

INTEGRAL COACH FACTORY, CHENNAI- 600 038

**SCHEDULE OF REQUIREMENTS FOR MANUFACTURE
AND SUPPLY OF STAINLESS STEEL SIDEWALL &
ROOF ASSEMBLIES**

ICF/MD/SPEC-200
Issue Status : 01
Revision : 04
Date : 28.09.2017

IDENTIFICATION SHEET

No of Pages 19 +1

Amendment Nos.	1	2	3	4	5
Date Of Issue	05/05/2018				

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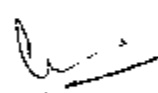
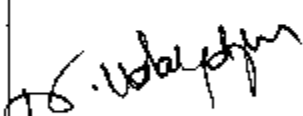

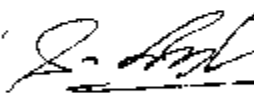
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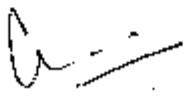
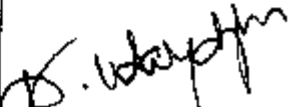
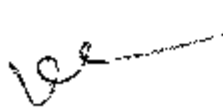
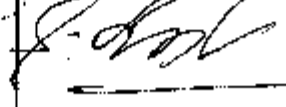
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Page No	Clause No.	EXISTING DESCRIPTION	REVISED DESCRIPTION
11	12.4	The Quality Assurance Plan (QAP) to be submitted to ICF initially for approval.	The Quality Assurance Plan (QAP) Shall be made as per ICF/QAP/LHB-10,ISSUE STATUS-01,REV-00 and shown to the Inspection Authority.

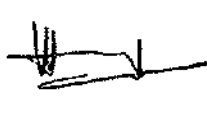
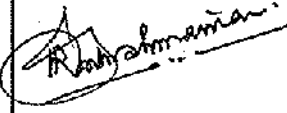


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Changes Data on Rev.03


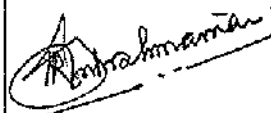
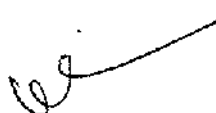

Sl. No	Month / Year of issue	Revision / Amendment	Clause No.	Reason for Revision / Amendment
1	AUGUST-2017	Rev.04	<u>Changes</u>	The following changes are made by including the requirements as per ISO 3834, EN 15085, Laser welding and spot weld quality requirement including argon gas purging to avoid discoloration.
			4.1.A.(iv)	"Automatic/CNC/robotic spot welding" machine added.
			4.1.A.(vii)	Modified as " Laser cutting machine of effective bed size (min. 1.5M width x 3M length)and Laser welding machine of effective bed size (min 2.5M width x 3M length) or Laser cutting cum welding machine of effective bed size (Min 2.5m width x 3m length)" to suit the cutting and welding requirements of sidewall sheet joints
			6.0	Tension of 8 tonnes modified to 12 tonnes to suit 3 mm thick sheet.
			7.1	Clause modified by including Welders qualification as per ISO 9606-1,Laser weld and Spot welding operator qualification as per ISO 14732.

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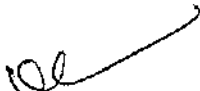
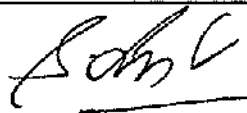
			7.2	Clause modified by including Supervisors additional qualification with IWE/IWT/IWS given by IIW or WRI/Trichy or AWTI/ICF
			7.3	Existing clause deleted. New clause for Inspection and testing personnel qualification as per ISO 9712 level-2 or SNT-TC-1A level 2 added. Renumbered as 7.7
			7.4	New clause for Welding plant calibration as per ISO 17662/ BS EN 50504 added.
			7.5	New clause on WPS for critical joints added. Welding Procedure Specification (WPS) shall be as per ISO 15609, 15613 and 15614.
			7.6	New clause on "Pickling/Passivation after welding" added.
			8.1	Clause modified by including measurement for spot welding indentation.
			8.2	Permission for Testing at NABL Lab for 8.2(i) deleted.
			8.2(iv)	DIN 8.1M: 2007 deleted.

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			9.1.(viii)	DIN 8.1M:2007 changed as "drawing" and spot size details deleted.
			10.1	Prototype sample drawing modified as "Lavatory sidewall of a LHB build".
			10.3	New clause on "Quality of Spot Weld" added. (Ref: Principal/AWTI letter no. AWTI/210 dated 09-01-2017.)
			12.1	Clause modified to include ISO 3834 and to follow EN 15085-CL1 standard requirements.
			12.3	Welding activities as per ISO 3834 & EN 15085 requirements added. Documentation for Spot weld data added.
			12.6	New clause for Quality requirement for spot welds as per CP C2 of ISO 15085-Part-3 added.
			Annexure-A	Replaced with Tables for tests to be conducted on test specimens and actual jobs.
			Annexure-B	Tables for quality requirements of spot welding added.

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1.0 SCOPE

- 1.1 This schedule covers requirements for manufacture and supply of sidewall & roof assemblies for LHB type coaches.

2.0 REQUIREMENTS


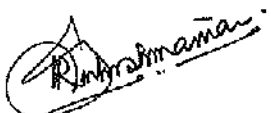


- 2.1 All vendors seeking registration with ICF must fulfill the requirements of this schedule.
- 2.2 They should have demonstrated their competence for manufacture of large size stainless steel fabrications.

3.0 COVERED AREA

- 3.1 The firm shall have adequate covered area for storage of raw material, finished products and work in progress. There should be a separate area earmarked for Stainless steel, to avoid mix up with mild steel fabrication.

4.0 MACHINERIES AND INFRASTRUCTURE REQUIRED

- 4.1 The firm shall have the following machinery and infrastructure with them as a minimum requirement for manufacture of heavy fabricated items.
- A. (i) MIG welding facility.
(ii) TIG welding facility.
(iii) Stainless steel fabrication handling facilities e.g. Crane, Nylon slings
(iv) Automatic /CNC/ robotic spot welding machine of suitable capacity to weld at a stretch with adequate clear space to handle long subassemblies with handling equipment.

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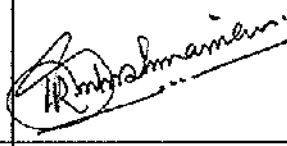
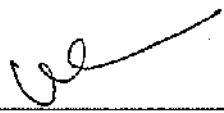
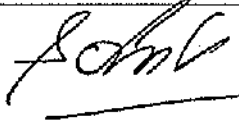
- (v) Hydraulic press with sufficient capacity for window forming for Non-AC coaches (or a proper MOU /back to back agreement with OEM's shall be submitted along with the tender).
- (vi) Sheet straightening machine for straightening of sheets before laser cutting.
- (vii) Laser cutting machine of effective bed size (min. 1.5M width x 3M length) and Laser welding machine of effective bed size (min 2.5M width x 3M length) or Laser cutting cum welding machine of effective bed size (Min 2.5m width x 3m length) to suit the cutting and welding requirements of sidewall sheet joints.

B. Separate stainless steel fabrication bay to be earmarked with minimum covered shed of 2000 sq. metres area having crane facility of at least 5 tonnes. Evidence for the above (Clause 4.1) shall be submitted along with the tender documents.

- 4.2 For manufacture of roof assemblies, the firm shall have Cold Forming facility within the premises or a proper Memorandum of Understanding/Back to back agreement with OEMs manufacturing heavy duty CRF sections of thickness exceeding 2mm.

5.0 GENERAL PRACTICE TO BE FOLLOWED DURING MANUFACTURE

- 5.1 The stainless steel for manufacture of sidewall & Roof shall be procured only from the reputed stainless steel producers in the country, such as 1. M/s. SAIL and 2. M/s. JINDAL. For any other source, approval from ICF shall be taken.
- 5.2 The Sub-assemblies shall be manufactured as per the relevant drawing issued by ICF using fixtures. For the first time supplier the prototype shall be approved by ICF design office before series production.

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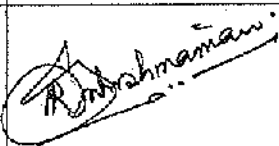
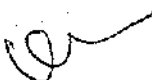
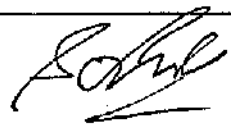
- 5.3 Sheets and plates shall be carefully straightened and flattened in straightening machine before laser cutting. Welded components or members shall be correctly matched and accurate levels and clearances shall be ensured to result in perfect welds.
- 5.4 Certain minor modifications in the assembly if required have to be done as advised by ICF.
- 5.5 The firm shall have necessary jigs and fixtures to ensure verticality and dimension as specified in the drawing.

6.0 SKIN STRETCHING

- (a) To ensure flatness of sidewall surface and to avoid undulations, the sheets shall be stretched before further welding of stiffeners in the fixture by applying a tension of 12 tonnes approx. on both sides (longitudinal side) by suitable stretching system (screw / hydraulic).
- (b) Stretching shall be released only after completion of welding of all stiffeners allowing sufficient cooling time.

7.0 REQUIREMENT OF WELDING ACTIVITIES

- 7.1 Welders qualified with ITI or equivalent qualification and qualified as per ISO 9606-1 for all critical joints, positions shall be only employed. Laser weld and Spot welding operator shall be qualified as per ISO 14732.
- 7.2 Supervisors shall have sufficient welding knowledge having minimum qualification of diploma in mechanical engineering. Firms shall identify and nominate a welding coordinator responsible for all welding operations. The welding coordinator should preferably have qualified as per ISO 14731 of IWE/IWT/IWS, diplomas awarded by Indian Institute of Welding or certificate from WRI/ Trichy or AWTI/ICF.

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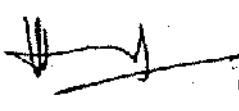
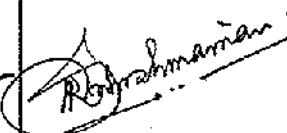


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- 7.3 Inspection and testing personnel shall have qualification as per ISO 9712 level-2 or SNT-TC-1A level 2.
- 7.4 All welding plants should be calibrated as per ISO 17662/ BS EN 50504.
- 7.5 WPS (Welding procedure specification) shall be prepared for all critical joints & qualified as per ISO 15609, 15613 and 15614 for applicable parts.
- 7.6 Pickling/Passivation shall be done after completion of all welding. Firm shall indicate in their QAP about this process and shall conduct trials in test plates before applying in the sidewall and roof.
- 7.7 Record of above details shall be maintained for verification.

8.0 INSPECTION & TESTING FACILITIES

- 8.1 The firm shall have calibrated measuring gauge, Vernier calliper, throat gauge, straight edge, level bed, etc. Spot welding indentation should be measured using digital depth gauge. The readings to be recorded in the inspection check list.
- 8.2 The firm shall have in house testing facilities for the following.
- (i) Chemical and Mechanical properties of raw material.
 - (ii) Macro etch test for fusion of fillet weld
 - (iii) Dye penetration test
 - (iv) Peel test & Chisel test of spot welds.
 - (v) Root bend, Face bend tests for butt welds.
- 8.3 Each completed assembly of the Roof shall be tested for water leakage at the works of the manufacturer. Appropriate test scheme & rig may be devised for the same to the satisfaction of ICF Engineers.

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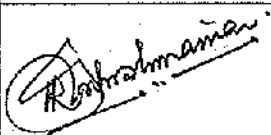
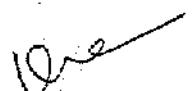
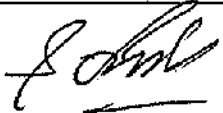
9.0 PRECAUTIONS

9.1 The firm shall take following precautions during manufacture/supply of stainless steel assemblies.

- (i) The outer surface should have no visible welding marks. No surface preparation will be done at ICF. Therefore, supplier shall prepare surface on which PU painting as per requirement of ICF can be directly done.
- (ii) Joint area to be welded must be clean. Use only stainless steel wire brush.
- (iii) Joint area must be free of grease, oil, water, dirt, finger marks.
- (iv) Use good commercial solvent cleaner to clean the weld area before welding.
- (v) Arc strikes adjacent to the weld must be avoided.
- (vi) Avoid excessive heat input.
- (vii) Grind the weld flush.
- (viii) Size of spot weld shall be chosen as per drawing.

10.0 FINISH

10.1 Exterior of roof and sidewall panels shall be without bulges or depressions that could be visible after painting. Concavity or convexity shall be less than 1.5 mm in a length of 2.5 metres and in this proportion for shorter length. The indices of concavity or convexity should be taken as guidance for manufacturing (refer clause 6.0). A prototype sample (2Nos.) of lavatory sidewall of a LHB build should be submitted to ICF by any new vendor seeking approval for supply of these sub assemblies for demonstrating the surface finish achieved by the firm and for prior approval before bulk manufacturing of sub-assemblies.

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10.2 Post welding stainless steel wire brush cleaning using mechanized wire brush should be done for side wall and roof sub-assembly. Roof / Side wall (on either side of each) would require to be provided with suitable primer as approved by ICF engineers, on both sides, leaving 50 mm strip along the edges that are required to be further integrated with other sub-assemblies by welding. Side wall of the LHB coaches which require skin tensioning shall be painted by ICF after skin tensioning process.

10.3 QUALITY OF SPOT WELD (Argon Gas Purging)

Spot welding shall be carried out in inert gas atmosphere to avoid any discoloration. Suitable arrangement shall be made in the machine to admit inert gas (Argon gas to purity 99.995% minimum). There shall not be any heat tint/ colour in the resultant spots.


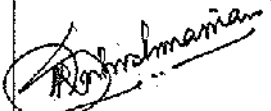


11.0 DRAWINGS

This specification shall be read along with the respective drawings for roof, sidewall and endwall issued by Railway engineers/ Purchaser.

12.0 QUALITY CONTROL REQUIREMENTS

12.1 The manufacturer shall have ISO: 9000 series and ISO 3834-CL2 certification. Firm shall follow EN 15085 – CL1 standard requirements and shall take steps to get certification for EN 15085 – CL1 standard.

12.2 There shall be a system to ensure traceability of the product from raw material stage to finished product stage.

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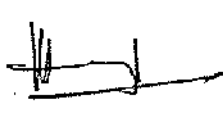
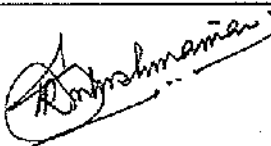
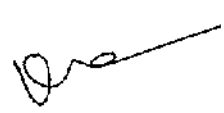

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12.3 Quality Assurance Plan (QAP) for the following aspects shall be ensured.

- Process flow chart
- Stage inspection details from raw materials stage to finished product stage.
- Various parameters to be checked and level of acceptance of such parameters indicated and method to ensure and control over them.
- Disposal system of rejected raw material and components.
- Check list for critical monitoring of above stages.
- Welding activities as per ISO 3834 & EN 15085 requirements.

DOCUMENTATION

- Incoming raw material register.
- Stage inspection results including finished products results as approved by QAP.
- Records of internal rejection and its analysis vis –a- vis action plan.
- Records of final products inspection by external agencies.
- Records of maintenance schedule of machinery and Plant
- Records of training imparted in Production, quality assurance, safety parameters and maintenance of machinery, periodical evaluation of welders etc.

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- Spot weld for daily production test, indentation measurement, spot welding tool dressing data.


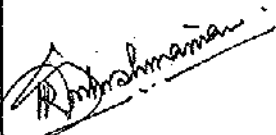

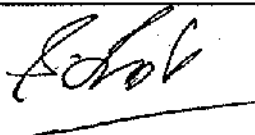
12.4 The Quality Assurance Plan (QAP) to be submitted to ICF initially for approval.

12.5 ROUTINE INSPECTION

Routine inspection of each finished item shall be carried out as follows for spot welds.

- a) Paper test- a stiff white paper shall be passed at random locations (at least two locations in each window bay) between spot welded members to ensure that the welding took place and there is no gap. If paper passes freely, then the item stands rejected.
- b) Chisel test – a chisel should be driven between two spot welds until one or both welds break. The fractured nugget should form cup and cone shaped fracture and size of nugget should be approximately to the size of spot weld. This test is to be done at two random locations to ensure fusion of spot weld. If the result is not satisfactory, the item stands rejected. If the result is satisfactory, the tested area should be levelled by tinkering and TIG welded.

12.6 Quality requirement of all the spot welds shall be evaluated to weld performance class CP C2 of ISO 15085- Part-3. (for reference annexure -A shall be followed.)

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MANUFACTURE AND SUPPLY OF STAINLESS
STEEL SIDEWALL & ROOF ASSEMBLIES**

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13.0 MARKING


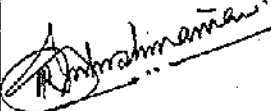


Manufacturers name or initial with month and year of manufacture shall be available in the finished products at two locations at the ends.

14.0 PACKING

The surface shall be properly protected against rubbing / impact / scratches during transportation via wagon/truck/trailers by wooden blocks / rubber pads at suitable locations in the transportation fixture.

Due care shall be taken to avoid mechanical damage during loading/transit /unloading. The packing should be such that while unpacking the consignment at ICF there should be no damage/dent mark to the finished product. As far as possible recyclable material to be used in packing of sub-assemblies.

Transit insurance shall be in the scope of supplier.

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**SCHEDULE OF REQUIREMENTS FOR
MANUFACTURE AND SUPPLY OF STAINLESS
STEEL SIDEWALL & ROOF ASSEMBLIES**


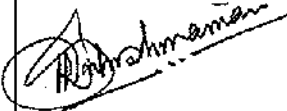


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Annexure-A

Table 1

(Tests to be conducted on test specimens for preparation of WPS or for proving
quality at an interval of one year)

S.No.	Tests	No. of samples	Requirement As per EN 15085 -3 placed as Annexure-B.
1	Visual inspection (as per cl.7.3 of ISO:15614-12)	All specimens	Table F.2 (external)
2	Indentation	All specimens	Table F.3
3	Shear pull test (as per ISO:14273)	11 specimens	Table F.4
4	Macro examination (as per ISO:17639)	2 specimens	Table F.2 (inner findings , internal)
5	Peel test / Torsion test - nugget diameter (as per ISO:14270/ISO:17653)	11 specimens	Nugget dia shall be as per table F.4.
6	Hardness (as per ISO:14271)	2 specimens (Macro examination samples shall be used)	Table F.2 (General)

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**SCHEDULE OF REQUIREMENTS FOR
MANUFACTURE AND SUPPLY OF STAINLESS
STEEL SIDEWALL & ROOF ASSEMBLIES**

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Table 2


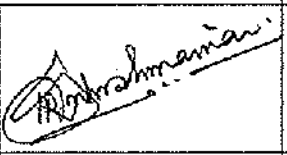
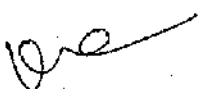

(Tests to be conducted on test specimens **daily** before start of work or at change of WPS or during tool change/tool dressing/after power cut)

S.No.	Tests	No. of samples	Requirement As per EN 15085 -3
1.	Visual inspection (external)	3 specimens	Table F.2
2.	Indentation		Table F.3
3.	Shear pull test as per ISO:14273		Table F.4

Table 3

(Tests to be conducted on actual jobs)

S.No.	Tests	No. of samples	Requirement As per EN 15085 -3
1.	Visual Inspection of production joints / fabricated components	100% on all spots	Table F.2 (external)

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SCHEDULE OF REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF STAINLESS STEEL SIDEWALL & ROOF ASSEMBLIES

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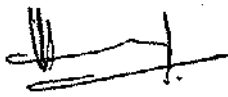
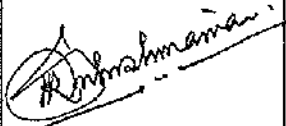
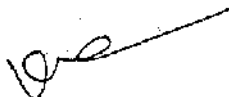

Annexure-B

EN 15085-3:2007 (E)

Table F.2 defines the quality requirements for resistance spot welded joints, projection welded joints and resistance seam welded joints for production welds.

Table F.2 — Quality requirements

Serial No.	Ref. No. to EN ISO 6520-2	Requirements	Weld performance class CP C1 and CP C2	Weld performance class CP C3	Weld performance class CP D
Quality requirements, general					
1		Classification of welding processes according to EN ISO 4063	21, 22	21, 22, 23	
2		Type of machine	Welding machines with programme cycle control and process inspection	Welding machine with programme cycle	The requirements CP C1, CP C2 and CP C3 are valid. For 21 the use of manual, foot table machines is permissible.
3		Field of application	Supporting part of rail vehicles (side walls, front walls, floors and outside parts as instrument cases, flaps, aprons, doors)		Subordinate parts (panels, cable ducts, ventilation grids)
4		Permissible sheet metal thickness ratio	$t_2 : t_1 \leq 3 : 1$ Other sheet metal ratios and welding of more than two sheets shall be agreed with the customer.		No requirements
5		Minimum shear pulling force	For 21 Table F.4 and Table F.5 For 22 and 23 these tables are valid in the sense corresponding to the connecting sector.		75 % of CP C1, CP C2 and CP C3

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SCHEDULE OF REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF STAINLESS STEEL SIDEWALL & ROOF ASSEMBLIES

ICF/MD/SPEC-200


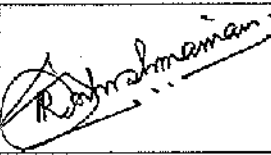
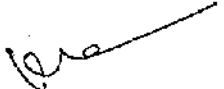

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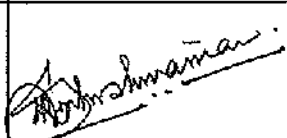
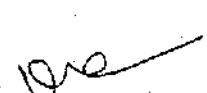
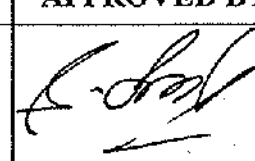
6		Surface appearance of the various parts	The surface of the joined parts shall be free of scale, rust, paint, dust, grease or other soiling at the place of the weld. Additionally surface coatings, lamination, corrosion protective, sealing, pastes and glue can be used if their welding suitability has been proved.	
7		Maximum hardness values for steel	The general requirements of EN ISO 15614-12 shall be applied. For the hardness values, EN ISO 15614-1 shall apply.	No requirements
Quality requirements, outor findings, external				
9	P 100	Crack	Not permissible	
10	P 2011 P 2012 P 2013	Gas pore Uniformly distributed porosity Localized porosity	Not permissible	Permissible if agreed between the contracting parties
11	P 602 P 612	Spatter Material extrusion	Permissible if agreed between the contracting parties	Permissible if agreed between the contracting parties
12	P 526	Surface imperfection	Surface quality 2 and 3 to table F.3 permissible	Surface quality 2, 3 and 4 according to Table F.3 permissible
13	P 522	Burn through from one side	Not permissible	Permissible
14	P 5263	Adhering electrode material	Not permissible	Permissible if agreed between the contracting parties
Quality requirements, inner findings, internal				
15	P 5216	Insufficient depth of penetration of nugget	Minimum 30 % max. 90 % of the particular sheet metal thickness	No requirements
16	P 100	Crack	Permissible for 21 and 22 in the centre area of the welding lens (maximum half diameter) Not permissible for 22	
17	P 2011 P 300	Gas pore Solid material inclusion	Permissible for 21 and 23 in the middle half of the welding lens diameter	

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SCHEDULE OF REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF STAINLESS STEEL SIDEWALL & ROOF ASSEMBLIES

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18	P 2012 P 2013	Uniformly distributed porosity Localized porosity	For 22: $A \leq 2\%$ $d \leq 0.4t_1$ ^a	For 22: $A \leq 4\%$ $d \leq 0.5t_1$
19	P 400 P 401	Lack of fusion No weld	Not permissible	
20	P 525	Excessive sheet separation	Immediate next to the welding point: $h \leq 0.1(t_1 + t_2)$	Permissible
Testing and documentation				
21		Visual test ^b	100 %	
22		Simplified weld production test (SWPT) ^c	daily before start of work at change of the WPS at tool modification	
23		Normal weld production test (NWPT) ^d	for the prove of the WPS to prove the quality in the production at regular intervals, depending on weld volume, weld equipment and welding performance class	Not required
24		Documentation	NWPT 100 % Process inspection 100 %	NWPT necessary Not required
<p>^a A = area of imperfection, d = size of single imperfection (for instance length, width, diameter).</p> <p>^b Testing the completeness of welding and external assessment without use of optical instruments.</p> <p>^c SWPT: Rolling test, chipping test according to ISO 10447 or simplified torsion test (weld production test) according to EN ISO 17653.</p> <p>^d NWPT: for 21 and 23: button test according to EN ISO 15614-12 with a macrograph and for 22: NDT, button test according to EN ISO 15614-12 with a macrograph.</p>				

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SCHEDULE OF REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF STAINLESS STEEL SIDEWALL & ROOF ASSEMBLIES

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Table F.3 defines the surface quality for resistance spot welded joints

Table F.3 — Surface quality

Surface quality	Requirements	Application
2	Surfaces where welding marks (electrode impressions, ring shaped reinforcement-formation, imperfections, through heat distortion etc.) do not amount to more than 10 % of the particular single sheet metal thickness. Note: If required the indentation can be filled in.	For surfaces with aesthetic requirements (for instance side walls, front walls and roofs of passenger trains).
3	Surfaces where welding marks do not amount to more than 25% of the particular metal thickness.	Surfaces for non-aesthetic requirement (for instance freight wagons, transport containers, sheeting of floors).


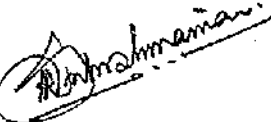
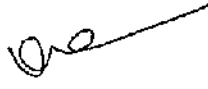

F.2 Minimum shear pull forces

Table F.4 and Table F.5 contain the minimum shear pull forces for resistance spot welding joints dependent on metal thickness for weld performance classes CP C1, CP C2 and CP C3. These shall be proven by in the tensile shear test.

----- steel: Table F.4;

The given values are the minimum average values for one set of five individual spot welds.

Higher shear pull forces may be agreed between the contracting parties and shall be approved by production weld tests.

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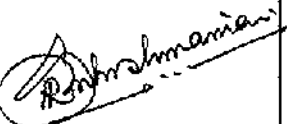
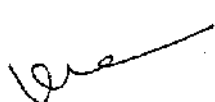
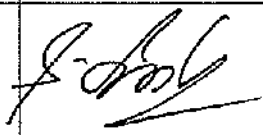
SCHEDULE OF REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF STAINLESS STEEL SIDEWALL & ROOF ASSEMBLIES

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Table F.4 — Minimum shear pull forces for resistance spot welding joints of steel for weld performance classes CP C1, CP C2 and CP C3


t_1 (mm)	d_L (m)	Tensile strength R_m of the parent metal [MPa]		
		≤ 360	> 360 to < 510	510 to < 620
		Minimum shear pull force per spot (KN)		
0.8	4.5	3.5	4.5	6.0
1.0	5.0	4.7	6.0	8.0
1.25	5.5	5.9	7.5	10.0
1.5	6.0	7.1	9.0	12.0
1.75	6.5	8.5	10.9	14.5
2.0	7.0	10.0	12.8	17.0
2.5	8.0	12.9	16.5	22.0
3.0	8.5	16.5	21.0	28.0

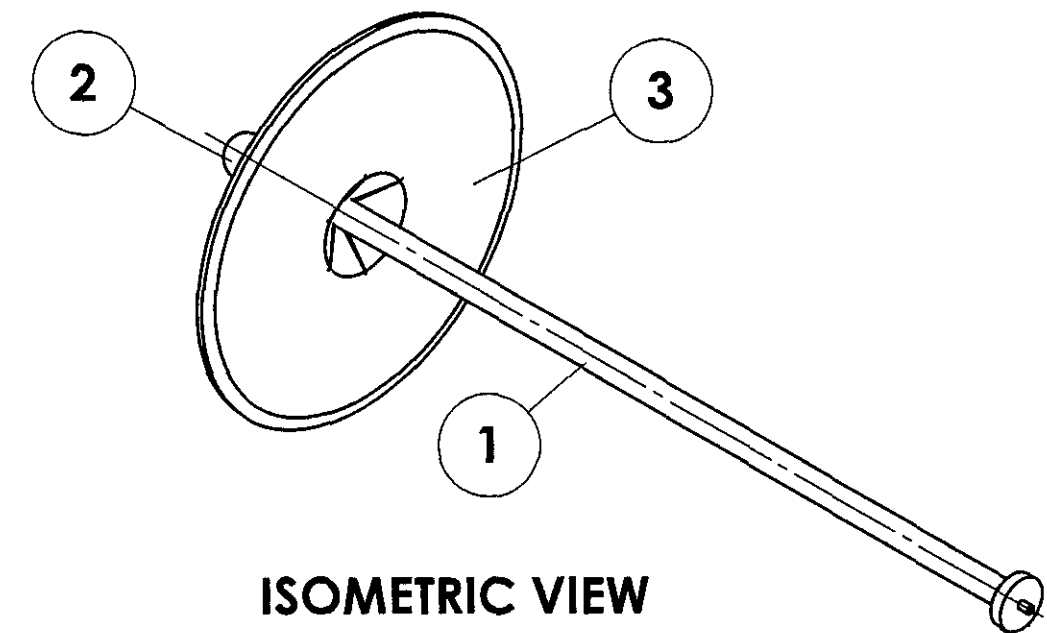
These values are valid for unalloyed and alloyed steel, also for the combination of them. For the combination of parent metals with different tensile strength, the material with the lower value shall be chosen. Supplier may refer EN15085-3 for more information if required.

