MANUFACTURE, TESTING, SUPPLY & COMMISSIONING OF BOWLS (JACKETED VESSELS) FOR 10 TON VERTICAL MIXER AT SPAG, SDSC SHAR, SRIHARIKOTA

JULY 2022

CONTENTS

Sl.No.	Specification/Requirement
1.0	**SCOPE OF THE TENDER:**
1.1	**Introduction:**
1.1.1	SDSC SHAR is planning to realize 10 nos. of jacketed vessels (bowls) along with accessories, 14 nos. of Fibre Reinforced Plastic (FRP) lids and 1 no. of alignment fixture under SPAG project.
1.1.2	The scope of work under this tender covers preparation of detailed fabrication drawings, procurement of raw materials, manufacture, testing, inspection, painting at manufacturer's site, packing & forwarding, transportation to SDSC SHAR, unloading, carrying out alignment checks of bowls with 2 nos. of 10 t vertical mixers at SPAG, SDSC SHAR.
1.1.3	Arrangements shall be made by the Tenderer for the inspection and testing during different stages of its manufacture starting from the raw materials procurement to till completion by the third party/ purchaser at the Tenderer's site as per the Quality Assurance Plan (QAP) and schedule. The vendor should engage reputed t**hird party agency approved by the purchaser. (for details refer 7.13).**
2.0	**GENERAL TERMS AND CONDITIONS:**
2.1	**Instruction to tenderers:**
2.1.1	One set of proposal document along with the design drawings are issued. Tenderer shall sign and stamp each page of document as token of his acceptance & submit along with his offer.
2.1.2	Transfer of proposal document issued to one Tenderer to another is not permissible.
2.1.3	Proposal documents shall remain the property of Department (SDSC SHAR, ISRO, Sriharikota) and if obtained by one intending Tenderer shall not be utilized by another without the consent of the Department.
2.1.4	The proposal shall be completely filled in all respects and shall be submitted together with requisite information. Any offer incomplete in any particulars is liable for rejection.
2.1.5	Tenderers shall set their quotations in firm figures and without qualifications or variations or additions in the terms of the proposal documents. Proposal containing qualifying expressions such as "subject to minimum acceptance" or "subject to prior sale" or any other qualifying expressions or incorporating terms and conditions at variance with the terms and conditions incorporated in the proposal documents are liable to be rejected.
2.1.6	Cost quoted shall be firm and fixed.
2.1.7	Price shall be quoted in Indian Rupee
2.1.8	Successful Tenderer shall submit project execution plan and work break up chart, detailing the methodology of execution (process plan) within 30 days from the date of issue of purchase order.

2.1.9	Tenderer should award any part of the work under the scope of this tender to any sub vendor only after obtaining necessary approval from the department. Tenderer shall submit relevant information as required by the department. Department has every right to accept or reject the proposal submitted. Approval of the department is no way relieves the tenderer from his responsibility and the Tenderer is wholly responsible for execution of work as per the specifications, terms, and conditions mentioned in this document.
2.1.10	Tenderer shall indicate clearly such of those works planned to offload to his sub-vendor.
2.1.11	Satish Dhawan Space Centre – SHAR (SDSC-SHAR) Sriharikota is declared as prohibited place under official secrets act 1923. Hence during execution of site works necessary security requirements enforced by the department from time to time shall be followed strictly.
2.1.12	SDSC SHAR shall have the right of inspection and supervision of the manufacturing process adopted by the Tenderer for the manufacture of equipment at various stages through their authorized representatives. In case the manufacturing process adopted is not found suitable and commensurate with the desired quality of the equipment, the Tenderer will be advised to adopt the correct manufacturing process which will be binding on the Tenderer. SDSC SHAR's decision regarding the quality of work and its acceptability shall be final and binding on the Tenderer.
2.1.13	Defects in the material like fractures, cracks, blow holes, laminations, pitting, etc., are not allowed.
2.1.14	During the alignment of bowls at site in Sriharikota, the tenderer has to make his own arrangements for boarding, lodging and transportation of his men and materials. However, subject to availability, hostel accommodation may be provided by the Purchaser (SDSC SHAR) on chargeable basis.
2.1.15	Free electricity and water will be provided by the Purchaser (SDSC SHAR) for the alignment works at the site. Tenderer shall take into this while quoting the price.
2.1.16	Tools required shall be arranged by the Tenderer.
2.1.17	Before starting the site work (at SDSC SHAR), the tenderer shall provide insurance as per workman compensation act to all his personnel working at site in Sriharikota against accidents. Insurance for the same shall be borne by the Tenderer.
2.1.18	The transfer of title of jacketed vessels (Bowls) to the Purchaser (SDSC SHAR) will take place only after satisfactory alignment of the bowls with 2 nos. of 10 t vertical mixers at SPAG,SDSC SHAR by the tenderer and full acceptance by the Purchaser.
2.1.19	Quote shall be based on FOR Sriharikota.
2.1.20	All Taxes and duties applicable shall be indicated clearly in quotation

	separately.
2.1.21	**GST Clause:** As applicable by HSN code.
2.1.21	Transportation & Transit Insurance are fully in the scope of tenderer and the same shall be borne by the tenderer.
2.2.	**Publicity relating to tenders:**
2.2.1	Advertisements, press release or other specialized publicity documents, which are related to or reveal the existence of a tender and are intended by the Tenderer for public distribution and/or the press, broadcasting, or television, shall be cleared/approved by the Department.
2.2.2	The Department may direct the Tenderer to withhold such publicity or to require modifications to the publicity material. The Tenderer shall comply with such direction.
2.3.	**Site visit:**
2.3.1	Tenderers may plan to visit and examine the site and its surrounding to familiarize themselves of the existing facilities and environment and may collect all other information which he may require for preparing and submitting the Bid and entering into the tender if required. Tenderers shall visit within 15 days from the date of tender enquiry.
2.3.2	Claims and objections due to ignorance of existing conditions or inadequacy of information will not be considered after submission of the Bid and during implementation.
2.4	**Validity of the offer:**
2.4.1	Bid shall remain valid for acceptance for a period of **six months** from the due date of submission of the Bid.
2.4.2	The Tenderer shall not be entitled during the said period to revoke or cancel his Bid or to vary the Bid except and to the extent required by Department in writing.
2.4.3	Bid shall be revalidated for extended period as required by Department in writing.
2.4.4	In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms and conditions of Bid finalized till that time.
2.5	**Cost of bidding:**
2.5.1	All direct and indirect costs associated with the preparation and submission of Bid (including clarification meetings and site visit, if any), shall be to Tenderer's account and the Department will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bid process.
2.6	**Project monitoring:**
2.6.1	Tenderer shall provide details of project team
2.6.2	Tenderer shall submit the project status report every 15 days mentioning the

	status of various activities w.r.t. planned schedule for realization of bowls along with its accessories like vent & drain valves, QCQD couplings, temperature sensors (Thermocouple sensors) and FRP lids.
2.6.3	Tenderer shall depute their Project team/ engineers for Monthly meeting to review the status and discuss/ resolve minor issues related to project execution at SDSC SHAR/ Tenderer's site based on mutual agreement on mutually agreeable dates.
2.7	**Performance bank guarantee:**
2.7.1	PBG at 3% of the value of the Purchase Order shall be submitted through bank guarantee from any of the Scheduled Banks executed on non-judicial stamp paper of appropriate value, and shall be valid for a period of sixty days beyond the date for completion of warranty period.
2.8	**Liquidated damage:**
2.8.1	Time is the essence of this order. If the Tenderer's defined scope of work is not made by the end of delivery period as per the P.O or any extension thereof by the DEPARTMENT, DEPARTMENT shall recover from the BIDDER as liquidated damages a sum of one-half of one percent (0.5%) of the P.O price of the undelivered stores for each calendar week or part thereof delay. The total liquidated damages shall not exceed ten percent (10%) of the P.O price of undelivered stores.
2.9	**Security deposit:**
2.9.1	Tenderer shall submit security deposit, within 15 days of Order Acknowledgement, for 3% of the total order value. Security Deposit shall be obtained through Bank Guarantee or fixed deposit receipt from any of the Scheduled Banks executed on non-judicial stamp paper of appropriate value and shall be valid for a period of sixty days beyond the date for completion of the Purchase Order.
2.9.2	In case the tenderer fails to furnish the security deposit within the specified date or extended due date, the Purchase Order/Contract shall be cancelled, and the EMD, if any, made earlier shall be forfeited, and, in addition, appropriate penal action will be considered.
2.9.3	Central PSUs/PSEs/Autonomous Bodies/MSEs shall be exempted from the payment of Security Deposit, and instead, an Indemnity Bond shall be submitted by them in lieu of the Security Deposit.
2.10	**Payment terms:**
2.10.1	In general, our payment terms will be 100% within 30 days after receipt, commissioning and acceptance on prorate basis.
2.10.2	However, if Vendors/Suppliers are requesting for advance payment, department may consider as given below, 1. After placement of confirmed Purchase Order: 20% of basic supply cost as advance against submission of bank guarantee

	for an equal amount from a nationalized/scheduled bank and shall be valid till Contract completion period plus 60 days. Format of Bank guarantee shall be obtained from Department after award of contract. 2. After receipt of items at SDSC SHAR, Sriharikota: 60% of basic supply cost against receipt of items at Purchasers / Department site on pro-rata basis. 3. After commissioning at SDSC SHAR, Sriharikota: Balance 20% of basic supply cost after alignment of all bowls with 2 nos. of 10 t vertical mixers and acceptance by Department and submission of Performance bank guarantee of 3% of P.O value valid till warranty period plus 60 days. 4. All the prevailing taxes applicable shall be paid at the time of final payment.
2.10.3	Wherever advance payment is requested, Bank Guarantee from any Nationalized Bank/Scheduled Bank should be furnished. In case of advance payments, if the vendor/supplier is not supplying the material within the delivery schedule, the advance amount will be recovered and interest will be levied as per the Marginal Cost of Lending Rate (MCLR) of SBI plus 2% penal interest.
2.10.4	Further wherever advance payments are requested, Interest will be loaded for advance payments/stage payments as per the MCLR of SBI and will be added to the landed cost for comparison purpose while arriving at L1. In case of different milestone payments submitted by the parties, a standard and transparent methodology like NPV will be adopted for evaluating the offers.
2.10.5	**Overall lowest bid (L1) will be considered for placement of purchase order. No part order will be recommended for any of the individual items.**
2.11	**Mode of payment:** Bidders can submit the banker details and payments can be made through NEFT/RTGS/ECS through PFMS.
2.12	**Make in India Clause:** General Terms & conditions for Bidders: For this procurement, bids from Class-I & class-II Local Suppliers are admissible. hence provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DIPP), Ministry of Commerce & Industries vide letter No. P-45021/2/2017-PP(BE-II) dated 04.06.2020 and subsequent amendment & directives shall be followed. Accordingly, offer will be evaluated & processed in conformation with above referred GOI order (Specially mentioned below). The bidder shall provide compliance and undertaking as per order and hereafter amendments:

2.12.1	Order no: F.No.6/18/2019 PPD dated 23.07.2020 of Department of Expenditure), Ministry of Finance Under Public procurement division for the General Financial rule (GFRs).
2.12.2	Class-I local supplier means a supplier or service provider, whose goods, service or works offered for procurement, has local content equal to or more than 50%, as defined under order.
2.12.3	Class-II local supplier means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this Order
2.12.4	Verification of local content: (i) The Class I local supplier/ Class- II local supplier at the time to tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for Class-I local supplier / Class II local supplier as the case may be. They shall also give details of the location(s) at which the local value addition is made. (ii) In case bid value is in excess of Rs. 10 Cr., Class-I local supplier / Class-II local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content. (iii)False declarations will be in breach of the code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules (GFR) for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the general Financial Rules along with such other actions as may be permissible under Law. (iv)A supplier who has been debarred by any procuring entry for violation of this order shall not be eligible for preference under this order for procurement by any other procuring entity for the duration of the debarment.
2.12.5	The percentage of local content should be specifically mentioned in the offer, without which it will be summarily rejected.
2.12.6	Preference will be given to Class-I Local supplier and in their absence, Class-II Local supplier will be considered.
2.13	**Delivery:**
2.13.1	Tenderer shall adhere to the delivery date mentioned in this tender and same shall be confirmed along with the offer. In case tenderer is unable to meet the delivery schedule, the offer is liable for rejection. Tenderer shall submit the delivery schedule chart along with the technical bid. Delivery schedule shall indicate month and no. of bowls proposed to supply to SHAR.
2.13.2.	The total quantity of 10 nos. of bowls along with bowl accessories viz.,

	Thermocouple sensors (refer annexure-6), QCQD couplings (refer annexure-7), 14 nos. of fiber reinforced plastic lids (refer annexure-8) & 1 no. of alignment fixture (refer annexure-9) shall be supplied within **twenty four months** from the date of award of purchase order.
2.13.3	Alignment of all the bowls with 2 nos. of 10 t vertical mixer shall be completed within **two months from the date of receipt at site or two months from the date of giving site clearance by department whichever is later.**
2.13.4	Intermediate milestones for realization of bowls as identified in this tender document shall be met.(refer point no. 16.0 –Major milestones)
2.13.5	**Storage:** Tenderer shall be responsible for transporting all the items to site, unloading and storage. All the items shall be properly packed to avoid any damage during transportation / handling / storage. SDSC SHAR will provide sheltered area for storage of the bowls and its accessories. Tenderer shall take proper care while unloading & storing the items.
2.14	**Packing & Forwarding:**
2.14.1	The tenderer will be held responsible for the items being sufficiently and properly packed for transport by rail, road, sea or air, to withstand transit hazards and ensure safe arrival at the destination. All packing and transport charges, transit handling costs, transit risk coverage and transport fees of agents employed at the place of delivery or elsewhere, shall be done by and at the expenses of the tenderer.
2.15	**Exclusion of tenders:**
	The following tenders shall be summarily rejected from the procurement process
2.15.1	Tenders of vendors who have been removed from the vendor list or banned/debarred from having business dealings with department.
2.15.2	The tenders which deviate from the requirements specified in the tender document or which contain false information.
2.16	**Drawings:**
2.16.1	Each drawing submitted by the Tenderer shall be clearly marked with the following details. a) Name of the Owner: Satish Dhawan Space Centre, ISRO b) Project Title : 10 t Vertical Mixer Bowls c) Purchase Order No : d) Title of the Drawing clearly identifying the system, equipment or part drawing, Revision Number and Date. e) Name of the Tenderer: (In case of Sub-Vendor or Manufacturer's drawing, name of the Tenderer and Sub-Vendor or Manufacturer shall be incorporated). f) Drawings duly signed in "checked" and “approved" columns. h) Scale to which the drawing is drawn.

	i) Cross references to all relevant drawings. j) All relevant notes to the drawing. k) All notes necessary for understanding and execution of work shown on a drawing shall be presented on the same drawing. l) All legends to all notations. m) Details of revisions carried out n) Bill of materials shall be tabulated, wherever required. o) All titles, noting's, markings and writings on the drawing shall be in English p) All the dimensions shall be in metric units.
2.16.2	If standard catalogues are submitted, the applicable items shall be highlighted therein.
2.16.3	The drawings shall indicate all dimensions and details of equipment, materials of construction etc.
2.16.4	For all revisions of the drawing, Tenderer shall ensure that all revisions are clearly encircled with revision numbers marked on the drawing.
2.16.5	Tenderer shall also ensure that general details of revisions are indicated for each revision in the revision block of the drawing along with the date and signed by the approving authority.
3.0	**PRICE AND TECHNICAL BIDS**
3.1	**Documents comprising the bid:**
3.1.1	This is e-procurement tender. All the documents need to be scanned and attached to the bid under "documents solicited from Vendor" form. In case it is not possible to upload due to higher file size, hard copy of the balance documents (without any price figures) shall be submitted physically before due date.
3.1.2	Offers shall be sent online only using standard digital signature certificate of class III with encryption / decryption. The tenders authorized online on or before the open authorization date and time only will be considered as valid tenders even though the bids are submitted online.
3.1.3	The tenderer must authorize bid opening within the time stipulated in the schedule by SDSC SHAR. Otherwise the online bid submitted will not be considered for evaluation.
On-line bids shall consist of the following:	
3.2	**Part – I Technical and un-priced commercial part:**
3.2.1	Technical and un-priced commercial part shall comprise the following documents/information. All the documents shall be scanned and uploaded in the ISRO e-procurement portal.
3.2.2	Submission of bid letter along with one set of proposal document along with drawings duly signed and stamped as token of acceptance. Scanned copy shall be uploaded in the ISRO e-procurement portal.
3.2.3	Unfilled price format (i.e. masking the prices) shall be submitted.

3.2.4	Power of attorney in favor of authorized signatory of the bid/ proposal documents.
3.2.5	Latest income tax returns/financial audited results.
3.2.6	Work execution Plan for realizing the bowls and its accessories.
3.2.7	Any other relevant document, Tenderer desires to submit.
3.2.8	Bid qualification criteria to be filled and submitted as per Annexure-1
3.2.9	Questionnaire to be filled and submitted as per Annexure-2
3.2.10	Compliance statement to be filled and submitted as per Annexure-3 as well as all the points in the tender document
3.2.11	Quality Assurance Plan as per Annexure-4. Party shall confirm the broad guidelines mentioned in QAP. However, this is only indicative. Detailed QAP shall be submitted by the party after placement of order.
3.2.12	Deviations, if any, w.r.t technical and commercial terms & conditions shall be clearly brought out under deviation list in Annexure-5. If deviations are not listed separately, it will be presumed that you are adhering to all the specification and terms & conditions given in this document.
3.2.13	Temperature sensors specifications along with schedule of quantity to be supplied is attached in Annexure-6
3.2.14	Quick Connect Quick Disconnect (QCQD) couplings specifications along with schedule of quantity to be supplied is attached in Annexure-7
3.2.15	Fibre re-inforced plastic lids specifications, drawings along with quantity to be supplied is attached in Annexure-8
3.2.16	Alignment fixture: Suitable alignment fixture to be configured, designed, fabricated and supplied to SHAR for ensuring perfect reproduction of bowls during fixing of the lift pads and machining the locating cups (refer point no. 5.5). Drawings are attached in Annexure-9.
	Note: All the above documents shall be filled, scanned and uploaded in the ISRO e-procurement portal.
3.3	**Part – II Price bid:**
3.3.1	Price bid shall contain schedule of prices and shall be filled in ISRO e-procurement portal. No deviations, terms and conditions, assumptions, discounts etc. shall be stipulated in price bid. Department will not take cognizance of any such statement and may at their discretion reject such bids.
3.3.2	Price bid format enclosed to the tender document shall be filled and uploaded in the ISRO e-procurement portal.
3.4	**Bid submission:**
3.4.1	Bid shall be submitted in two parts a. Part -1Techno-Commercial Part of the Bid b. Part-2 Price Part of the Bid
3.4.2	Offers should be submitted On-line using standard digital signature of class -

	3 with encryption/decryption options.
3.4.3	The tenders authorized online on or before the open authorization date and time will only be considered as valid tenders.
3.4.4	Prices shall be mentioned in the space/column provided in the ISRO e-procurement portal only for such purpose.
3.4.5	Physical copy of the bid will be accepted only in case if the file size is bigger and not possible to upload the same. In such case, the hard copy shall be submitted within due date. Documents received after due date will not be considered.
3.4.6	Prices quoted should be on the basis of F.O.R. Sriharikota.
3.4.7	The purchaser will not pay separately for transit insurance and same shall be included in the cost quoted by the Tenderer.
3.4.8	All risks in transit shall be exclusively borne the contractor and the purchaser shall pay only for such items as are actually received in good condition in accordance with the purchase order.
3.4.9	Bids duly filled in by the Tenderer should invariably be submitted as stipulated in the e-procurement portal.
3.4.10	Department may open Part – I of the bid on the due date of opening at convenience. Price Bid (Part-II) of the bid of the technically and commercially acceptable bids shall be opened at a later date.
3.4.11	Department reserves the right to reject any or all the Bids without assigning any reasons thereof.
3.5.	**Bid evaluation:**
3.5.1	The Tenderer shall provide all the relevant data/information/details required for evaluating the bid technical and commercially in the specific formats enclosed with the tender. Apart from this, Tenderer is free to add any other relevant information.
3.5.2	During evaluation, Department may request Tenderer for any clarification on the bid/ additional documents/ information required. Tenderer shall submit all clarifications/ additional documents/ information requested in original. If not submitted within the stipulated time department has right to reject such bids.
3.5.3	Techno-commercial discussion shall be arranged with Tenderer, if needed. Tenderer shall depute his authorized representatives for attending discussions.
3.5.4	The complete scope of work is defined in the tender document. Only those Tenderers who undertake total responsibility for the complete scope of work as defined in the tender document will be considered.
3.5.5	In case Bid does not fully comply with the requirement of Proposal document and the Tenderer stipulates deviations to the clauses of the proposal, which are unacceptable to the Department, the Bid will be rejected.
3.5.6	Performance of Tenderer on similar nature of works executed/ under

	execution will be taken into consideration.
3.5.7	The time schedule for completion is given in the Proposal document. Tenderer is required to confirm the completion period unconditionally.
3.5.8	Department shall not be obliged to furnish any information / clarification to unsuccessful Tenderer as regard non acceptance of their Bids.
3.5.9	The payment terms will be suitably loaded on the price for evaluating the price bids using standard techniques like NPV, if required.
4.0	**GENERAL DESCRIPTION OF THE BOWL:**
	The bowl shall have the following features:
4.1	The bowl is cylindrical vessel with flat bottom and open top. The bowl consists of SS304 inner shell and bottom plate.
4.2	The inner shell is covered with MS water jacket for heating/cooling. The water inlet/ outlet connections are terminated with QCQD couplings.
4.3	Air vent and water drain connections for the bowl jacket.
4.4	Two eyelets (part no.-31) are provided (180° apart) for handling with EOT crane and tackle. Four eyelets (part no.-48) are provided on lift pads as alternative arrangement for handling with EOT crane and tackle. Position of hole in lifting eyelets (Part No. 31 & Part No. 48) from top should be same for proper handling.
4.5	Four lift pads are provided for lifting the bowl with cradle in the mixer.
4.6	Two fork lift pads are provided for lifting the bowl using fork lift.
4.7	Four tilting feature for discharging the slurry/liquid from the bowl
4.8	Four resting pads for placing bowl over the trolley
4.9	Four temperature sensors with holders (i.e., Thermocouple sensors) are provided for measuring the temperature inside the bowl.
4.10	The top of the bowl will be covered with FRP lid.
5.0	**SCOPE OF THE TENDERER:**
5.1	Fabrication, Testing, Supply of 10 Nos. of jacketed vessels (bowls) along with accessories viz., Thermocouple sensors, QCQD couplings, Alignment of 10 nos. of bowls with 2 nos. of 10 t capacity vertical mixers at SDSC SHAR along with supply of 14 nos. of FRP lids and 1 no. of alignment fixture as per the enclosed drawings and specifications mentioned in this document. (refer annexure-6,7,8 & 9)
5.2	**Thermocouple sensors:** Each bowl shall be supplied with 4 nos. of thermocouple sensors along with 4 nos. of thermocouple assembly supports along with SS nuts/washers/bolts. The Thermocouple sensors shall be of make – Fabrika/Sensor Build or equivalent approved by SDSC SHAR. **Refer attached specifications and schedule of quantity for thermocouple sensors in Annexure-6** The tenderer has to prepare the thermocouple assembly support drawing for 10 t capacity vertical mixer bowls similar to that of the attached reference

	drawing. The drawing to be submitted to SDSC SHAR for review and acceptance. Thermocouple assembly drawing for similar small capacity vertical mixer bowl (i.e., 2.5 t vertical mixer- bowl) is enclosed for reference **(refer Annexure-9).** ***Note: Ignore RTD sensors assembly as shown in the bowl fabrication & machining drawing.***
5.3	**QCQD couplings:** Supply and assembly of QCQD couplings (2 nos. per each bowl) for water inlet and outlet connections. (Make: M/s. STAUBLI, Model: TTX60-DN80.110A/IC6/JE). **Refer attached document for detail specifications and schedule of quantity in Annexure-7**
5.4	**FRP lids:** Fabrication and supply of 14 nos. of FRP lids as per the attached specifications and drawings in **Annexure-8.**
5.5	**Alignment fixture:** In general, the bowl is lifted up in axial direction and mated to the mixer (at shroud which is the interface between mixer & bowl) with zero-zero levelling. Shroud lower surface consists of a spigot (a circumferential extension from the shroud bottom surface to an extent of 35 mm) to ensure bowl centering during mating condition. Radial clearance of spigot to bowl inner diameter is 0.75 mm and spigot ID is $2838.5_{-0.120}^{0}$ mm. (refer drawing in Annexure-9). The bowl consists of 4 nos. of lift pads (for lifting the bowl) which are to be positioned precisely in order to meet the bowl mating requirements (should be mated completely with 0-0 levelling without interfering the spigot). Hence, a fixture consisting identical mixer shroud configuration and lift pins in-order to locate the lift pads on the bowl. The Tenderer shall configure, design and realize a suitable fixture for ensuring the perfect reproduction of bowls during fixing of the lift pads and machining the locating cups. **The drawings along with 3D model for the same shall be submitted to department for review and acceptance. The final (duly stamped by TPI) drawings shall be submitted for department approval.** The following drawings are attached for reference in Annexure-9; 1. Alignment fixture drawing - with similar configuration of a smaller capacity bowl (i.e., 4.5 t vertical mixer) – For configuration purpose only. (Dwg. 1 (a) & 1 (b)) 2. Bowl interface with 10 t vertical mixer shroud drawing (Dwg. 2) 3. Bowl lift pin drawing (Dwg. 3) 4. Lift pin co-ordinates drawing (Dwg. 4 (a) & 4 (b)) **Note: The fixture shall be supplied to SHAR.**
5.6	Fabrication & supply of additional shim plates for the lift pads if required during the bowl alignment with mixer at site.
5.7	Selection and testing of the raw material as per QAP.

