सत्यमेव जयते

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Research, Designs & Standards Organization, LUCKNOW - 226011

No. EL/3.1.35/2(Bogie) Dated: 27.08.2018.

Chief Electrical Engineer,

1. Central Railway, Mumbai, CST-400 001.
2. East Central Railway, Hazipur-844101.
3. East Coast Railway, Chandrashekharpur, Bhubaneshwar-751016.
4. Eastern Railway, Fairlie Place, Calcutta-700001.
5. North Central Railway, Block-A, Subedarganj, Allahabad- 211033.
6. Northern Railway, Baroda House, New Delhi-110001.
7. South Central Railway, Secunderabad-500 071.
8. South East Central Railway, Bilaspur-495004.
9. South Eastern Railway, Garden Reach, Calcutta-700 043.
10. Southern Railway, Park Town, Chennai-600 003.
11. West Central Railway, Jabalpur-482001.
12. Western Railway, Churchgate, Mumbai-400 020
13. Chittaranjan Locomotive Works, Chittaranjan – 713 331
14. Diesel Locomotive Works, Varanasi- 221004
15. Diesel Loco Modernization Works, Patiyala- 147003

TECHNICAL CIRCULAR No. RDSO/2018/EL/TC/0149 Rev. '0', Dated 27.08.2018

1. TITLE:

Technical Circular for repair of crack in welding of plate (Drg. No. 1209-01-312-145) of Pivot Transom sub assembly of bogie frames for WAP7/WAG9 locomotives.

2. BACKGROUND:

The plate as per drawing No. 1209-01-312-145 is a cover plate of sub assembly of Pivot Transom assembly of bogie frame of WAP7/WAG9 locomotives. It is welded as a last component in this sub assembly of pivot transom. South Central Railway reported the crack in welding between this plate and transom vertical web. The matter has been investigated for the reason of crack.

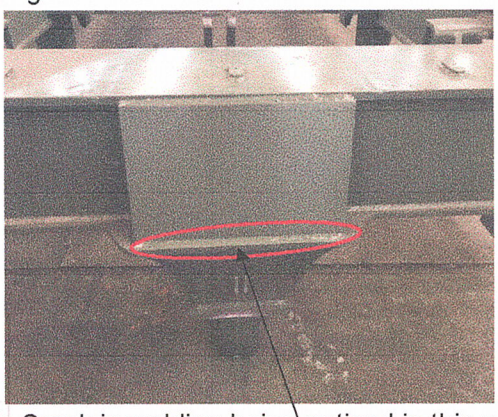


Fig. 1: Crack in welding being noticed in this portion

RDSO visited premises of M/s Ved, Kanpur a bogie manufacturer for examining the issues related with development of crack in plate welding of Pivot Transom sub assembly. During the investigation it was noted that Firms were not taking care of all the precautions as per Drawing no. 1209-01-112-120 of pivot transom.

3. OBJECT:

This Technical circular is being issued to reiterate the instruction and precautions to be taken during the welding of Pivot Transom sub assembly cover plate of bogie frames for WAP7/WAG9 locomotives.

4. PROCEDURE OF WELDING IN NEW BOGIES:

Welding of pivot transom sub assemblies in new bogies shall be done as per the clause no. 6.0 of CLW specification no. CLW/MS/3/BOGIE/003 and Drawing no. 1209-01-112-120.

Special care shall be taken during the welding of cover plate on transom vertical web as per section V of above mentioned drawing:

a) Maintain 2 mm gap between the two, to have end fusion of the filling material.
b) Ensure Profile of the fillet as per the drawing.

However, relevant feature of welding is reiterated as per CLW's Specification as under:

4.1 Welding Procedure:

(i) Filler Metal:
Metal Inert Gas (MIG) welding process using Argon gas(at least 80% argon) as shielding media and RDSO approved brand of filer wire AWSA5.18ER70S4 or 70S6 shall only be adopted for welding of bogie frame including brackets.

(ii) Run on and Run off tabs:
Run on and Run off tabs (a beveled fillet joint of about to 200mm long made out of the same plate and thickness) shall be attached with side beams at all corners by tack welding. During welding of the side beams these tabs are also to be welded as a continuous welding of the side beamed.

4.2 Quality of weld Joints:

(i) Weld joints shall have uniform beading and smooth change over from weld deposit to parent metal and through fusion between adjacent layers of weld metal and between weld metal and parent metal.

(ii) Weld joint shall be free from cracks, craters, undercuts, overlaps, porosity, inclusions, below-holes etc.

