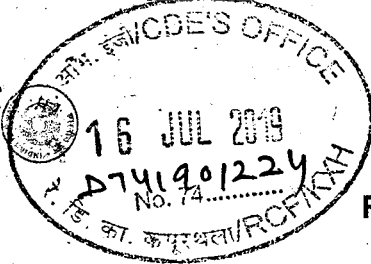


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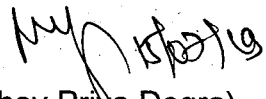
MD46111

Date: 15.07.2019

Sub: Issue of Specification no.MDTS-093, Rev-08 for Schedule of Infrastructural requirements and testing for Stainless Steel water tanks.

Please find enclosed the specification no. MDTS-093, Rev-08 for Schedule of Infrastructural requirements for manufacturing and testing for Stainless Steel water tanks.

All concerned are requested to take the necessary action.


(Abhey Priya Dogra)
Dy CME/D-2

Dy CPLE-II

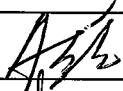
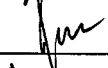
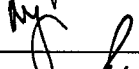
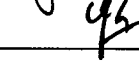
Copy to: -

- CQM, CPLE, CWE/Fur, CMM/RCF, CMT, CMM/TKJ
- ✓ SSE/Record (With Original Specification)
- SSE/Lib/Design
- SSE/Design/RCF/TKJ



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Name	Designation	Signature	Date	Level
Avtar Singh	SSE/Fur(D-2)		30.05.2019	Prepared
Ravi Ranjan Kumar	ADE/FUR		30.5.19	Agreed
Abhey Priya Dogra	Dy.CME-2		18.06.19	Reviewed
Manish Bhimte	CDE		21.6.19	Approved

Issue/Rev	Details of Changes	Date
Rev06	1. Filler metal (material no. as specified in DIN 8556) SG 1.4430 & SG 1.4316 added in Clause 4.2.1 for stainless steel TIG Welding.	07.10.11
Rev07	1. Clause 3.1 modified to withdraw the names of M/s Jindal steels Ltd and M/s Steel authority of India Ltd (SAIL) only as the source of raw material for manufacture of stainless steel water tanks.	29.10.11
Rev08	1. Clause 9 for warranty revised from Clause 3200 of Indian Railway Standard conditions of contract specifying warranty /guarantee to 84 months from the date of supply or 72 months from the date of commissioning of coach. 2. Filler metal specification IS: 5206-1983 equivalent to DIN 8556 is added in Clause 4.2.1.	30.05.19


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1 Scope: This schedule describes the requirement of infrastructure, testing, manufacturing process and technical requirements other than mentioned in the drawings for stainless steel water tanks.

2 Technical Requirements:

- 2.1 The under frame tanks shall be able to withstand flying ballast.
- 2.2 The tanks shall be provided with a discharge facility and shall be easily cleanable when necessary.
- 2.3 All the holes are to be jigs drilled only.
- 2.4 The mechanical strength of the water tanks and their suspensions shall meet the requirement as per para 2.1.4 of UIC-566.
- 2.5 The passenger coaches running on Indian Railways are designed for a service life of 30 years. The water tanks are to be developed and assembled accordingly.