5.8	Hydro test & pneumatic test for bowl inner shell and water jacket as per the specification given in tender document (point no. 7.6).	
5.9	Load testing of all the lifting eyelets for all the bowls as per prevailing standards.	
5.10	Providing support and measuring instruments for various stage inspections as well as final inspection.	
5.11	Any minor modification suggested during the course of fabrication /inspection shall be carried out at free of cost.	
5.12	The fabricator shall submit Bank Guarantee for equivalent amount (Rs.20Lakh) valid till completion of receipt and acceptance of Jacketed vessels (SS Bowls) and return of scrap/unused FIM, if any.	
5.13	Supply of all the necessary documents such as inspection & testing reports, fabrication & part drawings, as-built drawings, QAP etc.	
5.14	Transportation of finished bowls to SDSC SHAR, Sriharikota. Also the transport arrangement for the crews deployed for alignment/ site acceptance tasks.	
5.15	Any other items which are not included in the scope of department but required for the complete supply of the bowls as per the drawing.	
6.0	**SCOPE OF THE DEPARTMENT:**	
6.1	Tenderer has to carry out hydrotest for bowl inner shell and water jacket as per the specification given in tender document. Suitable top closure (1 no.) for hydro testing of the bowls will be supplied by department on returnable basis. The tenderer should furnish bank guarantee for the hydrotest lid supplied by the department and bear the cost for the transportation to tenderer site and return back to SDSC SHAR.	
6.2	Providing necessary tools, bowl lifting tackle, mixer, electricity, and crane for alignment works.	
6.3	Accommodation at Sriharikota for alignment personnel subject to availability will be provided on chargeable basis.	
6.4	Prime mover/Trailer support for moving the bowl within SPP.	
7.0	**TECHNICAL SPECIFICATIONS OF THE BOWL:**	
7.1	**Utility:**	
	This jacketed vessel called as mixer bowl (change can) is used in conjunction with a mixing device called vertical planetary mixer used for the mixing viscous materials.	
7.2	**Size of the vessel:** The tolerance & other dimensions are as per the drawings enclosed	
7.2.1	Inner diameter	2794 mm
7.2.2	Inner height	1805 mm
7.2.3	Outside diameter	2840 mm

7.2.4	Overall height		2486 mm
7.2.5	All dimensions shall confirm to the dimensions specified in the attached drawings / tender document		
7.3	**Material of construction:** Material for the other components shall be as per drawing. Procurement of shell and bottom plates shall be either from the imported sources or from the manufacturing /authorized distribution of the indigenous source. Mill test certificates for all the materials are to be furnished before taking up the fabrication. In case original test certificates are not available, material shall be tested at approved laboratories and test reports shall be submitted to the department for clearance.		
7.3.1	Inner shell & inner bottom plate		SS 304
7.3.2	Flange with SS cladding		SA 105 forged carbon steel
7.3.3	Bottom shell & Spherical dish		Carbon steel Gr. 70 SA 516
7.3.4	Thermocouple supports		As per the drawing which will be submitted by bidder
7.3.5	Struts		ASTM 106 Gr. B/ E250 BR, IS2062
7.3.6	Water jacket outer shell		Carbon Steel Gr. 70 SA 516
7.3.7	Code of construction		ASME section VIII, DIV.-1 (& Appendix-9)
7.4	**Design drawings:** The vessels shall be fabricated as per the enclosed design drawings.		
	S.No	Description	Drawing No.
	1	Bowl Welding	GSP 1801007/175-0-4, Rev-01 Sheet 1 to 4 of 6
	2	Bowl Machining	GSP 1801007/175-0-4, Rev-01 Sheet 5 & 6
	3	Bowl assembly	GSP 1801007/161-1-3 , Rev-00
	4	FRP LID	GSP 1801007/176-0-4, Rev-00
7.5	**Approval of drawings:**		
	Before start of the work, a PERT chart shall be made available to the department. The Tenderer shall provide the detailed fabrication and assembly drawings in accordance with code for scrutiny and approval within 60 days after placement of order but prior to the fabrication. The Tenderer shall go ahead with the fabrication work only after getting the clearance from department or third party. The process and inspection schedule shall be submitted along with drawings to the department for approval.		
7.6	**Pressure specifications/Test conditions:**		
7.6.1	Internal working pressure	7 KSC (g)	
7.6.2	Jacket working pressure	7 KSC (g)	

7.6.3	Pneumatic test pressure		7 KSC (g) [internal & jacket]
7.6.4	Hydrotest pressure		10 KSC (g) [internal & jacket]
7.6.5	Code of construction		ASME section VIII, DIV. -1 (& Appendix-9)
7.7	**Stress Relieving cycle (tentative):**		
7.7.1	a	Loading temperature	100^{o}C (max.)
	b	Rate of heating	30^{o}C/hr.
	c	Soaking temperature	400$\pm$20^{o}C for 6hrs.
	D	Rate of cooling	40^{o}C/hr.
	e	Unloading	100^{o}C (max.)
7.7.2	Stress Relieving cycle shall be decided based on the thickness and as per ASME Sec VIII Div. 1.		
7.7.3	Leak test for shell flange (Part No 1) with Inner shell (Part No 2) to be pneumatically tested at 1 kg/sq.cm with soap solution		
7.7.4	Four nos. of tilting features are configured with two on front and two on rear side. Towards load testing of these 4 nos. of tilting features, at a time only one pair of tilting features (both front or both back) to be tested for a load carrying capacity of 30000 kg. Similarly both pairs of tilting features shall be load tested for each bowl and same procedure of load testing shall be followed for all the bowls.		
7.7.5	Natural gas fired/Oil fired/electric furnace shall only be used. Baffles shall be used to avoid deposit of residues on the job.		
7.7.6	Job shall be heated after completion of all fabrication / welding activities on that part.		
7.7.7	Local heating using induction coil is not acceptable		
7.7.8	Temperature recorders shall be used during SR and data shall be submitted for review.		
7.7.9	Job temperature shall be monitored and recorded using suitable measurement instrument.		
7.7.10	Temperature Chart shall be submitted for review during inspection.		
7.8	**Radiography/ UT / DP:**		
	The long seam weld of the inner shell and weld joint between inner shell and bottom plate shall be 100% radiography tested and the corresponding films/ reports shall be submitted to department. All fillet welds to be DP tested and subjected to UT as and where required. The internal fillet welds between bottom plate and shell should be UT tested. Top flange SS overlay must be UT qualified. SS & CS sheets shall be tested and qualified by UT as per IS code for thickness measurements. UT tested and qualified sheets shall be used for the fabrication. The UT equipment shall be calibrated before use and the calibration certificates shall be provided to the department. UT inspection shall be carried out by level -2 inspectors and above.		
7.9	**Fabrication and machining:**		

7.9.1	Inner & bottom shells, inner bottom plate, water jacket and spherical dish shall be made out of single larger sheets. For the inner, bottom and jacket shell shall have only one long seam joint. Dish to be of single piece construction. **The bottom plate should be realized from a single plate and no joints are permitted.**
7.9.2	Fabrication and edge preparation for welds shall be as per ASME code for pressure vessels. Qualified welders approved by inspection agency (third party) only shall be employed for welding. Tungsten inert gas (TIG) welding shall be adopted for SS welding.
7.9.3	Proper ribs shall be provided during L-seam welding of the inner shell, bottom shell, water jacket and spherical dish to avoid distortion.
7.9.4	Enough care shall be exercised by providing necessary ribs during welding of the inner shell to the bottom plate to avoid distortion. Party should note that the distortion at this stage may finally results in the reduction in the minimum thickness mentioned in the drawing (after machining) which is not at all acceptable.
7.9.5	Top flange shall be stress relieved before overlaying and UT tested after overlaying. Minimum thickness of SS overlay shall be maintained as per drawing after machining.
7.9.6	All interior welds shall be free from pits and crevices.
7.9.7	The indented jacketed vessel (bowl) is not only a pressure vessel, but forms as a part of mixing machine, the bowl has to be machined to close tolerances and utmost care shall be taken during welding to avoid the welding distortions. More care shall be exercised and necessary fixtures to be made during SS welding and stress relieving.
7.9.8	Pickling and passivation of the external SS surfaces (before covering the jacket shell) of the bowl shall be carried out.
7.9.9	Before fixing the jacket shell, jacket internal portions shall be thoroughly cleaned and baffle orientation & cleanliness shall be cleared by the department/third party. No repair on the bowl to meet final dimension shall be ensured before welding the jacket portion.
7.9.10	No welding will be permitted after stress relieving machining shall therefore be carried out on the bowl as a fully completed single piece.
7.9.11	Provision of suitable tell-tale holes and weld orientation are to be decided in consultation with the department at the time of preparation of fabrication drawing
7.9.12	The critical dimensions shall be achieved within the tolerances as mentioned in the drawing. The minimum thickness after machining of inner shell (32mm) and bottom plate (32mm) has to be ensured as specified in the drawings. No waiver will be permitted on these dimensions.
7.9.13	Additional geometrical and positional tolerances indicated in the drawing are

	only to reduce alignment trials at site. The vendor has full responsibility of mating all the bowls with the mixer.
7.10	**Painting:**
	All exterior surfaces should be cleaned with emery paper and painted with two coats of primer and two coats of pista green epoxy paint. All the machined surfaces shall be applied with anti – corrosive varnish. Painting shall be carried out as per the following: 1. No. of coats – 4 2. Coat thickness: I coat (Primer) – 10 to 20 μ, II coat (Primer) – 20 to 40 μ, III coat (Paint) – 40 to 85 μ, IV coat (Paint) – 85 - 115 μ Approved Make of paints: CDC/ Bombay paints /Berger /Goodlac /Nerolac /Asian paints
7.11	**Surface finish*:***
	Internal: The interior of the bowl and flange's top surface shall be finished to the extent of 1.6 to 3.2 microns as specified in drawings. Proper buffing shall be done to achieve above finish using the suitable buffing compound.
	External: All welds should be ground smooth and all the sharp edges should be rounded off for ease of cleaning.
7.12	**Inspection and testing:**
	Inspection and testing shall be carried out as per approved QAP. The party shall submit detailed Quality Assurance Plan based on finalized fabrication process flow. All the inspection tools and fixtures required for inspection shall be arranged by the tenderer. After the entire work has been completed, the VENDOR shall make all required adjustments until all guaranteed requirements are met. The test reports shall be handed over to PURCHASER's for approval. If the stipulated requirements are not fulfilled, the VENDOR shall make the deficiency good by providing it in every case, by altering and/ or replacing the parts or the whole system free of charge to the PURCHASER immediately.
7.12.1	Dimensional inspection during fabrication:
	a) Tenderer shall carry out all stage and final inspection as per QAP and inspection details shall be submitted to Purchaser for verification. b) Material test certificates (chemical & Mechanical)
7.12.2	Dimensional inspection and testing after fabrication and machining:
	a) Dimensions of the inner shell, bottom shell and jacket before and after rolling and also after welding. b) Dimensional inspection during machining of the inner shell. c) The bowl shall be hydro tested as a single unit as per the ASME code for pressure vessels. The hydraulic and pneumatic tests shall be carried out for all the bowls as per the specifications at Tenderer's site prior to dispatch. d) Leak test for shell flange (Part No 1) with Inner shell (Part No 2) to be

	pneumatically tested at 1 kg/sq.cm with soap solution e) Lifting Eyelets and lifting brackets of all the bowls shall be load tested as per prevailing standards which is acceptable by purchaser. f) Four nos. of tilting features are configured with two on front and two on rear side. Towards load testing of these 4 nos. of tilting features, at a time only one pair of tilting features (both front or both back) to be tested for a load carrying capacity of 30000 kg. Similarly, both pairs of tilting features shall be load tested for each bowl and same procedure of load testing shall be followed for all the bowls. f) All bowls shall be dispatched only after formal inspection and acceptance at your site.
7.13	**Third party inspection:**
	Tenderer shall engage third party (like M/s Lloyds register, M/s M.N. Dhastur, M/s BVQI, M/s DNV, M/s.TUV or any reputed agency approved by department) at Tenderer's cost. Tenderer shall provide necessary support and measuring instruments for stage and final inspection. Tenderer shall carry out minor modification suggested at the time of stage and final inspections without any additional cost as per the approved procedures.
7.14	**Transportation:**
	The tenderer shall properly pack and dispatch all deliverables in trucks to SDSC SHAR, Sriharikota.
7.15	**Alignment with mixer:**
	The vessel forms a part of a vertical mixer and serves as mixing bowl with very close clearances between the agitator and the bowl both at the bottom and vertical sides. The alignment work shall be carried out for 2 nos. of mixers available at SHAR. The clearances between the bowl and the mixer are very critical and with the available provisions in the bowl & mixer, the clearances shall be maintained. Tenderer shall depute their engineers and technicians to Sriharikota to align all the bowls with the mixer.
7.16	**Documentation:**
	All inspection & test reports in duplicate and as built drawings (4 sets) shall be prepared and submitted to department besides the fabrication and part drawings in AUTOCAD format for all the bowls. Mill test certificates for the materials are to be furnished. This shall form the handing over of documents.
8.	**GENERAL POINTS:**
8.1	The test specimens of the SS plates as per the standards must be prepared and supplied to department for carrying out necessary material test certification from our end after our material identification stamping.
8.2	The jacket shall be provided with suitable drain valve for draining out entire jacket water as and when necessary. Correspondingly a valve for air vent shall be provided at the top of the jacket.

8.3	The following matter shall be painted on each of the bowl a) FRONT END & REAR END b) BOWL No. on all sides (Bowl No. should start from 1,2,.....10) c) TARE WEIGHT on front side. d) PST1, PST2, PST3 & PST4 for temperature sensors. e) Flange shall be marked with 0^0, 90^0, 180^0, 270^0 in CCW starting from front. (i.e., marking shall match to the reference taken during machining &inspection). f) A, B, C and D on lift pads for identification
9.	**CODES AND STANDARDS:**
9.1	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.
9.2	Other national standards established to be equivalent or superior to the codes and standards specified are also acceptable. The Tenderer shall furnish English translation of all standards specified in this specification.
9.3	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.
9.4	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 Tenderer.
10	**SAFETY:**
10.1	It is the Tenderer's responsibility to see the safety of workmen and protection of surrounding equipment at the work zone.
10.2	All the safety equipment required for carrying out the work such as face shields, welding goggles, helmets, safety belts etc. shall be supplied by the Vendor at his own cost.
10.3	Vendor shall give an undertaking to observe all safety norms put forth by department from time to time, until completion of the work.
11.0	**OTHER IMPORTANT INFORMATION TO TENDERERS**
11.1	Tenderer has to make their own arrangement for transportation and food for their employees.
11.2	Tenderer shall take necessary care required during the work. Shall provide necessary insurance for all the work men employed to carry out the above work and proof shall be submitted prior to start of work.
11.3	The wages of the employees paid by the tenderer shall meet the minimum wages act. stipulated in the Nellore, AP, region.
12.0	**GENERAL SPECIFICATION RELATED TO FABRICATION:**
12.1	All welds shall be ground.
12.2	100% DP test for root and final weld pass shall be carried out.

12.3	100% Ultrasonic test for plates (MS) of thickness above 20mm and as per QAP unless otherwise specified.
12.4	100% Radiography test for all butt welds for plate (MS) thickness 20mm and above and as per QAP unless otherwise specified.
12.5	The entire fabrication activity shall be performed in a planned / sequential manner to achieve desired dimensional/geometrical tolerance specified in the drawing or functional requirement mentioned in this document. It is suggested to add sufficient number of fixtures and tools to control the distortion during welding process.
12.6	Dimensions shown in the drawing are final acceptance dimensions. Allowances for machining and thinning due to fabrication process shall be added to arrive at material sizes. Tenderer is wholly responsible for realizing the finished product. Allowances mentioned in the drawing are indicative. Tenderer shall study the requirement and provide proper machining allowances required based on the fabrication procedure followed by the Tenderer.
12.7	Dimensional tolerance wherever not specified shall follow the standard open dimension tolerances provided in the drawing.
12.8	The effective throat thickness of a fillet weld shall be shortest distance from the root to face of the diagrammatic weld.
12.9	Wherever welded attachments are used to facilitate fabrication, same shall be removed carefully by cutting or chipping and surface of material shall be finished smooth by grinding. As far as possible, hammering shall be avoided.
12.10	Edge preparation shall be carried out for all joints as mentioned in the drawing or as per standard fabrication procedure.
13.0	**ADDITIONAL DATA TO BE FURNISHED BY TENDERER ALONG WITH TECHNICAL BID:**
13.1	List and Make of the bought out components that the Tenderer has considered (if any) in the proposal.
13.2	List and make of imported items (if any).
13.3	Compliance Statement for Clause by Clause compliance
14.0	**DATA TO BE FURNISHED BY TENDERER AFTER THE AWARD OF CONTRACT/ORDER:**
14.1	Proposed Quality Assurance Plan
14.2	Proposed Project execution plan and fabrication process plan.
14.3	Bar chart for supply schedule indicating the date of completion of various activities so as to complete the execution of the tender within the time frame stipulated in the tender specification.
14.4	Any manufacturing and fabrication work carried out prior to the approval of the drawings will be at the Tenderer's own risk and expenses
14.5	Drawings submitted by the Tenderer for approval shall be checked/reviewed

	by the PURCHASER and comments, if any, on the same will be conveyed to the Tenderer. Tenderer shall incorporate all these comments in his drawings.
14.6	Tenderer shall send copies of instruction manuals along with the dispatch of equipment. Instruction manual shall contain full details, as-build drawings of all equipment, alignment procedure, testing procedure, operation & maintenance procedure of the equipment. After commissioning and initial operation of the equipment, if the instruction manuals require any modifications/additions the same shall be incorporated and the updated instruction manuals shall be submitted by the Tenderer to Purchaser.
14.7	Unpriced Purchase orders for bought out components.
14.8	Material test Certificates for all items.
14.9	Procedures for Welding, Qualifications of Welders, Painting and Finishing
14.10	Plan of alignment of bowls to the mixer.
14.11	Inspection and Testing Plan.
14.12	Dimensional inspection reports generated during entire fabrication process, alignment at SDSC SHAR.
14.13	All the reports generated during fabrication including material test certificates and other NDT tests.
14.14	Final as built drawings, 4 sets hard copy and one set soft copy in *.dwg format
15	**SPECIAL CONDITIONS:**
15.1	**EFFECTIVE DATE OF CONTRACT:**
15.1.1	The successful BIDDER will be awarded with PO (Purchase Order) and the PO shall come into force from the date of release.
15.2	**Quotation/Bid:**
15.2.1	The quoted price shall be fixed and firm. The quotation shall be according to the PRICE FORMAT.
15.3	**SCHEDULE OF DELIVERY**
15.3.1	BIDDER shall submit a detailed time chart, for fabrication, assembly, testing and commissioning.
15.4	**PAYMENT SCHEDULE**
15.4.1	All payments shall be made within 30 (thirty) days after submission of the following documents:
15.4.1.1	The original and three Xerox copies of Performa invoice.
15.4.1.2	Clearance by DEPARTMENT for stage payments as appropriate.
15.4.2	CLAIMS
15.4.2.1	Claims on account of additional works, not covered under the above scope, if any, may be considered by the DEPARTMENT and shall be settled based on mutual discussion.
15.4.2.2	Claims on account of any additional Taxes & duties payable, which are statutory levies, shall be paid by the DEPARTMENT, at rates prevailing at the time of delivery.
15.4.2.3	In the event of the failure on the part of either tenderer to meet its

	responsibilities of the PO, the parties of this PO shall negotiate and come to a mutual understanding regarding the payments already made and the schedule of subsequent delivery/payments, in accordance with the PO.
15.5	**MODIFICATIONS /CHANGES TO SPECIFICATIONS:**
15.5.1	The job is supply of a special purpose jacketed vessel as such it may involve minor changes in qualitative requirements and specifications. Any amendment to the PO which may be necessary in these respects will be established within a reasonable time as may be mutually agreed in the form of an amendment. Such modifications shall be accommodated by the BIDDER.
15.6	**CONDITIONS FOR COMPLETION OF PO:**
15.6.1	This PO will be considered to have been performed in all respects, only after delivery and alignment of Bowls to SDSC SHAR, Sriharikota in satisfactory working condition.
15.6.2	The PO will be considered to have been completed only after the SDSC SHAR has effected the mutually agreed payment in full after satisfying itself regarding all the terms and conditions of such payment.
15.7	**CONFIDENTIALITY AND PROPRIETARY RIGHT PROTECTION:**
15.7.1	BIDDER and SDSC SHAR, will be obliged to preserve the confidentiality of the proprietary information received, exchanged between each other during the period of the Contract.
15.7.2	Technical documentation published and/or claimed for a patent shall be effected by both the parties only on mutual decisions and approval of both the parties, during the existence of this agreement.
15.7.3	Only those persons among the SDSC SHAR / TENDERER's staff, who are directly engaged in the fulfilment of the Contract will be furnished / acquainted with the proprietary information.
15.8	**EXECUTION METHODOLOGY:**
15.8.1	BIDDER and SDSC SHAR shall designate in writing competent representative(s) to co-ordinate and carry out various tasks such as interfacing, progress monitoring, scheduling of inspection and acceptance tests etc., for effective channel of communication with other tenderer for timely realization of the Bowls.
15.8.2	SDSC SHAR / its representatives shall be entitled to inspect the TENDERER'S premises and other sub-vendor's premises during the manufacture, examine and test at workmanship of all systems, components to be supplied under this PO.
15.8.3	When systems / components have passed the specified test, the SDSC SHAR representative will furnish declaration to this effect in writing to TENDERER. TENDERER shall provide copies of test certificates to the SDSC SHAR as may be required.
15.8.4	A separate Project Team shall be identified by the TENDERER immediately after signing the Contract to organize and progress with identified activities and task. The project team shall co-ordinate various activities of the PO.TENDERER shall ensure active functioning of the project team from start to end of the project.

