GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA, TRIVANDRUM 695547, KERALA
PURCHASE & STORES

Ph No: 0471-2567 726/813/317/319
Fax +091-0472-2800712,0471-2567305

Date : 13/12/2016

INVITATION TO TENDER

Our Ref No : 01TE **2016-028092-01**

Tender Due: 14:30 **Hrs ISTon** 16/01/2017

Tender Opening : 10:30 Hrs IST on 17/1/2017

M/s

Dear Sirs,

Please submit your sealed quotation , in the Tender Form enclosed here along with the descriptive catalogues / pamphlets /literature ,superscribed with Our Ref.No. and Due Date for the supply of the following items as per the terms & conditions mentioned in Annexure(Form No: ENCLOSED)

S.No.	Description of Items with Specifications	Unit	Quantity
1	FABRICATION OF SEMICRYO MOCKUP TURBOPUMP CONSISTING OF MAIN TURBOPUMP ASSEMBLY, LPOT ASSEMBLY AND LPFT ASSEMBLY AS PER DETAILS GIVEN IN ANNEXURE -1	No.	1

DELIVERY AT: LPSC, VALIAMALA

MODE OF DESPATCH BY ROAD

DUTY EXEMPTIONS EXEMPTED

SPECIAL INSTRUCTIONS NIL

SPECIFIC TERMS ENCLOSED

INSTRUCTIONS TO TENDERERS:

Note 1] Fax / E-mail offers will not be considered.

2] General Terms & Conditions as per Annexure - IV.

3] A Compliance Matrix for Commercial terms is attached as per Annexure - V.

For and on behalf of the President of India
The Purchaser

एब्राहम वर्गीस /ABRAHAM VARGHESE
PURCHASE & STORES OFFICER
एलपीएससी/ LPSC

TERMS & CONDITIONS

1. Scope of Work:

The scope of work covered in this indent involves part machining, Assembling welding, Final Machining & dimensional inspection and assembly of Semicryo Mockup turbopump consisting of MAIN TURBOPUMP ASSEMBLY (SE MOCK-UP 2000.000.00.0), LPOT ASSEMBLY (SE MOCK-UP 2150.000.00.0) and LPFT ASSEMBLY (SE MOCK-UP 2250.000.00.0) as per drawings (list given in annexure 2) in Party's own material in SS 304L / SS321. All the welded joints of are to be subjected to DP evaluation and cleared. The party is authorized to use standard parts if it is meeting the material and dimensional requirements. Party has to provide cost break-up for Main turbopump assembly, LPOT assembly and LPFT assembly.

2. Responsibilities of the fabricator

2.1 Realisation of the **parts, sub assemblies and final assembly** according to the requirements specified in the drawing as per Annexure-2 and other detail given herein in Party's own material in SS 304L / SS321. Party has to select the proper welding rod suitable to the selected material. The selected material and welding rod has to be clearly specified in the quotation.

2.2 Castings required for realizing the assembly will be supplied by LPSC. Party has to carry out the machining of the casting as per the drawings. The casting drawings will be supplied by LPSC to assess the amount of machining in the casting.

2.3 The Party shall carry out the full inspection of the parts with their inspection facilities. The fabricator shall have full-fledged inspection facilities to carry out 100% dimensional (General inspection, Special Inspection). The inspection reports shall be prepared in detail with actual inspected values/interpretations. LPSC shall arrange for counter inspection for which the fabricator has to provide all necessary facilities. Party has to intimate the readiness of the items well in advance along with the inspection reports for arranging counter inspection.

2.4 Any minor modification should be incorporated without any additional cost.

2.5 Party shall design, develop and fabricate all necessary tools, jigs and fixtures required for carrying out the scope of work with their materials.

2.6 Hardware shall be serially numbered and identified with proper engraving.

2.7 Party shall supply 2 sets of quality control documents which contain inspection reports of all parts/sub assemblies along with hardware delivery.

2.8 The dispatch of finished components/sub assemblies from the party's works to LPSC shall be made only after the provisional / final acceptance of the items by LPSC and communicated by the identified focal point.

2.9 The finished parts shall be suitably packed in proper containers/boxes individually by the party before their dispatch to LPSC to avoid any transportation damages.

2.10 Party has to supply the material certificate for chemical composition and mechanical properties based on the test carried out at government approved lab.

2.11 Guidelines for quality control, inspection and acceptance procedures are detailed in the Annexure – 3. Party has to strictly follow the specifications and procedures detailed in the guidelines.

3. Responsibilities of LPSC

3.1 Issue of three copies of all the approved drawings to the party.
3.2 Castings required for realizing the assembly will be supplied by LPSC. The casting drawings also will be supplied by LPSC to assess the amount of machining in the casting.
3.3 Pre delivery counter-inspection shall be carried out by LPSC representatives at LPSC's discretion at the fabricator's site.
3.4 Acceptance of the fabricated hardware after verifying whether the specification at each phase of the fabrication as specified in the drawings are met.

4. Inspection and Quality Assurance

4.1 Party shall identify and possess inspection equipments, inspection fixtures, total production resources and skills which may be needed to achieve the required quality.
4.2 The parts fabricated by the party will be inspected and accepted or rejected subject to meeting the dimensions, tolerances and other requirements spelt out in this indent, its annexures and drawings.
4.3 However, the deviations, if any, could be analyzed in detail and it may become possible to accept parts with some minor non-conformances depending upon the nature of the non-conformances as well as its implications on the overall functioning of the system.
4.4 In the event of non-conformances, the details of non-conformance involved shall be referred by the party, in writing, to the LPSC's focal point. The non-conformance will be accepted, after discussing in the appropriate forums, if such non-conformance shall not affect the functioning of the system and

is of minor in nature. The decision on the minor and major non-conformances by LPSC will be final and binding upon the party.

4.5 Whenever non-conformances have been accepted subject to rework/repair, the party shall carry out such repair/rework at no extra cost to LPSC as per accepted rework/repair plan and it shall be re-inspected in accordance with the rework procedure requirements.

4.6 In case of rejection of the parts / assembly, party has to fabricate the parts / assembly in his own material without any extra cost.

5. Acceptance Procedure

5.1 The acceptance of the items fabricated against this shall be strictly based on the conformance of all technical requirements stipulated in the drawings and annexures of the indent. LPSC shall not accept items which deviate from the specification. However, LPSC reserves the sole right to accept deviations which may not affect the functional performance of the hardware.

5.2 The dispatch of the finished parts from the party's works to LPSC shall be made only after the provisional/final acceptance of the items by LPSC and formal dispatch clearance communicated in writing by the identified focal point.

6. Delivery Schedule

6.1 The delivery schedule completion under the scope of this Indent shall be T+6 Months Where, T is the date of issue of purchase order.

7. Packing and Dispatching

7.1 Finished products shall be handled and stored properly with care in suitable containers/packing cases to protect against damages.

7.2 The Party shall arrange packing of all the hardware accepted by LPSC for final dispatch in suitable road worthy packing cases/containers and arrange to transport the same to the LPSC's designated site at their own cost.

8. Ownership and Custody of Drawings and Documents

8.1 The party shall be the custodian and shall be responsible for the safe custody of all the drawings, documents, and materials etc., issued by LPSC as well as the documents generated during the course of work. The destruction or reproduction of drawings shall be done only with the written consent of LPSC.

9 Secrecy

9.1 The information related to this work will be treated as "secret" and that the contents of the drawings, process sheets or any other documents shall not be disclosed or parted with to any other individual, firm or company without the written authorization by the LPSC.

9.2 If the documents supplied are marked as 'restricted use' the Party shall take all necessary steps to ensure that the requirements of the contract or any specification, drawing, sample or information supplied by LPSC shall not be disclosed to any person other than a person employed or engaged by the LPSC, whether under SUB-CONTRACT or otherwise, for the performance of the contract.

9.3 Any disclosure to any person permitted under above shall be made in confidence and shall extend only as far as may be necessary for the purpose of the contract.

10. Sub Contracting

10.1 Sub-contracting in general is not preferred and encouraged. However, party may sub-contract part of their responsibilities in fabricating the component of this indent to another agency with the consent of LPSC. Such request will be agreed by LPSC subject to LPSC being satisfied with the capability of the SUB-CONTRACTOR in meeting the total requirement in terms of engineering skill, past experience, necessary infrastructure etc. to meet the required quality. Any sub-contracting agreed by the LPSC shall not absolve the obligations and responsibilities of the party specified in this indent.

11. Additional Criteria for selection of parties

11.1 The party must have earlier experience / expertise in realization of similar hardware involving operation like forming, machining and welding. The party should have executed at least two purchase orders for items involving forming / machining at an estimated cost of Rs. 20 lakhs each in the last three years. Documentary evidence to this shall be provided along with the quotation. Parties meeting the above criteria only will be shortlisted for evaluation.

Annexures

Annexure -2	Drawing & Parts list.
Annexure -3	Guidelines for quality control, inspection and acceptance procedure – to be followed by the party.

Annexure -2

LIST OF PARTS		
MAIN TURBOPUMP ASSEMBLY		
Sl No	**Part name**	**Drg No**
1	Casing assembly	SE-MOCKUP.2000.2200.0010.00.0
2	Manifold assembly	SE-MOCKUP.2000.2200.0020.00.0
3	Manifold half-1	SE-MOCKUP.2000.2200.0021.00.1
4	Manifold half-2	SE-MOCKUP.2000.2200.0022.00.1
5	Straightening device	SE-MOCKUP.2000.2200.0011.00.1
6	Branch	SE-MOCKUP.2000.2200.0012.00.1
7	Manifold sector	SE-MOCKUP.2000.2200.0013.00.1
8	Flange	SE-MOCKUP.2000.2200.0014.00.1
9	Flange	SE-MOCKUP.2000.2200.0015.00.1
10	Connector	SE-MOCKUP.2000.2200.0016.00.1
11	Connector	SE-MOCKUP.2000.2200.0017.00.1
12	Connector	SE-MOCKUP.2000.2200.0018.00.1
13	Connector	SE-MOCKUP.2000.2200.0019.00.1
14	Bracket	SE-MOCKUP.2000.2200.0031.00.1
15	Boss	SE-MOCKUP.2000.2200.0032.00.1
16	Boss	SE-MOCKUP.2000.2200.0033.00.1
17	Pipe Assly	SE-MOCKUP.2000.2200.0040.00.0
18	Pipe	SE-MOCKUP.2000.2200.0041.00.1
19	Flange	SE-MOCKUP.2000.2200.0042.00.1
20	Flange	SE-MOCKUP.2000.2200.0043.00.1
21	Casing	SE-MOCKUP.2000.2200.0217.00.1

Annexure -I (contd)

22	Nut	SE-MOCKUP.2000.2200.0224.00.1
23	Stud	SE-MOCKUP.2000.2200.0225.00.1
24	Lock washer	SE-MOCKUP.2000.2200.0226.00.1
25	Stud	SE-MOCKUP.2000.2200.0228.00.1
26	Lock washer	SE-MOCKUP.2000.2200.0231.00.1
27	Nut	SE-MOCKUP.2000.2200.0233.00.1
28	Stator Assembly	SE-MOCKUP.2000.2100.1000.00.0
29	Branch assembly	SE-MOCKUP.2000.2100.1100.00.0
30	Half branch	SE-MOCKUP.2000.2100.1101.00.1
31	Half branch	SE-MOCKUP.2000.2100.1102.00.1
32	Half Sphere	SE-MOCKUP.2000.2100.1002.00.1
33	Sphere Flange	SE-MOCKUP.2000.2100.1003.00.1
34	Flange	SE-MOCKUP.2000.2100.1004.00.1
35	Ring	SE-MOCKUP.2000.2100.1006.00.1
36	Ring	SE-MOCKUP.2000.2100.1009.00.1
37	Connector	SE-MOCKUP.2000.2100.1011.00.1
38	Bracket	SE-MOCKUP.2000.2100.1012.00.1
39	Exhaust Assembly	SE-MOCKUP.2000.2100.2000.00.0
40	Branch assembly	SE-MOCKUP.2000.2100.2100.00.0
41	Half branch	SE-MOCKUP.2000.2100.2101.00.1
42	Half branch	SE-MOCKUP.2000.2100.2102.00.1
43	Flange	SE-MOCKUP.2000.2100.2002.00.1