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SSE / D	SME/D	DY.CME / D	CDE/MECH

49516008

▽ ROUGH MACHINED	01 ROUGH CLEANED
▽▽ FINISH MACHINED	01b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	18 CHAMFERED

REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		NOTE REVISED. VIEWS UPDATED AS PER DETAIL.	



ISOMETRIC VIEW

NOTE:

- ITEM-1 TO BE RESISTANCE WELDED AS SHOWN IN THE RESPECTIVE DRAWING AND ITEMS-2&3 TO BE SUPPLIED IN LOOSE (TO BE ASSEMBLED IN FURNISHING AFTER INSERTING THERMAL INSULATION).
- 5% EXCESS QTY OF ITEMS-2&3 TO BE SUPPLIED AGAINST THE QTY CALLED FOR IN THE RESPECTIVE ASSEMBLY DRAWINGS.

1	SERRATED SPRING WASHER		3	AAA16495		0.003	
1	CAP		2	AAA16494		0.000	
1	WELDING PIN		1	AAA16493		0.002	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS

GROUP: 1-6 ROOF CONSTRUCTION

SURFACE AREA IN Sq.m.:0.002

WT/ASSY IN Kgs:

WELDING PIN ASSEMBLY

SCALE 1:1	SSE/D CHD	
ALT. a	ALTD DRN	A.Palanichamy 3D:A.Palanichamy 2D:P.Murugan

INDIAN RAILWAY STANDARDS

INTEGRAL COACH FACTORY, CHENNAI - 600038

SHEET 1 OF 1

LWGSCWAC2

49516008

A3

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO ICF/STD-9-0-001. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY

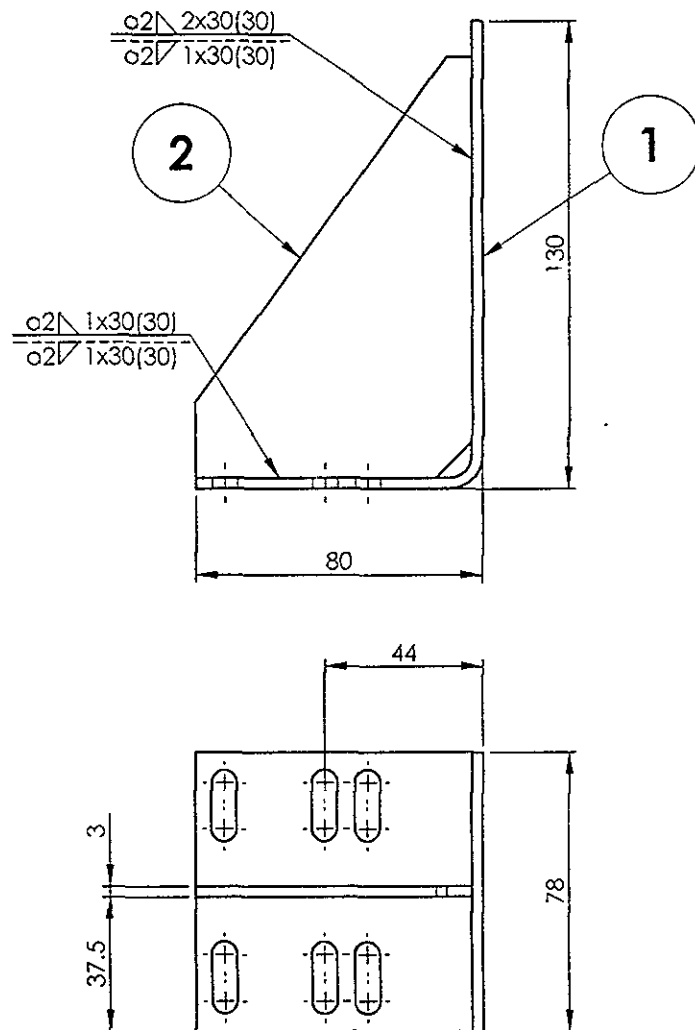
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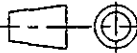
59316008

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▽▽ FINISH MACHINED	④ BURRS REMOVED
▽▽▽ H&S- VAC-NEED	⑤ CHAMFERED

REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE

**NOTE:**

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELD SPATTERS SHALL BE GROUND.
3. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
4. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
5. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
6. ALL BUTT WELDINGS TO BE DONE AT COACH OUTSIDE AND ROUGH GRINDING TO BE DONE ON THE SAME SIDE. PENETRATION SHOULD NOT BE GROUND.

1	WEB		2	AAA16907		0.134	
1	ANGLE		1	AAA16906		0.363	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF ASSEMBLY		SURFACE AREA IN Sq.m.:0.045			WT/ASSY IN Kgs:0.496		
BRACKET COMPLETE					SCALE	SSE/D	<i>K.Srirom</i>
					1:2	CHD	
					ALT.	ALTD	K.Srirom
						DRN	
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038							LWSCWAC/EOG
					SHEET 1 OF 1		
					59316008		A3

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO IC1/STD 9 0 001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER IS: 813:1986.

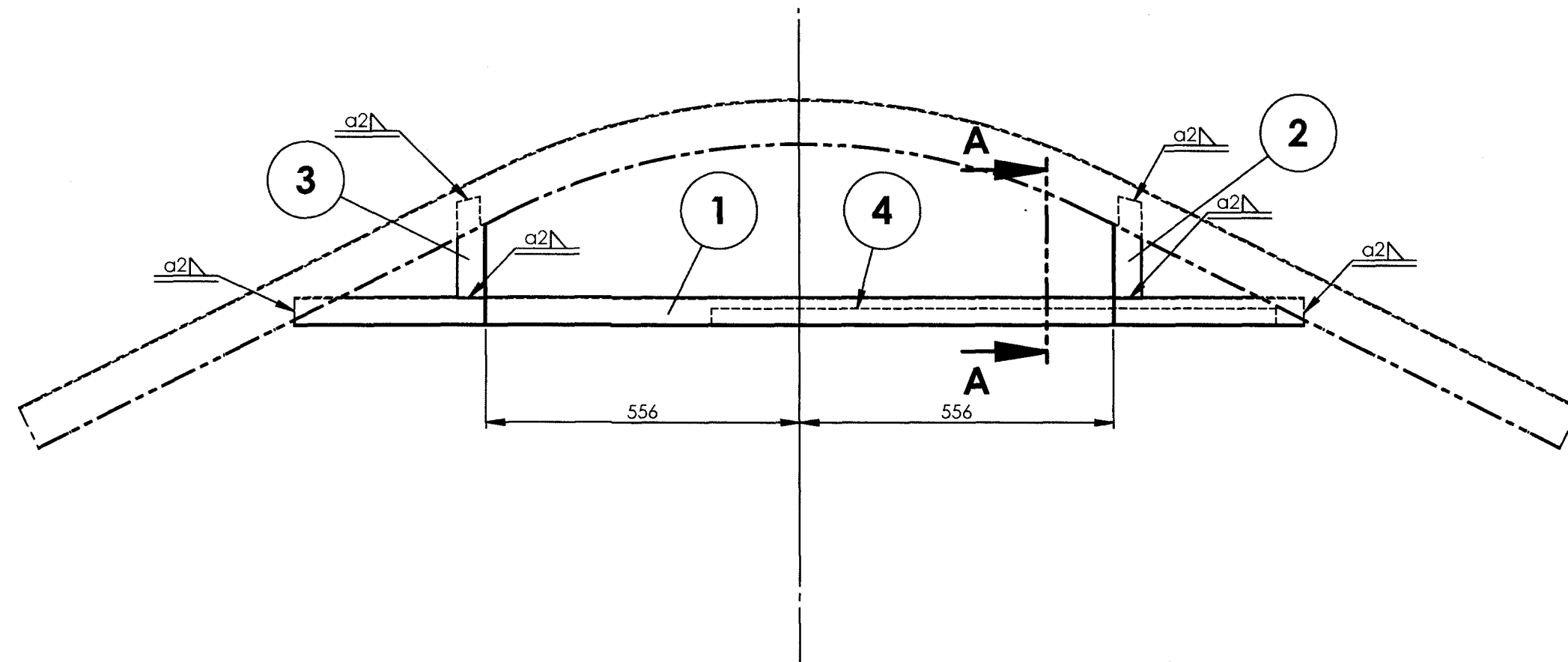
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	22-03-2013	<i>V. 22/3</i>
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME

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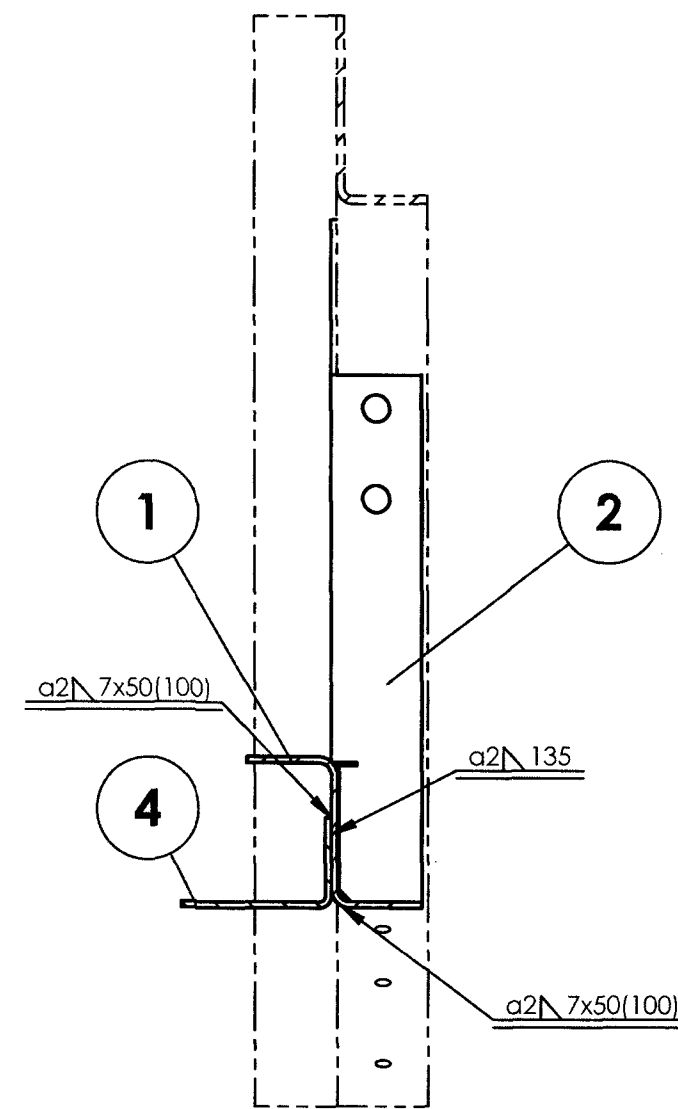
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▽▽▽ FINE FINISH MACHINED	①B CHAMFERED

REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE



NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE **CP C2** UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
9. FINISHED ASSEMBLY SHALL BE APPLIED WITH (AIRLESS SPRAY) ECO FRIENDLY WATER BASED MODIFIED EPOXY ZINC PHOSPHATE ETCH PRIMER TO ICF/MD/SPEC-231.



SECTION A-A
SCALE 2 : 5

1	ANGLE		4	AAB16326		1.23	
1	SUPPORTING ANGLE L.H.		3	AAB16324		0.203	
1	SUPPORTING ANGLE R.H.		2	AAB16323		0.203	
1	Z-MEMBER		1	AAB16325		2.91	
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF				SURFACE AREA IN Sq.m.: 1.379		WT/ASSY IN Kgs:	
CROSS BRACE COMPLETE FOR AC-3T LHB COACH					SCALE 1:10	SSE/D	
					CHD	ALTD	
					ALTD	DRN	S.Bala V.subramani.
					DRN		
INDIAN RAILWAY STANDARDS					SHEET 1 OF 1		
INTEGRAL COACH FACTORY, CHENNAI - 600038					64516003		
					A2		

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REF.DRG.NO.LE16104 alt-a

DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME
	14-09-2021	

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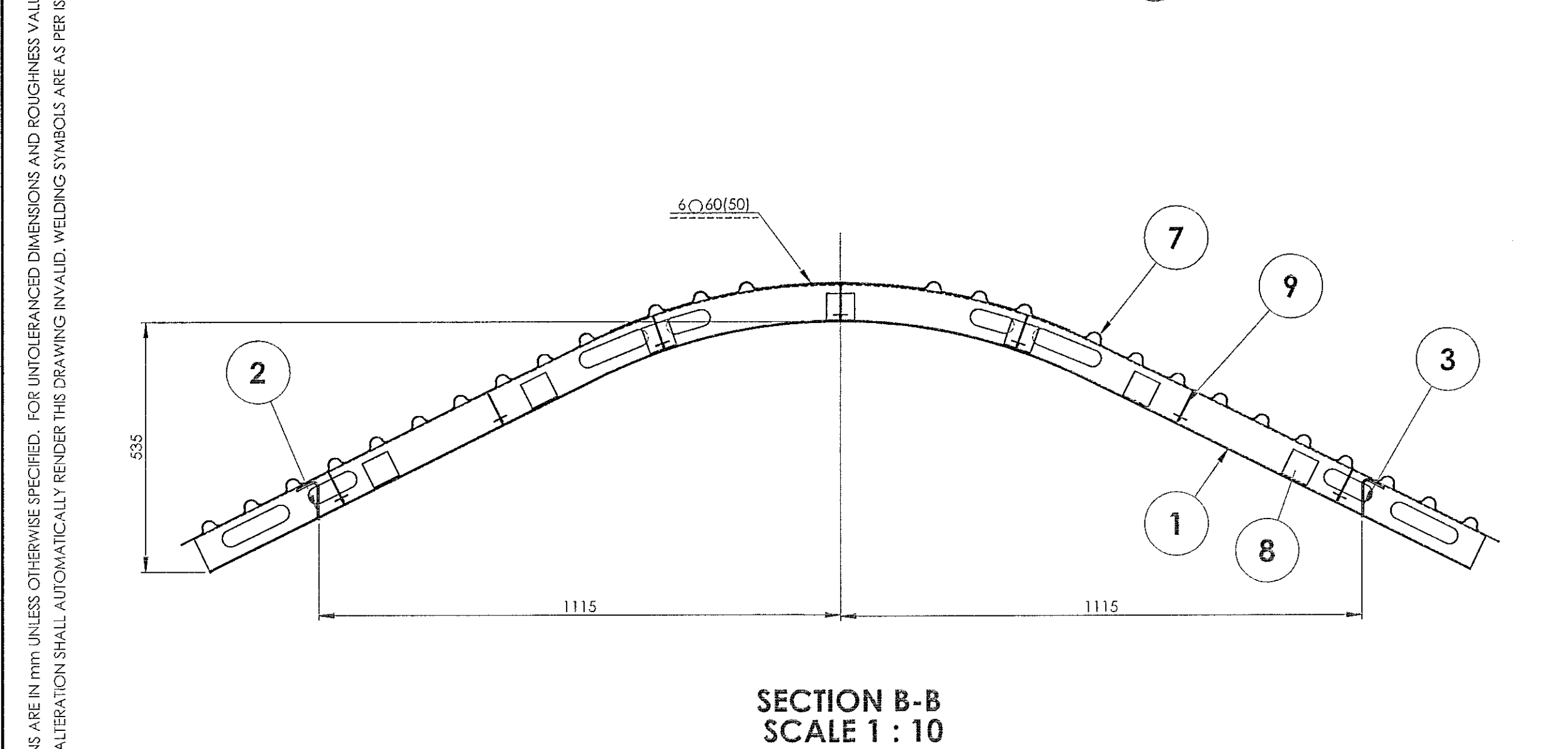
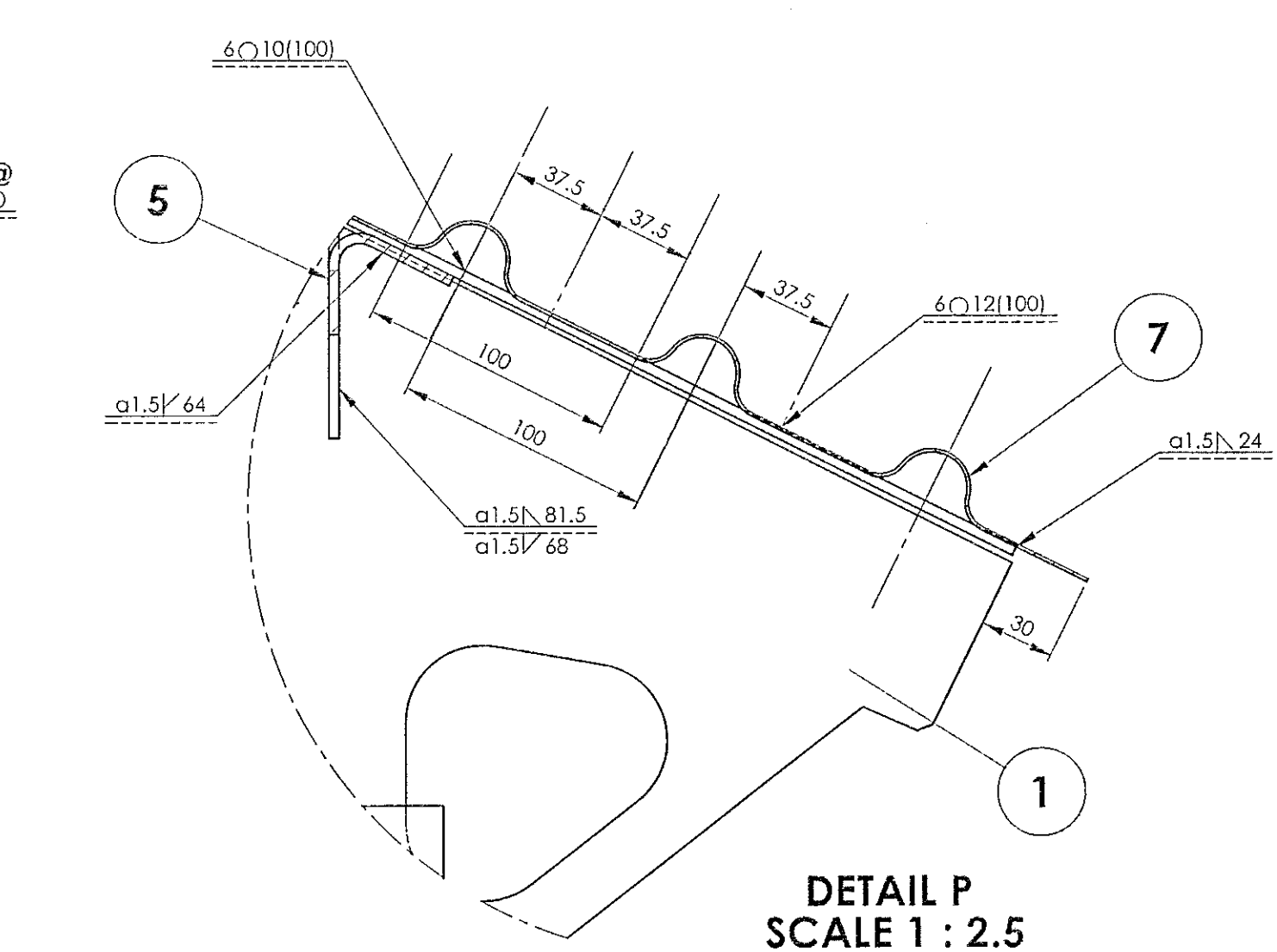
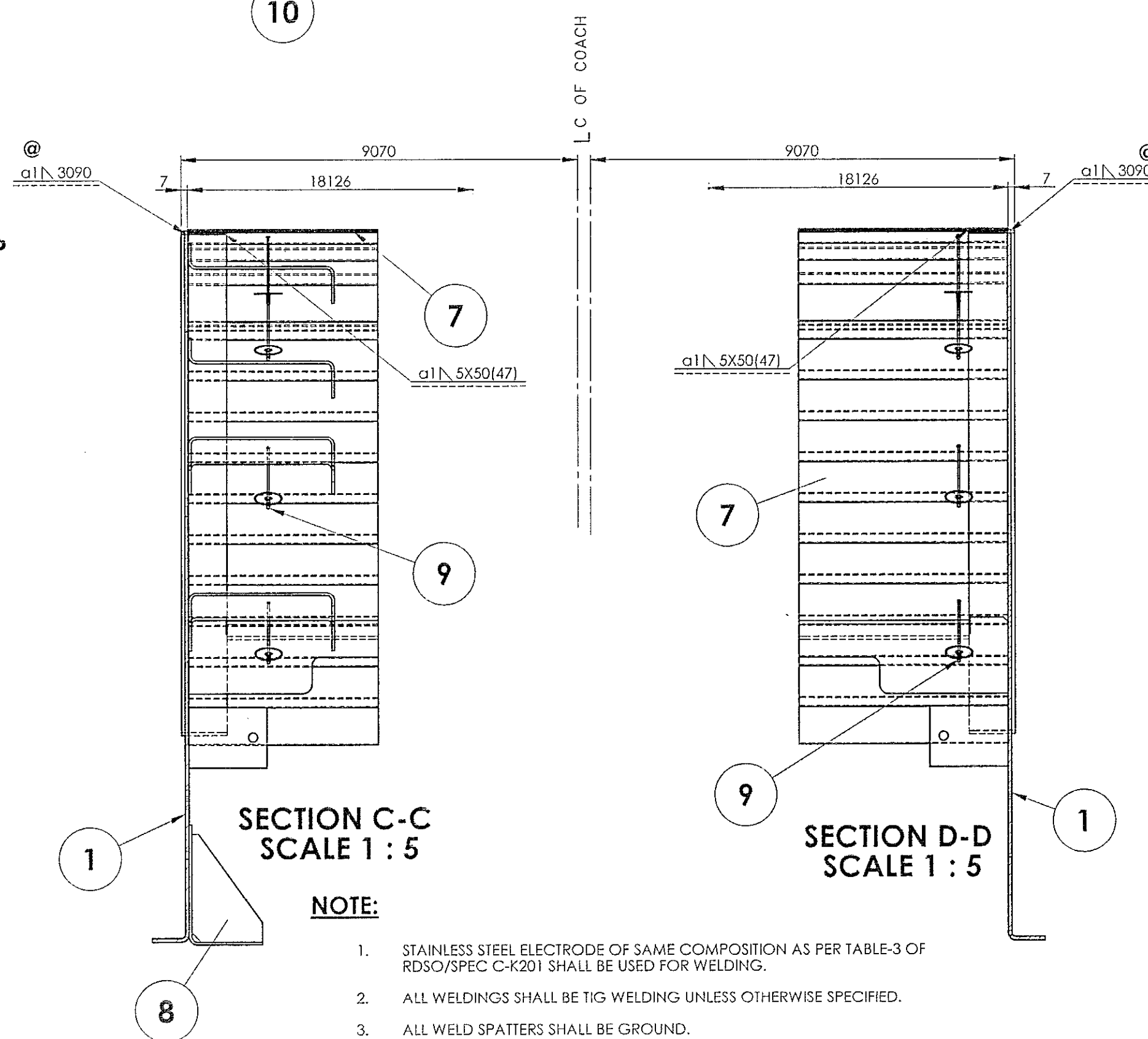
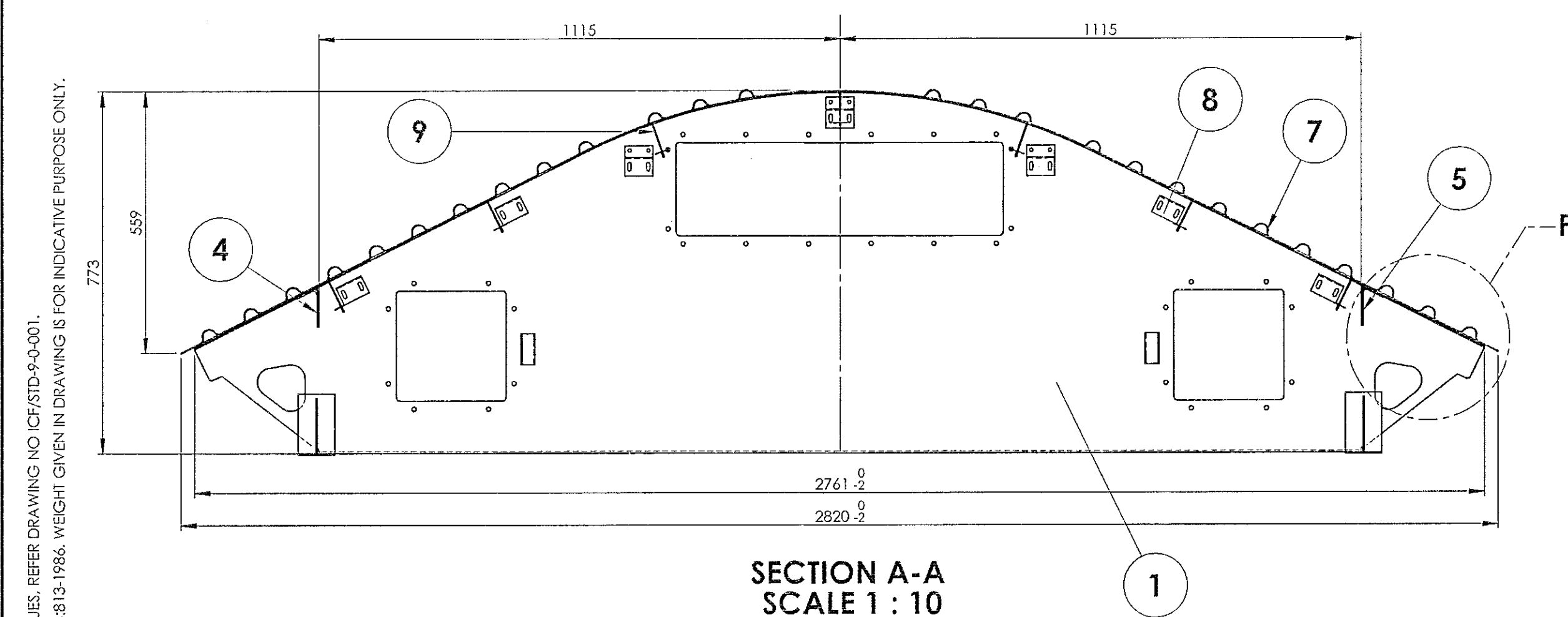
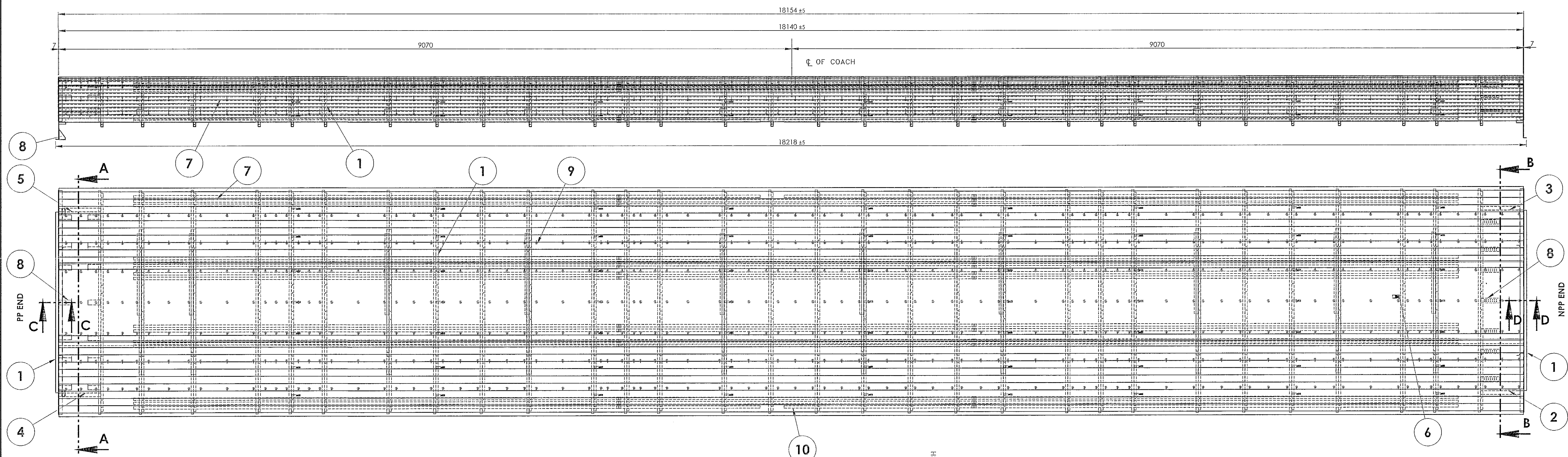
▽ ROUGH MACHINED
▽▽ FINISH MACHINED
▽▽▽ FINE FINISH MACHINED

(a) ROUGH CLEANED
(b) BURRS REMOVED
(c) CHAMFERED

REVISIONS

ALT. ZONE DESCRIPTION

APPROVED & DATE

SECTION C-C
SCALE 1 : 5SECTION D-D
SCALE 1 : 5

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE CP C2 UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/MD/SPEC-231.
9. FINISHED ASSEMBLY SHALL BE APPLIED WITH (AIRLESS SPRAY) ECO FRIENDLY WATER BASED MODIFIED EPOXY ZINC PHOSPHATE ETCH PRIMER TO ICF/MD/SPEC-231.
10. CENTRELINE OF COACH SHALL BE MARKED AS PER DRG No. 44516025
11. LEAK PROOF WELDING SHALL BE ENSURED.
12. ITEM-6 (NAME PLATE) SHALL BE WELDED OR RIVETED AT A SUITABLE LOCATION SHOWN IN THE DRAWING.
13. SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE OF ROOF ASSEMBLY SHALL COMPLY TO ICF/MD/SPEC-200 LATEST REVISION.