15.9	**REVIEW METHODOLOGY / TECHNICAL REVIEW / STATUS REVIEW:**
15.9.1	SDSC SHAR shall depute its representatives consisting of members drawn from different fields like Mechanical, Electrical, Instrumentation, System Reliability, Quality control, Safety, CLIP etc., to review the progress of the Project in order to ensure that various milestones of the Project are completed in time and stage payments are certified / recommended for release.
15.9.2	SDSC SHAR will conduct the Quality audit for the various sub-systems for mechanical at TENDERER'S premises by a team of representatives.
15.10	**REPLACEMENT:**
15.10.1	If any material/system/component or any portion thereof is damaged or lost during transit and commissioning, the SDSC SHAR shall give notice to TENDERER setting forth particulars of such materials/ systems/components damaged or lost. The replacement of such material/systems /components shall be effected at no extra cost to the SDSC SHAR by TENDERER within a reasonable time to avoid unnecessary delay in the intended usage of the systems/components.
15.11	**WARRANTY:**
15.11.1	TENDERER shall provide warranty for a period of 12 months from the date of installation, commissioning and acceptance by the SDSC SHAR. The warranty shall cover the quality and workmanship of the Bowls.
15.11.2	If during the aforesaid period of 12 months, the said any component of the bowls is found to be not conforming the description and quality aforesaid or have deteriorated then the SDSC SHAR will be entitled to reject such component thereof as may be noticed not to conform to the said description and quality.
15.11.3	On such rejection, TENDERER (if called upon to do so) shall replace the rejected components within reasonable time at no extra cost to the SDSC SHAR.
15.12	**PATENT RIGHT:**
15.12.1	TENDERER shall take all possible care and precautions to avoid infringement or use of patents or design rights or any alleged patents or design rights in the execution of this project. However, in the event of any claims made under or any action brought against in respect of such matters as aforesaid, beyond the control of TENDERER, the SDSC SHAR and TENDERER shall jointly settle any dispute or conduct any litigation that may arise there from, including financial implication.
15.13	**DOCUMENTATION:**
15.13.1	TENDERER shall present detailed document on the bowls and submit the same to the SDSC SHAR. The document should include sub-components specifications, acceptance plan & acceptance test specifications at system level & sub-system level, interface specifications, manufacturing drawing and also the documents mentioned elsewhere in the PO.
15.14	**INSPECTION & ACCEPTANCE CRITERIA:**
15.14.1	SDSC SHAR will depute quality audit teams (mechanical and instrumentation) for the inspection of bowls components. Quality audited

	components with due clearance from SDSC SHAR shall be used in the subassemblies. Quality audit teams will inspect the subassemblies before final assembly.
15.14.2	Notwithstanding anything contained in the PO, the SDSC SHAR have right to inspect the work of the sub-vendor/TENDERER at his premises. TENDERER has to arrange for the same.
15.15	**FORCE MAJEURE**
15.15.1	For the purpose of this Tender/PO the term “force majeure” shall mean strikes, lock-outs and other conflicts, acts of an enemy, war hostile blockade, disturbance of the public order, stroke of lightning, fire, thunder storm, flood explosion and acts of God and Government Acts beyond the reasonable control of the tenderer claiming force majeure.
15.15.2	If due to circumstances of force majeure, either of the parties to this Contract partially or completely unable to fulfil its obligations in accordance with this PO, then, the said tenderer shall be obliged to immediately inform the other tenderer of the occurrence of the circumstances of force majeure in writing.
15.15.3	The tenderer claiming force majeure shall also be obliged to keep the other tenderer informed of the events in the process related to the occurrence of the said force majeure circumstances and of the possible degree of non-fulfilment or delay in fulfilment of the obligations in accordance with this Contract.
15.15.4	All the obligations of the tenderer that invokes the plea of force majeure shall be suspended as long as the said force majeure circumstances continues to exist and not longer, and the said tenderer shall not be regarded as having committed breach or failure, nor shall be held responsible to make compensation for losses suffered by either tenderer.
15.15.5	The terms of fulfilment of the obligation shall be duly extended for the period during which the circumstances of force majeure lasts. The fulfilment of the obligations shall be resumed immediately after the cessation of the said circumstances of force majeure.
15.15.6	If the said force majeure circumstances last for more than sixty days, parties to this Contract shall discuss and agree upon further action.
15.15.7	If the state of non-fulfillment of obligation under the Contract be more than six (6) months and nothing could be done to make a statement about ceasing of obligations of Contract, within not more than six (6) months, either tenderer has the right to cancel the Contract without any preventive term with the agreement cancellation coming into force immediately.
15.16	**LIQUIDATED DAMAGES**
15.16.1	If the TENDERER fails to deliver the bowls within the specified period as per the PO or any extension thereof by the DEPARTMENT, DEPARTMENT shall recover from the TENDERER as liquidated damages a sum of one-half of one percent (0.5%) of the Contract price of the undelivered stores for each calendar week or part thereof delay. The total liquidated damages shall not exceed ten percent (10%) of the PO price. The bowls will be deemed to have delivered only when all its component parts are delivered. If certain components are not delivered in time, the Bowls will be considered as

	delayed until such time as these parts are delivered. However, delays by the department for clearances more than 2 months will not account in the TENDERER'S delay.
15.17	**ARBITRATION**
15.17.1	Except as otherwise specifically provided in the PO any disputes or differences including those considered as such by only one of the parties arising out of or in connection with this PO shall be, to the extent possible, settled amicably between the parties. If amicable settlement cannot be reached, then all disputes shall be settled as per the Indian Arbitration ACT 1996.
15.18	**LANGUAGE AND MEASURES**
15.18.1	All documents pertaining to the Contract including specification, schedule, notices, correspondence, operating and maintenance instructions, drawings or any other writings shall be in English language. The metric system of measurement shall be used.
15.19	**INDEMNIFY**
15.19.1	The tenderer shall, at all times, indemnify the SDSC SHAR against all claims including claims by any third party relating to stores for infringement of any rights protected by patent registration of design or trademarks. The tenderer shall also take the entire responsibility for adequacy of supplies/services for fulfillment of the Purchase Order.
15.20	**AMENDMENT TO THE CONTRACT**
15.20.1	No amendments or modifications of the PO shall be valid unless both parties and their authorized representatives make the same in writing and specifically stating the same to be an amendment to the PO. The modifications/changes shall be effective from the date on which they are made/ executed unless otherwise agreed to.
15.21	**TERMINATION OF THE PURCHASE ORDER**
15.21.1	Both the DEPARTMENT and TENDERER shall have the right to terminate the PO by giving a notice of 30 days in writing to the other for non-compliance with any of the clause of the PO. The termination for any other reason will be by mutual consent.
15.21.2	If the PO is terminated for any reasons, the expenses incurred for conduct of the above work are to be reckoned to the extent of the work that is carried out which will be settled by either of the parties to the PO on mutual agreement within 30 days or such extended period from the date of intimation of termination of the PO.
15.21.3	The ownership of all materials, parts and unfinished work paid for by the DEPARTMENT under the provisions of the PO shall vest with the DEPARTMENT or transferred to the DEPARTMENT by TENDERER as soon as they have been paid for.
15.22	**SECRECY**
15.22.1	The technical information, drawings, specifications and other related documents forming part of the PO, supplied by the DEPARTMENT/TENDERER to each other shall not be used for any other purpose, except for execution of the PO.

15.22.2	The technical information, drawings, specifications, records and other documents shall not be copied, transcribed, traced or reproduced in any other form or otherwise in whole and/or duplicated, modified, divulged and/or disclosed to a third party nor misused in any other form whatsoever without the consent in writing by either party, except to the extent required for the execution of this Contract. The technical information, drawings, specifications and other related documents, supplied by the DEPARTMENT shall be returned back with all approved copies and duplicates, if any, immediately after they have been used for the agreed purpose.
15.22.3	The technical information, drawing, specifications, records and other documents, which are supplied by TENDERER to the DEPARTMENT, shall be used only for exclusive purposes of the DEPARTMENT.
15.23	**SECURITY**
15.23.1	The party shall strictly comply with the security rules & regulations of the SDSC SHAR. The party shall complete the required formalities including verification of character & antecedents, of the persons engaged or deployed by him, through police or any other authority.

16. MAJOR MILESTONES:

Sl. No.	Description	Time (in months)	Compliance Yes or No	Remarks
T1	Placement of PO	T		
T2	Submission of Quality Assurance Plan and Fabrication process plan, Work break down structure	T1+1		
T3	Submission of fabrication drawings, machining drawings and assembly drawings etc. to department for approval.	T2+1		
T4	Review/Approval of fabrication drawings, machining drawings and assembly drawings etc. by department.	T3 + 3 weeks		
T5	Submission of final approved drawings	T4 + 2 weeks		
T6	Submission of purchase order copy (Unpriced) for raw materials/ various bought out items or readiness of raw materials to complete the scope of work.	T5+1		
T7	Completion of Welding, Machining, Inspection, Testing and painting of the bowls	T6+5		
T8	Receipt of bowls at SDSC SHAR	T7+15		
T9	Alignment with Mixer after readiness of SDSC SHAR site for alignment of bowls and clearance by department.	T8+2		

17. List of Annexures:

Sl. No.	Description
Annexure-1	Bid qualification criteria
Annexure-2	Questionnaire
Annexure-3	Compliance Statement
Annexure-4	QAP
Annexure-5	Deviations
Annexure-6	Thermocouple specifications, quantity and reference drawing
Annexure-7	QCQD specification document
Annexure-8	FRP lid drawing
Annexure-9	Alignment fixture drawing (4.5 t VM bowl)

18. Price Format:

Sl. No.	Items/ Information	Qty. (Nos.)	Basic Unit Cost (Rs.)	Tax (Rs.)	Total cost per unit (Rs.)	Grand total
		A	B	C	D=B + C	E=D x A
1.	Fabrication, testing & supply of Jacketed vessels (SS bowls) for 10 t capacity vertical mixers along with accessories viz., Thermocouple sensors (as per Annexure-6) & QCQD couplings (as per Annexure-7)	10				
2.	Fibre Re-inforced Plastic (FRP) lid (as per Annexure-8)	14				
3.	Alignment fixture (as per Annexure-9)	01				

Annexure-1

Bid Qualification Criteria for Supply of Bowls

Tenderers who are qualifying/meeting following Technical and Financial capabilities are eligible to participate in the bid for supply of Bowls. Tenderer shall furnish all the details with documentary proof and submit the same along with quotation. Bids of the parties which are not meeting the following criteria will not be considered for evaluation and will be rejected without seeking any further clarifications. Tenderer shall furnish the details of their resources in factory like manpower, machinery, quality system etc., for department to assess their capability. Tenderer shall submit above information in the format given in "Questionnaire" attached as Annexure-2.

Sl. No.	Criteria / Requirement	Reply / Eligibility from M/s….
1.	**Technical Qualification Requirements:** The Tenderer should meet the following technical qualifying requirements and shall submit relevant certificates/data to establish his credentials.	
1.1	The Tenderer shall be an organization with previous experience of atleast 5 yrs. as on March 2022, in having executed contracts for design, engineering, manufacture, supply, testing of internal/external pressure vessel/cylindrical shell (which involves machining)	
1.2	The Tenderer shall have a dedicated design team with experience in designing of pressure vessels/cylindrical shells as per ASME Section VIII Div 1.	
1.3	The Tenderer shall have dedicated fabrication team with experience of fabricating pressure vessel/cylindrical shell of more than 2m dia. as per ASME Section VIII Div 1.	
1.4	The Party should have successfully completed Design, Manufacture and Testing of at least 1no. of internal/external pressure vessel/cylindrical Vessel of dia. more than 2m, length equivalent or more than 2.5 m, shell thickness 30mm and weight 8t. (Enclose documentary evidence).	
1.5	The Party should have in house facility to machine jobs of diameter more than 2 m.	
1.6	Party shall have experience and in house facility for bending/rolling of 40 mm thick plates and diameter 2 m (approx).	
1.7	Party shall have qualified welders with experience of welding of plate thickness 40 mm or more.	
1.8	Party shall have experience in carrying out Radiography Test	

	of butt welds for plate thickness 40 mm or more.	
1.9	Party shall have experience in carrying out thermal stress relieving of job for sizes more than dia: 2m X Length: 2.5m.	Facility for carrying out stress relieving job
1.10	Party shall have RCC floor area of sufficient strength to bear the weight of bowl during hydro test.	
1.11	Party shall have experience in handling and tilting of large size jobs weighing more than 8 t.	
1.12	Party shall have experience in carrying pickling and passivation of large size jobs.	
1.13	Party shall have necessary capacity to carry out hydro test of the bowl as per specification in tender document.	
1.14	In case, Party is considering the outsourcing of any work mentioned above from 1.6 to 1.13, Party shall indicate the probable sub vendors with full details. The sub vendor shall have necessary experience in carrying out handling of large jobs of similar nature.	
1.15	Party shall have experience in arranging third party inspection in India.	
2.0	**Financial Qualification Requirements:** The Tenderer should also meet the following financial qualification requirements:	
2.1	The Tenderer should have average annual turnover of not less than a value of Rs.5 crores for last three financial years ending 31-03-2022.	
2.2	During the last 5 years, party should have successfully executed 1 order worth Rs. 2 crores	
2.3	Solvency certificate not less than 50 lakhs	
2.4	Audited balance sheet including profit and loss account for last three financial years ending 31-03-2022 showing annual turnover.	
3.0	**The following documents shall be submitted along with the application for prequalification of Bid:**	
3.1	Party establishment certificate and nature of work	
3.2	Purchase orders of similar items/ type of works completed.	
3.3	Satisfactory work Completion certificates, if any, from the clients of above referred works.	
3.4	Performance Report of jacketed vessel established (with years of service) from End users, if any, with addresses and contact person with phone numbers.	

3.5	Copy of audited Balance Sheets for last three years	
3.6	IT returns for last three years	
3.7	Duly filled "Questionnaire" (enclosed here with) with signature, name, phone no and company seal.	
3.8	Structure and Organizational Chart	
3.9	List of personnel with qualification & experience in the areas of a. Design, b. Production, c. Quality, d. Safety, e. Administration etc.	
3.10	List of Machinery & Equipment available to carry out fabrication of pressure vessel/bowl.	
3.11	Plant and Shop floor lay out.	
3.12	Any other relevant information which add value to above.	

4. Important notes:

4.1. In the above technical qualification, Tenderer shall clearly indicate the list of sub vendors in case of outsourcing if any. The same shall be evaluated and approved by purchaser.

4.2. Tenderer shall furnish all the above details fully and explicitly.

4.3. Please note that the "BID" without above mentioned documents/information in support of the eligibility criteria will be summarily rejected.

4.4. No further clarifications will be seeking in this regard.

5. Bid Selection Procedure and Process of Pre-Qualification

Step -1: Technical Bids will be opened and scrutinized for meeting all technical specification and supply conditions

Step -2: Short listing based on documents submitted, satisfying the all eligibility criteria given above by the Party or individual along with their Bid /application. (Non-submission of any document as given in above list within stipulated time leads to rejection of Bid)

Step–3: Subsequently Tenderer's competency, their technical achievements and financial status will be evaluated suitable for this project. Feedbacks from Tenderer's clients will be verified.

Step - 4: If required, visit will be made to their factory/ Party by technical team (SDSC SHAR) for accessing the capability of manufacturer.

Step - 5: Visit to sites, wherever required by technical team (SDSC SHAR) where Tenderer has supplied/established pressure vessels.

SDSC SHAR reserves right to verify the information/data furnished by Tenderer. If the same is found as fault or with any deviation the bid will be rejected. Only those Tenderers who are found suitable & meeting all above qualification Criteria/requirements will be finally qualified for opening the Price Bids for evaluation.

Annexure-2

Questionnaire
(Information to be provided by Party)

Name **Address:**

Phone: **Mobile:**

Fax: **E-mail:**

Sl. No.	Items/ Information	Specification/ details of items	Remarks
1	Type of Industry (SSU, Medium, Govt, etc.,)		
2	Year of Establishment		
3	Annual Turnover (in Rs. lakhs) for last three years, year ending up to 31-03-22 a. Turnover – 2021-22 b. Turnover – 2020-21 c. Turnover – 2019-20		
4	Similar Orders executed during last 03 years, capacity of vessel is to be mentioned. (Separate sheet can be attached for this) a. 2021-22 b. 2020-21 c. 2019-20		
5	Quality Certification of company (ISO, TUV,etc.,)		
6	Shop floor Area Covered		
7	No of Employees (with qualification &experience) (Tenderer shall mention contract personnel separately) **Design team** a. Engineers b. Draft man **Fabrication Team** a. Engineers b. Supervisors c. Technicians		
	Quality control engineers		
	Safety engineers		
8	Raw Material Sourcing: a. Steel Plates b. Rolled sections, Flats c. Forged Ring d. Round bars		
9	Welding /Fabrication Workshop (Type/capacity/ Quantity of machines shall be provided)		

	Welding machines		
	Gas/ Plasma cutting machines		
10	Handling facility available: a. Overhead /Gantry crane details (Capacity, span, lift) b. Mobile cranes		
11	Welding Professionals: 1. MMAW a. No. of welders b. Qualification details c. Qualified by 2. GMAW a. No. of welders b. Qualification details c. Qualified by 3. TIG d. No. of welders e. Qualification details f. Qualified by		
12	Details of NDT inspection equipment (LPT, UT, MPT, X-ray, etc.) Any out sourcing can be mentioned.		
13	Forming Facilities available (with brief specification of each machine)		
	Bending machine		
	Rolling machine		
14	Machining Facilities available (with brief specification of each machine)		
	Turning lathe(Conventional /CNC)		
	Vertical Turning Machine(Conventional/CNC)		
	Milling Machine(Conventional/CNC)		
	Drilling Machine(Conventional/CNC)		
	Cylindrical Grinding Machine (Conventional/CNC)		
	Any other machines		
15	Details of Inspection facilities / Instruments available (Brief description & specifications shall be provided)		

Date :Signature of competent person
Name :
Designation :
Company seal :

Annexure-3

Compliance Statement
(Information to be provided by Party)

Name	Address
Phone	Mobile
Fax	Email

Sl. No.	Items/ Information	Compliance	Remarks
1.	Supply of 10 nos. of Bowls		
2.	Supply of 14 nos. of FRP lids.		
3.	Supply of 50 nos. of Thermocouple (temperature sensors) [(10 bowls X 4 nos. = 40 nos.) + 10 nos. (spares)]		
4.	Supply of 20 nos. QDQC coupling for the water jacket inlet and outlet connections of the bowl jacket. (i.e., 2 nos. for each bowl, total : 10 bowls x 2 nos. = 20 nos.)		
5.	Alignment fixture (1no.)		
6.	Top closure (1no.) for hydro testing of the bowls.		SDSC
7.	Inner shell, MOC: SS304 and final minimum thickness after machining is 32 mm		
8.	Bottom Plate, MOC: SS304 and final minimum thickness after machining is 32 mm. The bottom plate should be realized from a single plate and no joints are permitted.		
9.	Radiography testing of Long seam weld of the inner shell and weld joint between bottom plate & inner shell.		
10.	Engagement of third party inspection at the cost of the Tenderer.		

Date :

Signature of competent person
Name :
Designation :
Company seal :

Annexure-4

Quality Assurance Plan (QAP)
(Sample copy)

Sub vendor - S **Main vendor - M** **Third party - T** **ISRO SDSC SHAR - C**

S. No.	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE/ METHOD OF CHECK	EXTENT	REF. DOCUMENT ACCEPTANCE NORM	FORMAT OF RECORD	S	M	T	C	HOLDING POINTS (H)
1	Quality Assurance Plan	Approval	Review	100%	Specification ASME Sec VIII Div 1:-2001	QAP			P	H	
2	Drawings	Approval	Review	100%	Specification ASME Sec VIII Div 1:-2002	DRG		P		H	
3	**Welding/Welder Qualification**										
3.1	WPS (Welding Procedure Specification)	Verification of documents	Review	100%	WPS ASME SEC IX	QW-482		P	R	R	
3.2	PQR (Procedure Qualification Record)	Welding Parameters	Check Test	100%	WPs Material Specs	Test Report + QW 483		P	R	R	
3.3	WPQ (Welder Performance Qualification)	Welding Parameters	R. T. Review	100%	WPS ASME Sec VIII Div 1	QW-484		P	R	R	
3.4	Weld Plan	Welding Parameters & process	Review	100%	Document ASME Sec VIII	Documentation		P	R	R	
4	**Material identification, correlation and certification**										
4.1	Inner Shell & Bottom Plates	Surface Condition	Visual	100%	Approved dwg.	Inspection Report		P	H	R	All materials shall be offered at party's site with manufacturer TC. Plates shall be stamped for identification. Check Testing shall be done in the absence of original TC or cannot be correlated.
		Dimensions	Measurement	100%	DRG	Inspection Report		P	H	R	
		T. C verification & correlation	Review/Visual	100%	SA.240 Ty.304	Inspection Report		P	H	R	
		UT	Visual	100%	SA 435	Inspection Report		P	W	R	

		IGC	Visual	1 sample per heat	SA.240 Ty.304	Inspection Report		P	R	R	
4.2	Jacket shell, Bottom dish, Skirt shell, Jacket closures and all other plates	Surface Conditions	Visual	100%	Free from defects	Inspection Report		P	H	R	Plates shall be stamped for identification. Check Testing shall be done in the absence of original TC or cannot be correlated. UT testing of plates above 12 mm thick. Weldability test for IS 2062 plates above 32 mm or carbon % more than 0.22
		Dimensions	Measurement	100%	SA-516 GR70/IS2062	do		P	R	R	
		T.C. Verification & correlation	Review/Visual	100%	SA-516 GR70/IS2062	do		P	R	R	
		Check Test	Sample test	1 sample per heat	SA-516 GR70/IS2062	Test Report		P	H	R	
		UT	Visual	100%	SA-435	UT report		P	W	R	
4.3	Body Flange Forgings	Surface Conditions	Visual	100%	Free from defects	Inspection Report		P	H	R	
		Dimensions	Measurement	100%	Approved DRG	do		P	R	R	
		Chemical & Mechanical property	Check Test	100%	SA-105	Test Report		P	H	R	Check test- Sample from the plate shall be cut/ removed in presence of third party/ SHAR
		UT	Visual	100%	A388/SA 578 Level C	Test Report		P	W	R	
4.4	Nozzel Forgings	Surface Conditions	Visual	100%	Free from defects	Inspection Report		P	H	R	
		Dimensions	Measurement	100%	Approved DRG	do		P	R	R	
		Chemical & Mechanical property	Check Test	100%	SA-105	Test Report		P	H	R	Check test- Sample from the plate shall be cut/ removed in presence of third party/ SHAR
		UT	Visual	100%	A388/SA 578 Level C	Test Report		P	W	R	
		IGC	Visual	100%	A 262 Practice E	do		P	R	R	
4.5	Balance Forgings Flanges, Pipes	Surface Conditions Dimensions	Visual		Drawing/Specs.	Inspection Report		P	H	R	
	Nipples, Couplings etc.	T.C. Verification & correlation	Measurement review	100%		TC/ check test Report		P	R	R	

5	**Fabrication**										
5.1	Dished End Forming	Dimensions	Measurement	100%	As per approved dwg.	Inspection Report	P	W	H	R	1. O.D, 2. Outer circumference, 3. Height(from dish bottom), 4. Thickness, 5. Straight face
		Profile (Template)	Templates	100%	As per approved dwg.	Inspection Report	P	W	H	R	
		DPT	Visual	Knuckle & Edges	ASME, Sec V	Inspection Report	P	W	H	R	
5.2	Long Seam set up of Main shell/ jacket shell/bottom shell	Dimensions	Measurement	100%	As per approved dwg.	Inspection Report		P	H	R	Main shell & jacket shell: 1. Shell Girth, 2. Total height, 3.Thickness, 4. Root face, 5. Root gap, 6. Bevel details Bottom shell: 1. Shell girth, 2.Width,3.Thickness,4.Root gap,5.Root face,6. Bevel details
		Joint details	By Gauge/ Visual	100%	As per approved dwg.	Inspection Report		P	H	R	
	Root Run	For defects	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	
	Back chip	For defects	DPT/Visual	100%	ASME, Sec V, Article-6	Inspection Report		P	W	R	
	Final weld	For defects	RT/Review	100%	ASME, Sec V, Article-2	Inspection Report		P	W	R	
5.3	Fit up of Bottom plate to inner shell & Top Flange to inner shell	Dimensions	Measurement	100%	As per approved dwg.	Inspection Report		P	H	R	Main shell & bottom plate (SS) welding should be 100 %. GTAW process, PQR to be provided. Fit up of inner shell to top flange: 1. Height of top flange to bottom plate 2. SS overlay, 3. top flange total length, 4. Top flange bevel details, 5. Root gap
		Joint details	By Gauge/ Visual	100%	As per approved dwg.	Inspection Report		P	H	R	

	Root Run	For defects	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	Fit up of bottom plate to inner shell: 1. Inner shell total length, 2. Bottom plate thickness, 3. Root gap, 4. Bevel details, 5. Orientation, 6. Bottom plate level
	Back chip	For defects	DPT/Visual	100%	ASME, Sec V, Article-6	Inspection Report		P	W	R	
	Final Weld (outside)	Soundness	DPT & Visual	100%	ASME, Sec V, Article-6	Inspection Report		P	W	R	
	Inside weld between Bottom Plate & Main Shell	Soundness	UT & Visual	100%	UT procedure & acceptance norms for general guideline Sec V	Inspection Report		P	W	R	Vendor to submit UT procedure & acceptance norms
			RT/Review	100%	ASME, Sec V	Inspection Report		P	W	R	
	Pneumatic test		Visual	100%	As per spec.	Inspection Report		P	W	R	Test pr.: 1 ksc
5.4	Fit up of Nozzles, Couplings, Stay bolts, Partition plates etc. on main Shell/ Dished end	Dimensions & bevel details	Dimension/Visual	100%	As per approved dwg.	Inspection Report		P	W	R	
	Root Run	Soundness	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	
	Back chip	Soundness	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	
	Final weld	Soundness	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	
5.5	Jacket shell fit up	Dimensions & bevel details	Dimension/Visual	100%	As per approved dwg.	Inspection Report		P	W	R	Weld soundness Main shell to jacket shell gap, Jacket shell height
	Jacket Closure fit ups	Dimensions & bevel details	Dimension/Visual	100%	As per approved dwg.	Inspection Report		P	W	R	
	Final weld	Soundness	DPT/Visual	100%	ASME, Sec V, Article-6	PT report		P	W	R	Jacket shell with main shell
5.6	Fit up of Dished end to bottom Shell	Dimensions & bevel details	Dimension/Visual	100%	As per approved dwg.	Inspection Report		P	W	R	Dish O.D, shell to dish gap, depth,
	Final weld	Soundness	MPT/Visual	100%	ASME, Sec V, Article-7	MPT report		P	W	R	

