

Annexure-A

SCOPE OF WORK

MANUFACTURE AND SUPPLY OF TC-UNDER FRAME WITH SHOT BLASTING AND PU PRIMER PAINTING FOR MEMU-3P PROJECT

I. Brief Scope of Work & Quantity:

SI No.	PART NO	DESCRIPTION	Qty/ Car	Total Quantity Reqd for 36 Cars	Scope of Work
1	ET11138SBPT	UNDER FRAME WITH SHOT BLASTING AND PU PRIMER PAINTING.	1	36	Supply of Fabricated TC Under Frame with Shot Blasting and PU Primer Paint

LIST OF SUBASSEMBLIES TO BE SUPPLIED BY VENDOR ALONG WITH UNDER FRAME IN LOOSE CONDITION:

SL NO.	Material	Description	UOM	QTY/ Car	Total Qty for 36Car
1	42241105P2	RING&TUBE ASSY	NO	4	144
2	4224110701	COVER ASSY.	NO	4	144
3	84956009	MTG FRAME FOR EWP/EWTP	NO	2	72

Note:

- Rake Formation: 1 Rake- 2DMC+2TC1+2TC2+2TC3
- Vendor should be approved source of RDSO/ICF /RCF
- Manufacture & Supply of Aggregates should conform to Latest drawings and to the material specification/Standards/Test, indicated in the respective drawings is to be adhered/ensured.
- Firm to supply aggregates for one TC Car to ascertain the fitment/installation aspects before bulk supply.

II : DETAILED SCOPE OF WORK FOR :

i. Details of TC Under Frame Assy

1. Under Frame Assembly Consists of following Major Sub Assemblies:
 - Head stock Assembly (PA & NPA END)
 - Body Bolster Assemblies
 - Side Bearer Assemblies
 - Longitudinal Assemblies

ii. Manufacturing of Detailed Components:

1. All Components to be only manufactured by CNC Flame Cutting/Plasma Cutting/Laser Cutting/Shearing for Plates & Sheets, Saw Cutting for Tubes/Pipes/Bars/Rods. Vendor shall submit a nesting plan to BEML for Approval before taking up for manufacturing.
2. Dress, Grind and Deburr cut edges of all detailed components and all edge preparation to be carried out by Beveling.
3. Straightening of Components to be carried out wherever required before taking up for forming/Machining/Assembly.

4. All Plasma cut/Flame cut/Laser cut components to be shot blasted before taking up for forming/Machining/Assembly. All Parts/Members shall be first degreased and derusted and Paint with Weld Primer.
5. Forming of Parts to be done by reducing Tool marks.
6. Machining of Components to be carried out as per drawing requirement. All machined surfaces to be protected from rusting by applying rust preventive oils and physical damages if any.
7. Mass production of detailed components can be taken up only after getting acceptance from BEML for first sample/ Proto Assy Clearance.

iii. Fabrication of Subassemblies/Assemblies:

1. All subassemblies/Assemblies to be fabricated out of weld jigs in order to achieve uniformity in dimensions, quality of above production. This Jigs to be shown to BEML/SIT during manufacturing Proto and subsequent production.
2. Welding of Fabrication Structures to be carried out as specified in drawings.
3. Welding shall be carried out uniformly along the length to avoid distortion. During Fabrication, Weld defects, Weld spatters, heat marks etc due to welding shall be removed before taking up for next assembly. Welder should be qualified for the requirements of IS: 7310 and IS: 817 or any equivalent international standards.
4. Pickling and Passivation to be carried out for removing weld marks on Stainless Steel surfaces.
5. Fabricate all major Sub Assemblies viz, Head Stock (PA & NPA End), Body Bolster (Refer point iv for details of stress relieving, Straightening and Machining), Side Bearer Assembly, Longitudinal Assemblies etc., as per Drawings.
6. Inner Surface of the Head Stock and Body Bolster Assemblies to be painted with 1 Coat of Epoxy Based Zinc Phosphate PU Primer as per RDSO Spec. M&C/PCN/100/2018 or latest
7. Dimensional check in accordance with the check sheet shall be carried for all major Sub-assemblies before taking up for Assembly on Under Frame Main Jig and report to be submitted to BEML.
8. Loading of Sub Assemblies Viz, Longitudinal Assemblies, Body Bolster Assemblies, Head Stock Assy (PAE), Head Stock Assy (NPAE), All Cross Members etc. required for Under Frame on Main Jig Assy.
9. The Under Frame Arrangement shall be checked for its Dimensions after Loading on Jig & before taking up for full welding and after full welding in accordance with check sheets and reports to be submitted to BEML
10. After completion of Full & Reverse Welding of Under Frame, All mechanical, Electrical Brackets and Side Bearer Tube to be installed as specified in Drawing
11. Trough Floor Installation and Floor Brackets by Welding to Under frame as per drawing.
12. All holes specified in Under Frame arrangement to be Drilled using Drill Jigs.
13. The Center Line of Under Frame, Body Bolster and Head Stock should properly Punched in such a way that it should be visible after Painting also.

