Fabrication, Testing and Delivery of Low Level Dolly Assembly for Small Satellite

Assembly Quantity: **02 No.**

Enclosure: The Low-level Dolly Assembly consist of Total: 11 Drawings:

Vendors are requested to go through supplied set of drawings and this fabrication document carefully in detail before submitting their offer.

1. INTRODUCTION:

The **low**-level Dolly is required to position the S/c in vertical orientation during Spacecraft assembly and testing operations. It consists of main structure, s/c mounting top adaptor, tow handle, non-marking wheels and jack assembly. The total system is mainly made of MS welded structure. Its jack system provides stable platform to S/c for various alignment and testing activities and wheels provides mobility from one place to others. The tow handle is used for easy movement between places. In order to ensure the quality aspect of the system, all the materials used should confirm their respective specification.

2. SCOPE OF WORK:

Fabrication, Assembly, Testing, Finishing and Supply of **Low level dolly** as per Assembly Drawing number **"ISAC-DTDF-SDEX-12-01021/000".**

The quantity required is as per the table given, the same has to be fabricated as per the guidelines given in the document. The delivery of item to URSC, Bangalore to be carried out.

Description	Quantity
LOW-LEVEL PLATFORM	**2 Nos.**

One set of drawings of "**LOW-LEVEL Dolly Assembly**" is enclosed herewith for fabrication.

3.0 FABRICATION:

3.1 No Raw material will be supplied from URSC.

3.2 The fabrication of the above assembly is to be done as per the fabrication drawings.

3.3 The fabrication of the Low Level Platform is as per the drawings enclosed.

3.4 Inspection of raw material by NDT methods like X-Ray or Ultrasonic test/certificate of conformance by the vendor is required prior to start of fabrication process.

3.5 The dimensions in the drawings are final finish size. Necessary welding fixture and standard fabrication techniques are to be adopted with suitable machining allowance to meet the final size (after machining) as per the drawings.

3.6 Wherever weld symbols are not clear in the drawings, vendor need to take the weld size as per the standard (or minimum thickness of the plate) with continuous weld joints. Proper edge preparation is to be done according to weldment sizes (as per ISO Weld Standard).

3.7 All the welded joints are to be free from defects such as cracks, discontinuity, porosity etc., Adopt established standards to ensure proper welding by taking necessary precautions. Adopt necessary NDT methods at all levels of fabrication. Dye Penetrant Test (DPT) to be done to inspect the weld quality by the vendor before proceeding to further operations and X-ray/Ultrasonic test, whenever suspected for weld, cracks, flow of any kind during inspection and testing.

3.8 Adopt necessary fixtures for the structure, large machined parts in order to protect them from deformation, distortion or damage of any kind which may occur during fabrication process, machining, handling, etc.

3.9 All welded structures are to be stress relieved before machining using non-heating process such as resonate frequency method, shot peening method.

3.10 Utmost care should be taken to protect the machined surfaces. All the parts are to be protected from scratches, tool marks, dents etc.

4.0 Machining

4.1 Location tolerances and surface finish to be maintained as per fabrication drawings. Care should be taken to protect the machined surfaces free from scratches, indent etc.

4.2 All machined surfaces are to be protected with thin film of wax/oil/grease.

4.3 Geometrical and dimensional tolerances to be controlled during machining based on electroplating thickness to get the sizes specified in the drawing after machining and electroplating.

5.0 SYSTEM ASSEMBLY:

Following points are to be observed during assembly.

5.1 Care should be taken while assembly to ensure geometric tolerances as given in drawing for proper functioning of the system.

5.2 All fasteners are to be high tensile steel with minimum Ultimate tensile strength of 100 kg/mm2. ‘UNBRAKO/TVS’ make. (Grade – 10.9)

5.3 Proper assembly sequence should be adopted to meet the functional requirement of the Low Level Platform assembly.

5.4 All fasteners in the different assembly should be tightened properly with a calibrated torque wrench to a definite torque value as recommended by the different manufacturer and as per ISO Torque certification after consulting with ISRO engineer.

Assembly Checks at URSC, Bangalore:

5.5 Mounting interface check for Low Level Platform with S/c Al. MGSE Interface rings to be done at URSC (ISRO) in presence of ISRO engineer. Any correction/ associated work such as Transportation, handling, lifting, positioning at URSC must be carried by vendor.

6.0 TESTING AND INSPECTION:

6.1 The fabricated parts should be inspected as per drawings for geometric and dimensional deviations and confirming within specified tolerance limits.