5.7	Fit up of skirt shell with main shell/ dished end, resting pads , tilter pin housings etc.	Dimensions & bevel details	Dimension/Visual	100%	As per approved DRG	Inspection Report		P	H	R	Fit up of inner shell to bottom shell: 1. Bottom shell total length, 2. Bottom shell thickness, 3. Root gap, 4.Top flange to bottom shll length, 5. Bevel details, 6. Orientation, 7. Bottom shell ovality, 8. Bottom shell to inner shell overlap
	Weld	Soundness	MPT/Visual	100%	ASME, Sec V, Article-7	MPT report		P	W	R	
	Final weld	Soundness	DPT/Visual	100%	ASME, Sec V	Inspection Report		P	W	R	
5.8	Machining of bottom shell and main shell	Dimension/ Straightness	Measurement	100%	As per approved DRG	Inspection Report	P	P	W	W	
5.9	Machining of resting pads and tilter pin housings	Dimension/ Straightness	Visual	100%	As per approved DRG	Inspection Report	P	P	W	W	
6	**Final inspection of bowl assembly before stress relieving**										
		Surface finish	Visual	100%	Drawing/QAP	Inspection Report		P	W	H	
		Dimension	Measurement	100%	As per approved DRG	Inspection Report		P	W	H	Total height, Top flange to bottom plate depth, lifting pad centre to centre, Inner shell I.D(finish), water outlet & inlet hole orientation, vent & drain hole orientation
		Completeness of all weldings	Visual	100%	As per approved DRG	Inspection Report		P	W	H	
		NDT completeness	Review	100%	As per QAP	Inspection Report		P	W	H	
7	**Fixture fabrication to ensure identical dimension of Bowls**	Dimension	Measurement	100%	Approved Drawings	Inspection Report		H	H	R	

8	Check for Lifting Brackets, Eyelets, lift pads, pair tilting features	Safe working load	Load test	100%	30 ton load shall be applied	Inspection Report		H	W	W	One pair of tilting features (both front or both back) to be tested for a load carrying capacity of 30 ton
		Weld joints	DPT/ Visual	100%	Approved Drawings	Inspection Report		P	W	R	
9	**Stress Relieving**											
	Stress relieving with resting pads etc	Loading temperature:100°C Rate of heating: 30°C/hr Soaking Temperature: 400 to 420°C, Soaking time: 6hrs. Rate of cooling: 40°C per hr. Unloading temp.:100°C max.	Chart review	100%	Approved PO/Spec	Heat treatment Chart	P	P	R	H	
10	Final Machining after heat treatment	Critical dimensions, Surface finish	Measurement	100%	As per Approved drg./Spec	Inspection Report		P	H	H	OD, flange thickness, Top flange surface finish, ID, Depth, SS overlay, Chamfer, Bottom radius, Bottom surface finish
11	NDT after heat treatment -UT of overlay on body flange	Soundness	UT/Visual	100%	SA 578	UT Report		P	H	R	
12	**Pneumatic test**											
12.1	Main shell	Strength	Visual	100%	ASME SEC VIII Div 1/Approved drg.	Inspection Report		P	W	W	Test pr: 7 ksc (Internal & Jacket)
12.2	Jacket shell	Strength	Visual	100%	ASME SEC VIII Div 1/Approved drg.	Inspection Report		P	W	W	
13	**Hydro test**											
13.1	Main shell	Strength	Visual	100%	ASME SEC VIII Div 1/Approved DRG	Inspection Report		P	W	W	Test pr: 10 ksc(Internal & Jacket)

13.2	Jacket shell	Strength	Visual	100%	ASME SEC VIII Div 1/Approved DRG	Inspection Report		P	W	W	
14	**Assembly of lifting pads on bowl**										
		Check for fitment of all parts	Visual/Dimension	100%	As per approved DRG	Inspection Report		P	W	W	
		Check for assembly	Visual/Dimension	100%	As per approved DRG	Inspection Report		P	W	W	
15	Painting of C.S surface, Emery finish	Surface finish	Visual	100%	Approved DRG/PO/Spec.	Inspection Report		H	R	R	
	Dry film thickness	Painting thickness	Measurement	100%	Approved DRG/PO/Spec.	Inspection Report		H	R	R	
	Marking	Marking	Visual	100%	Approved DRG/PO/Spec.	Inspection Report		H	R	R	
16	Pickling & Passivation of SS surface		Visual	100%	Approved DRG/PO/Spec.	Inspection Report		H	R	R	
17	Stamping of equipment & nameplate	Verification of nameplate details	Visual	100%	As per approved DRG	Acceptance Note		H	H	R	
18	SHAR Inspection: Dimension/visual Flange O.D, Flange thickness, Surface finish (Top flange), Radius, Bowl I.D, Flange step I.D, Surface finish (Step I.D), Chamfer, Step depth, Concentricity of step bore, Concentricity of plug bore, cylindricity for 100 mm from top surface, cylindricity for remaining depth, top surface to inner bottom depth, parallelism of bottom plate inner surface, perpendicularity of top flange, Bottom radius, Bottom face finish, Main shell thick after final machining, bottom plate thickness, S.S. overlay thickness, Lift pad centre to centre of bowl, Dist. b/n lifting pads (face to face), Center to center of lifting pads, parallelism b/n lifting pads faces, perpendicularity of lifting pad face with top flange, lifting pad height from top surface, centre of the bowl to lifting pad vertical face, height of the bowl from bowl top face to resting pad bottom, main shell OD, bottom shell OD, bottom shell height, jacket shell OD, lifting brackets hole center to center, lifting bracket hole center from top of the bowl, lifting bracket width, max. dimensions of bowl.										

Annexure-5

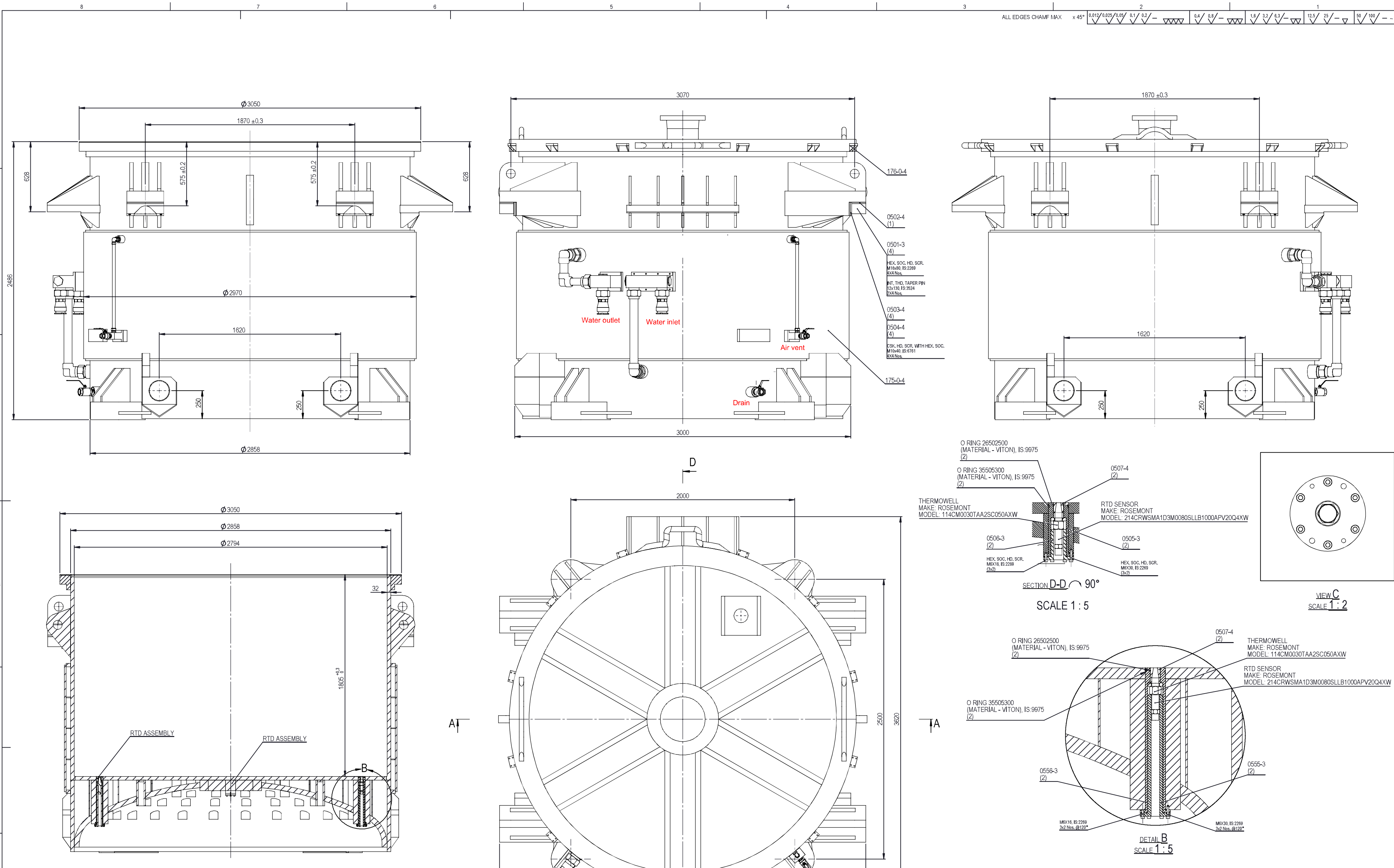
Deviations
(Information to be provided by Party)

Name	**Address**
Phone	**Mobile**
Fax	**E Mail**

Sl. No.	Tender Specifications	Deviations	Remarks
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

Date

Signature of competent person
Name :
Designation :
Company seal :



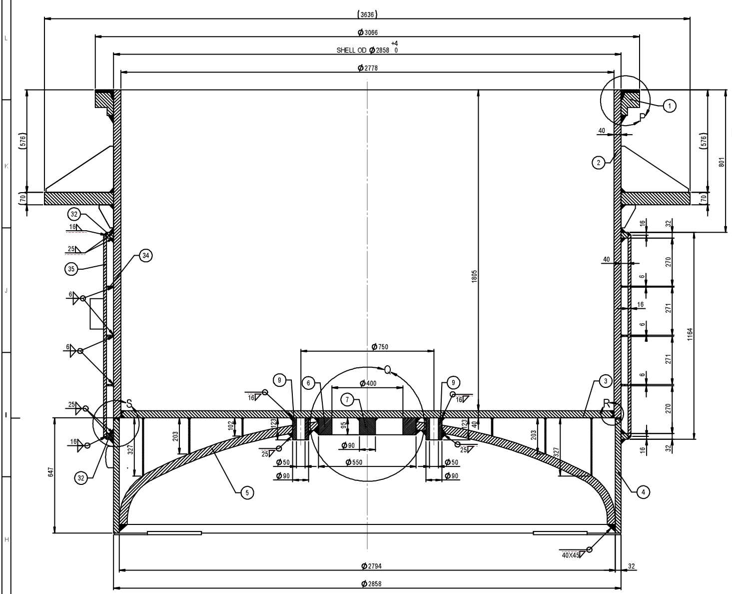
MACHINING DEVIATIONS WHERE NOT SPECIFIED

LENGTH IN mm OF SHORTER SIDE OF ANGLES			
upto 6	6 - 30	30-120	120-400
± 1°	± 30'	± 20'	± 10'

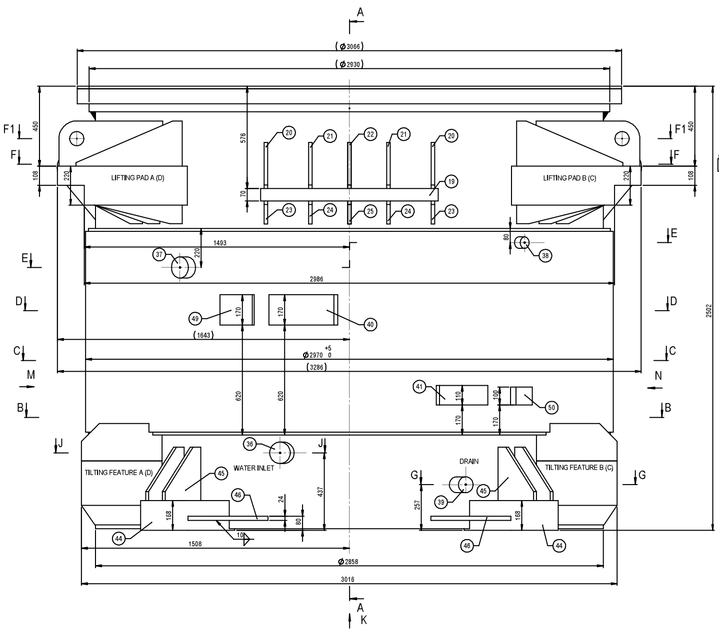
LENGTH OR Ø	upto6	6 30	30 120	120 315	315 1000	1000 2000	2000 4000	4000 -
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3

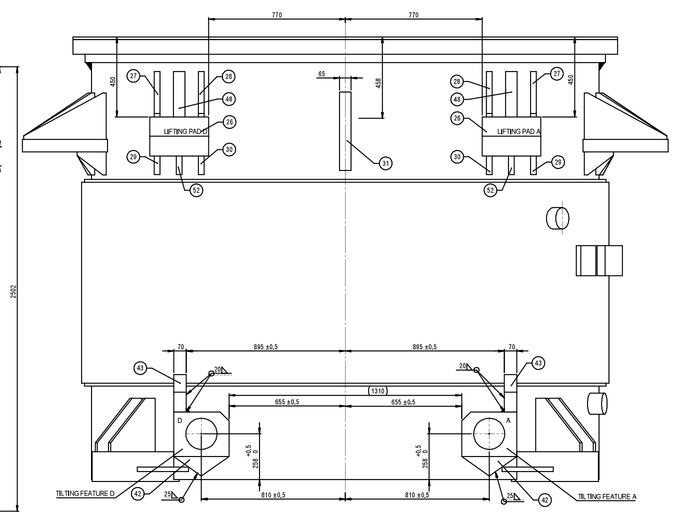
01	-	-	-		06-0-2
No.off	Stock Size	Semi Product	Material	Net Wt. kg / Stock Size kg	Drg No (Assembly)
Finish	√(√√√)	PROJECTION	HARDNESS	CASE DEPTH	PATTERN NO / Total Net Wt.
Scale 1:15	Designed RMK				
	Drawn RMK				
	Checked	Appr. RMK			
	Standards	Date 03.06.2021			
TYPE VM-10T		GROUP BOWL & TROLLEY ASSY	Used in	Alteration	Area / Sign / Date / Index
TITLE	BOWL ASSEMBLY		Superceded by	GSP1801007	
			Replaces	161-1-3	REV-00

ALL EDGES CHAMF MAX x 45°

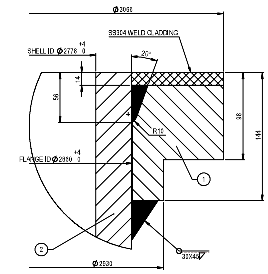


SECTION A-A



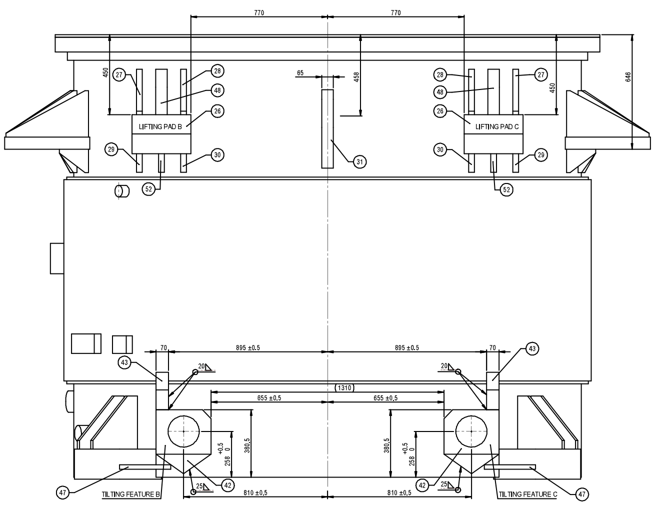


VIEW M

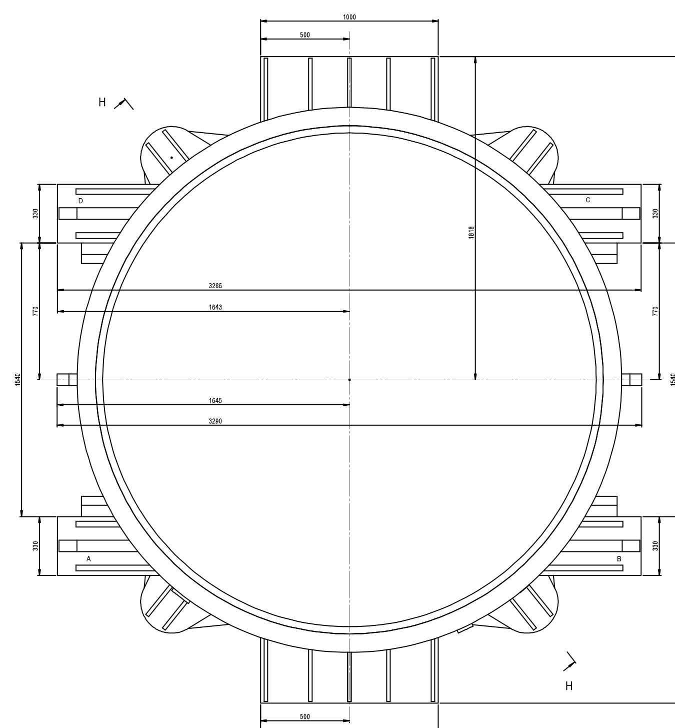


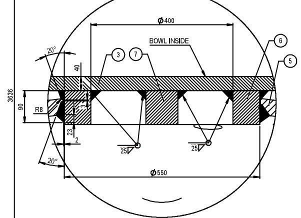
DETAIL P
SCALE 1 : 2

General Table					
PART NO	DESCRIPTION	SIZE	MATERIAL	QTY	WEIGHT (kg)
1	Flange with SS Cladding	OD 3066, ID 2860, 144 THICK	Forged Carbon steel SA 105	1	1114
2	Inner Shell	Plate 8974x1845x40 Thick	SS 304	1	5167
3	Inner Bottom Plate	ø2778, 40 Thick	SS 304	1	1892
4	Bottom Shell	Plate 8974x647x32 Thick	Carbon Steel Gr 70 SA 516	1	1442
5	Spherical Dish	ø3196x45 Thick	Carbon Steel Gr 70 SA 516	1	2816
6	Central Hub	OD 550, ID 400, 95 Thick	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	1	83
7	Central Strut	ø90x95		1	5
8	Hub Rib	155x95x20 Thick	E 250 BR, IS:2062	6	13
9	RTD Holder - 1	OD 90, ID 50, 123 THICK	SS 304	2	9
10	RTD Holder - 2	OD 150, ID 50, 395 THICK	SS 304	2	98
11	Strut - 1	OD 80, ID 50, 150 Height	E 250 BR, IS:2062 / ASTM A106 GR. B	12	43
12	Strut - 2	OD 80, ID 50, 230 Height		18	99
13	Strut - 3	OD 80, ID 50, 350 Height		24	201
14	Baffle Plate 1 (Cut to Shape)	1122x572x6 Thick	E 250 BR, IS:2062	1	30
15	Baffle Plate 2 (Cut to Shape)	697x572x6 Thick	E 250 BR, IS:2062	1	30
16	Baffle Plate - 3	4066x102x6 Thick	E 250 BR, IS:2062	1	20
17	Baffle Plate - 4	5794x203x6 Thick	E 250 BR, IS:2062	1	55
18	Baffle Plate - 5	7292x327x6 Thick	E 250 BR, IS:2062	1	112
19	Fork Lift Pad	1000x480x70 Thick	E 250 BR, IS:2062	2	516
20	Rib - 1	464x260x20 Thick	E 250 BR, IS:2062	4	75
21	Rib - 2	400x260x20 Thick	E 250 BR, IS:2062	4	65
22	Rib - 3	381x260x20 Thick	E 250 BR, IS:2062	2	31
23	Rib - 4	164x130x20 Thick	E 250 BR, IS:2062	4	14
24	Rib - 5	100x130x20 Thick	E 250 BR, IS:2062	4	8
25	Rib - 6	81x130x20 Thick	E 250 BR, IS:2062	2	4
26	Bowl Lift Pad - A, B, C & D	731x330x220	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	4	1657
27	Rib - 7	599x255x32 Thick	E 250 BR, IS:2062	4	153
28	Rib - 8	375x255x32 Thick	E 250 BR, IS:2062	4	96
29	Rib - 9	494x105x32 Thick	E 250 BR, IS:2062	4	56
30	Rib - 10	270x105x32 Thick	E 250 BR, IS:2062	4	32
31	Lifting Eyelet #1	443x216x65 Thick	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	2	98
32	Jacket End Ring	9330x40x32 THICK	Carbon Steel Gr 70 SA 516	2	182
33	Baffle Plate - 6	1100x40x6 Thick	E 250 BR, IS:2062	1	2
34	Baffle Plate - 7	8974x40x6 THICK	E 250 BR, IS:2062	3	51
35	Jacket Shell	9331x1132x16 THICK	Carbon Steel Gr 70 SA 516	1	1318
36	Water Inlet ##	ø120x113	Forged Carbon steel SA 105	1	12
37	Water Oulet ##	ø120x82	Forged Carbon steel SA 105	1	7
38	Air Vent ##	ø65x66	Forged Carbon steel SA 105	1	3
39	Drain ##	ø90x154	Forged Carbon steel SA 105	1	8
40	Pad - 1	380x170x72	E 250 BR, IS:2062	1	28
41	Pad - 2	300x110x43	E 250 BR, IS:2062	1	12
42	Tilting Feature	454x360x310	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	4	1581
43	Rib - 11	446x211.5x70	E 250 BR, IS:2062	4	207
44	Resting Pad	496x401x168	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	4	1043
45	Rib - 12	320x300x20 Thick	E 250 BR, IS:2062	8	120
46	Rib - 13	452x195x24 Thick	E 250 BR, IS:2062	4	66
47	Rib - 14	290x100x24 Thick	E 250 BR, IS:2062	4	22
48	Lifting Eyelet #2	583x255x65	E 250 BR, IS:2062 / IS:1875 CLASS II (20C8)	4	302
49	Pad - 3	200x170x48	E 250 BR, IS:2062	1	13
50	Pad - 4	120x100x47	E 250 BR, IS:2062	1	6
51	Strut Plug	⌀50X16	E 250 BR, IS:2062	54	14
52	Rib-15	368x105x32 Thick	E 250 BR, IS:2062	4	40
TOTAL STOCK WEIGHT (APPROX.)					21061



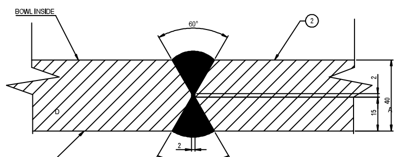
VIEW N



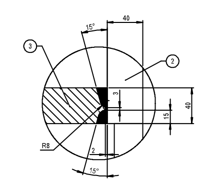


DETAIL Q
SCALE 1 : 5

NOTE:
1. Stock sizes mentioned in the table are for reference only. The actual stock may be planned suitably to achieve the requirements
2. SS-304 & SA516 Gr 70 Plates shall be UT Tested for thickness & for any defects.
3. Only Quality plates should be used
4. Weld between bottom plate and shell should be UT Tested
5. Unmentioned fillet weld size - 10mm
6. All fillet welds to be DP tested and subject to UT wherever applicable
7. Stress relieve bowl before machining
8. Lifting Eyelets shall be load tested for 30 ton inclusive of bowl self weight
9. All welds should be ground smooth for easy cleaning.
10. All sharp edges should be rounded off.
11. All seam welds should be 100% radiographed
12. Top flange weld cladding must be UT qualified
13. Dish to be of single piece construction
14. Avoid distortion during welding and maintain uniform machining allowance
15. All external machined surfaces except SS parts are to be applied with anti-corrosive varnish
16. Position of both the lifting eyelets (Part No. 31) from top should be same for proper tilting. Spacing 180°
17. Position of hole in lifting eyelets (Part No. 31 & Part No. 48) from top should be same for proper handling
18. Two coats of Apple Green Epoxy painting to be done to all external surfaces other than SS and machined surfaces.
19. Suitable cover to be fabricated for conducting the inner shell leakage test
20. Leak test for shell flange (Part No 1) with Inner shell (Part No 2) to be pneumatically tested at 1 kg/sq.cm with soap solution
21. One pair of Tilting features (both front or both back) to be tested for a load carrying capacity of 30000 kg.
22. Maintain centre height of tilting features (258 mm) same for all numbers (Part No 42) while welding.