REF.DRG.NO.

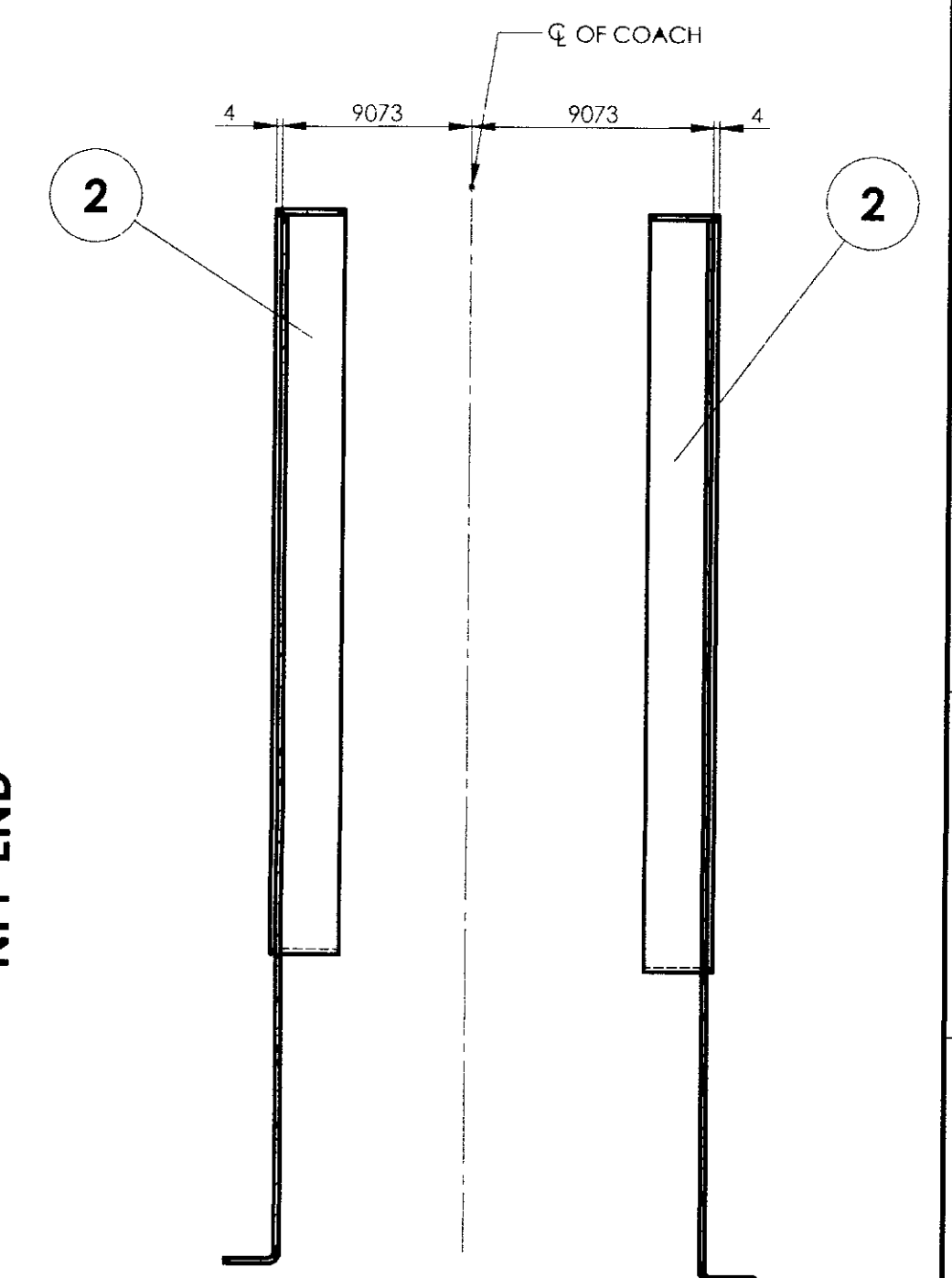
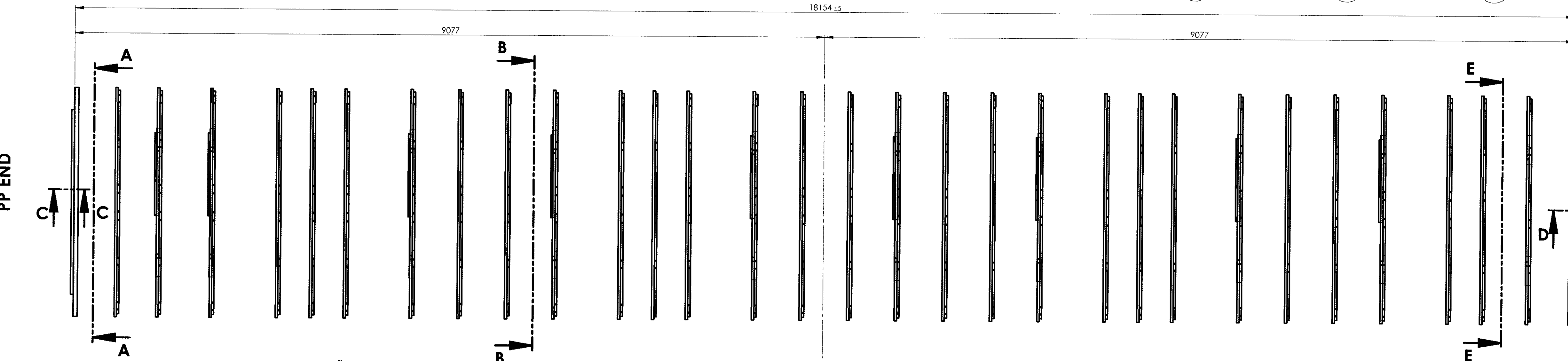
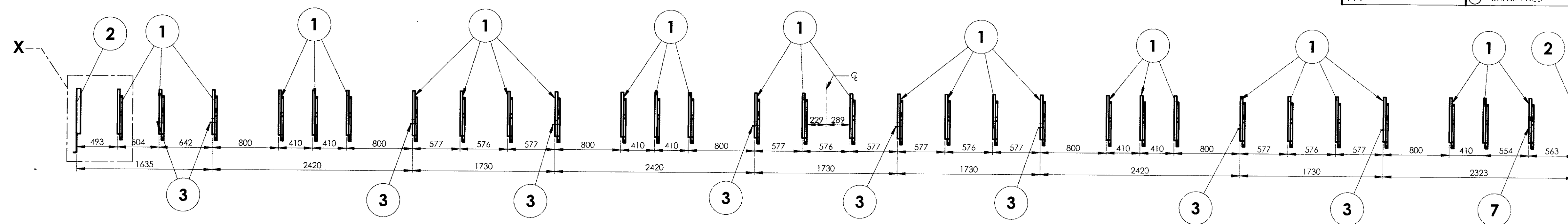
04/09/25
DATE OF LATEST ALT. DATE OF FIRST ISSUE A/E/SME

1	LAYOUT OF ELECTRICAL CONDUITS	10	82716021	191.62	
1	ARRANGEMENT OF WELDING PINS	9	82716004	3.04	
1	WELDING PARTS ON ROOF ASSY	8	82716003	359.644	
1	ROOF SHEET ASSEMBLY	7	82916013	722.19	
1	NAME PLATE FOR SUPPLIER IDENTIFICATION	6	AAA51072	0.063	
1	STIFFENING ANGLE	5	AAF16254	1.668	
1	STIFFENING ANGLE	4	AAF16253	1.668	
1	STIFFENING ANGLE	3	AAF16252	1.703	
1	STIFFENING ANGLE	2	AAF16251	1.703	
1	LOCATION OF ROOF ARCH AND CROSS BRACE	1	82716002	348.677	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	WT/UNIT IN KGS
GROUP: 1-6		SURFACE AREA IN Sq.m.: 248.297		WT/ASSY IN Kgs:	
ROOF ASSEMBLY		SCALE 1:50	SSE/D	CHD	
		ALT.	ALTD	DRN	E.SATHISH KUMAR
		INDIAN RAILWAY STANDARDS		LWFAC/PP2	
		INTEGRAL COACH FACTORY, CHENNAI - 600038		82716001	
SHEET 1 OF 1		A1			

82716002

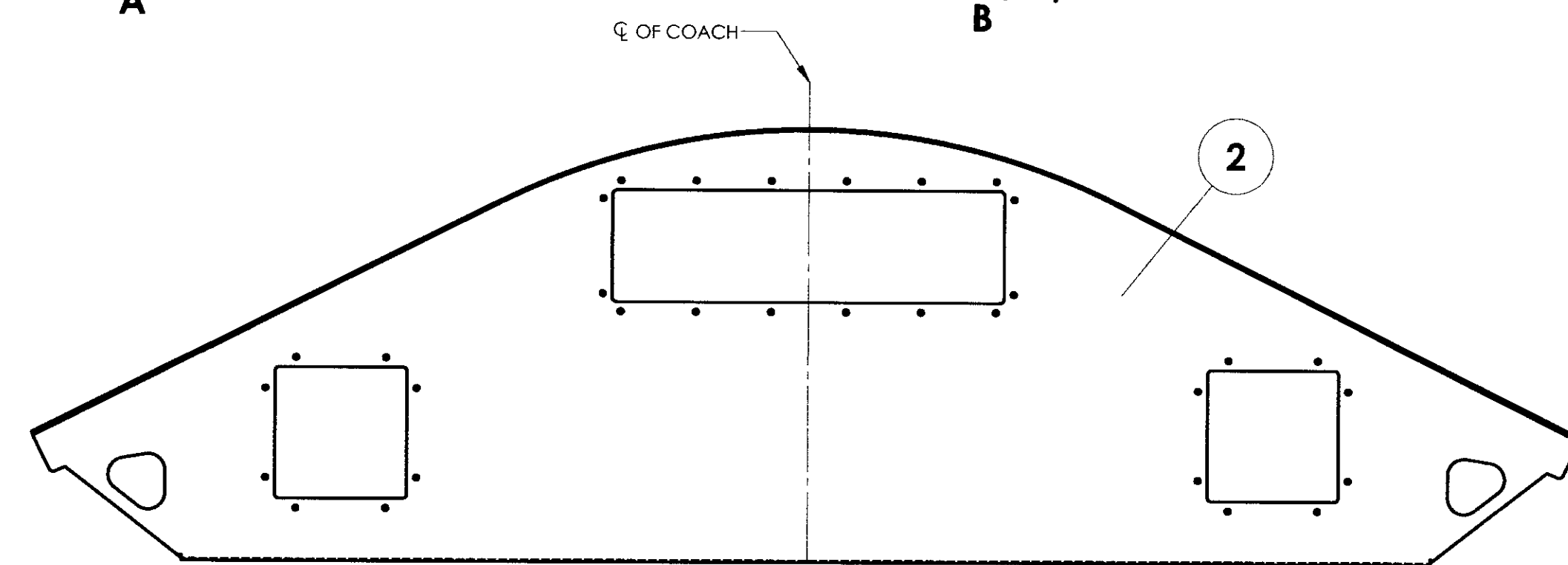
▽ ROUGH MACHINED	(01) ROUGH CLEANED
▽▽ FINISH MACHINED	(01b) BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	(18) CHAMFERED

		14	15	16
		REVISONS		
ALT.	ZONE	DESCRIPTION		APPROVED & DATE
a		ITEMS-4 & 5 ADDED. ITEM-3 QTY REDUCED FROM 10 TO 9. SECTION -EE ADDED. VIEWS UPDATED.		
b		ITEMS-4 & 7 ADDED. ITEM-4 & 5 DELETED. SECTION-EE REVISED. VIEWS UPDATED.		<i>[Signature]</i>

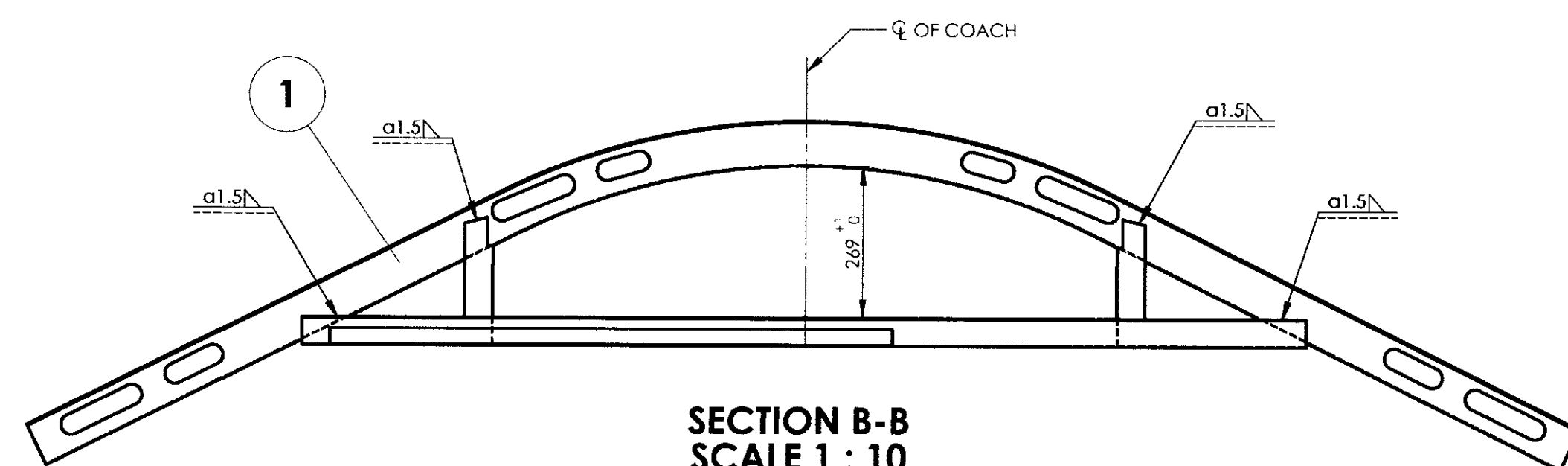


SECTION C-C
SCALE 1 : 5

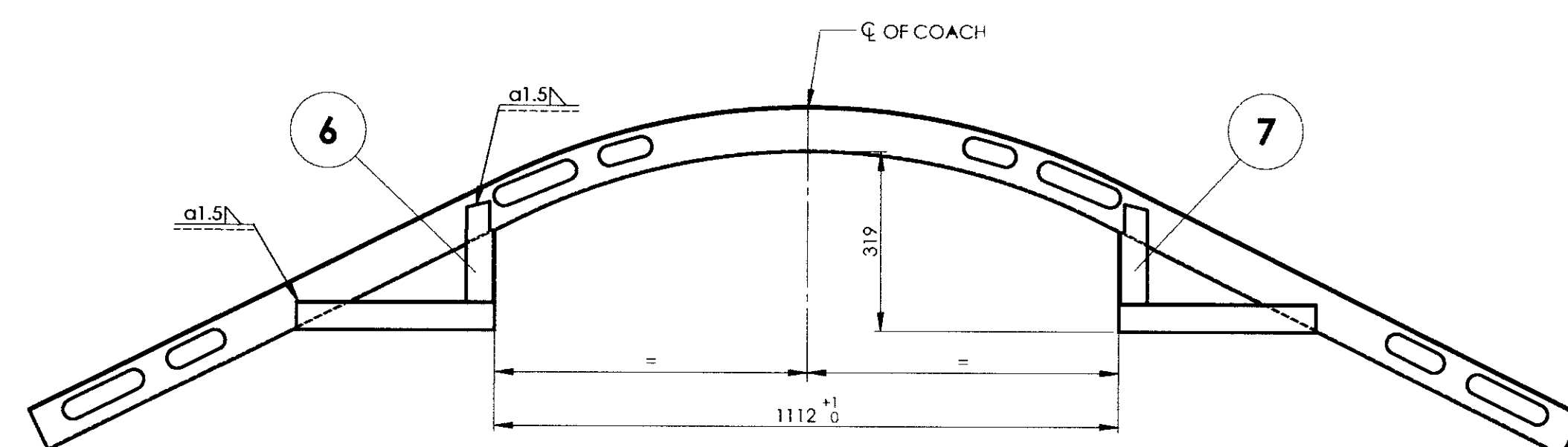
SECTION D-D
SCALE 1 : 5



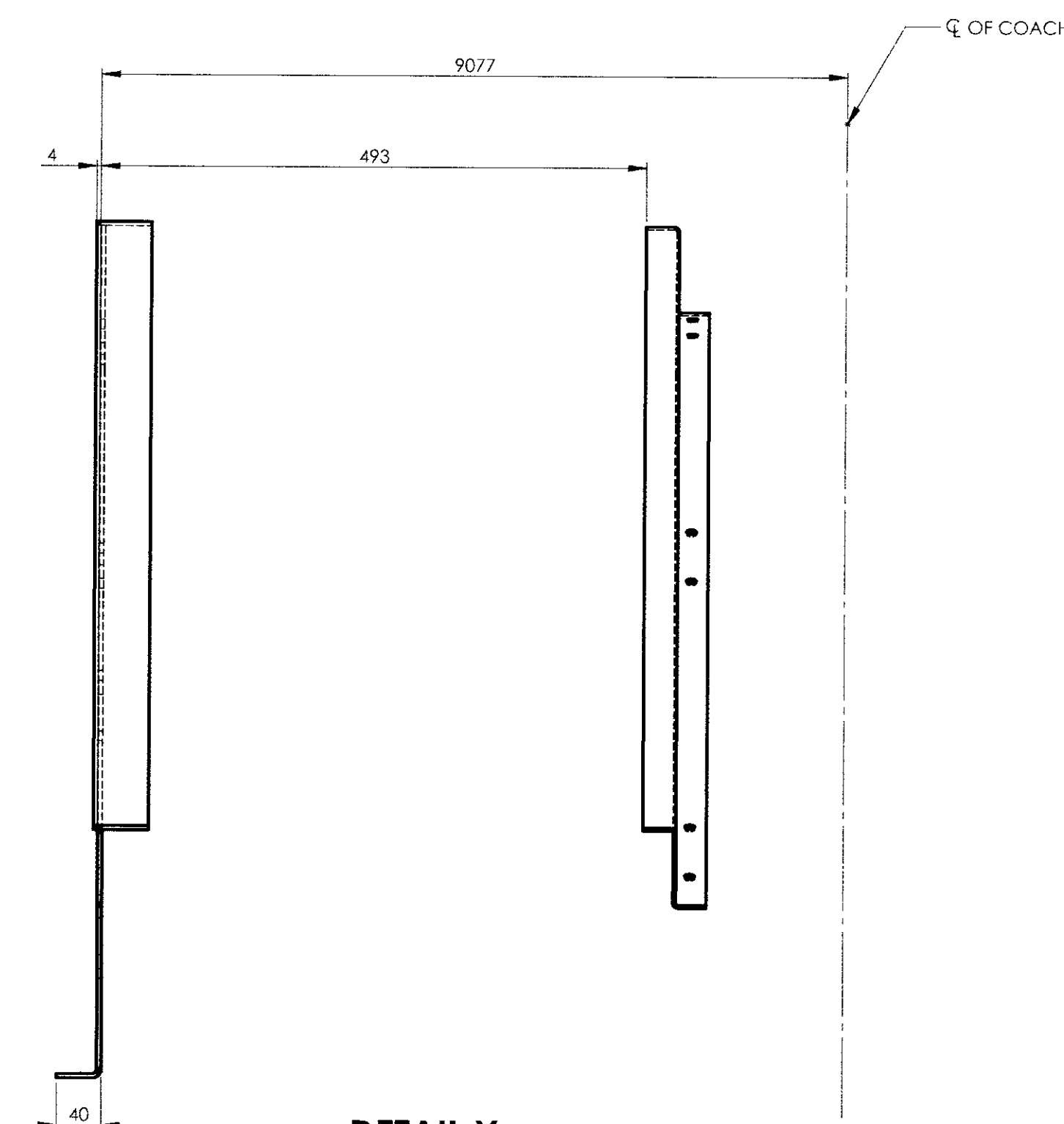
SECTION A-A
SCALE 1 : 10



SECTION B-B
SCALE 1 : 10



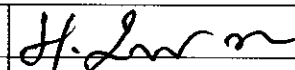
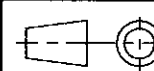
SECTION E-E
SCALE 1 : 10



DETAIL X
SCALE 1 : 5

NOTE:-


1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE 3 OF RD50/SPEC. CK-201 SHALL BE USED FOR WELDING.
2. ALL WELDING SHALL BE OF TIG UNLESS OTHERWISE SPECIFIED
3. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
4. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
5. ALL WELDED JOINTS SPATTERS SHALL BE GROUND.
6. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
7. ALL SHARP CORNERS SHALL BE ROUNDED OFF.