3 General & Manufacturing Facilities

- 3.1 Separate covered area for manufacturing SS water tanks to avoid iron contaminations and also having adequate space underneath for storage of raw materials e.g. sheets, billets, round corner squares, rounds etc. The covered area should have display board showing different colour shades nominated to different grades of steel to avoid mix up of materials. Arrangement of painting the billets, RCS rounds etc with particular paint shade previously nominated according to the grade of steel should be available. Each lot of raw material should have test certificate issued by OEM.
- 3.2 Fabrication should be confined to an area where only one grade of material is being worked.
- 3.3 At least 1 No. Fork-lift or 1 No. Over-head crane of 2t (Min.) capacity shall be available for material handling.
- 3.4 Minimum 1 No. of band saw /power hacksaw machine should be available.
- 3.5 At least one shearing machine of suitable capacity and of standard make shall be available.
- 3.6 At least one roll forming machine of suitable capacity and of standard make shall be available.
- 3.7 Adequate machining facilities comprising of universal milling machine, drilling, lathe with pipe threading facility etc. of suitable capacities and standard makes should be available.
- 3.8 At least one CNC laser profile cutting machine in working order should be available with the tenderer.
- 3.9 The firm shall have at least one press brake of suitable capacity along-with punch and dies for component forming.
- 3.10 Only TIG welding with Argon shielding gas should be used for fabrication of tanks. For this minimum two TIG welding plants should be available with the tenderer.
- 3.11 Adequate Nos. of hand grinders for removal of fins & burrs shall be available.
- 3.12 Handling equipments such as slings, hooks and lift truck forks should be protected with clean wood, cloth or plastic buffers to reduce contact with the iron surface.
- 3.13 Proof of procurement of raw material from OEM and their test certificate shall be enclosed by inspection agency alongwith the inspection certificate of water tanks.
- 3.14 The raw materials e.g. electrodes, hardware, rubber gaskets should be procured from the authorized distributor of original manufacturer and firm should procure material with test certificate.
- 3.15 The firm shall comply with IS:822 regarding, storage of consumables, calibration of welding equipment, training of welder, testing of welding and remedies for welding defects.
- 3.16 The welder shall have a minimum of 2 years experience of the same type of welding.
- 3.17 The fabricator shall have adequate fabrication and process capability to obtain all the tolerances and geometrical tolerances and shall have arrangement of jig/fixture/clamping device for main assembly & sub-assembly work.
- 3.18 The firm must have the immersion tanks with FRP lining for acid cleaning, neutralisation and water rinsing.
- 3.19 RCF reserves the right to summarily reject the offers received without submitting clause wise comments on this schedule of requirements.
- 3.20 Electrode for Tig welding shall be procured only from RDSO approved sources as indicated in RDSO vendor directory.

4 Guidelines for selection of material and welding consumables

4.1 Stainless steel sheets:

4.1.1 Selection of Stainless steel sheets for manufacture of Stainless steel water tank must be according to the drawings. The state of material, condition, finish etc. should be as per following guidelines:

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Heat treatment condition	The material must be cold rolled skin Passed, solution annealed and de-scaled
Finish	2B
Material grade and Designation	As per drawing provided with tender
Protection procedure	The SS sheets must be protected with LDPE film of 90±10 µms thickness

4.1.2 The steel sheets shall be cleanly rolled to the dimensions, weights and tolerances specified. These shall be free from cracks, surface flaws, laminations, rough, jagged and imperfect edges, unevenness and other harmful defects detrimental to the end use.

4.1.3 Supplier must ensure above information on the WTC obtained from SS sheet supplier prior to purchase of the material for water tank manufacturing. The inspection agency should also ensure above details on material WTC.

4.2 Welding consumables:

4.2.1 All the joints shall be TIG welded by a filler rod confirming to table given below:

Parent metal A	Parent metal B	Filler metal (material no. as specified in DIN8556 or IS:5206-1983)
X04Cr17Ni12Mo2Ti to IS: 6911-92, Equivalent to AISI: 316Ti, AISI 316, and AISI 316L.	X04Cr17Ni12Mo2Ti to IS: 6911-92, Equivalent to AISI: 316Ti, AISI 304 and AISI 316L.	SG 1.4430 or IS:5206- 1983 E23.12L
X04Cr19Ni19 to IS: 6911-92 Equivalent to AISI 304	X04Cr19Ni19 to IS: 6911-92 Equivalent to AISI 304	SG 1.4316 or IS:5206- 1983 E19.9L

4.2.2 Acceptance standards for welds shall be as per EN25817-1992 TIG welding intermediate(C).

4.2.3 Argon gas: Gr.1 of IS: 5760-1983.

4.2.4 Grinding wheels shall be free from iron, iron oxide, zinc or other undesirable materials that may cause contamination on the surface.

4.3 Recommended practice of welding, cleaning and passivation processes:

4.3.1 Welding process:

4.3.1.1 Welding process to be used is DC TIG welding in pulsing mode with digital TIG welding machine only.

4.3.2 Cleaning and Passivation:

4.3.2.1 Surface contaminants such as free iron, oxide scale, rust, grease, oil, carbonaceous or other residual chemical films, soil, particles, metal chips, dirt or other nonvolatile deposits might adversely affect the metallurgical or sanitary condition or stability of a surface. These may impair the normal corrosion resistance or result in later contamination of the stainless steel or cause product contamination at a later stage and should be cleaned and de-scaled. Treatment shall be given as under (Refer-Annexure-B):

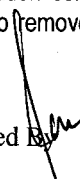
4.3.2.2 Remove all solid floating particles steel chipping, filing, dust, welding slag before start of the acid cleaning process.