Annexure -I (contd)

44	Flange	SE-MOCKUP.2000.2100.2003.00.1
45	Flange	SE-MOCKUP.2000.2100.2004.00.1
46	Connector	SE-MOCKUP.2000.2100.2005.00.1
47	Connector	SE-MOCKUP.2000.2100.2006.00.1
48	Flange	SE-MOCKUP.2000.2100.2007.00.1
49	Housing Assembly	SE-MOCKUP.2000.2100.3000.00.0
50	Manifold assembly	SE-MOCKUP.2000.2100.3100.00.0
51	Manifold half	SE-MOCKUP.2000.2100.3101.00.1
52	Manifold half	SE-MOCKUP.2000.2100.3102.00.1
53	Inlet branch	SE-MOCKUP.2000.2100.3001.00.0
54	Guiding device	SE-MOCKUP.2000.2100.3002.00.0
55	Manifold sector	SE-MOCKUP.2000.2100.3003.00.1
56	Flange	SE-MOCKUP.2000.2100.3004.00.1
57	Flange	SE-MOCKUP.2000.2100.3005.00.1
58	Connector	SE-MOCKUP.2000.2100.3006.00.1
59	Connector	SE-MOCKUP.2000.2100.3007.00.1
60	Boss	SE-MOCKUP.2000.2100.3008.00.1
61	Boss	SE-MOCKUP.2000.2100.3009.00.1
62	Connector	SE-MOCKUP.2000.2100.0026.00.1
63	Stud	SE-MOCKUP.2000.2100.0052.00.1
64	Stud	SE-MOCKUP.2000.2100.0057.00.1
65	Nut (M14x1.5)	SE-MOCKUP.2000.2100.0058.00.1
66	Locking washer	SE-MOCKUP.2000.2100.0059.00.1
67	Stud	SE-MOCKUP.2000.2100.0061.00.1

Annexure -1 (contd)

68	Nut (M20 X 1.5)	SE-MOCKUP.2000.2100.0062.00.1
69	washer	SE-MOCKUP.2000.2100.0063.00.1
70	Nut	SE-MOCKUP.2000.2000.0002.00.1
71	Nut	SE-MOCKUP.2000.2000.0003.00.1
72	Washer	SE-MOCKUP.2000.2000.0004.00.1
LPOT ASSEMBLY		
Sl No	**Part name**	**Drg No**
1	Casing Assly	SE-MOCKUP.2000.2150.2000.00.0
2	Manifold Assly	SE-MOCKUP.2000.2150.2100.00.0
3	Branch Assly	SE-MOCKUP.2000.2150.2110.00.0
4	Half branch	SE-MOCKUP.2000.2150.2111.00.1
5	Manifold's sector Assly	SE-MOCKUP.2000.2150.2120.00.0
6	Half sector	SE-MOCKUP.2000.2150.2121.00.1
7	Branch Assly	SE-MOCKUP.2000.2150.2200.00.0
8	Half branch	SE-MOCKUP.2000.2150.2201.00.0
9	Inlet branch	SE-MOCKUP.2000.2150.2001.00.0
10	Nozzle set	SE-MOCKUP.2000.2150.2002.00.0
11	Connector	SE-MOCKUP.2000.2150.2003.00.0
12	Bottom	SE-MOCKUP.2000.2150.2004.00.0
13	Boss	SE-MOCKUP.2000.2150.2005.00.0
14	Flange	SE-MOCKUP.2000.2150.2006.00.0
15	Flange	SE-MOCKUP.2000.2150.2007.00.0
16	Outlet branch Assly	SE-MOCKUP.2000.2150.3000.00.0
17	Flange	SE-MOCKUP.2000.2150.3001.00.0

Annexure -2 (contd)

19	Shell assy.	SE-MOCKUP.2000.2150.3100.00.0
20	Flange	SE-MOCKUP.2000.2150.3003.00.0
21	Plate	SE-MOCKUP.2000.2150.3004.00.0
22	Stud	SE-MOCKUP.2000.2150.0011.00.0
23	Nut M12X1.5	SE-MOCKUP.2000.2150.0012.00.0
24	washer	SE-MOCKUP.2000.2150.0013.00.0

LPFT ASSEMBLY

Sl No	**Part name**	**Drg No**
1	Casing Assly	SE-MOCKUP.2250.0040.00.0
2	Inlet branch	SE-MOCKUP.2250.0041.00.0
3	Nozzle set	SE-MOCKUP.2250.0042.00.0
4	Connector	SE-MOCKUP.2250.0043.00.0
5	Outlet branch	SE-MOCKUP.2250.0050.00.0
6	Nut M10x1.5	SE-MOCKUP.2250.0014.00.1
7	Lock Washer	SE-MOCKUP.2250.0015.00.1
8	Stud	SE-MOCKUP..2250.0016.00.1

Annexure-3

QUALITY CONTROL, INSPECTION AND ACCEPTANCE PROCEDURES

CONTENTS

SL.NO.	DESCRIPTION	PAGE NO.
I	Facility Requirements at Industry	3
II.	Quality Control Documents to be made by Industry	3
III.	Inspection Sequence to be performed by Industry	3
IV.	Quality Control Documents to be submitted to LPSC by industry	3
V.	Inspection Procedures to be followed at Industry	3

SCOPE: This document indicates the Quality Control Checks to be performed at Industries for the realization of Semicryo mock-up turbopump hardware.

I FACILITY REQUIREMENT AT INDUSTRY

- Good inspection lab possessing all required instruments and equipments.
- Proper NDT facilities.
- Good air conditioned environment with proper A/C, lighting, Dust control and vibration free floor for final inspection.
- Good inspection team consist of Manager, Engineer/Supervisor and Inspectors.

II QUALITY CONTROL DOCUMENTS TO BE MADE BY INDUSTRY

1. Route Card for Manufacturing/Inspection with proper material acceptance certificate and Identification No.
2. Deviation Report
3. Final Inspection Report
4. Welding Reports
5. DP check report
6. Non-conformity reports

III INSPECTION SEQUENCE TO BE PERFORMED BY INDUSTRY

1. Stage inspection
2. Final inspection which includes 100% visual inspection and inspection of drawing dimension measured by instruments.
3. Preparation of final inspection report.
4. Non-conformance report preparation

IV QUALITY CONTROL DOCUMENTS TO BE SUBMITTED TO LPSC BY INDUSTRY

1. Final inspection Report
2. NDT reports (DP tests)
3. Welding reports
4. Non-conformance Report
5. Material test certificate

V INSPECTION PROCEDURE TO BE FOLLOWED AT INDUSTRY

1.0 Responsibility of Work Centre

1.1 Final inspection of parts must be carried out after completion of all operations.

1.2 Final inspection report should clearly contain LPSC Purchase Order No., Material name, component name, Order quantity, offered quantity, serial No. of parts, separate columns for required values and actual values

1.3 Hardware shall be engraved with drawing number.

1.4 Party shall carry out the full inspection of the parts with their inspection facilities. The inspection reports shall be prepared in detail with actual inspected values/interpretations. LPSC shall arrange for counter inspection of selected parts at the discretion of LPSC for which the fabricator has to provide all necessary facilities. Party has to intimate the readiness of the items well in advance along with the inspection reports for arranging counter inspection.

1.5 Protruding burrs, sharp edges, high spots, scratch marks, tool marks etc should be removed before final inspection.

1.6 Before final inspection, all parts must be thoroughly cleaned to remove traces of oil, grease etc by using ultrasonic cleaner with proper cleaning agent.

1.7 Recommended cleaning agent for metallic parts are "Trichloro Ethylene".

1.8 100% Visual inspection of parts to be done during inspection stage to ensure that the parts are free from surface defects like scratches, tool marks, dig marks, chattering and line marks.

1.9 Party has to supply the material certificate for chemical composition and mechanical properties based on the test carried out at government approved lab.

1.10 All inspection instruments/equipments, gauge used by the fabricator for inspection should be periodically calibrated and certified. Calibration procedures should be traceable to National /International standards as per ISO Norms.

1.14 Industry shall prepare the following documents for LPSC scrutiny:

1. Final Inspection report
2. Welding reports
3. DP reports
4. Non-conformance report
5. Material test certificate

2.0 Responsibility of LPSC

2.1 LPSC shall arrange for counter inspection of selected parts at the discretion of LPSC for which the fabricator has to provide all necessary facilities. Party has to intimate the readiness of the items well in advance along with the inspection reports for arranging counter inspection.

2.2 Deviation report will be provided to Work Centre for necessary corrective action.

2.4 Acceptance of hardware will be decided by LPSC and the decision will be communicated by the focal point before dispatch.

Annexure IV

General Terms and Conditions:

1) **Earnest Money Deposit :**
Earnest Money Deposit amounting to **Rs.2.79 Lakhs** shall invariably be submitted by you along with your offer. Offer without EMD will be rejected. The EMD shall be submitted in the form of Demand Draft/Bankers Cheque/FD receipts or Bank Guarantee drawn in favour of Accounts Officer, LPSC and payable at Thiruvananthapuram/Bengaluru. Submission of EMD is exempted in respect of Registered vendors, Foreign vendors, CPSU/CPSE, MSE, KVIC, NSIC. Vendors seeking exemption from payment of EMD shall submit necessary proof like registration number, copy of relevant valid certificates along with your offer, failing which the said offer will be rejected. The EMD of a vendor will be forfeited if the vendor withdraws or amends their tender or deviates from the tender in any respect within the validity period of the tender.

2) **Purchase / Price Preference to MSEs**
Purchase/Price preference will be applicable to the product reservation admissible to the Micro and Small Enterprises. Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small and Medium Enterprises Development Act, 2006. The participating MSEs in a tender, quoting price within the band of L-1 + 15% may also be allowed to supply a portion of the requirement by bringing down their price to the L-1 price, in a situation where L-1 price is from someone other than an MSE. Such MSEs may be allowed to supply upto 20% of the total tendered value. In case of more than one such eligible MSE, the supply will be shared equally.

3) **Warranty**
You shall provide applicable warranty for the items offered by you without fail. For the applicable period you shall provide necessary warranty certificate.

4) **Performance Bank Guarantee**
Towards the performance of the systems during the warranty period you shall submit a performance bank guarantee equivalent to 10% of the order value to cover the warranty period. This PBG shall be interest free and the same shall be returned to you on successful completion of all contractual obligations. The said PBG shall have a further claim period of 2 months.

5) **Security Deposit**
On acceptance of the order, you shall submit an interest free amount equivalent to 10% of the total contract/order value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/PDR receipts duly endorsed in the name of the centre. The Security Deposit will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited/adjusted.

6) **Offer Validity**
Your offer shall be valid for 120 days from the date of tender opening. In case you offer validity less than 120 days, the said offer is liable for rejection which may please be noted.