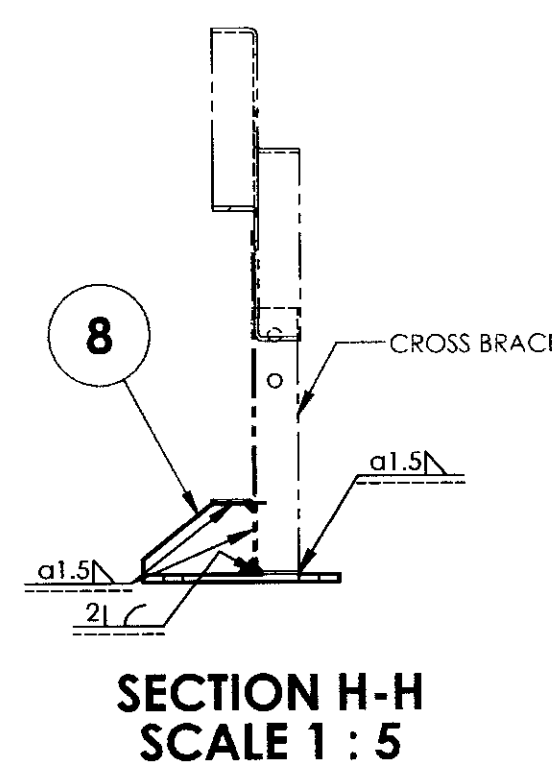
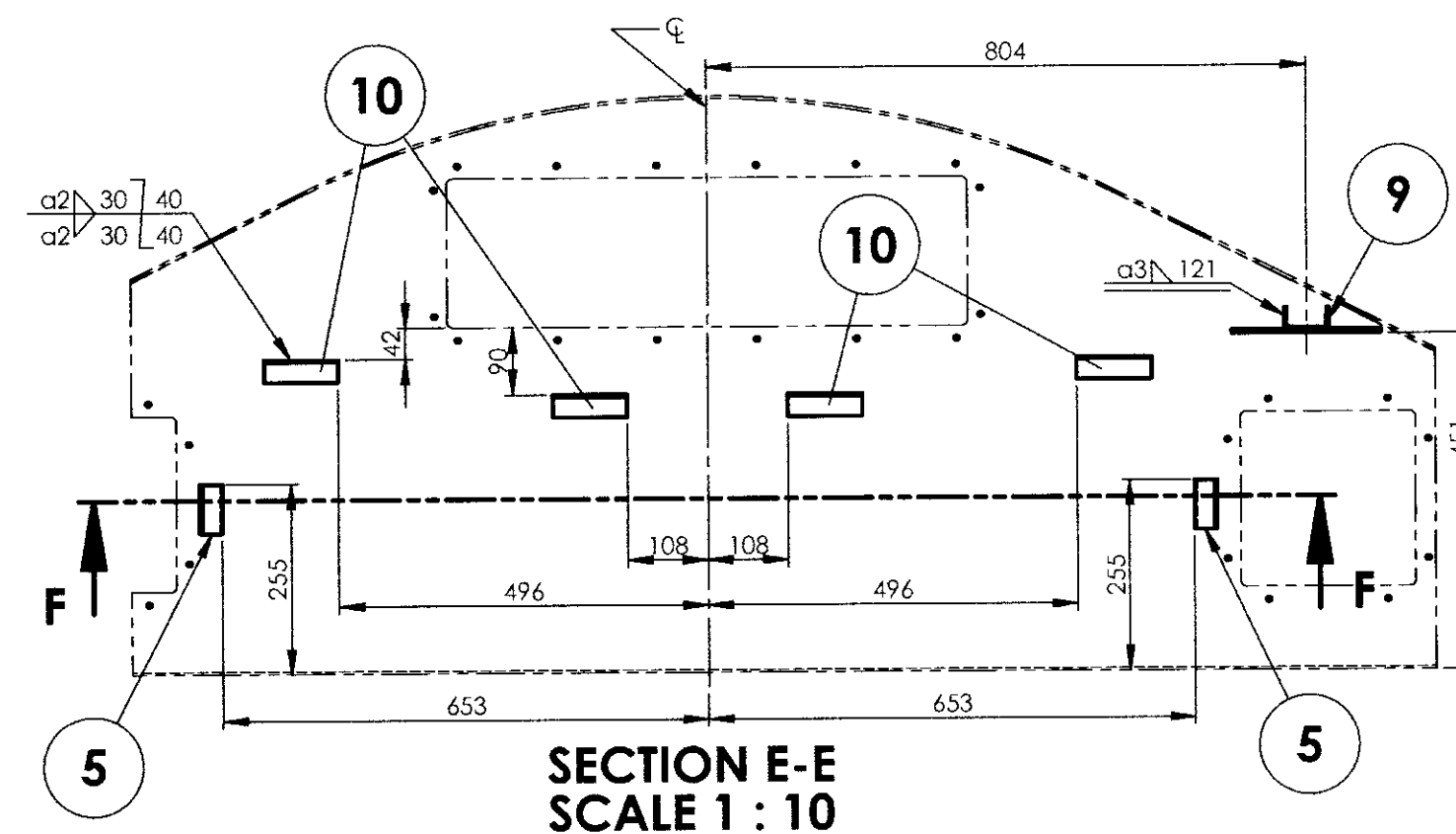
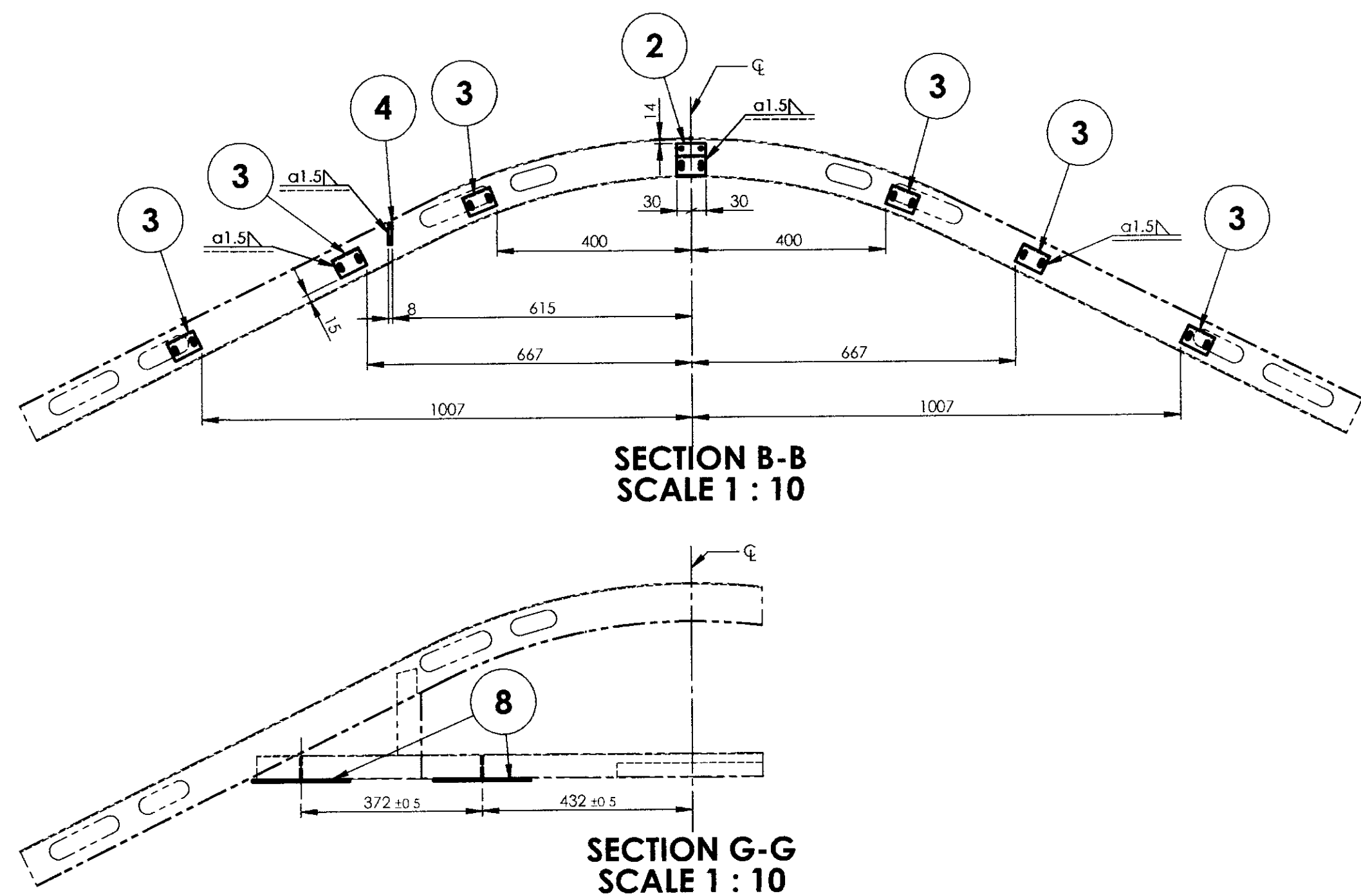
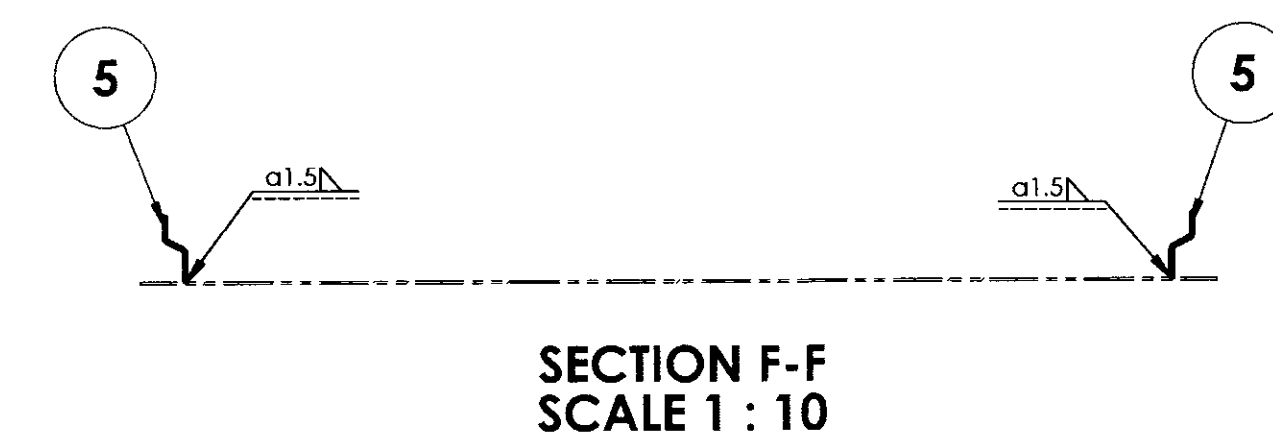
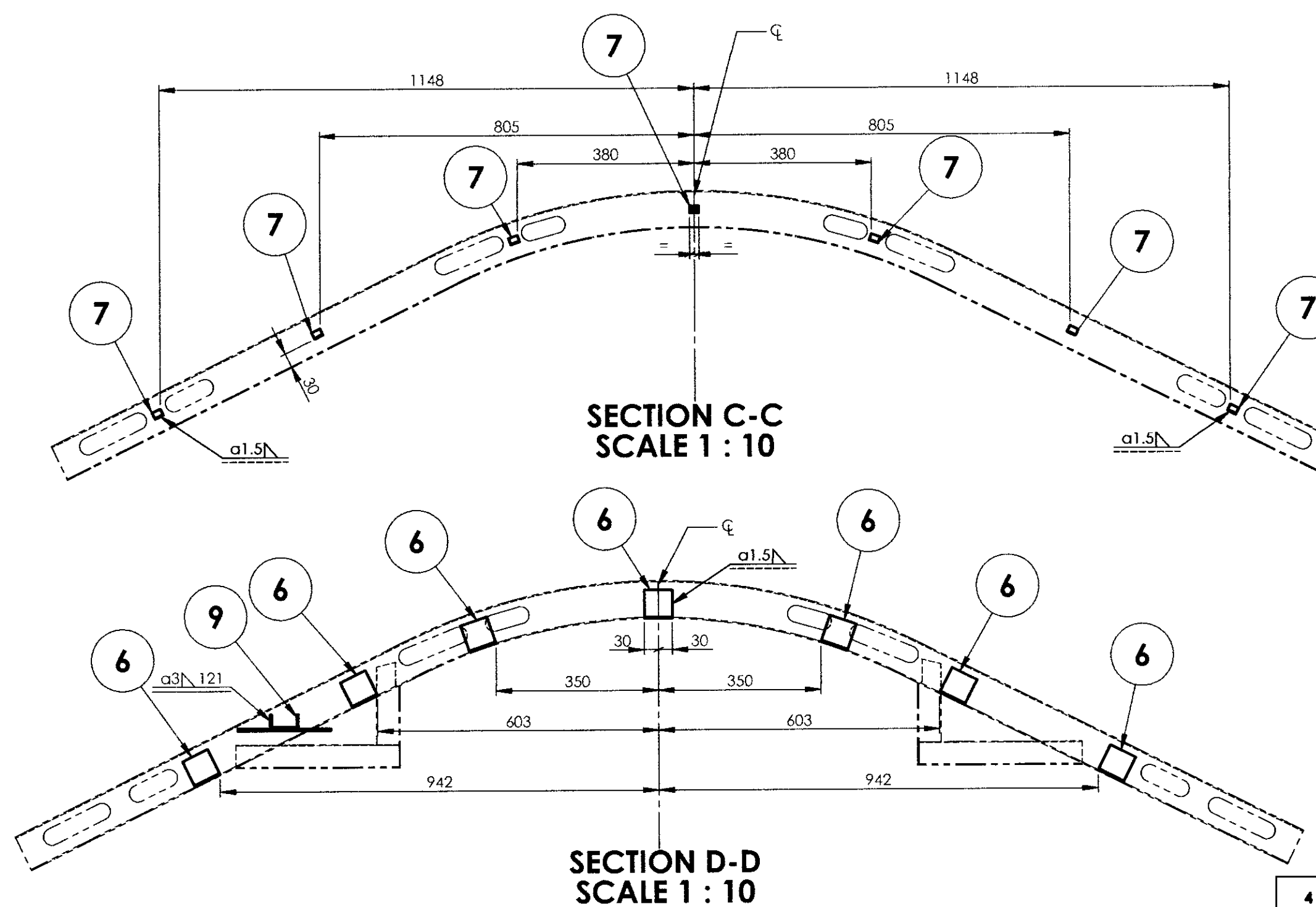
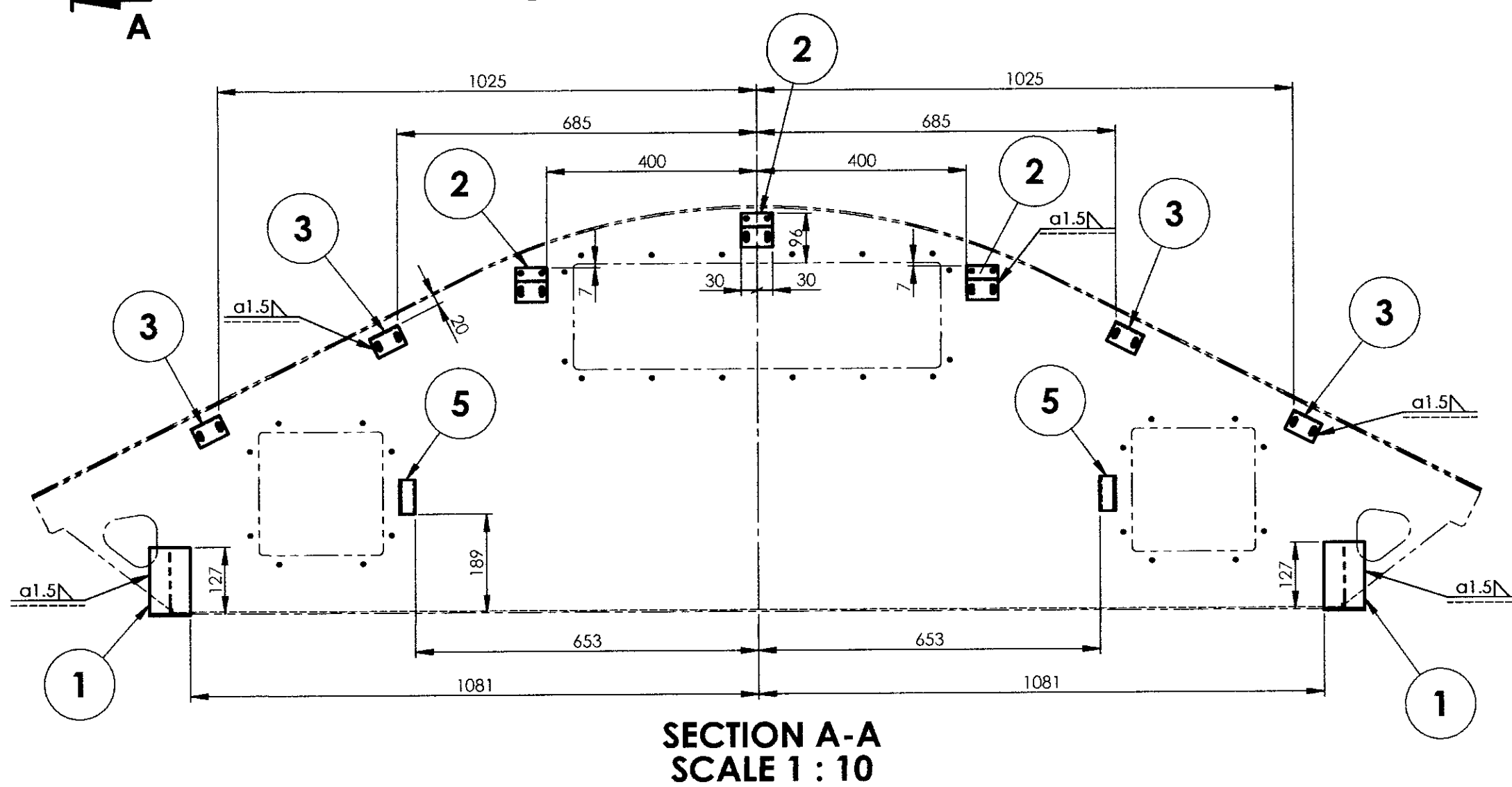
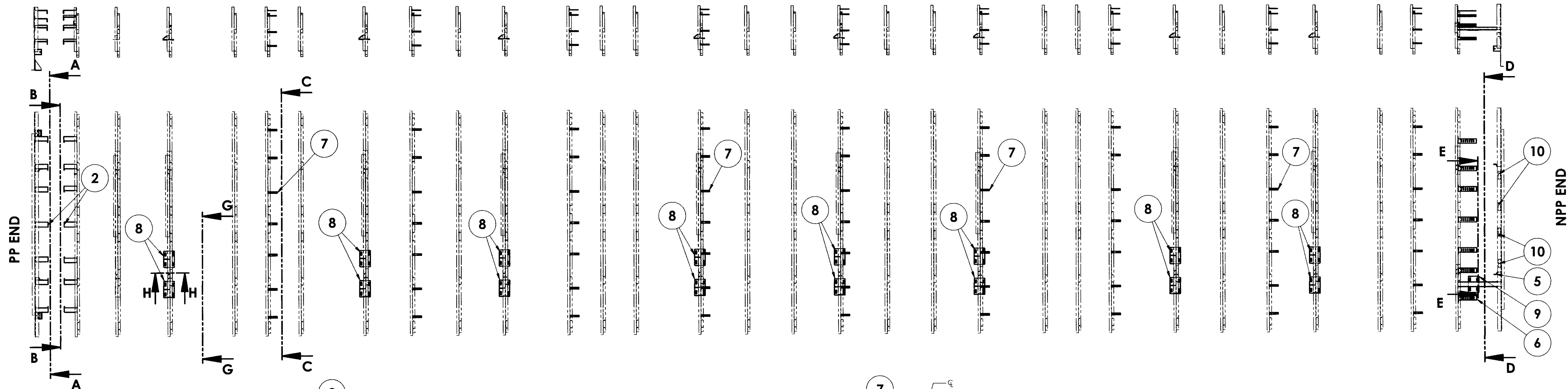
1	PART CROSS BRACE COMPLETE (LH)		7	82716030		0.83	
1	PART CROSS BRACE COMPLETE(RH)		6	82716029		0.83	
1	PART-CROSSBRACE-COMplete (LH)		5	82914019		0.77	
1	PART-CROSS-BRACE-COMplete(RH)		4	82914018		0.77	
9	CROSS BRACE COMPLETE		3	64516003		4.540	
2	FINAL ROOF ARCH COMPLETE		2	82716014		45.262	
30	ROOF ARCH COMPLETE		1	AAFI6101		7.09	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGs.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction			SURFACE AREA IN Sq.m :		WT/ASSY IN Kgs:		
LOCATION OF ROOF ARCH AND CROSS BRACE					SCALE	SSE/D	
					1:50	CHD	
					ALT.	ALTD	E.SATHISH KUMAR
					b	DRN	E.SATHISH KUMAR
INDIAN RAILWAY STANDARDS INT'GRAL COACH FACTORY, CHENNAI - 600038				SHEET 1 OF 1		LWFAC/PP2	
						82716002	
						A1	

82716003

▽ ROUGH MACHINED
▽▽ FINISH MACHINED
▽▽▽ FINE FINISH MACHINED

⑩ ROUGH CLEANED
⑪ BURRS REMOVED
⑫ CHAMFERED

REVISIONS				APPROVED & DATE
ALT.	ZONE	DESCRIPTION		
b		ITEM-9 ADDED. QTY OF ITEM-8 REVISED. VIEWS UPDATED.		
c		ITEM-10 ADDED. VIEWS UPDATED.		



NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
7. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
4	ANGLE		10	AA814338		0.13	
1	BRACKET FOR PILLAR FIXING		9	82716022		2.34	
16	BRACKET FOR PARTITION PILLAR MOUNTING		8	82716014		1.04	
43	BRACKET FOR CONDUIT FIXING		7	AA814024		0.034	
7	ANGLE		6	AAE14518		0.396	
4	ANGLE		5	AA814354		0.14	
1	GROUNDING FLAP		4	AAA14900		0.084	
10	BRACKET COMPLETE		3	AA814344		0.315	
4	BRACKET		2	AA814353		0.302	
2	BRACKET COMPLETE		1	59314008		0.497	
GROUP: 1-6 Roof Construction							
SURFACE AREA IN Sq.m.: 35.479				WT/ASSY IN Kgs:			
WELDING PARTS ON ROOF ASSY				SCALE 1:25	SSE/D	CHD	
				ALT. c	ALTD	DRN	E.SATHISH KUMAR
				LWFAC/PP2			
				82716003			
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1			
INTEGRAL COACH FACTORY, CHENNAI - 600038				A1			

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND DIMENSIONAL VALUES, REFER DRAWING NO ICF/STD-9-0-001. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY.

REF.DRG.NO.

22-4-26

04-09-25

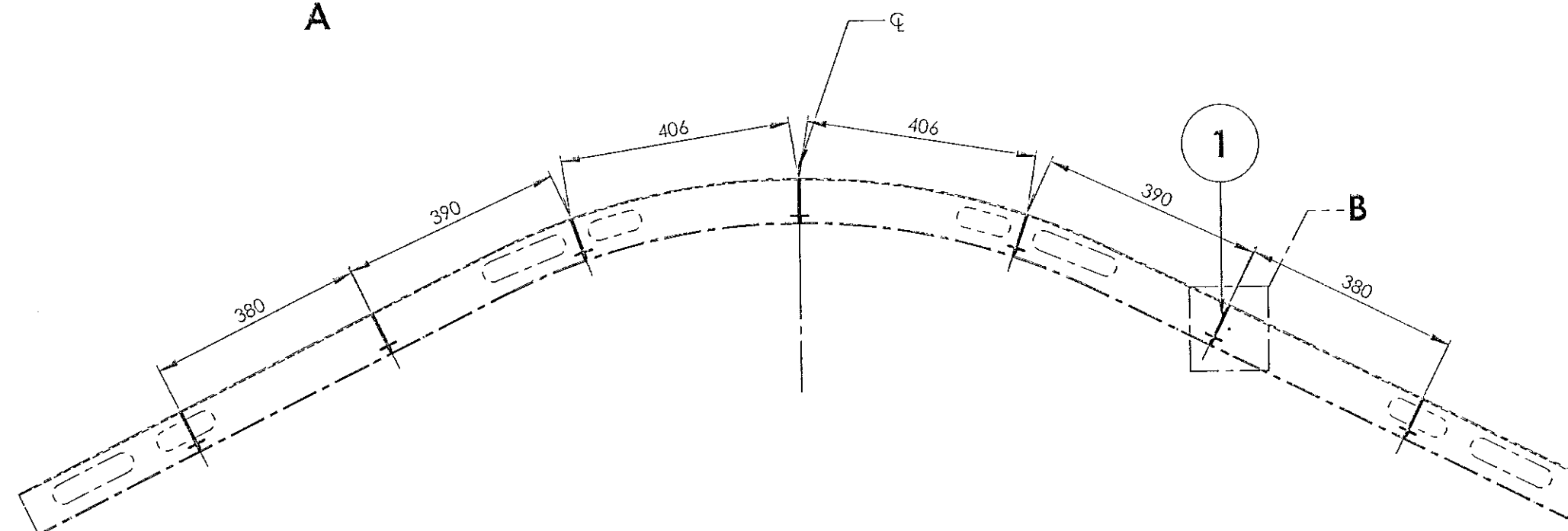
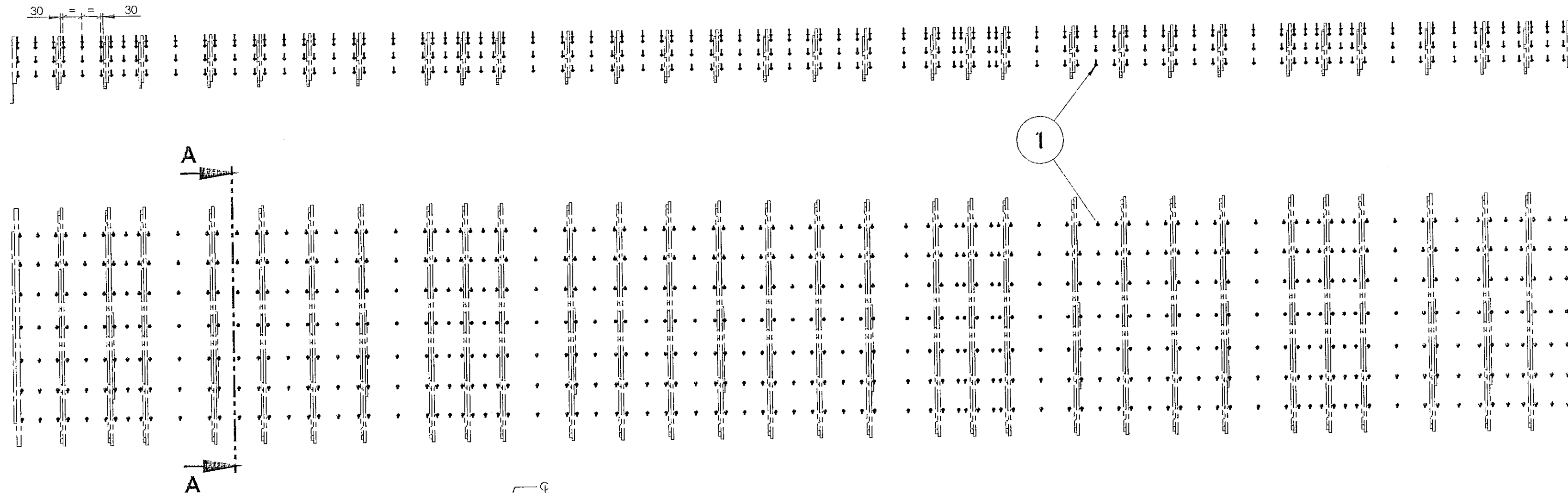
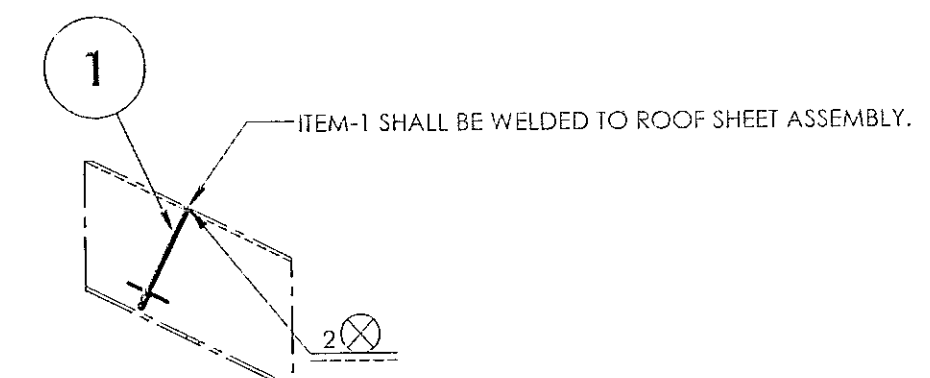
AME/SME

82716004

▽ ROUGH MACHINED	⊖ ROUGH CLEANED
▽▽ FINISH MACHINED	⊖⊖ BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	⊖⊖⊖ CHAMFERED

REVISIONS

ALT.	ZONE	DESCRIPTION	APPROVED & DATE
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SECTION A-A
SCALE 1 : 10DETAIL B
SCALE 1 : 5

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE CP C2 UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

REF.DRG.NO.-

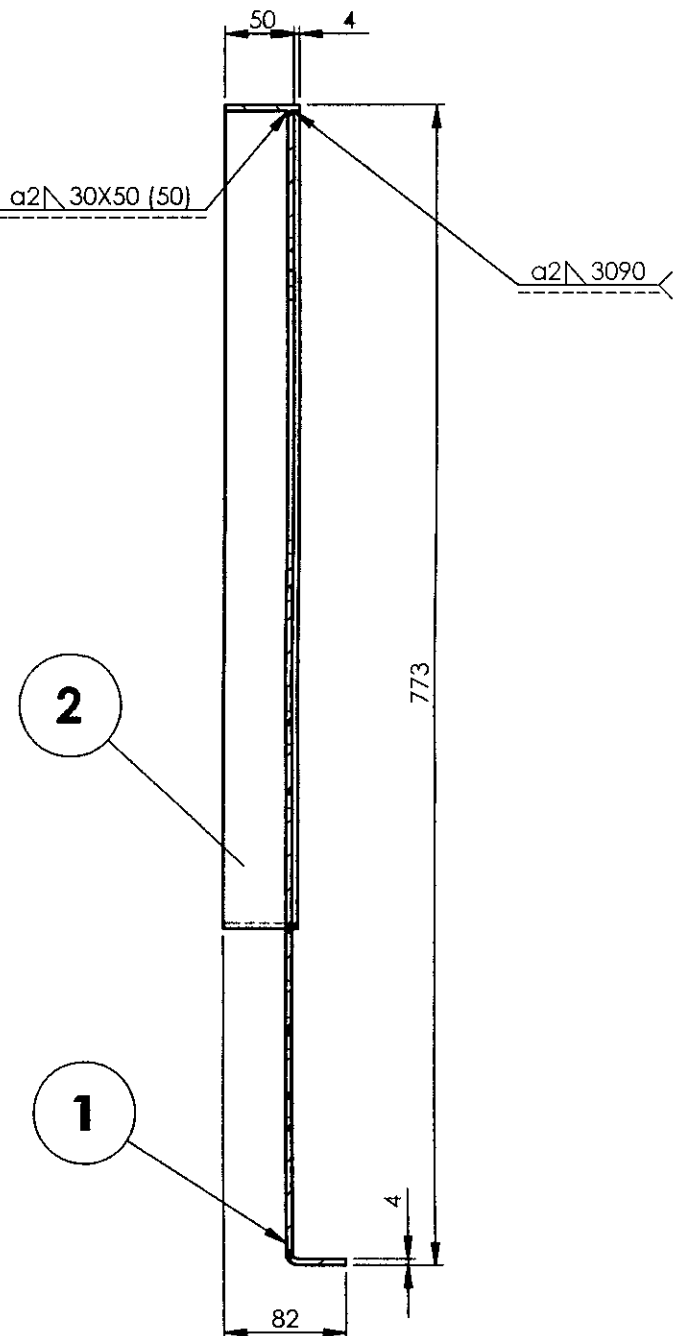
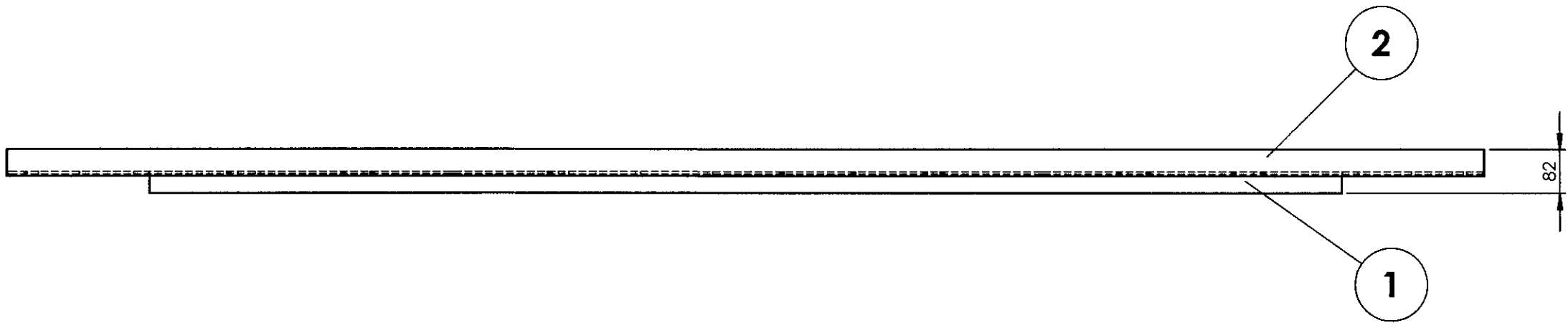
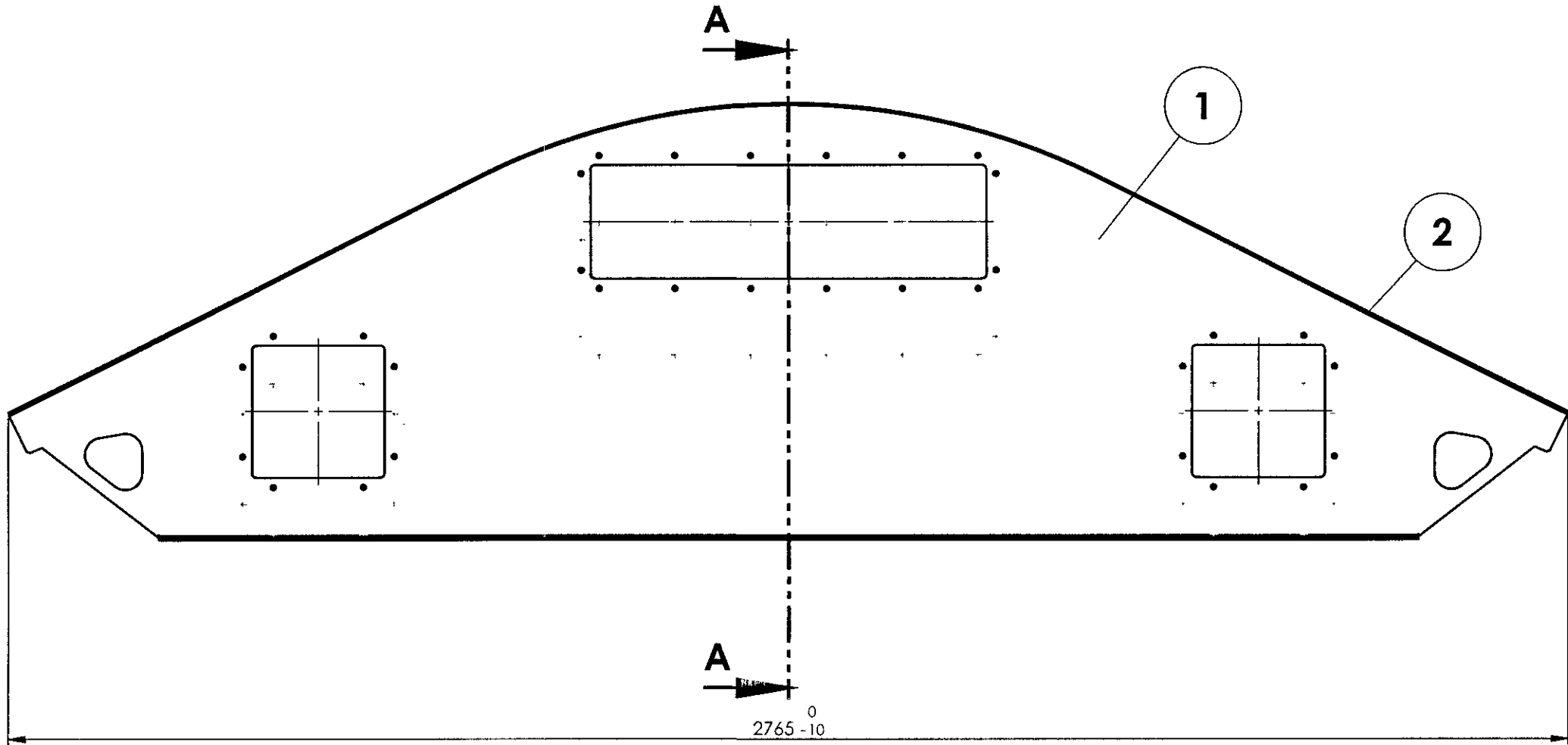
651	WELDING PIN ASSEMBLY		1	49516008		0.005	
For Drawing	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction				SURFACE AREA IN Sq.m.: 34940225.4 WT/ASSY IN Kgs:			
ARRGT. OF WELDING PINS					SCALE 1:50	SSE/D CHD	<i>[Signature]</i>
					ALT	ALTD	
					DRN	DRN	E.SATHISH KUMAR
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038					SHEET 1 OF 1	82716004	A2

DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME
	04/09/25	<i>[Signature]</i>

82716014

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①B CHAMFERED


REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE



SECTION A-A
SCALE 1 : 5

NOTE:

1. ALL WELDING SHALL BE OF TIG UNLESS OTHERWISE SPECIFIED.
2. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC. CK-201 SHALL BE USED FOR WELDING.
3. ALL WELDED JOINTS SPATTERS SHALL BE GROUND.
4. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
5. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
6. FOR WELD TESTING PREFERANCES REFER DRG. No. ICF/STD-9-0-998.
7. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

1	FLANGE FOR FINAL ROOF ARCH.		2	AAB16333		4.80	
1	FRONT SHEET OF FINAL ROOF		1	AAF16123		40.46	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction		SURFACE AREA IN Sq.m.: 2.898			WT/ASSY IN Kgs:		
FINAL ROOF ARCH COMPLETE					SCALE 1:20	SSE/D	L. Panduranga Rao
						CHD	
					ALT	ALTD	
						DRN	E.SATHISH KUMAR
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038						LWFAC/PP2	
						82716014	
					SHEET 1 OF 1		

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO. ICF/STD-9-0-001. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER IS:813-1986. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY.