(iii) In butt welded area, one extra run of welding shall be applied; excess metal shall then be grounded off to eliminate stress and normalize the welded metal.

(iv) The fillet weld profile shall be made concave by grinding so that smooth transition occurs at the toe of weld maintaining correct size of the welds. Welds shall be ground to eliminate stress raisers and do improve fatigue life.

(v) Adequate measures shall be taken by the manufacturer to avoid distortion during welding. Minor distortion, if any, shall be corrected preferably in the cold (by mechanical method). Any correction to be done by flame heating of members shall be carried out only in presence of Inspecting Agency or his representative; temperature of heated part shall not exceed 500°C.

(vi) Any linear discontinuity shall be unacceptable and shall be repaired by chipping or grinding up to the root and subsequent welding. After rectification of defects in welding, the area shall be re-examined by the same method to ensure defect free weld joint.

The drawings & specifications for welding are given in Annexure- 'A' of CLW specification which is reiterated here as Annexure- 1

5. PROCEDURE FOR REPAIRING OF WELDING:

(i) Remove cracked welding by gauging/grinding by cut off wheel.
(ii) Edge preparation in cover plate to maintain root gap to enable end fusion of welding.
(iii) Welding shall be done as per CLW specification no. CLW/MS/3/BOGIE/003 and Drawing no. 1209-01-112-120.
(iv) The welded area shall be stress relieved by heating to about 600-650°C with the help oxy acetylene torch followed by slow cooling under cover of asbestos sheet if the bogie is not subjected to any other heat treatment after repair welding.
(v) After cooling of joint at room temperature weld joint to be inspected by Dye Penetrate Test & Magnetic Particle Test.

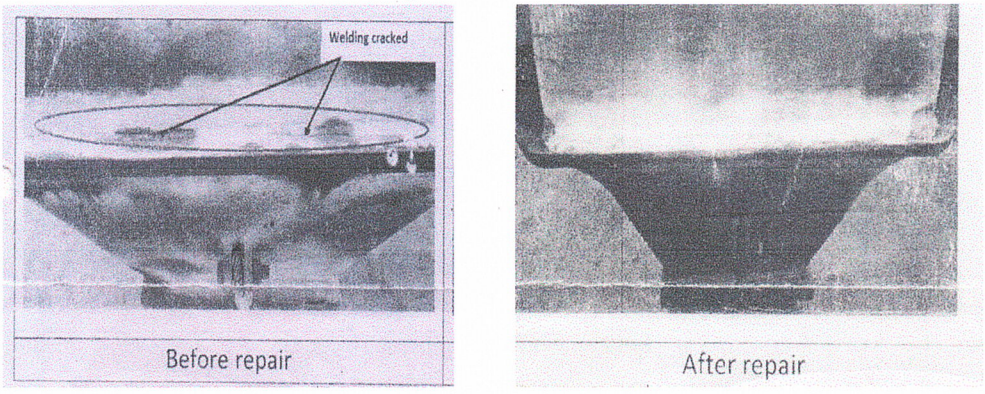


Fig.2: Photo of transom before and after repair

6. CLASS & GRADE OF CONSUMABLE MATERIAL FOR WELDING:

As per CLW specification no. CLW/MS/3/BOGIE/003.

7. AGENCY FOR IMPLEMENTATION:

All POH workshop/Electric Loco Sheds/PUs.

8. ENCLOSURES :

(i) Drawing. No. 1209-01-312-145 for item no.17 (Plate).
(ii) Drawing No. 1209-01-112-120 of Pivot Transom.