7) **Liquidated Damages:**

If you fail to deliver the ordered items satisfactorily within the time specified or any extension thereof, Liquidated Damage @ 0.5%(zero point five percent) of the order value or part thereof the un-delivered items for each calendar weeks of delay shall be recovered from your bill. However total Liquidated Damage shall not exceed 10%(ten percent) of the order value.

8)Tender fee **Rs.573/- (Rupees Five Hundred and Seventy Three only)** (Including Service Tax) shall be payable only in the form of Bank draft in favour of Accounts Officer, LPSC, Valiamala payable at Trivandrum and the same shall be enclosed along with Part-I, Techno-Commercial Bid, **without which your offer will not be considered.**

Instruction to Indigenous Suppliers:

9) Our Normal payment terms are 100% within 30 days after receipt and Successful Installation and acceptance of the item at our site. Please confirm acceptance in your quotation.

10) We are exempted from payment of Excise Duty as per Notification No.10/97 CE Dtd.01.03.1997 as amended by Notification No.16/2007 CE Dt.01.03.2007.Necessary Excise Duty Exemption Certificate shall be issued in case of an order on you. As such you may be quote accordingly.

11) Please specify Sales Tax percentage, if any, in your offer

Instruction to foreign Suppliers:-

12) Our normal payment term is **SIGHT DRAFT**, Please confirm acceptance in your offer, if you insist for L/C, and all bank charges shall be to your account. Confirm acceptance.

13) We prefer import from sources abroad directly against payments in foreign exchange. In case due to certain reasons this is not possible, we prefer to go for 'High Sea Sales' against payment in Indian Rupee. In this case, consignments shall be cleared through Customs only by us.

14) In case the quote is on Indian Rupee (Outside High Sea Sale), the price shall include taxes and duties if any. We shall not able to provide any duty or tax exemption/concession certificates. If the item quote is of USA make, please quote for all-inclusive price since we prefer to get the item on FOR destination basis.

15) Please specify whether any export clearance is required in case of an order on you.

16) Warranty/Guarantee applicable for the item shall be mentioned in your offer.

17) Special Certification for packing Material : as per Plant Quarantine (Regulation of Control into India) Order 2003, Articles packed with packing material of plant origin viz., hay, straw, wood shavings, wood

chips, saw dust, wood waste, wooden pallets, Dunn age Mats, wooden packages, coir pith, pear or sphagnum moss etc., will be allowed entry by Customs only with a Phytosanitary Certificate. In case if a Purchase Order, if you propose to us any of the above material for packing such a certificate issued by your local Plant Quarantine Authority shall be furnished.

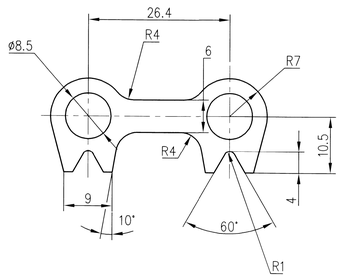
18) Confirm whether any Export License is required and for which End User Certificate is to be provided by us, in case of an Order on you. (Enclose format for EUC, if applicable)

19) Either Indian Agent on behalf of the foreign principles or the foreign principal directly can quote against this order, but not both. In either case an Indian agent cannot represent more than one principal against the same tender.

20) Your offer should reach us on or before the due date and time i.e, 16th January, 2017 at 14.30 hrs IST. Offer received after the due date and time will not be considered. Offers received through fax or email will not be considered.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

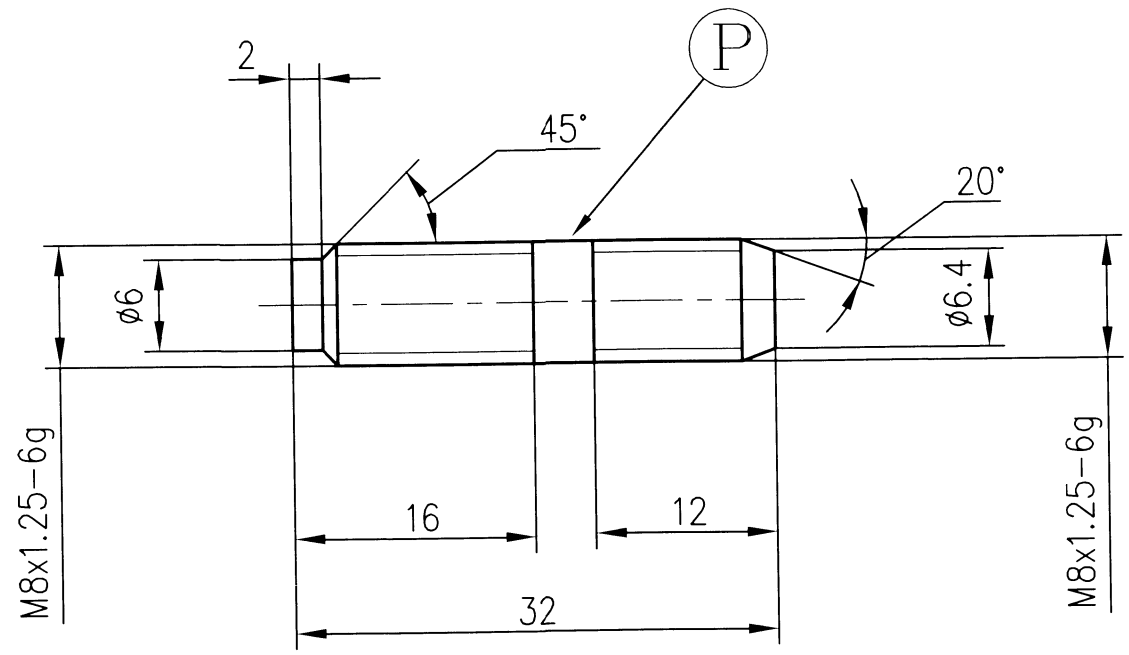
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



NOTES

1. Threads should be free from chattering marks, burrs, peeling off
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														
LENGTH OR DIA		UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE		UPTO 6	6–30	30–120	120–400
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0				±1°	±30'	±20'	±10'

AMEND.No.	DATE

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5 MARKING

AMEND.No.	DATE

SCP

TITLE

Stud

Calculated Weight ____ Kg

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	24/8/15
CHD.		1/11/16
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2200.0228.00.1

Rev. No.

FORMAT A4

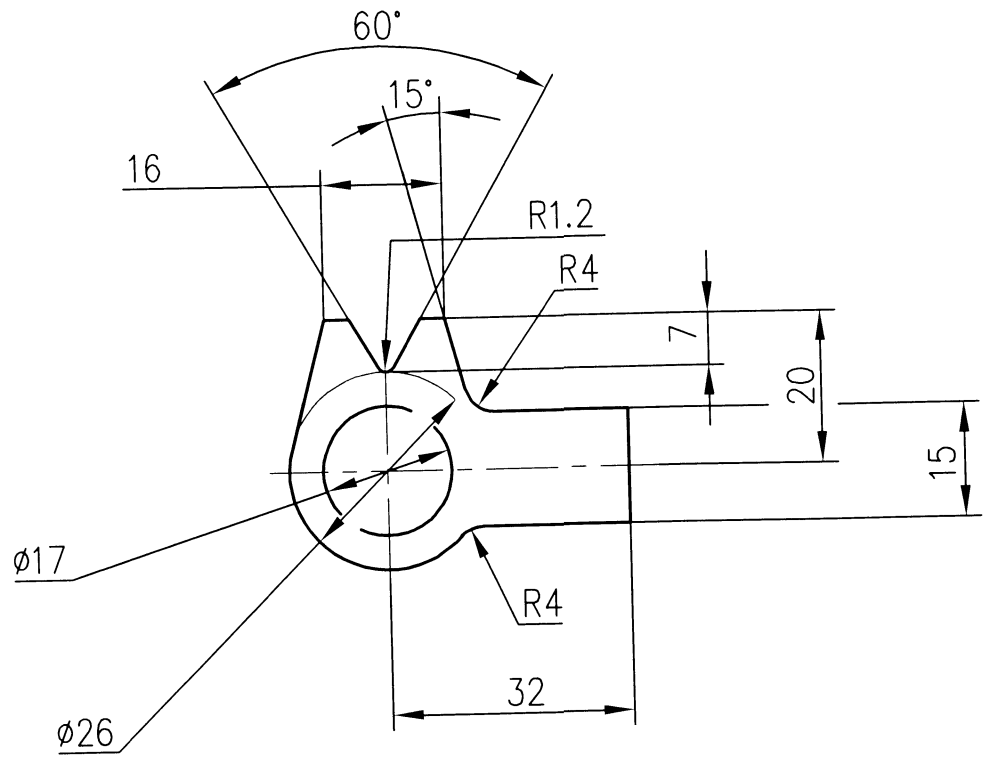
SCALE 2:1

SHEET 1 OF 1

4	3	2	1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE	UPTO 6	6–30	30–120	120–400
	±1°	±30'	±20'	±10'

	DATE	AMEND.No.	INDEX
C			
B			

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL Sheet 1mm SS304
Mechanical properties

SURFACE TREATMENT

Concentricity
Perpendicularity
Angularity
Parallelism

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE FINISH (√)

MARKING

TITLE

Lock washer

Calculated Weight ____ Kg

	SIGN.	DATE
DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	20/8/15
CHD.		1/11/16
APPD.		1/11/16
2016	SIGN.	DATE

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INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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ISSUE No.

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Rev. No.

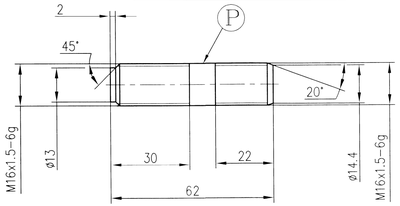
FORMAT A4

SCALE 1:1

SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



NOTE

1. Threads should be free from chattering marks, burrs, peeling off
2. Engrave drawing number at P.

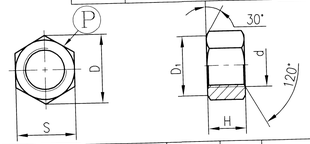
MACHINING DEVIATION TO IS 2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														
LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 6300	UPTO 10000	UPTO 16000	UPTO 20000	UPTO 25000	UPTO 32000	UPTO 40000
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±9.0	±11.0	±14.0	±18.0

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH Ra 2.5 MARKING

INDEX	AMEND.No.	DATE

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8-25	1.6-8	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Designation	d	H	S	D	D_1	Mass	Qty.
SE 2000.2200.0224.00.1	M16x1.5-6H	14	22	≈ 25.4	22	0.016	20
SE 2000.2200.0233.00.1	M8x1.25-6H	7	12	≈ 13.8	12	0.003	16

NOTE

1. Threads should be free from chattering marks, burrs, peeling off
2. Engrave drawing number at P.

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL SS304
Mechanical properties

SURFACE TREATMENT

Concentricity
Perpendicularity
Angularity
Parallelism

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE FINISH
√Ra 2.5

MARKING

TITLE

Nut
(See table)

Qty. per Assembly	Calculated Weight
	Kg

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

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DGN.		
D.CHD.		
DRN.		20/2/15
CHD.		
APPD.		
2016	SIGN.	DATE

DRG.No. SE MOCK-UP.2200.0224.00.1

Rev. No.