TYPE L SEAM WELD DETAIL FOR INNER SHELL
SCALE (1:1)


DETAIL R
SCALE 1 : 2

MACHINING DEVIATIONS WHERE NOT SPECIFIED

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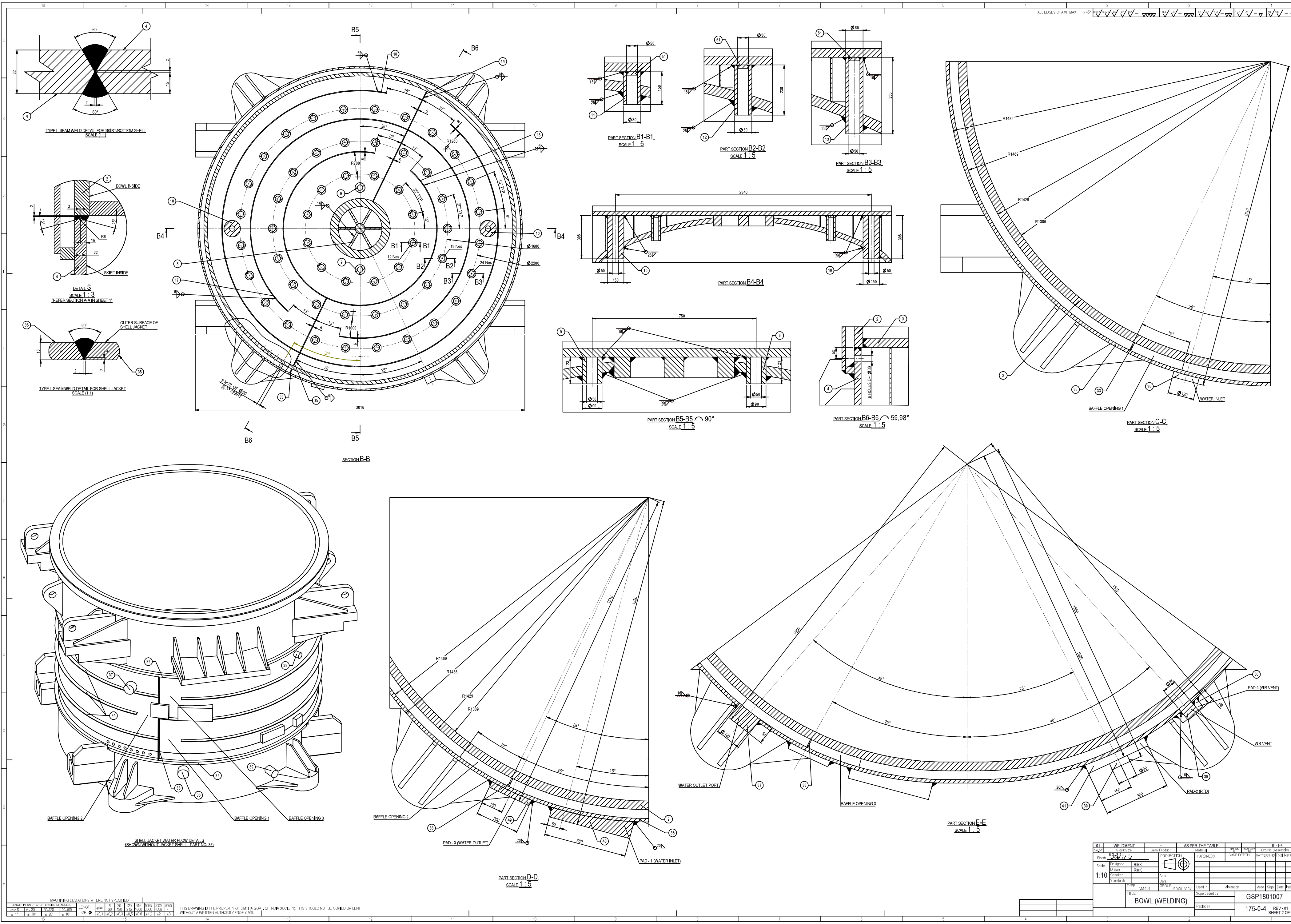
FOR OTHER REQUIREMENTS, REFER QUALITY PLAN & SUPPLY CONDITIONS BEFORE FABRICATION
Alternate Material Class 3, 30C8 IS:1875

01	WELDMENT	--	AS PER THE TABLE			161-1-3
No.off	Stock Size	Semi Product	Material	Net Wt. kg.	Stock Size kg.	Drg No (Assembly)

Finish 6.3 3.2 - -
Scale 1:10 — Designed: RMK; Drawn: RMK; Checked; Standards
PROJECTION — Appr. — Date
HARDNESS — CASE DEPTH — PATTERN NO — Total Net Wt.
TYPE VM-10T — GROUP BOWL ASSY. — Used in — Alteration — Area — Sign — Date — Index
TITLE: BOWL (WELDING)
Superceded by — Replaces
GSP1801007
175-0-4 REV - 01
SHEET 1 OF 6


TYPE L SEAM WELD DETAIL FOR SKIRT/BOTTOM SHELL
SCALE (1:1)
BOWL INSIDE
SKIRT INSIDE
DETAIL S
SCALE 1 : 3
(REFER SECTION A-A IN SHEET 1)
OUTER SURFACE OF SHELL JACKET
TYPE L SEAM WELD DETAIL FOR SHELL JACKET
SCALE (1:1)
SECTION B-B
PART SECTION B1-B1
SCALE 1 : 5
PART SECTION B2-B2
SCALE 1 : 5
PART SECTION B3-B3
SCALE 1 : 5
PART SECTION B4-B4
PART SECTION B5-B5 90°
SCALE 1 : 5
PART SECTION B6-B6 59,98°
SCALE 1 : 5
WATER INLET
BAFFLE OPENING 1
PART SECTION C-C
SCALE 1 : 5
SHELL JACKET WATER FLOW DETAILS
(SHOWN WITHOUT JACKET SHELL - PART NO. 35)
BAFFLE OPENING 2
BAFFLE OPENING 3
PAD - 3 (WATER OUTLET)
PAD - 1 (WATER INLET)
PART SECTION D-D
SCALE 1 : 5
WATER OUTLET PORT
PAD 4 (AIR VENT)
AIR VENT
PAD-2 (RTD)
PART SECTION E-E
SCALE 1 : 5
ALL EDGES CHAMF MAX
MACHINING DEVIATIONS WHERE NOT SPECIFIED
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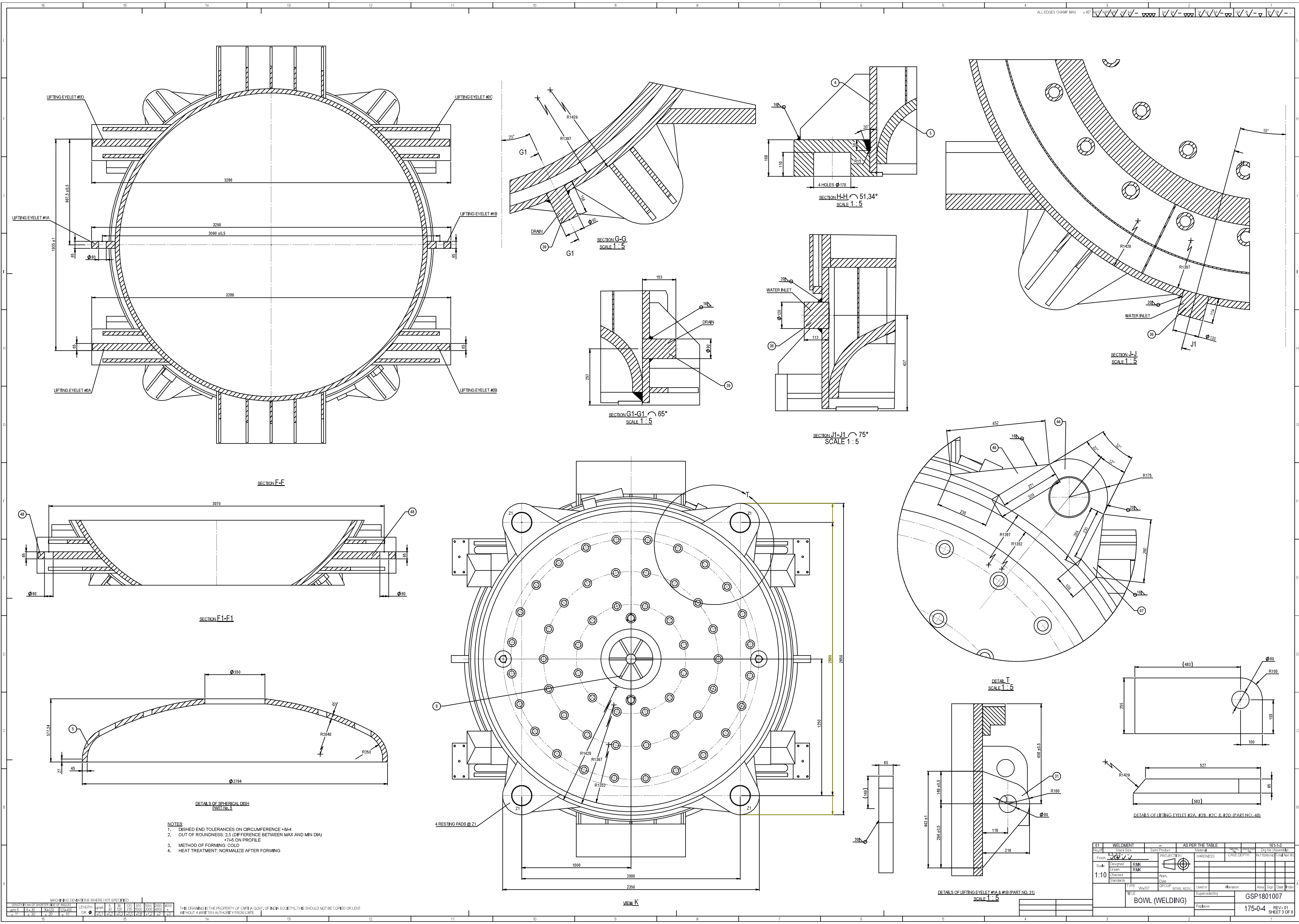
WELDMENT
AS PER THE TABLE
Designed RMK
Drawn RMK
1:10
BOWL (WELDING)
GSP1801007
175-0-4
REV - 01
SHEET 2 OF 8



SECTION F-F
SECTION F1-F1
SECTION G-G SCALE 1 : 5
SECTION G1-G1 65° SCALE 1 : 5
SECTION H-H 51,34° SCALE 1 : 5
SECTION J1-J1 75° SCALE 1 : 5
SECTION J-J SCALE 1 : 5
DETAIL T SCALE 1 : 5
VIEW K
LIFTING EYELET #1A
LIFTING EYELET #1B
LIFTING EYELET #2A
LIFTING EYELET #2B
LIFTING EYELET #2C
LIFTING EYELET #2D
WATER INLET
DRAIN
4 HOLES Ø170
4 RESTING PADS @ Z1
DETAILS OF SPHERICAL DISH PART No. 5
DETAILS OF LIFTING EYELET #1A & #1B (PART NO. 31) SCALE 1 : 5
DETAILS OF LIFTING EYELET #2A, #2B, #2C & #2D (PART NO. 48)
NOTES
1. DISHED END TOLERANCES ON CIRCUMFERENCE +8/-4
2. OUT OF ROUNDNESS: 2.5 (DIFFERENCE BETWEEN MAX AND MIN DIA) +7/-5 ON PROFILE
3. METHOD OF FORMING: COLD
4. HEAT TREATMENT: NORMALIZE AFTER FORMING
ALL EDGES CHAMF MAX
MACHINING DEVIATIONS WHERE NOT SPECIFIED
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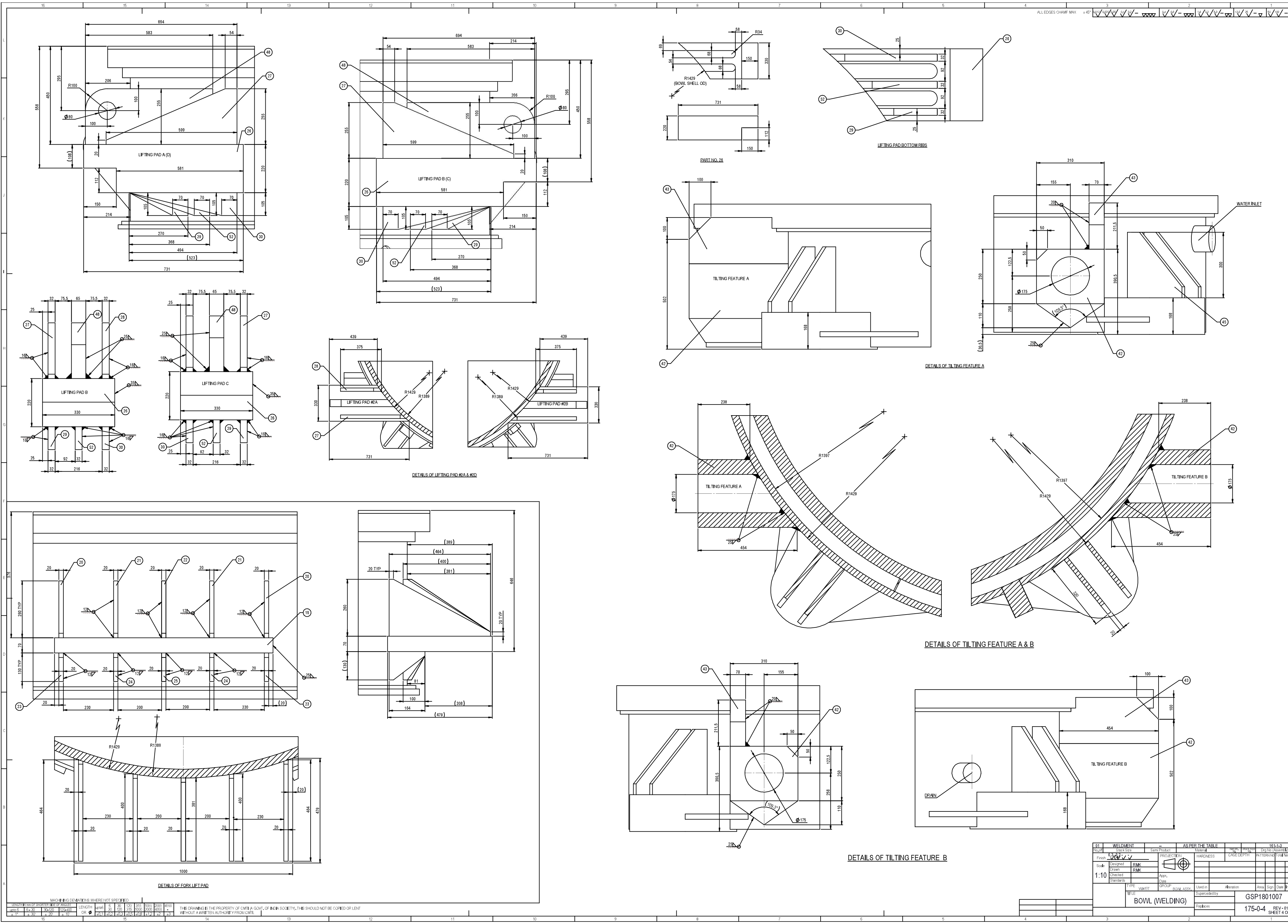
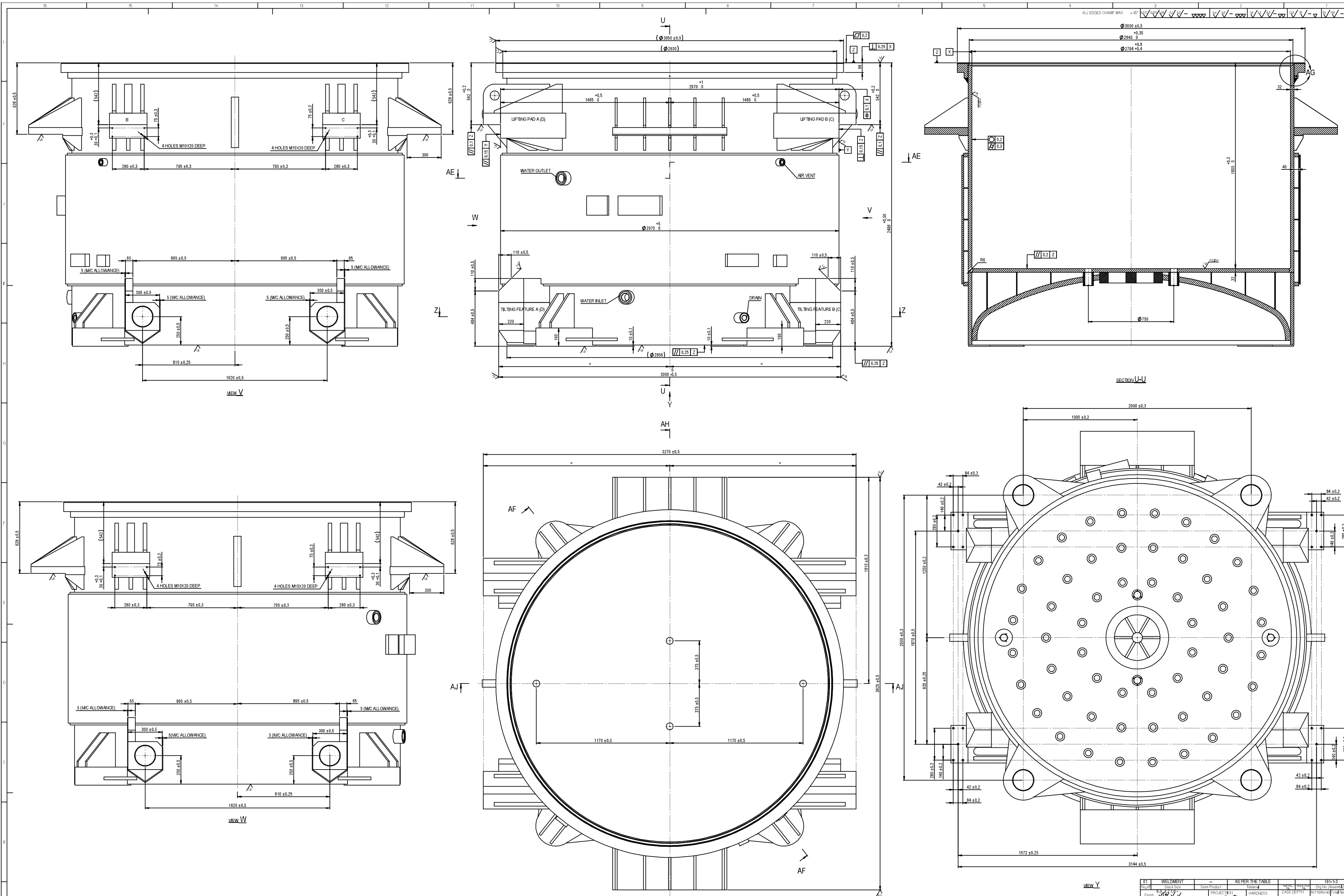
01 WELDMENT AS PER THE TABLE 165-1-3
Scale 1:10
Designed RMK
Drawn RMK
TYPE VILM07
GROUP BOWL ASSY.
TITLE BOWL (WELDING)
GSP1801007
175-0-4
REV - 01
SHEET 3 OF 8

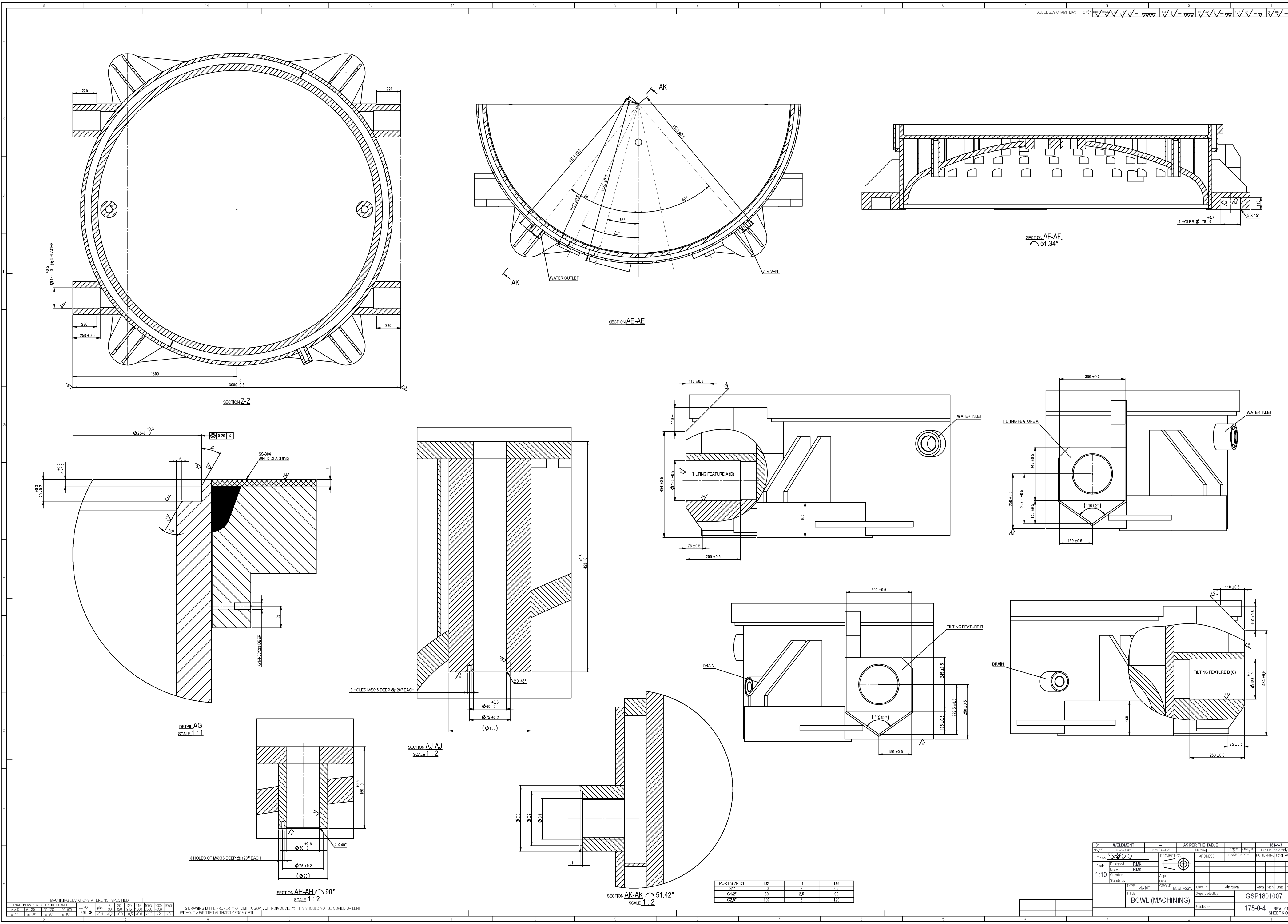

LIFTING PAD A (D)
LIFTING PAD B (C)
LIFTING PAD B
LIFTING PAD C
LIFTING PAD #2A
LIFTING PAD #2B
DETAILS OF LIFTING PAD #2A & #2D
PART NO. 26
LIFTING PAD BOTTOM RIBS
R1429 (BOWL SHELL OD)
TILTING FEATURE A
TILTING FEATURE B
WATER INLET
DRAIN
DETAILS OF TILTING FEATURE A
DETAILS OF TILTING FEATURE A & B
DETAILS OF TILTING FEATURE B
DETAILS OF FORK LIFT PAD
ALL EDGES CHAMF MAX
MACHINING DEVIATIONS WHERE NOT SPECIFIED
THIS DRAWING IS THE PROPERTY OF CMTI (A GOVT. OF INDIA SOCIETY), THIS SHOULD NOT BE COPIED OR LENT WITHOUT A WRITTEN AUTHORITY FROM CMTI.
WELDMENT
AS PER THE TABLE
Scale 1:10
Designed RMK
Drawn RMK
Checked
Standards
BOWL ASSY
BOWL (WELDING)
GSP1801007
175-0-4
REV - 01
SHEET 4 OF 6



MACHINING DEVIATIONS WHERE NOT SPECIFIED

LENGTH IN mm OF SHORTER SIDE OF ANGLES				LENGTH OR Ø	upto6	6 30	30 120	120 315	315 1000	1000 2000	2000 4000	4000 -
upto 6	6 - 30	30-120	120-400		±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3
± 1°	± 30'	± 20'	± 10'									

01	WELDMENT	--	AS PER THE TABLE			161-1-3
No.off	Stock Size	Semi Product	Material	Net Wt. kg.	Stock Size kg.	Drg No (Assembly)
Finish 6.3 3.2 1.6 -	PROJECTION	HARDNESS	CASE DEPTH	PATTERN NO	Total Net Wt.	
Scale 1:10	Designed RMK	Drawn RMK	Checked	Standards	Appr.	Date
TYPE VM-10T	GROUP BOWL ASSY.	Used in	Alteration	Area	Sign	Date / Index
TITLE BOWL (MACHINING)	Superceded by	GSP1801007				
	Replaces	175-0-4	REV - 01	SHEET 5 OF 6		



PORT SIZE D1	D2	L1	D3
G1"	50	2	65
G1/2"	80	2,5	90
G2,5"	100	5	120

Annexure-8

FIBRE REINFORCED PLASTIC (FRP) LID

1. Scope

1.1 The scope of this tender includes supply of FRP lids for bowls as per the specifications mentioned.

1.2 It covers supply, manufacture, fabrication, inspection and testing at vendor's / sub-vendor's works, packing for shipment, transportation to site.