REF.DRG.NO.

DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME
	8/8/25	

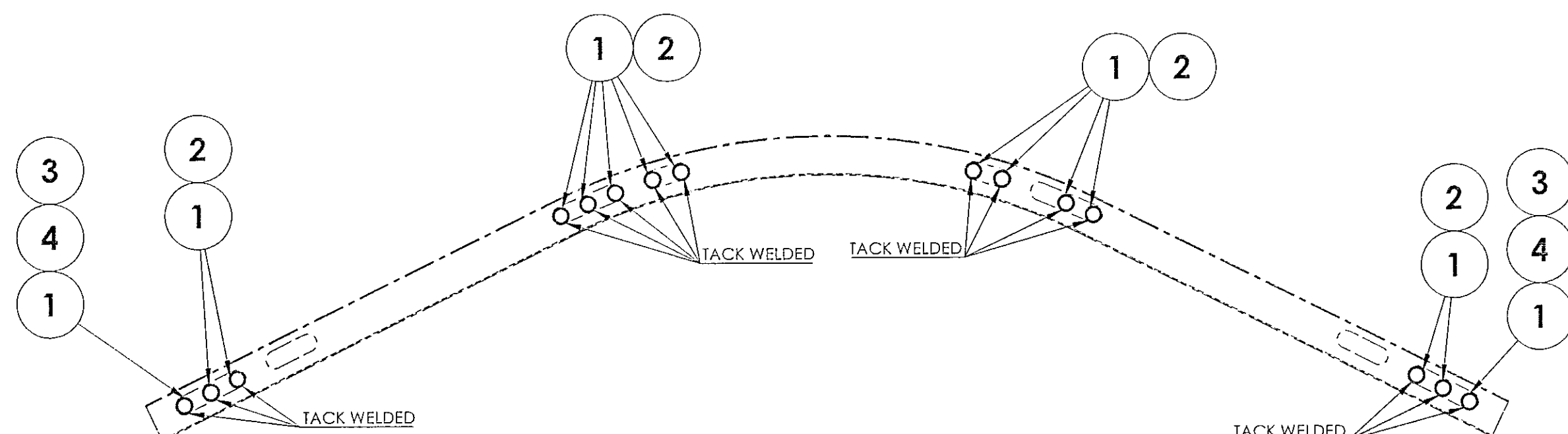
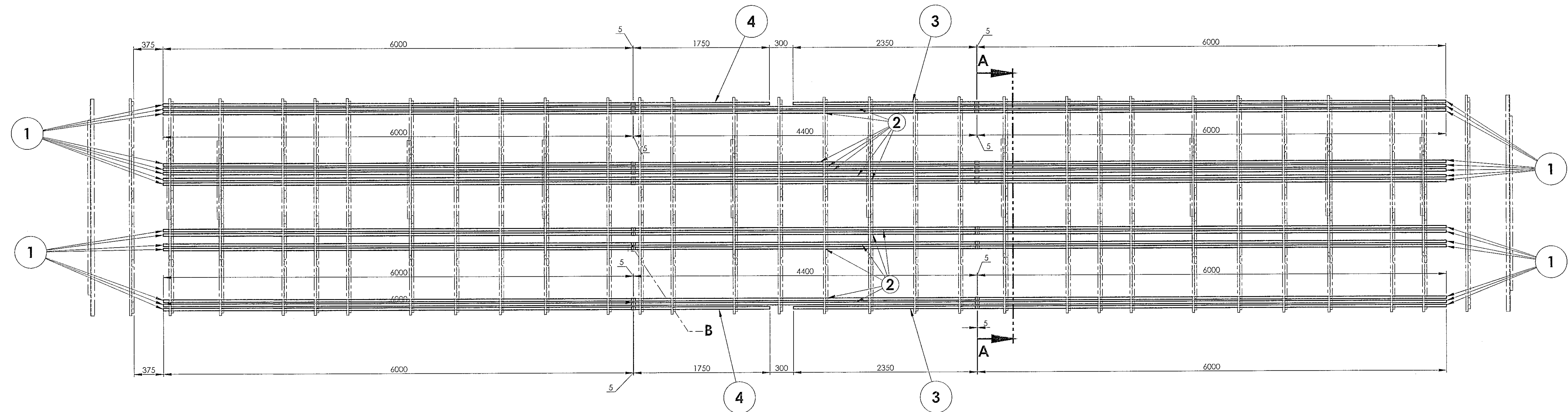
82716021

▽ ROUGH MACHINED
▽▽ FINISH MACHINED
▽▽▽ FINE FINISH MACHINED

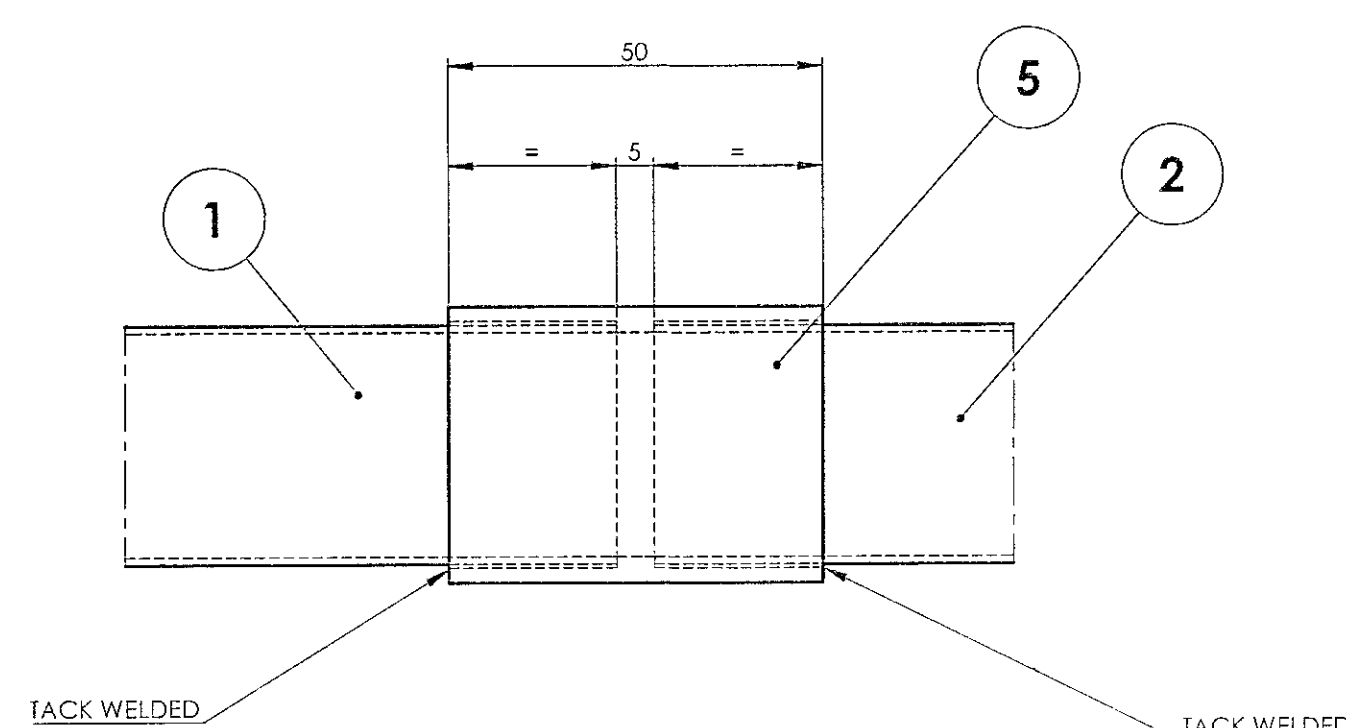
(01) ROUGH CLEANED
(01b) BURRS REMOVED
(01c) CHAMFERED

REVISIONS

ALT. ZONE DESCRIPTION APPROVED & DATE



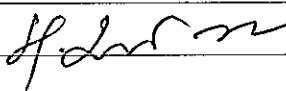
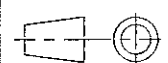
SECTION A-A
SCALE 1 : 10



DETAIL B
SCALE 1 : 1

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE CP C2 UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
9. ALL SHARP EDGES AND BURRS TO BE REMOVED IN CONDUITS TO AVOID DAMAGE TO ELECTRICAL CABLES.

30	COUPLER FOR CONDUITS		5	AAE16764		0.09	
2	CONDUIT	1 X OD 32 X 1750	4		IS:17876 X04Cr19Ni9	1.35	
2	CONDUIT	1 X OD 32 X 2350	3		IS:17876 X04Cr19Ni9	1.81	
13	CONDUIT	1 X OD32 X 4400	2		IS:17876 X04Cr19Ni9	3.39	
30	CONDUIT	1 X OD 32 X 6000	1		IS:17876 X04Cr19Ni9	4.63	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction				SURFACE AREA IN Sq.m.: 81.72		WT/ASSY IN Kgs:	
LAYOUT OF ELECTRICAL CONDUITS				SCALE	SSE/D		
				1:30	CHD		
				ALT.	ALTD		
				-	DRN		
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038				SHEET I OF I		LWFAC/PP2	
							
				82716021		A1	

REF.DRG.NO.:-

04/09/25
DATE OF LATEST ALT. DATE OF FIRST ISSUE A/E/SME

82716022

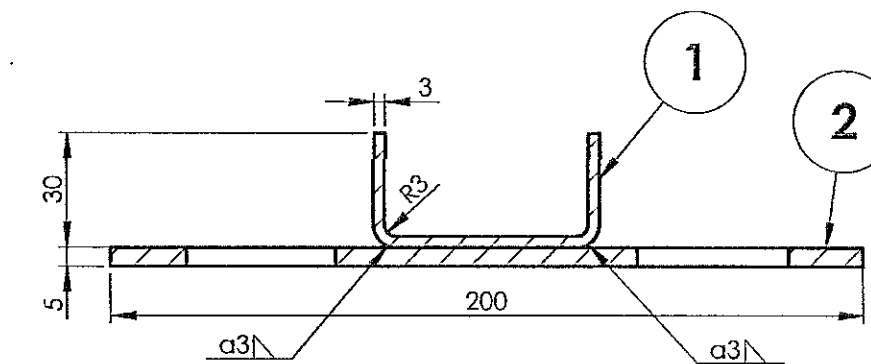
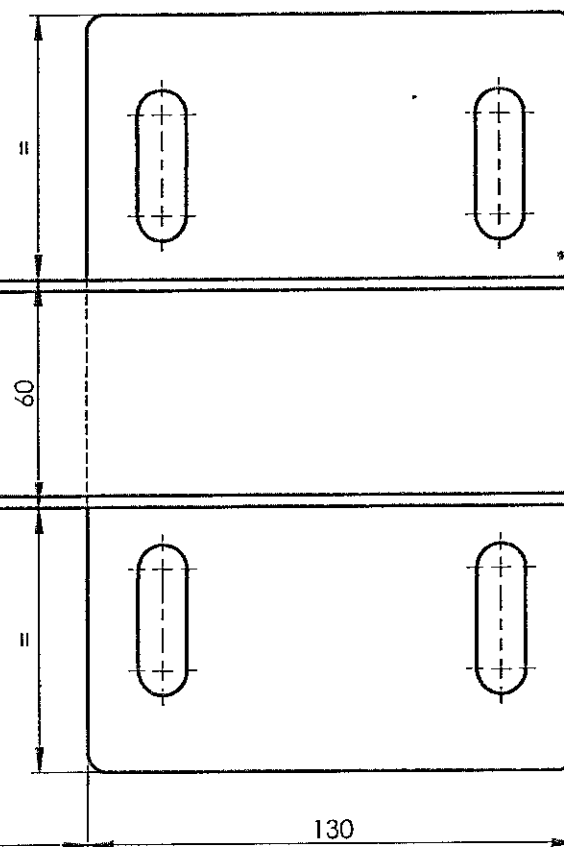
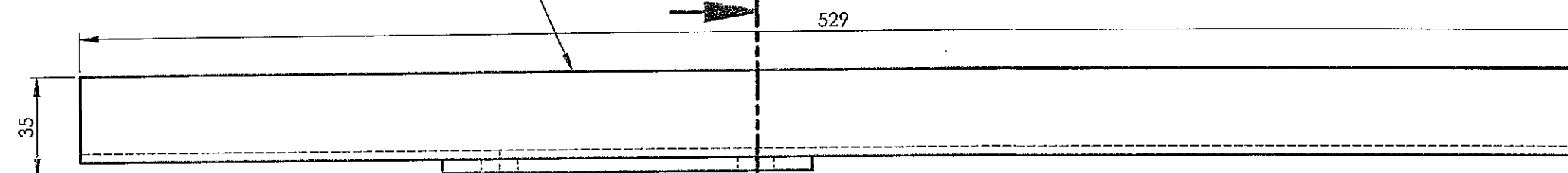
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	⑱ CHAMFERED

REVISIONS

ALT.

ZONE

DESCRIPTION

APPROVED &
DATE

SECTION A-A

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. FOR WELD TESTING PREFERANCES REFER DRG. No. ICF/STD-9-0-998.
7. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

REF.DRG.NO.-

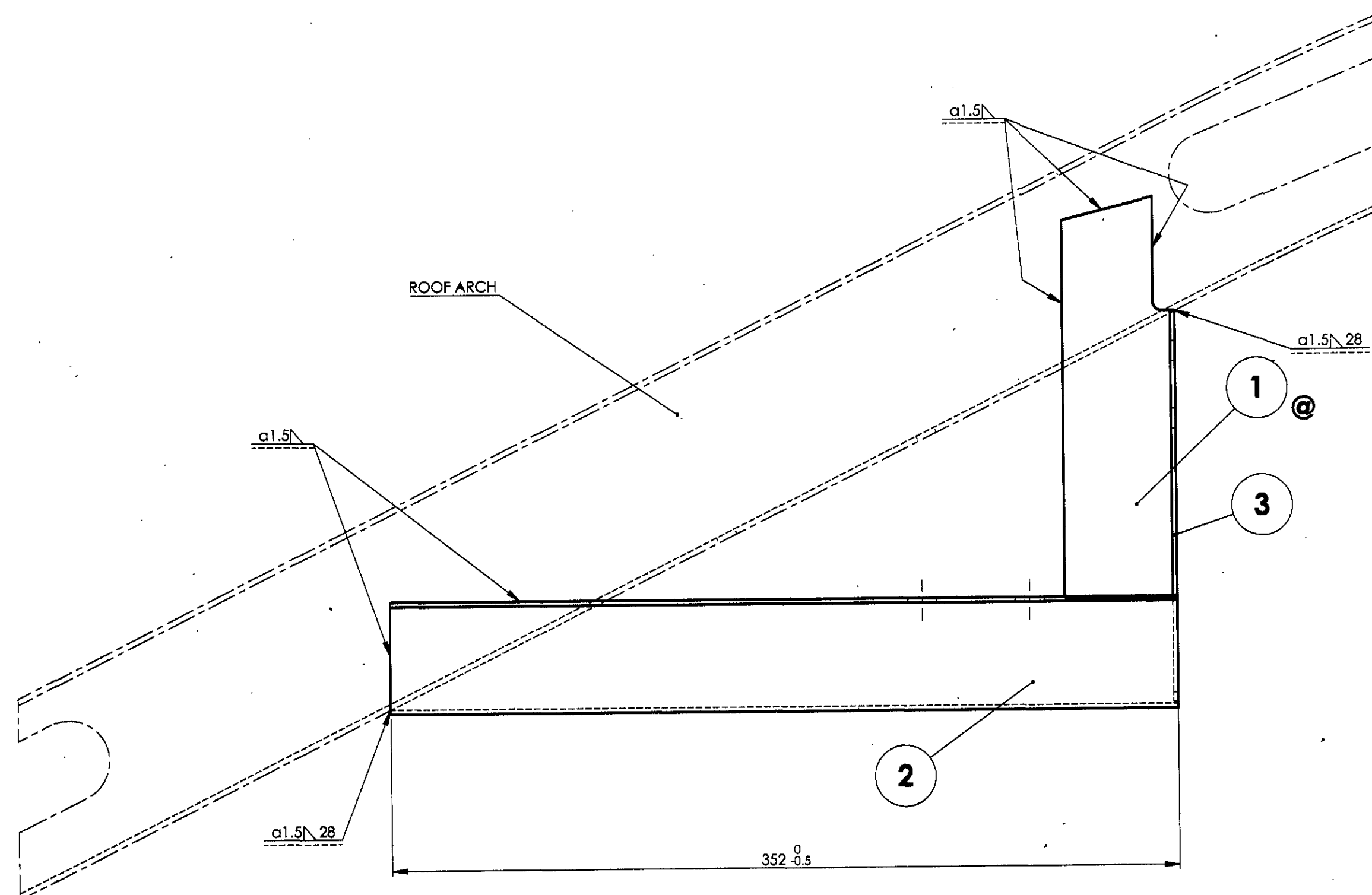
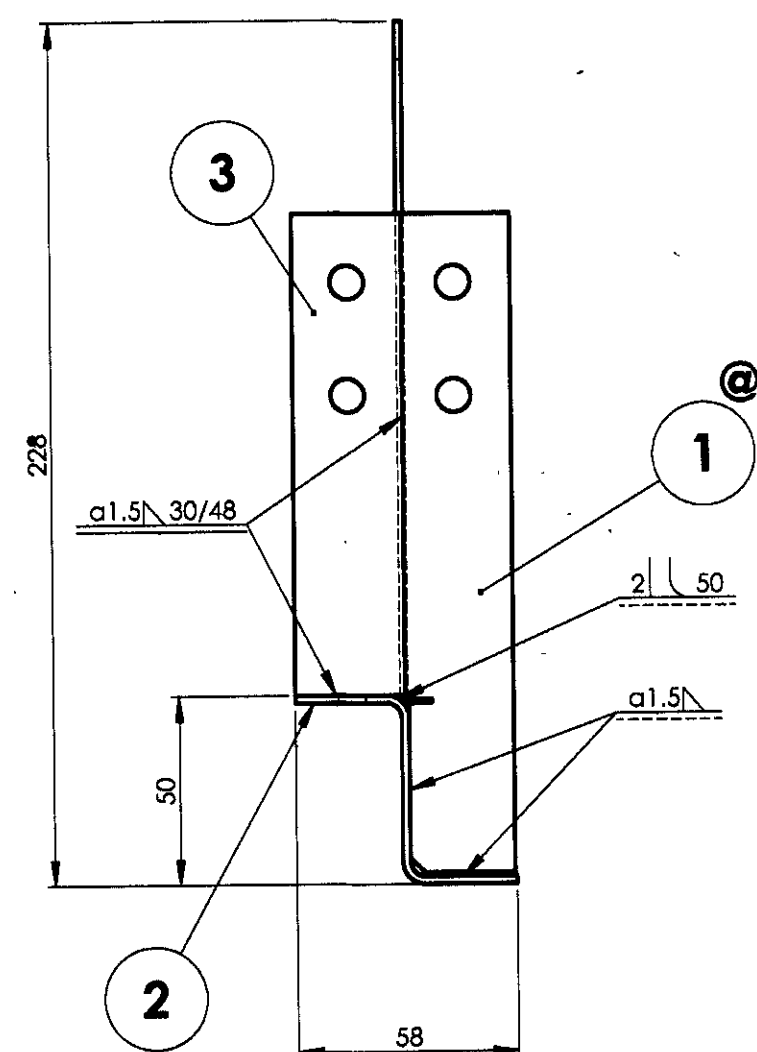
	21-02-26	<i>P. H. S.</i>
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME

1	PLATE		2	AAF16195		0.96	
1	CHANNEL	3x108x529	1		RDSO SPEC C-K201 X2 Cr Ni 12	1.40	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6				SURFACE AREA IN Sq.m.: 173601.06		WT/ASSY IN Kgs:	
BRACKET FOR PILLAR FIXING					SCALE	SSE/D	<i>H. J. S.</i>
					1:2	CHD	
					ALT.	ALTD	
						DRN	VEDA VARSHINIE
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038					SHEET 1 OF 1		
					82716022		A3

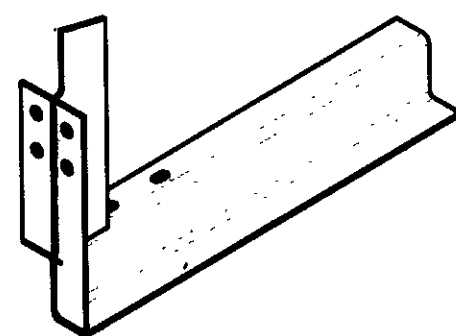
82716029

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①8 CHAMFERED

REVISIONS			APPROVED & DATE
ALT.	ZONE	DESCRIPTION	

**NOTE:**

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
7. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
- ⑧ 8. ITEM-1 SHALL BE ENSURED FOR VERTICALITY.

**ISOMETRIC VIEW**

1	FLAT		3	AAF14523		0.06	
1	Z MEMBER		2	AAF14293		0.57	
1	SUPPORTING ANGLE R.H.		1	AAB14323		0.203	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS

GROUP: 1-6 Roof Construction SURFACE AREA IN Sq.m.: 0.11 WT/ASSY IN Kgs:

PART CROSS BRACE COMPLETE(RH)

SCALE 1:2	SSE/D	CHD	ALT	ALTD	DRN	E.SATHISH KUMAR
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LWFAC/PP2

INDIAN RAILWAY STANDARDS
INTEGRAL COACH FACTORY, CHENNAI - 600038

SHEET
1 OF 1

82716029**A2**

REF.DRG.NO.-

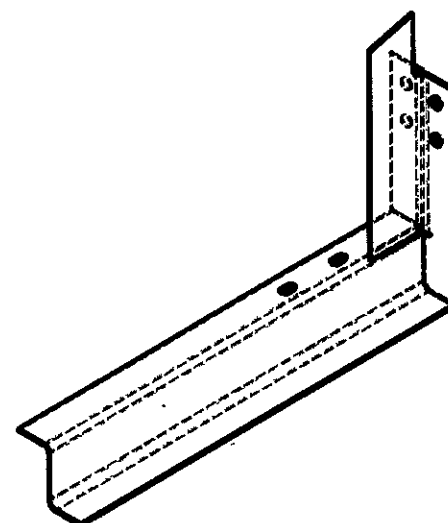
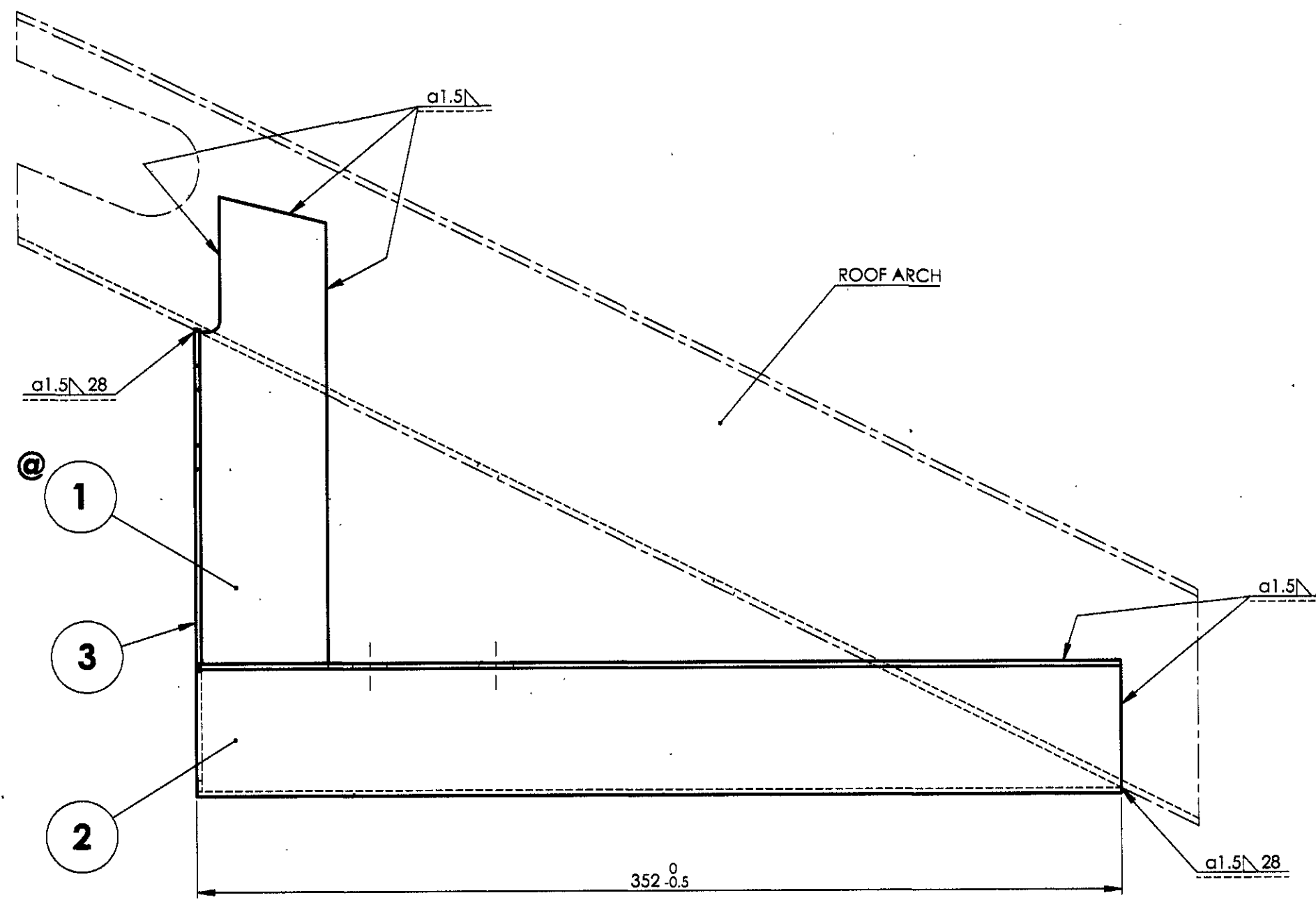
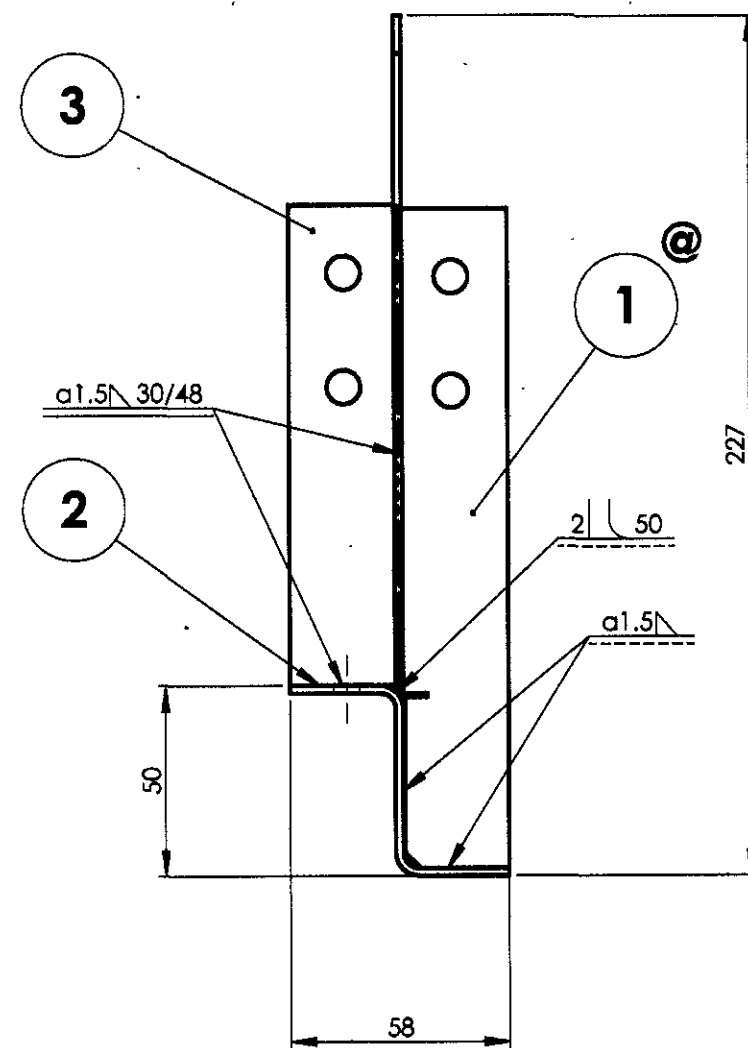
DATE OF LATEST ALT.	22-4-26	AME/SME
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ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO. ICF/STD-9-0-001. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY.

