ANNEXURE TO INDENT NO: SDSC SHAR/VALF
PURCHASE/SH2024000895

TECHNICAL & COMMERCIAL SPECIFICATIONS DOCUMENT

FOR

COLLECTION OF FREE ISSUE MATERIAL, VERIFICATION OF BOM, PROCUREMENT, MANUFACTURE, CONTROL ASSEMBLY, TRANSPORTATION, HANDLING, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH PEDESTAL (MLP) FOR ASLP PROJECT

SPECIFICATIONS & PRICE SCHEDULE

OWNER : INDIAN SPACE RESEARCH ORGANISATION

PROJECT : AUGMENTATION OF SECOND LAUNCH PAD (ASLP)

LOCATION : SDSC, SHAR, SRIHARIKOTA

AUGUST 2024

AUGMENTATION OF SECOND LAUNCH PAD (ASLP)

SATISH DHAWAN SPACE CENTRE

SRIHARIKOTA - 524124.

INDIAN SPACE RESEARCH ORGANISATION

ISSUE
R0

Signature of the Supplier for accepting of specification mentioned above

MOBILE LAUNCH PEDESTAL TECHNICAL SPECIFICATIONS			
Slno	**SPECIFICATION NO: ASLP-MLP-001/**	**ISSUE NO.**	**TITLE: REQUEST FOR PROPOSAL FOR MOBILE LAUNCH PEDESTAL**
SPECIFICATIONS			
1	SECTION A	R0	GENERAL TERMS, CONDITIONS & SPECIFICATIONS OF THE CONTRACT
2	SECTION B	R0	SCOPE OF WORK & TECHNICAL SPECIFICATIONS
3	SECTION C	R0	WELDING SPECIFICATIONS
4	SECTION D	R0	QUALITY ASSURANCE PLAN
5	SECTION E1 to E8	R0	DETAILS TO BE SUBMITTED BY VENDOR ALONG WITH OFFER.

PART – A

GENERAL TERMS AND CONDITIONS OF THE CONTRACT

ISSUE R0

PROJECT INFORMATION

1.0	Project Title	:	Supply of MLP for ASLP project
2.0	Location of Plant	:	Shriharikota, AP
3.0	Access to Site	:	Road From North of Chennai is apprx. 100 km. from East of Sullurpetta in Nellore dist is approx 28km. Rail Chennai – Vijayawada rail track line.
4.0	Terrain	:	Uneven with level varying significantly.

5.0 Climatic Conditions

a) Temperature

Mean of daily max	:	42.2 ^{0}C
Mean of daily min.	:	11.8 ^{0}C
Maximum Temperature	:	44.6 ^{0}C

i. Design ambient temperature for performance guarantee : 45.0 ^{0}C

ii. For electrical system design : 50 ^{0}C

b) Relative humidity

i. Range : 15% to 100%

ii. Design relative humidity for performance guarantee : 70%

c) Rainfall

i. Annual average maximum : 1331.3 mm

6.0 Power supply

a) For motors rated 200kW and below and motors rated upto 250kW with VFD	:	415V, 3-phase, 3-wire, effectively earthed AC
b) Uninterrupted power supply	:	230 V, 1 phase, 50 Hz,

ISSUE R0

			2 wire AC supply
c)	Lighting fixtures	:	240V, 1 phase, 2 wire, 50Hz, earthed system.
d)	Space heaters in panels	:	240V, 1 phase, 2 wire, 50 Hz, earthed system
e)	Construction power	:	415 V $\pm$ 10%, 3 phase, 4-wire,50 Hz $\pm$ 5%, AC supply at one place. Further distribution by Supplier

PART – B

GENERAL SPECIFICATIONS OF THE CONTRACT

Signature of the Supplier for accepting of specification mentioned above

1. INTRODUCTION

SDSC SHAR invites tenders in ISRO e-procurement website from reputed firms with proven ability to ***"COLLECTION OF FREE ISSUE MATERIALS, VERIFICATION OF BOM, PROCUREMENT, MANUFACTURE, SUPPLY, CONTROL ASSEMBLY, TRANSPORTATION, HANDLING, INSPECTION, ERECTION, TESTING AND COMMISSIONING OF MOBILE LAUNCH PEDESTAL FOR ASLP PROJECT"*** as per the specifications

2. PRE-BID MEETING

2.1. Pre-bid meeting is planned for briefing of scope of work to tenderers,

2.2. Clarifying the clarifications to tenders and to site visit.

2.3. Date of pre-bid meeting is planned on 22nd August 2024 at 14:00 hrs in SVAB conference hall, in Second launch pad, Sriharikota, Andhra Pradesh.

2.4. Interested tenderers who want to attend pre-bid meeting may email to our Purchase officers email: jomin@shar.gov.in and our Senior Purchase officer email: sselvan@shar.gov.in for arranging entry permit. It is requested to kindly mention tender number and description of tender.

2.5. It shall be noted that attending pre-bid meeting is not mandatory for qualification of tender.

2.6. SDSC SHAR prefers to tenderers to attend the pre-bid meeting for better clarity on scope of work.

3. SCOPE OF WORK AND TECHNICAL SPECIFICATIONS

The detailed scope of work and technical specifications is given in Sections B, C D, E of RFP document. The general specications are given below.

4. SUPPLIER's OBLIGATIONS & FUNCTIONS

4.1. SPECIFICATIONS AND DRAWINGS

The Supplier shall execute the works in compliance with the provisions of CONTRACT, good engineering practices and codes requirements.

4.2. SUBMISSION OF TECHNICAL DOCUMENTS

Supplier shall prepare and submit to SDSC SHAR for approval of following documents and drawings:

4.2.1. Technical literatures & data sheets of equipment used by him.

4.2.2. Fabrication shop layout for fabricating of MLP.

4.2.3. Details of heat treatment / stress relieving equipment

4.2.4. Details of Turning machines / milling machines to be used for machining.

4.2.5. Assembly Shop layout drawings suitable for control assembly of MLP.

4.2.6. Detailed Quality Assurance Plan

4.2.7. No activity shall be executed unless SDSC SHAR's approval is obtained. The above documents shall be submitted in a format approved by SDSC SHAR.

4.3. PROCUREMENT, FABRICATION & SUPPLY

4.3.1. Supplier shall carry out detailed shop floor fabrication drawings based on department provided fabrication drawings and supply the MOBILE LAUNCH PEDESTAL in accordance with the scope, technical specifications and terms & conditions of contract.

4.3.2. Supplier staff / contract staff shall include maximum number of welders to complete fabrication of MLP Modules.

4.3.3. Supplier shall identify competent engineer with proven experience on similar works as coordinator with SDSC SHAR for briefing weekly or bi-weekly status / updates to SDSC SHAR.

4.4. DELIVERY AND STORAGE

4.4.1. Dispatch Instructions given in the Contract shall be strictly followed. Failure to comply with the instructions may result in delay in payment apart from imposing any other charges as may be deemed to fit.

4.4.2. The Supplier shall be responsible for transporting all the material, equipment to site, unloading and storage.

4.4.3. No equipment shall be delivered without obtaining dispatch clearance from SDSC SHAR.

4.4.4. All the equipment shall be properly packed to avoid any damage during transportation / handling / storage and any damages found has to be replaced at free of cost by supplier.

4.4.5. The equipment and material received at site shall be stored at a place assigned for this purpose.

4.4.6. Supplier shall take proper care while storing the equipment and shall provide watch & ward at his own cost.

5. INSTALLATION

5.1. GENERAL

5.1.1. Supplier's staff shall include adequate number of competent erection engineers with proven experience on similar works to supervise the erection works and sufficient skilled, unskilled and semiskilled labour to ensure completion of work in time.

5.1.2. Supplier's erection staff shall arrive at site on date agreed by SDSC SHAR. Prior to proceeding to work, Supplier shall however, first ensure that required/sufficient part of his supply has arrived at site.

5.1.3. Erection of equipment may be phased in such a manner so as not to obstruct the work being done by other Suppliers and / or operating staff who may be present at that time.

5.1.4. During erection, Department's quality team / their engineer will visit site from time to time with or without Supplier's engineer to establish conformity of the work with specification. Any deviations, deficiencies or evidence of unsatisfactory workmanship shall be corrected as instructed by Department. All the material handling equipment shall be in the scope of Supplier only.

5.1.5. Supplier shall carry out work in a true professional manner and strictly Adhere to the approved drawings. Any damage caused by Supplier during erection to new or existing building / environment shall be made good at no extra cost to Department.

5.2. RECORDS

Supplier shall maintain records pertaining to the quality of erection work in a format approved by Department. Whenever erection work is complete, Supplier shall offer erected equipment for inspection to Department's engineer who along with Supplier's engineer will sign such records on acceptance.

5.3. MLP ERECTION

5.3.1. Supplier shall carry out the works in accordance with the specific Instructions given on the approved drawings, method statements, manufacturer's drawings / documents or as directed by Department. MLP's components shall be erected in neat manner so that they are level, plumb, and square and properly aligned and oriented. Tolerances shall be as established in manufactures fabrication drawings or as stipulated by Department. No equipment shall be welded or bolted, until its alignment is checked and found acceptable by Department.

5.3.2. Supplier shall provide all supervision, labour, tools for erection, testing and inspection, machines, cranes, equipment, scaffolding, rigging material and incidental material such as bolts, wedges, anchors, etc. required to complete the works. Supplier shall also provide at his own cost all such consumables like oxygen – acetylene gas, welding rods, grinding wheels, temporary supports, shims etc. required to complete work.

5.3.3. Supplier shall take utmost care while handling instruments, delicate equipment, panels etc. and protect all such equipment on erection.

5.3.4. The unit mentioned for erection and commissioning charges of MLP is in Lot / Lumpsum. The total cost quoted for erection & commissioning shall be firm/fixed upto quantity variation of ±10%. Hence, there shall not be any additional claim on account of increase / decrease in quantities. (i.e., Fabrication items/machined items/forging items/Bought out items etc.,)

5.4. SAFETY

Supplier shall follow the safety regulations / codes and shall take necessary measures at his own cost. It is the contractor's responsibility to ensure the safety of their workmen and protection of surrounding equipment at work zone. Safety of the workers is in the scope of the contractor. Department is not responsible for safety risks if any to the contractor workers during course of the MLP Erection & commissioning at SDSC SHAR.

5.5. ERECTION & CONSTRUCTION POWER

5.5.1. Electrical power may be extended by SDSC SHAR on chargeable basis, as per the tariff rules of State Electricity Board and SDSC SHAR. Reasonable quality of normal Construction power (415V, 3 phase, 50 Hz) will be made available at one point which is 350m away from the work site However onward distribution shall be done by the supplier. Installation of necessary power cables of 350m or more, energy meters, switchgear & distribution system, etc. for Construction power in a safe manner in strict conformity with local rules & regulations will be responsibility of supplier.

5.5.2. During non-availability of power, supplier shall make his own arrangement of alternate power source at their own cost.

5.6. WORK RULES AT SDSC-SHAR

The work shall be carried out on SDSC-SHAR working days only or permission to be obtained from the contract manager for late hours / holidays.

5.7. SITE PREPARATION / CLEARANCE

5.7.1. No site preparation works are planned by SDSC SHAR for site fabrication works. Only environmental clearance will be provided for site preparation works. Preparation of required site for fabrication and approach requirements for handling the MLP shall be in the scope of contractor. The site identified for such works will be within 400 meters from erection location.

5.7.2. Supplier shall make temporary fencing all around the erection site to avoid unnecessary entry of erection team to launch complex area.

5.7.3. Upon completion of work, supplier shall remove all his equipment and material from the site within one month or time mutually agreed. Supplier at all times shall keep site in clean condition and remove all unwanted material at regular intervals. In case supplier fails to remove all their equipment and material within the mutually agreed time, it is deemed that SDSC SHAR will arrange to remove the same at Supplier's cost.

6. ACCOMMODATION

6.1.1. Accommodation will not be provided by SDSC SHAR to Contractors.

6.1.2. Supplier shall make own arrangement for accommodation, transportation & canteen facility for all his staff, technicians, labour & workers.

7. MEDICAL FACILITIES

No medical facilities will be provided by SDSC SHAR. Supplier shall make own arrangement at his own expenses for medical facilities for site personnel.

8. WORK PROGRAMME

Supplier shall prepare a detailed programme schedule for review / approval by SDSC SHAR. Supplier as per exigencies of work shall revise and update programme periodically.

8.1. SUB-CONTRACTS

8.1.1. No work shall be sub-contracted without prior approval of SDSC SHAR.

8.1.2. Supplier shall be responsible for the proper execution of any sub-contract placed by him in connection with this purchase order.

8.1.3. Supplier shall furnish to SDSC SHAR the copies of all un-priced sub-orders showing promised delivery dates and places.

9. CHANGES AND MODIFICATION TO SPECIFICATIONS, DRAWINGS AND QUALITATIVE / QUANTITATIVE REQUIREMENTS

9.1.1. Supplier shall obtain approval from SDSC SHAR before initiating the action for procurement of bought out items.

9.1.2. During the fabrication review, supplier has to carry out the mutually agreed modifications to meet the overall requirement.

10. RECORD OF DRAWINGS AND O&M MANUALS

10.1. Supplier shall submit 3 hard copies & one soft copy of all the approved drawings incorporating any modification / changes made during the execution of CONTRACT. All these drawings shall be marked as 'As Built'.

10.2. Submission of the drawings shall be a precondition for releasing of any final payment due to Supplier.

Signature of the Supplier for accepting of specification mentioned above

11. TAXES AND DUTIES

11.1. The procurement is intended for the bonafide use in Systems/Sub-systems of Launch Vehicle Project of Indian Space Research Organization, Government of India, Department of Space and eligible for IGST@5% as per guiding principles conveyed by the Ministry of Finance Dept. of Revenue Notification No. 25/2018 – Integrated Tax (Rate) Schedule-I; Sl. No. 243B dated 31.12.2018 (Amendment to Notification No. 07/2018-Integrated Tax (Rate) dated 25.01.2018 and Notification No. 01/2017- Integrated Tax (Rate) dated: 28.06.2017)

11.2. CGST/SGST/UTGST/IGST (whichever is applicable) shall not be included in the lump sum quote but indicated (both percentage of tax applicable & amount on which it is applicable) separately in schedule of prices.

11.3. It is the responsibility of the contractor to issue the Tax Invoice strictly as per the format prescribed under the relevant applicable GST law (CGST Act/SGST Act/UTGST Act/IGST Act). Contractor has to indicate the proper GSTN Registration/ HSN code in their tax invoices.

11.4. CGST/SGST/UTGST/IGST shall be paid at actuals against Tax Invoice but restricted to the amount and percentage in the contract.

GST details are given below
GSTIN: 37AAAGS1366J1Z1
LEGAL NAME: SATISH DHAWAN SPACE CENTRE SHAR
VALIDITY FROM:29/08/2017
TYPE OF REGISTRATION: REGULAR

12. STATUTORY VARIATION

Statutory variation for CGST/SGST/UGST/IGST is applicable, provided the actual completion of services does not occur beyond the period stipulated in the order/contract or any extension (without levy of penalty). For variation after the agreed completion periods, the service provider alone shall bear the impact for the upward revisions.

For downward revisions, the Department shall be given the benefit of reduction in CGST/SGST/UGST/IGST.

13. RISK COVERAGE

The Supplier shall arrange comprehensive risk coverage at his own cost covering the value of item including transportation to the site from manufacturer's works, storage at site, erection, testing and commissioning at site. The period of such coverage shall be up to contractual completion period or any extension granted by Department thereof.

14. INCOME TAX

Income tax at the prevailing rate as applicable from time to time shall be deducted from the supplier's bills as per Income Tax Act, 1961 and the rules there-under or any re-enactment or modifications thereof and a TDS certificate shall be issued.

15. SECURITY DEPOSIT

15.1. The supplier, whose tender is accepted, will be required to furnish by way of security deposit for the due fulfilment of the contract such a sum as will amount to 3 % of the contract price of the work awarded.

15.2. The security deposit (bearing no interest) shall be held by the Department as security till satisfactory completion, testing and handing over of all the system and for the due performance of all suppliers' obligations under the contract as per delivery period or extension granted thereof by the Department.

15.3. The supplier within 10 days of Purchase Order or signing of Contract, deposit with the Accounts officer, Satish Dhawan Space Centre SHAR, Sriharikota as detailed above by any one or more of the following modes namely

I. By a crossed demand draft in favour of Accounts officer, Satish Dhawan Space Centre SHAR drawn on SBI and payable at Sriharikota.

II. By a bank guarantee in the prescribed format (required format will be provided after award of contract). The bank guarantee shall be from a nationalized bank & shall be valid for 60 days beyond completion period.

15.4. In case of breach of contract, the Performance Security shall stand forfeited in addition to other relief available to the Department under this contract.

16. PACKING AND FORWARDING

16.1. The Supplier shall arrange to have all the material suitably packed as per the standards and as specified in the contract. Unless otherwise provided for in the contract, all containers (including packing cases, boxes, tins, drums, and wrappings) used by the Supplier shall be non-returnable.

16.2. All packing and transport charges, transit handling costs and transport fees of agents employed at the place of delivery or elsewhere, shall be deemed included in the price to be paid to the Supplier.

17. ARBITRATION

In the event of any question, dispute of difference arising under these conditions or any conditions contained in the Purchase Order or in connection with this contract, (except as to any matters the decision of which is specially provided for by these conditions) the same shall be referred to the sole arbitration of the head of the Purchase Office or some other person appointed by him, it will be no objection that the arbitrator is a Government Servant that he had to deal with matter to which the contract relates or that in the course of his duties as Government Servant he had expressed views on all or any of the matters in disputes or difference. The award of the arbitrator shall be final and binding on the parties of this contract.

It is Term of this contract:

a. If the arbitrator be the head of the purchase office.

   I. In the event of his being transferred or vacating his office by resignation or otherwise, it shall be lawful for his successor-in office either to proceed with the reference himself, or to appoint another person as arbitrator, or.

   II. In the event of his being unwilling or unable to act for any reason, it shall be lawful for the Head of the Purchase Office to appoint another person as arbitrator: or

b. If the arbitrator be a person appointed by the Head of the Purchase Office in the event of his dying, neglecting or refusing to act, or resigning or being unable to act, for any reason, it shall be lawful for the Head of the Purchase Office either to proceed with the reference himself or to appoint another person as arbitrator in place of the outgoing arbitrator. Subject as aforesaid, the Indian Arbitration and

Conciliation Act, 1996 and the rules there under and any statutory modifications thereof for the time being in force shall be deemed to apply to the arbitration proceedings under this Clause. The arbitrator shall have the power to the extent with the consent of the Purchaser and the Contractor the time making and publishing the award. The venue of arbitration shall be place as the purchaser in his absolute discretion may determine. Work under the Contract shall, if reasonably possible, continue during arbitration Proceedings.

c. In case order is concluded on the public Sector Undertakings, the following Arbitration Clause will be applicable.

In the event of any dispute or differences relating to the interpretation and application of the provisions of contracts, such dispute or difference shall be referred by either party to the Arbitration of one of the Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Bureau of Public Enterprises. The Indian Arbitration and Conciliation Act, 1996 shall not be applicable to the Arbitration under this clause. The award of the arbitrator shall be binding upon the parties to the dispute provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such Additional Secretary when so authorised by the Law Secretary whose decision shall bind the parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the arbitrator.

18. APPLICABLE LAW AND JURISDICTION

The laws of India shall govern this purchase order for the time being in force. The Courts of Andhra Pradesh, India only shall have jurisdiction to be with and decide any legal matters or disputes what so ever arising out of the purchase order.

19. FORCE MAJEURE

19.1. Should a part or whole work covered under this purchase order be delayed due to reasons of Force Majeure which shall include legal lockouts, strikes, riots, civil commotion, fire accident, quarantines, epidemic, natural calamities and embargoes the completion period for work, equipment referred to in this

agreement shall be extended by a period not in excess of the duration of such Force Majeure. The occurrence shall be notified within reasonable time.

19.2. Neither party shall bear responsibility for the complete or partial nonperformance of any of his obligations (except for failure to pay any sum which has become due on account of receipt of goods under the provisions of the present purchase order / Contract) if the non-performance results from such force majeure circumstances such as, but not restricted to, flood fire earthquake, civil commotion, sabotage, explosion, epidemic, quarantine restriction, strike, lock-out, freight embargo, acts of the Government either in its sovereign or contractual capacity, hostility, acts of public enemy and other acts of God as well as war or revolution, military operation, blockade, acts or actions of state authorities or any other circumstances beyond the control of the parties that have arisen after the conclusion of the present Purchase order / contract.

20. GUARANTEES

The Supplier shall guarantee that the items and equipment furnished by him is in conformance with the requirement of the specifications. Goods covered by the contract shall be free from defects in materials or workmanship for a period of **12 months** from the date of successful commissioning & acceptance by Department.

21. WARRANTY

The Supplier shall provide **12 months'** warranty for the entire system for a defect liability, after final official handing over at his cost. During this period, supplier has to provide and adhere to the following:

21.1. He has to attend breakdown maintenance calls. All the defective components have to be replaced or rectified on one to one basis.

21.2. Break down maintenance should be responded within 48 Hours' time and shall be completed within 48 Hours after respond.

21.3. Department will not provide any transport/accommodation.

21.4. In case Supplier failed to attend and repair the system within 7 days from the date of reporting the problem, Department will reserve right to forfeiting the BG apart from withholding of any payment payable to the Supplier.

21.5. Where defects in items are remedied under warranty, the period for which the warranty operates shall be extended by such period, as the items are not available to SDSC SHAR. Where defect items are replaced by new ones, the full warranty period stipulated in the purchase order shall apply to such replacement items as from the date of their delivery.

22. SCHEDULE OF PRICE

22.1. CONTRACT price shall include all costs of *"procurement of raw materials, manufacture, testing, control assembly, dismantling, packing, forwarding, transport to site, unloading, storage,* all risk coverage, erection, installation, testing & evaluation and commissioning of equipment including any other cost for proper and complete execution of the CONTRACT.

22.2. CONTRACT prices shall also include all travelling expenses, living expenses, salaries, bonus, overtime, benefit and any other compensation for engineers, supervisors, skilled, semiskilled workmen, watch and ward staff, labours and other staff employed by the Supplier, cost of tools and tackles required for erection and other consumable material required, materials, equipment and all taxes, duties, and levies as applicable on the date of submission of bid.

22.3. Supplier shall agree for addition/ deletion of the works for the same quoted unit rates and such variation is limited to **± 10%** of the ordered quantities.

22.4. Price shall be firm & fixed and the contractor has to agree for the same rates for the **± 10%** quantity variations also.

22.5. Erection charges including third party inspection charges shall be firm and fixed even for the **± 10%** quantity variations also.

22.6. The rate quoted shall be on FOR SDSC SHAR, Sriharikota basis.

22.7. The taxes applicable for supply and erection & commissioning shall be indicated separately in the price bid.

Signature of the Supplier for accepting of specification mentioned above

22.8. If the offers submitted by the Suppliers are silent on taxes, it will be presumed that quoted rates are inclusive of taxes & duties and no claim in this regard will be entertained later.