27/8/18

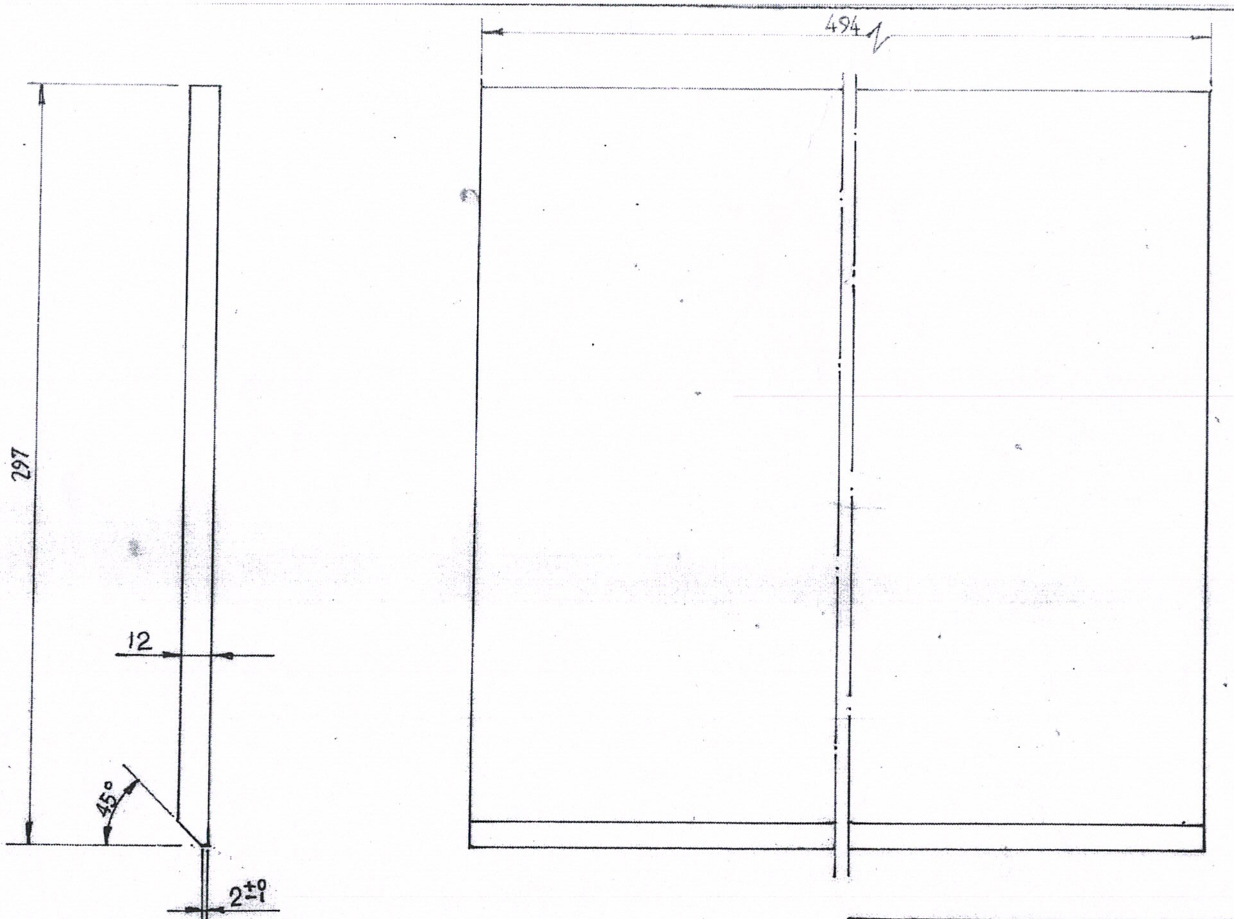
(Pratibha Gupta)
for Director General/Electrical

Copy to: As per standard mailing list

Annexure-1

LIST OF RELEVANT DRAWINGS & STANDARDS TO BE REFERRED

SN	Description/Drg. No.	Reference for
1.	IS:2102	General tolerances (for intolerance linear and angular dimensions)
2.	RDSO'sMC-4	Code of procedure of Ultrasonic Testing technique for butt weld joints for Bogie Frames.
3.	EN287-1/IS:7310(Part-I)/IS817/AWS Code D.1.1	Qualification of welders
4.	IS:2062	Steel for general structural purpose.
5.	DIN:2448	Standard for tube
6.	IRS M41	
7.	IRS M1079	
8.	RDSO SPEC No. VL.SPEC-6(latest version) & Drg. No. 1209-01.112-001 and Drg. No. 1209-01.112-202	For Stress relieving
9.	ASTM: 435/IS:4225, ASTM E-164	For Ultrasonic test plate
10.	Blue Standard of IIW	For Radiographic test
11.	IS:3658	For Dye Penetration test
12.	IS:5334	For Magnetic Particle test
13.	WP-27 IRB, 35 IRB, 36 IRB, 37 IRB, 38 IRB, 39 IRB, 40 IRB, 41 IRB, 42 IRB, 43 IRB, 45 IRB, 46 IRB, 48 IRB, 49 IRB, 50 IRB, 51 IRB(16 specifications), WP-10, WP-45, IRB(Motor Support) procedure of welding 72 pages.	Welding procedure
14.	RDSO Spec. M&C/PCN/100/2009)or latest)	Painting
15.	STR No. CLW/2015/ELDO/M/STR/0019 Rev'0' issued on September'2015(or latest)	Schedule of Technical Requirement for Bogie Frame Assembly without Brake Gear.



