FINAL DRAFT

INDIAN RAILWAY SPECIFICATION FOR WD-13-CASNUB-22 W(M)-BOGIE-88 FOR CAST STEEL BOGIES CASNUB-22W(M) WITH FRICTION DAMPING ARRANGEMENT FOR BROAD GAUGE

Issued By
RESEARCH DESIGNS AND STANDARDS ORGANIZATION
MINISTRY OF RAILWAYS

SCHEDULE Of TECHNICAL REQUIREMENTS
FOR
CASNUB-22W(M) CAST STEEL BOGIES FOR BROAD GAUGE WAGONS

1. GENERAL,

This schedule covers the technical requirements for the manufacture and supply of CASNUB -22W(M) cast steel Bogies fitted with a spring plank, long travel helical springs and load proportionate friction damping arrangement for Broad gauge(1676 mm) wagons.

These bogies shall be suitable for fitment of standard wheel sets to RDSO's drawing no. WA/WL-4902, cartridge bearings to STR /AB/RB-27-86 with Corrigendum, No.2, Elastomeric Pads to STR No.02-MISC-85 (Revision 3 of July 1988) and side Bearer pads to STR No.03-Misc.-86 (Revision 2 of July 1988).

2. SCOPE OF SUPPLY

The bogie shall be supplied complete with top and bottom centre pivots, centre pivot retainer, centre pivot bolt with washer and castle nut, dust shield welded to centre pivot top, side bearer housing and brake rigging including brake shoes, elastomeric pads, metal bonded side bearer pads, but without wheel sets, bearing, adapters, side frame key, retainer bolt and nut, and side frame key bolt and nut which shall be supplied by the purchaser free of cost for fitment of the bogies.

3. SPECIFICATION

The bogies and its components shall conform to this Schedule of Technical Requirements, relevant drawings to latest alteration number, and latest relevant specifications. case of conflict among STR/Drawings/other Specifications, the drawings shall take precedence over the STR and the Specifications. The STR shall take precedence over the specifications.

4. CROUPING OF COMPONENTS

Various components which form the bogie assembly are grouped below. Details are given in the Annexures shown against each group.

Sl.No.	Group	Components
1.	Cast components	**a) steel** - Side frame, bolster, top and bottom pivots, side bearer housings, brake beams, brake head(can be either cast or fabricated) and wedges (Annexure No.I). **b) Iron**- Brake Blocks (Annexure No.I).

2.	Spring Components	Outer, inner springs and snubber springs for Brake (annexure --II),springs for Block Assembly and brake beam support and side frame and bolster liners.
3.	Rubber Components	Side bearer pads, elastomeric pads, and Centre pivot Washer (Annexure No.III).
4.	Forged components & Fasteners	Brake beam hanger, retainer key, centre pivot retainer bolts, rivets and various types of cotter pins (Annexure No.IV).
5.	Fabricated Components	Various types of steel sections machined and formed, welded and Preassembled like brake heads, safety brackets, spring plank, etc. (Annexure No.V).

5. BOGIE ASSEMBLY REQUIREMENTS

1.	Matching of Side Frame	Frames of bogies shall be Matched according to RDSO's drawing No.WD-85054-s/3.
2.	Rivetting	While riveting side frame with spring plank, the following Should be ensured:- i) Rivetting should be to IS:7215 Group B. ii) The diagonal distance between the pop marks on the side frames corresponding to the centre of the horn gap should be equal before rivetting the spring plank. iii) The four holes shown in Sketch SK-69594 and WD-85054-8/3 should be reamed and secured by 25 mm fitted bolts. **iv)** The diagonal distances referred to in para (ii) above must remain equal after securing the plank with rivets and fit bolts while the side frames are still on the fixture
3.	Welding	welding procedure for –welding friction liners to be prepared and approved by RDSO before welding
4.	Dimenslons	The leading dimensions and tolerances of the bogies shall be in accordance with RDSO's Drawing No.WD-85054-S/5.
5.	Load testing:	The bogies shall be tested for the loads representing tare, gross and 50% overload conditions for the corresponding axle load. scale of this test shall be as below: • 100% checking of Bogies under tare. • 5% checking of Assembled Bogies under gross load and 50% overload. RDSO Inspector may carry out random checks to the extent of 5% of Assembled Bogies under tare, gross load and 50% overload conditions.
6.	Painting	Each bogie shall be given one coat of Red Oxide Zinc Chromate Primer to Specification IS:2074-79 followed by one coat of ready mixed paint Red Oxide to IS:123-62. Mating faces of pivots and friction plates will not be painted.

6. DRAWINGS

The bogies shall be manufactured according to RDSO'S drawing No.WD-85054-8/2 and relevant drawings listed in Annexure VI. The alteration numbers indicated against drawing in the Annexure are, however, subject to advancement in the course of construction of these bogies and the contractor shall comply with these amendments in manufacturing the components. Copies of such amended drawings shall be supplied to the contractor free of cost. Changes involving significant costs will be implemented only after mutual agreement on price implication.

7. DEVIATIONS

Where deviations from the original design, material specifications, dimensions, etc., are desired, specific Proposals shall be submitted for prior approval of the RDSO/Lucknow before commencement of manufacture.

8. INSPECTION

8.1 The inspection shall be carried out by Director General, RDSO,Lucknow, or his nominee in accordance with the requirements of this relevant IS specifications schedule, approved drawings and Is specifications referenced are listed at Annexure VII. The listing is, however, not exhaustive.

8.2 The bogie supplier shall at his own cost supply all labor, appliances, tools and gauges necessary for the testing and Inspection of the bogies accordance with the Schedule of Technical Requirements.

8.3 The supplier will design his own gauges for the bogie and its components for checking the dimensional requirements.These gauges will be approved by the RDSO before the manufacturer begins series production.

8.4 Fully assembled bogies will be offered before painting.Painting will be done only after receiving clearance from the Inspector.

9. PATTERN BOGIE AND COMPONENTS

9.1 The manufacturer will submit two fully assembled bogies tor Pattern Inspection.Components from the two bogies will be pooled without disturbing the springs groups or the side frame combination) to form a Pattern bogie.All prescribed tests and checks will be carried out on this bogie.Series Production will be undertaken only after approval of the Pattern bogie.

10. "AS MADE" DRAWINGS

The bogie suppliers shall supply tracings on cloth of "As Made" drawings followed in the manufacture of the bogies where deviations from the original design, material specifications and dimensions, etc., have been adopted.

11. CLARIFICATIONS

Any further clarification required by the supplier can be obtained from the Director General, Research Designs and standards organization ,Ministry of Railways ,Manak Nagar Lucknow-226011 (INDIA) .

ANNEXURE-I

(sheet 1 of 5)

CAST COMPONENTS

(Other than brake shoes)

All casting shall be properly cleaned by shot blasting or by any other approved process. Inapproachable core cavities may be permitted to remain with stand sticking in these areas. The inspector may require that any or all the casting be subjected to re-shot blasting or cleaning in order to ensure proper visual examination.

Location on casting which will be drilled, riveted or bolted shall be free from nails, chills or other excess materials.

Rectification of defects in castings: Rectification of defects by welding shall be as indicated in Annexure-IA (2 sheets).The procedure for welding and heat treatment shall be in accordance with that laid down in IS: 5530 and 18:9595.

Side frames and bolsters will have non-repetitive serial numbers and a minimum of two 25 x 25x8 mm annealing lugs cast on the component. Lugs not broken for testing should be allowed to remain on the castings.