23. MODE OF PAYMENT

All the payments due to Supplier will be made in Indian currency by crossed "Account Payee" cheque sent to the registered office of the Supplier. Suppliers can submit their banker details and payments can also be made through ECS/ PFMS.

24. TERMS OF PAYMENTS

General guideline TERMS OF PAYMENTS are as indicted below. Any deviation to these payment terms to be brought out.

SDSC SHAR general payment terms are 100% after supply, Erection and acceptance by department.

Or if supplier is willing to take advance, the following payment terms will be considered by SDSC SHAR. Hence Supplier shall mention in the offer regarding payment terms with advance or without advance.

24.1. FOR SUPPLY OF ITEMS (for sl.no:1 to 5 in price bid, i.e. supply of fabricated items, supply of fabricated items with normal & heavy machining, Supply of forged items with machining, Linear bearings and Hydraulic system etc.,)

24.1.1. **20%** of supply cost as advance against submission of bank guarantee for an equal amount from a reputed nationalized/scheduled bank and shall be valid till Contract completion period. Format of Bank guarantee shall be obtained from Department after award of contract

24.1.2. **70%** of supply cost along with GST against receipt of material at Purchasers / Department site on pro-rata basis and clearance by CLIP (by department)

24.1.3. **10%** of supply cost after successful commissioning & acceptance by CLIP of equipment, system covered under contract against submission of Performance bank guarantee valid till warranty period plus 2 months claim period

Signature of the Supplier for accepting of specification mentioned above

24.2. FOR ERECTION OF GROUND ANCHOR FOR MLP AT SITE (for sl.no:6).

24.2.1. **90%** of Erection of ground anchors cost along with GST against completion of foundation of ground anchor, Erection of Ground anchor and clearance by CLIP (by department)

24.2.2. **10%** of Erection of ground anchors cost after successful commissioning & acceptance by CLIP of equipment, system covered under contract against submission of Performance bank guarantee valid till warranty period plus 2 months claim period

24.3. FOR ERECTION, TESTING AND COMMISSIONING OF MLP AT SITE (for sl. no 7 in price bid, i.e. Erection and commissioning of MLP etc).

24.3.1. **20%** of erection cost as advance after commencement of work and mobilization of crane at site & against submission of bank guarantee for an equal amount from a reputed nationalized/scheduled bank and shall be valid till Contract completion period. Format of Bank guarantee shall be obtained from Department after award of contract

24.3.2. **15**% of erection cost after positioning of Anchor legs, Module 2A, 2B, 2C, 2D, 3A, 3B.

24.3.3. **15**% of erection cost after completion of welds and inspection for modules 2A, 2B, 2C, 2D, 3A, 3B.

24.3.4. **15%** of erection cost after positioning of Module 1A, 1B and 1C.

24.3.5. **15%** of erection cost after completion of welds and inspection on Module 1A, 1B, 1C.

24.3.6. **10%** of erection cost after assembly position of SSR and inspection.

24.3.7. **10%** of erection cost along with GST after successful commissioning and acceptance by CLIP against submission of Performance bank guarantee valid till warranty period plus 2 months claim period

Note: It is suggested to have same payment terms for Sub-vendor for erection also. If a mile stone payment for erection is released to Supplier by department similar payment is to be released to sub-vendor for erection.

24.4. THIRD PARTY INSPECTION

24.4.1. 50% of third party inspection charges after receipt of all modules (Module 1, 2 and SSR) at purchasers / Department site.

24.4.2. 50% of third party inspection charges along with tax after Erection, Commissioning and acceptance of the system.

25. PERFORMANCE BANK GUARANTEE

25.1. The supplier shall guarantee for the performance of the equipment by providing bank guarantee in favour of the Department for an amount equivalent to **3 %** (three percent) of the total value of this contract valid till the warranty period of the contract plus 2 months claim period.

25.2. The performance bank guarantee shall be submitted by the supplier with in fifteen days from the date of accepting the equipment as per the CONTRACT. Format for the performance bank guarantee shall be obtained from the Department.

26. DELIVERY SCHEDULE

The realization of fabrication works within the schedule is very essential to meet ISRO launch manifesto. Hence, Suppliers are requested to adhere to the schedules given below. Contractor shall follow the following schedule for executing the contract:

S.No	Description of Target	Responsibility	Completion target
	Supply portion (item no: 1,2,3,4,5 and 6). Break up of 10 months supply is given below for reference only and not for calculation of LD.		**T+10 Months**
1	Purchase order release along with drawings.	Dept.	T
2	Preparation of part drawings, part drawings Interface verification, verification of Bill of Materials w.r.t Bom mentioned in drawings and actual requirement from GA drawings.	Supplier	T+7 days
3	Release of tender enquires for raw material	Supplier	T+10 days
4	Receipt of raw material at Contractors works	Supplier	T+30 days
5	Completion of cutting of raw material as per BOM and rolling of raw materials.	Supplier	T+45 days

6	Fabrication of modules shall start by (Three shift operations)	Supplier	T+35 days
7	Fabrication (i.e completion of fit and start of welding) of all 9 modules and 4 Anchor legs shall be in progress round the clock with three shift operations.	Supplier	T+50 days
8	Completion of fabrication including stress relieving, machining and inspection of Ground anchors	Supplier	T+90 days
9	Completion of stress relieving of modules	Supplier	T+7.5 months
10	Completion of machining of modules	Supplier	T+8 months
11	Completion of control assembly including inspection, trail movement with hydraulic system	Supplier	T+9 months
12	Receipt of Ground anchors, Foundation bolts, reinforcement rods etc at SDSC SHAR	Supplier	T+8 days
13	Completion of Foundation for Ground anchors, alignment of ground anchors and grouting.	Supplier	T+9 months
14	Transportation from supplier site and receipt of all modules at SDSC SHAR and storage of modules.	Supplier	T + 10 months
	Erection Portion (item no: 7) **Break up of 4 months of Erection is given below for reference only and not for calculation of LD .**		4 months from date of site clearance
15	Mobilization of erection Team and suitable mobile Crane at SDSC SHAR	Supplier	(Prior to T1)
16	Department clearance for erection and commissioning.	Dept.	T1
17	Positioning of bearing plate and anchor legs	Supplier	T1+1 day
18	Alignment and inspection of top surface of anchor legs	Supplier	T1+2 day
19	Welding of lifting hooks on all modules and readiness for erection.	Supplier	T1+ 3 days
20	Position of module 2A, 2B, 2C, 2B, 3A and 3B with Crane and suitable support structures	Supplier	T1+ 10 days
21	Alignment of modules 2A, 2B, 2C, 2B, 3A and 3B	Supplier	T1+ 13 days
22	Locking of modules and start of welding including three shift operation for welders.	Supplier	T1+ 15 days
23	Completion of welding on modules 2A, 2B, 2C, 2B, 3A and 3B	Supplier	T1+ 45 days
24	Positioning of modules 1A, 1B and 1C	Supplier	T1+ 48 days
25	Alignment of Modules 1A, 1B and 1C	Supplier	T1+ 50 days
26	Locking of modules and start of welding of	Supplier	T1+ 80 days

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	modules including three shift operation for welders.		
27	Inspection of Modules 1 on linear bearing sitting surface	Supplier	T1+ 82 days
28	Scrapping of linear bearing sitting surface of Module 1 if required		T1+90 days
29	Assembly of linear bearings to SSR and assembly of SSR with Module-1, Jacks, adjustable spacers, mechanical stopper assembly.	Supplier	T1+ 95 days
30	Inspection of SSR interface rings sitting surface, free movement of SSR with Hydraulic system.	Supplier	T1+ 95 days
31	Scrapping of Interface ring sitting surface on SSR, if required	Supplier	T1+ 105 days
32	Reinspection of Interface ring sitting surface on SSR	Supplier	T1+ 106 days
32	Movement trails of MLP with Bogie and anchoring at SVAB	Supplier	T1+ 107 days
33	Mobilization of loads	SDSC SHAR	T1+ 105 days
34	Readiness of load testing, by bonding strain gauges and dial guage for deflection measurement.	SDSC SHAR	T1+ 109 days
35	Load testing	SDSC / Supplier	T1+ 110 days
36	Movement of MLP back to erection site and anchoring	SDSC / Supplier	T1+ 111 days
36	Finishing operation and painting	SDSC / Supplier	T1+ 119 days
32	Erection & Commissioning of the Mobile Launch Pedestal (MLP) and handling over of MLP	Supplier	T1 + 4 months

The Bidders who are not agreeing for the above delivery schedule, will be rejected with out seeking any clarification.

27. LIQUIDATED DAMAGES

In the event of the Supplier failing to complete the work within the delivery period specified in the contract agreement or in extension agreed thereto, Department shall reserve the right to recover from the Supplier as liquidated damages, a sum of 0.5 percentage per week or part thereof of the undelivered portion of the total contract price of equipment or work. However, the total liquidated damages shall not exceed **10.0** percentage of the total Contract price. The LD reckoning date shall be **T+10 months** for the undelivered supply portion (i.e for item no: 1 to 6 and

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8) and **T1+4 months** from the date of Department clearance for erection & commissioning portion (i.e for item no: 7 and 8) of the contract price.

28. LAND BORDER SHARING

28.1. The bidder shall provide compliance to Order No. F.No.07.10.2021 PPD (1) dated 23.12.2023 and amendments thereof by Ministry of Finance, Department of Expenditure, Public Procurement Division regarding restrictions on procurement from a bidder of a country which shares a land border with India and comply to all the provisions of the Order. In this regard, you shall certify that the bidder entity is not from such a country or, is from such a country, has been registered with the Competent Authority.

28.2. As per the above Order, Tenderer / OEM should not offer product/service is from such a Country sharing Land border with INDIA.

29. MAKE -IN -INDIA (MII)

29.1. Provisions contained in Public Procurement Policy (Preference to Make in India), Order 2017 issued by DPIIT vide OM No. P-45021/2/2017-PP(BE-II) . Part (4) Vol II dated 19.07.2024 & directives related including latest amendments (if any) is applicable for this tender. You are requested to provide Self Declaration Certificate that the offered Item meets Local Content Requirement of Class 1 or Class 2 as per Make in India(MII) Policy, clearly indicating the Percentage of local content & the details of Location(s) at which value addition is made in the offered product. It may be noted that Local Content shall not include services such as Transportation, Insurance, Installation, Commissioning, Training and after sales service support like AMC/CMC etc

30. PURCHASE PREFERENCE TO MSME:

30.1. Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 as amended from time to time issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the BIDDER MUST BE MANUFACTURER OF

THE OFFERED PRODUCT in case of bid for supply of goods. TRADERS ARE EXCLUDED from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence along with UDYAM REGISTRATION in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1 plus 15% (Selected by Buyer) of margin of purchase preference/price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25% (selected by Buyer) percentage of total QUANTITY

31. DISCLOSURE AND USE OF INFORMATION

31.1. The supplier shall If the documents supplied by SDSC SHAR are marked **"Strictly Confidential"**, supplier shall take all necessary steps to ensure the same.

31.2. Supplier shall guarantee that all information and data received during contract period is confidential and should not be revealed to any other.

31.3. Execution of Purchase Order from SDSC SHAR shall be classified as **"confidential"** within the meaning of the Official Secrets Act and shall not be divulged to any third party without prior written permission of SDSC SHAR. All drawings & documents shall be returned after execution of work.

31.4. No publicity of any kind whatsoever regarding this work shall be given without prior clearance from SDSC-SHAR

32. PATENTS & PATENT RIGHTS INDEMNIFICATION:

32.1. All specifications, drawings, patents and such other relevant information furnished by the Centre / Unit to the contractor / Supplier shall be the property of the Centre / Unit. If during the process of execution of the purchase order/contract, any improvements, refinements, technical changes, modifications, etc are effected by the contractor / Supplier, such changes shall not affect the title of the Centre / Unit to that property.

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32.2. The Center / Unit shall have the absolute right to assign, transfer, sublet, use and transmit all such modified drawings, specifications, patents, proto-types, etc., to any third party and the contractor / supplier shall not have any claim or right whatsoever in respect of such modified drawings, specifications, patents, proto-types,etc.

33. INDEMNITY:

33.1. The process indicated in the purchase order/ contract shall be deemed to include all amounts payable for the use of patents, copyrights, registration charges, trademarks or other industrial property rights.

33.2. The contractor / Supplier shall at all times, Indemnify the centre / Unit against all claims including claims by any third party relating to stores for infringement of any rights protected by patent registration of design or trade marks.

33.3. Till the supplies reach their destination, the contractor / Supplier shall be responsible for any damage to the supplies arising from what ever cause other than force majeure factors.

33.4. The contractor / supplier shall also take the entire responsibility for adequacy of supplies / services for fulfilment of the purchase order/ Contract.

34. ACCEPTANCE AND REJECTION:

On completion of the work or part of the work as specified in the contract, the representative of Department referred to, shall check as soon as possible, but in any event within one month of notification of readiness for acceptance that the work performed complies with the contract requirements as regards to quantity and quality.

In the event of rejection of any of the articles, whereby the Supplier feels himself aggrieved, he may within eight days of the receipt of notification of rejection and before such articles have been removed from the place of inspection, give the Department notice of objection. Such objection shall be considered by a Board of Appeals of the Department. The Department shall, without prejudice to the arbitration clause in the contract, take a decision upon Presentation of the Board's

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findings. On completion of tests, the members of the Inspection Organisation of the Department or Inspection agency appointed by Department shall prepare a report, which must be countersigned by the Supplier.

35. SUSPENSION:

35.1. Department may notify the Supplier to suspend performance of any or all of his obligations under the Contract. Such notice will specify the reasons for suspension and the effective date of suspension. Supplier there upon shall suspend the performance of such obligations until ordered in writing to resume performance of Contract by Department.

35.2. If Supplier's performance or his obligations remain suspended or the rate of progress is reduced, then, the time of completion will be suitably extended and all costs incurred by Supplier as a result of suspension or reduction in rate of progress will be paid to Supplier provided that the suspension or reduction in the rate of progress is not by reasons of Supplier's default or breach of Contract.

36. CANCELLATION

36.1. GENERAL RULE

The Department shall have the right at any time to cancel a contract either totally or in part by giving written notice by registered mail. From the time of receipt of the written notice, the Supplier shall undertake to observe the instructions of the Department as to the winding up of the contract both on his own part and on the part of his sub-suppliers.

36.2. WITHOUT FAULT OF SUPPLIER

In the case of cancellation of a contract by the Department without any fault of the Supplier, the Supplier shall on receipt of Department's instructions forthwith take the necessary steps to implement them. The period to be allowed to implement them shall be fixed by the Department after conclusion with the Supplier and, in general, shall not exceed three months.

Subject to the Supplier confirming, Department shall take over from the Supplier at a fair and reasonable price all finished parts not yet delivered to the Department, all

unused and undamaged material, bought-out components and articles in course of manufacture in the possession of the supplier and property obtained by or supplied to the Supplier for the performance of the contract, except such material, bought-out components and articles in course of manufacture as the supplier shall, with the agreement of the Department, elect to retain.

36.3. WITH FAULT OF SUPPLIER:

The Department reserves the right, after full consideration of all relevant circumstances, including the observations of the supplier, to cancel a contract in any of the following circumstances.

36.3.1. In the event of the Supplier's failure to meet

I. The Technical requirements of the Supplier.

II. The Progress and/or delivery requirements.

36.3.2. If the Supplier has not observed the provisions of the contract concerning the disclosure and use of information provided by the Department.

36.3.3. If the Supplier fails to comply with the provisions of the contract concerning the equipment, supplies and technical documents made available by the Department.

36.3.4. If the Supplier transfers his contract without the Department's authorization or concludes sub-contracts against the Department's explicit directives.

In the event that Supplier unjustifiably repudiates the Contract or fails to ship or dispatch all or part of the goods ordered for reasons other than those attributed to the Department’s actions or as provided in the Force Majeure clause, the Department may, by giving an appropriate notice in writing to the Supplier, fix a Date of Essence by which the Supplier must complete the dispatch in full. If the Supplier fails to do so, the Department, in addition to his right to recover Liquidated Damages in terms of the Contract, shall also have the right to cancel this Contract and make substitute purchases from other sources. If the goods are in a partial state of fabrication, Department may have the fabrication completed by other means, in which event Supplier shall be liable to Department for the additional expenses incurred thereby, but shall not have any claim on savings, if any, in such cases.

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In the event of such cancellation, the Department shall unless otherwise specified in the contract, only pays.

- In the case of a fixed-cost contract for the supply of equipment or material. The contractual value of items delivered and accepted under the contract before receipt of notification of cancellation, or to be accepted under the special conditions of cancellation.
- In the other cases.

A fair and reasonable price in respect of such work as has been carried out prior to the receipt by the Supplier of notification of cancellation.

37. FRAUDULENT PRACTICES, BRIBERY AND CORRUPTION OF GOVERNMENT SERVANTS

The contractor represents and undertakes that he has not given, offered or promised to give, directly or indirectly any amount, gift, consideration, reward, commission, fees, brokerage or inducement to any person in service of the department or otherwise in procuring the contracts or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the contract or any other contract with the Government for obtaining a contract or showing or forbearing to shoe favour or disfavour to any person in relation to the contract or any other contract with the government. Any breach of the aforesaid undertaking by the contract or any one employed by him or acting on his behalf or for his benefit (whether with or without the knowledge of the contractor) or the commissioning of any offence by contractor or any one employed by him or acting on his behalf, as defined in chapter IX of the Indian Penal code, 1860 or the prevention of corruption Act. 1947 or any other Act enacted for the prevention of corruption shall, without prejudice to any other legal action, entitle the Department to cancel the contract either wholly or in part, and all or any other contracts with Contractor and recover from the Contractor such amount or the monetary value thereof and the amount of any loss arising from such cancellation without any entitlement or compensation to the Contractor. The Department will also have the right to recover any such amount from any contracts concluded earlier between the

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contractor and the Government of India. The contractor will also be liable to be debarred from entering into any contract with the Government of India for a minimum period of five years. A decision of the Department to the effect that a breach of the undertaking had been committed shall be final and binding on the Contractor.

38. Risk and Cost Purchase

Timely delivery of goods/services is of prime importance and where the vendor fails to fulfil their contractual obligations, the Procuring Entity shall be entitled, and it shall be lawful on his part, to procure Stores and/ or services similar to those ordered/cancelled, with such terms and conditions and in such manner as it deems fit at the “Risk and Cost” of the Contractor and the Contractor shall be liable to the Procuring Entity for the extra expenditure, if any, incurred or accrued by the Procuring Entity for arranging such procurement. However, the Contractor shall not be entitled to benefits if any, from such procurements.

Prior to resorting to risk purchase the Purchaser shall consider impact of the default by the contractor, proper notice to the contractor to invoke risk purchase clause and method of recovering the additional amount spent by the Purchaser. The cost as per risk purchase exercise may be recovered from the Earnest Money Deposit/ Security Deposit/ Performance Security of the supplier and/or bills submitted by the supplier against the same contract or any other contract. GST will be charged / levied on Risk Purchase as per the provision of GST Act Rule thereon.

Risk purchase action may be initiated under any of the following conditions.

a. When the supplier fails to deliver the materials even after extending the delivery period.

b. When the supplier fails to respond to purchases request for supply of the materials and fails to provide any genuine and bonafide reason for the delay in supply.

c.When the supplier breaches any of the terms and conditions of the supply order/ contract and as a result fails to execute the order satisfactorily.

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SECTION- B

TECHNICAL SPECIFICATION

ISSUE R0

1.0 SCOPE

This specification covers the description of scope of work, functional requirements, technical parameters, general design, materials, construction features, interfaces, list of drawings, and bought out items.

The scope of the tenderer shall include understanding of Mobile Launch Pedestal and its functional requirement, preparation of part drawings, consolidation of bill of material, verification of BOM, collection of steel raw material from SDSC, procurement of balance raw materials, fabrication, stress relieving / heat treatment, machining, assembly of sub-systems along with bought out items, design & supply hydraulic system, shop inspection, control assembly, testing at the manufacturer's works, packing , forwarding, transportation, delivery at site (SDSC-SHAR) including unloading, handling at site, erection, testing, commissioning, performance / acceptance testing as per the enclosed specification under the supervision of ISRO & Third party Inspection agency (TPIA) and handing over of Mobile launch pedestal.

2.0 QUANTITY

The total quantity of Mobile launch pedestal required is 1 (one).

3.0 ESTIMATED WEIGHT

The estimated finished weight of the system in each category is approximate only. The contractor shall agree for addition / deletion of the works and such variation is limited to ± 10% of the order value. Offer shall be valid for ± 10% of the order value. However payment will be made based on the final finished drawing weight.

3.1 Structural / Fabricated items without machining.

Procurement, fabrication, stress relieving (only for modules 3A & 3B), control assembly, testing and inspection at contractors works, transportation to SDSC SHAR, unloading / receipt, preparation of storage site (if required), handling at site, storage & inspection at SDSC SHAR, handling at site of structural steel / Mild steel components conforming to IS:2062 Grade E250 & IS:808 is 140,00 kg (approximate).

Items coming under above category are module 3A &3B, handrails, staircases, covers, etc..

3.2 Fabricated structural items with machining.

Procurement, fabrication, stress relieving, machining, control assembly, testing and inspection at contractors works, transportation to SDSC SHAR, unloading / receipt, preparation of storage site (if required), handling at site, storage & inspection at SDSC SHAR, handling at site, erection & commissioning of structural steel / Mild steel components conforming to IS:2062 of grade E250 and E350), IS:808, items with machining is 660,000 kg (approximate).

Items coming under above category are modules, SSRs, Anchor legs, bottom covers, flanges for L110 cover, Interface rings, flanges for SC120, shims, bearing plates, adapter plates etc..

3.3 Forgings / Machined Special Steel components.

Procurement, manufacturing, machining, heat treatment, control assembly, testing and inspection at contractors works, transportation to SDSC SHAR, unloading / receipt, preparation of storage site (if required), storage, handling at site, erection & commissioning of alloy steels / forged steels / cast steels like cast steel 40Cr4, 45C8, 40C8, IS 1570 X04Cr19Ni9, C90, AISI 4340 (40Ni2Cr1Mo28 of IS:1570), ASTM A668M (Grade-D) etc.. which is 32000 kg (approximate).

Items coming under above category are track for bearing plate handling arrangement, Sector rings for SSRs, adjustable spacers, through bolts, fasteners, etc..

3.4 Linear Bearings for SSR's movement:

Procurement of linear bearings with rails, inspection, sub-assembly, control assembly, testing and inspection at contractors works, packing, forwarding, transportation to SDSC SHAR, handling at site, erection & commissioning. Quantity: 9 nos.

3.5 Hydraulic Cylinders with complete power pack for SSR's Movement:

Design of complete hydraulic system for operation of Hydraulic cylinders for linear movement of SSR's, approval of SDSC SHAR, procurement of cylinders, power pack with pumps, motors, hoses, directional control valves, pressure relief valves, etc and other accessories as per specification, assembly with systems, testing at vendor site, control assembly with MLP at manufacturer site, transportation to site, unloading, storage, erection and commissioning. Quantity: 1 lot.