6.2 Vendor should submit inspection report giving the measured dimensions and geometrical dimensions for the parts as well as the assembly and it is to be audited and cleared by URSC engineers **before proceeding for load test.**

6.3 All the standard parts given in Annexure-II are to be inspected and test certificate by supplier is to be submitted for the audit to URSC engineers before assembling parts to the Test Mass.

6.4 All threaded holes/inserts to be inspected with Go, No-Go thread gauges and complied.

Following check should be done by the vendor:

6.5 Compliance verification with respective to drawings, specification given in this document.

6.6 Dimensional and Technical data inspection with respect to drawing and specifications

6.7 Test certificate, warranty certificate etc., should be submitted to URSC at the time of delivery for standard parts.

Mandatory Inspection for Load Test:

6.8 Inspection of all the critical dimensions should be done at each step by the vendor.

6.9 All the welded joints are to be Dry Penetrant Test (DPT) and cleared before start of the load tests and again after the load tests.

Apart from the dimensional inspection and conventional checks the following qualifications tests are to be executed by the party in the given sequence.

Qualification Test on Modular Test Mass assembly:

a) Static load test
b) Mobility test

The above tests are to be carried out in presence of URSC Engineers. In each of these tests, careful observation is made such that there should not be any flaws in fabrication and all the parts are free from any kind of defects. *Following paragraphs give a brief description of test procedure, equipment/facilities required:*

a) Static load test:

The static load test of Low Level Platform will be done with simulation mass of 1050 kg at C.G 1.0m with Jack on Flat surface. The masses will be assembled on top adaptor in increments of 350kg, 700kg and 1050kg steps. The static deflection at various locations w.r.t increment load is to be recorded. This arrangement is to be held undisturbed for 2 hours. The simulation mass is then unloaded in the same sequence as loading and corresponding deflections have to be noted.

b) Mobility Test:

After completion of the above test, the jacks are relieved and the Low Level Platform is kept on the wheels. The total assembly with simulation mass 500kg is towed using tow bar to check for mobility and maneuvering on a concrete floor.

7) FINISHING:

7.1 Grinding and Ni-Cr plating is to be done on mounting interfaces surface (Topside). After Plating surface flatness of 0.2mm should be maintained.

7.2 Total structure to be painted with **MRF metal coat paint** as per given below procedure:

The surface preparations are to be done as follows.

i) Round off edges, remove burrs, undue built up weldment etc.,
ii) Clean the surface, to be free from oil, dirt etc.
iii) All Machined surfaces is to be protected during sand blasting the complete surface
iv) Primer with compatible thinner should be applied, Metal paste, putty touch up and necessary a surface preparation is to be done.
v) Color of paint will be intimated after completion of load testing with Metal Coat No. Superior white-846, Oxford blue-112, Passion yellow-325.
vi) Two coats MRF metal paint coat shall be applied.
vii) The party should use only MRF metal paint with MRF recommended primer/thinner. No other brand should be used.

7.3 Primer properties:

i. **Salt spray**: The primer coatings shall not exhibit blistering, lifting of either coating, or substrate pitting after exposure to a 5 percent salt spray for 1000 hours in accordance with ASTM-B117.

ii. **Water resistance**: The primer coatings shall withstand immersion in distilled water maintained at 49 ± 3^0C for 4 days without exhibiting any evidence of wrinkling, blistering, or any other coating deficiency.

iii. **Fluid resistance**: The primer coatings shall withstand immersion for 24 hours in synthetic lubricating oil conforming to MIL-PRF-23699 or equivalent, and synthetic hydraulic fluid conforming to MIL-PRF-83282 or equivalent. Four hours after removal from the respective fluid, the coatings shall not exhibit any softening, blistering, loss of adhesion or any other coating deficiency.

iv. **Solvent resistance**: The primer coatings shall withstand 50 passes (25 back and forth rub) by a cloth rag soaked in methyl ethyl ketone (MEK). Rubbing through to bare substrate constitutes failure of the primer coatings to properly cure

v. **Adhesion**: The primer coating must have a rating of no less than 4A when examined in accordance with ASTM-D3359

vi. A coupon test for the paint shall be done by the vendor in accordance with applicable ASTM standards. This sample coupon needs to be cleared by ISRO engineers.

8) LIST OF STANDARD ITEMS:

The following are the major standard items as indicated in Annexure-**II** to be procured and integrated in the system by vendor.