14. Vendor Code and Serial numbers for all Under Frames & Body Bolster to be punched on the assemblies, locations as per drawings.
15. Shot Blasting & PU Primer Painting of Under Frame to be carried out as mentioned in Point. v
16. All other dimensions / standards / specifications to be maintained / followed for all Subassemblies / Assemblies as per respective Drawings with latest alterations. Before starting the production, vendor should ensure to manufacture as per the latest drawing as and when it is updated.

iv. Stress Relieving, Check & Straightening and Machining for Body Bolster Sub Assy :

1. The Stress Relieving of the Body Bolster shall be carried out in an Oil Fired/Electric Furnace equipped with Thermocouples & Recorders. Proper Fixtures to be used to avoid any distortion of the Body Bolster during Heat treatment. If any resetting is required to be done after Heat treatment in order to achieve required dimension the Body Bolster shall be again suitable heat Corrected (Refer Detail Scope for Stress Relieving as per AWSD-11).
2. Check & Straightening of Body Bolster has to be carried out after Stress Relieving Operation.
3. Machining of Body Bolster Assy to be carried out as specified in Body Bolster Drawing No. ET11139.

v. Shot Blasting & PU Primer Painting of Under Frame:

1. Holes, Machined, Earthing & Stainless Steel Surfaces to be masked and ensure to avoid entry of Shots & Paint.
2. Shot/Grit blasting of Under frame to grade SA 2.5 of ISO 8501-1-1988.
3. Cleaning of the Surface of the Under Frame with Pressurized Air/Emery paper to remove dust & Debris.
4. After grit blasting, the under frame to be offered for inspection and after successful quality clearance, primer painting to be done.
5. PU primer painting to be carried out within 4 hrs of grit blasting.
6. Check the Condition of Masked Areas & Painting Equipment before starting of painting.
7. Paint the Frame with One Coat of PU Primer Finishing to RDSO SPECN. M&C/PCN/100/2018 or Latest to get minimum DFT of 60 Microns.

III. INSPECTION & CLEARANCE :

a. Proto Inspection :

1. Offer the Sub Assemblies Viz, Body Bolster, Head Stock, Side Bearer Tube Assy etc, in Tack Welded Condition to BEML inspection.
2. Dimensional Check Sheet for Machining of Body Bolster to be maintained/offered for BEML Inspection.
3. Offer Under Frame for BEML Inspection in Jig Loading and in Tack Welded Condition.
4. Offer the completed Proto Under Frame to RITES. Associate with RITES for final inspection & clearance. Firm shall carryout any modifications suggested by BEML /RITES without any additional cost.

b. General Inspection Conditions:

1. Offer All Under Frames to RITES. Associate with RITES for final inspection/clearance and Firm shall carryout any modifications suggested by BEML /RITES
2. DPT shall be carried out for all Weld Joints of Sole Bar Assembly, Side Bearer Tube with Bottom Flange of Body Bolster, as specified in Drawing No. ET11100 & ET11130. DPT Testing should be carried out by ANST or INST Level 2 Certified Personal only through Third party NDT agency. Test report to be submitted to BEML /RITES Inspection.
3. Chemical and Mechanical testing of samples should be carried out as and when insisted by BEML/RITES inspection team at their discretion.
4. BEML/RITES at their sole discretion may inspect any item at any stage of Manufacturing of Under Frame.
5. The Vendor shall maintain & provide a copy of all test reports (DPT, Stress relieving and Check sheets) to BEML/RITES. All the witnessed Check sheets, inspection reports like dye penetrate testing, chemical & Mechanical testing, Dimensional report etc. should be submitted to BEML in digital form via email or CD/DVD.