1.3 The contractor / vendor shall perform tests as per the codes and this specification to meet the user's requirements spelt here in.

1.4 Testing & evaluation of equipment shall be carried out by the contractor/vendor to meet the functional requirements of equipment/system.

1.5 The FRP lids for bowl are planned to be removed from the bowl and installed on the bowl by means of the "Bowl Lid Extractor". Hence dimensional control shall be strictly followed.

1.6 The equipment, materials and services shall conform in all respects to high standards of workmanship and be capable of performing in continuous commercial operation in a manner acceptable to the DEPARTMENT who will interpret the meaning of drawings and specifications and shall have the power to reject any 'equipment/work' or material which in his judgement are not in full accordance there with.

2. Equipment & services to be provided by the vendor:

2.1This specification covers the general requirements for supply of material, manufacture, testing, inspection at contractor's & vendor's works, packing, forwarding, transportation, risk, coverage during transit, delivery at site of the FRP lids based on isophthalic resin for bowls complete with cotton rope and sponge gasket.

2.2 Shop inspection and tests as per specifications shall be arranged by the vendor to enable DEPARTMENT to inspect. Where ever not specified, the shop inspection tests shall be as per recent codes applicable.

3. Specific requirement/ Instruction to vendor

3.1 Laminating procedures and approval of operators shall be as per BS4994-1987

3.2 **The vendor has to fabricate/Manufacture one piece of FRP LID and get the approval from the DEPARTMENT before proceeding to fabricate rest of the lids.**

4. Codes and Standards

4.1 All equipments, 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.

4.2 The FRP lids shall conform to BS 4994 for fabrication.

4.3 Other national standards established to be equivalent or superior to the codes and standards specified are also acceptable. The vendor shall furnish English translation of all standards where standards in any other language are referred.
4.4 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.
4.5 Unless indicated otherwise, all codes and standards referred to in this enquiry specification shall be understood to be the latest version.

5. Tolerances

5.1 Lid OD (dimension 3080 mm) of the FRP lid for bowl shall have a positive tolerance of 10 mm. Negative tolerance on this dimension shall not be allowed.
5.2 Lid ID (dimension 2760 mm) of the FRP lid for bowl shall have a negative tolerance of 10 mm. Positive tolerance on this dimension shall not be allowed.
5.3 Central hub/projection on the top of the FRP lid for bowl shall have a tolerance of ± 5 mm on height and +5 mm on diameter with no negative tolerance.
5.4 Other tolerances shall be as per the code BS 4994-1987.

6. FRP lid for bowls (Based on Isophthalic Resin): Quantiy = 14 Nos.

6.1 Requirements

6.1.1 FRP lids are required for covering bowls during storage and while transporting between various facilities.
6.1.2 The lid shall get seated on a circular flange of the bowl as an insert. Refer drawing attached for details. Sponge gasket of ID – 2782 x OD – 3058 shall be bonded with 12 mm thick on the seating surface of the lid (on the bowl flange).
6.1.3 Inner surface of lid shall be provided with mould finish.
6.1.4 Outer surface of the lid shall be provided with a resin coat. No fibre shall be projected out. Operators hand shall not be injured while cleaning the surface of the lid.
6.1.5 The bowl lid shall have a central hub/projection at the top for enabling the lid to be captured in a C- frame of the lid lifting mechanism. Refer drawing attached for details.
6.1.6 The lid shall have 6 nos. of stiffeners (Refer Section E-E of the drawing) to have deflection less than 5 mm.
6.1.7 For hand grip and lifting, 2 nos. of semi-circular handles 180^0 apart shall be provided on top of lid. (i.e.at 90^0 & 270^0). Refer Detail-C of the drawing enclosed.
6.1.8 For hand grip & lifting, 2 nos. of rectangular handles 180^0 apart shall be provided on side of lid (i.e.at 0^0 & 180^0). These shall be at right angles to the handles provided on the top (i.e. at 90^0 & 270^0). Refer Detail-D of the drawing enclosed.
6.1.9 The lid shall be provided with 12 nos. of hanging loops (cotton thread) at regular intervals on the outer periphery. The connection mechanism of loops to the lid is shown in the Detail-I of the drawing enclosed. A lengthy cotton rope of 6mm shall be inserted into the loops for fastening the lid to the bowl top flange.

6.1.10 A sampling port made of SS 304 material is to be provided on the lid for sampling purpose (Refer section G-G in the attached drawing).
6.1.11 Colour of the lid shall be lemon yellow
6.2.12 No metal parts/pieces, metal screws / bolts shall be incorporated in the fabrication of the lid.
6.2.13 Weight of the lid shall be limited to as min. as possible (approx. 220 kg)
6.2.14 Lid deflection shall not exceed 5 mm.
6.2.15 No. of bowl lids required: 14 nos.
6.2.16 The following details shall be labelled on the top surface of the lid.
Lid no. : xx (Starting with
Weight in kgs: xxx (Each lid to be measured and written with paint)

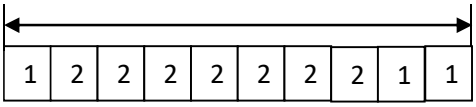
6.2 Operating conditions:

6.2.1 Chemicals to be handled : Solid Propellant slurry
6.2.1 Density : 1.78 gm/cc
6.2.3 PH value : NA
6.2.4 Operating Temperature : 50 deg.^{0}C
6.2.5 Operating Pressure : Ambient

6.3 Design data:

6.3.1 Design code : BS 4994 – 1987
6.3.2 Design temperature : 60^{0}C
6.3.3 Deflection : Not to exceed 5 mm.
6.3.4 Design wind load : 150 km / hr.
6.3.5 Resin : Isopthalic polyester resin (VBR-4501-ISO).
6.3.6 Glass content : 30-35%
6.3.7 Method of fabrication : Hand lay up method
6.3.8 Curing procedure : Room temperature curing
6.3.9 Thickness of cover : 8 mm + 6 nos. of stiffeners of 168X75X7 mm
6.3.10 Mass of reinforcement : CSM 450 gm/m^2 with Isopthalic resin (0.9 mm thick per layer)
6.3.11 Surfacing mat : 20 to 30 gm/m^2 with isopthalic resin (0.4 mm thick per layer)
6.3.12 Lay-up sequence (Indicative):

For 8 THK



1 - Surfacing mat 20 to 30 gm/m^2, 2- CSM 450 gm/m^2 with Isopthalic resin

6.3.13 Isopthalic resin Properties:
Trade name : VBR-4501-ISO (chemical resistance resin)
Appearance : Clear liquid

Density @ 20^0C : 1.15 gm/cc
Viscosity @ 25^0 C : 600-800 cps
Hardness Barcol : Min. 45
Elongation at break % : 2.2
Tensile strength : 55 N/mm^2

6.4 Dimensional details

S. No.	Description	Units	Required	Tolerances	
				(+)	(-)
1.	Lid O.D	mm	3080	10	0
2.	Lid I.D	mm	2760	0	10
3.	Lid end rib height	mm	108		
4.	Stiffener height	mm	75		
5.	FRP thk	mm	8		
6.	Bowl channel width	mm	144.5		
7.	Hub O.D	mm	As indicated in the dwg.		
8.	Hub flange O.D	mm	400	5	0
9.	Hub height	mm	290	3	3
10.	Hub flange thk.	mm	40	2	2
11.	Top handle location	deg.	90-270 deg.		
12.	Side handle location	deg.	0-180 deg.		
13.	Gasket	mm	I.D 2782 O.D 3058 THK 12		
14.	Weight	kg	approx. 220		
15.	No. of equal distance cleats	Nos.	12		
16.	Insert (Sample port)	Refer dwg. (G-G section)			

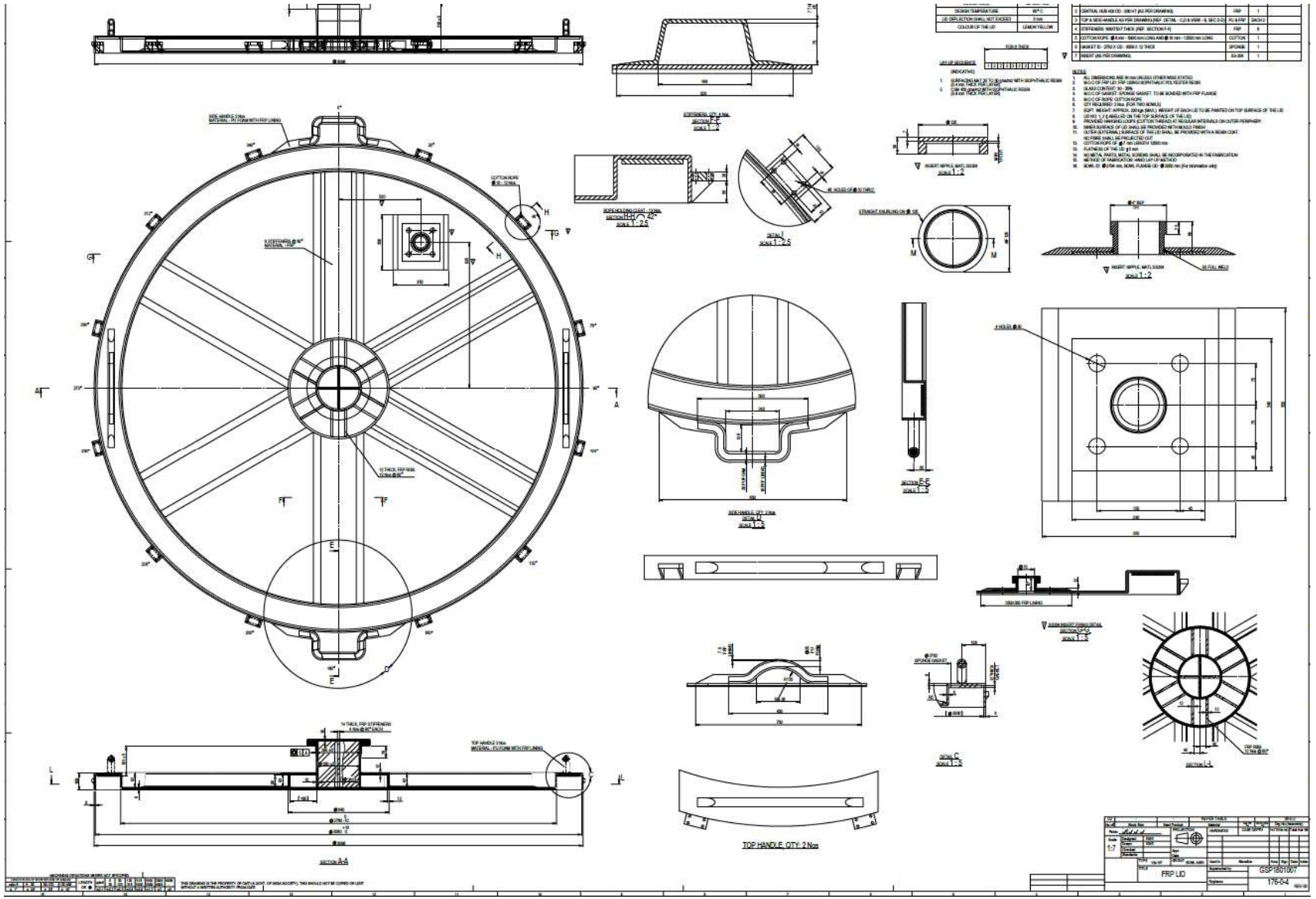
Drawing enclosed
Note: The above dimensions are tentative only, however finalized configuration will be submitted after releasing purchase order.

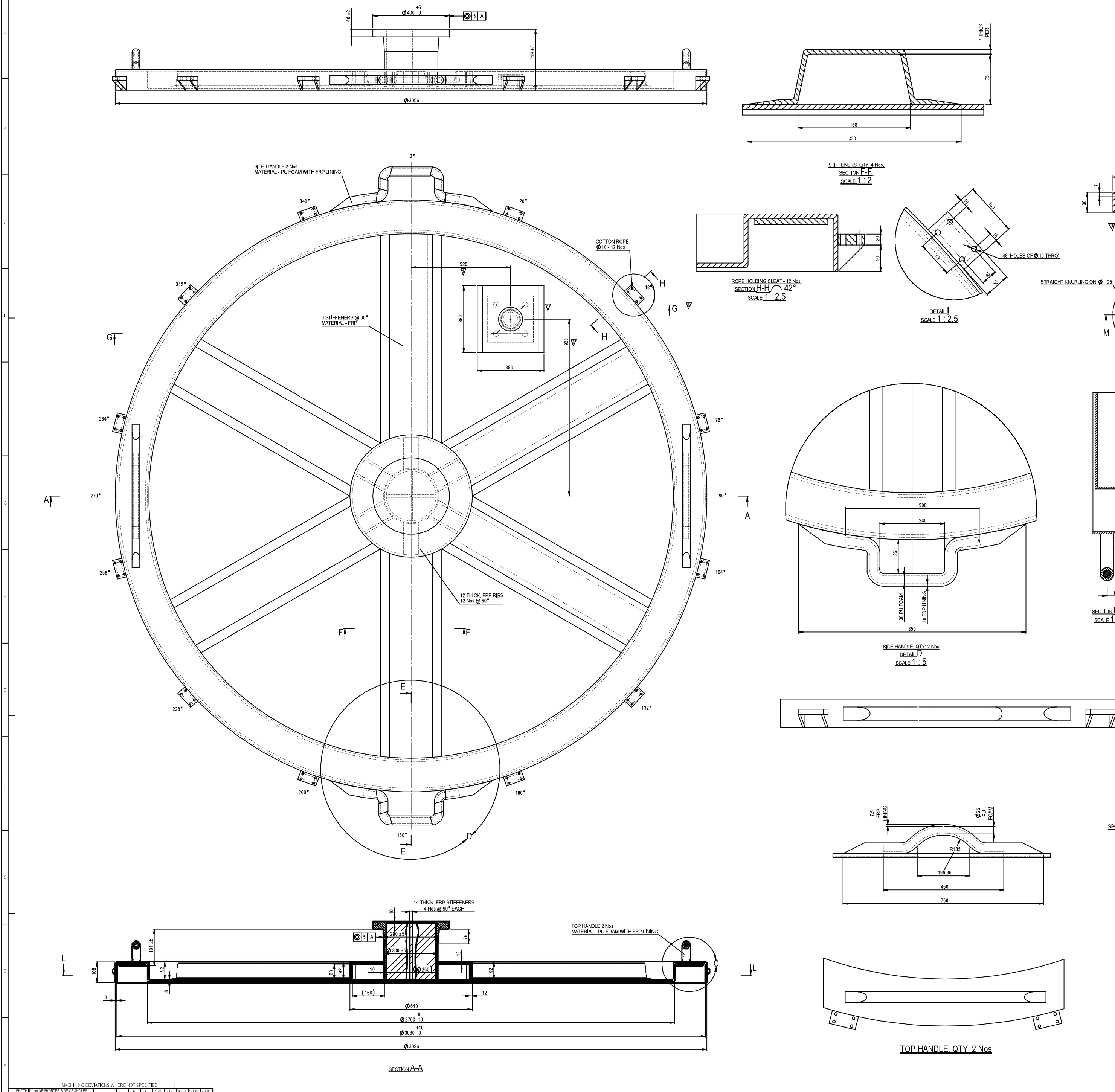
7. Documentation:
7.1 Raw material test certificates
7.2 Mechanical properties test report
7.3 Inspection reports

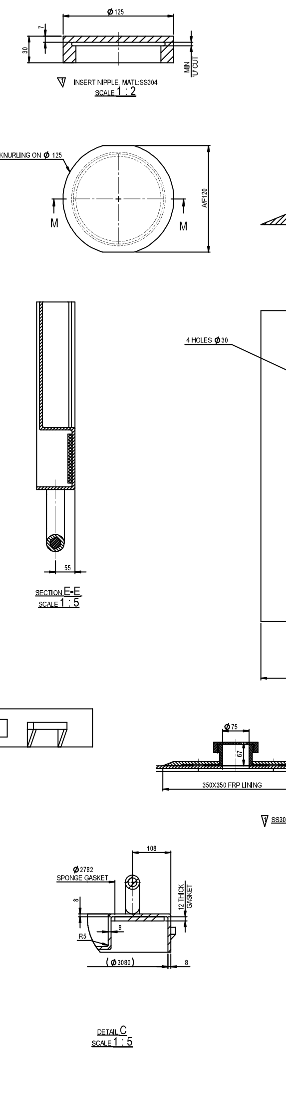
8. Quality assurance plan:

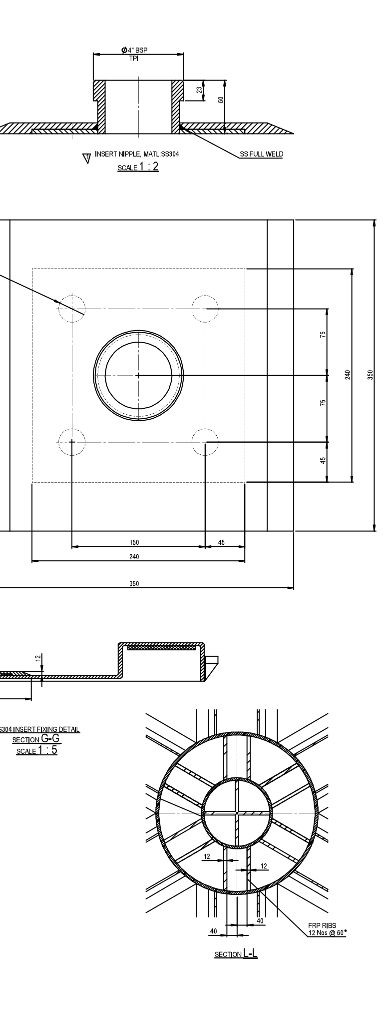
S. No.	Components & operation	Characteristics	Type of check	Quantum of check	Reference Documents	Acceptance norms	Format of Record	Inspection /Agency		
								P	W	V
1.	**Raw material**									
1.1	Unsaturated polyester resin	a. Appearance b. Add value c. Gel time d. Peak exothermic temperature e. Viscosity	Verification of supplier TC /testing by vendor	Every batch/ consignment	IS6746	IS6746	Supplier TC/ Lab TC	2		1
1.2	Chopped strand mat (CSM)	a. Density b. Moisture content	Verification of supplier test certificate /testing by vendor	Every batch/ consignment	IS 1151	IS 1151	Supplier TC/ Lab TC	2		1
1.3	Surface mat	a. Density b. Moisture content	Verification of supplier test certificate /testing by vendor	Every batch/ consignment	IS 1151	IS 1151	Supplier TC/ Lab TC	2		1
1.4	Fabricated laminate	a. Ultimate tensile strength b. Barcol Hardness c. Lap shear strength d.Unit modulus e.Glass content	Testing by vendor	Once	BS4994	BS4994	Lab TC	2		1
2.	FRP lid	a. Dimensions b. Extent of cure	Measurement Acetone test	Every lid	Approved dwg. BS4994	Approved dwg. BS4994	IR IR	2	1	

TC= Test certificate, IR= Inspection report, P= Performing agency, W= Witnessing agency, V=Verifying agency, 1= Department/ Third party, 2= Vend


TOP HANDLE, QTY: 2 Nos
FRP LID
GSP1501007







ALL EDGES CHAMF MAX x 45°

DESIGN DATA	
DESIGN CODE	BS 4994-1987
DESIGN TEMPERATURE	60° C
LID DEFLECTION SHALL NOT EXCEED	5 mm
COLOUR OF THE LID	LEMON YELLOW

S.N.	DESCRIPTION	MATL	QTY	REMARKS
1	LID 2086 OD X 8 THICK (AS PER DRAWING)	FRP	1	
2	CENTRAL HUB 400 OD - 290 HT (AS PER DRAWING)	FRP	1	
3	TOP & SIDE HANDLE AS PER DRAWING (REF. DETAIL - C,D & VIEW - B, SEC D-D)	PU & FRP	EACH 2	
4	STIFFENERS 168X75X7 THICK (REF. SECTION F-F)	FRP	6	
5	COTTON ROPE: Ø6 mm - 5000 mm LONG AND Ø10 mm - 12500 mm LONG	COTTON	1	
6	GASKET ID - 2782 X OD - 3058 X 12 THICK	SPONGE	1	
7	INSERT (AS PER DRAWING)	SS-304	1	

LAY-UP SEQUENCE

(INDICATIVE)

FOR 8 THICK

1	2	2	2	2	2	2	2	1	1

1. SURFACING MAT 20 TO 30 gms/m2 WITH ISOPHTHALIC RESIN (0.4 mm THICK PER LAYER)
2. CSM 450 gms/m2 WITH ISOPHTHALIC RESIN (0.9 mm THICK PER LAYER)

NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHER WISE STATED
2. M.O.C OF FRP LID: FRP USING ISOPHTHALIC POLYESTER RESIN
3. GLASS CONTENT: 30 - 35%
4. M.O.C OF GASKET: SPONGE GASKET. TO BE BONDED WITH FRP FLANGE
5. M.O.C OF ROPE: COTTON ROPE
6. QTY REQUIRED: 2 Nos. (FOR TWO BOWLS)
7. EQPT. WEIGHT: APPROX. 220 kgs (MAX.). WEIGHT OF EACH LID TO BE PAINTED ON TOP SURFACE OF THE LID
8. LID NO: 1, 2 (LABELLED ON THE TOP SURFACE OF THE LID)
9. PROVIDED HANGING LOOPS (COTTON THREAD) AT REGULAR INTERVALS ON OUTER PERIPHERY.
10. INNER SURFACE OF LID SHALL BE PROVIDED WITH MOULD FINISH
11. OUTER (EXTERNAL) SURFACE OF THE LID SHALL BE PROVIDED WITH A RESIN COAT. NO FIBRE SHALL BE PROJECTED OUT
12. COTTON ROPE OF Ø7 mm LENGTH 12500 mm
13. FLATNESS OF THE LID ±5 mm
14. NO METAL PARTS, METAL SCREWS SHALL BE INCORPORATED IN THE FABRICATION
15. METHOD OF FABRICATION: HAND LAY UP METHOD
16. BOWL ID: Ø2794 mm, BOWL FLANGE OD: Ø3050 mm (For information only)

No.off	Stock Size	Semi Product	Material	Drg No (Assembly)
02	-	-	REFER TABLE	06-0-2

Scale 1:7 — Designed RMK — Drawn RMK — Checked — Standards

PROJECTION — HARDNESS — CASE DEPTH — PATTERN NO — Total Net Wt.

TYPE VM-10T — GROUP BOWL ASSY.

TITLE: FRP LID

GSP1801007

176-0-4 REV-00

QUICK CONNECT QUICK DISCONNECT COUPLING

1. Scope of work: Testing, inspection, supply and assembly of QCDC couplings (65 NB) to the bowl as per drawing and specifications indicated below:

2. Description of item: QCDC male coupling is intended for bowl (tank unit) with no or minimal spill during connection/ disconnection w.r.t hose unit.