FORMAT A4

SCALE 1:1

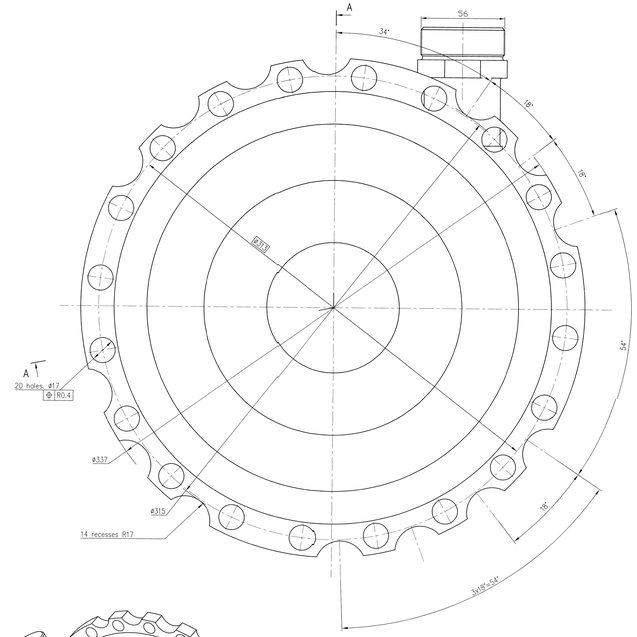
SHEET 1 OF 1

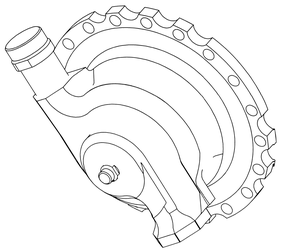
MACHINING DEVIATION TO IS 2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	upto 6	upto 30	upto 120	upto 315	upto 1000	upto 2000	upto 4000	upto 8000	upto 16000	upto 32000	ANGLE	upto 10	upto 50	upto 120	upto 400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.0	±5.0		±1°	±30'	±20'	±10'

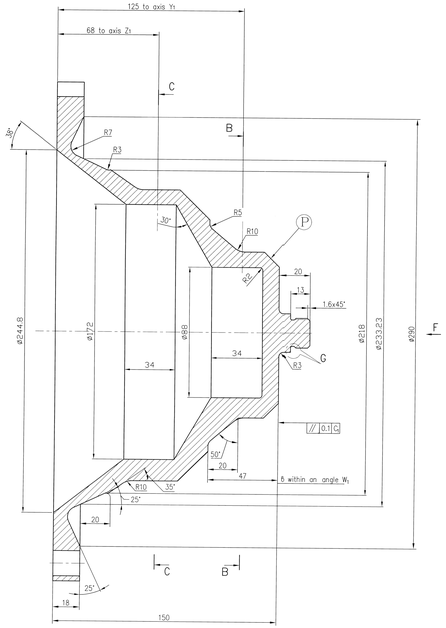
	DATE	AMEND.No.	INDEX
INDEX			
AMEND.No.			
DATE			

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

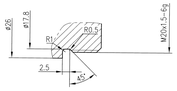




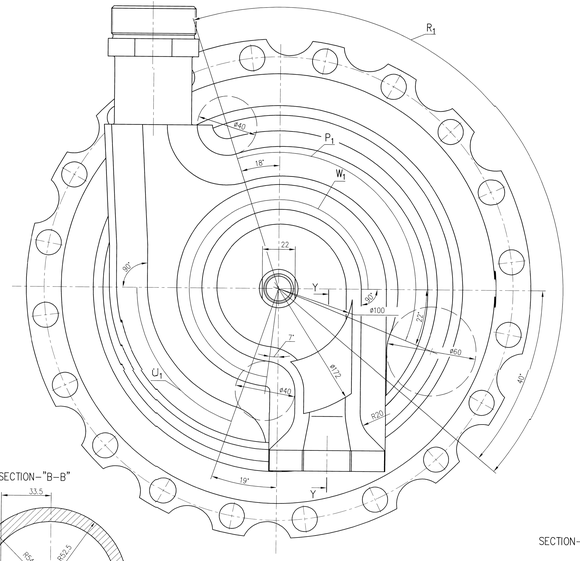
SECTION–"AA"



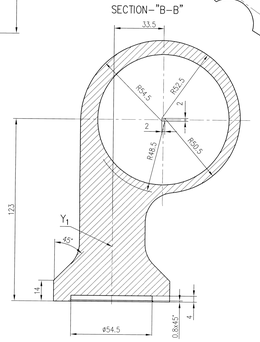
DETAIL–"G" (2:1)



VIEW FROM–"F"



SECTION–"B–B"



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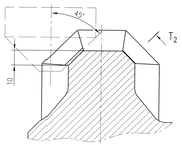

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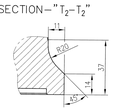
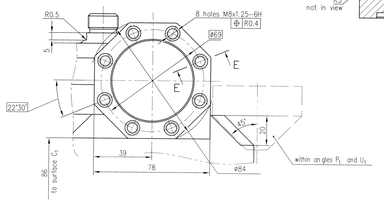
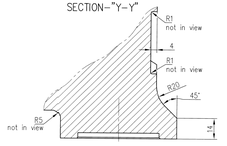


VIEW FROM–"D"

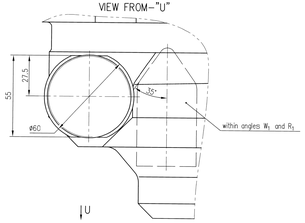


SECTION–"Y–Y"



SECTION–"E–E"

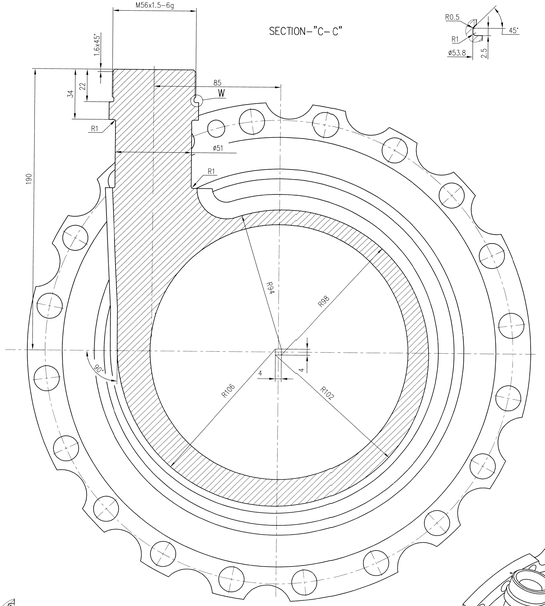
VIEW FROM–"U"

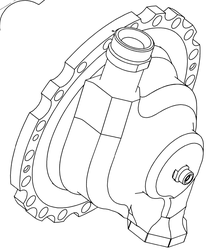


U

DETAIL–"W" (2:1)

SECTION–"C–C"





1. Engrave drawing number at P.

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304	SURFACE TREATMENT	TITLE		INDEX
Concentricity	Mechanical properties		Casing		MODIFICATION ORDER No & DATE
Perpendicularity	General tolerance ±0 or js12				REVISION
Angularity	Thread tolerance	SURFACE FINISH	DGN		
Parallelism	Thread chamfer & under cut	Ra 2.5	D CHD		
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to	Radii not specified	MARKING	DSN		
Fabricated Mass	Chamfers not specified		CHD		
			APPD		

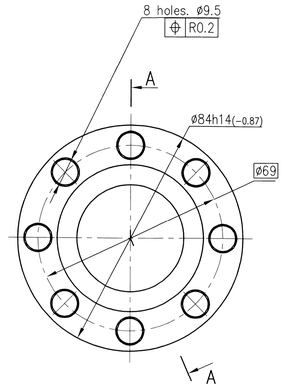
GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA, THIRUVANANTHAPURAM - 695547

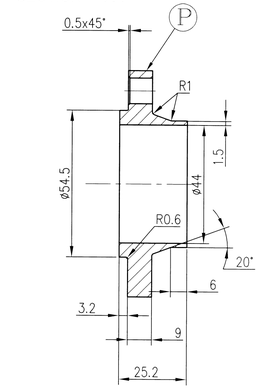
TPD–SC/CPEG

DRG No. SE MOCK–UP.2200.0217.00.1

DRG No. | Rev No. | FORMAT
UF

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										LENGTH IN mm OF SHORTER SIDE OF ANGLE				MACHINING FINISH IN MICRONS				
	UPTO 6	UPTO 30	UPTO 120	UPTO 400	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12000	UPTO 16000	UPTO 6	6–30	30–120	120–400	6–25	1.6–6	0.025–1.6	< 0.025
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±1°	±30'	±20'	±10'	▽	▽▽	▽▽▽	▽▽▽▽

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE: Flange
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5	
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		MARKING	Calculated Mass kg.

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547
D.CHD.			
DRN.		20/8/13	
CHD.			
APPD.			
2016	SIGN.	DATE	

TPD–SC/CPEG

ISSUE No.

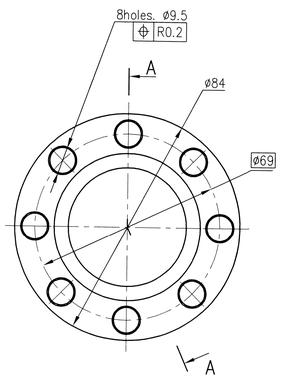
DRG.No. SE MOCK-UP.2200.0043.00.1

Rev. No.

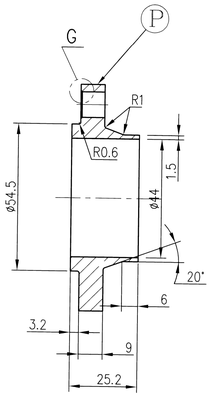
SCALE 1:1

SHEET 1 OF 1

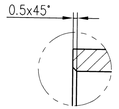
FORMAT A3



SECTION–"AA"



DETAIL–G



SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														MACHINING FINISH IN MICRON			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	LENGTH IN mm	UPTO 6	6-30	30-120	120-400	▽	▽▽	▽▽▽	▽▽▽▽
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	ANGLE	±1°	±30'	±20'	6-25	1.6-6	0.025-1.6	< 0.025
6-30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0									
30-120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0										
120-315	±0.5	±0.8	±1.2	±2.0	±3.0											
315-1000	±0.8	±1.2	±2.0	±3.0												
1000-2000	±1.2	±2.0	±3.0													
2000-4000	±2.0	±3.0														

1. Engrave drawing number at P.

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

TITLE

Flange

DGN.			
D.CHD.			
DRN.	Raghu	18/8/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
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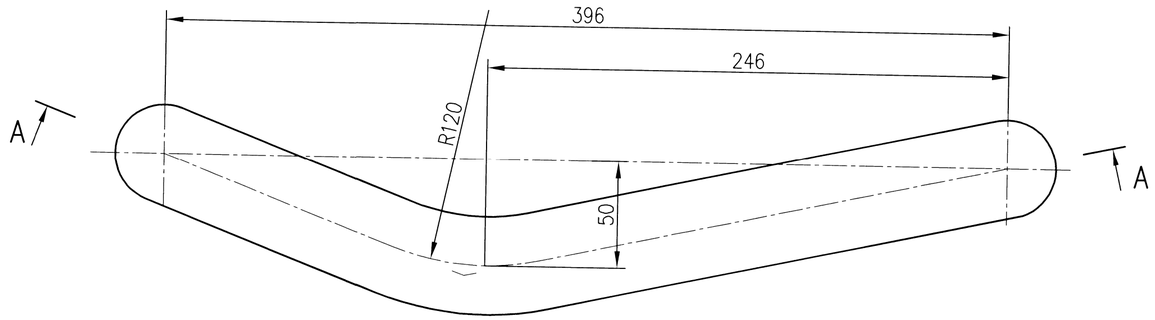
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MODEL.2200.0042.00.1 Rev. No.
SCALE 1:1 SHEET 1 OF 1 FORMAT A3

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

TPD-SC/CPEG
ISSUE No.