9) SCHEDULE:

Delivery Period terms: Delivery of all items should be completed within 3 months of Placement of PO.

Warranty: 1-year warranty period shall be provided for all applicable elements of the Dolly.

10) DELIVERY:

The finished low-level platform should be neatly covered, packed and delivered to URSC safely. The loose parts, if any, should be packed in a suitable wooden box. Care should be taken during transportation to avoid damages (such as scratches) on the painted parts and failure of parts.

Annexure-I

Bill of materials

BILL OF MATERIALS				
Low Level Platform				
Sl.No	**Name**	**Drawing No**	**Qty**	**Material**
1	DOLLY STRUCTURE	ISAC-DTDF-SDEX-12-01027/000	1	ST-42
2	BOTTOM RING	ISAC-DTDF-SDEX-12-01003/000	1	ST-42
3	CHEQUERED SHEET	ISAC-DTDF-SDEX-12-01048/000	4	AL-Alloy
4	CHEQUERED SHEET SUPPORT BAR-1	ISAC-DTDF-SDEX-12-01018/000	2	ST-42
5	CHEQUERED SHEET SUPPOT BAR-2	ISAC-DTDF-SDEX-12-01004/000	2	ST-42
6	CHEQUERED SHEET WELD PLATE	ISAC-DTDF-SDEX-12-01033/000	1	ST-42
7	L-ARM 'C' BRACKET	ISAC-DTDF-SDEX-12-01025/000	4	ST-42
8	L –ARM 'I' BRACKET	ISAC-DTDF-SDEX-12-01022/000	4	ST-42
9	BUSH	ISAC-DTDF-SDEX-12-01040/000	1	ST-42
10	BAR LOCK PIN	ISAC-DTDF-SDEX-12-01043/000	1	ST-42
11	TOW BAR ASSEMBLY	ISAC-DTDF-SDEX-12-01034/000	1	ST-42
12	CASTER WHEEL	STD (Refer Annexure-II)	4	**STD**
13	SCREW JACK ASSY	STD (Refer Annexure-II)	4	**STD**
14	HEX BOLT HEAD	M10X106L	1	**STD**
15	WASHER	FOR M10	10	**STD**
16	HEX NUT	M10	9	**STD**
17	HEX HEAD BOLT	M10X30L	8	**STD**
18	HEX. HEAD BOLT	M6X25L	16	**STD**
19	HEX. NUT	M6	16	**STD**
20	WASHER	FOR M6	16	**STD**
21	HEX. HEAD BOLT	M8X30L	4	**STD**
22	HEX NUT	M8	16	**STD**
23	HEX. HEAD BOLT	M20X130L	8	**STD**
24	HEX. NUT	M20	*8*	**STD**

Annexure –II

PROCUREMENT OF STANDARD PARTS

Following are the major standard parts need to be purchased by the party to complete the assembly of the fixture. The quantity is per given here are per fixture assembly.

1) Specification for screw jack assembly

1.1 Item Description : Screw jack assembly

1.2 Specifications : Gear ratio- 5:1; Lift 350mm

1.3 capacity : 1 ton

1.4 Qty : 04 Nos per fixture

1.5 Mounting bracket pitch : 102mm, 2 nos. bolts of dia.11mm

2) Specification for Castor wheels

2.1 Item Description : Castor wheels (PU wheels)

2.2 Specifications : Overall Height-177mm, Wheel diameter- 125mm, Swivel Type with wheel face brake option

2.3 Working Load Limit : 1100 kg

2.4 Qty : 04 Nos

2.5 Material : Wheel tread- antistatic and conductive polyurethane; Core- Grey cast iron

2.6 Mounting bracket pitch : 4 nos. bolts of dia.6.5mm with 105mmX78mm pitch

IMPORTANT NOTE:

1. Any doubts on the contents of this document, drawings and bought out items need to be discussed and clarified with URSC Engineers before vendor initiates the actual fabrication and procurement of standard parts.
2. The standard items as listed in Annexure-II have to be procured by vendor.
3. Plastic cap should be provided on unattached/unused threaded holes.
4. While quoting, the party shall submit process planning for the major activities, such as structural fabrications, large machining, surface treatment and finishing of large surface, integration of sub-assemblies and testing etc.
5. Mounting interface matching of low level platform with satellite interface rings to be done at URSC (ISRO) in presence of ISRO engineer. Any correction / associated work such as Transportation, handling, lifting, positioning must be carried by vendor.
6. The order will be placed on cumulative value of total work.