3. Datasheet & Schedule of quantity:

S. No.	Description	Units	Required	Remarks
1.	Make	-	M/s. STAUBLI	
2.	Model	-	TTX45-DN65	
3.	Type	-	Male	Tank unit
4.	Quantity	Nos.	24	(2 nos. per each bowl + 4 nos. spare)
5.	Nominal diameter	mm	65	
6.	65 NB Hex. Nipple male (BSP)	Nos.	48	(4 nos. per bowl + 8 nos. spare)
7.	65 NB 90º Elbow Female (BSP)	Nos	24	(2 nos. per bowl + 4 nos. spare)
8.	Max. allowable pressure	bar	8 to 10	
9.	Allowable temperature range	°C	15 to 45	
10.	MOC	-	Stainless steel	
11.	Shut-off	-	Double	Tight shut-off with no spill
12.	Seal	-	NBR/EPDM	
13.	End Fitting	-	Female BSP 2 ½"	
14.	Colour code	-	Blue and red	12 nos. of each color
15.	Medium	-	Demineralized water	
16.	Spares		Sealing kit, locking kit, handles	Applicable for 4 nos. of couplings
17.	Maintenance tool kit		To be provided	

3. Documentation:

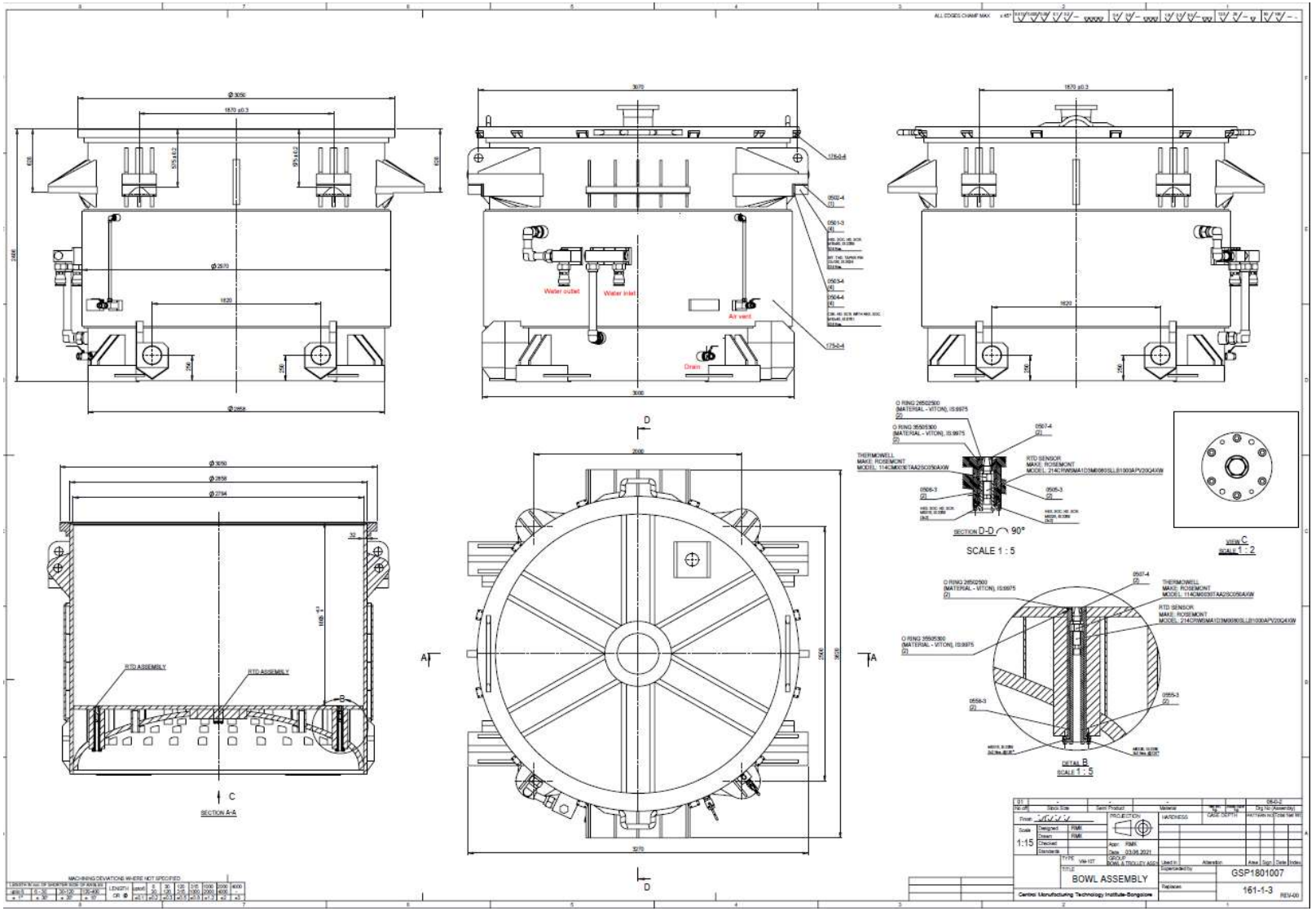
3.1 Test certificates: Report/certificate of compliance/ conformity for Hydrostatic test

3.2 Visual inspection report

3.3 Dimensional inspection reports: Report/certificate of compliance with applicable drawings provided by OEM

3.4 Any other applicable test certificates/ reports may be furnished.

4. Drawing: Bowl assembly drawing indicating water inlet and outlet port is attached.


Water outlet
Water inlet
Air vent
Drain
RTD ASSEMBLY
RTD ASSEMBLY
SECTION A-A
SECTION D-D
SCALE 1 : 5
VIEW C
SCALE 1 : 2
DETAIL B
SCALE 1 : 5
1:15
BOWL ASSEMBLY
GSP1801007
161-1-3

TEMPERATURE SENSOR

1. Scope of work: Supply, testing, inspection & assembly of thermocouple sensors as per the reference drawing and the specifications indicated below:

2. Specification:

Thermocouple sensor
Quantity- 50 Nos.
Make- Fabrika/Sensor Build or equivalent approved by purchaser

S.No.	Parameter	Specification
1.	Type	Fast Response K (Ni-Cr, Ni-Al)
2.	Sensor	Dual Element Sensor
3.	Temperature Range	0 to 100^{o} C
4.	Junction Type	Grounded
5.	Thermocouple Tip	Silver Enclosed Flush Tip
6.	Tip Diameter	3 mm to 6.5 mm
7.	Sheath	Teflon insulated sheath
8.	Thermocouple wire	3-meter SS Braided flexible cable with Teflon insulation. 20 AWG Stainless Steel Overbraid–Resists Abrasions and Cuts, Yet remains Flexible
9.	Termination Style	Quick connect disconnect type
10.	Accuracy	Class 1
11.	Color coding	As per ANSI/M96.1 or IEC 5843
12.	Operating Area Class	Zone 1, Intrinsically Safe

3. Thermocouple support assembly: The drawing for thermocouple support to be prepared similar to the attached reference drawing and submitted to purchaser for approval and acceptance. Above specified thermocouple to be inserted into a Teflon bush and assembled using pipe, flanges and bolts/studs. (Refer the attached reference drawing)

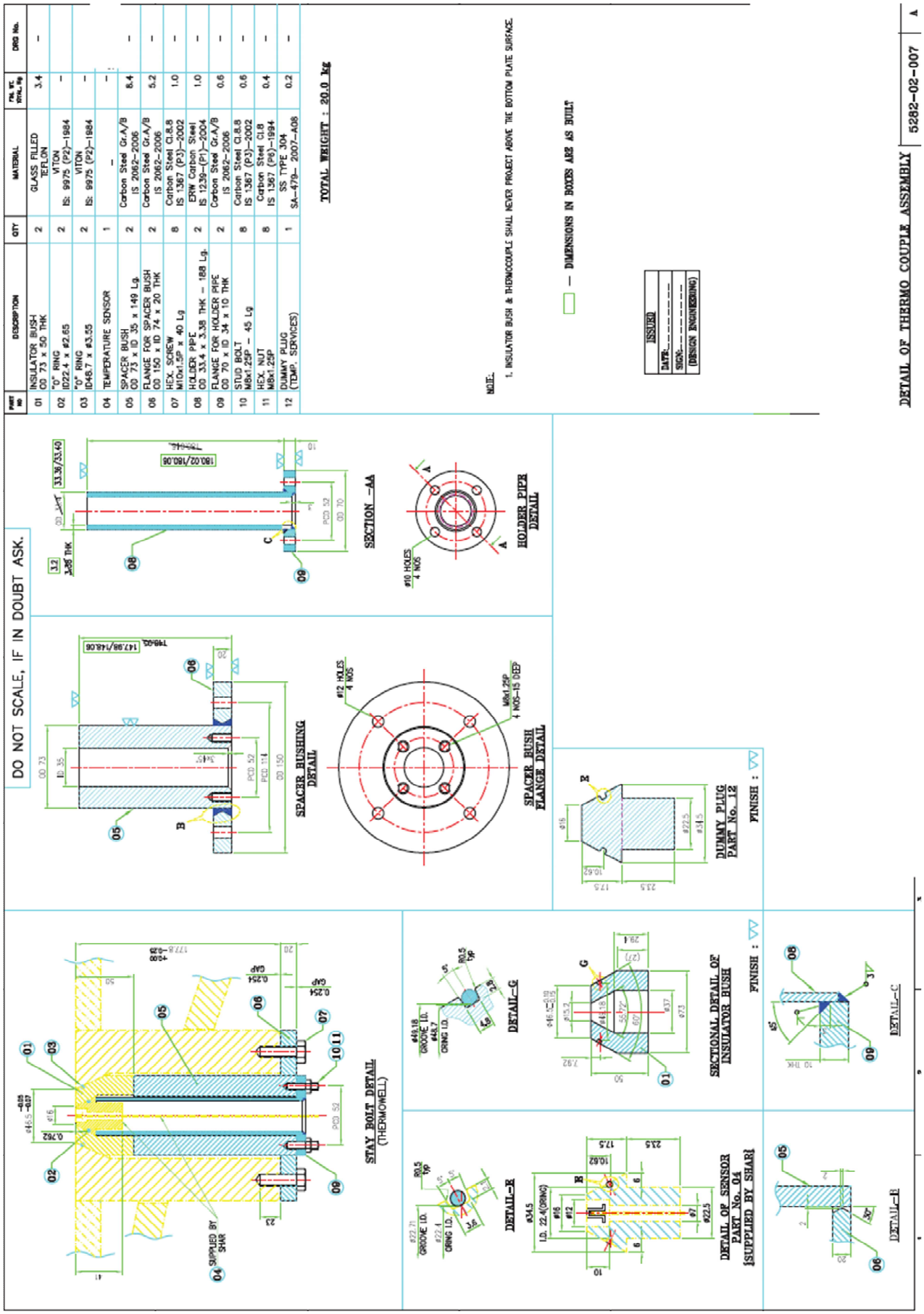
4. Schedule of quantity & Spares list:

S.No.	Item	Qty.
1.	**Thermocouple sensors**	**40 nos. (10 bowls x 4 nos. per bowl)**
2.	**Spares list**	
2.1	**Thermocouple sensors**	**10 nos.**
2.2	Teflon bush (insulator)	2 nos.
2.3	Teflon bush (spacer)	2 nos.
2.4	O ring-Viton	2 nos.
2.5	Necessary holder pipe, flanges, Hex. screw, SS nuts, bolts, studs and flanges	Intended for 10 nos. of bowls

5. Terms and Conditions:

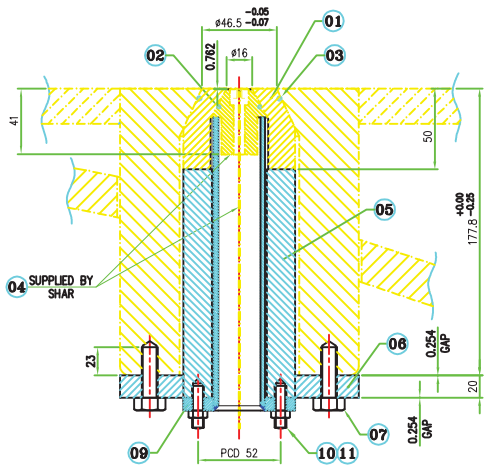
1. Tenderer to provide sensor in assembled condition.
2. Warranty certificate and calibration certificates to be provided.
3. Warranty period of 1 year
4. Any change in specification/better specification can be permitted with the approval of purchaser.

Thermocouple assembly drawing for similar small capacity mixer bowl (for reference)

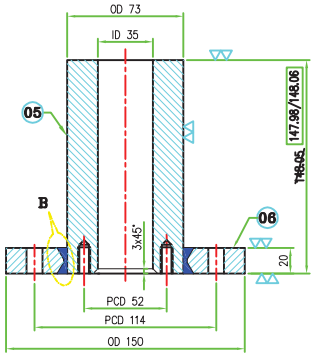


PART NO	DESCRIPTION	QTY	MATERIAL	FIN. WT. APPROX. Kg	DRG No.
01	INSULATOR BUSH OD 73 x 50 THK	2	GLASS FILLED TEFLON	3.4	–
02	"O" RING ID22.4 x Ø2.65	2	VITON IS: 9975 (P2)–1984	–	
03	"O" RING ID48.7 x Ø3.55	2	VITON IS: 9975 (P2)–1984	–	
04	TEMPERATURE SENSOR	1	–	–	
05	SPACER BUSH OD 73 x ID 35 x 149 Lg.	2	Carbon Steel Gr.A/B IS 2062–2006	8.4	–
06	FLANGE FOR SPACER BUSH OD 150 x ID 74 x 20 THK	2	Carbon Steel Gr.A/B IS 2062–2006	5.2	–
07	HEX. SCREW M10x1.5P x 40 Lg	8	Carbon Steel Cl.8.8 IS 1367 (P3)–2002	1.0	–
08	HOLDER PIPE OD 33.4 x 3.38 THK – 188 Lg.	2	ERW Carbon Steel IS 1239–(P1)–2004	1.0	–
09	FLANGE FOR HOLDER PIPE OD 70 x ID 34 x 10 THK	2	Carbon Steel Gr.A/B IS 2062–2006	0.6	–
10	STUD BOLT M8x1.25P – 45 Lg	8	Carbon Steel Cl.8.8 IS 1367 (P3)–2002	0.6	–
11	HEX. NUT M8x1.25P	8	Carbon Steel Cl.8 IS 1367 (P6)–1994	0.4	–
12	DUMMY PLUG (TEMP. SERVICES)	1	SS TYPE 304 SA–479– 2007–A08	0.2	–

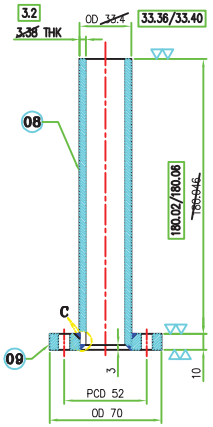
DO NOT SCALE, IF IN DOUBT ASK.



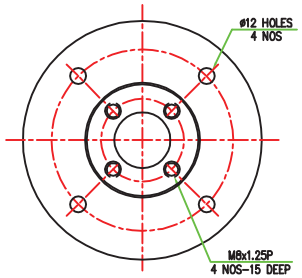
STAY BOLT DETAIL
(THERMOWELL)



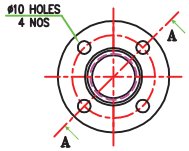
SPACER BUSHING DETAIL



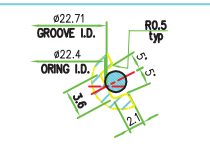
SECTION –AA



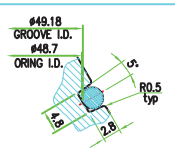
SPACER BUSH FLANGE DETAIL



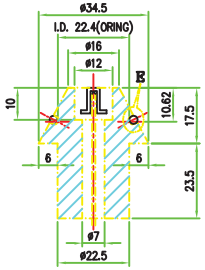
HOLDER PIPE DETAIL



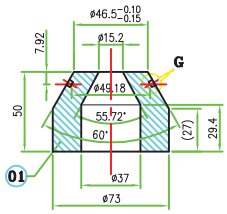
DETAIL–E



DETAIL–G

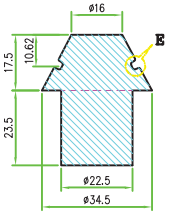


DETAIL OF SENSOR PART No. 04 {SUPPLIED BY SHAR}



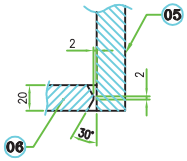
SECTIONAL DETAIL OF INSULATOR BUSH

FINISH :

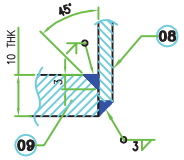


DUMMY PLUG PART No. 12

FINISH :



DETAIL–B



DETAIL–C

PART NO	DESCRIPTION	QTY	MATERIAL	FIN. WT. TOTAL. Kg	DRG No.
01	INSULATOR BUSH OD 73 x 50 THK	2	GLASS FILLED TEFLON	3.4	–
02	"O" RING ID22.4 x ø2.65	2	VITON IS: 9975 (P2)–1984	–	
03	"O" RING ID48.7 x ø3.55	2	VITON IS: 9975 (P2)–1984	–	
04	TEMPERATURE SENSOR	1	–	–	
05	SPACER BUSH OD 73 x ID 35 x 149 Lg.	2	Carbon Steel Gr.A/B IS 2062–2006	8.4	–
06	FLANGE FOR SPACER BUSH OD 150 x ID 74 x 20 THK	2	Carbon Steel Gr.A/B IS 2062–2006	5.2	–
07	HEX. SCREW M10x1.5P x 40 Lg	8	Carbon Steel Cl.8.8 IS 1367 (P3)–2002	1.0	–
08	HOLDER PIPE OD 33.4 x 3.38 THK – 188 Lg.	2	ERW Carbon Steel IS 1239–(P1)–2004	1.0	–
09	FLANGE FOR HOLDER PIPE OD 70 x ID 34 x 10 THK	2	Carbon Steel Gr.A/B IS 2062–2006	0.6	–
10	STUD BOLT M8x1.25P – 45 Lg	8	Carbon Steel Cl.8.8 IS 1367 (P3)–2002	0.6	–
11	HEX. NUT M8x1.25P	8	Carbon Steel Cl.8 IS 1367 (P6)–1994	0.4	–
12	DUMMY PLUG (TEMP. SERVICES)	1	SS TYPE 304 SA–479– 2007–A08	0.2	–

TOTAL WEIGHT : 20.0 kg

NOTE:

1. INSULATOR BUSH & THERMOCOUPLE SHALL NEVER PROJECT ABOVE THE BOTTOM PLATE SURFACE.

— DIMENSIONS IN BOXES ARE AS BUILT

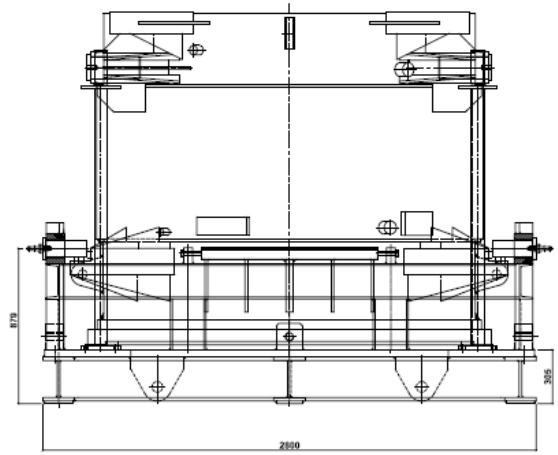
ISSUED
DATE:_____
SIGN:_____
(DESIGN ENGINEERING)

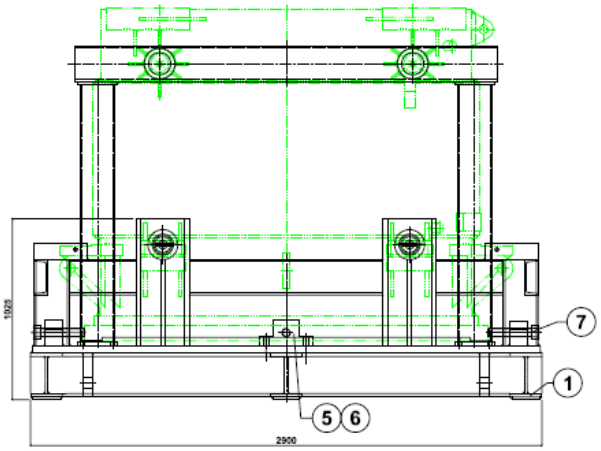
DETAIL OF THERMO COUPLE ASSEMBLY | 5282–02–007 | A

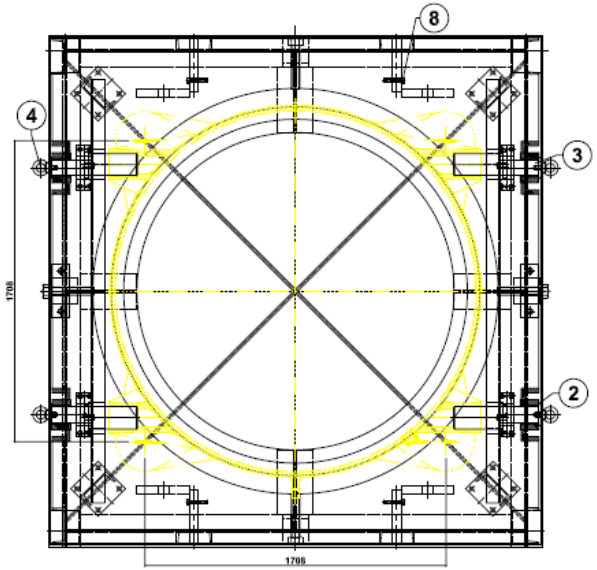
U:\Designs\General\5282Dwg\Rev.0\5282–02–007.dwg.

ALIGNMENT FIXTURE

Dwg. 1 (a)







Note: Dwg. 1 (a) & 1 (b) is reference drawing of similar structure and do not consider any dimension from these drawings.

The approx. dimensions are given below as indicated in the drawings Dwg. 2,3,4 (a) & 4 (b).

1. Lift pin to pin - center distance = 1870 mm (refer pg. no. 61)
2. Diagonally opposite lift pins edge to edge distance = 3552.08 mm (refer pg. no. 61)
3. Spigot ID = 2838.5 mm (tolerances = 0, -0.120)
4. Spigot extension (circumferential) from shroud bottom surface = 35 mm

PART NO.	DESCRIPTION	MATL.	DRG NO:	QTY.	TOT.WT. KGS.
8	HBM-20X120LG	-	-	4	
7	HBM-48X250LG	-	-	4	
6	HSM-30X90LG	-	-	4	
5	BRACKET	MS	M-15467	2	
4	EYE BOLT M-24	-	-	4	
3	PIN	EN-9	M-15467	4	
2	BUSH	GM	M-15467	4	
1	FRAME	MS	M-15466	1	

ALL DIMENSION ARE IN mm

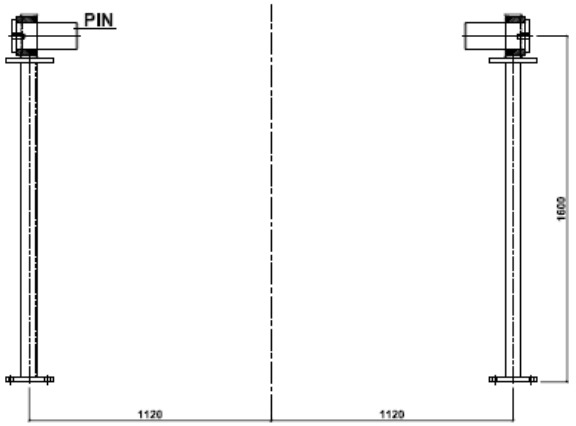
MACHINE SYMBOLS

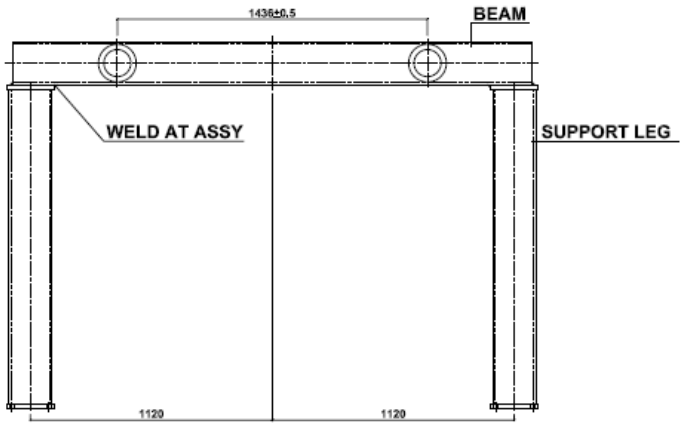
REMOVE SHARP CORNERS

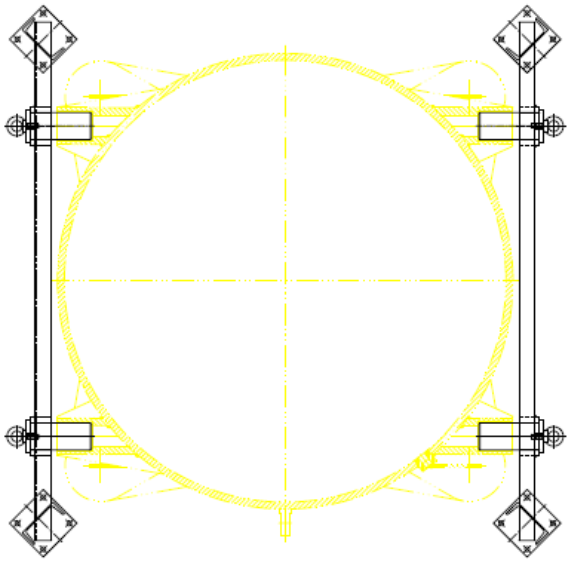
DSD		CUSTOMER : SDSC, SHAR ; ISRO
DRN	PRAVEEN	PROJECT : 4.5T VERTICAL MIXER BOWL
CKD	UPENDRA	TITLE : ALIGNMENT FIXTURE
APD		
DATE		

PROJN.	
SCALE	1 : 1
REF. NO.	-
DRG. NO.	SHEET 1 OF 2
REV.	0

Dwg. 1 (b)







4	EYE BOLT M-24	-	-	4	
3	PIN	EN-9	M-15467C	4	
2	BEAM	MS	M-15467B	2	
1	SUPPORT LEG	MS	M-15467A	4	
PART NO.	DESCRIPTION	MATL.	DRG NO:	QTY.	TOT.WT. KGS.