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



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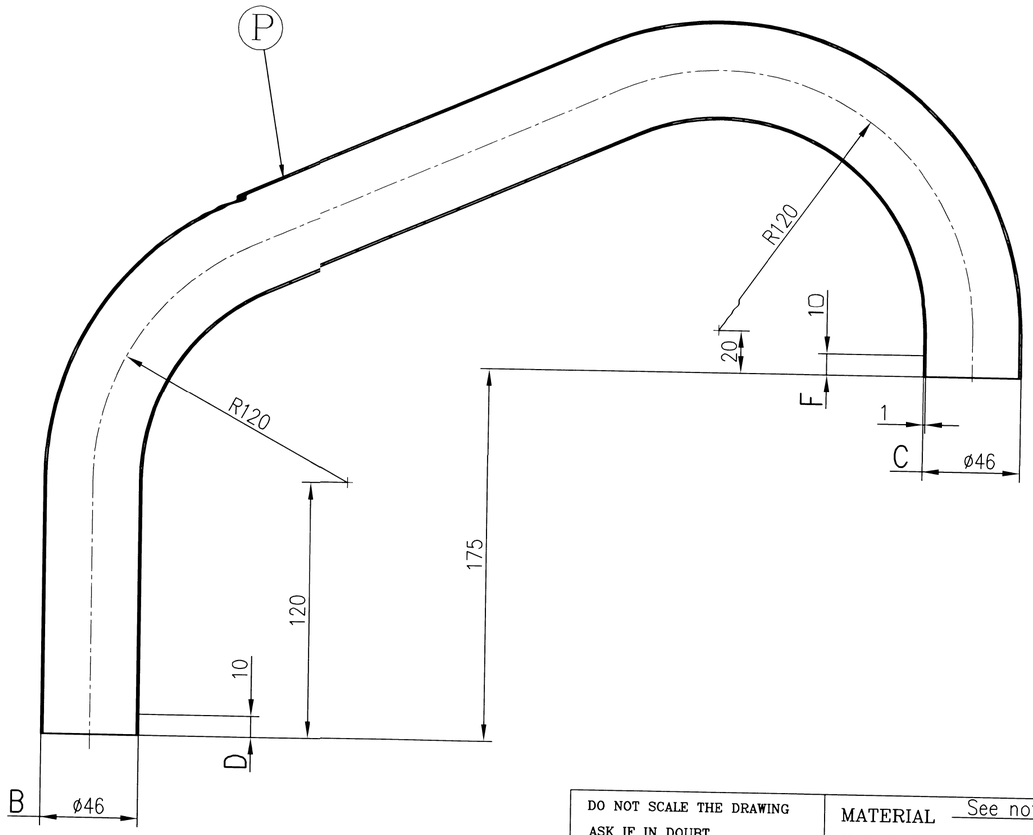

NOTE

1. Pipe 46x1mm SS304
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

Concentricity
Perpendicularity
Angularity
Parallelism

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

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MATERIAL See note
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH (√)

MARKING

Calculated Mass kg.

TITLE

Pipe

DGN.		11/11/15	
D.CHD.		11/11/15	
DRN.	Raghu	18/8/15	
CHD.		11/11/15	
APPD.		11/11/15	
2016	SIGN.	DATE	

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VALIAMALA TRIVANDRUM–695547

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ISSUE No.

DRG.No. SE MOCK–UP.2200.0041.00.1

Rev. No.

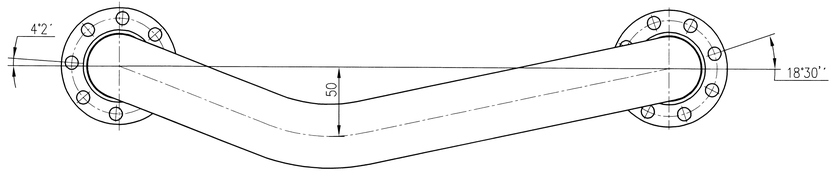
FORMAT A2

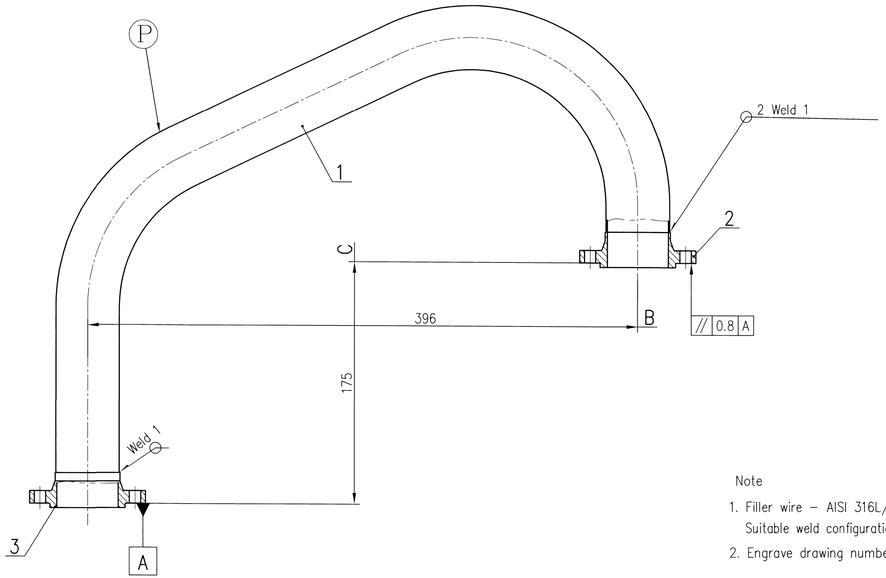
SCALE 1:2

SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





Note

1. Filler wire – AISI 316L/308– for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass
kg.

TITLE

Pipeline
Assembly

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		
D.CHD.		11/11/15
DRN.	Raghu	10/9/15
CHD.		
APPD.		11/11/15
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MODEL.2200.0040.00.0AD

Rev. No.

FORMAT A2

SCALE 1: 2

SHEET 1 OF 1

Size		Part No.	Drg. No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A2			SE MOCK-UP.2200.0040.00.0AD		Pipe line Assembly		
					Parts		
A2		1	SE MOCK-UP.2200.0041.00.1		Pipe	1	
A3		2	SE MOCK-UP.2200.0042.00.1		Flange	1	
A3		3	SE MOCK-UP.2200.0043.00.1		Flange	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Pipeline Assembly

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	20/8/15
CHD.		1/11/16
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2200.0040.00.0

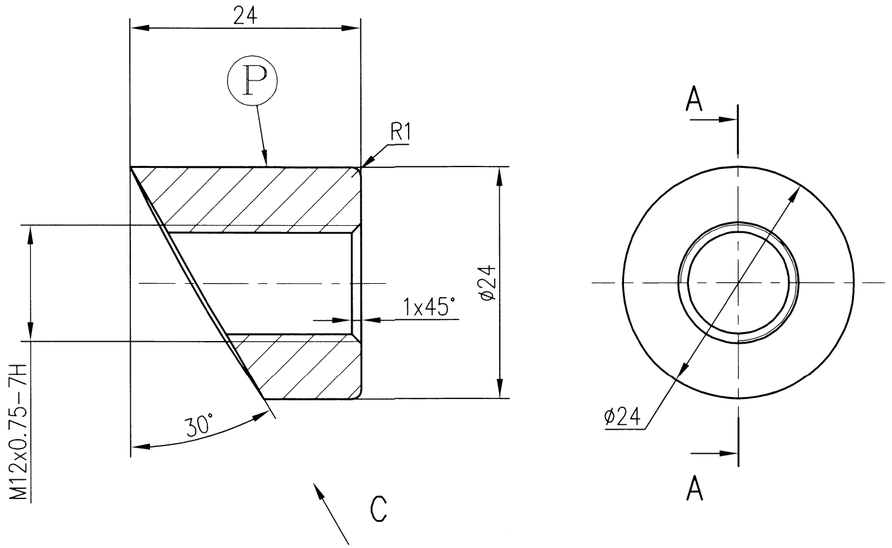
Rev. No.

FORMAT A4

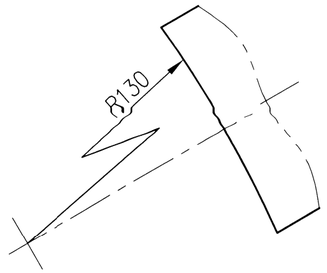
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SCTION–"AA"



VIEW FROM–"C"



NOTES

1. Threads should be free from chattering marks, burrs, peeling off
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE																					
	UPTO 6		UPTO 6		UPTO 30		UPTO 120		UPTO 315		UPTO 1000		UPTO 2500		UPTO 4000		ABOVE 4000		LENGTH IN mm OF SHORTER SIDE OF ANGLE		MACHINING FINISH IN MICRONS	
UPTO 6	±0.1																		UPTO 6	±1°	▽	8–25
6		±0.2																	6–30	±30'	▽▽	1.6–8
30			±0.3																30–120	±20'	▽▽▽	0.025–1.6
120				±0.5															120–400	±10'	▽▽▽▽	< 0.025
315					±0.8																	
1000						±1.2																
2500							±2.0															
4000								±3.0														
ABOVE 4000																						

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE: Boss
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5 MARKING	Calculated Mass kg.

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DGN.		1/11/16	
D.CHD.		1/11/16	
DRN.	Raghu	20/8/15	
CHD.		1/11/16	
APPD.		1/11/16	
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2200.0033.00.1 | Rev. No. | FORMAT A3

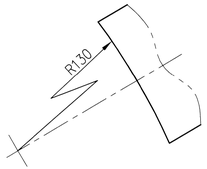
SCALE 2:1 | SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE

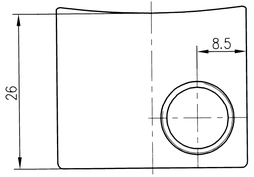
REVISION

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

VIEW FROM–"A_1"



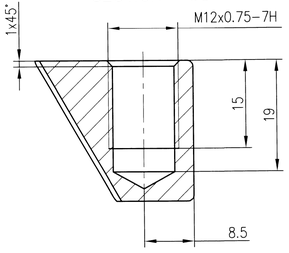
VIEW FROM–"D"



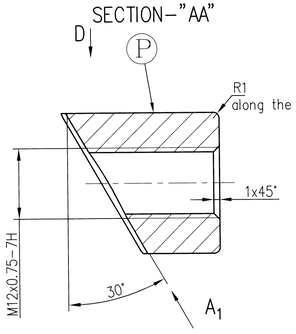
NOTES

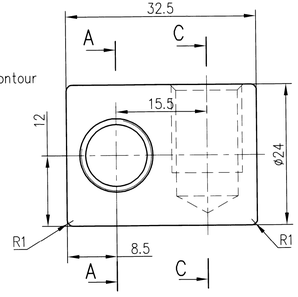
1. Threads should be free from chattering marks, burrs, peeling off
2. Engrave drawing number at P.