3.6 Foundation for Ground anchors at SDSC SHAR

Foundation of Ground anchors is to be realized as per the drawings, which involves excavation of soil upto 4.5m deep, dewatering, laying of reinforcement, positioning foundation bolts and stoppers as per drawing, filling of concrete, curing, positioning and alignment of ground anchors as per the drawings and specification, locking of ground anchors, Grouting the ground anchors and curing. Total quantity: 4 nos of ground anchors.

3.7 Erection and commissioning of MLP at SDSC SHAR

Erection and commissioning of MLP which shall include, preparation of approach roads (if required) for movement of Crane approach all around the erection site, handling of modules, transportation from unloading site to erection site, positioning of modules including temporary support structure, alignment of modules, inspection, locking of modules with fixtures, inspection, welding between modules, inspection, assembly of SSR and all bought out items, inspection, scrapping (if required) on Interface ring sitting surface on SSR with authorized scrapping agents to achieve 30 arc seconds accuracy, support for load testing, painting and handling over of MLP.

3.8 Third party inspection of MLP:

Arranging the third party inspection agency to carry out the inspection works at all stages as per the approved QAP for manufacturing and testing at contractors works and during Erections works at SDSC SHAR.

Tenderer shall note that partial offer / scope is not allowed in this tender and partial offer / scope will lead to rejection of offer. Hence tenderers are requested to quote for complete scope.

Tender shall note that overall lowest offer only will be considered for placement of order.

4.0 BACKGROUND INFORMATION

The Mobile Launch Pedestal (MLP) is a fabricated steel structure used for launching launch vehicles. The proposed MLP will be used for launching LVM3, with variants of L110 / SC120 / SC200, which is supported by two S-200 Strap-on motors. The Strap-on motors along with the main launch vehicle is supported on the MLP before launching.

The Mobile Launch Pedestal can be moved using the existing Bogie system to the launching pad and then fixed to the ground through anchor legs. The Launch vehicle is assembled on the MLP in the Vehicle Assembly Buildings and then the MLP is moved on rails to the launch pad.

Similar Mobile Launch pedestal is available in Second Launch Pad (SLP) at SDSC SHAR Sriharikota. Tenderer may visit SDSC SHAR for better understanding of the system and familiarizing the unloading site & erection site for realising and commissioning of Mobile launch pedestal.

5.0 DETAILED SCOPE OF WORK / EQUIPMENT AND SERVVICES TO BE PROVIDED BY CONTRACTOR

For Successful realization of Mobile launch pedestal, the scope of tender shall include but not limited to the following items:

5.1 Complete understanding of functional requirements of Mobile launch pedestal, interfaces and thereby ensuring satisfactory operation of the system

5.2 Understanding of supplied drawings and preparation of part drawings, verifying the part drawings with the assembly drawings, verifying the bill of materials as per the drawings.

5.3 Verification of all interfaces in the drawing.

5.4 Submission of execution plan for all major actives including manufacturing, testing packaging, delivery to ISRO site at Sriharikota, erection and commissioning.

5.5 Collection of free issue materials from SDSC SHAR by submitting bank guarantee including loading of material at SDSC SHAR.

5.6 Procurement of balance raw materials and bought out items as per specification from approved vendors, after approval from SDSC SHAR.

5.7 Qualifying the welders and welding procedures at contractors shop.

5.8 Carrying out fabrication as per approved fabrication drawings, stress relieving the fabricated components and machining of the items as per the drawing.

5.9 Fabrication involves huge amount of J-Type edge preparation using machining for higher thick plates.

5.10 Qualifying the weld joints with respective NDT methods mentioned in drawings.

5.11 Stress relieving of all the fabricated modules using thermal furnace.

5.12 Shot blasting and primer painting of all the modules.

5.13 Machining of all the modules as per the drawing. Inspection of modules on the machine itself for verification of geometrical tolerances.

5.14 Internal transportation of modules in the work shop.

5.15 Procurement of linear bearings with rails which are required for SSR linear movement operation.

5.16 Procurement of Hydraulic cylinders, hydraulic power pack etc. which are required for SSR linear movement operation.

5.17 Finalizing the procedure of Control assembly, testing at shop floor.

5.18 Mobilizing the suitable pedestals for supporting the modules during control assembly.

5.19 Control Assembly and testing at shop along with bought out items as per approved general assembly drawings with required calibrated measuring instruments.

5.20 Construction of civil foundation with foundation bolts for ground anchors on existing rail track between SVAB track change over system and track End (towards TLP) in Second launch pad area.

5.21 Positioning of ground anchor, alignment of ground anchors, verification of alignment, locking of ground anchors, grouting of ground anchors with Fosroc GP2 conbextra cement.

5.22 Transportation of Modules to SDSC SHAR.

5.23 Preparation of unloading site, receipt of manufactured items and related materials at site, unloading near erection site, storing of modules, near the erection site.

5.24 Extension of power supply from existing power panel at 350m away from MLP erection.

5.25 Mobilization of crane, handling slings or suitable hydraulic Jacks, support pedestals etc.

5.26 Finalizing the procedure for the erection of MLP to ensure all the functional requirements.

5.27 Mobilizing the support pedestals for supporting the erection at SDSC SHAR.

5.28 Carrying out erection, testing and commissioning of MLP with all sub-systems to ensure all the functional requirements.

5.29 All tools, tackles, cranes etc for erection.

5.30 First fill of oil, grease, lubricants consumables, etc. as required during start up and commissioning operations.

5.31 Testing, commissioning of complete Mobile Launch Pedestal and handing over.

5.32 Trial movement of MLP with existing Bogie.

5.33 Painting of MLP structures including primer coating at SDSC SHAR.

5.34 Achieving 30 arc seconds level accuracy on SSR sitting surface Is most important. If required suitable surface scrapping shall be done through approved agency.

5.35 Arranging third party inspection agency to carry out the inspection works at various stages as per the approved QAP for manufacturing and testing procedures.

5.36 Preparation / Revision of Drawings if any changes made and submission of As built drawings.

6.0 EQUIPMENT AND SERVICES TO BE PROVIDED BY SDSC SHAR

6.1 Approving all operational procedures for control assembly and erection at SDSC SHAR.

6.2 Reviewing the weekly/ biweekly /monthly status at contractors works for timely completion of realisation.

6.3 Reasonable quality of normal construction power will be made available will be made available at one point which is 350m away from the work site (415V, 3phase 50 hz, max 300A) on chargeable basis at SDSC SHAR. However onward distribution shall be by the supplier. Installation of necessary power cables of 350m or more, energy meters, switchgear, distribution system & necessary protection system etc. for Construction power in a safe manner in strict conformity with local rules & regulations will be responsibility of supplier.

6.4 Issue of Free Issue material to Successful vendor. Loading and transportation to party's site is in the scope of Vendor.

6.5 Bogie system for movement of MLP at site.

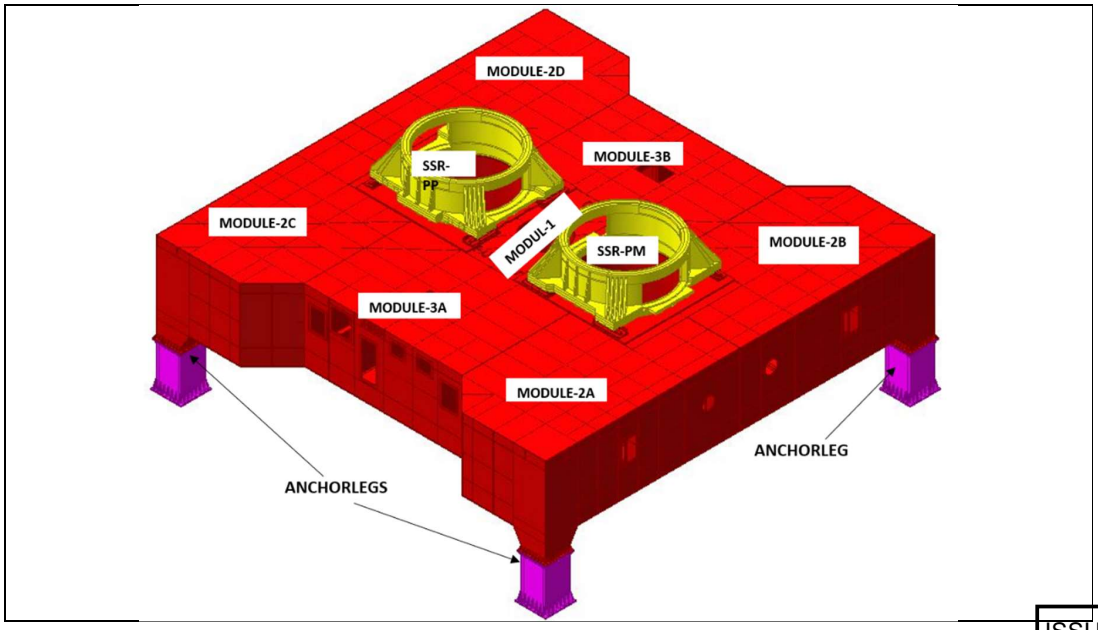
6.6 Dummy load (2 Nos.) of 200 Tons each for load testing at site.

7.0 TECHNICAL DETAILS OF MLP

MLP with a fully assembled launch vehicle will be transported on bogie system from Vehicle assembly building to launch pad.

The configuration of Mobile Launch Pedestal consists of following five major units:

(a) Pedestal Deck
(b) Strap-on Support Rings (SSR)
(c) Components for SSR position adjustment
(d) Anchor Legs
(e) Ground anchors



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A brief description of the constructional features required for each of the above subassemblies / components is listed here below:

7.1 Pedestal deck

7.1.1 The Pedestal Deck shall be made of structural steel plates arranged in form of grid of multiple flanges and webs as shown in drawings. The deck has to transfer the different loads from launch vehicle and other applicable loads during the integration, transportation and final positioning at launch pad to the bogie system / anchor system. The MLP shall be manufactured so as to achieve the accuracy requirements specified for the top surfaces of SSRs

7.1.2 The bottom of the deck shall be at EL 3200 and the top of the deck shall be at EL 6800. There shall be two intermediate levels inside the deck and a 2m x 2.3m passage / walkway shall be provided for accommodating service lines, safety equipment, etc. inside the Pedestal Deck. Staircases to be provided for access from the floor level to the passage inside MLP. At the bottom of MLP, suitable interfaces shall be provided at 4 locations for fixing to the bogie at 14m square as shown in drawings.

7.1.3 Flange for central 2000 mm diameter opening with two types of top covers for different variants of launch vehicle and one number of bottom cover is provided in the drawings

7.1.4 The overall size of MLP shall be 19.2 m X 19.2 m. To facilitate the aspects of fabrication, transportation, handling and erection of pedestal deck at site, the pedestal deck shall be made up of modules. The proposed modules are configured based on the maximum size, and also the maximum weight to be handled for any module. A central module of adequate size is provided to take care of the requirement of supporting the launch vehicle on a single module to achieve the desired accuracy in the alignment.

7.1.5 Two locally raised (and machined) surfaces suitable for supporting SSRs & the base plates shall be provided on the top surface of the MLP.

7.1.6 Staircases on Y+ side is to be provided. Staircase on Y+ side is to be foldable type having folding arrangement with chain pulley block.

7.2 Strap on Support Rings (SSR)

7.2.1 There shall be two Strap-on support rings (SSRs) placed on the MLP pedestal deck for supporting the launch vehicle. The two SSRs are designated as SSR (P+) and SSR (P-). Each SSR shall support the design vehicle load of 500 t.

7.2.2 The SSR shall have a circular opening for the exhaust of launch vehicle

7.2.3 During non-integration, transportation and at launch pad, the SSR will be rigidly bolted all around on the top surface of MLP. During strap-on integration, the SSR is supported only on linear bearings. Also, bolting arrangement shall be provided between the support pads of SSR and the top machined surface of MLP.

7.2.4 Each SSR shall be provided with a interface ring which is an interfacing component between the launch vehicle and the SSR.

7.3 Components for SSR position adjustment

7.3.1 The SSRs shall have the provision to make adjustment (± 50 mm) to facilitate the launch vehicle stage alignmnet. The SSR (P-) shall have adjustment provision along P (pitch) axis and SSR (P+) shall have the provision along Y (Yaw) axis. A maximum adjustment of 50 mm on either side of the mean position shall be feasible on each SSR.

7.3.2 The SSR position adjustment has to be carried out with the mass of S-200 positioned on the SSR. The vehicle load acting on the components used for each SSR position adjustment is 500 t. The linear speed for movement of SSR along with S200 shall be 10 mm /min (maximum).

7.3.3 The positioning accuracy required for linear movement of SSR during its position adjustment shall be +/- 0.1 mm.

7.3.4 For carrying out SSR position adjustment, four Base Plates shall be provided which are to be inserted below the four corner support pads of each SSR. The linear bearings shall be mounted on the Base plate. The Base plates shall be bolted to the top of the Pedestal Deck.

7.3.5 A bolting fixture for initial positioning of the various base plates shall be provided to achieve proper alignment of the four linear bearings. After ensuring smooth movement of all four SSR mounted on linear bearings, the base plates shall be dowelled to the machined plate & the bolting fixtures shall be removed.

7.3.6 Four mechanical stops shall be provided in order to limit the total movement of each SSR and also to provide locking of the SSR in the finally adjusted position. Out of these four mechanical stops, two stops shall be located on each side of the SSR and they shall be mounted on the machined top surface of the MLP.

7.3.7 The mechanical stop shall be a rotationally constrained Screw with fine pitch threads whose linear position can be adjusted by manually rotating the axially constrained nut. The pitch for the screw thread is selected as 1.5mm so that by rotating the nut by an angle of 24°, the screw can be advanced / retracted by 0.1mm which is the required positioning accuracy for the SSR adjustment.

7.3.8 As a backup feature, it is also proposed to use the mechanical stop as a device for accurately positioning the SSR during its adjustment. Out of the two stops located on each side of SSR, one of them shall be set accurately and locked in the required position in order to limit the hydraulic cylinder stroke. Then the hydraulic cylinders shall be actuated so that SSR is moved to butt against the pre-set Mechanical Stop.

7.4 Anchor legs, Bearing plate and Ground anchor

7.4.1 The Pedestal Deck shall be supported on four Anchor Legs which in turn supported on bearing plates and ground anchor. The interface details are provided as per existing system.

7.4.2 Each Anchor Leg will have one bearing plate and its handling arrangements (consisting of chain pulley blocks of 2 t capacity) as in the system existing at site. The bearing plates are used for creating a clearance between MLP and the bogie so that the bogie can be retracted. Four number of bearing plates will be used.

7.5 Interface of Bogie with MLP

7.5.1 Top surface of the bogie is located at 3165 mm. When MLP is on ground anchors, the Elevation of bottom plate is 3185 mm at bogie resting area and 3200 mm in

other areas. A 35 mm thick bearing plate is inserted between anchor leg and ground anchor top surface to create clearance between MLP and bogie in order to facilitate retraction of the bogie system after parking of MLP. When the MLP is on wheel bogie, the 35 mm thick bearing plate below anchor legs is removed and the Elevation of bottom plate is at 3165 mm at the bogie resting area and 3180 mm in other areas.

7.5.2 During movement of MLP, 16 numbers of M100 bolts are used for clamping between MLP and Bogie.

7.5.3 In order to achieve the accuracy requirements specified for the top vehicle mounting surface of each SSR, machining is required to be carried out at all interfaces between Anchor-legs / MLP / SSR / Replaceable rings. Interfaces between any two modules are also to be machined. Also, during erection at site, alignment of top surfaces of Anchor Legs & also of the top machined surfaces of MLP have to be monitored and controlled.

8.0 LIST OF DRAWINGS AND PREPARATION OF PART DRAWINGS

Sl. No	Drawing/Document No	Drawing/Document Title	Latest Rev.	Date of Issue	No. of Sheets
1	TCE.11365A-ME-857-GA-0020	MOBILE LAUNCH PEDESTAL ASSEMBLY	R1	17/6/20	02
2	TCE.11365A-ME-857-DD-0002	DETAILS OF MODULE 1 OF MLP	R0	19/3/20	06
3	TCE.11365A-ME-857-DD-0003	DETAILS OF MODULE 2A & 2D OF MLP	R0	19/3/20	04
4	TCE.11365A-ME-857-DD-0004	DETAILS OF MODULE 2C & 2B OF MLP	R0	19/3/20	04
5	TCE.11365A-ME-857-DD-0005	DETAILS OF MODULE 3A OF MLP	R1	17/6/20	03
6	TCE.11365A-ME-857-DD-0006	DETAILS OF MODULE 3B OF MLP	R0	19/3/20	03
7	TCE.11365A-ME-857-DD-0007	SSR(P+) WELDMENT	R1	17/6/20	02
8	TCE.11365A-ME-857-DD-0008	SSR(P+) MACHINING	R0	19/3/20	01
9	TCE.11365A-ME-857-DD-0009	SSR(P-) WELDMENT	R1	17/6/20	02
10	TCE.11365A-ME-857-DD-0010	SSR(P-) MACHINING	R0	19/3/20	01
11	TCE.11365A-ME-857-DD-0011	BEARING PLATES	R1	17/6/20	01
12	TCE.11365A-ME-857-DD-0012	DETAILS OF BEARING PLATE HANDLING ARRANGEMENT	R1	17/6/20	01
13	TCE.11365A-ME-857-DD-0013	ANCHOR LEG SUBASSEMBLY AND DETAILS	R0	19/3/20	01
14	TCE.11365A-ME-857-DD-0014	DOOR SUBASSEMBLY AND DECK	R0	19/3/20	01
15	TCE.11365A-ME-857-DD-0015	HAND RAILS ON PEDESTAL DECK	R0	19/3/20	03
16	TCE.11365A-ME-857-DD-0016	STAIRCASE AND RAILING FOR MLP -Y+	R0	19/3/20	02
17	TCE.11365A-ME-857-DD-0017	STAIRCASE AND RAILING FOR MLP -Y-	R0	19/3/20	02
18	TCE.11365A-ME-857-DD-0018	DETAILS OF COVERS FOR SC110 OPENING	R0	19/3/20	01
19	TCE.11365A-ME-857-DD-0019	DETAILS OF COVERS FOR SC120 OPENING	R0	19/3/20	01

20	TCE.11365A-ME-857-DD-0020	DETAILS OF BOTTOM COVERS FOR L110 OPENING	R0	19/3/20	01
21	TCE.11365A-ME-857-DD-0021	ADJUSTABLE SPACER SUBASSEMBLY	R0	19/3/20	**01**
22	TCE.11365A-ME-857-DD-0022	MODULE INTER CONNECTION DETAILS	R0	19/3/20	**01**
23	TCE.11365A-ME-857-DD-0023	WINDOW SUBASSEMBLY AND DETAILS	R0	19/3/20	**01**
24	TCE.11365A-ME-857-DD-0024	INTERFACE RING (P+)	R0	19/3/20	**01**
25	TCE.11365A-ME-857-DD-0025	INTERFACE RING (P-)	R1	17/6/20	**01**
26	TCE.11365A-ME-857-DD-0026	DETAILS OF SSR ADJUSTMENT COMPONENTS	R0	19/3/20	**01**
27	TCE.11365A-ME-857-DD-0028	ENCLOSURE FOR CRYO PIPES TYPE-1	R0	19/3/20	**01**
28	TCE.11365A-ME-857-DD-0029	ENCLOSURE FOR CRYO PIPES TYPE-2	R0	19/3/20	**01**
29	2024/SVAB/Bogie/001,	Hex, head bolt M100 X 350 L bolt thread length: 150mm with Nut and washers Qty: 16 nos.	--	--	**01**
30	TCE.7517A-ME-857-DD-2446	Fork, Qty: 20 nos	R1		**01**
32	MEC/09E9/SA/V1-2/34-03/01880	Ground Anchors, Qty: 4 nos.	C		**02**
33	10-05-01-343/SO1/R2	Foundation for Ground anchors.			**02**
33	2024/SVAB/ASLP/001,	Foundation bolts and plates for Ground Anchor .		09.07.24	**01**
34	2024/ASLP/MLP/002	layout of Ground anchors			**01**
34	------	Configuration drawings of Hydraulic system and circuit	---	----	**09**
35	-------	Plate cutting layout for Free issue			

8.1 From the above assembly drawings, party has to make detailed part drawings for each and every item mentioned in the bill of material of modules, details of edge preparation, tolerance etc.. to be clearly given.

8.2 From bill of materials given in the drawing, party shall verify the quantity of bill of materials and dimensions with respect to the general assembly drawings.

9.0 APPROXIMATE WEIGHT OF MODULES:

Sl	Description	Qty	Unit weight	structural	Machined	Forging
1	Module 1A	1	67000		67000	
2	Module 1B	1	27000		27000	
3	Module 1C	1	67000		67000	
4	Module 2A	1	82500		82500	
5	Module 2C	1	82500		82500	
6	Module 2B	1	81500		81500	
7	Module 2D	1	81500		81500	
8	Module 3A	1	44500	44500		
9	Module 3B	1	47000	47000		

10	Anchor legs	4	10162		40648	
11	Bearing plate	4	523			2092
12	Ground anchor	4	3185		12740	
13	SSR P+	1	53500		45013	8487
14	SSR P-	1	56000		47513	8487
15	Interface rings 2	2	570		1140	
16	Doors	2	130	260		
17	Window	8	98	784		
18	Handrails	1	3500	3500		
19	Staricase Y+	1	2500	3500		
20	Staricase Y-	1	2800	3500		
21	L110 cut out closure	1	2100		2100	
22	SC120 Cut out closure	1	2050		2050	
23	L110 bottom cover	1	860		860	
24	Cryo Enclosures	1	1000		1000	
25	Cryo Enclosures	1	800		800	
26	M100 bolts	16	47			752
27	Adjustable spacers	46	25			1150
28	Base plate	8	400		3200	
29	Adaptor plate	8	200		1600	
30	Mechanical stopper assembly	8	270 (144+126)		1152	1008
31	M48 Foundation bolts	lot	112			4000
32	Reinforcement for foundation	4	7500	30000		
33	Locking plates in foundation	lot	4000	4000		
34	Fasteners, foundation	lot	2000			2000
35	Back up plate between modules	lot	3926		3926	
36	Module interconnecting assembly	lot			7258	2000
		Total approximate weight		**137044**	**660000**	**29976**

9.1 As all final fabrication drawings are being used along with tender, no further discrepancies related to weight will be entertained. If any change in scope or change in drawings is given by SDSC SHAR, then only recalculation of weight will done as per the finished weight of drawings.

9.2 Categorization of items from machining to forging or structural steel to machined steel also will not be entertained.

10.0 COLLECTION OF FREE ISSUE MATERIALS FROM SDSC SHAR

10.1 After placement of Purchaser order, successful vendor shall submit bank guarantee of Rs: 300 lakhs valid for the period of Supply portion and collect below mentioned steel plates from SDSC SHAR to party's site for utilising in manufacturing of MLP.

