspected, condition recorded & the required repairs identified

1. Overall Condition (corrosion/ damaged/bent members) of Underframe.
2. Twist/ Permanent Distortion in Underframe.
3. Camber of Underframe (Should not be less than 2 mm)
4. Condition of Center Sill (Pls refer Annexure-II)
5. Draft Gear Pocket Condition.
6. Center Sill at Back Stopper location.
7. Bolster-Top Plate/ Bottom Plate Condition & Joints with Sole Bar & Center Sill.
8. Sole Bar Condition
9. Cross Bar Joints with Sole Bar & Center Sill.
10. Condition of Stingers. These need to be added/ replaced/ repaired as per drgs of BOXN/BOXNR.
11. CP Top Castings & Bolster Gusset Plates condition.
12. Head Stock Condition & Joints with Sole Bar
13. Brake Gear Support Brackets Condition.
14. Striker Casting Condition
15. Brake Gear (including Hand Brake) & its components should be inspected separately & the warranted repairs recorded