SECTION–"CC"



SECTION–"AA"

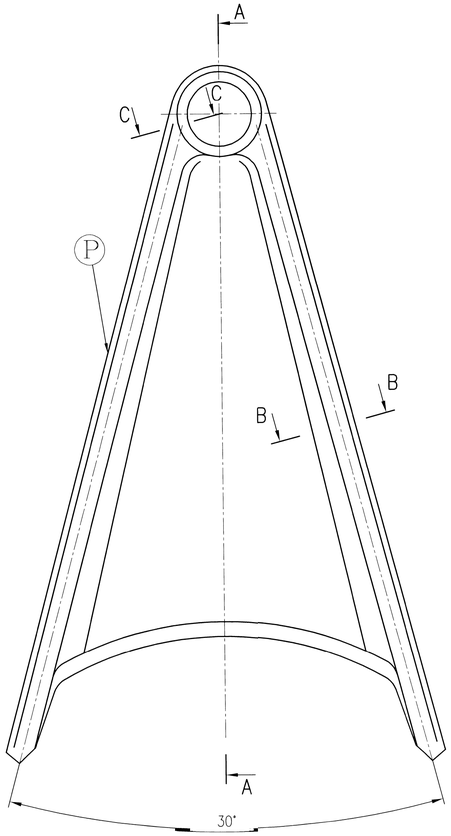


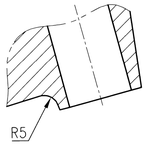


LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE												MACHINING FINISH IN MICRONS				
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE				▽	▽▽	▽▽▽	▽▽▽▽	▽▽▽▽▽
									UPTO 6	6–30	30–120	120–400	12.5	3.2	1.6	0.4	0.025
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	1°	30'	20'	10"	6–80	1.0–6	0.05–1.6	0.012–0.4	0.006–0.2

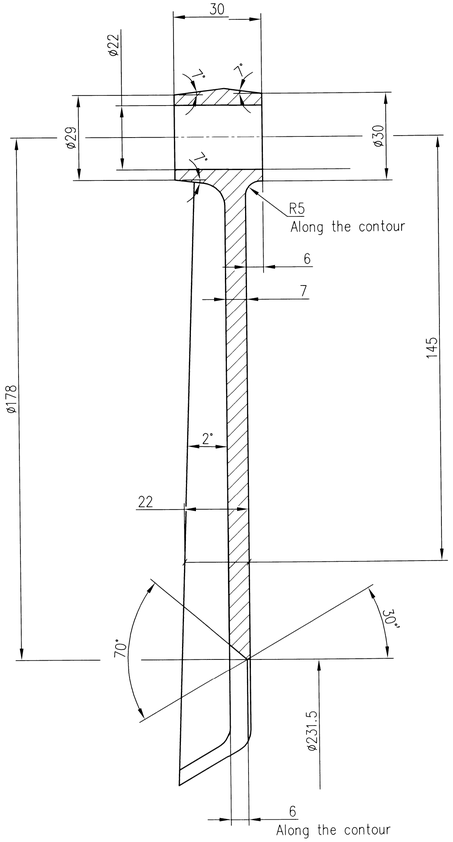
DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE	INDEX / MODIFICATION ORDER No. & DATE
			Boss	REVISION
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH $\sqrt{}$ Ra 2.5	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547	TPD–SC/CPEG ISSUE No.
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		MARKING Calculated Mass kg.	DGN. / D.CHD. / DRN. Raghu 10/8/15 / CHD. / APPD. 2016 SIGN. DATE	DRG.No. SE MOCK–UP.2200.0032.00.1 Rev. No. SCALE 2:1 SHEET 1 OF 1 FORMAT A3

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

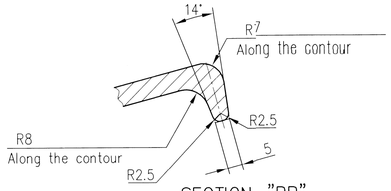




SECTION–"CC"



SECTION–"AA"



SECTION–"BB"

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS 304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

TITLE

Bracket

DGN.		1/11/16
D.CHD.		1/11/16
DRN.		10/8/15
CHD.		1/11/16
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2200.0031.00.1
SCALE 1:1
SHEET 1 OF 1

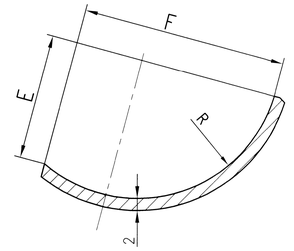
INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TPD–SC/CEPG
ISSUE No.
Rev. No.
FORMAT A2

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–CC" ○ (2:1), SECTION–"BB" (2:1)

SECTION–"AA" (2:1)



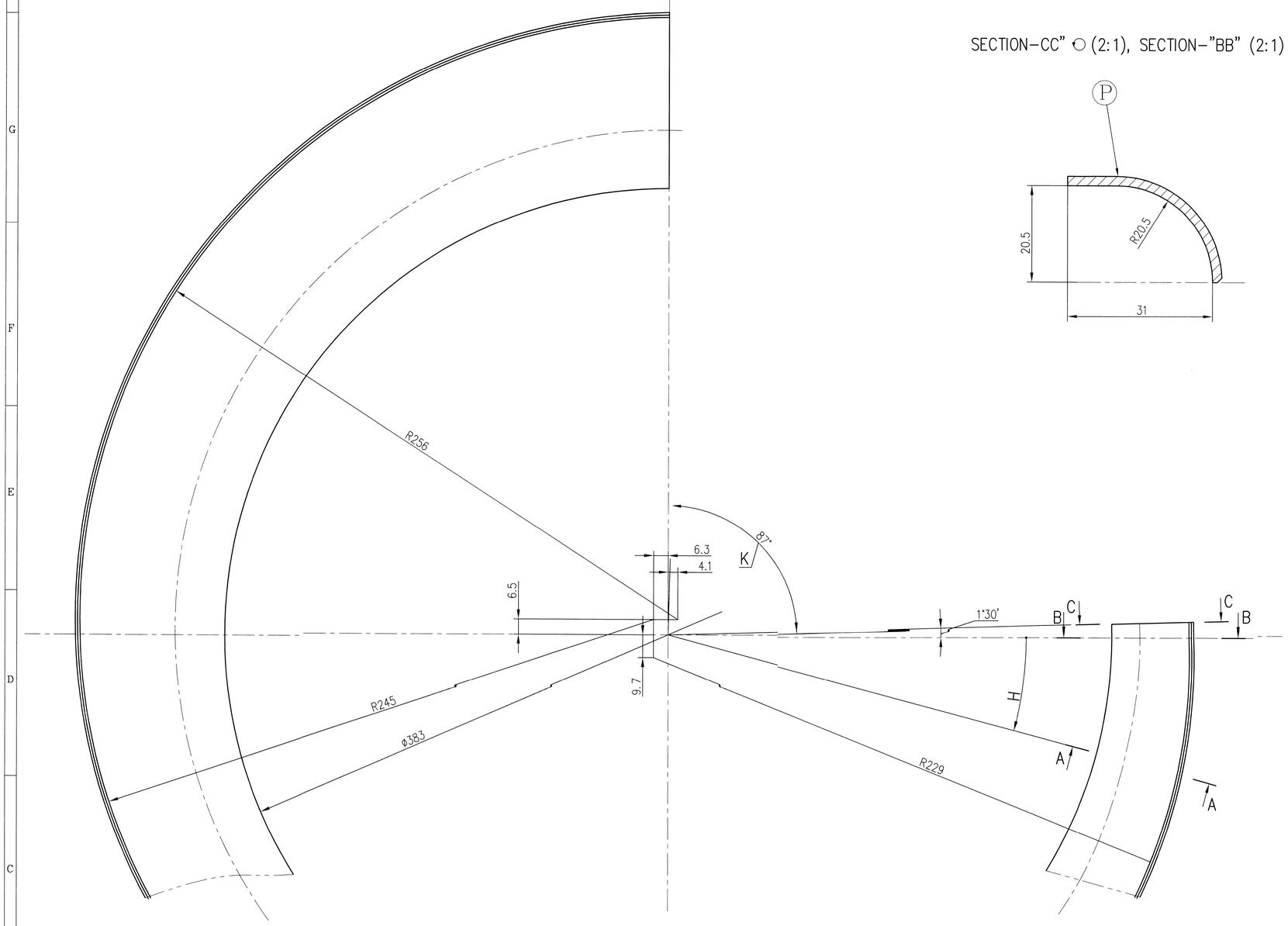


Table 1

H	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°
R	20.48	23.63	25.05	27.05	28.78	30.37	31.99	33.52	35.01	36.47	37.89	39.28	40.64	41.99	43.31	44.61	45.88	47.23	47.89
F	31.00	33.87	37.39	39.8	42.34	44.78	47.26	49.37	51.55	53.71	55.79	57.82	59.84	61.81	63.74	65.67	67.54	69.49	70.53
E	20.48	21.33	21.79	23.81	25.32	26.77	28.15	29.53	30.85	32.15	33.39	34.62	35.81	37.01	38.19	39.32	40.43	41.65	42.19

1. Engrave drawing number at P.

SE 2000.2200.0021.00.1 – direct image

SE 2000.2200.0022.00.1 – mirror image

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet 2mm SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE: Mainfold's half

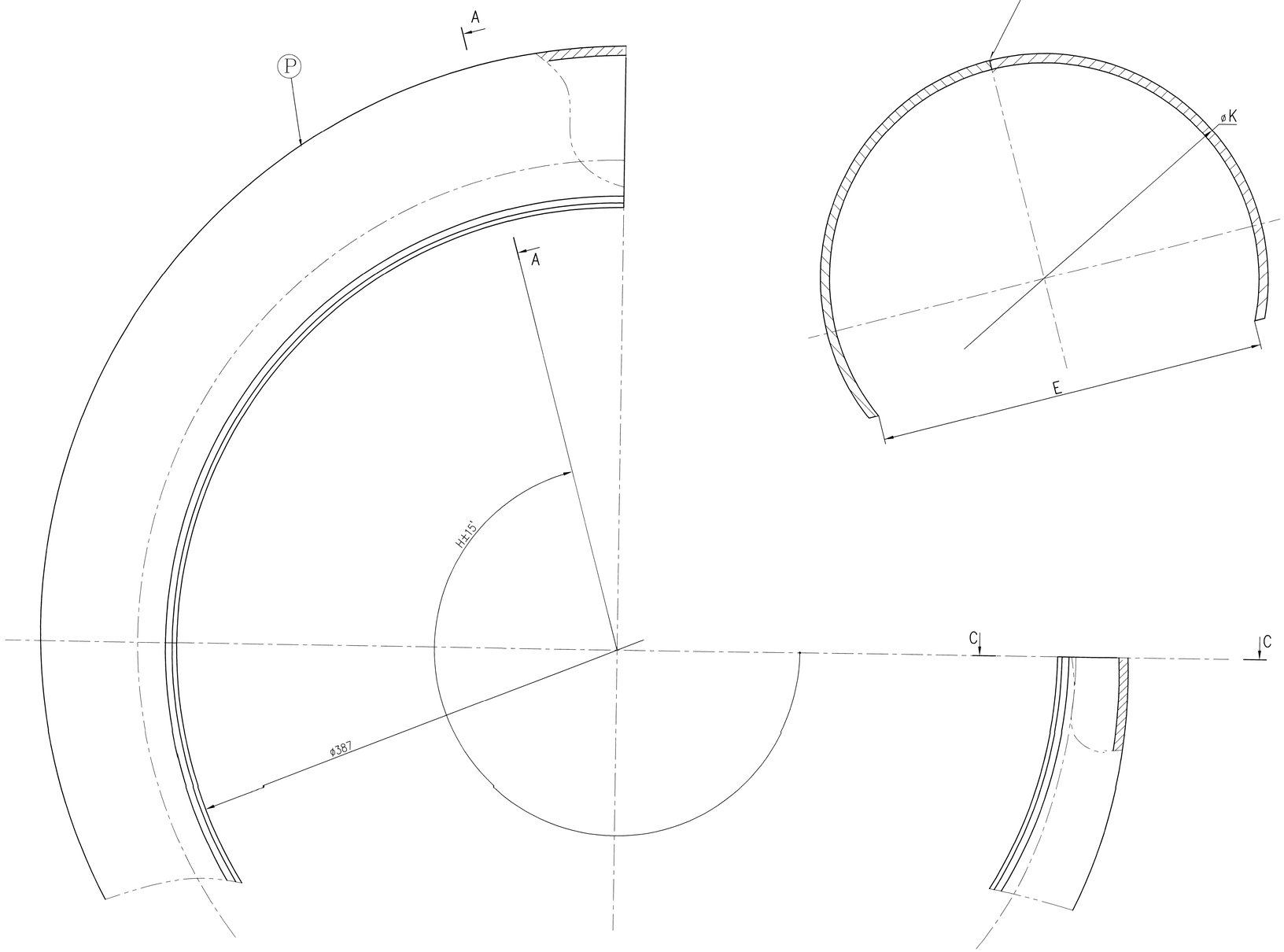
DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	29/9/16
CHD.		
APPD.		
2016	SIGN.	DATE