IV. Delivery Schedule:

1. Proto TC Under Frames shall be delivered to BEML at RC-II Unit/ Bangalore Complex, after Inspection Clearance & after implementing any modifications if any suggested by BEML/RITES.
2. After Successful Installation of Proto Under Frame at BEML, Bulk Production to be taken up after obtaining Clearance from BEML Inspection Team.
 - TC Under Frame - 12 Cars/Month (After Proto Clearance).
3. All aggregates to be supplied as a set in Car wise using proper holding Jigs to RC-II Unit, KGF/Bangalore Complex based on confirmation by M/s.BEML.

V. Material Scope:

1. BEML Scope :

- a) Raw materials in the form of Plates/Sheets.
- b) Rounds and Tubes in full Lengths.
- c) Bought Out Items as mentioned SI No.VII
- d) Applicable Drawings.
- e) Painting Specification.
- f) Inspection Check Sheet/Inspection Test Plan for Under Frame, Body Bolster, Head Stock etc.,

2. Vendor Scope.

- a. All required welding consumables, Shot Blasting Consumables, Paints & Painting Consumables, Rust Preventive oils, Lubricants as specified in Drawing/RDSO Specifications.
- b. Epoxy Zinc Phosphate Primer Paint to be procured from ICF/RCF/RDSO Approved sources only, to be inspected by RITES at Source and test certificates to be submitted to M/s.BEML
- c. Material Specification of Welding consumables, Shot Blasting Consumables, Rust Preventive Oils & **paints** and its expiry details shall be furnished to BEML for approval before manufacturing of the first proto Under Frame.

VI. General Notes to Comply:

1. Quality Assurance Plan (QAP) should be submitted by firm for approval.
2. Process Qualification Record (PQR)/Welding Procedure Specification (WPS) should be available.
3. Vendor should be ISO: 9001 – 2015 Compliant.
4. Before taking up manufacturing activity, Self-Inspect the M/s BEML supplied component (Bought Out Items) for transit damages, In case of any defects same has to be communicated with detailed report and send back the same to BEML in as is condition.
5. Vendor shall submit nesting plan to BEML for Approval before taking up for manufacturing. Off cuts and Scrap generated during manufacturing of components to be returned to BEML as per approved nesting plan.
6. Ensure components supplied by M/s. BEML and Fabricates Subassemblies and Assemblies are stored properly and damages due to poor & improper storage, workmanship etc. should be the responsibility of Vendor.
7. Vendor shall ensure the proper fitment of aggregates while shell integration/furnishing at initial batches of supply & further in case of any fitment issues at RC-II unit KGF and Bangalore Complex. Vendor has to engage their representative for necessary correction and implementation of those corrections in further supplies.
8. Any minor scope Changes/Modifications in drawing or during inspection if any to be taken up by the vendor without any additional cost.
9. All under frames to be properly protected to avoid damages during loading, unloading and transportation.

VII. LIST OF BOUGHT OUT ITEMS UNDER BEML SCOPE:

SI.NO	PART NO	DESCRIPTION	UOM	QTY/CAR
1	84951102	BEARING BRACKET WITH SUPPORT	NO	2
2	ET12116	TUBE	NO	4
3	ET11103	LONGITUDINAL BEAM	NO	2
4	ET11104	LONGITUDINAL BEAM	NO	8
5	ET11105	LONGITUDINAL BEAM	NO	2
6	LB13132	TROUGH FLOOR PART	NO	7
7	ICFSK71512C5	EARTHING LUG	NO	9
8	ICFSK71512C7	EARTHING LUG	NO	1
9	ICFSK71512C8	EARTHING LUG	NO	4
10	ICFSTD110084	BEARING PIECE	NO	4
11	411831390000	BOSS	NO	4
12	4224110707	BUSH	NO	4