UNLESS STATED OTHERWISE CUTTING EDGES √RZ100

T211/170	–	–	PLATE	2	STEEL	IS:8500 Fe 540B	13·5
	निर्देश संख्या REF. NO.	अंग आरेखण संख्या PART DRG. NO.	वर्णन DESCRIPTION	संख्या प्रति इंजन NO./LOCO	पदार्थ MATL	विशिष्टि SPECN	प्रति भार कि.ग्रा. WT. EACH IN KG.

अभिकल्पित DGN
जाँचा CHD
अधीक्षक SUPDT
समीक्षित REVIEWED AME/DE'D
अनुमोदित APPROVED DY.CDE (DED)
दिनांक DATE 21-1-98
पैमाना SCALE 1:2
संदर्भ/REF. ABB DRG. NO. 1B016-00379

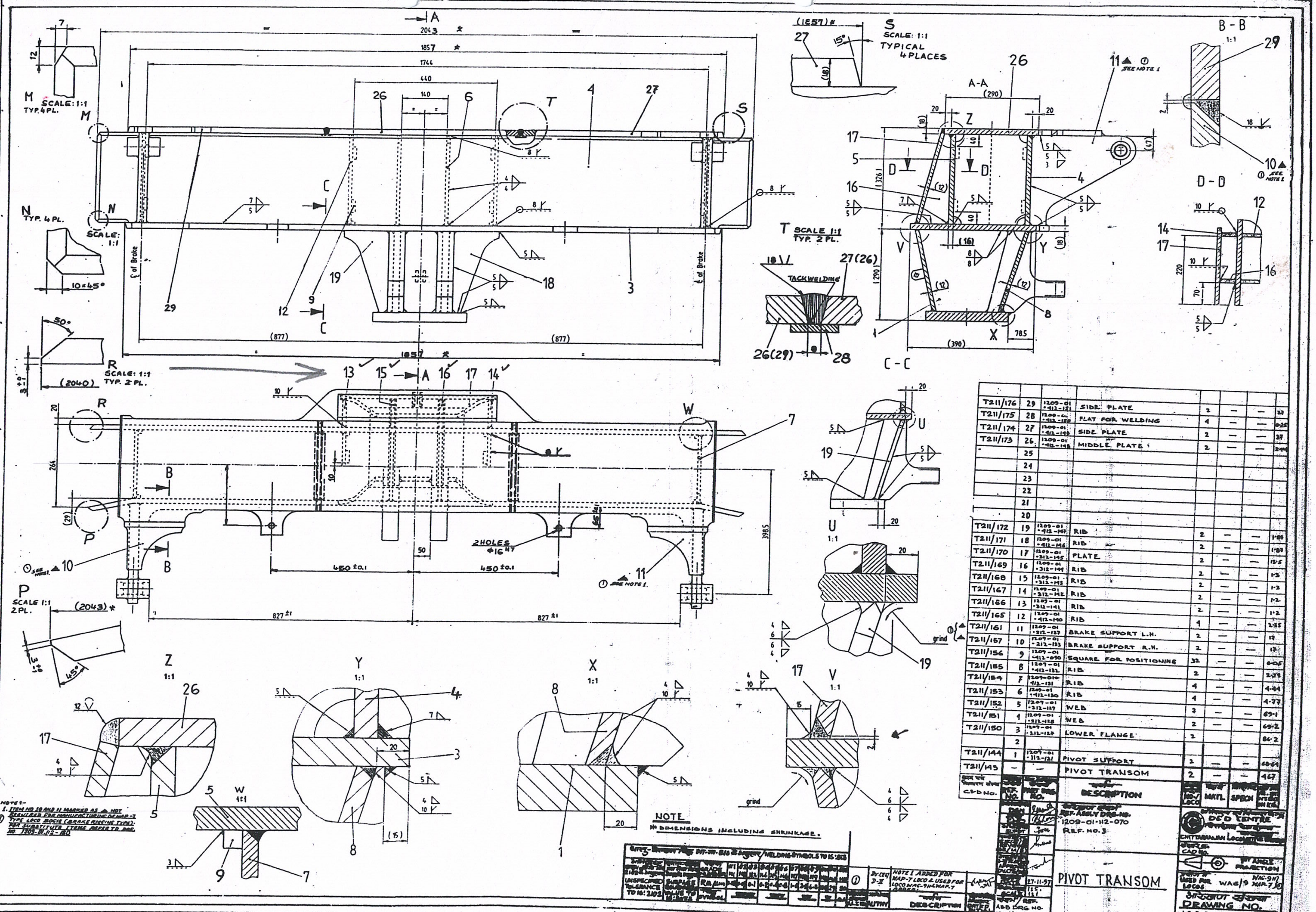
आरेखण संदर्भ
REF. ASSLY DRG. NO. 1209-01-112-120,
REF. NO. 17