10.2 Packing / loading of steel plates at SDSC SHAR is scope of contractor only.

10.3 Transportation of steel plates from SDSC SHAR to party's site is in the scope of contractor only.

10.4 List of steel plates to be given as a free issue material is given below:

S.NO	Shall be utilised in following Module / parts	Thickness	Length	Width	QTY	Unit Weight (kg)	Total Weight (kg)
1	Module 3A Module 3B, SSR P-, Bearing Plate arrangement, Interface ring P+ & P1, SSR Adjustment Component-1	63mm	6300mm	2500mm	2	7789	15578
2	Module-1, Module 2A & 2D, Module 2B & 2C, Bearing Plate arrangement, SSR Adjustment Component-1	70mm	8000mm	3000mm	4	13188	52752
3	SSR P+, SSR P-	75mm	6300mm	2500mm	3	9273	27819
4	Module 2A & 2D, Module 2B & 2C	85mm	6300mm	2500mm	1	10509	10509
5	Module 2A & 2D, Module 2B & 2C	100mm	7400mm	3000mm	2	17427	34854
6	SSR P+, SSR P-	105mm	6300mm	2500mm	6	12982	77892
7	Module 2A & 2D, Module 2B & 2C Ground Anchor Anchor Leg	120mm	6300mm	2500mm	7	14837	103859
						Grand Total Weight (kg)	323263

10.5 The above mentioned plates shall be utilised as per the plate cutting layout for the part numbers given below in the respective modules.

Module-1 TCE.11365A-ME-857-DD-0002_R0					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
1	**4**	PLATE 70 THK x 5450 x 5460	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
2	**45**	PLATE 70 THK x 2240 x 2620	GRADE-E250, QUALITY BR AS PER IS:2062	1	1
Module 2A and 2D TCE.11365A-ME-857-DD-0003_R0					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
3	**30**	PLATE 85 THK x 1516 x 730	GRADE-E250, QUALITY BR AS PER IS:2062	1	2

4	**54**	PLATE 100 THK x 2550 x 2550	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
5	**56**	PLATE 120 THK x 1650 x 1600	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
6	**57**	PLATE 120 THK x 1650 x 1520	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
7	**59**	PLATE 120 THK x 1775 x 800	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
8	**61**	PLATE 120 THK x 1520 x 800	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
9	**62**	PLATE 120 THK x 1600 x 797	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
10	**63**	PLATE 120 THK x 1200 x 234	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
11	**64**	PLATE 120 THK x 1360 x 797	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
12	**65**	PLATE 120 THK x 960 x 234	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
13	**74**	PLATE 70 THK x 300 x 300	GRADE-E250, QUALITY BR AS PER IS:2062	2	4
14	**101**	PLATE 85 THK x 1475 x 730	GRADE-E250, QUALITY BR AS PER IS:2062	1	2

Module 2B and 2C TCE.11365A-ME-857-DD-0004_R0

Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
15	**30**	PLATE 85 THK x 1516 x 730	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
16	**54**	PLATE 100 THK x 2550 x 2550	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
17	**56**	PLATE 120 THK x 1650 x 1600	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
18	**57**	PLATE 120 THK x 1650 x 1520	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
19	**59**	PLATE 120 THK x 1775 x 800	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
20	**61**	PLATE 120 THK x 1520 x 800	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
21	**62**	PLATE 120 THK x 1600 x 797	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
22	**63**	PLATE 120 THK x 1200 x 234	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
23	**64**	PLATE 120 THK x 1360 x 797	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
24	**65**	PLATE 120 THK x 960 x 234	GRADE-E250, QUALITY BR AS PER IS:2062	1	2
25	**74**	PLATE 70 THK x 300 x 300	GRADE-E250, QUALITY BR AS PER IS:2062	2	4
26	**101**	PLATE 85 THK x 1475 x 730	GRADE-E250, QUALITY BR AS PER IS:2062	1	2

Module 3A TCE.11365A-ME-857-DD-0005_R1

Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP

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27	**44**	PLATE 63 THK x 340 x 545	GRADE E-250, QUALITY BR AS PER IS:2062	2	2
28	**45**	PLATE 63 THK x 1360 x 2025	GRADE E-250, QUALITY BR AS PER IS:2062	1	1
Module 3B TCE.11365A-ME-857-DD-0006_R0					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
29	**46**	PLATE 63 THK x 340 x 545	GRADE E-250, QUALITY BR AS PER IS:2062	2	2
30	**47**	PLATE 63 THK x 1560 x 2225	GRADE E-250, QUALITY BR AS PER IS:2062	1	1
SSR P + TCE.11365A-ME-857-DD-0007_R1 and 0008					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
31	**2**	PLATE 105 THK. x 2300 x 568	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
32	**18**	PLATE 75 THK. x 1190 x 1365	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
33	**19**	PLATE 75 THK. x 1190 x 1185	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
34	**20**	PLATE 75 THK. x 1190 x 1025	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
35	**21**	PLATE 75 THK. x 1190 x 885	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
36	**22**	PLATE 75 THK. x 1190 x 760	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
37	**29**	PLATE 105 THK. x 1902 x 1375	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
38	**30**	PLATE 105 THK. x 1900 x 555	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
39	**31**	PLATE 105 THK. x 5050 x 1700	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
40	**32**	PLATE 105 THK. x 1292 x 1375	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
41	**35**	PLATE 105 THK. x 555 x 250	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
42	**36**	PLATE 105 THK. x 392 x 250	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
SSR P- TCE.11365A-ME-857-DD-0009_R1 and 0010					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
43	**2**	PLATE 105 THK. x 2300 x 568	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
44	**18**	PLATE 75 THK. x 1190 x 1245	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
45	**19**	PLATE 75 THK. x 1190 x 1230	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
46	**20**	PLATE 75 THK. x 1190 x 1050	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
47	**21**	PLATE 75 THK. x 1190 x 920	GRADE-E250, QUALITY BR AS PER IS:2062	4	4

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48	**22**	PLATE 75 THK. x 1190 x 685	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
49	**25**	PLATE 75 THK X 1190 X 795	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
50	**26**	PLATE 16 THK X 280 X 250	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
51	**29**	PLATE 105 THK X 5050 X 1500	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
52	**30**	PLATE 105 THK X 2144 X 445	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
53	**31**	PLATE 105 THK X 5050 X 1902	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
54	**32**	PLATE 105 THK X 1632 X 1186	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
55	**33**	PLATE 105 THK X 1220 X 432	GRADE-E250, QUALITY BR AS PER IS:2062	2	2
56	**7**	PLATE 63 THK X 230 X 70	GRADE-E250, QUALITY BR AS PER IS:2062	8	8
Bearing Plate arrangement TCE-11365A-ME-857-DD-0012 and 0011					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
57	**2**	PLATE 70 THK X 75 X 100	GRADE-E250, QUALITY BR AS PER IS:2062	1	4
Anchor Leg TCE.11365A-ME-857-DD-0013					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
58	**1**	PLATE 120 THK x 2160 x 960	GRADE-E250, QUALITY BR AS PER IS:2062	2	8
59	**2**	PLATE 120 THK x 2160 x 1200	GRADE-E250, QUALITY BR AS PER IS:2062	2	8
Interface rings TCE-11365-ME-857-DD-0024					
Slno	Part no.	DESCRIPTION	MATERIAL	Qty per unit	Qty per MLP
60	**1**	PLATE 63 THK X OD 4250 x ID 4000	GRADE-E250, QUALITY BR AS PER IS:2062	1	1
Interface rings TCE-11365-ME-857-DD-0025					
61	**1**	PLATE 63 THK X OD 4250 x ID 4000	GRADE-E250, QUALITY BR AS PER IS:2062	1	1
SSR Adjustment Component TCE-11365-ME-857-DD-0026					
Base Plate					
62	**1**	PLATE 63 THK x 1926 x 450	GRADE-E250, QUALITY BR AS PER IS:2062	2	8
Adaptor plate for SSR P-					
63	**1**	PLATE 53 THK x 1680 x 315	GRADE-E250, QUALITY BR AS PER IS:2062-	4	4
Adaptor plate for SSR P+					
64	**1**	PLATE 53 THK x 1680 x 315	GRADE-E250, QUALITY BR AS PER IS:2062	4	4
Ground anchor MEC/09E9/SA/VI-2/34/03/					
65	**5**	PL 120 x 480 x 1200 m/c 475 Width	GRADE-E250, QUALITY BR AS PER IS:2062	2	8

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66	**6**	PL 120 x 480 x 960 m/c 475 Width	GRADE-E250, QUALITY BR AS PER IS:2062	2	8

10.6 If any additional plates required for the above mentioned part numbers in the drawing, it shall be in the scope of the Successful vendor only.

10.7 From the free issue materials collected by Successful vendor from SDSC SHAR, an approximate scrap generated will be around 47 MT. The scrap generated by the steel plates of free issue materials, shall be the property of the successful tenderer. Hence tenderer shall consider the advantage of scrap / revenue generated from Scrap into account and quote unit price accordingly.

11.0 SPECIFICATION OF HYDRAULIC SYSTEM FOR SSR MOVEMENT

11.1 Hydraulic system shall be suitable for movement SSR with one stage of launch vehicle of weight 500t approximately.

11.2 Two hydraulic double acting cylinders are to be used for the positioning of the SSR. Both the hydraulic cylinders shall be located on the same side of the SSR. The hydraulic cylinders shall be front flange mounted on a fabricated bracket and the bracket shall be mounted on the top surface of the MLP. The Piston rod of the cylinders shall be connected to the SSR through a rod and clevis joint so that both push and pull movements can be carried out through the hydraulic cylinder.

11.3 The hydraulic system consists of 4 number of cylinders connected to manifold blocks in Power pack through hoses. Each cylinder is connected through two hoses with each manifold block in power pack.

11.4 Power pack consists of four manifold blocks. Each manifold block shall contain manual operated directional control valves, flow control and pressure relief valve as per the hydraulic circuit.

11.5 Power pack shall contain one number of motor connected with 4 split way pump.

11.6 ***Specification of Hydraulic cylinder***:

11.6.1 Type: Double acting cylinder.

11.6.2 Capacity: Minimum 20t in pull mode and 23t in push mode.

11.6.3 Stroke: 150mm

11.6.4 Minimum diameter of Bore: 125mm

11.6.5 Maximum working pressure: 250 bar.

11.6.6 3/8” NPT End Fit + 2 female male QC/DC couplings with dust cover.

11.6.7 Mounting style: front flange mounting with thread rod end.

11.6.8 Accessories: Rod clevis, Pivot pin, Eye bracket.

11.6.9 Cylinder shall have manifold block assembly mounted on it.

11.6.10 Cylinder shall be supplied along with mounting accessories like rod celvis, eye bracket, pivot pin etc.

11.6.11 The piston rod of the cylinders is connected to the SSR through clevis joint

11.6.12 Total hydraulic cylinders required is 5 (4 for SSR and 1 as spare).

11.6.13 2 nos of seal kits to be supplied.

11.7 Specification of Power pack

11.7.1 A hydraulic power pack shall be supplied for the operation of the hydraulic cylinders.

11.7.2 The hydraulic power pack shall contain oil reservoir, pump, motor and its components, valves & manifolds, local control panel for the control of both electric and hydraulic parameters as required to meet the poisoning accuracy + / - 0.1 mm of linear movement of SSR and as per the configuration of hydraulic circuit.

11.7.3 The Power Pack shall be mobile type with polyurethane castor wheels.

11.7.4 The Power Pack shall be suitable for outdoor installation in saline atmosphere with ambient conditions. The hydraulic system shall use fire retardant type hydraulic oil of Quintolubric N 822-300 manufactured by Quaker Chemicals.

11.7.5 All interconnecting piping / hydraulic hoses between the power pack and the hydraulic cylinders shall also be supplied by the Contractor.

11.7.6 The Power Pack shall be provided with two pumps (one operating and other standby) and the two shall be interconnected with a provision for change over. The two pumps shall be operated by explosion proof class II B type electric motor. Two pumps shall be connected to individual motors.

11.7.7 The oil reservoir shall be made of stainless steel. The oil tank shall be provided with all accessories like suction strainer, return line filter, pressure gauge, oil level indicator, gauge isolating valve, air breather, etc. The Power Pack shall have all hydraulic valves & other control components interconnected with stainless steel pipework. The operating valves shall be mounted on suitable manifold blocks.

11.7.8 All valves/manifolds shall be as per the hydraulic circuit proposed by the party in order to achieve the performance requirements stated in this specification.

11.7.9 All outlets of the power pack shall be fitted with male/female quick couplers (QC/DC end connections) to suit the interconnecting piping/hoses with male/female quick couplers.

11.7.10 Pressure Gauge (glycerine filled type) range of 0 to 400 bar, Accuracy: ± 2% or better shall be fixed to power pack.

11.7.11 Level/Temperature gauge: Suitable oil level and temperature gauge shall be provided in the system.

11.7.12 All the components of hydraulic system shall be made of high reliable makes like Europress pack, parker or its equivalent. Prior approval shall be obtained from purchaser for finalising the components and sub-vendor.

11.8 Specification of Pump

11.8.1	Type	:	Axial piston pump spilt flow type with 4 equal outlets
11.8.2	Maximum discharge	:	4 X 0.22 litre/min
11.8.3	Maximum working pressure	:	250 bar
11.8.4	Quantity	:	2 Nos (1 no will be as spare pump)

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11.8.5 3/8" NPT End Fit + 2 female male QC/DC couplings with dust cover.

11.8.6 Pump shall be designed such a way that all four cylinders may be operated simultaneously.

11.9 Specification of motor

11.9.1 Type : Electric motor (A/c Squirrel cage induction motor) 3 phase, 4 poles, 415V ± 10%, 50 Hz ± 3%

11.9.2 IP enclosure: 60 or better

11.9.3 Temperature specification: T4 class

11.9.4 Ambient temperature: 46˚C

11.9.5 Relative humidity : shall be suitable for greater than 95%.

11.9.6 Motor shall have flame proof construction with flame proof starter and necessary flame proof gland(s)(double compression type) suitable for class IIB with power cables of about 20m (copper conductor, PVC insulated armoured cables) termination.

11.9.7 All electrical fittings/panels/motor etc. must be flame proof type suitable for group-IIB, hazardous area as per EN 50018.

11.9.8 Total quantity of motor: 2 nos (1 as spare).

11.10 Specification of Hose

11.10.1 The interconnecting piping shall consist of required number of hoses of highest quality between the end of supply outlet on power pack and the hydraulic cylinder. Hoses shall be wire braided for longer life and reliability. The distance between power pack and the cylinders shall be considered as 20m

11.10.2 Maximum working pressure: 250 bar

11.10.3 Burst pressure: 2800 bar

11.10.4 3/8" NPT end fit

11.10.5 Size of hose shall be suitable for flow rates.

11.10.6 Length of hose shall be 20m.

11.10.7 Minimum factor of safety : 6

11.10.8 End connections shall be Male/Female quick couplers (QC/DC end connections) along with metal dust caps attached at both ends

11.10.9 3/8" NPT End Fit + 2 male couplings and QC/DC end connections along with metal dust caps at both ends

11.10.10 Quantity of hoses: 16 nos (2 sets)

11.11 Local control panel

11.11.1 A local control panel shall be provided on the power pack for the operation of the cylinders. The local control panel shall include the following control switches & displays:

11.11.2 Power on / off switches with LED lamp

11.11.3 Start/stop switch for motor/pump of power pack with LED lamp.

11.11.4 Individual manual direction control valves for forward/reverse movement of SSR

11.11.5 Individual Control valve for controlling the speed of movement of the SSR

12.0 SPECIFICATION OF LINEAR BEARINGS

12.1 Static capacity of linear bearing: 1300 kN

12.2 Dynamic capacity of linear bearing: 599 kN

12.3 Rail length required is 1760mm

12.4 Each rail shall be provided with 4 number of bearings.

12.5 Linear bearings shall be with inner seal, end seal and side seal.

12.6 Bearing shall be supplied with normal radial clearance.

12.7 Anti rust protection coating shall be provided on both rails and bearings.

12.8 Total quantity required is 9 sets (each set consists of 1 rail with 4 bearings). 8 numbers for usage in MLP and 1 number as spare.

12.9 Preferred make of linear bearing shall be THK make with model no: NR100LR4SSFM+1760LFF or equivalent make with good reliability.

13.0 INSTRUCTIONS FOR PROCUREMENT OF RAW MATERIAL:

13.1 All the raw material shall be from fresh stock and free from defects like lamination etc.. Re-rolled raw materials are not acceptable. Raw material shall be of reputed make like SAIL, Jindal, Tata, Essar or its equivalent with good reliability. Prior approval shall be obtained for any other makes of Steel for verifying the reliability.

13.2 Material test certificates shall be submitted before fabrication for further clearance.

13.3 All the plate material shall be qualified through UT.

13.4 Record of all the raw materials test certificates are to be maintained, to be produced as and when required.

13.5 Raw material shall be cut only after departmental clearance and material traceability shall be ensured even after cutting the raw material / heat number shall be transferred to the respective cut material also.

13.6 All castings and forgings shall be procured from reputed manufacturer with high reliability. Prior approval shall be taken before procurement for the sub-vendor.

13.7 All fasteners shall be of reputed make like Unbrako, TVS or its equivalent with high reliability

13.8 All paints shall be procured from reputed makes like Berger, Asian, Bombay, Grand ply coats, Shalimar or its equivalent.

14.0 INSTRUCTIONS FOR FABRICATION OF MODULES

As the system is used for launching operation, it demands workmanship of the highest order, in which high level of accuracy in the manufacture of various subassemblies is required in order to meet the stringent accuracy requirements specified for the vehicle mounting surfaces

14.1 After ensuring raw material clearance from SDSC SHAR only plate cutting to be started. latest techniques of computer operated numerical control plate cutting machines are to be used. Heat number of plates shall be transferred to the cut material also.

14.2 Edge preparation is to be carried out on CNC gas cutting machines for smaller thick plates where V type edge preparation is shown in drawing.

14.3 Edge preparation is to be carried out on Milling / Shaping machine for higher thick plates where J type edge preparation is shown in drawing. If V type edge preparation is made for J type joints, material will be rejected.

14.4 Fit up of all plates shall be carried out as per the drawings.

14.5 All welding shall be carried out by qualified and approved welders.

14.6 Welding Electrodes shall be from ESAB, ADOR, D&H or equivalent from any reliable makes only.

14.7 All fabrication works shall be carried out as per instruction given Section C.

14.8 **Major work involved in realisation of MLP is welding. Hence, welding of fabricated modules shall be done round the clock in three shift operation.**

14.9 In each module minimum 8 number of welders are to be deputed in each shift around the clock. For fabrication of 11 modules minimum number of welders to be deputed in each shift is 88.

14.10 Contractor shall use latest welding machines, methods and techniques for high weld deposit rate and timely completion of fabrication.

14.11 Unless otherwise specified on drawings, tolerances for fabrication shall be as per ISO:13920.

14.12 Unless otherwise specified on drawings, all butt welds shall be full penetration welds. All butt welds shall be 100% Ultrasonic test qualified.

14.13 Unless otherwise specified on drawings, all fillet welds shall be 50% of the minimum plate thickness and shall be on both sides of the plate. Also, all weld shall be continuous.

14.14 Welding sequence shall be such that the distortion and residual stresses are minimised. All welds shall be deposited in proper sequence so as to balance the applied heat as far as possible. (A wandering sequence shall be used whenever necessary).

14.15 The procedure to be followed by CONTRACTOR for all weld repairs shall be subject to approval by the PURCHASER

14.16 All the weld joints shall be qualified as per the instructions given in the drawings.

14.17 The overall size of MLP shall be 19.2 m X 19.2 m. To facilitate the aspects of fabrication, transportation, handling and erection of MLP, the pedestal deck shall be made up of modules as per the drawings given (i.e SSR P+, SSR P-, Module 1A,

1B, 1C, 2A, 2B, 2C,2D, Anchor legs, Ground anchors). Further splicing of modules at fabrication shop is not acceptable.

14.18 Chequered plates in side the pedestal deck are shown in drawing as it is to be welded but Chequered plates are to be bolted / screwed to the modules.

15.0 INSTRUCTIONS FOR STRESS RELIEVING OF FABRICATED MODULES

15.1 Structure shall be stress relieved through conventional heat treatment in the furnace as per the standard to eliminate residual stress developed during Welding. Other modes of stress relieving are not accepted.

15.2 Stress relieving shall also be carried out for all the fabricated modules, SSR's, anchor legs, ground anchors, base plate and bearing plate.

15.3 Proper care shall be taken during stress relieving to avoid distortion of plates during stress relieving.

15.4 If Modules 2A, 2B, 2C and 2D can be cannot be accommodated in the furnace, the leg portion of module i.e elevation 2350 to 3200 to be fabricated after stress relieving the module and local stress relieving shall be done for leg portion.

15.5 If modular type furnace is planned, complete module 2A/2B/2C/2D including leg shall be thermally stress relieved.

15.6 If Modular furnace is planned, before stress relieving, modular furnace along with the location of Module, location and quantity of thermocouples shall be reviewed by TPI and ISRO. Modular furnace, location and quantity of thermo couples shall be as per latest IS standard

15.7 Stress relieving charts shall be reviewed by SDSC SHAR.

16.0 INSTRUCTION FOR GRIT BLASTING AND PRIMER PAINTING

16.1 It is preferred to grit blasting to SA 2.5 grade for complete surface of the module including internal surface. and painting the primer for the complete surface as per the painting specification.

17.0 INSTRUCTION FOR MACHINING OF MODULES

17.1 Machining of the modules shall be carried out only after Stress relieving

17.2 Machining of SSR supporting areas shall be done in a single setting and transferring the reference planes to the side surface and machining on the other surface. Axis marking has to be done on the CNC machine itself, inspection of SSR shall be carried out on the machine itself. Hence prior intimation shall be given to purchaser.

17.3 Machining of module-1A or 1C shall be done in single setting, size of module is 6m X 5.5m X 3.6m. Inner diameter of ø4100 of top plate shall be machined. Axis marking of all axis including linear bearing shall be done top plate after machining.

17.4 Drilling tapped holes on Module -1 to be done after matching marking only.

17.5 Machining of modules 2A, 2B, 2C & 2D shall be done in a single setting at MLP leg interface and bogie interface. Size of each module is 9.61mX5.7mX4.4m. Axis

marking on anchor leg interface plate, extending the lines side surface of modules and axis marking on Bogie plate

17.6 All four anchor legs shall be machined in single setup.

18.0 CONTROL ASSEMBLY OF MODULES / TESTING / INSPECTION AT CONTRACTOR'S WORKS:

18.1 Control assembly of all modules and bought out items shall be carried out as per the drawings.

18.2 Top surface accuracy of SSR in combination with interfacing ring shall be 30 arc seconds (±0.25mm). The top face of each SSR shall lie within 2 parallel planes, which are 0.5 mm max.apart, and the mean plane shall make an angle not more than 30 arc seconds with a reference horizontal plane under full load.