Tests for chemical composition and mechanical properties:

1. Test bars for side frame and bolster will be cast integral with the component. Test bars for other castings will be cast separately.

2. Chemical analysis of each heat for each type of castings is to be recorded.

3. Test bars for each heat and heat-treatment batch combination will be tested for mechanical properties. Test results will be recorded.

4. Retests: Retests will be governed by the relevant IS Specification.

5. Sufficient samples shall be retained for retests or cross checking of chemical and mechanical properties when required by the Inspecting 0fficer. Samples will be retained for the length of time indicated by the relevant IS specifications.

Non -destructive Tests:
The following non-destructive tests shall be carried out:-

(i)Radiographic Tests:
One side frame and one bolster casting in every 100 or part thereof shall be subjected radiographic examination bogie for the initial supply of 300 bogies. Frequency of testing shall be reduced to 1 in 500 after the successful supply of initial 300 bogie sets. Different contracts will be treated as if in continuation irrespective of contract size--unless there is a gap of 3 months between executions of two Consecutive contracts or there is a major design change.

The sketches showing locations for radiographic examination are enclosed as No. WDX-8401-S/1 and No. WDX-8401-S/8. All radiographs shall clearly reveal the image of penetration at appropriate locations to enable correct interpretation of radiographic classification. In no case sensitivity of radiographs would be below 2%.
Standard of radiographic examination at different locations shall be as under:-

Location as shown in sketches WDX-8401-S/1 and WDx-8401-s/8	Accepted level of severity as per ASTM-446-81 or E-71(No hot tears or cracks are permissible
Side Prame: Location 2	Gas porosity- level 3 Sand inclusion - level 3 Shrinkage-level 3 in categories CB and CD. -level 4 in categories CA and CC.
Bolster: Locations 1 and 2	
Side Frame: Location 5 and 3	Gas porosity-Level 4
Bolster: Location 3	Sand inclusion-level 4

Location as shown sketches in WDX-8401-S/1 and WDX-8401-S/8	Accepted Level of severity as per ASTM446-81 or E-71 (No hot tears or cracks are permissible)
Side Frame: Location 5&3	Gas porosity - level 4 Sand inclusion - level 4 Shrinkage -level 4 in categories CB and CD. - level 5 in categories CA and CC.
Bolster: Location 3	
Side Frame: Locations 1 and 4	Gas porosity - level 5 Sand inclusion - level 5 Shrinkage - level 5 in categories CB and CD - level 5 in CA and CC.

(ii) Magnetic Particle Test: Locations for magnetic particles test on side frames and bolsters are indicated in sketches No. WDX-8401-S/8 & S/1.Manufacturers shall carry out this test on all side frames and bolsters.

7. Weight

Castings shall be rejected if their weight is above the limits specified below:-

Side Frame : 490 kg (Maximum)
Bolster : 670 kg (Maximum)
Brake Beam : 80 kg (Maximum)

8. Load Testing:

Castings shall be selected at random fur load test by the inspector for selecting samples. Different contracts will be treated as if in continuation irrespective of contract size— unless there is a gap of 3 months between execution of two consecutive contracts or there is a major design change. In such cases, tests will be carried out as if on a new contract.

Casting will be checked by magnetic Particle test both before and after the load tests. A Shallow crack after load test which can be removed by grinding off to a depth 1 mm will not be treated as a failure. In case of other Case cracks two more castings from the same lot shall be tested.If any one of the latter castings fails in the load test, the lot stands rejected. In case of rejection the manufacturer shall review his foundry practices and take whatever steps necessary to satisfy the inspector of the adequacy of the process of manufacture.

(a) Proof Load Test:

This test will be conducted on side frame, bolster and brake beam. The frequency of testing and load applied shall be as below: -

Item	Frequency of Testing	Load Applied	Maximum Deflec- tion	Permanent Set Max. at Centre
Side Frame	1 in 50	117 t	---	0.4 mm
Bolster	1 in 50	117 t	---	0.7mm
Brake Beam	1 in 50	12 t	3 mm	0.2 mm

(b) Destruction Test:

This test will be conducted on side frame and bolster only.Frequency and other details are as below:-

(1) Test Loads:

The sample castings selected for destruction test shall be subjected to loads specifled below.

No fracture/cracks should take place at theseloads. A shallow crack which can be removed by grinding off a depth of 1 mm will be ignored.The test is to be discontinued If the casting begins to fracture or show cracks at less than the specified loads.

(a) Side Frame : 234 t

(b) Bolster : 254t

(2) Sample Size:

one side frame and one bolster casting in every 100 or Part thereof shall be tested for the initial supply of 200 bogies. Subsequent frequency of testing shall reduced to 1 in 1000 after the successful supply of initial 200 bogie sets. The selection of side frame/bolster for this test shall be made at random by the Inspector from the lot.

For determining frequency of tests different contracts shall be treated as if in continuation irrespective of the size of contract unless there is a gap of 3 months between execution of two consecutive contracts or there is a major design change.

(3) Application of Test Load: The side frame casting shall have the test load applied in the direction of the vertical axis at the seat of the spring plank, with the casting supported at the axle box seat at each end. The Bolster castings shall be loaded in the direction perpendicular to the longitudinal axis at the pivot seat, the supports being at the spring seat at each end.

(4) Sectioning Test: Castings subjected to destruction tests Shall be sectioned to check wall thickness and casting defects in order to establish moulding practices. Sketches showing the location for sectioning are enclosed as No. WDX-8401-S/3 and No. WDX-8401-S/9.

ANNEXURE -I-A

(Sheet 1 of 2)

WELDING REPAIR PROCEDURE FOR SIDE FRAME AND BOLSTER FOR CASNUB 22W(M) BIOGIES

1. **SCOPE**

This procedure covers the repair by Electric Are welding of defects revealed on examination in castings to Grade27-54 to IS:1030.

2. **DEFECTS**

Defects greater than 10% of the wall thickness shall be repaired by removing defective material and welding. Defects less than 10% deep shall be ground out and blended.

3. **GENERAL REQUIREMENTS**

3.1 Electrodes shall conform to Class 'D' of the Indian Railways approved list.

3.2 All welding shall be done by welders qualified to IS:7318 pt. I.

3.3 Local preheating may be done where necessary to produce crack free welds.

3.4 Welding in zones 1 and 2 is to be carried out only after obtaining permission from the inspector. Zones are shown in sheets 5 and 6 of WDX-8401-S/7.

4. **REPAIR PROCEDURE**

4.1 Preparation.

4.1.1 Defects to be entirely removed by appropriate method to ensure sound welding.

4.1.2 In the case of defects through the section, edge preparation shall be according to IS:9595.

4.2 **Weld Zone Restriction**.

4.2.1 Zone 1: castings shall be shot blasted after welding and heat treatment.

4.2.2 Zone 2: castings shall be welded with a minimum of 2 passes and then heat treated.

4.2.3 Zone 3: No heat treatment required after weld repair.

4.3 Weld Finish

4.3.1 All welds shall where possible be dressed smooth to casting surface contour.

5. Final Inspection

5.1 All welds to be finally inspected by magnetic particle test after dressing. If defects are still evident repair procedure shall be repeated.