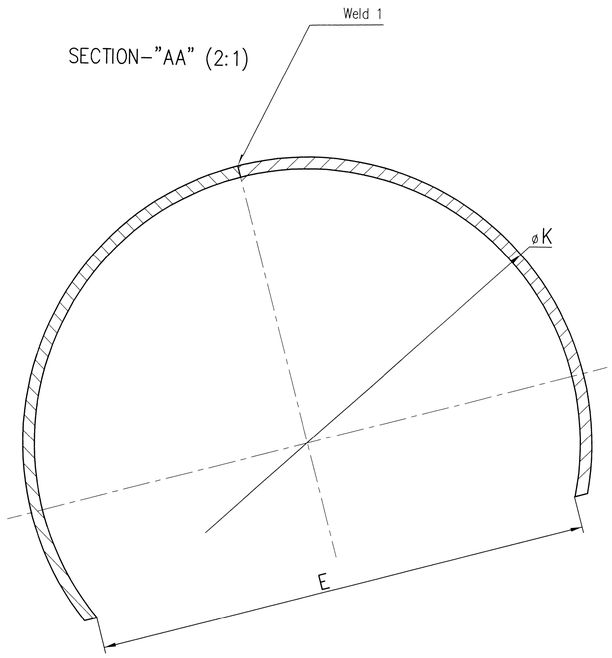
GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

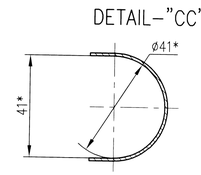
DRG.No. SE MOCK–UP.2200.0021.00.1 Rev. No.
SCALE 1:1 SHEET 1 OF 1 FORMAT A1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION
	TPD–SC/CPEG
	ISSUE No.

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	







H	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°
E	33	35.83	38.67	41.5	44.33	47.17	50	52.83	55.67	58.5	61.28	64.17	67	69.83	74.67	75.5	78.33	81.17	84
øK	45	50.7	54.35	58	61.5	64.75	68	71	74	77	79.8	82.6	85.25	88	90.6	93.25	95.75	98.5	100
Bmin=Dmin	–	–	7.64	–	7.85	–	8.04	–	7.96	–	7.7	–	7.28	–	6.77	–	6.11	–	–

NOTE

1. Use filler wire:– SS316L/308 for welding
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'	

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Qty. per Assembly

Calculated Mass kg.

TITLE

Manifold Assembly

DGN.			
D.CHD.			
DRN.			
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2200.0020.00.0AD
SCALE 1:1
SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION
	TPD–SC/CPEG
	ISSUE No.
Rev. No.	FORMAT
	A1

Size		Part No.	Drg. No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2200.0020.00.0AD		Manifold Assembly		
					Parts		
A1		1	SE MOCK-UP.2200.0021.00.1		Manifold's half	1	
*		2	SE MOCK-UP.2200.0022.00.1		Manifold's half	1	w/o dwg

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Manifold Assembly

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	19/8/15
CHD.		1/11/16
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2200.0020.00.0

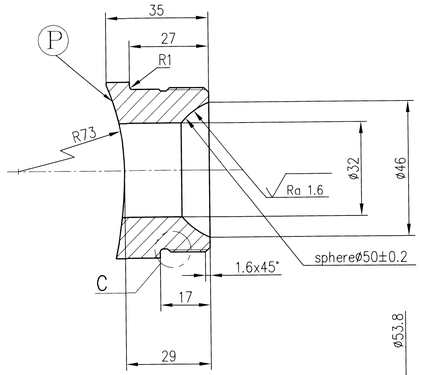
Rev. No.

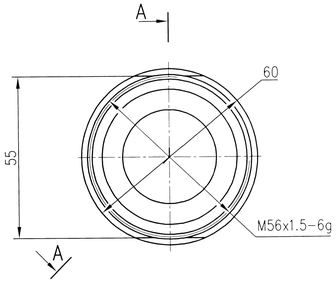
FORMAT A4

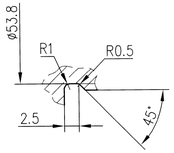
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"







DETAIL–"C" (2:1)

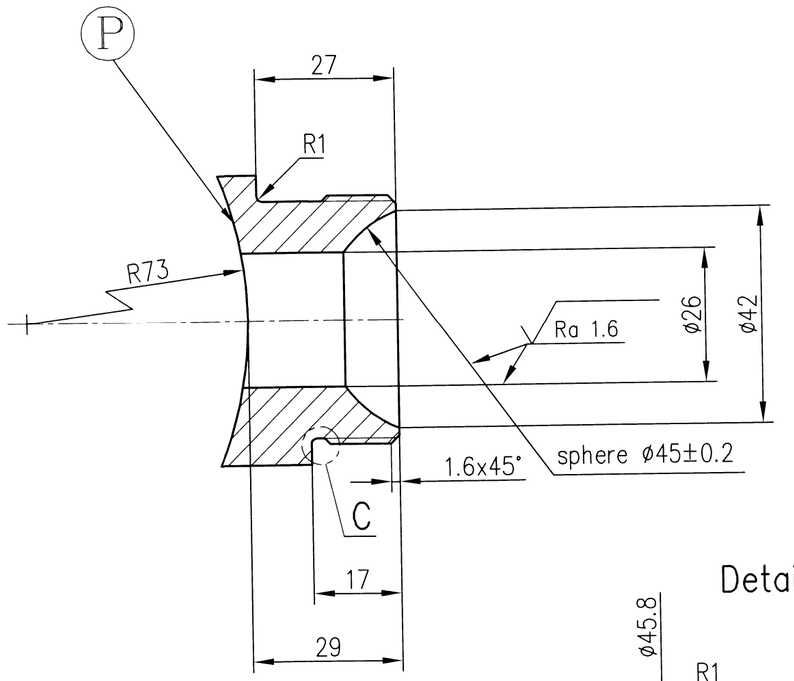
NOTES

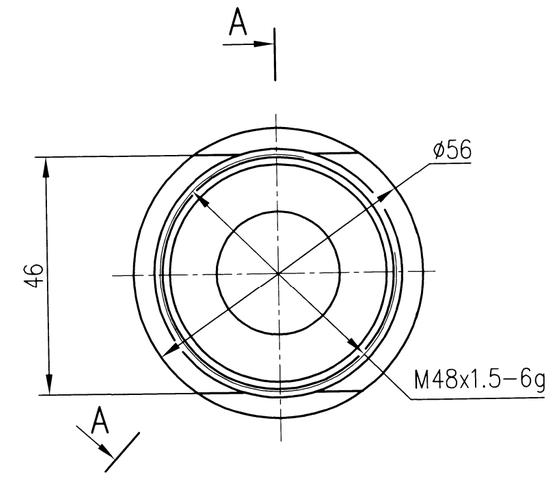
1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

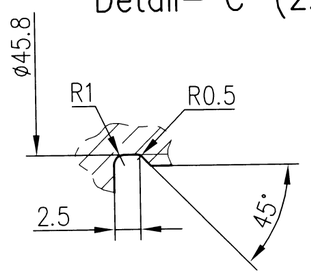
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





Detail–"C" (2:1)



NOTES

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE													
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	LENGTH IN mm OF SHORTER SIDE OF ANGLE				MACHINING FINISH IN MICRONS		
							ABOVE	UPTO 6	6–30	30–120	120–400	▽	▽▽	▽▽▽
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±3.0	±1°	±30'	±20'	±10'	8–25	1.6–8	0.025–1.6
6–30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±4.0	±0.5°	±20'	±15'	±5'	6.3–25	1.6–6.3	0.025–1.6
30–120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±6.0	±0.5°	±15'	±10'	±5'	6.3–25	1.6–6.3	0.025–1.6
120–400	±0.5	±0.8	±1.2	±2.0	±3.0	±4.0	±8.0	±0.5°	±10'	±5'	±5'	6.3–25	1.6–6.3	0.025–1.6
400–1000	±0.8	±1.2	±2.0	±3.0	±4.0	±6.0	±10.0	±0.5°	±10'	±5'	±5'	6.3–25	1.6–6.3	0.025–1.6
1000–2000	±1.2	±2.0	±3.0	±4.0	±6.0	±8.0	±12.0	±0.5°	±10'	±5'	±5'	6.3–25	1.6–6.3	0.025–1.6
2000–4000	±2.0	±3.0	±4.0	±6.0	±8.0	±10.0	±16.0	±0.5°	±10'	±5'	±5'	6.3–25	1.6–6.3	0.025–1.6

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE: Connector
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5 MARKING	Calculated Mass kg.

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DGN.		1/11/16	
D.CHD.		1/11/16	
DRN.	Raghu	19/8/15	
CHD.		1/11/16	
APPD.		1/11/16	
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CEPG

ISSUE No.