18.3 The top surface of two SSRs shall lie within +/- 0.5 mm maximum from the mean position.

18.4 Positioning accuracy for the linear movement of each SSR shall be +/- 0.1 mm.

18.5 Free movement of SSR.

18.6 Dimensional verification.

18.7 After completion of assembly, the assembly shall be inspected for compliance with assembly drawings and for its performance requirements (inclusive of demonstration of specified accuracy for the top vehicle mounting surfaces of SSR). After completion of performance requirements to the entire satisfaction of the PURCHASER, necessary dowels shall be provided between interfaces of all modules before dismantling of shop assembly.

19.0 PACKING, TRANSPORTATION TO SDSC & UNLOADING NEAR ERECTION SITE

19.1 All the modules are to be dismantled from assembly of all modules. All the bought-out items are to packed and to be despatched.

19.2 Suitable party who is capable of transporting oversized dimensions structures are to be hired and to be transported.

19.3 All the modules are to be unloaded near to the erection site.

19.4 Site near the MLP erection consists of soft sandy soil, if required unloading site and approach road shall be developed by contractor for suiting the movement of trailers with modules.

19.5 All tools and tackles, support structures, cranes / hydraulic Jacks for unloading the modules are in the scope of contractor only.

20.0 CIVIL FOUNDATION FOR GROUND ANCHORS

20.1 Four numbers of civil foundation shall be made as per the approved drawings. Four number of civil foundations are suitable for parking one MLP. Foundation involves excavation of 5m deep from the rail top, dewatering, laying of base mat with PCC, laying of reinforcement bars, foundation bolts, stoppers as per the drawings, fixing

of template of ground over the foundation bolts, alignment of foundation bolts and filling of RCC.

20.2 As ground water level in SDSC SHAR is very near to the surface of the ground, continuous dewatering is required from the day of excavation.

20.3 Samples of concrete shall be taken and to be tested as per standard.

20.4 In the drawings elevation of top of concrete is shown as +150mm above the rail top, but actual required elevation of top concrete shall be -375mm (which is below the rail top).

20.5 Ground anchor bottom elevation shall be -325mm.

20.6 Ground anchor top plate elevation shall be +150mm.

20.7 The 50mm gap between top of concrete (-375mm) and bottom of ground anchor (-325mm) shall be filled with grouting cement.

20.8 Size of the foundation shown at the top is 2250 mm X 2250m of 4.1meter depth.

20.9 All the reinforcement rods and foundation bolts will be accounted separately on weight basis for recommendation of payment.

20.10 Final foundation drawings will be given after placement of purchase order.

20.11 After curing of civil foundation (minimum of 15 days), ground anchors to be positioned and alignment to be carried out as per the drawings, verification of alignment and locking of ground anchors. Grouting of ground anchors with Fosroc GP2 conbextra cement.

21.0 ERECTION OF MLP

21.1 Supplier shall select suitable erection agency which is capable of completing erection in 4 months as per delivery schedule given. Supplier shall select any suitable approved erection agency only like M/s Hassan Brother, Chennai, M/s Kutty Brothers, Chennai etc or equivalent party with good reliability.

21.2 Power supply shall be extended from existing panel (415V, 3phase 50 hz, max 300A) around 350 away from erection site. Power cable shall be suitable for welding ten welding machines at a time. Weather proof panel shall be fixed near the MLP erection with minimum 1 incoming and 10 out going connections. Suitable incoming and outgoing breaker / MCB/ ELCB are to be used as safety device.

21.3 Bearing plates shall be positioned on ground anchors as per the drawings.

21.4 Anchor legs to be positioned on bearing plates, alignment to be carried out as per the drawings. Anchor legs are to be fastened and torqued with ground anchors using suitable fasteners and washers.

21.5 Site near the MLP erection consists of soft sandy soil, movement of modules from storage site to erection site and crane approach area all around the erection site may require development of roads or suitable steel plate / wooden sleepers shall be used for crane movement.

21.6 Contractor shall make temporary fencing all around the erection site, to avoid unauthorized entry of contractor team into the launch complex.

21.7 All tools and tackles, support structures, cranes / hydraulic Jacks for unloading the modules are in the scope of contractor only.

21.8 Contractor shall hire suitable crane which is capable of handling modules at a distance away from ground anchors. Suitable crane capacity shall be selected to have minimum of 70t horizontal reach of minimum 20m and 85t at 15m approach.

21.9 Positioning of modules 2A, 2B, 2C, 2D, 3A and 3B, with support structures, alignment of modules with respect to Bogie sitting surface and rail track.

21.10 After alignment of modules, fasteners between modules 2A, 2B, 2C, 2D and anchor legs are to be torqued. Alignment to be reverified.

21.11 The modules shall be rigidly bolted to each other through temporary lug supports which are to be welded on all the modules.

21.12 Welding shall be carried out between modules 2A, 2B, 2C, 2D, 3A and 3B.

21.13 Welding Electrodes shall be from ESAB, ADOR, D&H or equivalent from any reliable makes only.

21.14 All root and final welds shall be qualified by DT test.

21.15 In order to achieve the accuracy requirements specified for the Bogie sitting surface, welding sequence shall be such that the distortion and residual stresses are minimised. All welds shall be deposited in proper sequence so as to balance the applied heat as far as possible. (A wandering sequence shall be used whenever necessary).

21.16 If the gap observed between the adjacent modules are higher than 5mm, suitable thick backup plates are to be used for covering the gap for welding.

21.17 During welding between modules minimum 15 number of welders are to be deputed in each shift and around the clock. For site welding of modules total numbers of welders to be deputed in each shift is 45.

21.18 After completion of all welds between module 2A, 2B, 2C, 2D, 3A and 3B. Module 1A, 1B and 1C to be positioned using crane and shall be supported on support structures.

21.19 All the support structures for modules are in the scope of tenderer only.

21.20 Modules 1A, 1B and 1C are to be aligned with respect to rail track and Bogie surface plates and as per the drawings.

21.21 Welding shall be carried out between modules 1A, 1B and 1C with surrounding modules.

21.22 All root and final welds shall be qualified by DT test.

21.23 In order to achieve the accuracy requirements specified for the module-1 top surface, welding sequence shall be such that the distortion and residual stresses are minimised. All welds shall be deposited in proper sequence so as to balance the applied heat as far as possible. (A wandering sequence shall be used whenever necessary).

21.24 Top surface of linear bearing base plate sitting surface level to be measured. All the eight linear bearing base plate sitting surface shall be corrected using surface scrapping technique by authorised agents.

21.25 After ensuring level of Linear bearing base plate sitting surface as per the drawing, SSR with linear bearings to be assembled on pedestal deck with linear bearings.

21.26 Smooth movement of SSR shall be ensured.

21.27 SSR's shall be in kept at mean position and shall be locked.

21.28 Top interface ring sitting surface level on SSR shall be measured shall be 30 arc seconds (±0.25mm). The top face of each SSR shall lie within 2 parallel planes, which are 0.5 mm max.apart, and the mean plane shall make an angle not more than 30 arc seconds with a reference horizontal plane.

21.29 If required 30 arc seconds accuracy is not achieved on top of interface ring sitting surface level on SSR sitting surface, complete surface shall be corrected using surface scrapping technique by approved agency only or insitu machining of complete surface of interface ring sitting surface shall be machined in single setup..

21.30 Scrapping by nonapproved agency or grinding is not allowed on top of SSR sitting surface.

21.31 If required the Scrapping or insitu machining shall be carried out for Bogie sitting surface also.

21.32 All other miscellaneous items like hoods, cut covers, enclosures, staircases, windows, doors are erected.

21.33 Hydraulic systems for SSR linear motion shall be commissioned.

21.34 After the modules are welded together, the temporary lugs welded to the modules are to be removed. All items like temporary lug supports, fasteners, additional bottom supports / anchor legs, special tools & tackles etc. required during erection at CONTRACTOR's Works as well as at PURCHASER's site shall be supplied by the CONTRACTOR.

21.35 All Handling equipment required for erection of MLP at site shall be mobilised by the CONTRACTOR. No handling equipment will be provided by the DEPARTMENT.

21.36 SDSC SHAR will not provide any stores facility for storing and erection works.

22.0 TESTING AND INSPECTION OF MLP AT SDSC SHAR

22.1 Top interface ring sitting surface level on SSR shall be measured and shall be with in 30 arc seconds (±0.25mm). The top face of each SSR shall lie within 2 parallel planes, which are 0.5 mm max. apart, and the mean plane shall make an angle not more than 30 arc seconds with a reference horizontal plane.

22.2 Positioning accuracy for the linear movement of each SSR shall be +/- 0.1 mm.

22.3 Free movement of SSR.

22.4 Dimensional inspection.

22.5 Movement of MLP with Bogie on rail track.

22.6 Manpower support for mobilization of loads for load testing and deflection measurement and strain measurement.

23.0 TOLERANCE ON MLP STRUCTURE

Sl. No.	Location on MLP	Geometrical Tolerance	Dimensional Tolerance	Remarks
1.	**Ground anchors:**			
1.1	Grouting and levelling of top surface of ground anchors.	Within ± 0.15 mm.	Within ± 0.15 mm	At shop shall be carried out by the contractor for control assembly of MLP.
1.2	Square-ness of positioning of ground anchors.	------	• Center to centre distance: 18000 ± 2.0 mm • Difference of both Diagonal distances shall be less than 4.0 mm.	
2.0	**Anchor legs:**			
2.1	Over all height of individual anchor leg		Within 2150 +2 mm -0mm	
2.2	Flanges at both ends of anchor legs	Flatness and profile of bottom flange surface within 0.1mm and parallelity with top flange within 0.1 mm to be maintained.		During control assembly at shop and before final erection, top surface of four anchor legs to be levelled within ± 0.1 mm.
3.0	**Modules 2A,2B,2C & 2D:**			
3.1	Interface (Surface H) with anchor leg top flange	Flatness and profile to be maintained within 0.1 mm.	------	Shall be witnessed on the CNC machine it self by ISRO / TPI
3.2	Parallelity of anchor leg bolting (Surface H) with bogie resting surface.	Within 0.1 mm.	------	Shall be witnessed on the CNC machine it self by ISRO / TPI
3.3	Parallelity anchor leg bolting Surface (H) with anchor leg top flange with both machined plates (surfaces A and B) provided on central module 1.	Within 0.1 mm.	------	Shall be witnessed on the CNC machine it self by ISRO / TPI
3.4	Overall height of the modules 2A, 2B, 2C & 2D	------	Within 4450 ± 2.0 mm	

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Sl. No.	Location on MLP	Geometrical Tolerance	Dimensional Tolerance	Remarks
	from bottom of anchor bolting surface to top of Machined surface			
4.0	**Module 1:**			
4.1	Machined plates (A&B)	Flatness and profile to be maintained within 0.1 mm.	------	
4.2	Parallelity of Machined plates with anchor leg bolting Surfaces on module 2A,2B,2C & 2D (H)	Within 0.1 mm.	------	
4.3	Height of the module 1	------	Within 3600 ± 2.0 mm	
4.4	Overall height from the ground level (0.00 EL)	------	Within 6800 ± 2.0 mm	
4.5	Distance (7800mm) between the centre to centre of S200 exhaust gas openings.	------	Within 7800 ± 2.0 mm	
4.6	Angle between the both centre axis (parallel to Y+Y- axis) of S200 exhaust gas openings.	------	Shall not be more than 0.1º	
5.0	**Strap-on support Rings (SSRs):**			
5.1	Top surface of SSR	Flatness and profile to be maintained within 0.05 mm.	Must be within ± 0.05 mm	
5.2	Top surface accuracy (flatness and profile) of SSR after assembly of complete MLP including interface ring.	Within 30 arc seconds (±0.25mm) with reference to local horizontal plane.	Must be within ± 0.05 mm	Most critical parameter to be established during control assembly at shop and final erection at site.
5.3	Height of SSR	------	Within 1800 ± 1.0 mm	
5.4	Overall height from the ground level (0.00 EL)	------	Within 8600 ± 2.0 mm	Overall tolerance on specified mean position of 8600 mm.
5.5	Relative levels of top surfaces of both SSRs after assembly of complete MLP.	------	Top surface of both SSRs shall lie within ± 0.5 mm from the mean horizontal	

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Sl. No.	Location on MLP	Geometrical Tolerance	Dimensional Tolerance	Remarks
			plane of 8600 mm.	
5.6	Positional tolerance on PCD 4170mm on each SSR top surface		Ø4170 ± 0.2 mm	
6	**Interface rings**			
6.1	Top & bottom surface of each interface ring	Flatness and profile to be maintained within 0.05 mm.		
6.2	Top surface accuracy (flatness and profile) of interface ring after complete assembly with MLP -SSR	Within 30 arc seconds (±0.25mm) with reference to local horizontal plane.	Must be within ± 0.05 mm	Most critical parameter to be established during control assembly at shop and final erection at site.
6.3	Positional tolerance on PCD 4030mm & 4170mm on each SSR top surface		Ø 4030 ± 0.2 mm Ø 4170 ± 0.2 mm	
7	**Interfaces on top of MLP**			
7.1	Interfaces for L110 RFDS hoods on Module-1 top surface		Within ± 0.2 mm	As mentioned in MLP tender drawings
7.2	Interfaces for Retractable arms on Module-3A & 3B top surfaces		Within ± 0.2 mm	-do-

24.0 CODES AND STANDARDS

24.1 All equipment, systems and works covered under this specification shall comply with all currently applicable statutes, regulations, standards and safety codes in the locality where the equipment will be installed

24.2 In particular, the latest editions of following standards are applicable:

Steel for general structural purposes	:	IS 2062
Rolled Sections and Special sections	:	IS 808, IS 1161, IS 1173, IS 1252, IS 1730, IS 1731, IS 1732, IS 1863, IS 1864, IS 2314

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24.3 Other national standards established to be equivalent or superior to the codes and standards specified are also acceptable. The SUPPLIER shall furnish English translation of all standards specified in this specification

24.4 In the event of any conflict between the codes and standards referred to in the specification and the requirements of this specification, the more stringent of these requirements shall govern

24.5 Unless indicated otherwise, all codes and standards referred to in this enquiry specification shall be understood to be the latest version on the date of offer made by the Supplier

25.0 SURFACE PREPARATION AND PAINTING

25.1 All the shop-fabricated items shall be Grit blasted, primer painted, after stress relieving and before machining.

25.2 All the site fabrication items also shall be Grit blasted and primer painted before erection.

25.3 After completion of erection / before despatch of machined items to SDSC, all the damaged primer painted area shall be rectified. After primer painting, the total surface shall be final painted with sufficient number of coats using air-drying silicone aluminium paint which will be suitable to withstand 600°C, having a DFT of 40 microns

25.4 **Preparation of Surface**: All surfaces to be painted shall be clean, dry and free from oil, grease, dirt, dust, corrosion and weld spatters. Any other surface contaminant except tightly bonded residues of mill scale rust is permissible to a limit of not more than 5% of whole surface and a maximum of 10% on any particular square inch area. Surfaces that may become inaccessible after erection or installation or both, shall be prepared and painted while still accessible as per the same procedure mentioned above

25.5 Grit blasting: The entire surface of all the fabricated materials is to be Grit blasted as per near white quality of steel structures painting council (SSPC) standard of SA 2.5 of SIS 055900. The surface profile after blasting shall be between 37-65 microns and should be of jagged in nature. Hand cleaning shall be carried out by chipping and scraping followed by wire brushing/abrasive wheels for items for which surface preparation is difficult by Grit blasting after taking approval from purchaser / TPIA. All surfaces shall be degreased using a suitable solvent to remove oil and grease and shall be dried off before painting

25.6 Painting scheme: Immediately after Grit blasting, one coat of inorganic zinc silicate primer shall be applied to a dry film thickness (DFT) of 65 microns (minimum). The second coat of same primer paint shall be applied after completion of SDSC SHAR site final assembly and welding works on total MLP surface. The Final coat of 40 microns of Air drying silicone aluminium paint suitable to withstand 600 oC shall be given.

Sr. No.	Layers	Paint	Dry Film Thickness (DFT) (µm)
1.	Primer	Inorganic Zinc Silicate	65 (minimum)

2.	Final Coat for MLP	Airdrying Silicone Aluminimium	40 (minimum)
3	Final coat for hand rails, internal path ways, external stair cases etc.,	Aliphatic, acrylic, poly urethane finish paint	40 (minimum)

25.7 All paint and primer shall be of standard quality and procured from approved standard, manufacturers only.

25.8 Machine finished surfaces shall be protected against corrosion by a rust inhibiting coating that can be easily removed prior to erection or which has characteristics that make removal unnecessary prior to erection

25.9 Second primer coating and final HR painting shall only be done after the structure is erected, levelled, plumbed, aligned and welded/connected in its final position, tested and commissioned

25.10 Items like staircase, Handrails, internal pathways, etc. shall be painted with Acrylic Aliphatic Polyurethane Paint of colour as mentioned by purchaser at the time of commissioning to a thickness of 65 microns.

25.11 Paints supply shall be checked for shelf life to meet the requirements before application. Proper action shall be taken well in advance prior to actual usage

25.12 Paint Specification

(a) Inorganic Zinc Silicate Primer:

- Two part, self-cured
- Dry temperature resistance to 400^0 C
- Minimum shelf life of 12 months
- Minimum coverage of 9 sq./litre at 65 microns minimum
- Volume of solids 60% (minimum) by weight and 80% of zinc in dry film by weight
- No mud cracking at an applied thickness of 75 microns.

(b) Air drying silicone aluminium paint

- Temperature resistance up to 600^0 C continuous
- Single component, Self-cured
- Resin base: Silicon
- Volume of solids 25% minimum
- Excellent adhesion by cross hatch test
- Minimum shelf life 12 months.

(c) Acrylic aliphatic, non- yellowing Polyurethane finish paint

- Two part, self-cured
- volume of solids 40% minimum
- Surface dry- 1 hour, hard dry- over night
- Suitable for spray and hand paint (Brush) applications
- Finish Smooth and high glossy appearance
- Minimum coverage of 8 sqm /litre at 40 microns DFT minimum
- Good Flexibility & adhesion properties, no visible damage and detachment of film.
- Pot life : 3 hours and shelf life : 12 months (minimum)
- Protection against corrosion under the conditions of condensation
- The film when dry It shall be free from sags, runs, streaks, chalking, cracking and any other such film defects.
- Resistance to oil, water and solvents.

26.0 SPECIFIC REQUIREMETNS / INSTRUCTIONS TO BIDDERS

26.1 In case of any deviations from the technical specifications, the bidder shall indicate the same in Schedule of deviations. If no deviations are listed in the schedule of deviations, it shall be considered that the SUPPLIER complies in total with the technical specifications. Any deviations indicated elsewhere other than schedule of deviations in the offer will not be accepted.

26.2 Any items which may not have been specifically mentioned herein but are needed to complete the equipment / system shall also be treated as included and the same shall also be furnished and erected, unless otherwise specifically excluded as indicated.

26.3 All Jigs and fixtures, tools and tackles required during various stages of execution of order right from manufacture at shop to the erection and testing at site shall be in the scope of the Contractor

26.4 The SUPPLIER shall specify all the Design modifications which he considers are necessary for him to carry out in order to meet the guarantee requirements. The details of design modifications proposed to be carried out shall be attached as Annexure to the Schedule of Deviations from Technical Specifications

27.0 QUALITY ASSURANCE PLAN / SCOPE OF INSPECTION

27.1 Supplier shall hire any International reputed third party inspection agency like M/s Lloyds, M/s MN Dastur, M/s DNV, M/s Bureau veritas, M/s Mecon or equivalent for third party inspection of during various stages as per QAP.

27.2 Raw Material Inspection shall be carried out at the SUPPLIER'S works for compliance of the raw materials to the specified standards.

27.3 Bought out components shall be inspected either at SUPPLIER'S works or at the SUB-CONTRACTOR'S premises for compliance with the Specifications.

27.4 Fabricated components shall be inspected at the Supplier's works for compliance with the component drawings. Sub-Assemblies shall be inspected at the Supplier's works for compliance with the Sub-Assembly drawings and for performance requirements. Also, full Assembly of the MLP shall be inspected at Supplier's works after control assembly for compliance with assembly drawings and performance requirements.

27.5 Assembly / Site welding of the MLP shall be inspected at Purchaser's premises at every stage during assembly for compliance with the Assembly Drawings and performance requirements.

28.0 TENDER EVALUATION AND PENALITY FACTOR

28.1 The SUPPLIER shall comply with all systems / parameters specified in this document.

28.2 Deviation from the specifications, if acceptable to the PURCHASER insofar as practicable, will be converted to rupee value and added to the bid price to compensate for the deviation from the specification. In determining the rupee value of the deviations, the PURCHASER will use the parameters consistent with those specific in the documents and specifications and other information as necessary and available to the PURCHASER

29.0 DATA TO BE FURNISHED ALONG WITH BID AND AFTER AWARD OF CONTRACT

The SUPPLIER shall ensure that the following documentation are prepared and submitted to PURCHASER for his review / record.

29.1 *Along with the bid*:

29.1.1 Description of the equipment offered along with catalogues, drawings, etc. along with deviations from Technical Specification and proposed Design modifications.

29.1.2 All data sheets mentioned in annexures (F2 to F10) of the tender specification, duly filled in as applicable.

29.1.3 All the prequalification documents mentioned in Annexure-F2.

29.1.4 Bar chart for supply & erection schedule indicating the date of completion of various activities so as to complete the execution of the contract within the time frame stipulated in the Tender Specification.

29.2 After award of contract.

29.2.1 Schedule of Assembly & Detailed drawings and documents to be submitted for review & approval with submission dates.

29.2.2 Quality Assurance Plan (QAP)

29.2.3 Bar chart for supply & erection schedule indicating the date of completion of various activities so as to complete execution of the contract within the time frame stipulated in the LOI / Purchase order.

Signature of the Supplier for accepting of specification mentioned above

29.2.4 Progress Reports.

29.2.5 Along with Invoice for a particular item, all the inspection documents related to the particular item are to be re-submitted.

29.2.6 The above list of documents is indicative and not exhaustive. The Supplier/Contractor shall submit documents as specified in various sections/annexures of this specification and also as per the specific instructions of the PURCHASER

30.0 FINAL DOCUEMENTS

30.1 CONTRACTOR shall submit two copies of operation and maintenance manuals of bought out items well before the despatch of the equipment. The manual shall be in sufficient detail with step by step instructions to enable others to inspect, erect, commission, maintain, dismantle, repair, reassemble and adjust all parts of the equipment. Each manual shall also include a complete set of approved as built drawings together with performance / rating curves / charts of the equipment, maintenance schedule and test certificates wherever applicable.

30.2 CONTRACTOR shall submit all the raw material test certificates, ultrasonic testing of the raw material, UT certificates of all necessary welds, stress relieving charts, Hardness test certificates and dimensional inspection of individual components, load test and performance reports for the total system.

30.3 Quality assurance documentation compiled for the project.

SECTION- C

WELDING SPECIFICATIONS FOR SHOP & SITE FABRICATION ITEMS

WELDING SPECIFICATIONS

1.0 SCOPE

This specification shall apply to shop and site fabrication of all welded joints in carbon steel and low alloy steel. The specification shall apply to all the joints indicated below:

(a) Butt joints produced by double sided welding which produce the same quality of deposited weld metal on both inside and outside weld surfaces

(b) Butt joints produced by single sided welding having backing strip which remains in place and full penetration butt weld without backing strip

(c) Corner or those joints connecting two (2) members approximately at right angles to each other in the form of L or T.