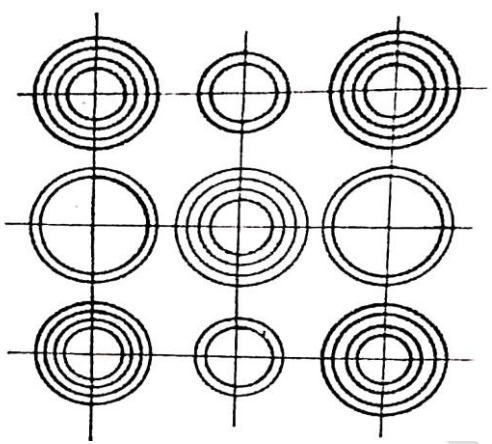
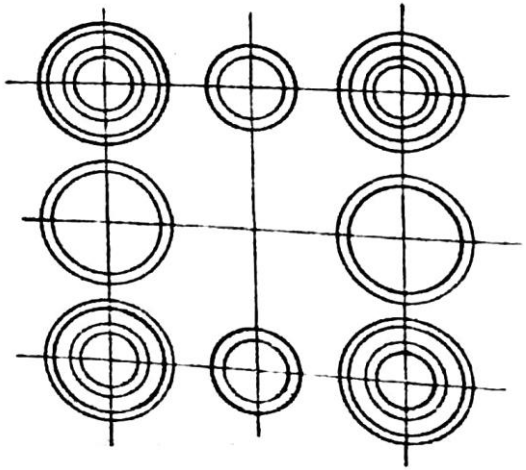
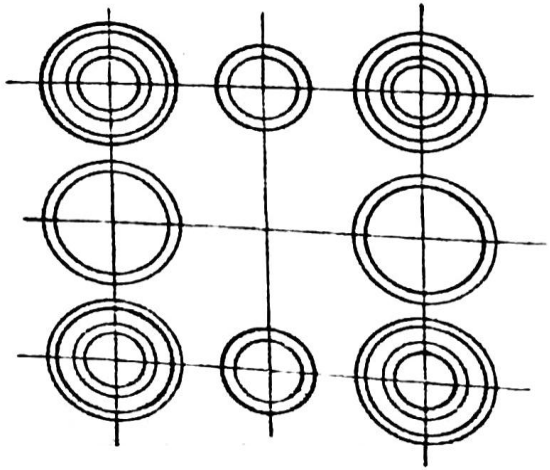
Annexure-II

SPRING COMPONENTS

1. The Helical Spring Group for various axle load applications of the bogie shall be in accordance with Annexure II-A.
2. Material for Helical Spring: The springs to drawing no.WD-83069-S/01 shall be manufactured out of steel confirming to IS 3195 grade 60Si7 and as pr RDSO specification no.G-75
3. The helical spring shall be manufactured as per RDSO specification no.G-74
4. Spings for Brake Block Assembly: These springs shall be manufactured as per RDSO specification No.G-74.
5. Brake beam supports shall be made out of spring steel flats to IS:3885 Pt.1 Grade 1.
6. Side frame and bolster liners shall be made out of spring steel to IS:3885 Pt.1Garde IV and heat treated to achieve a hardness value of 380-420 BHN.

ANNEXURE-IIA

SPRING GROUPS FOR VARJOUS AXLE LOADS

Axle Load		22.9 Tonnes			20.32 Tonnes			16.25 Tonnes		
SPRING GROUP FOR EACH END OF BOGIE BOLSTER										
NUMBER OF SPRINGS PER GROUP		OUTER 7	INNER 5	SNUBBER 2	OUTER 6	INNER 4	SNUBBER 2	OUTER 4	INNER 4	SNUBBER 2
Test Load On Bogie Pivot	Tare	6.0 Tonnes			6.0 Tonnes			4.7 Tonnes		
	Gross	40.5 Tonnes			35.3 Tonnes			27.2 Tonnes		
	50% Over Load	60.8Tonnes			53.0Tonnes			40.8Tonnes		
Detail of Springs		Outer-WD-83069-S-01,Item-1			Inner-WD-83069-S-01,Item-2			Snubber-WD-83069-S-01,Item-3		

ANNEXURE-III

RUBBER COMPONENTS

1. **Side Bearers**: Metal Bonded side bearer rubber pads to specification No.03-MISC-86 (Revision 2 of July 1968) shall be placed in side bearer housing to SK-69594. The pads shall be selectively assembled to obtain height from rail level as well as difference in height from center pivot top as specified in drawing No.WD-85054-S/6.

2. **Elastomeric Pads:** The elastomeric pads to drawing No.WD-2-7621-S/2 and specification No.02-MISC-85 (Revision 3 of July 1988) shall be provided between adapter and side frame crown.

3. **Centre Pivot Washer:** The washer shall be as per item 5 of RDSO drawing No.WD-: 85079-8/2.

ANNEXURE-IV

FORGED COMPONENTS AND FASTENERS

S.No.	Description	Drawing No	Specification
1.	Centre Pivot Retainer	WD-85079-8/2	18:2004 C1.4
2	Bolts with Nut	W/BG-6166	IS:226
3	Centre Pivot Bolt	WD-85079-S/2 Item 6	IS:226
4	Castle Nut (M-56)	W/BE-4719	IS:226
5	Rivets - 12, 20,22 and 24 dia.		IS:1929 IS:1148
6	Cotter split	W/KY-20	IS:2638
7	Split Pins		IS:549
8	Hexagonal fit bolt with washer and nut	M-24	IS:1364 IS:3640 IS:2016
9	Brake Beam Hanger	SK-69597	IS:1875 CL.IV
10	Side frame Key	SK-69594	IS:1875 CL.IV
11	Brake Block Adjuster	WD-88012-S/1 Item	IS:1875 CL.II

ANNEXURE-V

(Sheet 1 of 2)

FABRICATED COMPONENTS

S.No.	Description	Drg. No. with Alt.No.	specn.
1	Equalizing Lever with bushes	SK-69597 It.1, 5,6,7	IS:226 IS:2073
2	Bogie End Pull Rod	-do- Item 2	I8:226
3	Bogie Brake Push Rod	-do- Item 3	18:226
4	Bogie Safety Strap	WD-87017-8/1 Item 2	IS:226
5	Pin 28 dia. x 90 mm with washer	SK-69597 Item 8	IS:226
6	Pin 40 dia with washer	do- Item 14	IS:226
7	Pin 35 dia with washer	-do- Item 15	IS:226
8	Brake Beam Hanger	-do- Item 12	18:1875
9	Pin	L/PN-609/M or L/PN-610/M	IS:226
10	Washer 56 dia x 37 dia x 5 thk)	-	IS:226
11	Washer (90 dia x 50dia x 8 thk)	-	IS:226
12	Bush for BB Hanger	SK-69597 Item 13	1S:2073
13	Bush Brake Beam	WD-85084-S/1	IS:2073
14	Brake Head & Details	WD-85084-s/3	IS:226 with IS:1975 18:1079
15	Bush for Brake Head	LU/BU-556/M LU/BU-557/M	do
16	Bush for Brake Head	L/BU-554/M L/BU-555/M	

ANNEXURE-V

(Sheet 2 of 2)

S.No.	Description	Drg.No.with Alt.No	Specn.
17.	Brake Shoe Key	W/BG-6161	IS:3885 or IS:3195
18.	Cover	W/BG-6163	IS:226
19.	Pin	W/BG-6244	IS:226
20.	Adjusting Piece	W/BG-6164	IS:226
21.	Centre Pivot Retainer	WD-85079-8/2 Item 4	IS:2004
22.	Washer	WD-85079-s/2 Item 5	IS:226
23.	Dust Shield	WD-85079-5/2 Item 7	IS:1079
24,	Sleeve	W/BG-2439	IRS M.4
25.	Spring Plank	SK-69594 Item 6	IS:3747
26	S.F.Friction Liner	SK-69594 Item 7	IS:3885
27	Bolster Liner	WD-85079-8/3 Item 2	IS:3885
28	Bush for side Frame	SK-69597 Item 16	IS:2073

Testing of Brake Pull/Push Rod: These components shall be tested for a load of 18 t applied in axial direction. The Components shall withstand this load without any fracture. 2% of Pull rods as well as push rods shall be load tested as above.