82716030

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①B CHAMFERED

REVISIONS				APPROVED & DATE	
ALT.	ZONE	DESCRIPTION			



ISOMETRIC VIEW

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
7. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
- ⑧ 8. ITEM-1 SHALL BE ENSURED FOR VERTICALITY.

1	FLAT		3	AAF14523		0.04	
1	Z MEMBER		2	AAF14292		0.57	
1	SUPPORTING ANGLE L.H.		1	AAF14324		0.203	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS

GROUP: 1-6 Roof Construction SURFACE AREA IN Sq.m.: 0.11 WT/ASSY IN Kgs:

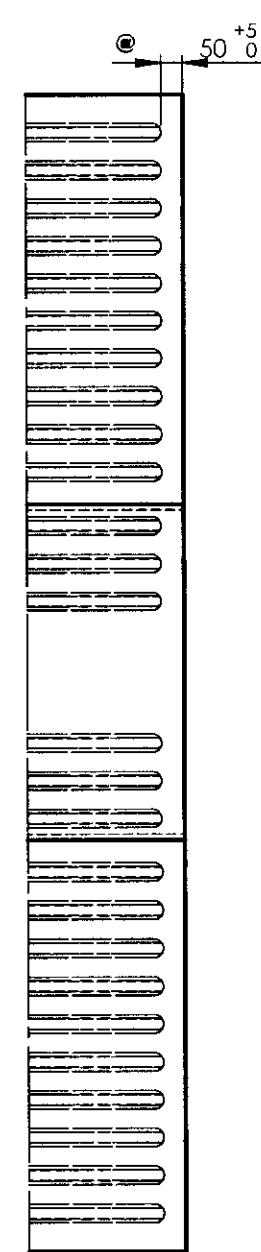
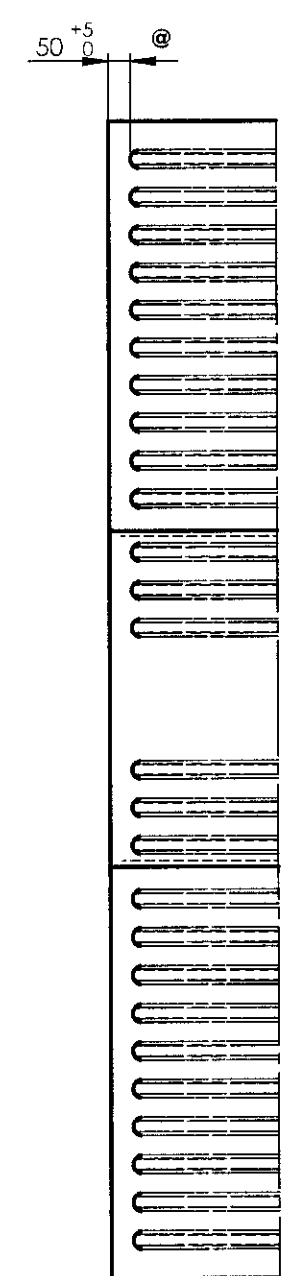
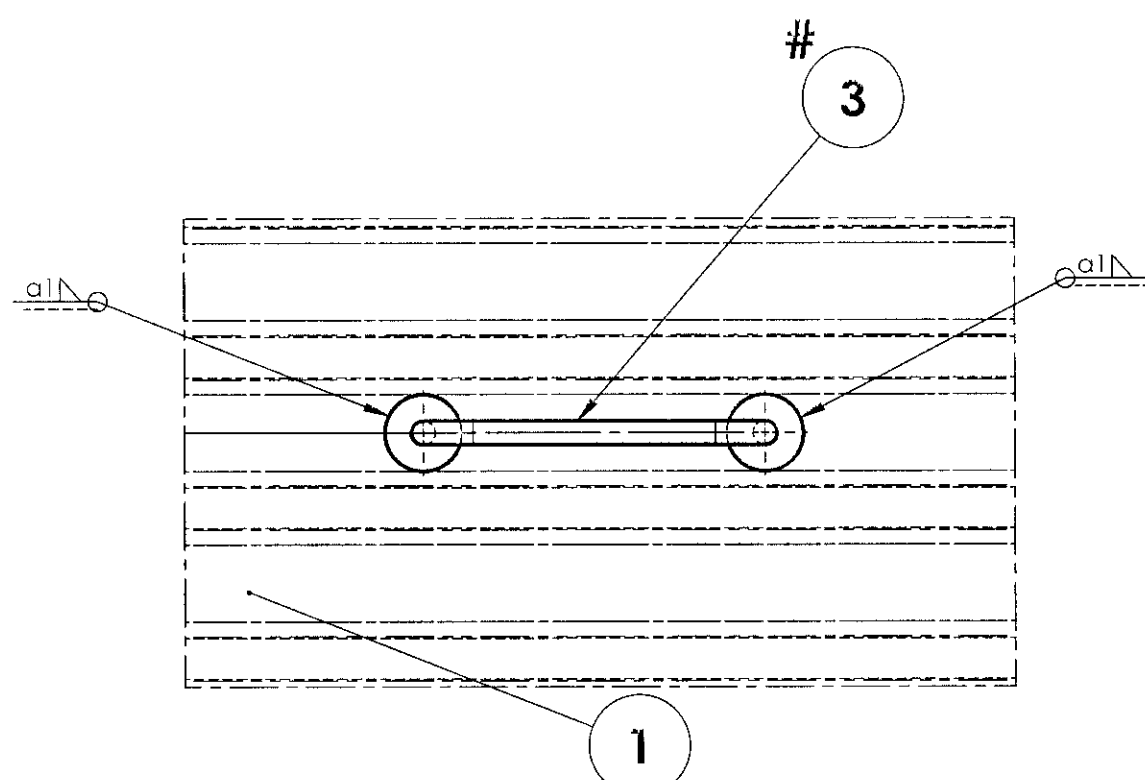
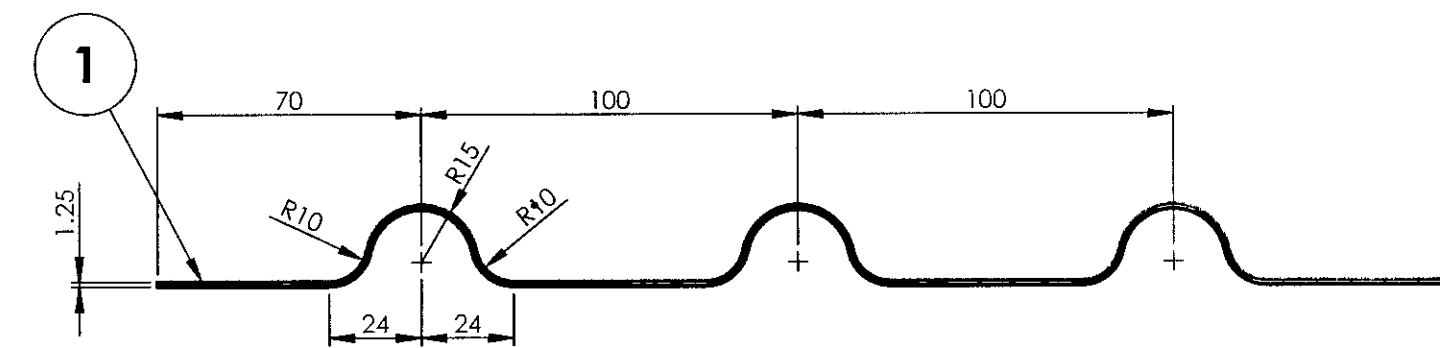
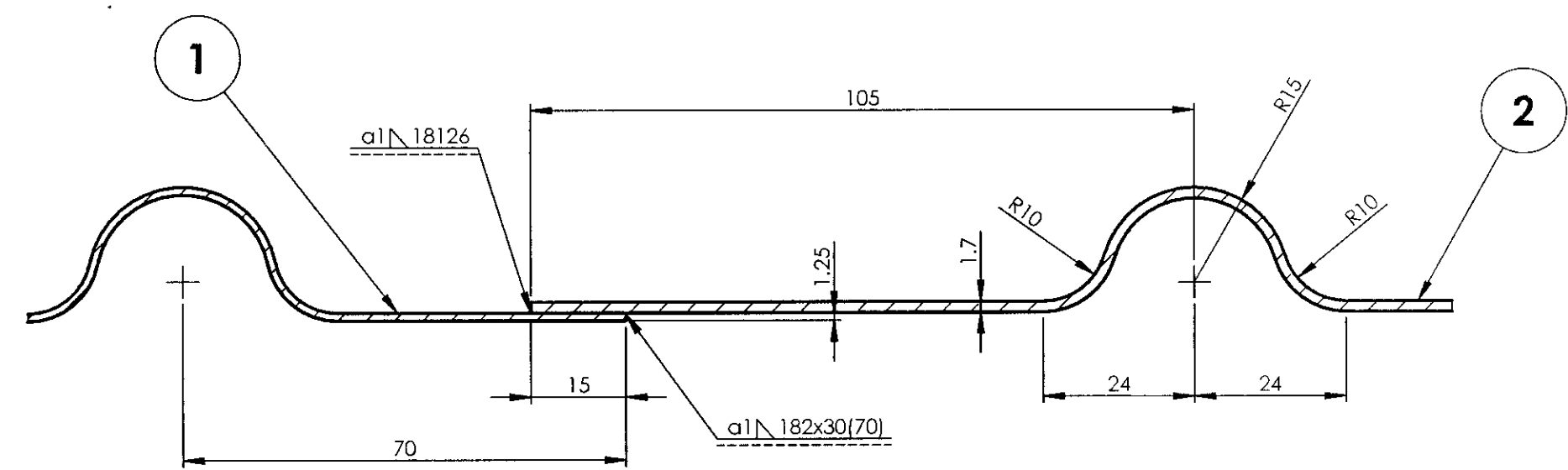
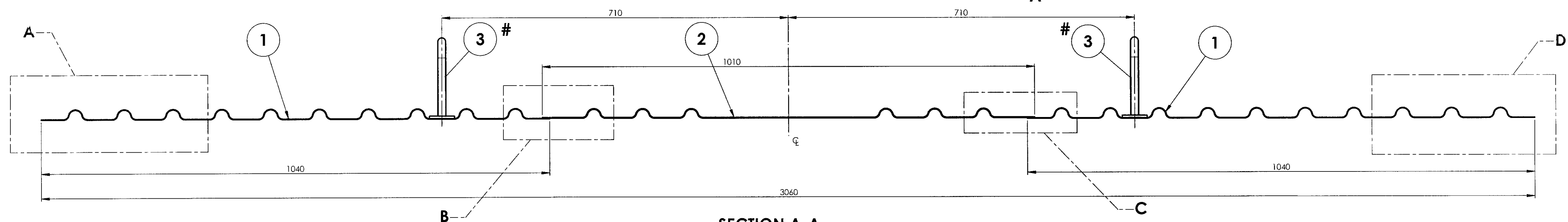
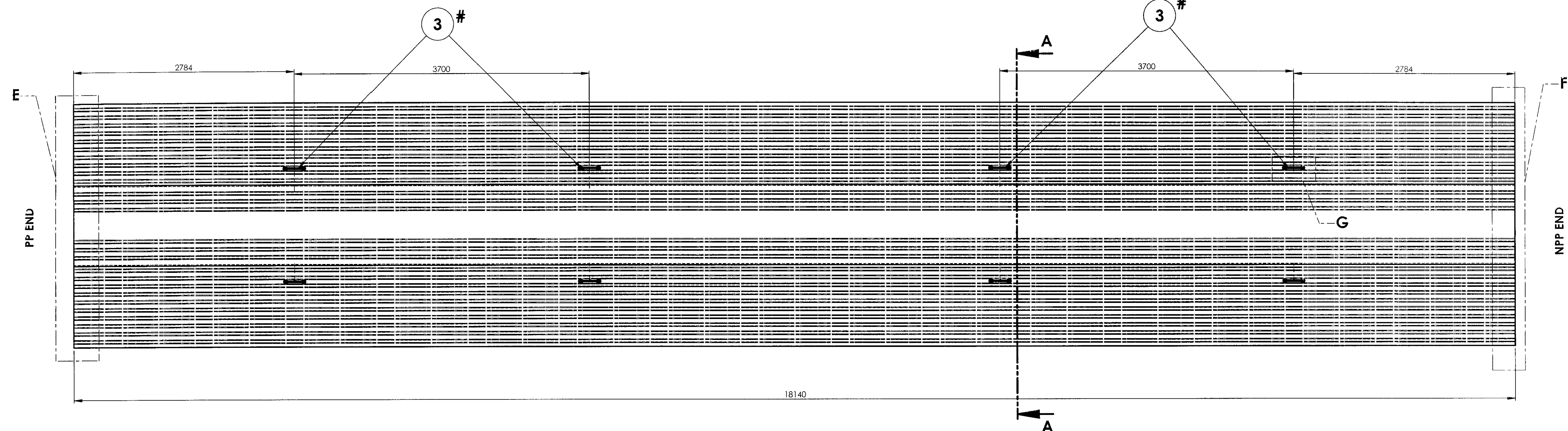
PART CROSSBRACE COMPLETE (LH)INDIAN RAILWAY STANDARDS
INTEGRAL COACH FACTORY, CHENNAI - 600038SHEET
1 OF 1

82716030

A2

82916013

▽ ROUGH MACHINED	⊖ ROUGH CLEANED
▽▽ FINISH MACHINED	⊖⊖ BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	⊖⊖⊖ CHAMFERED



ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO IC/7/STD-9-001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY.

REF.DRG.NO.

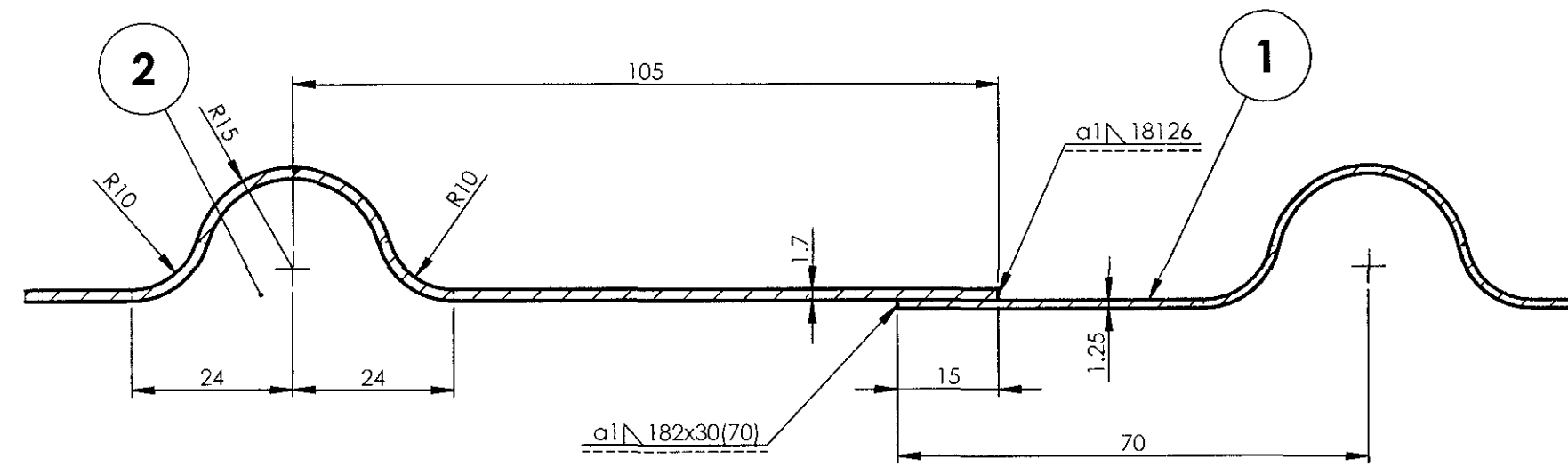
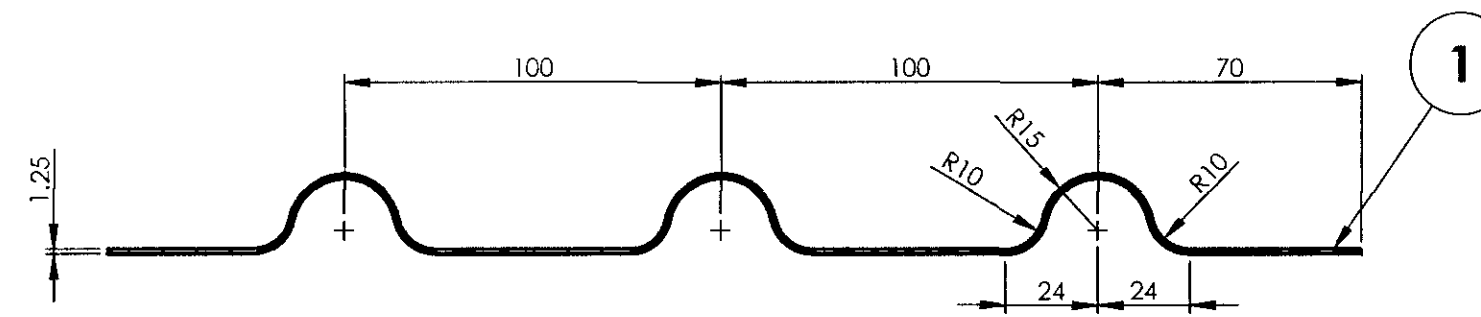
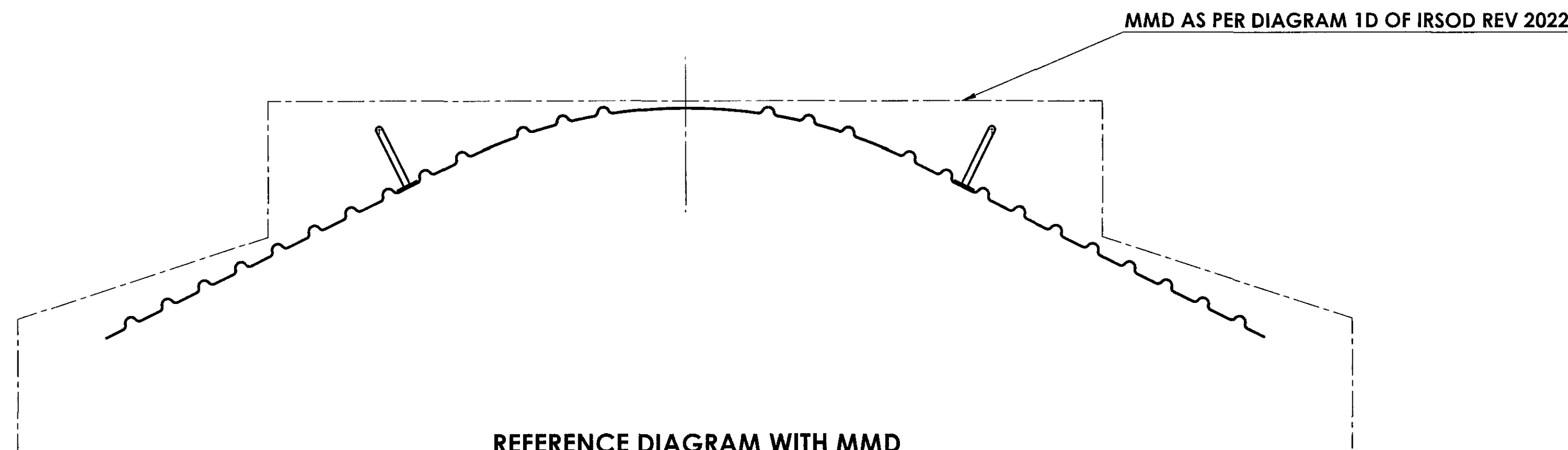
DATE OF LATEST ALT.	15-04-2025	DATE OF FIRST ISSUE	AME/SME
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GROUP: 1-6 Roof Construction	SURFACE AREA IN Sq.m.: 130.25	WT/ASSY IN Kgs:
SCALE 1:30		SSE, D
CHD		ALT
ALTD		DRN
Amal George		
INDIAN RAILWAY STANDARDS		SHEET 1 OF 2
INTEGRAL COACH FACTORY, CHENNAI - 600038		82916013
		A1

82916013

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	② BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	③ CHAMFERED

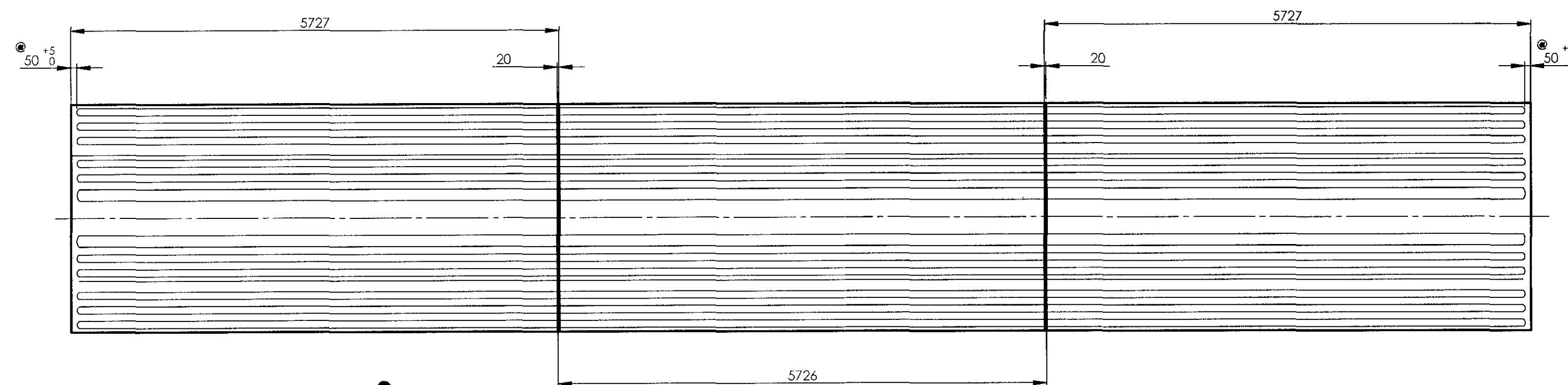
REVISIONS				APPROVED & DATE
ALT.	ZONE	DESCRIPTION		

DETAIL C
SCALE 1 : 1DETAIL D
SCALE 1 : 2

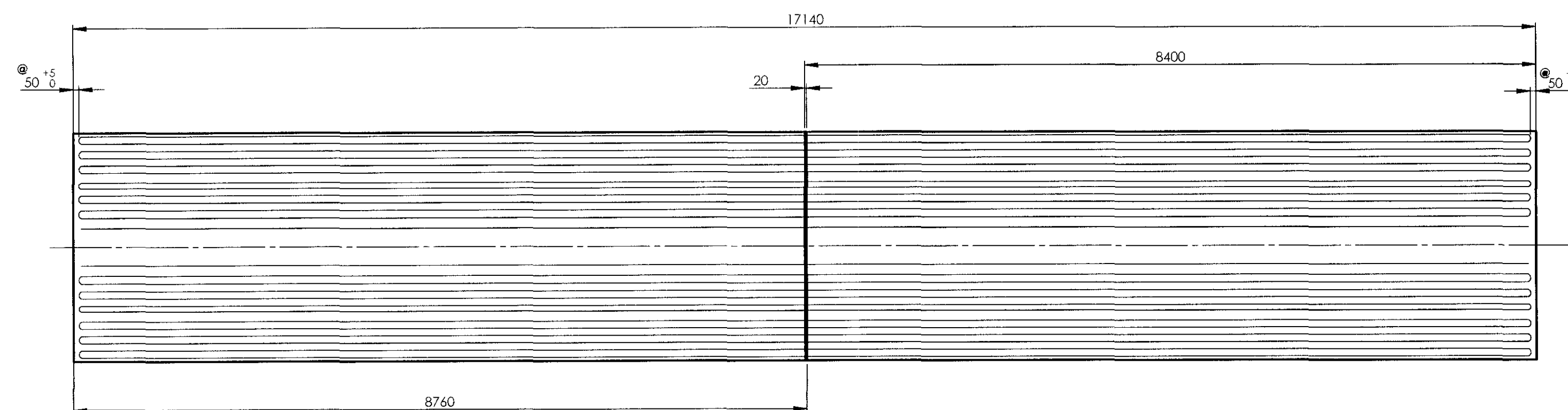
REFERENCE DIAGRAM WITH MMD

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE **CP C2** UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
9. NIBBLER CUTTING TO 80mm, FLATTENING TO 50mm AND LEAK PROOF WELDING SHALL BE DONE ON ROOF SHEET CORRUGATIONS AT BOTH ENDS OF ROOF SHEET ASSEMBLY AS PER THE DRAWING. AFTER COMPLETING THESE OPERATIONS THE FINAL ROOF SHEET ASSEMBLY SHALL CONFORM TO THE IMAGE " **ANNEXURE-1 TO DRG 58214002.PDF** " .
10. ROOF SHEET ASSEMBLY CAN ALSO BE MADE WITH LAP JOINTS ALONG LONGITUDINAL DIRECTION AS PER ALTERNATE DESIGN 1 & 2 OF ROOF SHEET ASSEMBLY AS SHOWN IN THE DRAWING WITH AN OVERLAPPING LENGTH OF 20mm .
11. FOLLOWING ADDITIONAL NOTES ARE APPLICABLE ONLY FOR PROCUREMENT OF ROOF SHEET ASSEMBLIES FROM TRADE.
 - a) ROOF SHEET ASSEMBLY SHALL BE SUPPLIED AS SINGLE ASSEMBLY IF PROCURED FROM TRADE.
 - b) HANDLE COMPLETE TO DRG. NO. 87416034 SHALL BE SUPPLIED LOOSE & WELDED ON ROOF SHEET ASSEMBLY BEFORE ROOF ASSEMBLY STAGE. THIS ITEM SHALL BE CUT & REMOVED AFTER THE SHELL ASSEMBLY IS PLACED ON THE TRESTLE. (THIS NOTE IS APPLICABLE ONLY FOR ROOF SHEET ASSEMBLIES BOTH IN HOUSE AND RECEIVED FROM TRADE & NOT APPLICABLE FOR ROOF ASSEMBLY COMPLETE RECEIVED FROM TRADE)



& ALTERNATE DESIGN-1 OF ROOF SHEET ASSEMBLY FOR TRANSVERSE JOINTS



& ALTERNATE DESIGN-2 OF ROOF SHEET ASSEMBLY FOR TRANSVERSE JOINTS

8	HANDLE COMPLETE		3	87414034		0.96	
1	MIDDLE ROOF SHEET	1.7 x 1108 x 18140	2		RDSO SPEC C-K201 X5 Cr Ni 18 10	273.37	
2	ROOF SHEET PART	1.25 x 1235 x 18140	1		RDSO SPEC C-K201 X5 Cr Ni 18 10	224.00	
QTY.	DESCRIPTION	Dimensions	ITEM NO.	REF.DRG.	MATERIAL	Weight/Unit in Kgs	REMARKS

GROUP: 1-6 Roof Construction		SURFACE AREA IN Sq.m.: 130.25		WT/ASSY IN Kgs:	
ROOF SHEET ASSEMBLY		SCALE 1:30	SSE: D	LWACCN/PP2	
		ALT	ALTD		
		DRN	Amal George		
INDIAN RAILWAY STANDARDS		SHEET 2 OF 2		82916013	
INTEGRAL COACH FACTORY, CHENNAI - 600038				A1	

REF.DRG.NO.