(d) Partial penetration welds of the groove type which are used for connections not subjected to external loading

(e) Fillet welded joints of approximately triangular cross-section joining two surfaces at approximately right angles to each other and having a throat dimension at least 70% of the thinner of the parts being joined but not less than 6 mm.

(f) Any other similar joint which is not specified above but may be encountered during fabrication

2.0 CODES AND STANDARDS

2.1 The welding equipment, welding consumables, preheating, Post weld Heat Treatment (PWHT), other auxiliary functions and welding personnel shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment are to be fabricated and installed. Nothing in this specification shall be construed to relieve the CONTRACTOR of this responsibility. Specifically, the latest editions of the codes and standards listed below shall apply:

(a) ASME Boiler and Pressure Vessel Code (BPV Code), Section II Part C - Material Specifications for Welding Rods, Electrodes, and Filler Metals
(b) ASME BPV Code, Section V - Non-destructive Examination (NDE)
(c) ASME BPV Code, Section VIII Division 1- Rules for Construction of Pressure Vessels
(d) ASME BPV Code, Section IX - Welding and Brazing Qualifications
(e) American Society of Non-destructive Testing (ASNT) SNT-TC-IA- Recommended Practice
(f) Indian Boiler Regulations (IBR)
(g) Any other codes and standards specified in Section B/E2/E3.

2.2 The codes and standards listed in para 2.1 forms an integral part of this specification. In the event of conflict between this specification and the codes and standards, the more stringent shall govern.

2.3 If no specific requirements are given in this specification, the requirements of the applicable code shall govern.

3.0 WELDING PROCESSES

The following welding processes shall be used:

3.1 GAS TUNGSTEN ARC WELDING (GTAW)

3.1.1 The root pass of single-sided groove welds without backing

3.1.2 Full penetration nozzle connection where other side is inaccessible

3.1.3 Any butt and fillet weld on equipment with thickness 5 mm or less

3.1.4 For all passes of butt and fillet welding of nozzles on equipment and integral piping of size 50 mm NB or smaller

3.2 Shielded Metal-Arc Welding (SMAW)

3.3 SUBMERGED ARC WELDING (SAW)

Maximum weld deposit per pass shall be 12.7 mm for carbon steel (P-1) and 9.5 mm for other materials.

3.4 Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW) processes

3.5 Other processes such as plasma-arc and electro-slag welding may be used only with the approval of the PURCHASER and depending upon the process and application proposed. These processes may require testing in addition to that specified by the governing procedure qualification code.

3.6 Table 1 gives recommendations for welding processes to be used for carbon, low alloy and austenitic stainless steels.

4.0 WELDING CONSUMABLES

4.1 The SUPPLIER / CONTRACTOR shall provide, at no additional cost, all the welding consumables such as electrodes, filler wires, flux, oxygen, acetylene and argon etc., in order to complete the welding in all respects. The consumables shall be from reputed and approved manufacturers. All the consumables shall be approved by the PURCHASER/TPI.

4.2 The electrodes and filler wires shall be of the class specified in Table 1 Welding Specification Chart.

4.3 Electrode qualification test records shall be submitted for the PURCHASER's approval. The SUPPLIER / CONTRACTOR shall also submit batch test certificates from the electrode manufacturer for physical and chemical tests.

4.4 Electrodes shall be in sealed containers and adequate care shall be taken for storage, strictly in accordance with the manufacturer's recommendations.

4.5 Electrodes, which have been removed from the original containers, shall be kept in baking ovens as per the manufacturer's recommendations and, once these are taken out, shall be consumed within the time limits stipulated by the manufacturer. Care shall be taken in handling the electrodes to prevent any damage to the flux covering. Portable ovens shall be used for carrying the electrodes from the main oven to the field. Electrodes of different specifications shall be stored in different compartments of a baking oven to avoid mix up.

4.6 The electrodes, filler wires and flux used shall be free from contamination such as rust, oil, grease and such foreign matter.

4.7 Low hydrogen electrodes shall be used for weld joints in carbon steel if the wall thickness exceeds 19 mm and low alloy steel of all thicknesses except that non-low hydrogen electrodes shall be permitted for the root pass of carbon steel only.

4.8 If ultimate tensile strength of base material permits, E 6010 electrodes may be used, for root pass of butt welds and for fillet welds, in carbon steel.

5.0 WELDING QUALIFICATIONS

5.1 Qualification of the welding procedures to be used and the performance of welders and welding operators shall conform to the requirements of the BPV Codes and Section IX. For equipment under the purview of IBR, these shall also meet the requirements of IBR.

5.2 No production welds shall be undertaken until the qualification requirements are completed to the satisfaction of the PURCHASER.

5.3 When impact testing is required by the code or by the specification, these requirements shall be met in qualifying welding procedures.

5.4 The CONTRACTOR shall be responsible for qualifying any welding procedure, welders and welding operators intended to be deployed. The CONTRACTOR shall submit the Welding Procedure Specification (WPS) for acceptance by the PURCHASER. After approval by the PURCHASER,

Signature of the Supplier for accepting of specification mentioned above

the procedure qualification test shall be carried out by the CONTRACTOR, at his own expense, duly witnessed by the PURCHASER. A complete set of test results, in specified format, shall be submitted to the PURCHASER for approval immediately after completion of procedure qualification test. All tests as required by the BPV code Section IX or IBR shall be carried out. The WPS shall require re- qualification, if any of the essential variables or supplementary variables is altered.

5.5 Welders and welding operators shall be qualified in accordance with BPV Code and Section IX or IBR, as applicable. The qualification shall be carried out in the presence of the PURCHASER. Only those welders and welding
operators who are qualified by the PURCHASER shall be deployed on the job. For equipment under the purview of IBR, approval of the local IBR inspector shall be obtained by the CONTRACTOR.

5.6 Welders and welding operators shall always keep their identification cards with them and shall produce them on demand. The CONTRACTOR shall issue the identity cards after the same are duly certified by the PURCHASER. Welder or welding operator, who is not in possession of the identity card, shall not be allowed to work.

5.7 The CONTRACTOR shall use forms as per BPV code, section IX, form QW-482, form QW-483 and form QW-484. Other forms are also acceptable subject to approval by the PURCHASER.

5.8 Unless agreed otherwise, the CONTRACTOR shall advise the PURCHASER, in writing, at least three (3) weeks before any welder or welding operator is deployed on the work, the names and qualifications of the proposed welders, welding operators and welding supervisors. It shall be the CONTRACTOR's responsibility to ensure that all welders and welding operators employed by him or his SUB-SUPPLIERS/SUB-CONTRACTORS, on any part of the work either in the CONTRACTOR's or his SUB-SUB-CONTRACTOR's works or at site are fully qualified as required by the code. Each welder and welding operator shall qualify for all types of welds, positions and materials or material combinations he may be called upon to weld.

5.9 Should the PURCHASER require to qualify or requalify any welder or welding operator, the CONTRACTOR shall make available, at no extra cost to the PURCHASER the men, equipment and materials for the tests. The cost of testing the welds shall be borne by the CONTRACTOR.

5.10 Welding supervisors shall have qualifications such as engineering degree or engineering diploma in welding technology with adequate knowledge of welding consumables, welding machines, NDE and a minimum of five (5) years of experience in supervising welding of joints.

5.11 All welding, including the tacking up of all welds shall be carried out by qualified welders and welding operators as per approved WPS. Any weld made by other than a qualified welder or welding operator or not carried out as per approved WPS shall be cut out and re-welded.

5.12 For purposes of identification and to enable tracing full history of each joint, each welder and welding operator employed on the work shall be given a designation.
The welder and welding operator's designation and the date on which the joint was made, shall be stamped near the relevant joint and on the relevant drawings also. Copies of the drawings so marked shall be furnished to the PURCHASER for record purposes. For austenitic stainless steels, welder and welding operator's designation shall be applied with water -proof paint or by etching or stencilling machine that is not detrimental to the metal. Alternatively, record cards may be used.

5.13 For each welder and welding operator, a record card shall be maintained showing the procedures for which he is qualified. These cards shall note the
production welds, the date of the welding done, the type of defects produced and their frequency. The record shall be reviewed once in a week by the PURCHASER and those welders and welding operators whose work required a disproportionate amount of repair shall be disqualified from welding. Re-qualification of welders and welding operators disqualified more than three (3) times shall be entirely at the discretion of the PURCHASER. As far as possible, the qualification shall be carried out at the location (site or shop) where the actual fabrication and welding work is to be carried out.

6.0 PREPARATION FOR WELDING

6.1 Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects, which would adversely affect the quality of the weld. All welding faces and adjoining surfaces, for a distance of at least 50 mm from the edge of the welding groove or 12 mm from the toe of the fillet in the case of socket welded or fillet welded joints, shall be thoroughly cleaned of rust, scale, paint, oil or grease, both inside and outside.

6.2 Joints for welding shall be as per the project specifications and approved fabrication drawings.

6.3 Butt joints shall be prepared as per ASME BPV Code Section VIII Division 1, unless specified otherwise. For equipment under the purview of IBR, these shall be as per IBR. Any other end preparation which meets the WPS is acceptable.

6.4 Internal misalignment shall be reduced by trimming but such trimming shall not reduce the finished wall thickness below the required minimum wall thickness. Trimming shall not be abrupt. It shall be tapered with a minimum

slope of 1:3. Root opening of the joint shall be within the tolerance limits of the WPS.

6.5 Welds shall be as per ASME BPV Code Section VIII Division 1 or in accordance with IBR for equipment under the purview of IBR.

6.6 Reinforcing pads and saddles shall have a good fit with the parts to which they are attached. A tell-tale hole shall be provided on the side of any pad or saddle to reveal leakage in the weld and to allow venting during welding and heat treatment. Pad or saddle shall be added, after the branch weld has undergone satisfactory visual and NDE.

6.7 The ends shall be prepared by machining, grinding, flame cutting or plasma cutting. Where flame cutting is used, the effect on the mechanical and metallurgical properties of the base metal shall be taken into consideration.

Flame cutting of alloy steel is not advisable. If alloy steel is cut using flame, the heat affected zone shall be removed completely by grinding and/or machining. Magnetic Particle (MT) or Liquid Penetrant (PT) testing shall be carried out to ensure soundness of edges. However, flame cutting of carbon steel is permitted. Wherever practicable, flame cutting shall be carried out by machine. Machine flame-cut edges shall be substantially as smooth and regular as those produced by edge planning and shall be cleaned free of slag.

Manual flame cutting shall be permitted only where machine flame cutting is not practicable and with the approval of the PURCHASER, and such surfaces shall be ground or dressed to a smooth finish as required by the specification and to the satisfaction of the PURCHASER. Slag, scale or oxides shall be removed by grinding to bright metal at least two (2) mm beyond the burnt area.

6.8 Thermal cutting of carbon steel shall be performed under the same conditions of preheating and PWHT as for the welding of each class of material. However, PWHT is not required when:

(a) The heat affected zone produced by thermal cutting is removed by mechanical means immediately after cutting. However, in any case, all remaining slag, scale or oxides shall be removed by grinding to bright metal at least two (2) mm beyond the burnt area, or

(b) Thermal cutting is part of fabrication, manufacturing or erection sequence leading to a weld end preparation where welding immediately follows.

6.9 On austenitic stainless steels, plasma cutting, machining or grinding methods shall be used for edge preparation. Flame cutting is not permissible. Cut surfaces shall be machined or ground smooth after plasma cutting. Stainless steel materials shall be ground with Al_2O_3

grinding wheels and cleaned with stainless steel wire brushes.

6.10 Before fitting up the weld joint, the profile and dimensions of the weld end preparation shall be checked by the PURCHASER. If the specified tolerances are exceeded, this shall be corrected (with prior approval) by grinding, machining or any other method acceptable to the PURCHASER.

6.11 Fit-ups shall be examined by the PURCHASER prior to welding the root pass.

7.0 TECHNIQUE AND WORKMANSHIP

7.1 Stainless steel welding shall be carried out at a location away from carbon steel welding.

7.2 Components to be welded shall be aligned and spaced as per the requirements of the code and WPS.

7.3 Alignment and spacing shall be achieved using suitable wires to maintain the gap. These shall be removed after tack welding. The ends to be welded shall be held using suitable clamps, yokes or other devices which will not damage the surfaces in any manner. It shall be ensured that welding operations do not result in distortions.

7.4 Earthing shall be provided on the job using earthing clamps of similar material as ISSUE the job. Earthing shall not be given through welding rotators.

7.5 Tack welds at the root joint, for maintaining joint alignment, shall be made only by qualified welders or welding operators and with filler metal equivalent to that used in the root pass. Tack welds shall be fused with the root pass weld, except that those which have cracked shall be removed. Peening is prohibited on the root and final passes of a weld. The required preheat shall be maintained prior to tack welding. Means shall be made available to measure preheat temperature.

7.6 No welding shall be carried out if there is any impingement in the weld area of rain, snow, excessive wind or if the weld area is wet.

7.7 Irrespective of the class of steel, root runs shall be made without interruption other than for changing the electrodes or to allow the welder or welding operator to reposition him. Root runs made in the shop may afterwards be allowed to cool by taking suitable precautions to ensure slow cooling e.g. by wrapping in a dry asbestos blanket. Welds made at site shall not be allowed to cool until the thickness of weld metal deposited exceeds one third of the final weld thickness or 10 mm, whichever is greater.

7.8 When welding alloy steels, it is strongly recommended that interruption of

welding be avoided. Where such interruption is unavoidable, either the preheat shall be maintained during the interruption or the joint shall be post heated or wrapped in dry asbestos blankets to ensure slow cooling. Before recommencing welding, preheat shall be applied again.

7.9 Welded-on bridge pieces and temporary attachments shall preferably be avoided. Where approved by the PURCHASER, these may be used. Material of these shall be compatible with material with which they are temporarily welded. All such pieces shall be removed after welding of joints and the weld area ground flush. These areas shall be subjected to MT and PT examination. These pieces shall be welded by qualified welders and welding operators and with electrodes compatible with the parent material. The preheating requirements of material shall be applied and maintained during the welding of attachments. These temporary attachments shall be removed by grinding, chipping, sawing or by arc or flame gouging. When arc or flame gouging is used, at least three (3) mm of metal shall be left around the surface which shall be removed by grinding. This metal shall not be removed by hammering or by use of force.

7.10 The arc shall be struck only on those parts of parent metal where weld metal is to be deposited. When inadvertent arc-strikes are made on the base metal surfaces outside the joint groove, the arc-strikes shall be removed by grinding and shall be examined by MT and PT procedures.

7.11 Oxides shall not be permitted to form during welding or heat treatment or both, on the internal surfaces which will not be subsequently cleaned. Inert gas purging is an acceptable method to prevent such oxidation. All joints in materials which contain more than 1¼ % chromium shall be purged to assure that less than 1% of oxygen is present on the joint underside before initiation of the welding. The purging operation shall be maintained for a minimum of two (2) passes.

7.12 Argon gas used in GTAW process for shielding and purging shall be at least 99.95% pure. Purging shall be carried out at a flow rate depending on diameter until at least five (5) times the volume between dams is displaced. In no case shall the initial purging period be less than 10 minutes. After initial purging, the flow of the backing gas shall be reduced to a point where only a slight positive pressure prevails. Any dams used in purging shall be fully identified and removed after welding and accounted for in order to avoid leaving them in the system. The rate of flow for shielding purposes shall be established in the procedure qualification.

7.13 Thorough check shall be exercised to maintain the required inter-pass temperature.

7.14 All equipment necessary to carry out the welding, for supporting of the work, for preheating and PWHT including thermal insulation for retaining the heat and for the protection of the welder and welding operator shall be provided

by the CONTRACTOR at no extra cost. All necessary precautions shall be taken during cutting and welding operations. It shall be ensured that proper ventilation is available in the welding area and adequate protective gear such as goggles, masks, gloves, protection for the ears and body are used at all times. For guidelines refer ASME standard Z49.1, “Safety in Welding and Cutting”.

7.15 After deposition, each layer of weld metal shall be cleaned with a wire brush to remove all slag, scale and defects, to prepare for the proper deposition of the next layer. The material of wire brush shall be compatible with parent material. Stainless steel materials shall be cleaned with grinding wheels or stainless steel brushes which have not been used on other materials. Either aluminium oxide or silicon carbide grinding wheels shall be used. Special care shall be taken to secure complete and thorough penetration of the fusion zone into the bottom of the weld. It is recommended that the root run be checked by MT or PT procedures for critical equipment.

7.16 If specified, upon completion of welding, the joints shall be wrapped in dry asbestos blankets to ensure slow cooling, unless PWHT is applied immediately.

7.17 No welding or welded parts shall be painted, plated, galvanised or heat treated until inspected and approved by the PURCHASER. Welds shall be prepared and ground in such a way that the weld surfaces merge smoothly into the base metal surface, particularly for welds which are to undergo NDE.

7.18 Except where necessary to grind flush for NDE, reinforcement for butt welds may be provided. The height of such reinforcement shall meet the requirements of the code. The reinforcement shall be crowned at the centre and tapered on each side of the joined members. The exposed surface of the weld shall be ground where required to present a workmanlike appearance and shall be free from depressions below the surface of the joined members. The exposed surface of the butt welds shall be free from undercuts, overlaps or abrupt ridges or valleys and shall merge smoothly into the surface at the weld toe.

7.19 Repair of weld metal defects shall meet the requirements of the code.

7.20 Any weld repair shall be subject to the approval of the PURCHASER.

7.21 In the event of several unsuccessful repair attempts or if the PURCHASER feels that a satisfactory repair is not feasible, the joint shall be completely remade.

7.22 It is preferable to use welding rectifier or DC generator for welding of austenitic steels and while using low hydrogen electrodes.

7.23 IDENTIFICATION OF WELDS

Wherever code symbol stamps are required on carbon steel and ferritic alloy steel they shall be applied directly on to the member with low stress dotted design metal die stamps or to a small stainless steel plate especially provided for such marks. These plates shall be lightly tack welded using electrodes, of diameter three (3) mm or less, of the type specified for the material. Before making the required tack weld, the material in the immediate surrounding area shall be preheated, as required, by electric means or propane or natural gas burners. Cooling shall take place under asbestos insulation in a draft-free area. Stress relieving of these welds is not required. Steel stamping directly on the surface of alloy steel with other than low stress die stamps shall not be used.

7.24 SEAL WELDS

7.24.1 Seal welding shall be carried out by qualified welders and welding operators and in accordance with approved drawings.

7.24.2 Threaded joints that are to be seal welded shall be made without the use of thread lubricating compound. Seal weld shall cover all exposed threads.

7.25 WELD ENCROACHMENT AND MINIMUM DISTANCE BETWEEN WELDS

7.25.1 Welded joints, more specifically longitudinal welds, shall be placed not closer than 50 mm to opening or branch welds, reinforcements, attachment devices or from supports etc. In case of deviation, the PURCHASER may specify additional NDE.

7.25.2 The longitudinal welds of two adjacent components shall be staggered by at least 30^{o}. The minimum distance between welds shall be 50 mm or three (3) times the wall thickness, whichever is greater. Intersection of welds shall be avoided as far as possible. If such welds are present, they shall be subject to suitable NDE at the discretion of the PURCHASER.

8.0 PREHEATING

8.1 Preheating prior to tack welding, welding and thermal cutting shall be used as a means of crack prevention and improving weld reliability. The general requirements of PWHT also apply to preheating.

8.2 Preheating shall be used as per the recommendations of ASME BPV Code Section VIII Division 1. For equipment under the purview of IBR, the requirements of IBR shall govern. Preheating of austenitic stainless steels is not required, except at low ambient temperatures, in which case a minimum preheat temperature of $10^{o}C$ is recommended. Table 2 gives the requirements of preheating for commonly used materials.

8.3 The preheating zone shall extend 75 mm or a distance equal to four (4) times the material thickness, whichever is greater, beyond the edge of the weld.

8.4 The preheat temperature shall be measured at least 75 mm away from the weld preparation.

8.5 Where preheating is specified, welding shall continue without interruption. In case interruption cannot be avoided, preheating shall be carried out before re-commencement of welding.

8.6 Oxy-acetylene preheating shall not be applied.

8.7 For preheating, fuel gas/air torches, burner systems (high velocity gas or oil burners) or electrical heating may be used either locally or in a furnace. For preheating above 250^{o}C, electric heating (resistance or inductive heating) is recommended.

8.8 Approved temperature - indicating crayons, thermocouples or digital contact or laser pyrometers shall be used to measure preheat and inter-pass temperatures. A calibration report of the pyrometers and thermocouples shall be available.

8.9 When the preheat temperature is 150^{o}C or higher, the metal shall be maintained at or above the preheat temperature until the weld is completed.

8.10 The welding of groove welds in low alloy steels of P-3 to P-5 groups with wall thickness of 19 mm or greater may only be interrupted, provided at least 10 mm of weld metal is deposited, or 25% of the welding groove is filled, whichever is greater. If the welding is interrupted prior to the above, the weld area shall be adequately covered with insulating material to ensure slow cooling. After cooling and before welding is resumed, visual examination of the weld shall be performed to assure that no cracks are formed. Required preheat shall be applied before welding is resumed.

9.0 POSTWELD HEAT TREATMENT

PWHT shall meet the requirements of ASME BPV Code Section VIII Division 1. Table 3 summarises the PWHT requirements for commonly used materials. For equipment under the purview of IBR, PWHT shall be as per IBR.

9.1 GENERAL REQUIREMENTS

9.1.1 A complete automatic temperature recording shall be made of preheating and stress relieving operations. Where propane gas burners or electrical resistance coils are employed, a complete temperature record of the preheating and stress relieving operation shall be made by means of a bo

type potentiometer. Other means of recording temperatures are permissible subject to the PURCHASER's approval.

9.1.2 Stress relief may be local or full furnace. Local stress relief shall be performed with electric induction or electric resistance coils. Suitable gas burning equipment using natural gas or propane may be employed.

9.1.3 At no time during a stress relieving/preheating cycle shall any water or liquid cooling medium be employed.

9.1.4 Where members being joined are unequal in thickness, the dimension of the heavier section shall govern the selection of width of the heated band and the
duration of the holding period shall be based on maximum weld thickness.

9.1.5 For local stress relief, using electrical methods, a minimum of two (2) thermocouples tack-welded to the surface and potentiometers shall be used on the part under at least four (4) layers of asbestos paper. The hot junctions of the thermocouples shall be located on either side of the joint at least 12 mm from the edge of the joint but no further away than 100 mm. When employing induction heating, at least six (6) turns of induction cable shall be used on each side of the weld. Induction coils shall be wrapped on top of the asbestos paper protecting the thermocouples with the first turn approximately 150 mm from the centre of the weld.

9.1.6 Local stress relief using gas torches or ring burners may be employed. However, the procedure shall be limited to small items and shall be approved by the PURCHASER.