4.3.2.3 Acid Cleaning: Nitric-Hydrofluoric acid solution is to be used to remove both metallic contamination and welding and heat treating scales.

4.3.2.4 Surface to be de-scaled are to be pre-cleaned prior to chemical treatment. The component/assembly should be totally immersed in the pickling solution. The surface should be in contact with the immersion solution until inspection shows that complete scale removal has been accomplished

4.3.2.5 Rinse the assembly thoroughly with water. Over pickling must be avoided. A neutralizing treatment, after completion of acid cleaning and passivation, by using aqueous caustic solution containing NaOH 10% by weight for a period of 5-60 minutes should be used as a final dip to remove smut.


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After that thorough water rinsing and drying operation is to be carried out. The pH of the rising water shall be from 6-8

NOTE: The process of acid cleaning, water rinsing, neutralization treatment, final fresh water rinsing must be done in sequence without giving any waiting time between the processes to avoid staining on the surface.

4.3.2.1.6 Free iron examination test (Ferroxyl test) should be carried out immediately after acid pickling and neutralization treatment to confirm that there is no free iron available on the surface. In case of positive test for free iron the whole process of acid pickling neutralization and water rinse should be repeated.

4.3.3 Solutions in water are as follows:

4.3.3.1 For acid cleaning :

Conc. HF4	6% by volume
Conc. HNO3	15-20% by volume.
Immersion Time	10-15 Minutes (max.)
Temperature	30-40 °C (When temp. is low exposure time may be increased)

4.3.3.2 For neutralizing treatment:

NaOH	10% by weight
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4.3.3.3 For ferroxyl test solution;

Distilled water	01 liter
Nitric acid (Conc.)	20 ml
Potassium Ferricyanide	30g

Note: Tanks for acid cleaning, neutralizing treatment and water rinsing should be made of stainless steel plates with FRP lining.

5. Testing Facilities:

5.1 Chemical Lab: The firm should have permanent arrangement with NABL certified Lab or a reputed steel making company for arranging the spectrum analysis of the material.


5.2 Physical Testing Lab: The firm must possess a well-equipped physical lab with following facilities:

- 5.2.1** Universal Testing machine of 40t capacity with load/ deflection plotting arrangement to conduct UTS, Yield strength. The firm shall have arrangement for conducting non-destructive test for welding as per requirement of the purchaser in house
- 5.2.2** The firm shall have arrangement for conducting non-destructive tests for welding as per requirement of the purchaser in house.

5.3 Other Testing Facilities: The firm shall possess the following:

- 5.3.1** The firm shall have suitable arrangement at a pressure of 5 Kg/cm² in house for testing the leakage's etc.
- 5.3.2** The firm shall have adequate facilities for preparation of test sample. Facilities like machining, grinding, polishing etc. should be available in house.
- 5.3.3** Adequate number of fine punches for stamping marking particulars on finished components.
- 5.3.4** Adequate numbers of measuring instruments such as:
 - 5.1.1.1** Digital Vernier Calipers - 0 mm to 300 mm.
 - 5.1.1.2** Measuring scales – 3 meter

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- 5.1.1.3 Inside & outside Micrometers - Ranging from 0 to 150 mm
- 5.1.1.4 GO & NO-GO gauges.
- 5.1.1.5 Profile gauges

6 Testing of prototype & regular production assemblies:

6.1 Type Test: The supplier shall supply one prototype of each water tanks along with accessories for approval before commencing bulk supply. This prototype shall be examined from all view points and supplier shall incorporate changes suggested by RCF in the prototype as well as bulk supply. This clause is applicable for the first supply of a supplier. However, RCF shall have the right to repeat prototype approval process in subsequent order also. In this regard RCF decision shall be final.

6.1.1 Testing of the water tanks prototypes shall be done in the same condition as fixed in the coaches. The following test shall be applied to prototype samples:

- 6.1.1.1 Dimensional checking .
- 6.1.1.2 Water tightness (As per annexure-A).
- 6.1.1.3 Air tightness with a air pressure of 50000 Pa.
- 6.1.1.4 The fulfillment of the strength requirements according to para 2.1.4 of UIC566 by calculations and tests respectively.
- 6.1.1.5 The complete weight of the entire tank types and suspensions.
- 6.1.1.6 Test report of stainless steel sheets/coils from the manufacturer of stainless steel along with the bill.