Annexure - VI

(Sheet 1 oE 2)

(A) LIST OF CONSTRUCTION DRAWINGS

Drawing No.	Description	Alt .No
WD-85054-S/1	Index	3
WD-85054-S/2	General Arrangement	4
WD-85054-S/3	Cast Steel Side Frame	6
WD-85079-S/3	Cast Steel Bolster (Separate Pivot)	4
SK-69594	Bogie Details	17
WD-83069-S/1	Spring Details (20.3t Axle load)	4
WD-85054-s/4	Bogie Brake Gear Arrangement	3
WD-85084-S/1	Brake Beam	1
SK-69597	Bogie Brake Gear Details	13
WD-85054-S/6	Leading Dimensions and Tolerances	6
WD-85054-S/7	Assembly Procedure	2
SK-77579	Wedge	4
WD-88012-S/1	Brake Block Assembly & Details	1
WD-85084-S/3	Brake Head & Details(Fabricated)	2
WD-86034-S/1	Brake Head (Cast Steel)	Nil
WD2-7621-s/2	Metal Bonded Rubber for secondary suspension bogie with cartridge bearing	4
WD-85079-s/1	Centre Pivot & Side Bearer arrangement	3
WD-85076-S/1	Metal Bonded Rubber Pads for Side Bearer	4
WD-85079-S/2	Centre Pivot Assembly Details	4
WD-87017-S/1	Details of Safety strap and Brake Beam Support	2

ANNEXURE-VI

(Sheet 2 of 2)

(B) LIST OF PART DRAWINGS

Drg. No.	Description	Alt.No
W/BG-6161	Brake shoe key	2
WA/BG-6158	Brake block	7
W/BG-6163	Cover	2
W/BG-6165	Spring	2
W/BE-4719	Castle Nut (M 56)	Nil
L/BU-554/M or L/BU-555/M	Bush for Brake Head	3
L/BU-556/M L/BU-557/M	Bush for Brake Head	3
L/BU-2439	Sleeve for Brake Beam	1
/PN-609/M or L/PN-610/M	Pin	3
W/KY-20	Cotter Split	5

ANNEXURE - VII

(Sheet 1-of-2)

SPECIFICATION FOR BOGIE MANUFACTURE

Bogie	STR for new bogies
IS:1030 (Gr.27-54)	Springs for brake block Side frame, bolster, CP ,brake beam, Side Bearer housing
276 Gr.1	Wedge
3885 Gr.4	SF Friction Liner
3885 Gr.4	Bolster Friction Liner
3195 Gr.60Si7	Helical Springs
3747	Spring plank
1875 Cl.1V	Hanger and retainer
226	Push rod, pull rod, lever and side bearer packing
1079	Boss for Brake Head
2073 Gr.C.45 or C-14 Case hardened	Bush for CS brake beam
1929) 1148)	Rivets
2585 & 549	Key Bolt with 6.30 split pin
210 Gr.20	CI brake block
1363	Adaptor retaining Bolt & Nut
2074	Primer Paint
123	Red Oxide paint
9595	Welding
2638	Cotter split
2004	Centre pivot retainer
7215	Riveting

7318 Pt.I	Qualifications for Welders
4897	Deviation for un-toleranced dimensions and mass of steel casting
2102	Allowable deviations for dimensions without Specified tolerance
3469 Pt.I ,II & III	Weight, quantity and dimensioning tolerances on forgings
3073	Finish of centre pivot Hexagonal tit bolts
5530	Code of procedute for rectification of steel castings by metal arc welding process
ASTM 446-B1 or E-71	standard for radiographic analysis

ANNEXURE-VIII

Schedule of Technical Requirements
For
Manufacture of
Brake Beam Hangers & Bush for CASNUB 22 W (M) Bogie
Drawing No. SK-69597 (*latest alteration*)

1.0 SCOPE

1.1. This schedule has two sections i.e. Section-A & Section-B, Section-A covers the technical requirements, methods of sampling and tests for brake bream hangers to RDSO Drawing SK-69597 latest alteration to be used on CASNUB 22 W(M) bogies. Section-B covers schedule of infrastructural requirements for manufacturing, testing and quality control to be available" at the manufacturer's premises.

1.2. Brake beam hangers should be procured from sources meeting the requirements of material and manufacturing process. The brake beam hanger manufacturers should supply the brake beam hangers along with the bushes.

SECTION-A

2.0 RAW MATERIAL REQUIREMENTS

Material Specification	Carbon Steel Class 4 of IS: 2004:1991(Third Revision) (Reaffirmed 2001)
Inclusion rating	Not worse than 2.5 A, B, C, D of fig-2 (IS: 4163-2004) for both thick and thin series.
Grain size	Grain size shall not be coarser than 5 as per IS: 4748-2009 (Reaffirmed 2003)
Billets and Size	Billet size of 128mmXl28mm (min.) to provide a reduction ratio of 4:1 (min.) from billet to final product to ensure a proper grain flow, especially at the radius portion.

3.0 MANUFACTURING PROCESS

3.1 Saw-cut/shear billets to the required length.

3.2 Heat billets in a non-oxidizing environment in a forging furnace.

3.3 Drop forge in closed dies to ensure continuous grain flow lines from the head to shank. The dies should emboss the manufacturer's details as per drawing.

3.4 Trim fins all-round the hanger by trimming dies.

3.5 Longitudinal grinding should be done to remove forging and parting lines.

3.6 Linishing should be done by linishing machine to remove tool marks after grinding, to improve surface finish.

3.7 Normalize hangers by controlled & uniform heating in a furnace at 850°C to 880° C, soaking at this temperature for one hour per 25 mm of part thickness followed by cooling in still air.

3.8 Carry out cyclic shot peening of the hanger as per IS: 7001. The intensity should be checked every shift so as to provide a coverage of 90% and intensity of 0.3 mm in Almen strip (type-A).

3.9 Finish machining of the bore holes should be the final operation.

3.10 The hangers should be given a rust protection i.e. red oxide zinc chromate primer before final inspection. A coat of rust protective paint i.e black synthetic enamel shall be given after final inspection.

4.0 INSPECTION BY MANUFACTURER

4.1 **Raw material** - The manufacturer should maintain steel mill certificates with details of Cast No./Heat No, chemical composition, steel making process etc. These tests should also be done by him on a sample of each heat of material purchased:

i) Chemical composition.
ii) Ultimate tensile strength, yield strength and percentage elongation
iii) Bend test
iv) Inclusion rating
v) Grain size
vi) Macroscopic examination for checking cracks/porosity.

4.2 **Stage -** The manufacturer should carry out stage inspection of the product as per manufacturing process flow chart and to ensure that the manufacturing process shall maintained standard of quality.