DATE OF LATEST ALT.	15-07-2025	AME/SME
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82916014

▽ ROUGH MACHINED
▽▽ FINISH MACHINED
▽▽▽ FINE FINISH MACHINED

① ROUGH CLEANED
①b BURRS REMOVED
⑱ CHAMFERED

REVISIONS

ALT. ZONE DESCRIPTION APPROVED & DATE

52
73
130

1 2

1 2

200
5
130

α3 60

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE CP C2 UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERANCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

1	RIB		2	AAF16194		0.10	
1	PLATE		1	AAF16195		0.96	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS

GROUP: 1-6 Roof Construction SURFACE AREA IN Sq.m.:0.06 WT/ASSY IN Kgs:

BRACKET FOR PARTITION PILLAR MOUNTING

SCALE 1:2 SSE/D CHD
ALT. ALTD DRN Amal George

INDIAN RAILWAY STANDARDS SHEET 1 OF 1
INTEGRAL COACH FACTORY, CHENNAI - 600038

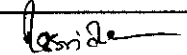
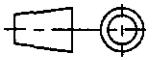
82916014 A3

15-07-2025
DATE OF LATEST ALT. DATE OF FIRST ISSUE A ME/SME

REF.DRG.NO.87416006 Alt NIL

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO ICF/STD-9-0-001. ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553. WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY

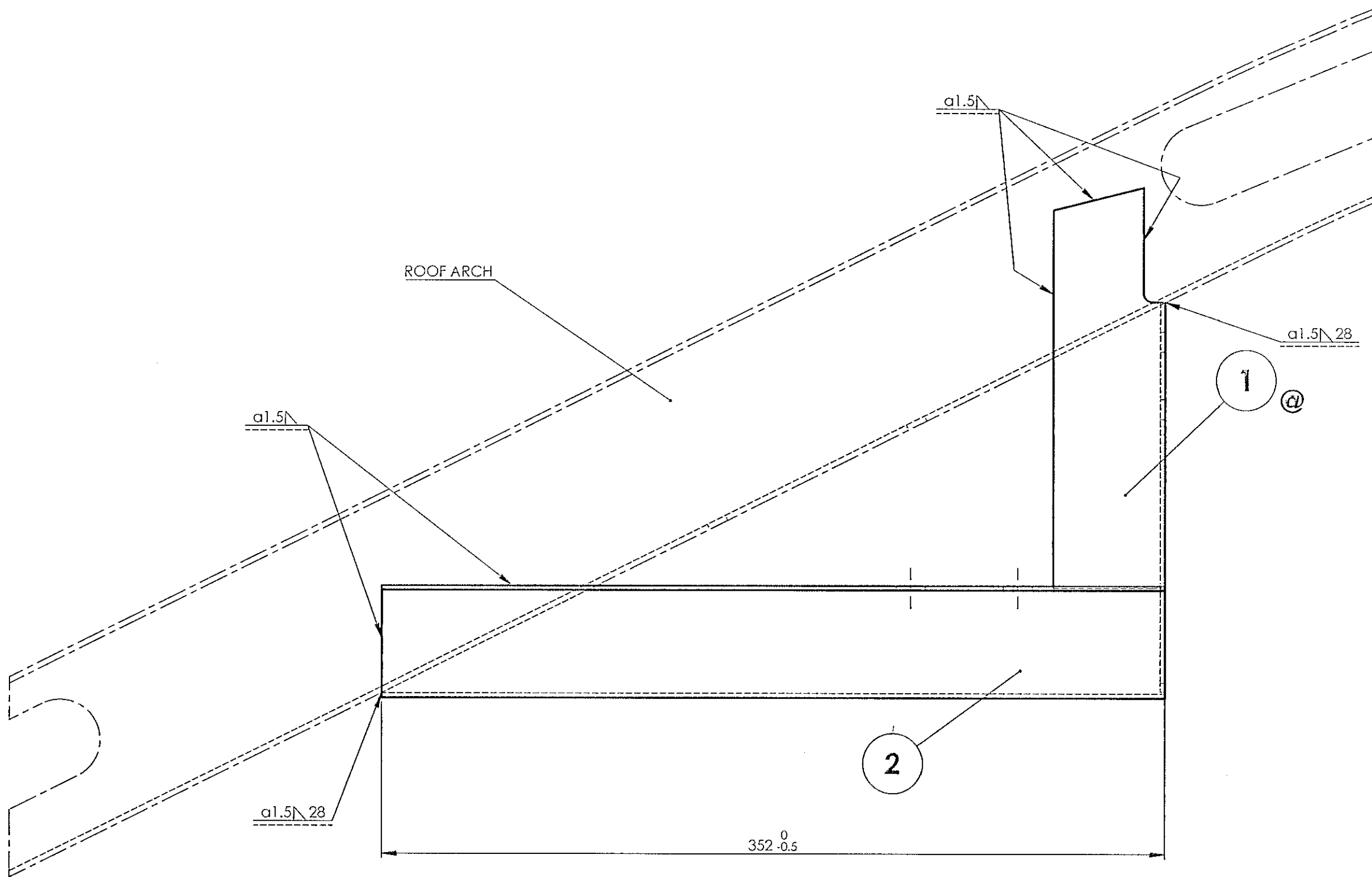
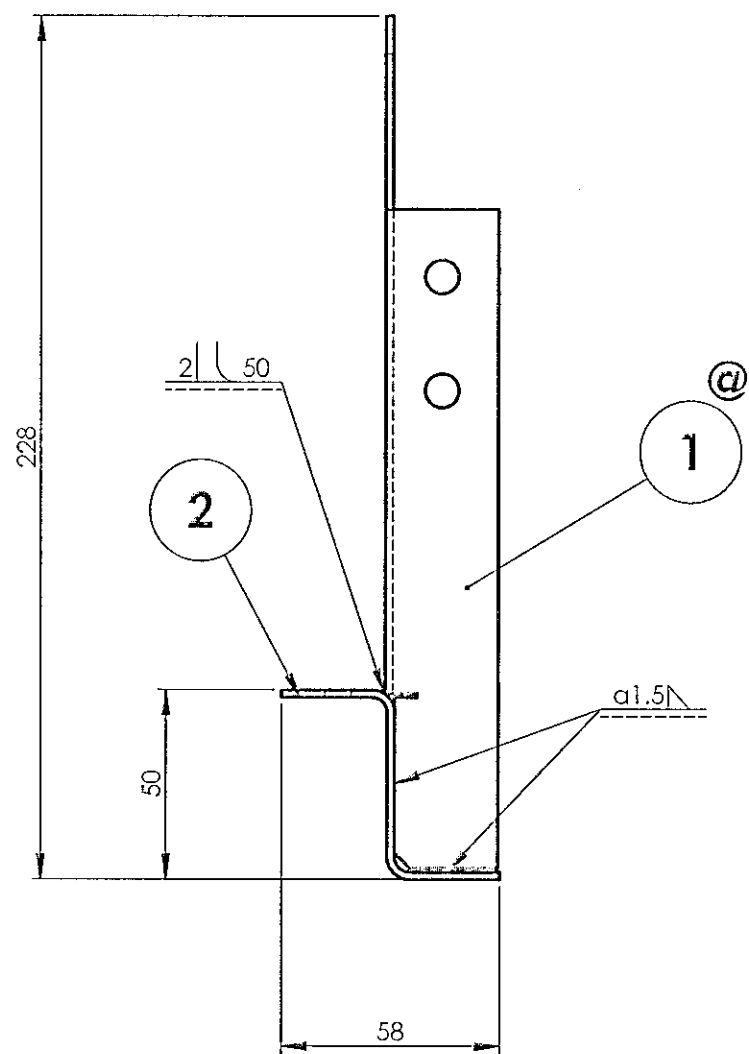
1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE **CP C2** UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.

1	RIB		2	AAF16194		0.10	
1	PLATE		1	AAF16195		0.96	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction		SURFACE AREA IN Sq.m.:0.06			WT/ASSY IN Kgs:		
<h1>BRACKET FOR PARTITION PILLAR MOUNTING</h1>					SCALE	SSE/D	
					1:2	CHD	
					ALT.	ALTD	
						DRN	Amal George
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1	 LWACCN/PP2		
INTEGRAL COACH FACTORY, CHENNAI - 600038					82916014		
					A3		

82916018

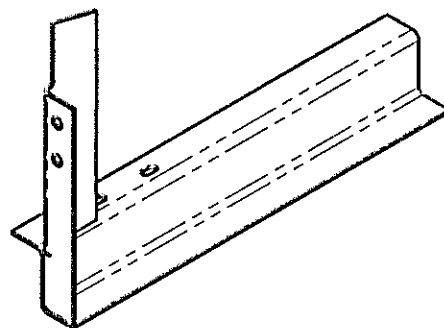
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	② BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	③ CHAMFERED

REVISIONS				APPROVED & DATE	
ALT.	ZONE	DESCRIPTION			



NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
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5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE CP C2 UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
- ⑨ 9. ITEM-1 SHALL BE ENSURED FOR VERTICALITY.



ISOMETRIC VIEW

1	Z MEMBER		2	AAF16293		0.57	
1	SUPPORTING ANGLE R.H.		1	AAB16323		0.203	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction				SURFACE AREA IN Sq.m.: 0.1		WT/ASSY IN Kgs:	
PART CROSS BRACE COMPLETE(RH)				SCALE 1:2	SSE/D	CHD	
				ALT	ALTD	DRN	
						Arnal George	
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1		LWACCN/PP2	
INTEGRAL COACH FACTORY, CHENNAI - 600038				82916018		A2	

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REF.DRG.NO.-

DATE OF LATEST ALT.	10 -11-2025	AME/SME
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82916019

▽ ROUGH MACHINED
▽▽ FINISH MACHINED
▽▽▽ FINE FINISH MACHINED

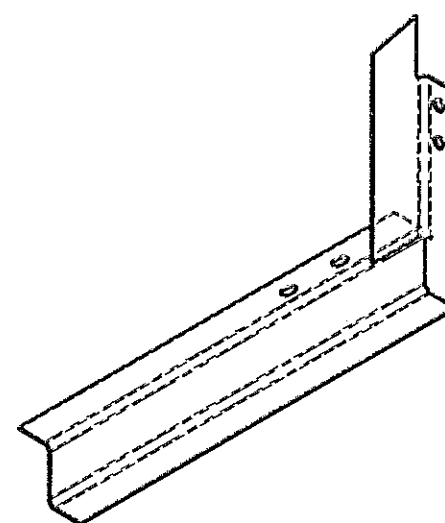
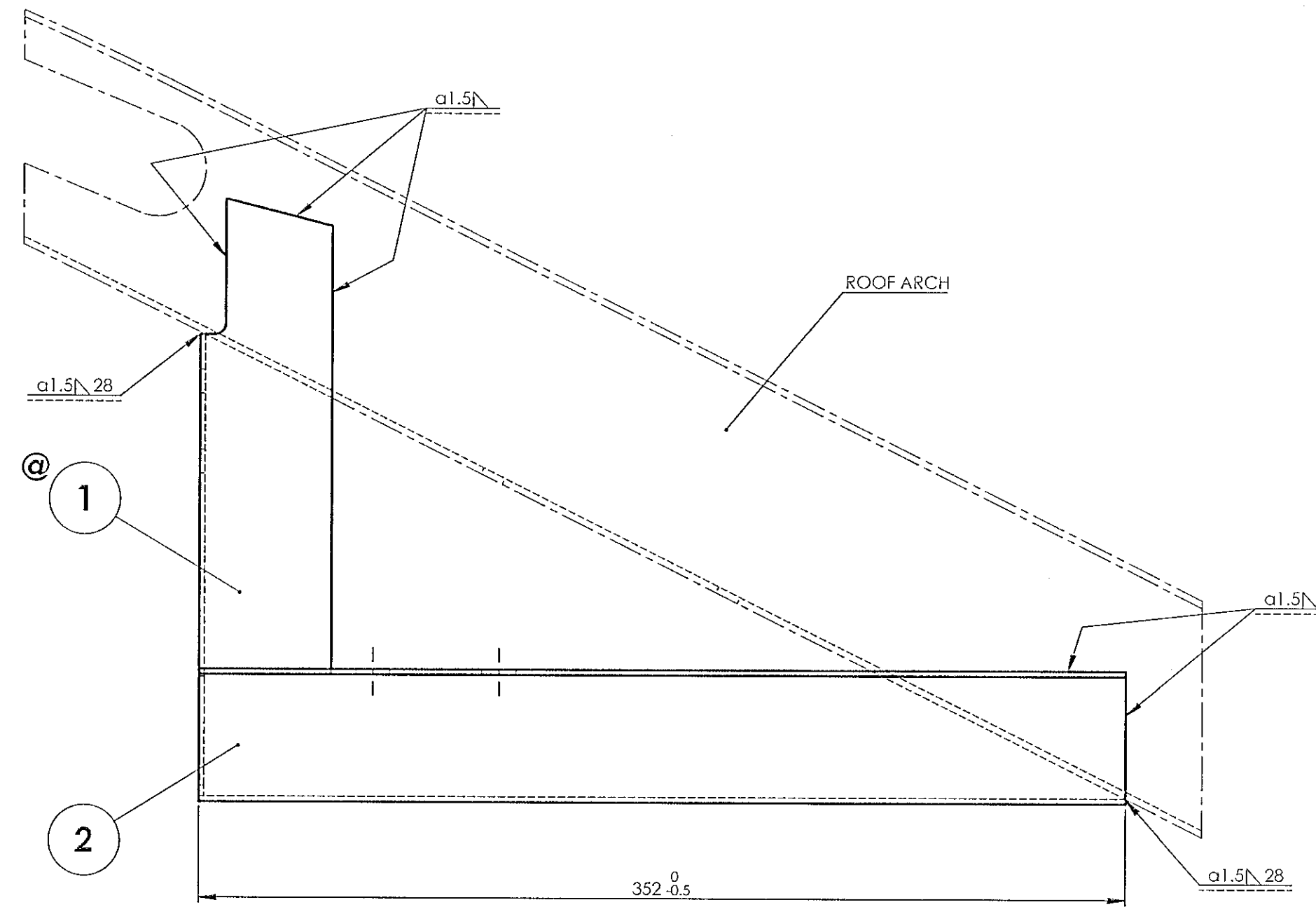
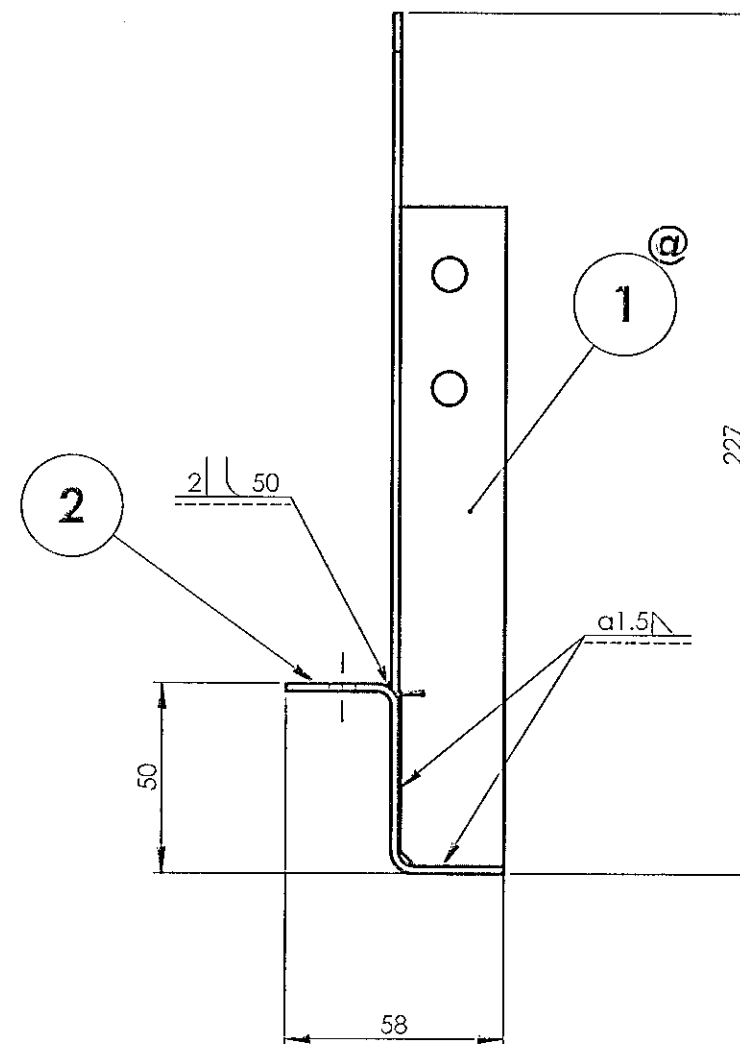
① ROUGH CLEANED
② BURRS REMOVED
③ CHAMFERED

REVISIONS

ALT.

ZONE

DESCRIPTION

APPROVED &
DATE

ISOMETRIC VIEW

NOTE:

1. STAINLESS STEEL ELECTRODE OF SAME COMPOSITION AS PER TABLE-3 OF RDSO/SPEC C-K201 SHALL BE USED FOR WELDING.
2. ALL WELDINGS SHALL BE TIG WELDING UNLESS OTHERWISE SPECIFIED.
3. ALL WELD SPATTERS SHALL BE GROUND.
4. ALL WELDED JOINTS SHALL BE PICKLED AND PASSIVATED BEFORE SURFACE TREATMENT.
5. ALL SHARP CORNERS SHALL BE ROUNDED OFF.
6. ALL WELD PERFORMANCE CLASS SHALL BE **CP C2** UNLESS OTHERWISE SPECIFIED.
7. FOR WELD TESTING PREFERENCES REFER DRG. No. ICF/STD-9-0-998.
8. FOR WELD PROCEDURE SPECIFICATION REFER DRG. No. ICF/STD-9-0-999.
- ⑨ 9. ITEM-1 SHALL BE ENSURED FOR VERTICALITY.

1	Z MEMBER		2	AAF16292		0.57	
1	SUPPORTING ANGLE L.H.		1	AAB16324		0.203	
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF.DRGS.	MATL	WT/UNIT IN KGS	REMARKS

GROUP: 1-6 Roof Construction

SURFACE AREA IN Sq.m.: 0.1

WT/ASSY IN Kgs:

PART CROSSBRACE COMPLETE (LH)

SCALE 1:2	SSE/D CHD	Amal George
ALT	ALTD	
DRN		Amal George

LWACCN/PP2

INDIAN RAILWAY STANDARDS
INTEGRAL COACH FACTORY, CHENNAI - 600038

SHEET
1 OF 1

82916019

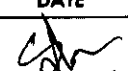
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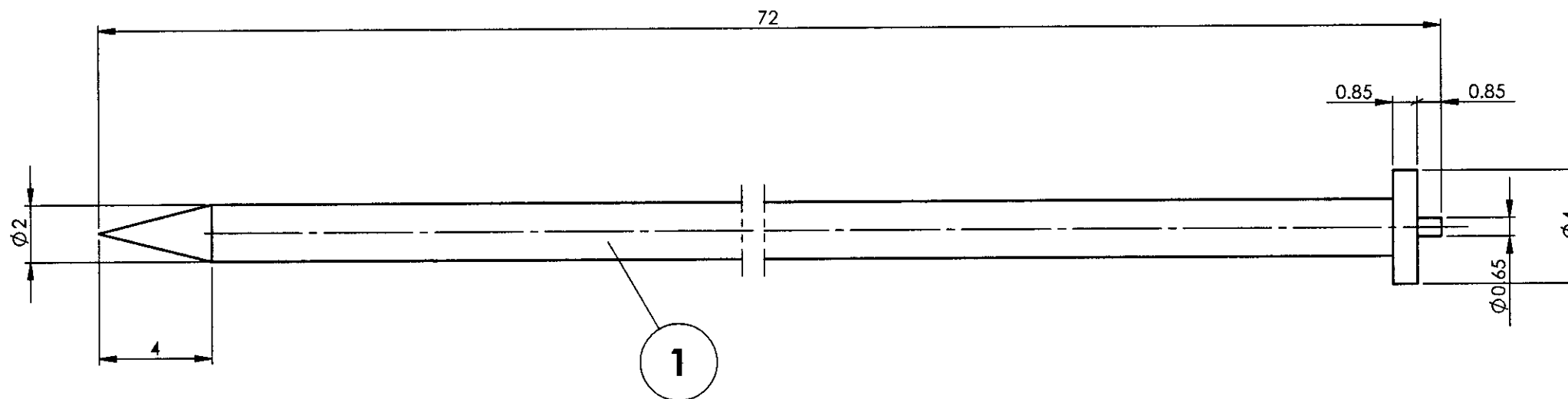
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DATE OF LATEST ALT.	to -11-2025	AME/SME
DATE OF FIRST ISSUE		

AAA16493

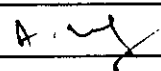
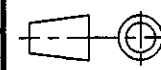

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	② BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	③ CHAMFERED

REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		DRAWING REVISED.	




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ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553.
WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY

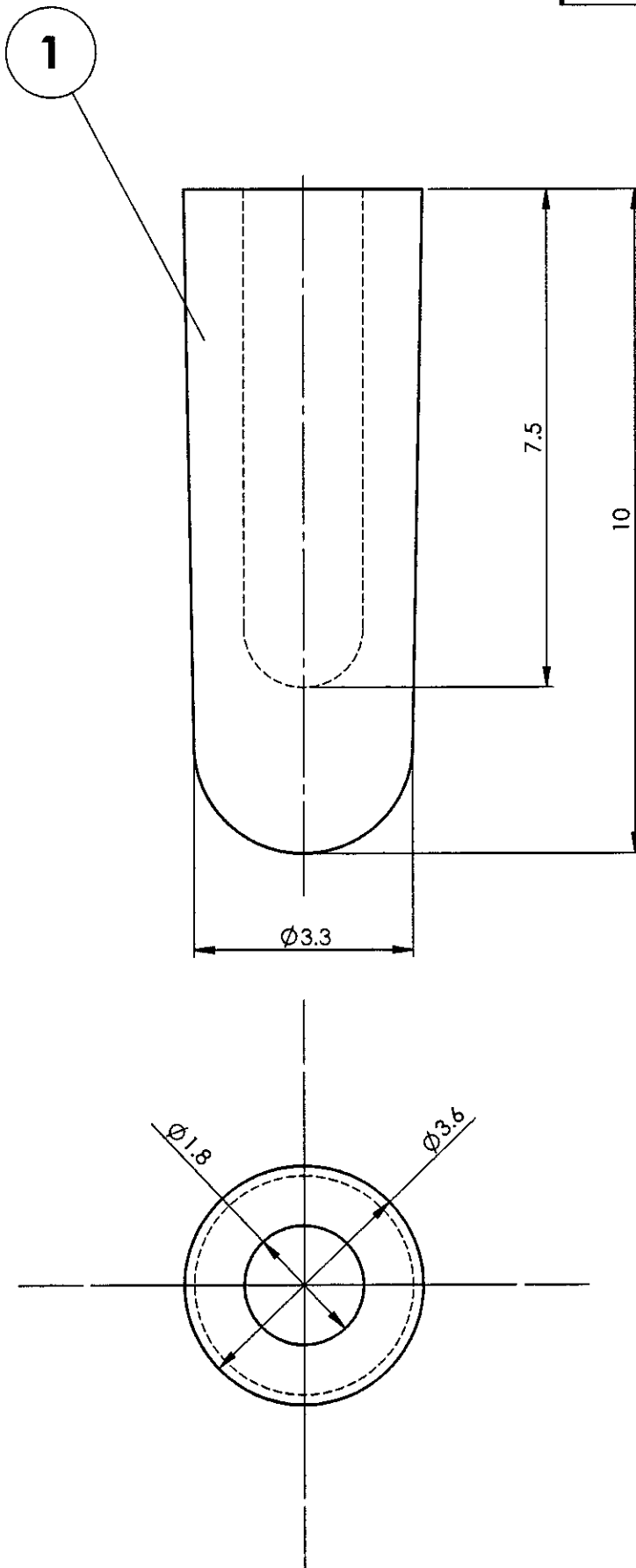
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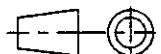
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Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF CONSTRUCTION				SURFACE AREA IN Sq.m.: 0.000		WT/ASSY IN Kgs:	
WELDING PIN					SCALE 5:1	SSE/D CHD	
					ALT. a	ALTD DRN	A.Palanichamy
							3D: A.Palanichamy 2D: P.Murugan
							
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1		AAA16493	
INTEGRAL COACH FACTORY, CHENNAI - 600038						A3	
06-02-2024		19-07-2013					
DATE OF LATEST ALT.		DATE OF FIRST ISSUE		AME/SME			


AAA16494

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①8 CHAMFERED

REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		DRAWING REVISED.	



1	CAP	Ø3.6x10	1		IS:5831	0.000	
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF CONSTRUCTION		SURFACE AREA IN Sq.m.:0.000			WT/ASSY IN Kgs:		
CAP					SCALE	SSE/D	
					10:1	CHD	
					ALT.	ALTD	A.Palanichamy
					a	DRN	3D:A.Palanichamy 2D:P.Murugan
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600036				SHEET 1 OF 1			
					AAA16494		A3

06-02-2024	19-07-2013	
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME


REF.DRG.NO.mi001576, ITEM-2

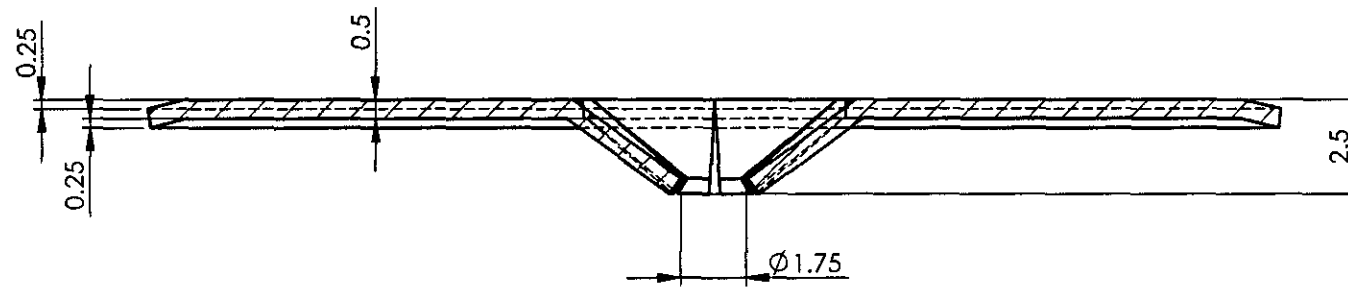
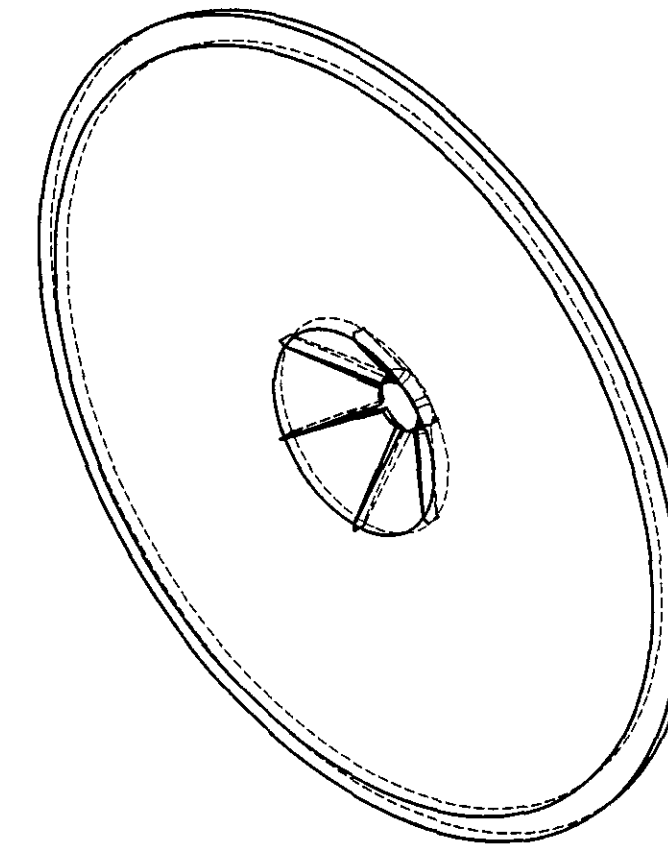
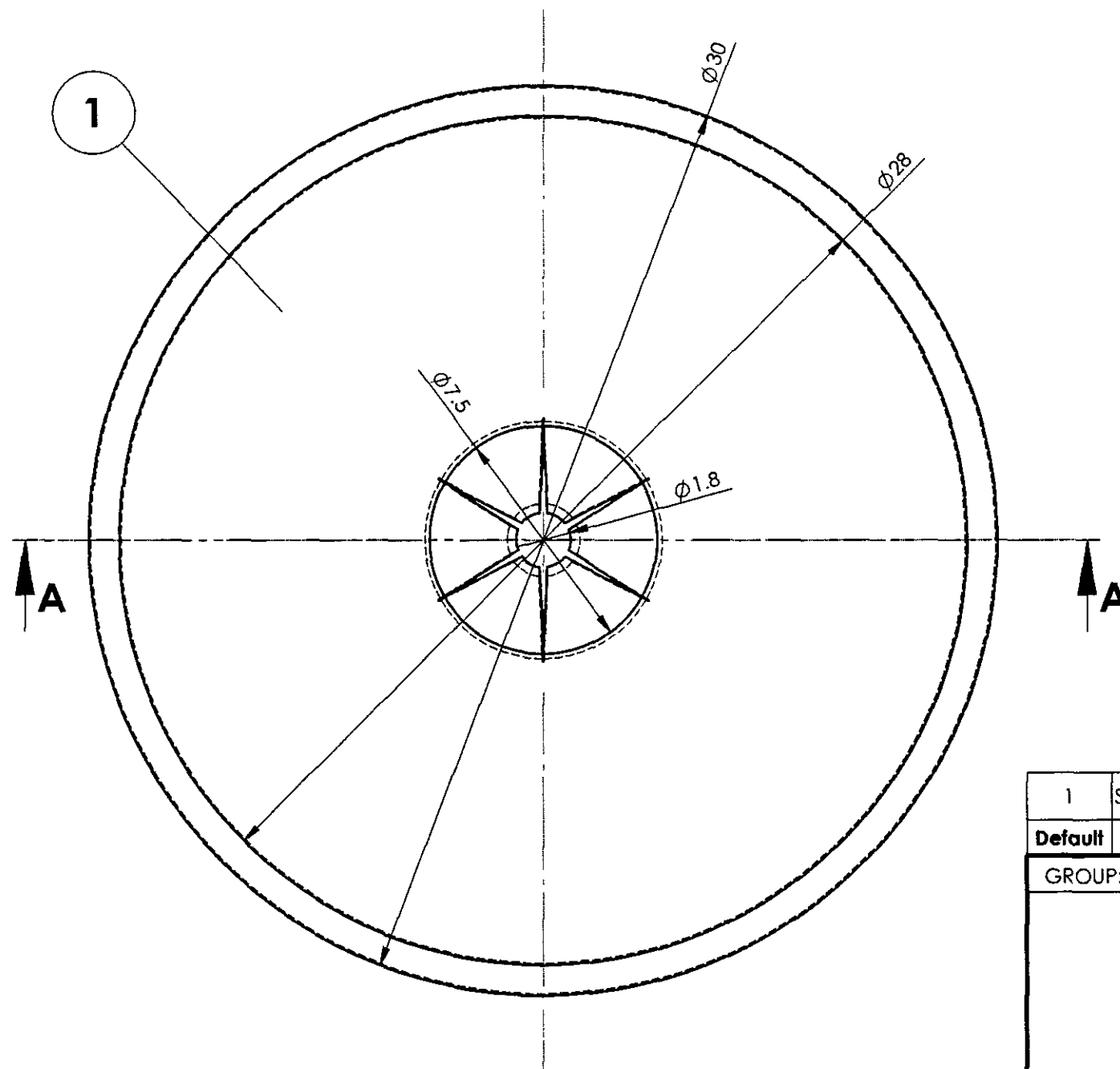
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO ICF/STD-9-0-001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553.
WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY

AAA16495


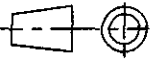
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①B CHAMFERED

REVISIONS

ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		DRAWING REVISED.	