ALL DIMENSION ARE IN mm

MACHINE SYMBOLS

REMOVE SHARP CORNERS

DSD		
DRN	PRAVEEN	
CKD	UPENDRA	
APD		
DATE		

CUSTOMER : SDSC, SHAR ; ISRO

PROJECT ; 4,5T VERTICAL MIXER BOWL

TITLE : ALIGNMENT FIXTURE

PROJN.

SCALE 1 : 1

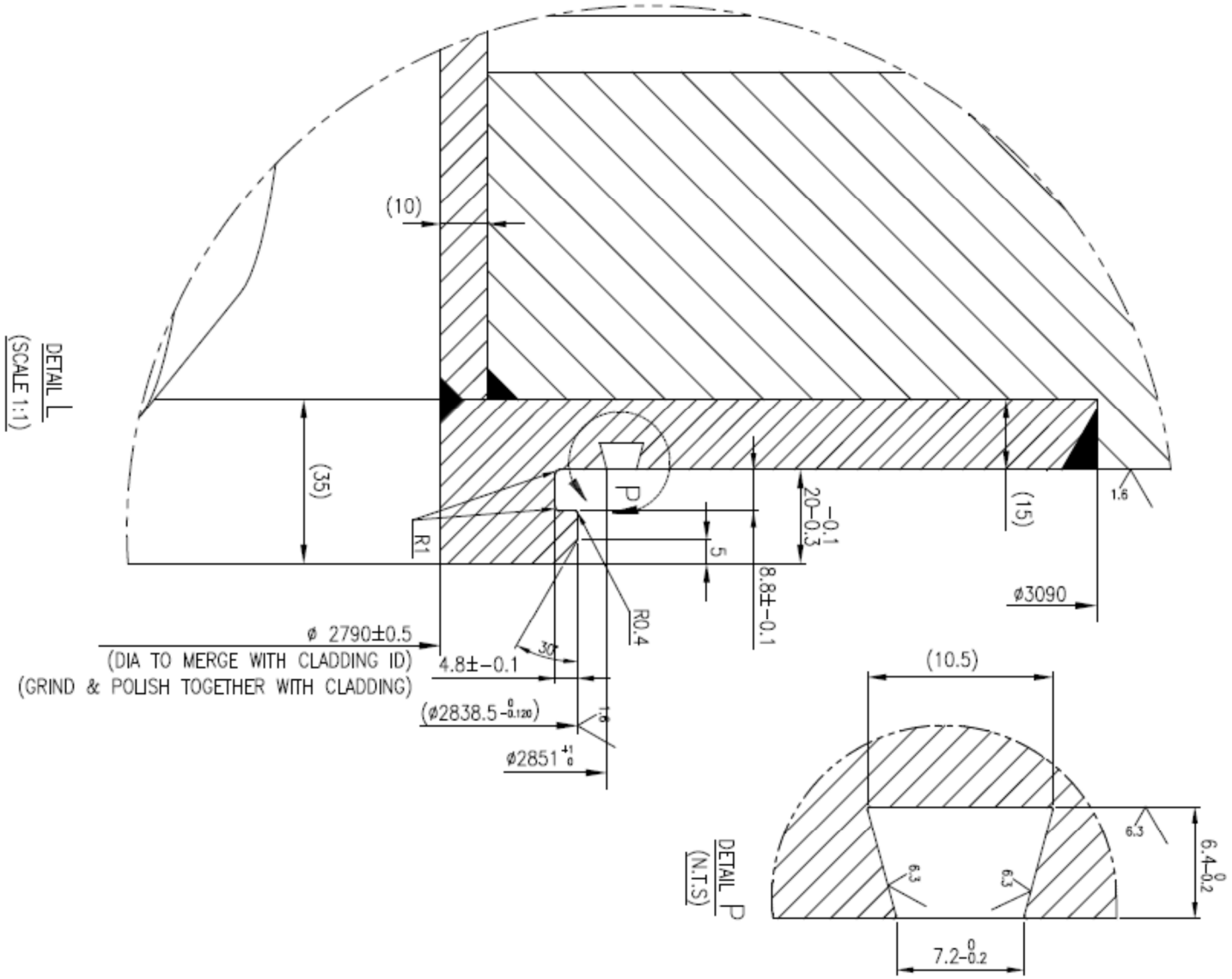
REF, NO. -

DRG. NO.

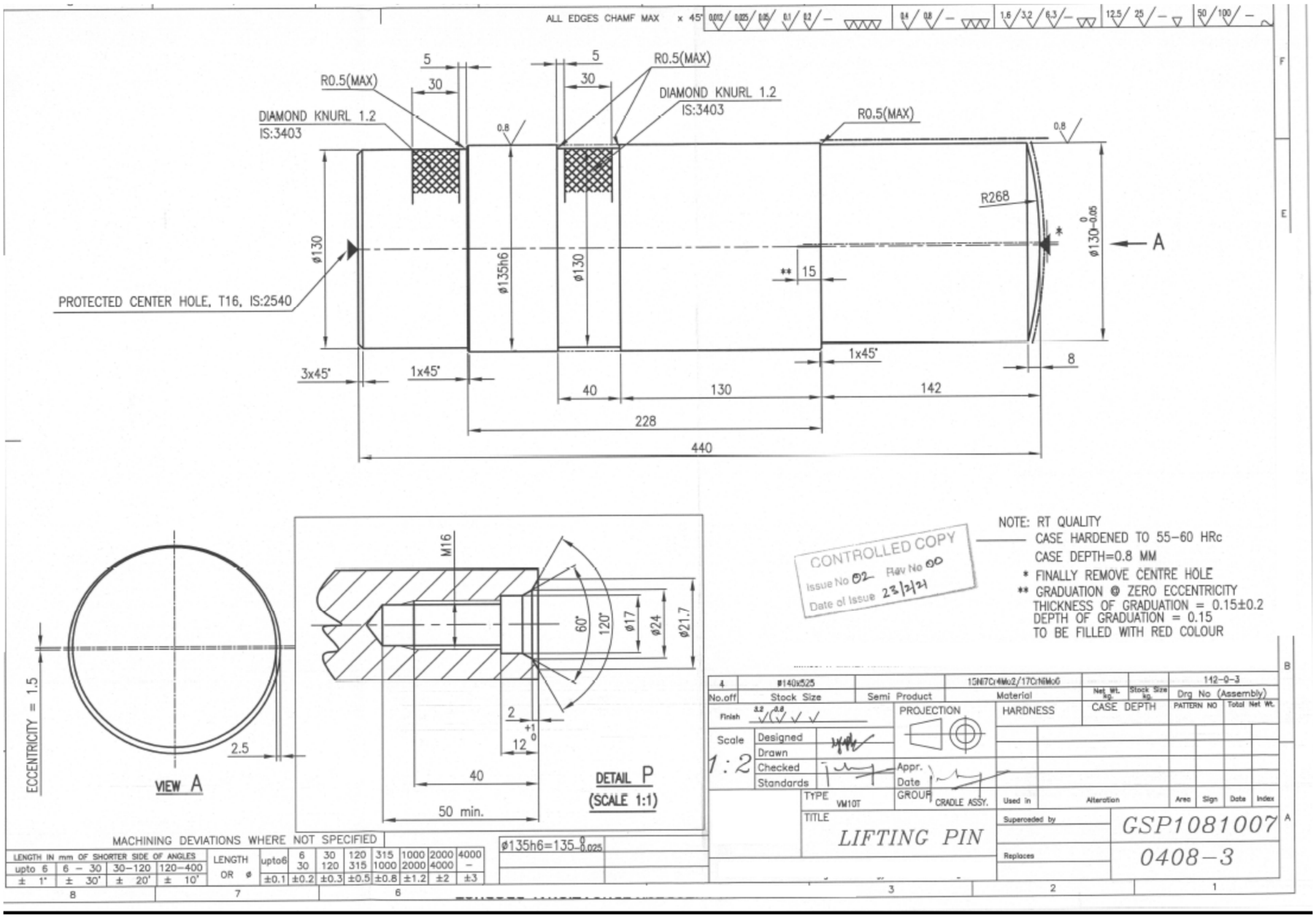
SHEET 2 OF 2

REV. 0

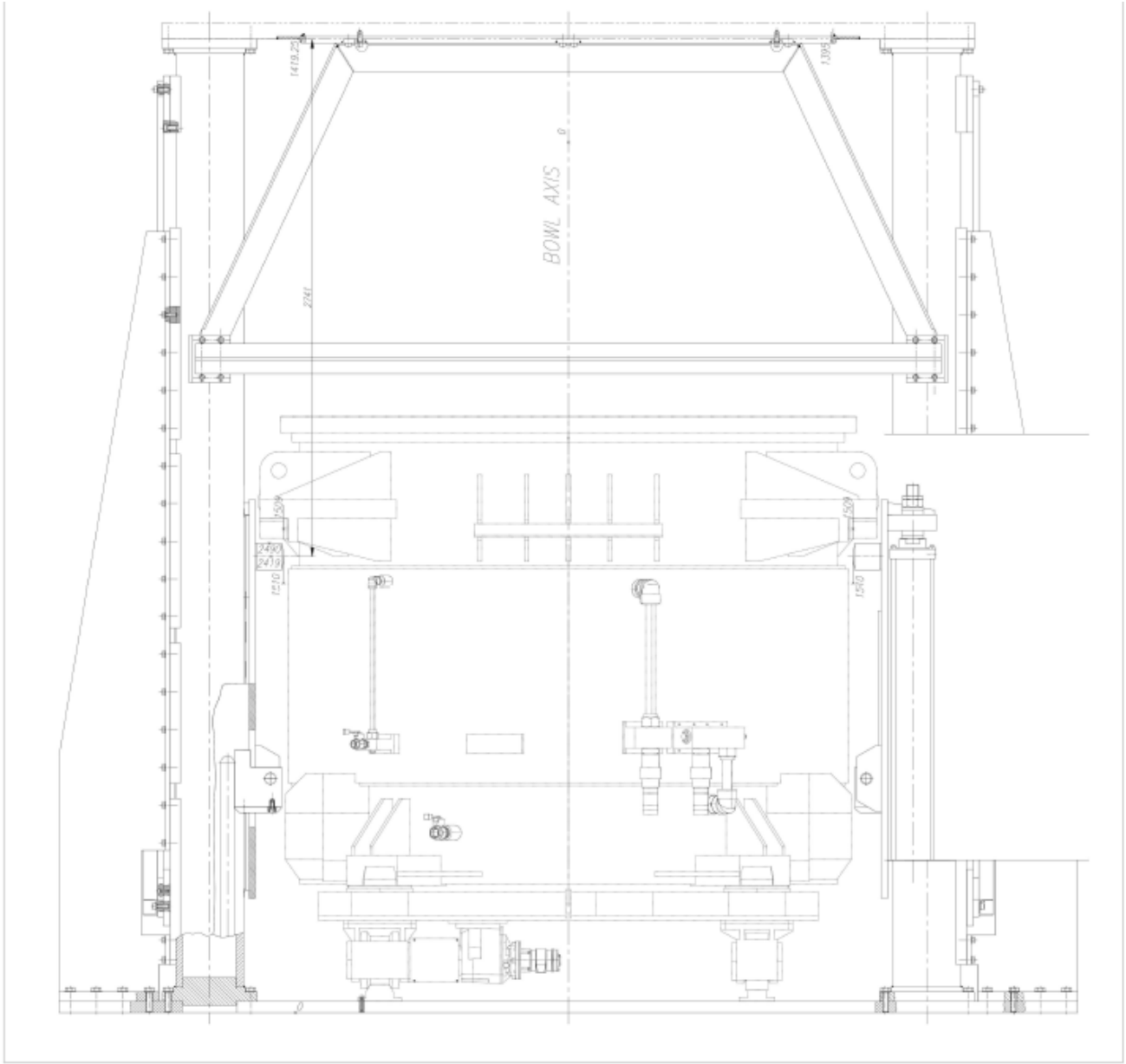
Bowl interface with 10 T vertical mixer shroud drawing – Dwg. 2



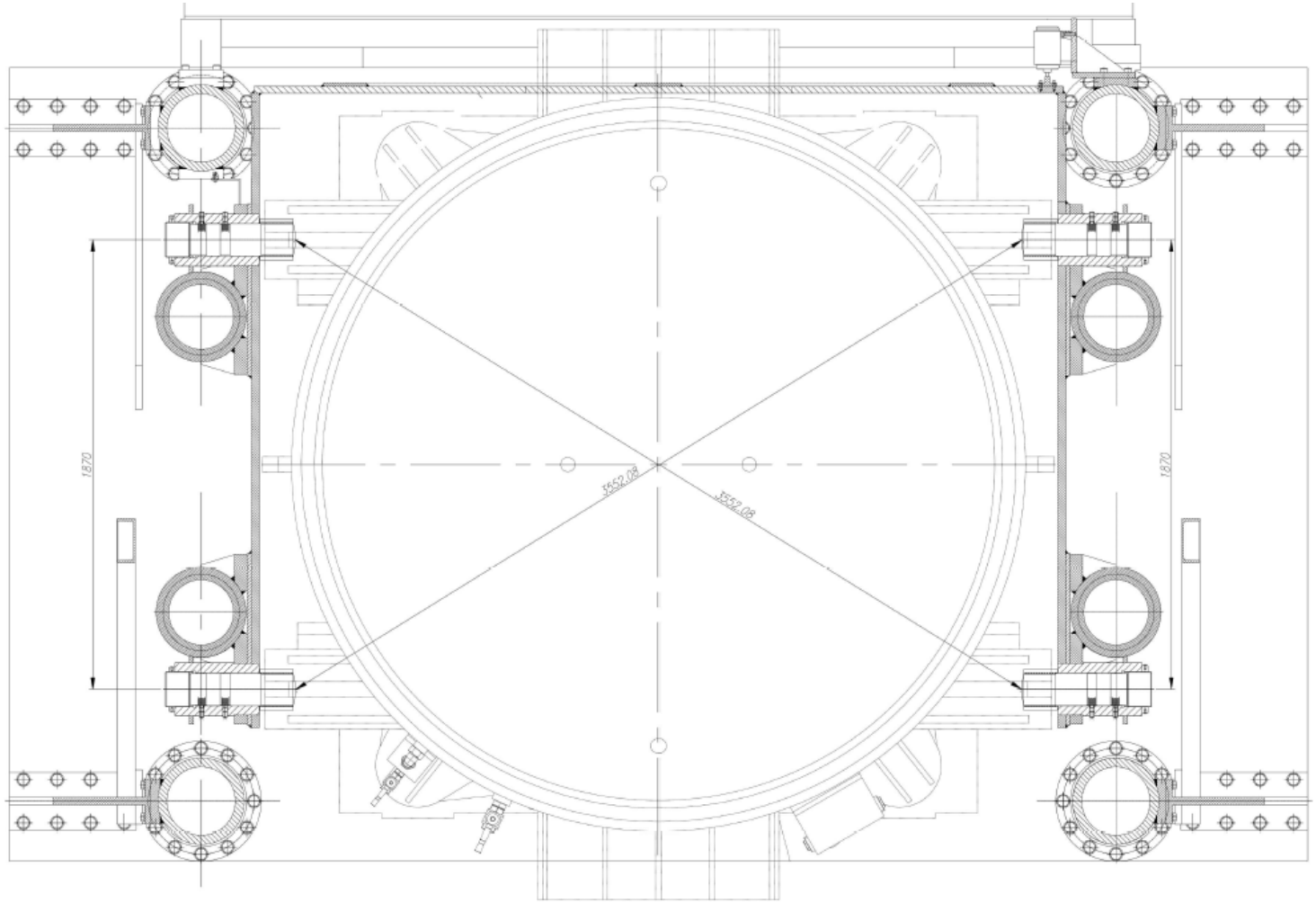
Bowl Lift Pin Drawing – Dwg. 3

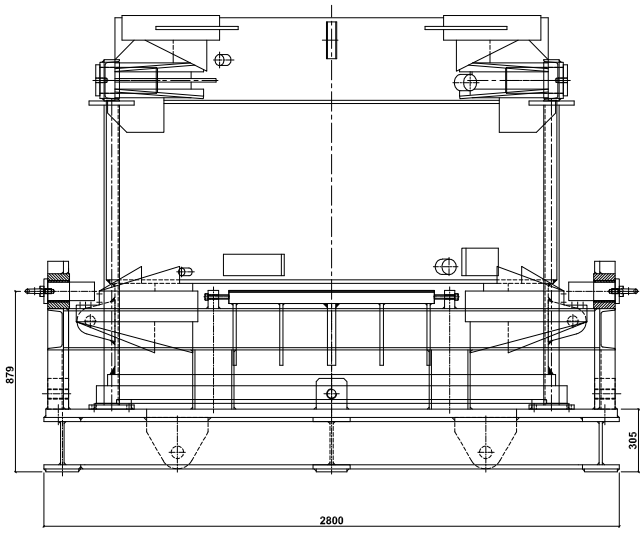


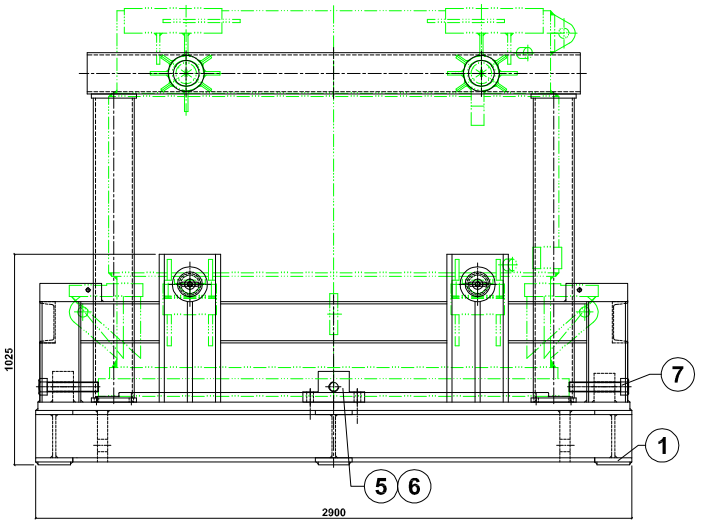
Lifting pin coordinates drawing – Dwg. 4 (a)

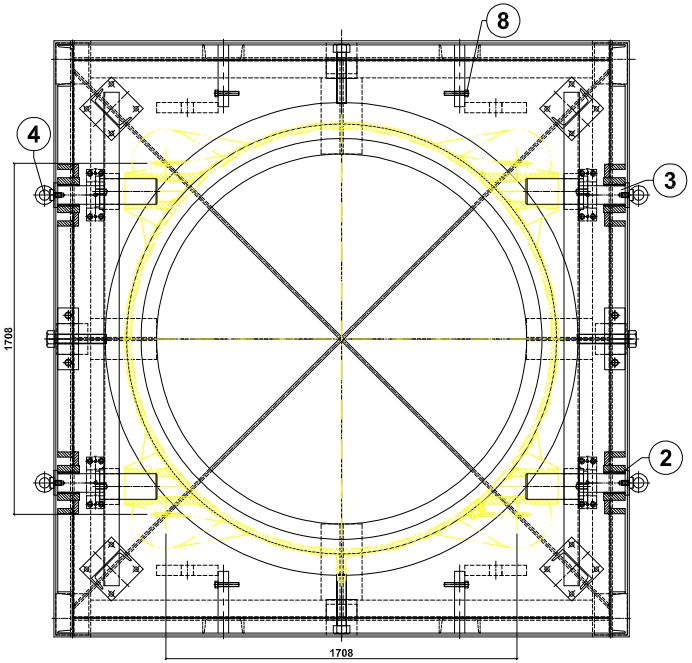


Lifting pin coordinates drawing – Dwg. 4 (b)









QTY : 1NO

8	HBM-20X120LG	-	-	4	
7	HBM-48X250LG	-	-	4	
6	HSM-30X90LG	-	-	4	
5	BRACKET	MS	M-15467	2	
4	EYE BOLT M-24	-	-	4	
3	PIN	EN-9	M-15467	4	
2	BUSH	GM	M-15467	4	
1	FRAME	MS	M-15466	1	
PART NO.	DESCRIPTION	MATL.	DRG NO:	QTY.	TOT.WT. KGS.

ALL DIMENSION ARE IN mm

MACHINE SYMBOLS

50 / 100 / -
12.5 / 25 / -
1.6 / 3.2 / 6.3 / -
0.4 / 0.8 / -

REMOVE SHARP CORNERS

DSD		
DRN	PRAVEEN	
CKD	UPENDRA	
APD		
DATE		

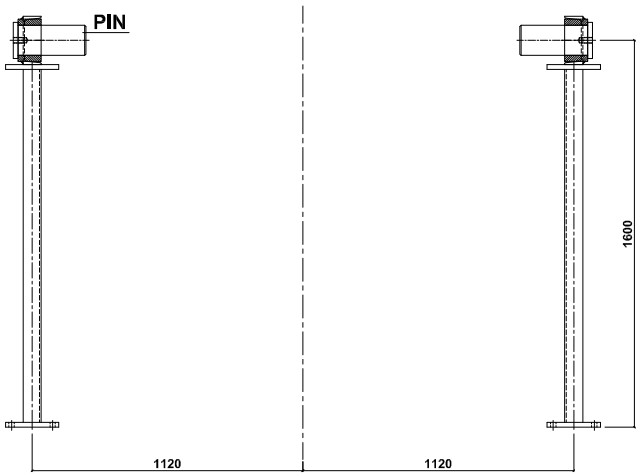
CUSTOMER : SDSC, SHAR ; ISRO

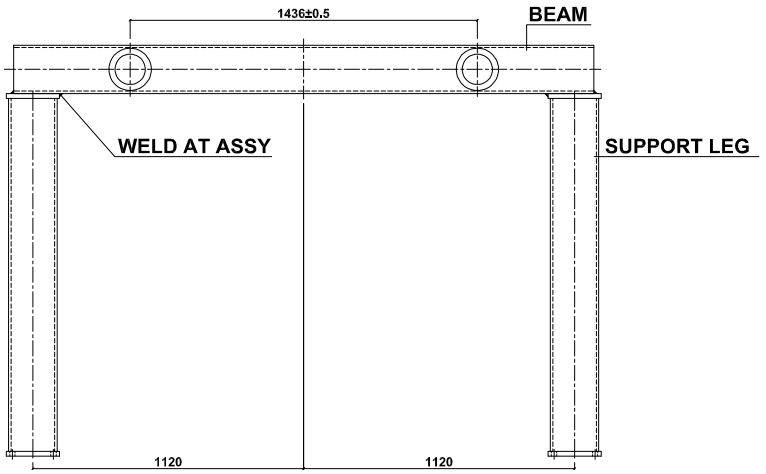
PROJECT : 4.5T VERTICAL MIXER BOWL

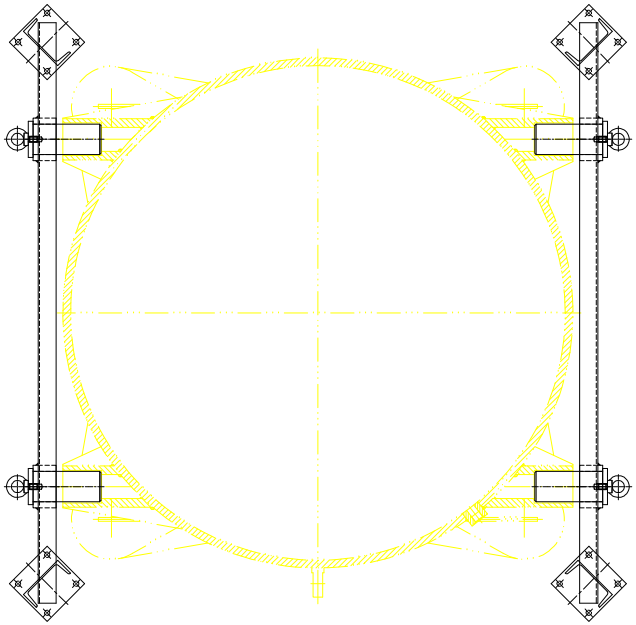
TITLE : ALIGNMENT FIXTURE

PROJN.	
SCALE	1 : 1
REF. NO.	-
DRG. NO.	
REV.	0

SHEET 1 OF 2







PART NO.	DESCRIPTION	MATL.	DRG NO:	QTY.	TOT.WT. KGS.
4	EYE BOLT M-24	-	-	4	
3	PIN	EN-9	M-15467C	4	
2	BEAM	MS	M-15467B	2	
1	SUPPORT LEG	MS	M-15467A	4	

ALL DIMENSION ARE IN mm

MACHINE SYMBOLS

REMOVE SHARP CORNERS

DSD			CUSTOMER : SDSC, SHAR ; ISRO
DRN	PRAVEEN		PROJECT : 4.5T VERTICAL MIXER BOWL
CKD	UPENDRA		TITLE : ALIGNMENT FIXTURE
APD			
DATE			

PROJN.	
SCALE	1 : 1
REF. NO.	-
DRG. NO.	
REV.	0
SHEET 2 OF 2	