4.3 Finished product

S.No.	Checks	Sampling
i)	Dimensional accuracy as per RDSO Drawing SK-69597 (Straightness, Holes center to center, Stem size, thickness & Hole size)	100%
ii)	Microstructure examination for grain flow lines	1 in 200
iii)	Brinell hardness	1 samples per 100 forgings.
iv)	Magna flux testing for surface cracks	100%
v)	Ultimate tensile strength, yield strength and percentage elongation.	1 piece in 500 or part of that
vi)	Grain size shall not be coarser than 5 as per IS:4748-2009 (Reaffirmed 2003)	1 in 200
vii)	Bend test at 700 kg	1 piece in 500
viii)	Load test at 20T	1 piece in 500

Note: -

i) The manufacturer should develop gauges for dimensional checking of the component. These gauges must be periodically calibrated to ensure proper inspection. A set of gauge for inspection shall be kept separately.

ii) The manufacturer will maintain all test pieces and records of stage and final inspections for perusal by the inspecting authority.

5.0 INSPECTION OF FINISHED PRODUCT BY INSPECTITING AUTHORITY

5.1 Check the all records of raw material, Magna flux & shot peening material and other internal testing.

5.2 Visual inspection

i) Five percent Brake Beam hanger shall be visually checked with or without magnifying glass to ensure freedom of the forgings from surface defects e. g. laps, cracks, folds, nicks dents, rough, scales, imperfect edges and other harmful surface defects.

ii) The forgings fins and parting lines should not be acceptable.

iii) Manufactures markings should be as given in the drawing.

5.3 Physical, Chemical & Dimensional Inspection

S.No.	Description	Sample size	Acceptance Criteria
i.	Dimensional accuracy (Straightness, Holes center to center, Stem size & Hole size)	5% or 5 Nos. per lot	All dimensions and surface finish as per RDSO Drawing SK-69597 (Latest Alternation)
ii.	Surface defect freedom of the forgings from surface defects e. g. laps, cracks, folds, nicks dents, rough, scales, imperfect edges etc	100%	No surface defect permitted.
iii.	Chemical composition of Brake Beam hanger & Bush	1% or 1 piece per lot min.	IS: 2004 & IS: 5517
iv	Ultimate tensile strength yield strength and percentage elongation.	1% or 1 piece per lot min.	IS: 2004
v	Micro -examination	1% or 1 piece per lot min.	IS: 2004
vi	Brinell hardness	2% or 2 nos. per lot min	IS: 2004
vii	Magnaflux testing for surface cracks	5% or 5 nos. per lot min	No surface crack is permitted

Note:

i) Load and bend testing of hangers must be done on a machine with the provision of applying a measured load. The machine must be able to provide a display of the permanent set/ elongation after applying the load for 2 minutes.

ii) Bend test of hanger must be done by applying 700 Kg load towards the thickness at one end holding other end at centers. There should be no permanent bend, brakeage, damage, crack at any locations after removing the loads.

iii) Under test load, there should be no permanent set breakage or crack of the component, and elongation should be <0.2 mm.

iv) All test-pieces shall be kept separately with permanent marking for the benefit of the Inspecting official for record, and after inspection shall be suitably marked destructively so as to prevent its use. These destructively marked samples should be supplied along with the lot to the consignee.

v) In case any picked up sample fails, manufacture shall re-offer. However, in such cases, double the quantity of samples shall be picked up and shall be checked for dimensions and other specified testing. In case anyone sample again fails the entire lot shall be rejected.

vi) It should also be confirmed by the firm by submitting the document that bushes fitted in brake beam hangers have been procured to as per material specification of IS:5517,45C-8 with hardened and tempered, hardened value (250-300 BHN).

6.0 HANDLING AND PACKING

The Brake Beam Hangers should be properly handled during manufacture these should not be thrown on floor at any stage of manufacture to avoid any damage. Hangers should be packed securely in rigid ◎case ensuring that each case does not exceed weigh more than 425 kg approx.

7.0 WARRANTY FOR HANGERS

The Brake Beam Hanger shall be warranted for a period of 5 years against any defects imputable to manufacture and material from the date of delivery of the hangers as indicated by stamping of months and year of the manufacture. These shall be replaced free of cost by the manufacturer.

SECTION-B

1.0 GENERAL REQUIREMENT

1.1 Firm should maintain minimum M&P & test equipment requirements.

1.2 Dimensional checking equipment - measuring tapes, scales, vernier calipers, all type of gauge surface plate and micrometers.

1.3.1 Facilities for sample preparation for microstructure analysis.

1.4 Reflecting metallurgical microscope with measuring grid and image analyser.

1.5 Chemical laboratory & spectrometer for checking steel composition,

1.6 Universal testing machine for load & bend testing within built facility of reading and producing a chart.

1.7 Magnaflux/magnetic particle testing equipment.

1.8 Shearing/Saw machine.

1.9 Forging furnace with temperature controller & recorders having a facility of reading and producing a chart.

1.10 Drop stamping press.

1.11 Forging & trimming dies.

1.12 Milling/grinding machine & linishing machine.

1.13 Drilling machine with drills & boring tools.

1.14 Normalizing furnace with temperature controller & recorder.

1.15 Shot peening machine.

2.0 QUALITY CONTROL REQUIREMENTS.

2.1 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. This system should also facilitate to identify the raw material composition from the finish product stage.

2.2 The Firm must ensure that there is a QAP (Quality Assurance Plan) as per RDSO ISO Document No: QM-RF-8.1-3 latest version, Guidelines for preparing QAP.

2.3 There should be at least one full time technologist having a minimum bachelor's degree in relevant field & 5 years experience or a person with diploma in relevant field with 12 years experience. He should be free from day-to {any production, testing and quality control responsibilities. He should be mainly responsible for development of the product, analysis of products, control over raw material and corrective action in case of difficulties in achieving the parameters.

2.4 The firm must ensure that the in-charge of the Quality Control Section is having a qualification of minimum bachelor's degree in the relevant field and has a minimum of 5 years experience. Alternatively the in-charge can be a diploma holder with a minimum of 12 years experience. He should be actively involved in day-to-day activities of quality control of stage inspection.