6.2 Acceptance Test: This test shall be done on all the supplies after approval of prototype sample of water tanks:

- 6.2.1 Dimensional checking.
- 6.2.2 Water tightness (As per annexure-A).
- 6.2.3 Air tightness with a air pressure of 50000 Pa.
- 6.2.4 The complete weight of the entire tank types and suspensions.

7 Quality Control Requirements:

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

7.1.1 Ensure that there is a QAP for the product detailing various aspects:

- 7.1.1.1 QA Organizational Chart.
- 7.1.1.2 Flow Process Chart.
- 7.1.1.3 Stage inspection details.
- 7.1.1.4 Various parameters and to ensure control over them.

There should be at least one full time technologist having a minimum bachelor's degree in relevant field & 5 years experience or a person with diploma in relevant field with 12 years experience.

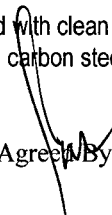
- 7.1.1.5 The firm should have acquired ISO: 9001 certification and the product for which an approval is sought should be broadly covered in the scope of the certification for manufacture and supply.
- 7.1.1.6 The Quality manual of the firm for ISO: 9001 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.
- 7.1.1.7 The firm shall ensure that proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.
- 7.1.1.8 The firm shall ensure that all the relevant specifications, IS standards are available with them.

8 Handling, Storage and Transportation

8.1. Walking on the stainless steel surface should be avoided, where unavoidable, personal should wear clean shoe covers each time. Kraft paper, blotting paper, paper board or flannel or other protective material should be laid over areas where personals are required to walk. Supplier needs to make all these arrangements.

8.2. Shearing tables, press brakes, layout stand and other carbon steel work surfaces should be covered with clean kraft paper, blotting paper, paper board or flannel or other protective material to reduce the contact with carbon steel.

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- 8.3 Hand tools, brushes, molding tools and other tools and supplies required for fabrication should be segregated from similar items used in the fabrication of carbon steel equipment and should be restricted to use on one material. Tools and supplies used with other materials should not be brought into the SS fabrication area.
- 8.4 Grinding wheels and sanding material should not contain iron, iron oxide, zinc or other undesirable materials that may cause contamination on the surface. Grinding wheels and sanding material and wire brushes previously used on other metals should not be used on stainless steel. Wire brushes should be of stainless steel which is equal in corrosion resistance to the material being worked on.
- 8.5 Measures to protect the cleaned surfaces should be taken as soon as final cleaning is completed and should be maintained during all subsequent fabrication, inspection, storage and installation. The basic guidelines are as follows :
- 8.6 Do not remove wrappings and seals from incoming materials that is water tanks until they are at use site, ready to be used or installed.
- 8.7 Do not store the finished cleaned materials and components stored directly on the ground or floor and do not permit these to come in contact with galvanized or carbon steels, Zinc, lead Brass etc.
- 8.8 Do not use carbon or galvanized steel wire for bundling and galvanized steel identification tags.

9 Warranty :

The supplier shall give warranty for the complete water tank including individual parts against failing or proving unsatisfactory in service due to defective design, material or workmanship within 84 months from the date of supply or 72 months from the date of commissioning of coach, whichever is earlier and shall replace the same at his own cost and risk. Name of manufacturer with month & year of manufacture along with manufacturing details on metallic plate should be displayed at some suitable location not visible to passengers, ordinarily.


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ANNEXURE-A

**INSTRUCTION SHEET FOR TESTS ABOUT
KEEPING PRESSURE AND WATER PROOFNESS OF THE TANKS**

WORKING PROCESS:

Close all openings of the tank assembly.

Pressurize the water tank using compressed air at 0.2 bar for 10 minutes at least.

Test stand should have a water column for reading pressure level of a compressed air supply line & a pressure gauge attached directly to tank for reading tank pressure level.

CONTROL:

Tank pressure is controlled using readings on a liquid column. The control should be so designed that a leak as small as it may be would manifest itself in a fall of the liquid level in the column.

RESULT EVALUATION:

If no fall of the liquid level is observed, the product is considered to be acceptable.

If a fall of the liquid level is observed, tank is to be rejected due to leakages.

PRINCIPLE

The surface to be controlled is covered with a wetting liquid with the following criteria:

low viscosity

big wetting ability

big frothing quality under the action of the air under pressure which is crossing the leak area.

The presence of a leak manifests itself in bubbling in the liquid.