9.1.7 The stress relieving temperature shall be maintained for a period of time proportioned on the basis of one (1) hour per 25 mm of weld thickness at the joint, but in no case less than one (1) hour.

9.1.8 For piping joints and socket welded joints, pads, bosses, branch welds and couplings, one (1) thermocouple shall be positioned at a minimum distance of two (2) pipe wall thicknesses from the weld.

9.1.9 Equipment on both sides of any joint shall be adequately supported throughout the preheating, welding and stress relieving operations to prevent distortion.

9.1.10 All heating and cooling rates shall be maintained as per ASME BPV Code and time-temperature charts from the recorder shall be made available for review and acceptance.

9.1.11 The CONTRACTOR shall submit a detailed written procedure for the PWHT for the approval of the PURCHASER.

9.2 CARBON STEEL

9.2.1 Welded joints in carbon steel shall be stress relieved, upon completion of the welding operation, in accordance with Table 3.

9.2.2 When local stress relief is employed, the welded joint shall be heated to a temperature of not less than 600°C. The temperature level shall be maintained between 600 and 650°C, one (1) hour per 25 mm of weld thickness but in no
case less than one (1) hour. The weld area shall then be allowed to cool undisturbed in still air to a temperature not exceeding 315°C.

9.2.3 Heating and Cooling

Carbon steels, after having reached their specific stress relief temperatures, may be cooled in the furnace or under wraps, i.e., leaving the induction coils or resistance heaters and insulation in place. This means that, at the stress relief temperatures, the power to the furnace or heating coils may be shut off and cooling takes place in the furnace or with all insulation and coils remaining on the part. For furnace stress relief, the doors of the furnace may be opened after the power is shut off, at or below 315°C. Thermocouples controlling the temperatures shall remain during the cooling cycle so that excessive cooling, if

it occurs, can be observed and immediately corrected. The stress relieving coils and insulation shall only be removed after the part has cooled to below 315°C or if stress relieved in a furnace the part may be removed from the furnace and permitted to cool in still air at a temperature not below 10°C.

9.3 ALLOY STEEL

9.3.1 Welds in alloy steel shall be stress relieved after the welding operation in accordance with Table 3. After welding, the material shall be wrapped in asbestos and allowed to cool slowly if PWHT is not carried out immediately.

9.3.2 For full furnace stress relief of a welded assembly, the entire fabricated section shall be heated uniformly to the temperature specified. The temperature shall be maintained for a period of time proportioned on the basis of one (1) hour per 25 mm of weld thickness of the piece having the greatest weld thickness in the furnace charge, but in no case, less than one (1) hour.

10.0 ELECTRODES

10.1 The specification and size of the electrodes, voltages and amperages, thickness of beads and number of passes shall be as specified in the approved welding procedure or otherwise agreed in writing. Only basic coated electrodes shall be used, which will deposit weld metal having the same or higher physical properties and similar chemical composition to the members being joined. For each batch of approved brand, certificate

showing compliance with the specification shall be submitted to the PURCHASER for review before being released for use. All electrodes shall be purchased in sealed containers and stored properly to prevent deterioration. As welding electrodes deteriorate under adverse conditions of storage leading to dampness in the electrode coating, they shall normally be stored in dehumidified air-conditioned rooms or in hot boxes or ovens in their original sealed containers whose temperatures shall be maintained within specified limits. The condition of electrodes shall be frequently inspected.
Electrodes with damage to coating shall not be used. Electrodes shall remain identified until consumed. It is preferable to procure low hydrogen electrodes in hermetically sealed containers and preserve them without damage to the containers.

10.2 All low hydrogen electrodes, after baking as per the manufacturer's recommendations, shall be stored in ovens kept at 80 to 100°C before being used. Recommendations of the electrode manufacturer shall be strictly followed. Until the electrodes are taken out for welding, they shall be stored in portable ovens. The electrodes shall not be exposed to open atmosphere.

10.3 For welding of all grades of steel and alloys by the GTAW process, a 2% thoriated tungsten electrode conforming to SFA-5.12-86 EWTh-2 (AWS-A5.12-80, EWTh-2) classification shall be used.

10.4 All electrodes to be used on alloy and carbon steel shall conform to ASME BPV Code Section II Part C or any other equivalent code.

10.5 The type of electrodes used shall be only those recommended by the manufacturer for the use in the position in which the welds are to be made.

10.6 Current and polarity shall be maintained as recommended by the electrode manufacturer.

11.0 INSPECTION AND TESTING

11.1 The PURCHASER shall have free access to inspect welding or any other related operations at any time and at any stage of fabrication.

11.2 The PURCHASER may require NDE of any weld for reasons other than those given in the specification. The responsibility for the cost of such testing shall be mutually decided between the PURCHASER and the CONTRACTOR.

11.3 The CONTRACTOR shall inform the PURCHASER when the weld preparation and set-up for welding of various members selected by the PURCHASER are in progress so that the PURCHASER can inspect the assembly before welding starts.

11.4 The responsibilities of the PURCHASER's representative shall in no way

reduce the CONTRACTOR's responsibilities to ensure that the work is carried out in accordance with the specification.

11.5 Any examination by NDE methods shall be performed before or after PWHT based on the applicable code requirements.

11.6 For a welded branch connection and for any weld, necessary repairs and NDE shall be completed before any reinforcing pad is added.

12.0 EXAMINATION OF WELDS

12.1 Examination refers to the quality control functions performed by the SUPPLIER / CONTRACTOR during fabrication, erection and testing.

12.2 As a minimum, the following shall be examined by visual examination:

(a) Materials and components to ensure that these are as per the specification and are free from defects. If defects are noticed on "free-issue" items, these shall be brought to the notice of the PURCHASER without delay.
(b) Joint preparation and cleanliness
(c) Fit-up, joint clearance, and internal alignment prior to joining
(d) Preheating as applicable
(e) Variables specified by the welding procedure, including filler material, position and electrode
(f) Condition of the root pass after cleaning - external and where accessible, internal
(g) Slag removal and weld condition between passes
(h) Appearance of the finished joint and weld dimensions

12.3 Acceptance for the visual examination shall be as per ASME BPV Code Section VIII Division 1 or IBR as applicable.

13.0 QUALIFICATION AND CERTIFICATION OF NDE PERSONNEL

13.1 Approved and documented NDE procedure prepared by level III personnel shall be made available.

13.2 The CONTRACTOR's examining personnel shall have training and experience commensurate with the needs of the specified examinations. NDE supervisors/ examiners shall be qualified at level II or above of ASME BPV Code Section V.

13.3 The CONTRACTOR shall make available to the PURCHASER copies of certificates of qualification of the examiners he proposes to use for the PURCHASER's approval.

14.0 METHODS OF EXAMINATION

The methods of examination used, Ultrasonic (UT), Radiographic (RT), MT and PT shall be in accordance with ASME BPV Code, Section V.

15.0 ACCEPTANCE STANDARDS

15.1 Levels of acceptance of defects in welds shall be in accordance with ASME BPV Code Section VIII Division 1.

15.2 For equipment under the purview of IBR, the levels of acceptable defects shall be as per IBR.

16.0 REPAIR WELDING

16.1 All defects in welds requiring repair shall be removed by flame or arc gouging, grinding, chipping or machining. The major repairs may involve:

a. Cutting through the weld
b. Cutting out a portion of material containing the weld, or
c. Removing the weld metal down to the root depending upon the magnitude of the defects.

16.2 After removing the defect, the repaired portion and adjacent area shall be examined by the same NDE methods as specified for the original weld and the same acceptance criteria shall hold good.

16.3 All the repair welds shall be made using the same or other specified welding procedures as those used in making the original welds including preheating and stress relieving if originally required.

TABLE – 1

WELDING SPECIFICATION CHART FOR COMMONLY USED MATERIAL

Sl.no.	Base Material	Welding process		`Filler material	
		Root	Filler	Root	Filler
1.0	CARBON STEELS	GTAW	GTAW	ER70S2 OR ER70S3	ER70S2 OR ER70S3
1.1	≤5MM THICK				
1.2	>5MM AND <19MM THICK	GTAW OR SMAW	GTAW OR SMAW	ER70S2 OR ER70S3 OR E6010	E6013 F6-EL8 OR E7018 F7-EL12
1.3	>19MM THICK	GTAW OR SMAW	GTAW OR SMAW	ER70S2 OR ER70S3 OR E6010	E7018 F7-EL12

Signature of the Supplier for accepting of specification mentioned above

2.0	**LOW ALLOY STEELS**	**GTAW**	**GTAW**	**ER 80S B2**	**ER 80S B2**
2.1	**1 ¼ % Cr ½ Mo ≤5mm Thick**				
2.2	**1 ¼ % Cr ½ Mo >5mm Thick**	**GTAW**	**SMAW**	**ER 80S B2**	**E 8016 OR E8018-B2**
2.3	**2 ¼ % Cr 1% Mo >5mm Thick**	**GTAW**	**GTAW**	**ER 90S B3**	**ER 90S B3**
2.4	**2 ¼ Cr 1%Mo >5mm thick**	**GTAW**	**SMAW**	**ER 90S B3**	**E 9015 OR E9016 OR E9018-B3**

Note:

1) Low hydrogen electrodes shall be used for critical systems such as chlorine, hydrogen, caustic and similar toxic inflammable fluids and also whenever the wall thickness exceeds 19mm
2) The argon shielding gas flow rate shall not be less than 0.34 M^3/Hr
3) For purging and shielding argon gas shall be used. However nitrogen may be used as an alternative to argon for purging purpose only.
4) For fillet welds SMAW may be used instead of GTAW for thickness above 5mm.
5) For GTAW electrode shall be 2% thoriated tungsten.
6) Initial purging prior to welding proves shall be minimum of five times the volume between dams of ten minutes minimum whichever is higher. When welding commences the purge gas flow shall ensure that gas pressure is only marginally higher than atmospheric pressure to ensure no root concavity.
7) Back purging using argon/nitrogen shall be maintained for the root run and minimum of one additional pass.
8) Electrodes and filler wires manufactured by reputed firms duly approved by the PURCHASER shall only be used.
9) Electrodes shall have at least the same or higher physical properties and similar chemical composition to the members only be used.

TABLE-2

PREHEAT REQUIREMENTS

S.NO.	BASE MATERIAL	NOMINAL WALL THICKNESS MM	SPECIFIED MINIMUM TENSILE STRENGTH MPa	RECOMMENDED MINIMUM PRE-HEAT TEMPERATURE ^{0}C
1	CARBON STEEL	≤25	490	10
2	CARBON STEEL	>25	490	100
3	LOW ALLOY STEEL **1 ¼ % Cr ½ %Mo**	All	All	149
4	LOW ALLOY STEEL **2 ¼ % Cr 1% Mo**	All	All	210

TABLE-3

POSTWELD HEAT TREATMENT REQUIREMENTS FOR COMMONLY USED STEEL MATERIALS

Sr.no.	Base Material	NOMINAL WALL THICKNESS mm	METAL TEMPERATURE RANGE ^{O}C
1	CARBON STEEL	< 32	**NONE**
2	CARBON STEEL	>32	**600 to 650**
3	**LOW CARBON STEEL 1 ¼ % Cr ½ %Mo**	**ALL**	**600 to 650**
4	**LOW ALLOY STEEL 2 ¼ % Cr 1% Mo**	**ALL**	**680 to 700**

Notes:

1) In IBR systems, in carbon steels, PWHT is also required, when the carbon percentage exceeds 0.25%, at the temperature range of 600 ± 20^{o}C

2) For equipment in carbon steels or alloy steels and meant for lethal service, PWHT of all welds shall be carried out.

Signature of the Supplier for accepting of specification mentioned above

SECTION- D

QUALITY ASSURANCE PLAN

QUALITY ASSURANCE PLAN FOR MLP

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
A.	MATERIAL (RAW MATERIALS & BOUGHTOUTS)											
1*	Rolled plates & sections	a. Appearance	Visual	Major	100%	IS:2062	Freedom from defects like pitting, cracks, etc.	--	H	W	R	10% Random witness by TP
		b. Properties	Chemical analysis & physical test	Major	100%	IS:2062	Drawing specification	Mill test certificates/ Lab reports	H	R	R	
		c. Internal flaws	UT	Critical	100% for plates ≥20mm thick, 10% for sections ≥250mm	ASTM A435	Specification	NDT reports	H	W	R	-30% Witness by TP in the absence of MILL certifications
2	Fasteners (high tensile bolts & nuts etc.)	a. Quality	Visual	Major	Sample check as per relevant specification	IS:1367	a. No cracks b. Proper matching with nuts	IR	H	W	R	10% random witness by TP in the absence of Mill TC
		b. Chemical composition & physical properties	Chemical analysis, mechanical test	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III	Manufac-turer's test certificates / lap reports	H	R	R	
		c. Dimensional	Measure-ments	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III & XIII		H	W	R	

*Before starting of fabrication, department clearance shall be obtained after raw material inspection and clearance.

Legend :
VR – Supplier
IS – ISRO
TP – Third Party Inspection Agency
H – Carrying out responsibility
R – Review of records & results
W – Test/inspection to be witnessed

Signature For SUPPLIER | Signature For THIRD PARTY | Signature For ISRO | Date : Place :

QUALITY ASSURANCE PLAN FOR MLP

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
B.	WELDING PROCEDURE, WELDER'S QUALIFICATION, ETC.											
1	Welding	WPS, Welder's & Welding operator's qualification	Test piece, Visual, Physical & NDT	Critical	100%	ASME Sec IX	ASME Sec IX	WPS, PQR & WPQ	H	W	R	R or W by TP for WPS & PQR and W for welder qualification
C.	FABRICATION (MODULES OF MLP, ANCHOR LEG. ETC.)											
1	Setting out / Layout / Marking / CNC programming	Layout	Measurement	Major	100%	Relevant drawings	Full scale layout to be checked before cutting	Shop register	H	R	R	
2	Fit-up before welding	Quality. Material identification	Visual alignment & check of functionally critical dimensions	Major	100%	Drawings	a. proper edge preparation b. proper tack welds c. minimum gap for butt joints as per WPS d. DIN-8500	IR	H	R	R	Members requiring site welding shall be match marked at joining ends for site erection
3	Welding (fillet joints)	Profile, fillet size, overall physical appearance	Visual/ gauge, DP/ MPT after final welding	Major	100%	ASME Sec VIII, Vol-1	Drawings	IR	H	W	R	10% DP test at random shall be done by TP

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Signature Signature Signature Date :

For SUPPLIER For THIRD PARTY For ISRO Place :

QUALITY ASSURANCE PLAN FOR MLP

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
4	Welding (All Groove welds)	a. Root inspection after back gouging (for full penetration welds)	Visual & LPI	Major	100%	IS:3658	No cracks allowed	IR	H	R	R	
		b. Internal defects	UT	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	W	R	UT: 10% witness by TP
		c. Welding quality, surface defects	LPI / MPI/DPI after Root pass and Final pass	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	W	R	-30% witness by TP
5*	Stress relieving (after complete welding)	T-T curves	T-T curve verification	Major	100%	ASME Sec-VIII, Vol-I	Drawings	T-T graph	H	R	R	
6*	Dimensional inspection after welding & stress relieving	Dimensional	Measurement of major dimensions & full size shop layout checking	Major	100%	Drawing / DIN 8500	Drawings	IR	H	W	W	
D.	GRIT BLASTING & PAINTING											
1	Grit blasting & painting	Paint thickness	Visual & measurement by paint thickness gauge	Major	At random for paint thickness	Drawing & specification	Drawings & specification	IR	H	W	R	10% DFT witness by TP at random locations

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Signature Signature Signature Date :

For SUPPLIER For THIRD PARTY For ISRO Place :

* before starting of control assembly, department clearance shall be obtained for stress relieving and dimensional inspection of all modules.

QUALITY ASSURANCE PLAN FOR MLP

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
E.	MACHINING (MODULES OF MLP, ANCHOR LEG)											
1	Machining	Overall dimensions	Measurement & visual	Major	100%	Drawing	Drawing	IR	H	W	R	For critical category 30% & major category 10% witness by TP
2	Drilling, etc.	Drilling & tapping	Measurement of hole size & centre distances	Critical	100%	Drawing & DIN 8500	Drawing	IR	H	W	R	
F.	ASSEMBLY OF MODULES OF MLP, ANCHOR LEGS AND OTHER SUB-ASSEMBLIES AT SHOP											
1*	Control assembly at works	Dimensions, level, alignment, erection of clits with fasteners	Visual & measurement	Critical	100%	Drawing	Drawings	IR	H	W	W	Before dismantling, reference line& match marking to be punched. Welding of erection clits to be ensured.
G.	ERECTION AT SITE											
1*	Fabricated material inspection	Visual, dimensional, review of TC & IR	Visual & measurement	Major	100%	TS & approved drawings	TS & approved drawings	IR	H	R	R	
2	Welding & welder qualification	WPS, Welder's & Welding operator's qualification	Test piece, Visual, Physical & NDT	Critical	100%	ASME Sec IX	ASME Sec IX	WPS, PQR & WPQ	H	W	R	

*Dispatch clearance shall be obtained by department after successful control assembly at from suppliers site.

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Signature For SUPPLIER

Signature For THIRD PARTY

Signature For ISRO

Date :

Place :

QUALITY ASSURANCE PLAN FOR MLP

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
3*	Positioning & alignment of anchor legs, Modules	Position, level, span, diagonal, height and other dimensions	Measurement & visual	Major	100%	Drawing	Drawing	IR	H	W	W	10% witness by TP at random
4*	Welding	Preheat / interpass / sequence of welding	Visual	Major	100%	Drawing & TS	Drawing & TS	IR	H	W	R	10% witness by TP at random
5	Stress relieving	T-T curves	T-T curves, charts	Critical	100%	Drawing & TS	Drawings & TS	IR	H	R	R	
6	Complete welding	Visual, DPT, UT	Visual & UT	Major	100%	TS & drawings	TS & drawings	IR	H	W	W	10% witness by TP at random
7	Dimensional check of whole assembly	Position, level, span, diagonal, height and all dimensions	Measurement & Visual	Major	100%	Drawings	Drawings	IR	H	W	W	
10	Assembly of MLP with bogie	Interfaces & Clearances	Visual & measurement	Major	100%	TS & drawings	TS & drawings	IR	H	W	W	
11	MLP movement with bogie	Clearances	Visual & measurement	Major	100%	TS & drawings	TS & drawings	IR	H	H	H	

*Department clearance shall be obtained before commencement of erection & commissioning work i.e., after inspection and clearance of received MLP modules at SDSC SHAR

Legend :
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W – Test/inspection to be witnessed

Signature Signature Signature Date :

For SUPPLIER For THIRD PARTY For ISRO Place :

QUALITY ASSURANCE PLAN FOR SSRs

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
A.	MATERIAL											
1*	Rolled plates & sections, Forgings	a. Appearance	Visual	Major	100%	IS:2062	Freedom from defects like pitting, cracks, etc.	--	H	W	R	10% witness by TP at random
		b. Properties	Chemical analysis & physical test	Major	100%	IS:2062	Drawing specification	Mill test certificates/ Lab reports	H	R	R	
		c. Internal flaws	UT	Critical	100% for plates ≥20mm thick, 10% for sections ≥250mm	ASTM A435	Specification	NDT reports	H	W	R	For critical category : 30% random witness by TP in the absence of MILL TC
	Fasteners (high tensile bolts & nuts etc.)	a. Quality	Visual	Major	Sample check as per relevant specification	IS:1367	c. No cracks d. Proper matching with nuts	IR	H	W	R	10% random witness by TP in the absence of Mill TC
		b. Chemical composition & physical properties	Chemical analysis, mechanical test	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III	Manufac-turer's test certificates	H	R	R	
		c. Dimensional	Measure-ments	Major	Sample check as per relevant specification	IS:1367	IS:1367 Part III & XIII		H	W	R	

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Signature For SUPPLIER | Signature For THIRD PARTY | Signature For ISRO | Date : Place :

*Before starting of fabrication, department clearance shall be obtained after raw material inspection and clearance.

QUALITY ASSURANCE PLAN FOR SSRs

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
B. WELDING PROCEDURE, WELDER'S QUALIFICATION, ETC.												
1	Welding	WPS, Welder's & Welding operator's qualification	Test piece, Visual, Physical & NDT	Critical	100%	ASME Sec IX	ASME Sec IX	WPS, PQR & WPQ	H	W	R	R or W by TP for WPS & PQR and W for welder qualification
C. FABRICATION (SSR(P+), SSR(P-), MOUNTING BRACKETS FOR HYDRAULIC CYLINDERS & MECHANICAL STOPS, BASE PLATES, ADAPTOR PLATES, ETC.)												
1	Setting out / Layout / Marking / CNC programming	Layout	Measurement	Major	100%	Relevant drawings	Full scale layout to be checked before cutting	Shop register/IR	H	R	R	
2	Fit-up before welding	Quality	Visual alignment & check of major dimensions	Major	100%	Drawings	e. proper edge preparation f. proper tack welds g. minimum gap for butt joints as per WPS h. DIN-8500	IR	H	R	R	Members required site welding shall be match marked at joining ends for site erection
3	Welding (fillet joints)	Profile, fillet size, overall physical appearance	Visual/ gauge, DP/ MPT after final welding	Major	100%	ASME Sec VIII, Vol-1	Drawings	IR	H	W	R	10% DP test at random shall be done

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Signature For SUPPLIER | Signature For THIRD PARTY | Signature For ISRO | Date : Place :

QUALITY ASSURANCE PLAN FOR SSRs

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
4	Welding (All Groove welds)	a. Root inspection after back gouging (for full penetration welds)	Visual & LPI	Major	100%	IS:3658	No cracks allowed	IR	H	R	R	
		b. Internal defects	UT	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	W	R	UT: 10% witness by TP
		c. Welding quality, surface defects	LPI / MPI after Root pass and Final pass	Critical	Wherever asked in the drawing	ASME Sec-VIII, Vol-1	ASME Sec-VIII, Vol-1	Test report	H	W	R	For critical category 30% witness by TP
5*	Stress relieving (after complete welding)	T-T curves	T-T curve verification	Major	100%	ASME Sec-VIII, Vol-I	Drawings	T-T graph	H	R	R	
6*	Dimensional inspection after welding & stress relieving	Dimensional	Measurement of major dimensions & full size shop layout checking	Major	100%	Drawing / DIN 8500	Drawings	IR	H	W	W	
D.	GRIT BLASTING & PAINTING											
1	Grit blasting & painting	Paint thickness	Visual & measurement by paint thickness gauge	Major	At random for paint thickness	Drawing & specification	Drawings & specification	IR	H	W	R	10% DFT random witness by TP

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Signature Signature Signature Date :

For SUPPLIER For THIRD PARTY For ISRO Place :

*Before starting of control assembly, department clearance shall be obtained for stress relieving and dimensional inspection of all modules.
*Dispatch clearance shall be obtained by department after successful control assembly at from suppliers site

QUALITY ASSURANCE PLAN FOR SSRs

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTICS TO BE CHECKED	METHOD OF CHECKING	CATEGORY	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION AGENCY			REMARKS
									VR	TP	IS	
E.	MACHINING (SSR (P+), SSR (P-), MOUNTING BRACKETS FOR HYDRAULIC CYLINDERS & MECHANICAL STOPS, BASE PLATES, MECHANICAL STOPS, ADAPTOR PLATES, INTERFACE RINGS, ETC.)											
1	Machining	Overall dimensions, Geometrical tolerances	Measurement & visual	Major	100%	Drawing	Drawing	IR	H	W	R	10% for major category & 30% critical category witness by TP
2	Drilling, etc.	Drilling & tapping	Measurement of hole size & PCD, centre distances	Critical	100%	Drawing & DIN 8500	Drawing	IR	H	W	R	
F.	BOUGHTOUT ITEMS (Power pack, hydraulic cylinders, hoses, hydraulic valves, linear bearings, sensors .etc..)											
1		As per manufacturer's specification	As per manufacturer's specification	Major	100%	As per manufacturer's specification	As per manufacturer's specification	Manufacturer's test certificates IR	H	R	R	
G.	* ERECTION AT SUPPLIER'S SHOP AS WELL AS AT PURCHASER'S SITE											
1	Dimensional check of whole Assembly	Dimensional	Visual & measurement	Critical	100%	Drawing	Drawing	IR	H	W	W	
2	Hydraulic system	Pressure Test	Visual & measurement	Critical	100%	Drawing	Drawing & Specifications	IR	H	W	W	
3	Hydraulic Actuators	Hydraulic Actuator Performance Test (for Hydraulic Cylinders)	Visual	Critical	100%	Drawing	Drawing & Specifications	IR	H	W	W	
4	SSR movements	Range of movement for SSR Positioning accuracy for SSR movement	Measurement	Critical	100%	Drawing	Drawing	IR	H	W	W	
5	SSR & Interface Rings	Vehicle mounting Surface accuracy	Measurement	Critical	100%	Drawing	Drawing	IR	H	W	W	

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Signature Signature Signature Date :

For SUPPLIER For THIRD PARTY For ISRO Place :

*Department clearance shall be obtained before commencement of erection & commissioning work of complete MLP.