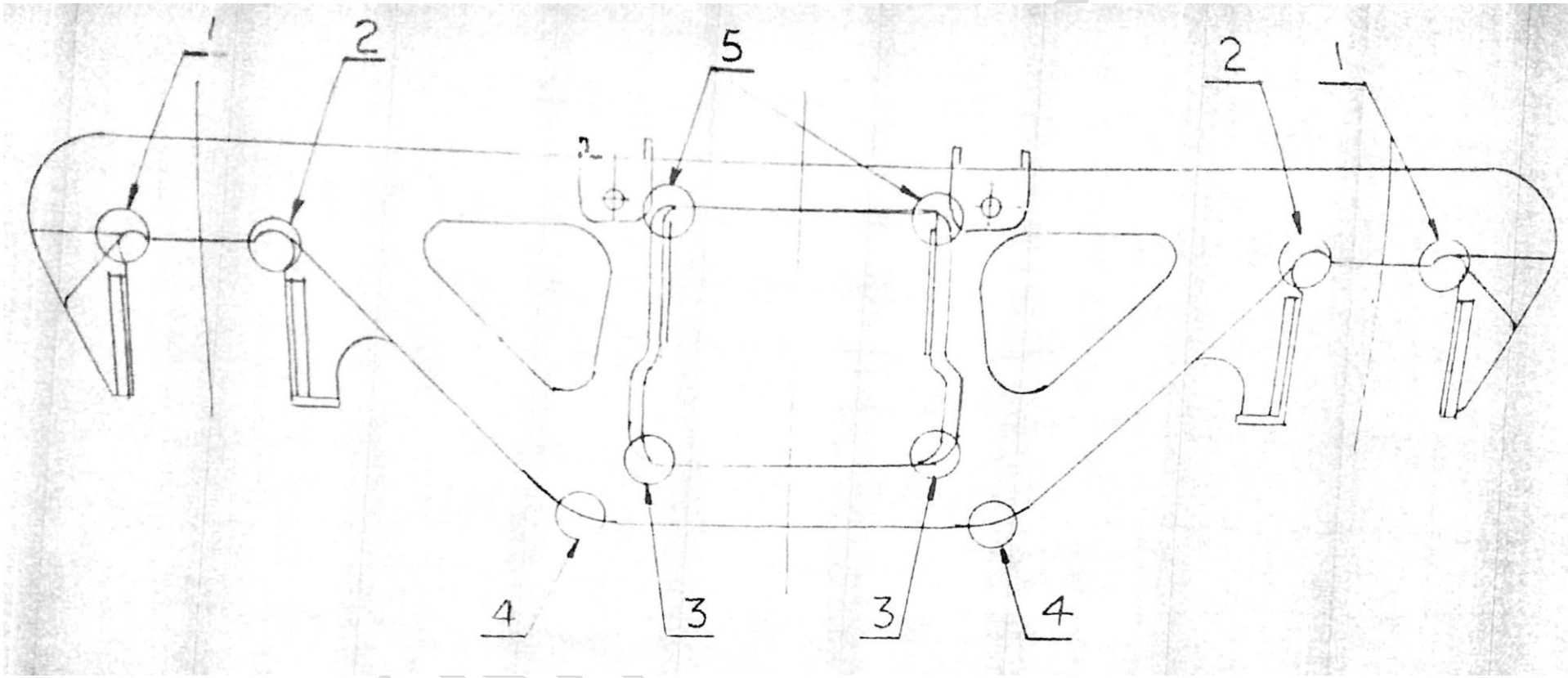
2.5 The firm should have acquired ISO: 9000 series certification and the product for which an approval is sought should be broadly covered in the scrape of the certification for manufacture and supply.

2.6 The Quality manual of the firm for ISO: 9000 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.

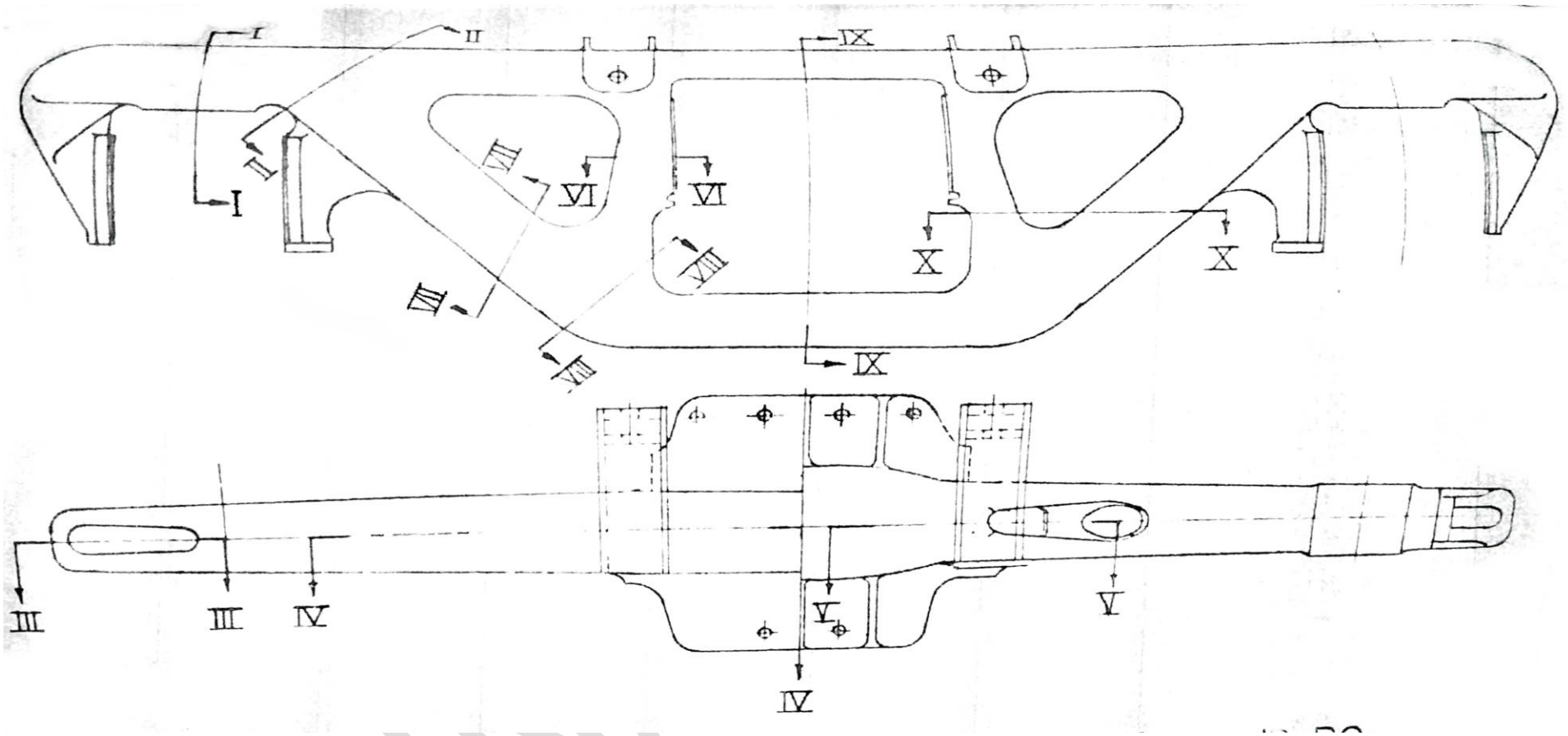
2.7 The firm should ensure that a proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.

2.8 The firm must ensure that all the relevant drawings /specifications, IS standards are available.

3. Inspection Check sheet for Brake Beam Hanger and Bush is attached at Annexure IX.



LOCATION FOR RADIOGRAPHIC EXAMINATION AND MAGNETIC PARTICLE TEST OF SIDE FRAME -CASNUB BOGIE



LOCATION FOR SECTIONING OF SIDE FRAME-CASNUB BOGIE

(SECTIONING SHALL BE DONE ON BOTH ENDS OF SIDE FRAME)

ANNEXURE-IX

Inspection Check-Sheet (WX-23023) FOR Brake Beam Hangers & Bush for CASNUB 22 W(M) Bogie

Item: Brake Beam Hanger for CASNUB 22 W(M) Bogies
STR/Specn. : WX-23023 of Nov 2023
Drawing No. : SK-69597 (Latest Alteration)

1	P.O. No.	
2	Consignee	
3	Name of supplied firm	
4	Lot size	100 Nos OR Part
5	Date of Inspection	
6	Qty. Ordered	
7	Qty. Received	
8	Qty. checked	
9	Qty. Passed	
10	Qty. Rejected	

1. Visual/Physical Examination of Brake Beam Hanger (100%).

Examination	Specified	Observations
Surface defect	Forging free from surface defects e. g. laps, cracks, folds, nicks dents, rough, scales, imperfect edges and other harmful surface defects.	
Marking Details	**As** per RDSO Drawing SK-69597 (Latest Alternation)	

2. **Brake Beam Hanger as per IS:2004 CL4**.