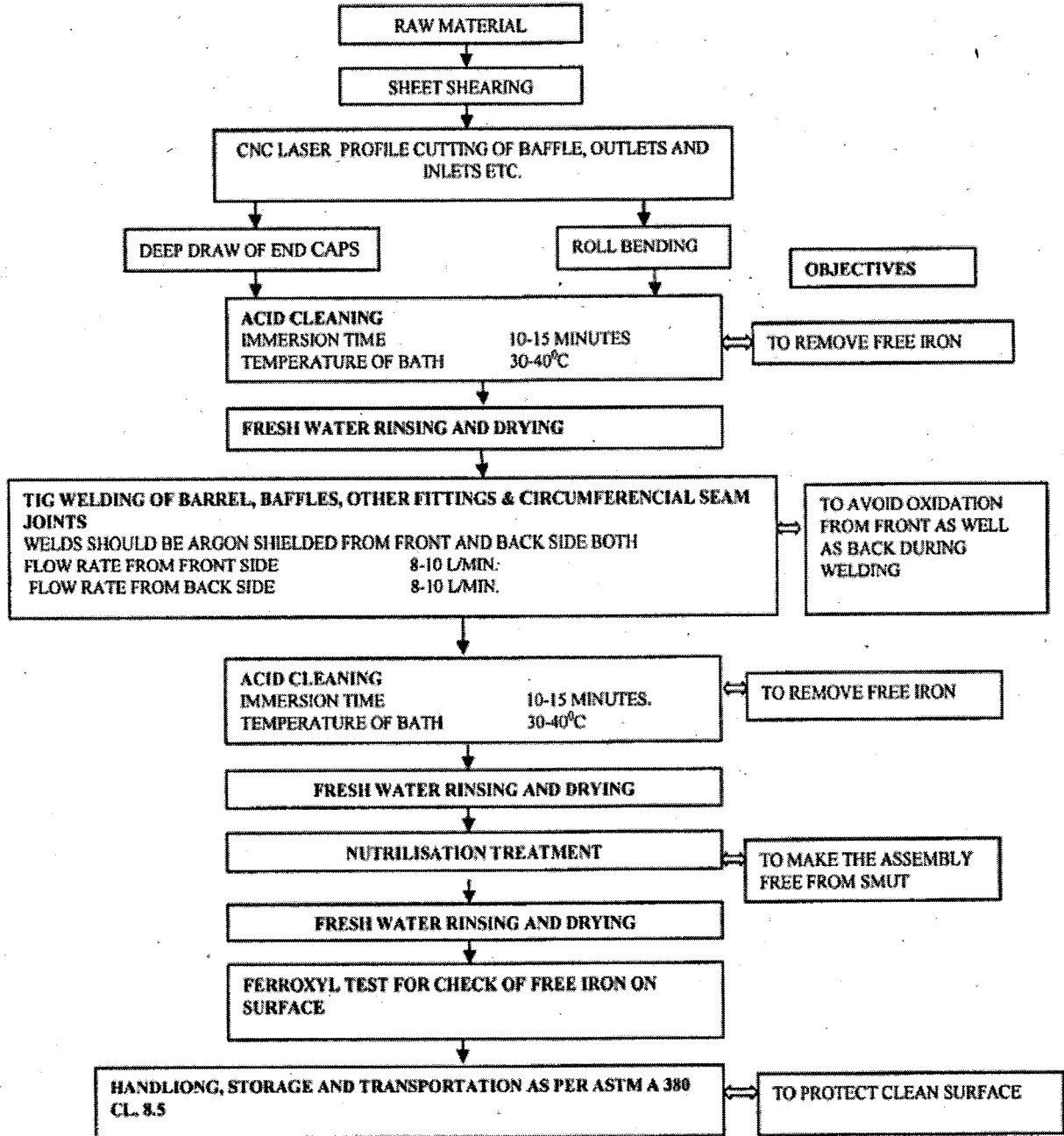
Control Report: For each prototype/supplied controlled tank, the inspection phases of water proofness, corresponding to this instruction sheet will be noted on the specified proforma .

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FLOW CHART

ANNEXURE-B



DETAILS OF DIFFERENT SOLUTIONS USED

ACID SOLUTION
 CONC. HF 4-6% by Vol.
 CONC. HNO₃ 15-20% by Vol

NUTRILISATION SOLUTION
 NaOH 10% by wt.

FERROXYL TEST SOLUTION
 DISTILLED WATER 01 L
 HNO₃ 20 ml
 Potassium Ferricyanide 30 gm

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