Note :

- Department clearance shall be obtained at the following stages of MLP realisation.

  a) Raw material inspection and clearance before fabrication.
  b) Stress relieving & Dimensional inspection before control assembly of all modules and SSRs.
  c) Dispatch clearance from supplier site after satisfactory control assembly.
  d) Inspection and clearance by department after receipt of items at SDSC SHAR before commencement of Erection & Commissioning.

- During manufacturing of MLP at supplier's site, non-conformances if any shall be brought to the notice of department for review & Clearance.

- Supplier shall ensure experienced and certified Third-Party inspectors to be deployed for execution at supplier's site and at SDSC SHAR.

- TP witness role at party's site shall be enhanced to 30% for critical items at various phases of work.

- QAP Shall be prepared by party before start of erection works at SHAR.

SCHEDULE OF PRICES & GENERAL PARTICULARS

1. Bidders shall not alter the contents of this schedule of prices. If the bidder wants any additions / alterations, these shall be brought out separately in the format as given in this schedule of prices.
2. MLP to be supplied and erected shall be in accordance with section A, B, C, D, and E of this specification.
3. The quantities indicated are an order of magnitude only. In case there is any variation in the quantities of items actually supplied from the quoted quantities, the price of the same shall be adjusted based on the unit rates furnished by the bidder. The unit rates shall be valid for both upward and downward variation in quantities.
4. The quoted price shall be price in Indian Rupees for procurement, revision of drawings, manufacture, supply, transportation, loading, unloading, packing & forwarding, inspection, control assembly, erection, testing and commissioning of Mobile Launch Pedestal for ASLP project at vendor and purchaser site inclusive of all taxes and duties as applicable indicated in the price bid.
5. Total price towards Supply portion, Erection and commissioning shall be indicated separately in the price bid and shall be firm and fixed. Same unit rates are also applicable for the quantity variation of **± 10%** also for supply portion.
6. Total price towards third party inspection (to be borne by the supplier) and Erection and Commissioning charges shall indicated separately in the price bid and shall be firm and fixed for the entire quantity variation of **± 10%.**
7. SDSC SHAR reserves right to place order in full or part of the scope.
8. Bidder shall note that the prices quoted for items shall include for start-up & commissioning spares also.
9. Bidder shall note that overall lowest offer only will be considered for placement of purchase order.

SCHEDULE OF PRICES

Sr. no.	Item	Unit	Qty.	Unit Cost (in Rs)	Total Cost	GST (%)	GST (In Rs.)	Total Cost (in Rs.)
1	**Structural Item/fabricated items**: Procurement, manufacturing, stress relieving (for modules 3A & 3B only) control assembly, testing and inspection at contractor's works transportation to SDSC SHAR , unloading /receipt, handling, storage & inspection at SDSC SHAR of fabricated structural steel confirming to IS: 2062 & IS: 808 (Grade E250 BR) items like modules 3A&3B, handrails, stair cases, landing platforms etc., as per specifications & drawings.	Kg	**140000**			**5%** with exemption certificate		
2	**Machined items**: Procurement, manufacture, stress relieving, machining control assembly, testing and inspection at contractor's works, transportation to SDSC SHAR, unloading/receipt, handling, storage at SDSC SHAR of fabricated structural steel confirming to IS: 2062 & IS: 808 (Grade E250 & E350), **with machining** like Modules, SSRs, Anchor legs, bottom cover, flanges for L110,cover for piping, Interface rings, flanges for SC120, shims, bearing plates, adapter plates etc., as per specifications & drawings	Kg	**660000**			**5%** with exemption certificate		
3	**Forging items**: Procurement, manufacture, machining, heat treatment, control assembly, testing and inspection at contractor's works, transportation to SDSC SHAR,	Kg	**32000**			**5%** with exemption certificat		

	unloading / receipt, handling, storage at SDSC SHAR of **forged steel/alloy steel/cast steels** like 45C8 / 40C8 / IS1570 X04Cr19Ni9, C90, AISI 4340, ASTM A668M (Grade–D) items like track for bearing plate handling arrangement, Sector rings for SSRs, adjustable spacers, through bolts, fasteners etc., as per specifications & drawings					e		
4	**Linear bearing**: Procurement, inspection, sub-assembly, control assembly with MLP, testing and inspection at contractor's works, packing, forwarding, transportation from place of manufacture to site, unloading/receipt at purchaser's site, handling, storage & inspection at purchaser site of linear bearing with rail set as per specification.	**Set**	9			**5%** with exemption certificate		
5	**Hydraulic system**: Procurement, inspection, sub-assembly, control assembly, testing and inspection at contractor's works, packing, forwarding, transportation from place of manufacture to site, unloading/receipt at purchaser's site, handling, storage & inspection at purchaser site hydraulic cylinders, hydraulic power pack, hydraulic hoses as per specification.	**Lump-sum**	1			**5%** with exemption certificate		
6	**Erection of Ground Anchors** for Mobile Launch pedestal (MLP) including civil foundation at site as per specification and drawings.	**Lump-sum**	1			**5%** with exemption certificate		
7	**Erection and commissioning** of Mobile Launch Pedestal (MLP) including storage / handling at site, erection, inspection, testing,	**Lump sum**	**1**			**5%** with exemption		

	commissioning and carrying out performance tests as per specification & drawings					certificate		
8	**Third Party Inspection (TPI)** charges for Mobile Launch Pedestal including supply items at vendors / sub-vendors site, manufacturing, stress relieving, machining, control assembly at vendor's site, erection & commissioning at SDSC SHAR.	**Lump-sum**	1			**5%** with exemption certificate		
9	Total cost: (1+2+3+4+5+6+7+8)							
							Total Landed Cost (Rs.)	

Note: 1) Prices are not to be filled other than percentage of GST and enclosed along with technical Bid, Price shall be filled in online only.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE: _____

SEAL OF THE COMPANY

1. PRE-QUALIFICATION CRITERIA

Bidders shall meet the following pre-qualification criteria. Offers of the bidders which are not meeting the following criteria will not be considered for evaluation.

A. Technical Qualification Requirements

The bidder shall meet the following technical requirements and shall submit relevant certificates to establish his credentials.

1. Bidder shall be an organization with long experience (more than Five years) in having executed contracts for manufacture, supply, erection, testing and commissioning of heavy structural works.
2. The firm shall have successfully completed Manufacturing of heavy structural works with fabrication, machining and assembly site of the given order during last 5 years ending with 31.03.2024.

   One Heavy structural work of 600 ton (or)
   Two heavy structural works of 400 ton each (or)
   Three heavy structural works of 200 ton each

   Bidders have to provide relevant certificates along with the Techno-Commercial Bid.
3. Tenderer shall agree for fabrication (i.e fit-up and welding of Module plates) of all modules parallelly (i.e Module 2A, 2B, 2C, 2D, 3A, 3B, 1A, 1B, SSR P+, SSR P-) to meet the delivery schedule.
4. The firm shall have facilities for accommodating all four modules of 2 (i.e 2A,2B,2C,2D) parallelly for fabrication and handling of minimum 10 m long and 6m wide, under the two numbers of 50t capacity cranes or one number of 85t crane. Details of the available or planned facilities to be given.
5. The firm shall have facilities for accommodating all four modules of 1, 3 (i.e 1A,1B, 3A, 3B) parallelly for fabrication and handling of minimum 8 m long and 6m wide, under the two numbers of 30t capacity cranes or one number of 60t crane (suitable for fabrication & handling of 3A, 3B, 1A, 1B). Details of the available or planned facilities to be given.
6. The firm shall have facilities for accommodating all two modules of SSR P+ and SSR P- parallelly for fabrication and handling of minimum 6 m long and 6m wide, under the two numbers of 30t capacity cranes or one number of 60t crane. Details of the available or planned facilities to be given
7. The firm shall have stress relieving furnace to accommodate module of 9.6m X 5.7m X 4m or shall have capability of establishing modular furnace using or sub-vendor

shall have capability of installing Modular type temporary furnace (suitable for stress relieving Module 2A, Module 1A, SSR). Details of the available or planned facilities to be given.

8. The firm shall have facility for CNC Milling / Boring machine and handling of big structures of at least 9.6m X 5.7m X 4.4m size suitable for machining Module 2 and module 1, under the two numbers of 50t capacity cranes or one number of 85t crane (suitable for machining Module 2A & Module 1A). Details of the available or planned facilities to be given.
9. The firm shall have vertical turning machine and CNC milling machine / CNC Horizontal boring machine suitable for machining of Ø7.2m diameter and to accommodate SSR of 5.4m (W) X 5.4m (L) X 2m (h) , under the 60t capacity crane (suitable for machining SSR). The process of machining of SSR's on top and bottom, shall be given with available / planned machines to meet given accuracy. Details of the available or planned facilities to be given.
10. The firm shall have an assembly bay of 24m X 24m (minimum) to carry out the control assembly of MLP under the two numbers of 50t capacity cranes or one number of 85t crane at minimum height of 10m under the hook. Details of the available or planned facilities to be given.
11. The firm shall agree to depute sufficient number of Welders for fabrication of all modules parallelly round the clock in three shift operation at Suppliers works and Erection site at SDSC.
12. The firm should not have any pending purchase orders from ISRO which is delayed more than 18 months from the original delivery period on account of firm.
13. The firm should have successfully completed manufacture and establishment of high structures to the satisfaction of any of the reputed third-party inspection agencies like M/s. MECON, M/s. M N Dastur & company (P)Ltd, M/s. LLOYDS INSPECTION AGENCY, M/s. BUREAU VERITAS, M/s DET NORSE VERITAS GL etc.

B. Financial Qualification Requirements

1. The Bidder's annual financial turnover shall be not less than Rs.2500 Lakhs per year during last three Financial years ending with 31.03.2024.
2. During Last 5 Years ending 31.03.2024, the bidders should have successfully completed either of the following:

A) One similar completed work of heavy fabrication work not less than Rs. 2500 lakhs (or)

B) Two similar completed works of heavy fabrication work with each not less than Rs. 1500 lakhs (or)

C) Three similar completed works of heavy fabrication work with each not less than Rs. 1000 lakhs

3. Solvency certificate of current financial year 2024-2025 from a scheduled bank for Rs.1000 lakhs or above.

C. Documents to be submitted along with the bid submission

1. Firm establishment certificate and nature of work.
2. Details of work similar type completed during the last five years ending with 31.03.2024.
3. Satisfactory work completion certificate from the clients, with the work order copies.
4. PAN & GST Registration No.
5. Profit & Loss Accounts, Balance Sheets duly Certified by the auditor and IT returns for the last three financial years with acknowledgement from IT Department up to last 3 years.
6. IT/ TDS certificate for last three years.
7. Structure and Organization chart.
8. List of personnel with qualification & experience in the firm in the areas of design, production, quality, safety, administration etc.,
9. List of Machinery & Equipment to be used for the work

D. Bid Selection Procedure and Process of Pre –Qualification

1. Short listing based on documents submitted to satisfy all the eligibility criteria mentioned in the tender document (Non – submission of any document as given in above list within stipulated time leads to rejection of Bid).
2. Subsequently Bidder’s competency, their technical achievements and financial status will be evaluated. Feedbacks from Bidder’s clients will be verified.
3. Visit to sites by technical team (ISRO or Third party) where Bidder has established above mentioned works.
4. If required, visit will be made to their factory / firm by technical team (ISRO or third party) for accessing the capability of manufacturer.
5. Scrutiny of all technical specification and supply conditions mentioned in techno-commercial bid.
6. Bids with partial offer (i.e. without complete scope) will not be considered for evaluation.

SCHEDULE OF GENERAL PARTICULARS / VENDOR EVALUATION FORMAT

SR. NO.	DESCRIPTION	
1.	Name of Company	
2.	Address of Company	
3.	Type of Company (Proprietary/Pvt.Ltd/Public Ltd/Joint Venure/Consortium)	
4.	Registration number	
5.	Year of inception of the company	
6.	Registered address	
7.	Name & address of the office of the Chief Executive of the company	
8.	Name & Designation of the officer of the Bidder to whom all correspondence shall be made for expeditious technical/ commercial co-ordination. Telephone number Fax number E-mail address	
9.	Locations of the Branches of Company (if any)	
10.	Annual turn-over of the company for the last three years	
11.	IT returns for the last 3 years	
12.	Major customers (Enclose copies of the Purchase Orders)	
13.	Any customers feedback on the services which is in writing (Pl. enclose copies)	
14.	Quality certification of the company	
15.	PAN Card Copy	
16.	The Profit & Loss Account details for the last 3 years which is duly audited and Submitted as part of the Annual Report	

17.	Orders executed during last three years, > 100 T or > Rs. 15 crores, references are is to be mentioned. (Separate sheet can be attached).	
18.	Shop floor area covered	
19.	No. of employees (Supplier shall mention contract personnel separately) Engineers Supervisors Technicians Quality control engineers Administrative Staff.	
20.	Handling facility available: Over head / Gantry Crane details (Capacity , span lift). Mobile Cranes.	
21.	Load testing facility Available: Maximum weight available. No. of weights Total test load available.	
22.	Welding / fabrication workshop (Type / capacity / quantity of machines shall be provided) MMAW machines GMAW machines Gas cutting machines Plasma cutting machines Welding Fixtures	
23.	Welding professionals: No. of Welders (MMAW), Qualification details, No. of Welders (GMAW), Qualification details, No. of Welders (TIG), Qualification details, Welders Qualified by:	
24.	Details of welding Inspection Equipment & Welding inspector available with supplier (LPT, UT, MPT, X-ray, etc)	
25.	Forming facilities available (with brief specification of each machine) Shearing Machine Cutting Machine Cutting Machine Bending Machine	
26.	Machining Facilities available (with brief specification of each machine) Turning lathe (Conventional /CNC) Milling Machine (Conventional / CNC) Gear Cutting / Hobbing Machines Drilling Machines (conventional / CNC) Cylindrical Grinding Machine (Conventional / CNC) Any other machines.	
27.	Details of inspection facilities / Instruments available (Brief description & specifications shall be provided)	

28.	If third party Inspection Services are taken for fabricating similar works give details.	
29.	Design Software's available Drafting & modeling software packages FEM software Other softwares Design Engineers (with qualification & experience)	
30.	Bid validity period (Min. 4 months from date of bid opening)	
31.	COMPLETION SCHEDULE	
32.	Delivery period for Supply shall be 10 months from date of P.O.	Yes / No
33.	Delivery period for Erection and commissioning shall be 4 months from date of site clearance.	Yes / No

SIGNATURE :

NAME :

SEAL OF THE COMPANY DESIGNATION :

COMPANY :

DATE :

CONFIRMATION OF ACHIEVING ACCURACY

The BIDDER shall furnish performance guarantees as listed below based on the data specified in section B:

1. Top vehicle mounting surface accuracy for each SSR in combination with interface ring shall be less than 30 arc seconds (± 0.25mm) i.e. all points on SSR top surface shall lie within two parallel horizontal planes which are 0.5 mm apart maximum.

2. Positional tolerance of PCD 4170 on SSRs top surface shall be within ±0.2 mm

SIGNATURE :_____

NAME :_____

DESIGNATION :_____

DATE :_____

SEAL OF THE COMPANY

EXCEPTIONS AND DEVIATIONS

In line with Proposal Document, Bidder may stipulate Exceptions and deviations to the proposed conditions if considered unavoidable (General Specifications & Technical Specifications)

Sl.no	Reference in Specification		Dept. Specification	Offered specification	Deviation
	Page no	Clause no			

NOTE:

- Only deviations are to be written in the above form.
- Any deviations taken by the Bidder to the stipulations of the Proposal document shall be brought out strictly as per this format and enclosed along with the bid.
- Any deviations not brought out in this Proforma and written elsewhere in the Proposal document shall not be recognized and the same is treated as null and void.
- Any wilful attempt by the Bidders to camouflage the deviations by giving them in the covering letter or in any other documents that are enclosed may render the Bid itself non-responsive.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE: _____

SEAL OF THE COMPANY

SCHEDULE OF TIME FOR MANUFACTURE, DESPATCH & SHIPMENT TO SDSC SHAR

The Bidder shall indicate here under the time for manufacture, despatch and completion of each equipment from the date of Letter of Intent (LOI) or Purchase order (PO) as shown below.

Equipment	Time for manufacture from date of LOI / PO excluding control assembly	Time for packing and ready for despatch from Works	Time for shipment to site	Deviation	Total time from date of LOI / PO to shipment to site.

The Bidder hereby undertakes to meet the above time schedule from the date of LOI / PO

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SCHEDULE OF BIDDERS EXPERIENCE

The bidder shall furnish here under a list of STRUCTURAL works executed by him to whom a reference may be made by the PURCHASER in case the PURCHASER considers such a reference necessary.

SL. NO.	Name & address of Client / Name & address of project or plant (incl. tel.no., fax no., e-mail and name & designation of person who can be contacted.	Purchase Order / Contact no. and Date.	Brief details of equipment / system covered	Scope of services	Contract price (Rs)	Scheduled date of completion	Actual date of completion	Reasons for delay in completion, if applicable.	REMARKS

Only experienced tenderers of executing minimum purchase orders of worth Rs.1000/- Lakhs in structural fabrication and machining field involving forged steels/ alloy steels and heat treatment should quote.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SPEC NO. ASLP/MLP/001	AUGMENTATION OF SECOND LAUNCH PAD (ASLP)	ANNEXURE: E7
	MOBILE LAUNCH PEDESTAL (MLP) SCHEDULE OF BIDDERS EXPERIENCE	SHEET 2 OF 2

SCHEDULE OF BIDDERS PRESENT WORK

The bidder shall furnish here under a list of STRUCTURAL works executed by him to whom a reference may be made by the PURCHASER in case the PURCHASER considers such a reference necessary.

SL. NO.	Name & address of Client / Name & address of project or plant (incl. tel.no., fax no., e-mail and name & designation of person who can be contacted.	Purchase Order / Contact no. and Date.	Brief details of equipment / system covered	Scope of services	Contract price (Rs)	Scheduled date of completion	Expected date of completion	Reasons for delay in completion, if applicable.	REMARKS

Only experienced tenderers of executing minimum purchase orders of worth Rs.1000/- Lakhs in structural fabrication and machining field involving forged steels/ alloy steels and heat treatment should quote.

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

DATE _____

SEAL OF THE COMPANY

SPEC NO. ASLP/MLP/001	**AUGMENTATION OF SECOND LAUNCHPAD (ASLP)**	ANNEXURE: E8
	MOBILE LAUNCH PEDESTAL (MLP)	SHEET 1 OF 1

CHECK LIST

S.NO	DESCRIPTION	RESPONSE BY SUPPLIER
1	All documents related to Prequalification criteria mention in Section F2 have been met and all related documents are enclosed in technical Bid	Yes / No
2	The detailed scope of work and technical specifications are understood and price was quoted accordingly. Signed	Yes / No
3	Bidder shall sign & stamp each page of the tender document (RFP) as token of his acceptance and submit the same along with tender.	Yes / No
4	Confirmation that the quoted prices are firm and fixed till the completion of scope of work.	Yes / No
5	Validity of Offer is 4 months (minimum).	Yes / No
6	All the forms in Section E1 to E8 are filled, signed and stamped and to be submitted along with offer. F1 shall be un priced copy.	Yes / No
7	Accepted for 5% IGST with exemption certificate (If not mentioned it will be assumed that the price quoted are inclusive of taxes).	Yes / No
8	Delivery Schedule with milestones	Yes / No
9	Accepted the Department Payment Terms. Bidder shall confirm payment terms with advance or with out advance.	With advance / without advance.
10	Are General terms and Conditions of Contract for Supply & Erection included in proposal acceptable?	Yes / No
11	If not acceptable, are the deviations brought out in the "Schedule of Deviations"	Yes / No
12	Are there any deviations from enquiry technical specifications?	Yes / No
13	If there are technical deviations, are these filled in "Schedule of Deviations from Tech. Specifications"?	Yes / No
14	Warranty for the fully commissioned and accepted system is 12 months	Yes / No
15	3% of the Order Value shall be submitted as Security Deposit for the performance of the contract along with acceptance of order letter, which is valid till acceptance of the system.	Yes / No
16	3 % of the Order Value shall be submitted as Performance Bank Guarantee, which is valid till completion of the warranty period plus 3 months claim period.	Yes / No
17	Liquidated Damages are acceptable	Yes / No
18	Last five years audited financial results are enclosed	Yes / No
19	Registration certificate of the company is enclosed	Yes / No
20	Are all data sheets duly filled in and submitted in offer	Yes / No
21	Signed Technical documents / drawings are attached along with technical bid	Yes / No
22	As per the land sharing border clause given in Section-A, are you (the Bidder/Company/Entity) OR offering product/service is from such a Country sharing Land border with INDIA.	Yes / No
23	Are you claiming MSME Preference for this tendered item/service? Note: You should have been the MANUFACTURER of the offered product or SERVICE Provider of the said service (in service tender) as per your MSME Registration. (If YES, valid Udyam Registration documents shall be uploaded. Otherwise your claim will not be considered. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h))	Yes / No

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

ISSUE P0

DATE _____

SEAL OF THE COMPANY