2A. **Chemical Composition** (1% or 1 nos. per lot min.).

Element					
C – 0.4-0.5%					
Mn- 0.6-0.9%					
Si - 0.15-0.35%					
S - 0.04% (Max)					
P –0.04% (Max.)					

2B. **Micro-Examination** (1% or 1 nos. per lot min.)

Lot/Batch No.								
Grain Size 5 Min								
Microstructure Normalized								

2C. **Hardness Test** (2% or 2 nos. per lot min.)

Lot/Batch No.								
Hardness- 175 BHN (Min)								

2D. **Mechanical Properties of Brake Beam Hanger** (1% or 1 nos. per lot min.)**.**

Specified Value (N/mm2)								
UTS-620 (Min)								
YS-320 (Min)								
El %- 15 (Min)								

3. Magnetic Particle Test of Brake Beam Hanger (5% or 5 nos. per lot min.)

Lot/Batch No.	Serial No.	Observation	Remarks

Spec. No.WX-23023	Date of issue: Nov 2023	Inspection check sheet for Brake Beam Hanger and Bush(CASNUB w(M)) Bogie

4. Dimensional examination (5% or 5 nos. per lot min.)

Sample No.	Outer Dia. (Ø60)	Inner Dia. (Ø42+0.039 /-0.0)	*End Thickness* (30 +1/-0)	Middle thick. (20 +1/-0)	CRS dist. (305±0.5)	Total length (375mm)	Middle width (40 +1/-0)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

5. Brake Beam Hanger Bush as per IS:5517,45 C-8.

5A. **Chemical Composition** (1% or 1 nos. per lot min.)

Element					
C – 0.4-0.5%					
Mn- 0.6-0.9%					
Si - 0.10-0.35%					
S - 0.35% (Max)					
P – 0.35% (Max.)					

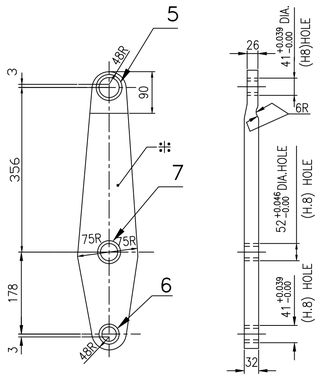
5B. **Hardness Test** (2% or 2 nos. per lot min.)

Lot/Batch No.								
Hardness- 250-300 BHN								

5C. Dimensional examination (5% or 5 nos. per lot min.)

Sample No.	Outer Dia. (Ø42+0.068 /-0.043)	Inner Dia. (Ø36+0.2 /-0.0)	*Thickness* (3 mm min.)	Length (30mm)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

WX06055 | WX23024 | WX24006



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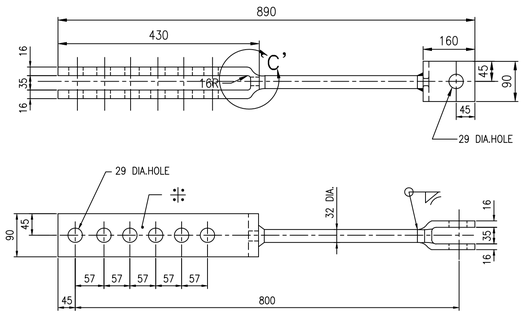

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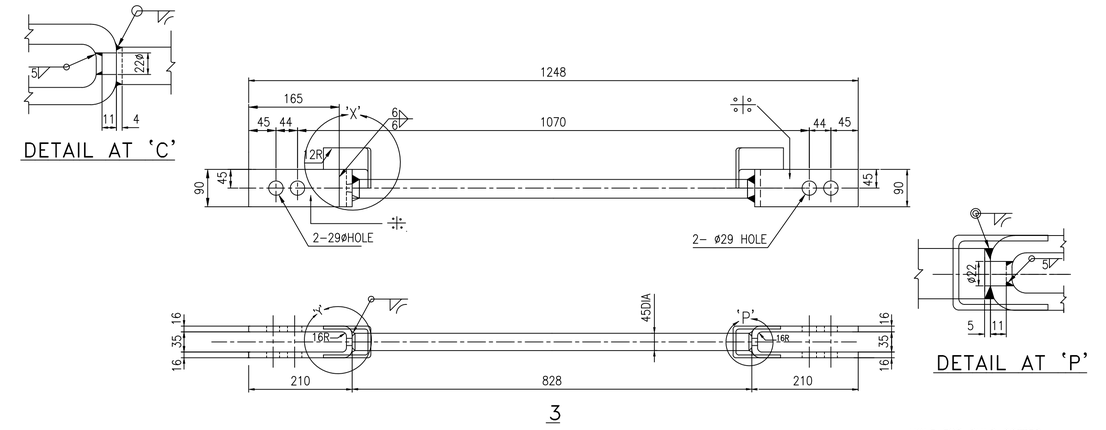

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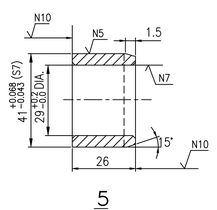

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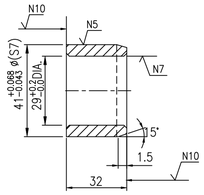

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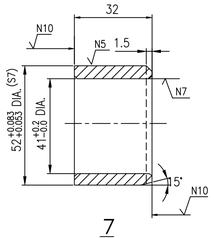

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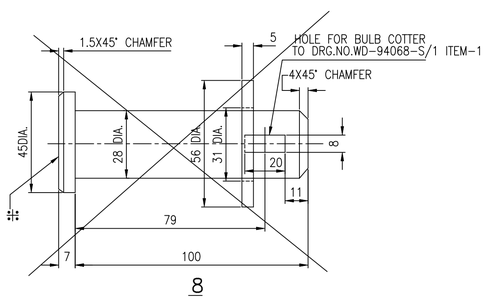

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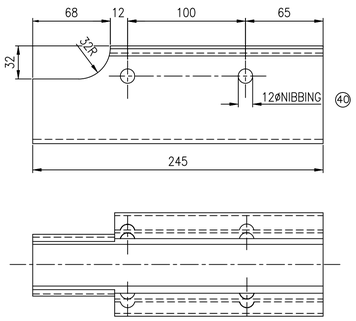

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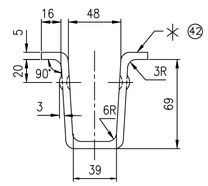

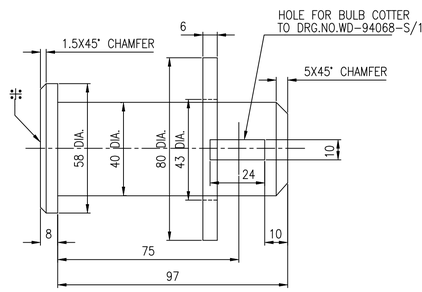

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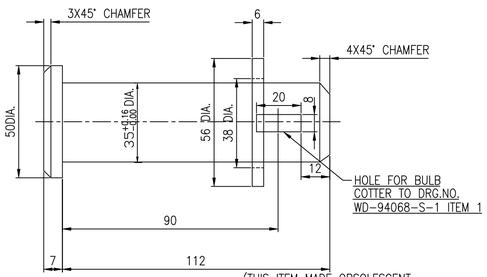