PLATE

अभिकल्प एवं विकास केन्द्र
D & D CENTRE
चित्तरंजन रेल इंजन कारखाना
CHITTRANJAN LOCOMOTIVE WORKS
संस्करण क्र.
CAD NO.
1ST ANGLE PROJECTION
प्रयोग में USED FOR LOCOS WAG/9
आरेखण संख्या
DRAWING NO.
1209-01-312-145

अतिनिर्दिष्ट सह्य-सीमा भा.मा. 2102 के अनुसार UNSPECIFIED TOLERANCE TO IS:2102	सतह-रुक्षता का मान भा.मा. 3073 के अनुसार SURFACE ROUGHNESS VALUE TO IS:3073												
	ग्रेड GRADE NUMBER	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
	Ra/µm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिह्न SYMBOL	▽▽▽▽			▽▽▽			▽▽			▽		~

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY.	वर्णन DESCRIPTION	दिनांकित आद्याक्षर DATED INITIAL



CPD No.	REF. NO.	PART DRG. NO.	DESCRIPTION	NO./LOCO	MATL.	SPECN.	WEIGHT IN KG.
T211/176	29	1209-01-412-151	SIDE PLATE	2	—	—	37
T211/175	28	1209-01-412-150	FLAT FOR WELDING	4	—	—	0.25
T211/174	27	1209-01-412-149	SIDE PLATE	2	—	—	37
T211/173	26	1209-01-412-148	MIDDLE PLATE	2	—	—	2.44
	25						
	24						
	23						
	22						
	21						
	20						
T211/172	19	1209-01-412-147	RIB	2	—	—	1.84
T211/171	18	1209-01-412-146	RIB	2	—	—	1.87
T211/170	17	1209-01-312-145	PLATE	2	—	—	13.5
T211/169	16	1209-01-312-144	RIB	2	—	—	1.3
T211/168	15	1209-01-312-143	RIB	2	—	—	1.2
T211/167	14	1209-01-312-142	RIB	2	—	—	1.2
T211/166	13	1209-01-312-141	RIB	2	—	—	1.2
T211/165	12	1209-01-412-140	RIB	4	—	—	2.35
T211/161	11	1209-01-212-137	BRAKE SUPPORT L.H.	2	—	—	17
T211/157	10	1209-01-212-133	BRAKE SUPPORT R.H.	2	—	—	17
T211/156	9	1209-01-412-090	SQUARE FOR POSITIONING	32	—	—	0.05
T211/155	8	1209-01-412-132	RIB	2	—	—	2.28
T211/154	7	1209-01-412-131	RIB	4	—	—	4.44
T211/153	6	1209-01-412-130	RIB	4	—	—	4.77
T211/152	5	1209-01-212-129	WEB	2	—	—	69.1
T211/151	4	1209-01-212-128	WEB	2	—	—	69.2
T211/150	3	1209-01-212-127	LOWER FLANGE	2			86.2
	2						
T211/144	1	1209-01-112-121	PIVOT SUPPORT	2	—	—	68.64
T211/145	—	—	PIVOT TRANSOM	2	—	—	467

REF. ASSLY DRG. NO. 1209-01-112-070
REF. NO. 3

NOTE
* DIMENSIONS INCLUDING SHRINKAGE.

NOTE:-
1. ITEM NO 10 AND 11 MARKED AS ▲ NOT REQUIRED FOR MANUFACTURING OF WAP-7 TYPE LOCO BOGIE (BRAKE RIGGING TYPE). FOR SUBSTITUTE ITEMS REFER TO DRG. NO. 1209-01-112-180

① NOTE 1 ADDED FOR WAP-7 LOCO & USED FOR LOCO NO. 9[illegible] WAP-7

DESCRIPTION

WELDING SYMBOLS TO IS:813

UNSPECIFIED TOLERANCE TO IS:2102

ABB DRG. NO. 15011-00197

DCD CENTRE
CHITTARANJAN LOCOMOTIVE WORKS

USED FOR LOCOS WAG/9 WAP-7

PIVOT TRANSOM

DRAWING NO. 1209-01-112-120

ALT. ①