SECTION A-A
SCALE 5 : 1

ISOMETRIC VIEW

1	SERRATED SPRING WASHER	DIA 30 x 0.5 THICK	1		IS:4072 Gr.65C6	0.003	COATING TO MDT5057
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF CONSTRUCTION			SURFACE AREA IN Sq.m.:0.001		WT/ASSY IN Kgs:		
SERRATED SPRING WASHER					SCALE	SSE/D	
					2:1	CHD	
					ALT.	ALTD	A.Palanichamy
					a	DRN	3D:A.Palanichamy 2D:P.Murugan
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1			
INTEGRAL COACH FACTORY, CHENNAI - 600038				AAA16495			A3

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO ICF/STD-9-0-001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER EN ISO 2553.
WEIGHT GIVEN IN DRAWING IS FOR INDICATIVE PURPOSE ONLY

REF.DRG.NO.mi001576, ITEM-3

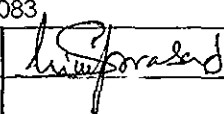
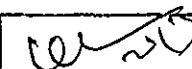
06-02-2024	19-07-2013	
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME

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				▽▽ FINISH MACHINED		⊖⊖ BURRS REMOVED		ALT.		ZONE		DESCRIPTION		APPROVED & DATE	
				▽▽▽ FINE FINISH MACHINED		⊖⊖⊖ CHAMFERED									
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ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS ADD TOLERANCE VALUES. REFER DRAWING NO IC/STD 9 0 001.

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER IS: 813-1986.

REF.DRG.NO.4.10113.0.20.095.138

GROUNDING FLAP		8 x 30 x 45	1	REF. DRGS	RDSO/SPEC C- K201 X5 Cr Ni 18 10	0.084	REMARKS
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF ASSEMBLY					SURFACE AREA IN Sq.m.:0.004		WT/ASSY IN Kgs:0.083
GROUNDING FLAP					SCALE	SSE/D	
					1:1	CHD	
					ALT.	ALTD	
					DRN	K.Sriram	
INDIAN RAILWAY STANDARDS					SHEET 1 OF 1		AAA16900 A3
INTEGRAL COACH FACTORY, CHENNAI - 600038							
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME					
	21-03-2013						

AAA16906

▽ ROUGH MACHINED

▽▽ FINISH MACHINED

▽▽▽ FINE FINISH VACUUMED

⊙ ROUGH CLEANED

⊙ BURRS REMOVED

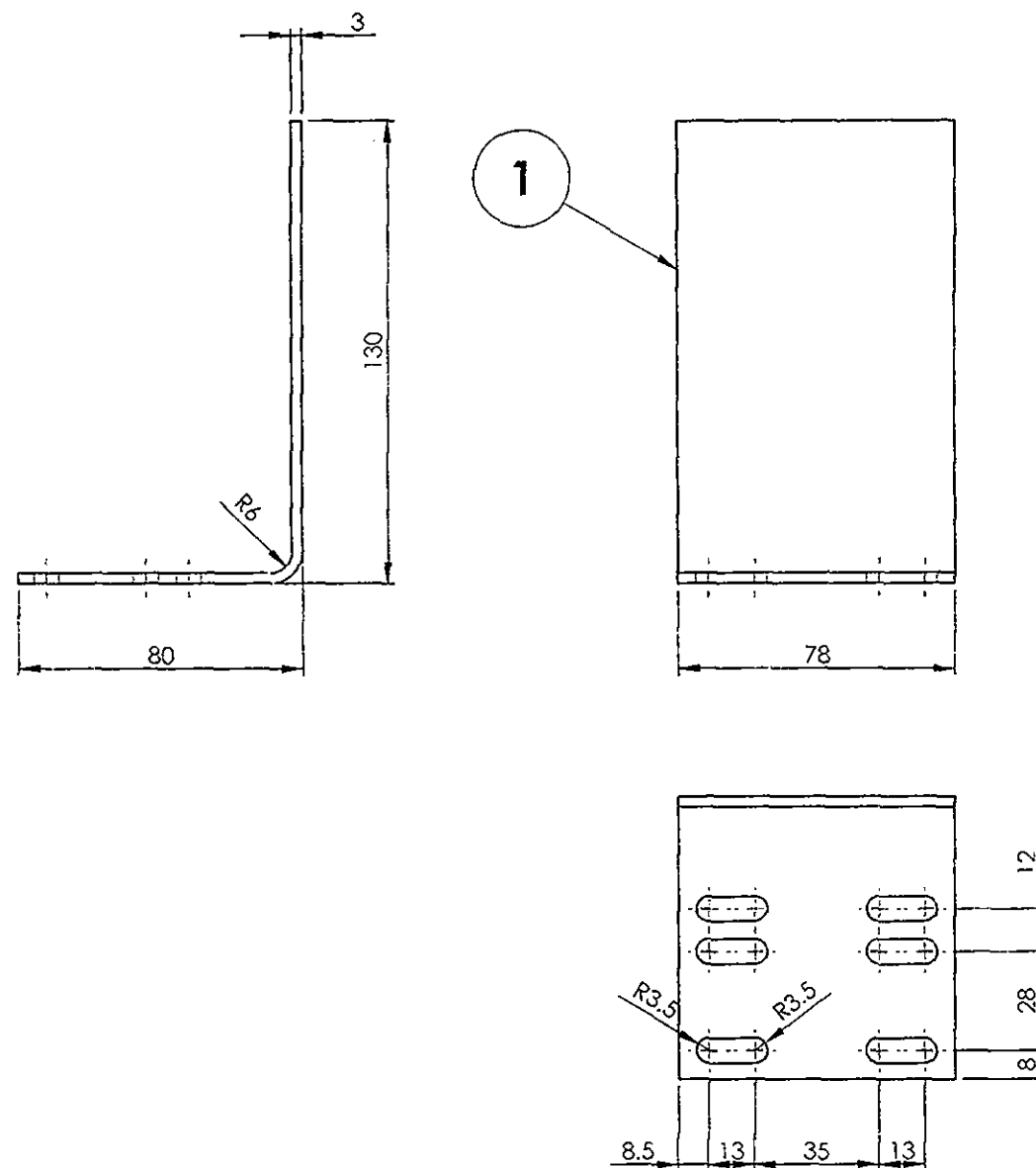
⊙ CHAMFERED

REVISIONS

ALT.

ZONE

DESCRIPTION

APPROVED &
DATE

1	ANGLE	3 x 78 x 204	1		RDSO/SPEC C-K201 X2 Cr Ni 12	0.363	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF ASSEMBLY				SURFACE AREA IN Sq.m.:0.033		WT/ASSY IN Kgs:0.363	
ANGLE					SCALE	SSE/D	K.Srirom
					1:2	CHD	
					ALT.	ALTD	
						DRN	
INDIAN RAILWAY STANDARDS					SHEET 1 OF 1		
INTEGRAL COACH FACTORY, CHENNAI - 600038					AAA16906		A3

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUNDOFF VALUES, REFER DRAWING NO ICIF/STD 9 0 001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER IS: 813-1986.

REF.DRG.NO.2.10113.0.20.095.115

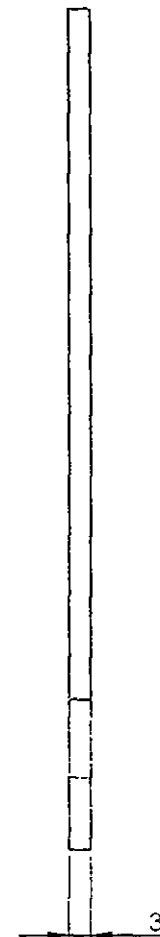
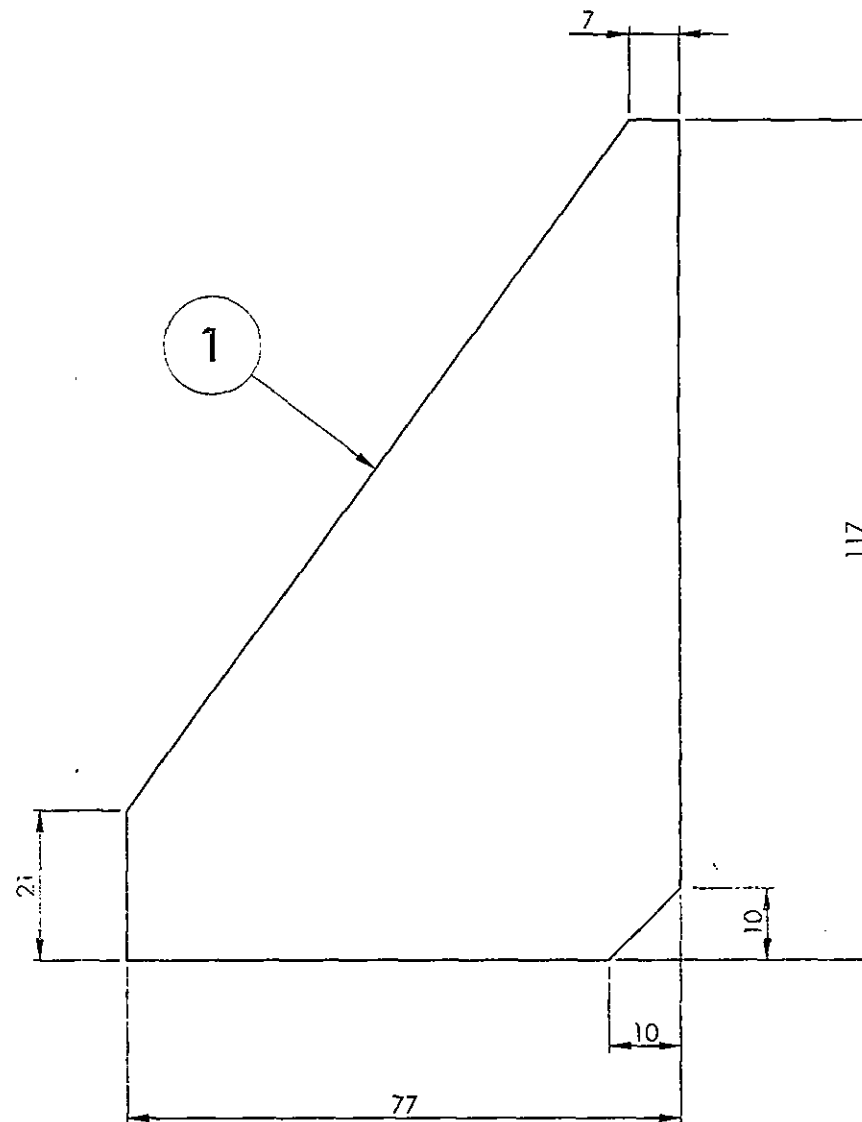
	21-03-2013	
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME

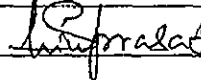
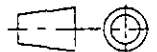
AAA16907

▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	② BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	③ CHAMFERED

REVISIONS

ALT.	ZONE	DESCRIPTION	APPROVED & DATE
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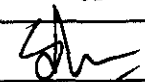
1	WEB	3 x 77 x 117	1		RDSO/SPEC C- K201 X2 Cr Ni 12	0.134	
QTY.	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF ASSEMBLY		SURFACE AREA IN Sq.m.:0.012			WT/ASSY IN Kgs:0.134		
WEB					SCALE	SSE/D	
					1:1	CHD	
					ALT.	ALTD	
						DRN	K.Srirom
INDIAN RAILWAY STANDARDS INTEGRAL COACH FACTORY, CHENNAI - 600038							
					SHEET 1 OF 1		AAA16907

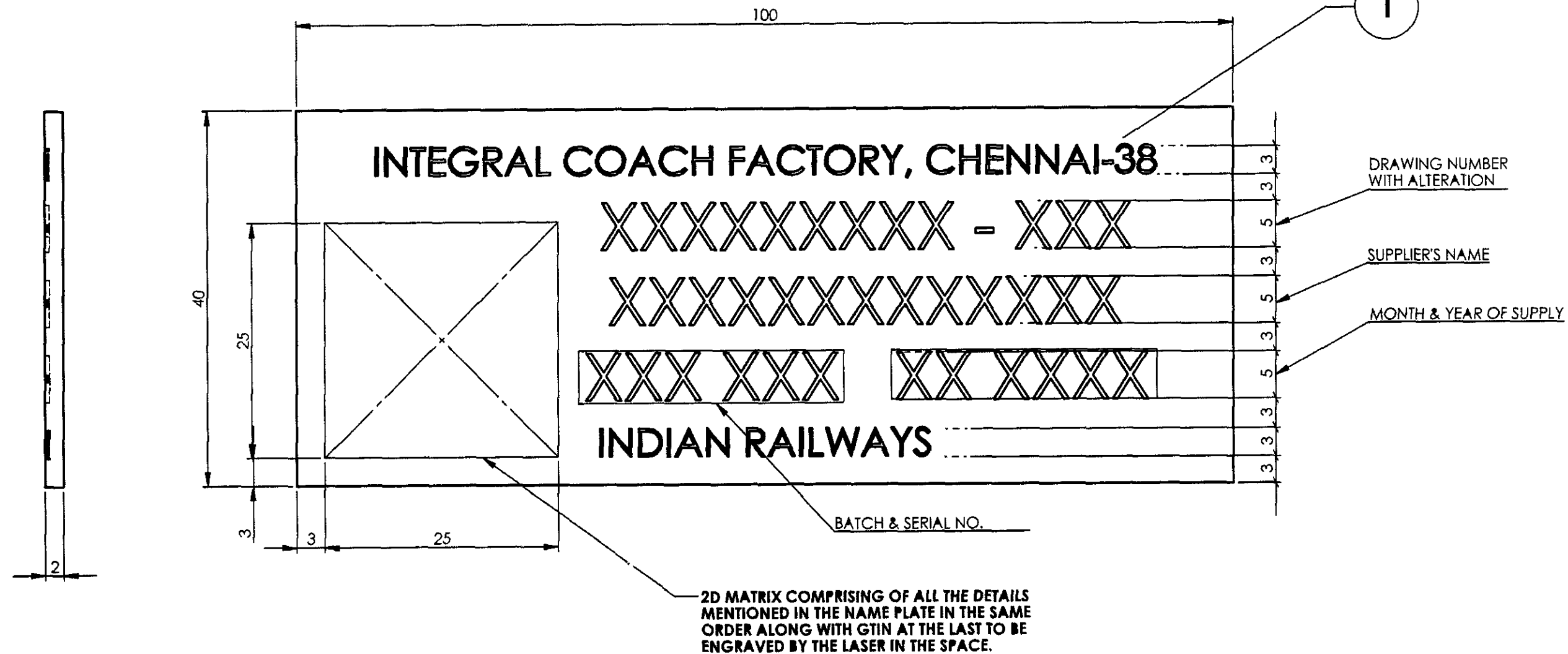
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED. FOR UNTOLERANCED DIMENSIONS AND ROUGHNESS VALUES, REFER DRAWING NO ICF/SID-9-0 001.
ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID. WELDING SYMBOLS ARE AS PER IS: 813 1986.

REF.DRG.NO.4.10113.0.20.095.116

AAA51072

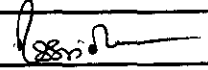
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①① BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①①① CHAMFERED


REVISIONS			
ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		NAME PLATE REVISED.	-sd-
b		DESIGN REVISED.	-sd-
c		BATCH & SERIAL NO. ADDED	-sd-
d		NOTE-2 ADDED.	



NOTE:

1. LETTERS TO BE PUNCHED OR ENGRAVED.
2. ALTERNATIVELY AISI-304/SS-304 (X02Cr19Ni10)/IS:6911(X04Cr19Ni9) ALSO ACCEPTABLE.

1	NAME PLATE FOR SUPPLIER IDENTIFICATION	2x40x100	1		RDSO/SPEC C-K201 X2 Cr Ni 12	0.063	\$
QTY	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 5-1 Body Side Doors				SURFACE AREA IN Sq.m.:0.009		WT/ASSY IN Kgs:	
NAME PLATE FOR SUPPLIER IDENTIFICATION					SCALE 2:1	SSE/D	
					ALT. d	CHD	
						ALTD	KUNTI THAKUR
						DRN	G. NAGESWARAN
INDIAN RAILWAY STANDARDS					SHEET 1 OF 1		
INTEGRAL COACH FACTORY, CHENNAI - 600038					AAA51072		
					A3		

06-07-2024	02.06.2010	
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME

REF.DRG.NO.

1		2		3		4		5		6		7		8	
AAB16026				▽ ROUGH MACHINED		① ROUGH CLEANED		REVISIONS							
				▽▽ FINISH MACHINED		①b BURRS REMOVED		ALT.		ZONE		DESCRIPTION		APPROVED & DATE	
				▽▽▽ FINE FINISH MACHINED		①8 CHAMFERED		a				Ø7 mm ELONGATED HOLE INTRODUCED TO REPLACE THE Ø7 mm HOLES. RM SIZE OF ITEM-1 REVISED. VIEWS UPDATED.		[Signature]	
A															
B															
C															
D															
E															
F															

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ISOMETRIC VIEW


1	BRACKET FOR CONDUIT FIXING	2 x 20 x 121	1		RDSO/SPEC C-K201 X2CrNi12	0.034	
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6		SURFACE AREA IN Sq.m.:0.005		WT/ASSY IN Kgs:			
BRACKET FOR CONDUIT FIXING				SCALE	SSE/D	[Signature]	
				2:1	CHD		
INDIAN RAILWAY STANDARDS				ALT.	ALTD	AMAL GEORGE	
				a	DRN	S.Bala V.Subramani.	
INDIAN RAILWAY STANDARDS				SHEET 1 OF 1		AAB16026	
INTEGRAL COACH FACTORY, CHENNAI - 600034						A3	
22-05-2023		30-08-2013		[Signature]			
DATE OF LATEST ALT.		DATE OF FIRST ISSUE		AME/SME			

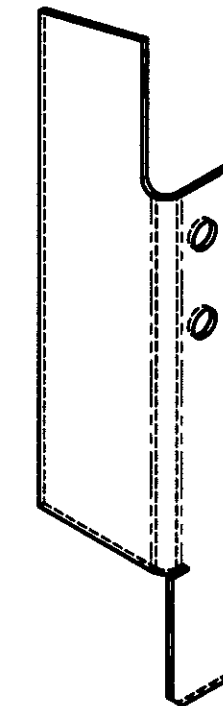
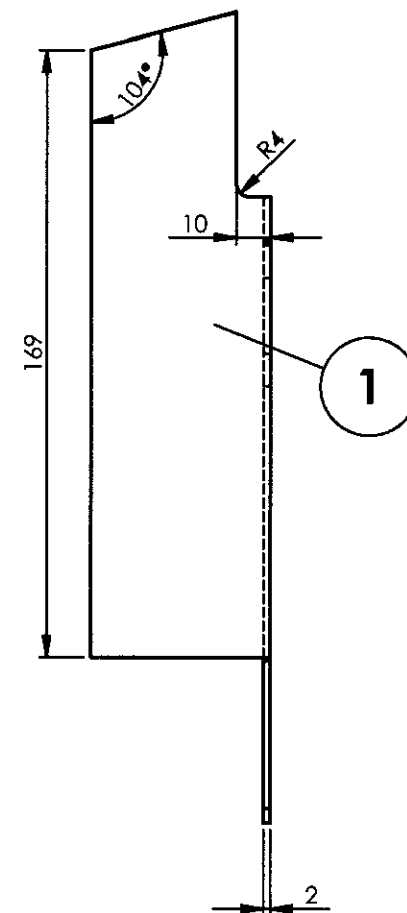
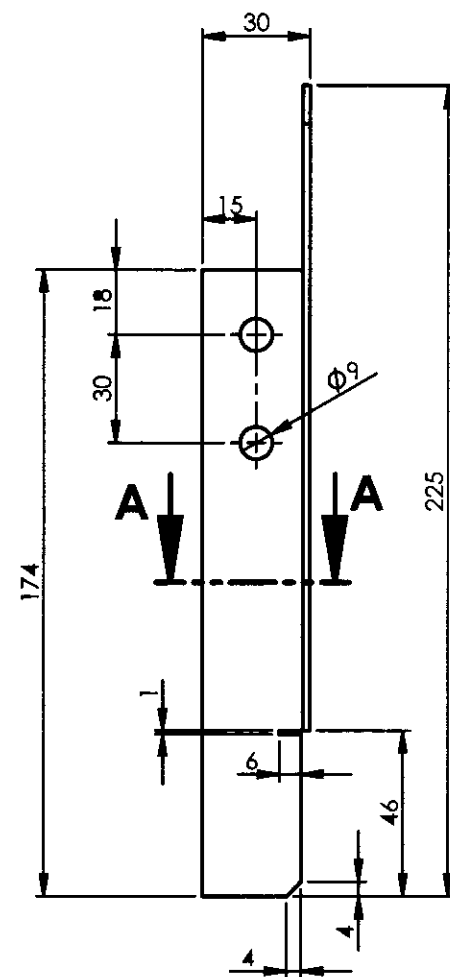
REF.DRG.NO.lg16127

AAB16323

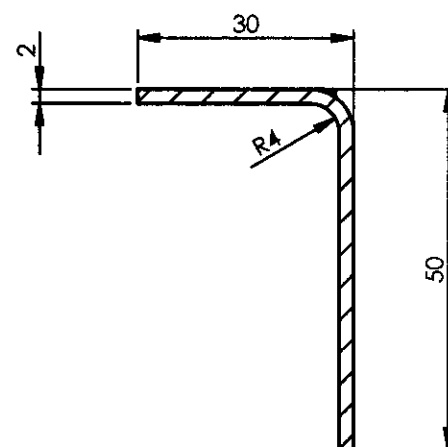
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①c CHAMFERED

REVISIONS

ALT.	ZONE	DESCRIPTION	APPROVED & DATE
•		LOCATION OF Ø9 HOLE ALTD FROM 11 TO 18	

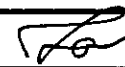


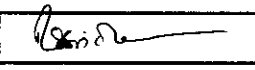
ISOMETRIC VIEW

SECTION A-A
SCALE 1 : 1

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REF.DRG.NO.LE16105

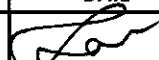
27-04-2022	19-09-2020	
DATE OF LATEST ALT	DATE OF FIRST ISSUE	AME/SME

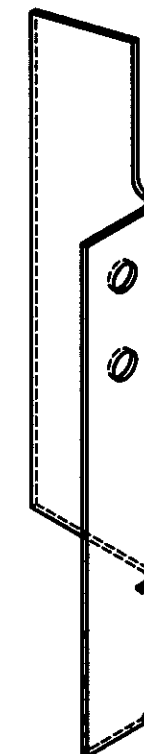
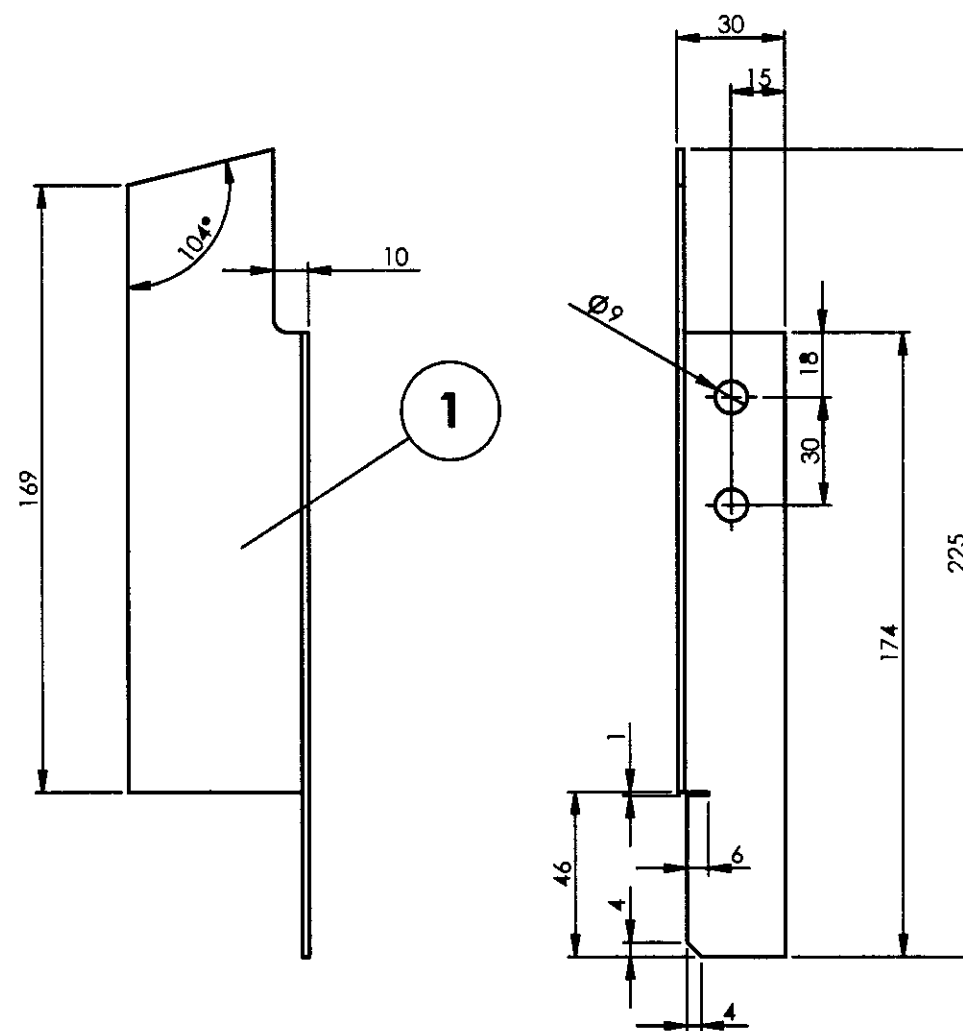
1	SUPPORTING ANGLE R.H.	2x75x225	1		RDSO/SPEC C-K201 X2CrNi12	0.203	
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 ROOF				SURFACE AREA IN Sq.m.:28504.33779 WT/ASSY IN Kgs:			
SUPPORTING ANGLE R.H.					SCALE	SSE/D	
					1:2	CHD	
					ALT.	ALTD	Bala V.Subramani.
INDIAN RAILWAY STANDARDS					•	DRN	S.Bala V.subramani.
					SHEET 1 OF 1		
INTEGRAL COACH FACTORY, CHENNAI - 600038					AAB16323		A3

AAB16324

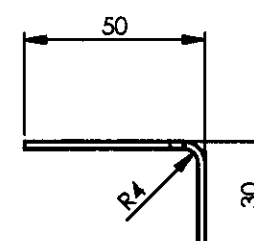
▽ ROUGH MACHINED	① ROUGH CLEANED
▽▽ FINISH MACHINED	①b BURRS REMOVED
▽▽▽ FINE FINISH MACHINED	①8 CHAMFERED

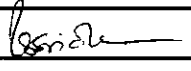
REVISIONS

ALT.	ZONE	DESCRIPTION	APPROVED & DATE
a		LOCATION OF Ø9 HOLE ALTD. FROM 11 TO 18	




ISOMETRIC VIEW



1	SUPPORTING ANGLE L.H.	2x75x225	1		RDSO/SPEC C-K201 X2CRNI12	0.203	
Default	DESCRIPTION	DIMENSIONS	ITEM NO.	REF. DRGS	MATL.SPEC.	WT/UNIT IN KGS	REMARKS
GROUP: 1-6 Roof Construction				SURFACE AREA IN Sq.m.: 28504.33779 WT/ASSY IN Kgs:			
SUPPORTING ANGLE R.H.					SCALE 1:2	SSE/D CHD	
					ALT. a	ALTD Bala V.Subramani.	
						DRN B.Suresh	
INDIAN RAILWAY STANDARDS					SHEET 1 OF 1		
INTEGRAL COACH FACTORY, CHENNAI - 600038					AAB16324		
					A3		

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REF.DRG.NO.LE16105 alt-b

27-04-2022	19-09-2020	
DATE OF LATEST ALT.	DATE OF FIRST ISSUE	AME/SME