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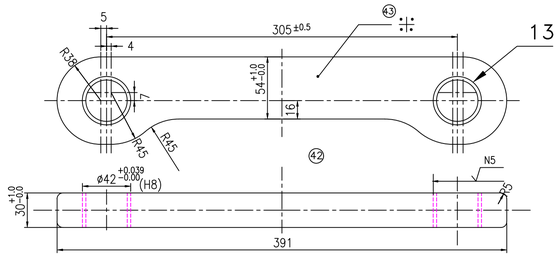

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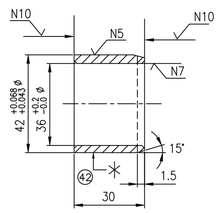

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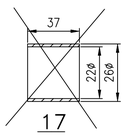

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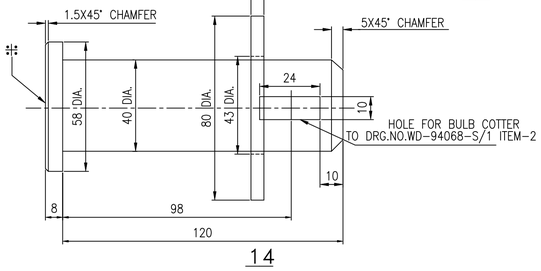

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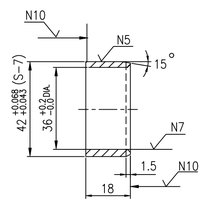

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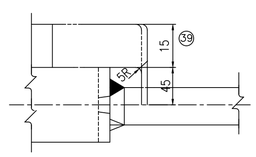
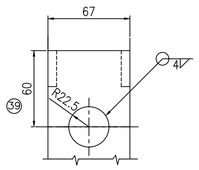


ENLARGED DETAIL AT 'X'



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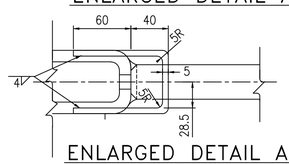

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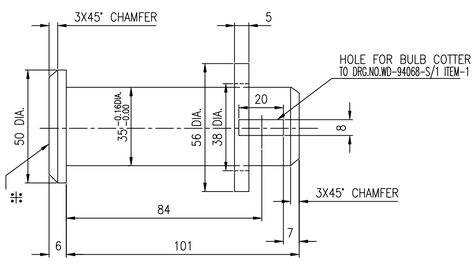

15

NOTE:-

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. DELETED.
3. ITEM NO.2 & 3 SHALL BE TESTED FOR A LOAD OF 18t. APPLIED AXIALLY.
43 42 ✻ 4. ~~STAMP DRG. NO.,MANUFACTURERS INITIAL, MONTH & YEAR OF MANUFACTURING IN 6mm TYPE.~~ TO BE EMBOSSED IN HOT CONDITION WITH 2MM HIGH LETTER & IN 6MM SIZE AS GIVEN BELOW IN ONE LINE ONLY MANUFACTURER'S INITIAL(TWO DIGIT ONLY) AS ALLOWED BY THE COMPETENT AUTHORITY,MONTH & YEAR OF MANUFACTURING(FOUR DIGIT ONLY), 3A (FOR IS:1875 CLASS 3A MATERIAL)(TWO DIGIT ONLY)
5. SURFACE ROUGHNESS VALUES SHALL BE AS PER IS:3073.
6. HARDNESS OF PINS & BUSHES TO BE 250 – 300 BHN.
✡ 7. MATERIAL FOR PIN AT ITEM NO.10,11,14 & 15 IS TO BE AS PER IS:5517,45,C–8 AND MATERIAL FOR WASHER AT ITEM NO.10,11,14 & 15 IS TO BE AS PER IS:2062 Fe 410 WA
41 8. ITEM NO 8 HAS BEEN REPLACED BY STANDARD PIN TO DRG. NO. W/PN–90. (REFER BOGIE BRAKE GEAR ARRANGEMENT OF CASNUB BOGIES.)
42 ✻ 9. MANUFACTURERS INITIAL, MONTH & YEAR OF MANUFACTURING SHALL BE MARKED BY METAL LASER ENGRAVING IN 6 MM SIZE & 0.1mm DEPTH MINIMUM.

ALT	ITEM	AUTHY	DESCRIPTION	DATE
43	12	WD–24044	NOTE NO. 4 FOR MARKING ON ITEM–12 REVISED AND ADDED.	07/24
42	9	WD–23092	NOTE NO. 4, ITEM–12 REVISED AND NOTE 9 ADDED. MARKING ON ITEM–13 ADDED.	11/23
41	8	WD–06058	NOTE NO. 8 ADDED.	08/06
40	9	WD–06013	BHN NO. OF ITEM NO.9 CHANGED FROM 380–420 TO 330–401.	03/06
			DRAWING REDRAWN.	10/04
39	3	WD–03026	DIMENSION 53MM CHANGED TO 15MM & DIMENSION 98MM CHANGED TO 60MM.	5/03

ITEM	DESCRIPTION & DIMENSION	NO. OFF	REF.DRG.	WT.OF ONE(KG)	MATL.&SPEC	REMARKS
17	~~SPACER~~	2	–	–	IS:2062, Fe410WA.	
16	BUSH	8	–	–	IS:5517,45 C–8	H/TEMPERED
15	PIN WITH WASHER & BULB COTTER	4	–	–	✡	
14	PIN WITH WASHER & BULB COTTER	2	–	1.36	✡	
42 13	BUSH FOR BRAKE BEAM HANGER	8	–	–	IS:5517,45 C–8	H/TEMPERED
42 12	BRAKE BEAM HANGER MODIFIED	4			IS:2004 CL4	NORMALIZED
11	PIN WITH WASHER & BULB COTTER	4			✡	
10	PIN WITH WASHER & BULB COTTER	2		1.065	✡	FOR FABRICATED BRAKE BEAM
42 9	BRAKE WEAR PLATE	4		1.798	IS:3885PI–1 Gr. IV	330 – 401 BHN
41 8	~~PIN WITH WASHER & SPLIT COTTER (W/KY–20)~~	~~5~~		~~1.037~~	~~IS:2062, Fe410WA.~~	
7	BUSH	2		0.120	IS:5517,45 C–8	H/TEMPERED
6	BUSH	2		0.139	IS:5517,45 C–8	H/TEMPERED
5	BUSH	2		0.113	IS:5517,45 C–8	H/TEMPERED
4	–	–			–	
3	BOGIE BRAKE PUSH ROD	1		20.410	IS:2062, Fe410WA.	
2	BOGIE END PULL ROD	1		14.780	IS:2062, Fe410WA.	
1	EQUALISING LEVER	2		17.000	IS:2062, Fe410WA.	

SUPERSEDED BY			DATE
SUPERSEDES			
SCALE	PASSED	sd.	
1:1	CHECKED	sd.	
1:2	DRAWN	sd.	
1:5	TRACED		
	J.S.NO.		

CASNUB 22W,22W(M),22NL, 22–H.S. & 22 NLM BOGIES

BOGIE BRAKE GEAR DETAILS

B.G. | R.D.S.O. [W] | GROUP | SK–69597