DRG.No. SE MOCK–UP.2200.0018.00.1 | Rev. No. | FORMAT A3

SCALE 2:1 | SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
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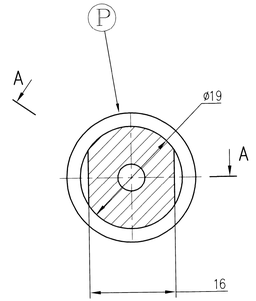
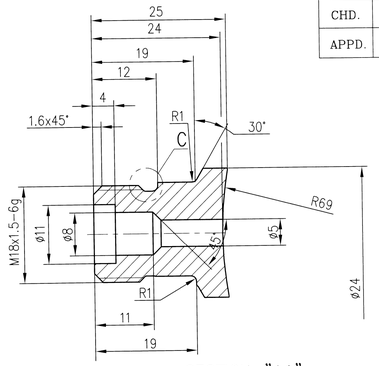
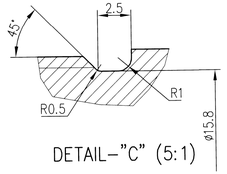
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





SECTION–"AA"



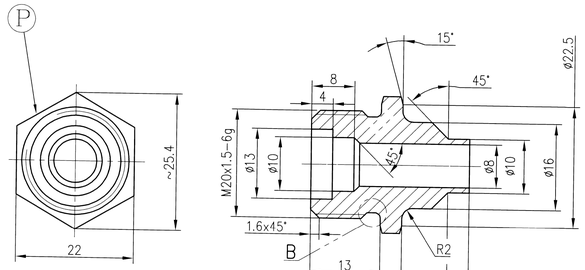
DETAIL–"C" (5:1)

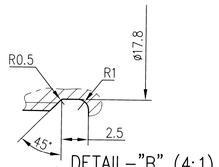
NOTES

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

| MACHINING DEVIATION TO IS:2102 MEDIUM (GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





DETAIL–"B" (4:1)

NOTE

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														MACHINING FINISH IN MICRONS					
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12000	UPTO 16000	UPTO 20000	UPTO 24000	UPTO 28000	UPTO 32000	▽	▽▽	▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽
	6	30	120	315	1000	2000	4000	8000	12000	16000	20000	24000	28000	32000	6-0.8	1.6-0.8	0.025-1.6	< 0.025		
	LENGTH IN mm OF SHORTER SIDE OF ANGLE																			
	UPTO 6	6-30	30-120	120-400	400-1000	1000 ABOVE														
LENGTH	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2														
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
6 - 30	±0.2	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
30 - 120	±0.3	±0.3	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
120 - 315	±0.5	±0.5	±0.5	±0.5	±0.8	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
315 - 1000	±0.8	±0.8	±0.8	±0.8	±0.8	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
1000 - 2000	±1.2	±1.2	±1.2	±1.2	±1.2	±1.2	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
2000 - 4000	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±2.0	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
4000 - 8000	±3.2	±3.2	±3.2	±3.2	±3.2	±3.2	±3.2	±3.2	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
8000 - 12000	±4.0	±4.0	±4.0	±4.0	±4.0	±4.0	±4.0	±4.0	±4.0	±5.0	±6.0	±7.0	±8.0	±9.0						
12000 - 16000	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0	±5.0	±6.0	±7.0	±8.0	±9.0						
16000 - 20000	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±6.0	±7.0	±8.0	±9.0						
20000 - 24000	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±7.0	±8.0	±9.0						
24000 - 28000	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±8.0	±9.0						
28000 - 32000	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0	±9.0						

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL SS304
Mechanical properties

SURFACE TREATMENT

Concentricity
Perpendicularity
Angularity
Parallelism

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

TITLE

Connector

DGN.			
D.CHD.			
DRN.	Raghu	10/2/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

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DRG.No. SE MOCK-UP.2200.0016.00.1
SCALE 2:1
SHEET 1 OF 1

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REVISION

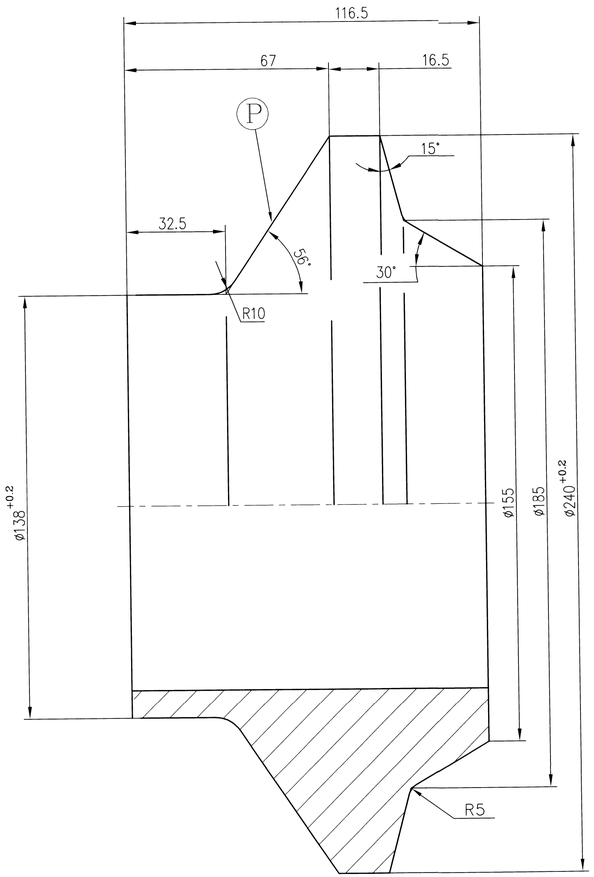
TPD-SC/CEPG

ISSUE No.

Rev. No.

FORMAT A3

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
√Ra 2.5

MARKING

Calculated Mass ____ kg.

DGN.		11/11/16
D.CHD.		11/11/16
DRN.	Raghu	12/8/15
CHD.		
APPD.		11/11/16
2016	SIGN.	DATE

TITLE
Flange

GOVERNMENT OF INDIA
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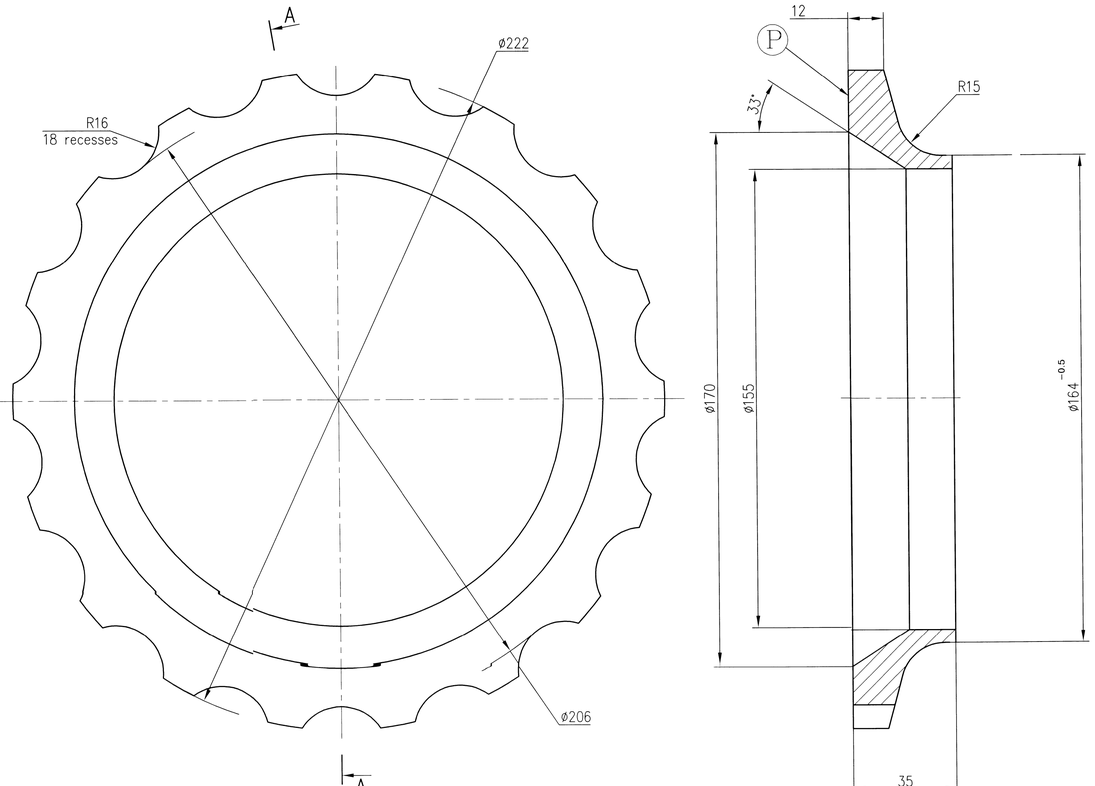
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TPD-SC/CEPG
ISSUE No.

DRG.No. SE MOCK-UP.2200.0015.00.1
Rev. No.
FORMAT A2
SCALE 1:1
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–AA"

1. Engrave drawing number at P.

INDEX	MODIFICATION ORDER No. & DATE

REVISION

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg.

TITLE

Flange

DGN.			
D.CHD.			
DRN.	Raghu	10/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

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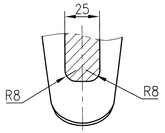
SCALE 1:1

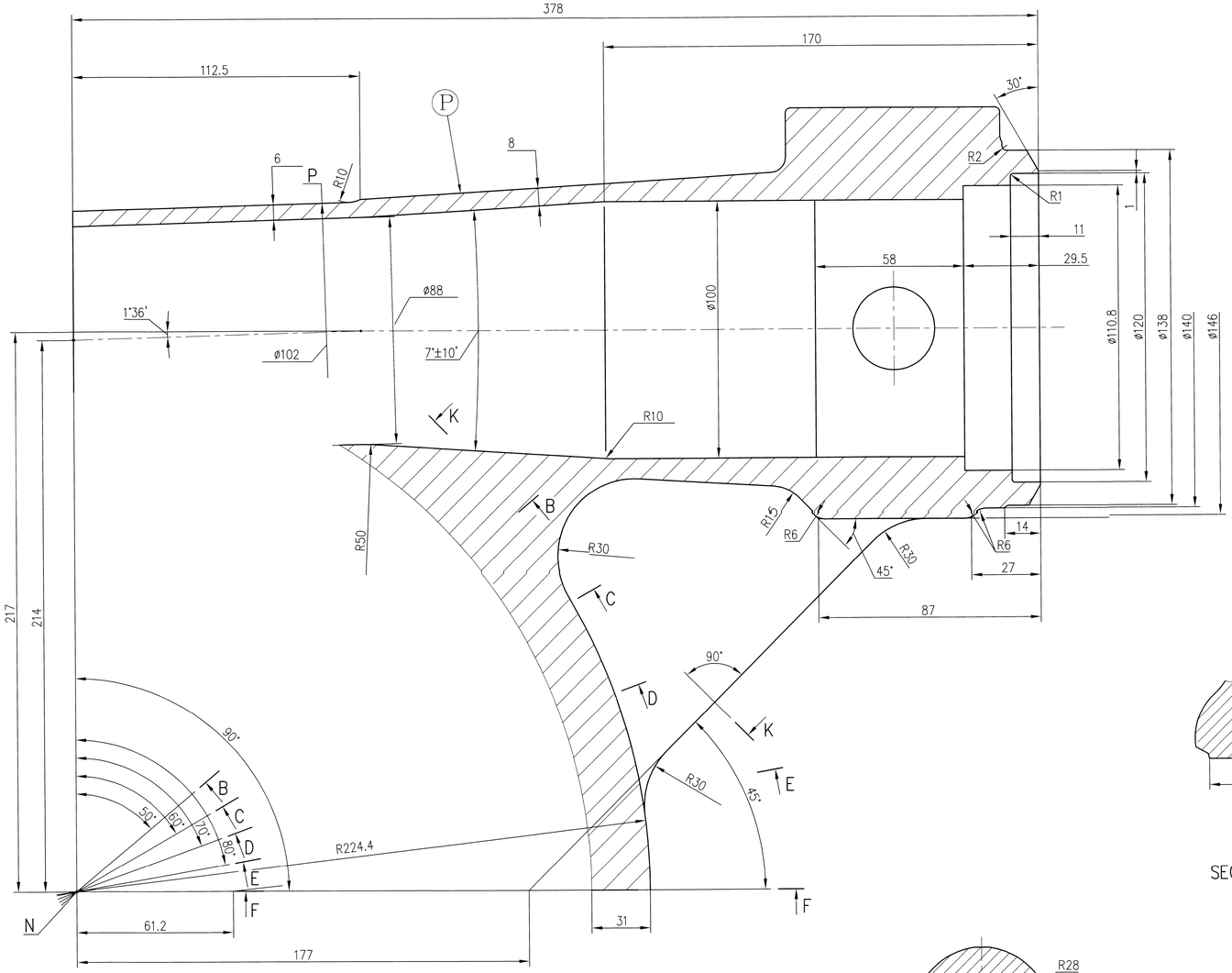
SHEET 1 OF 1

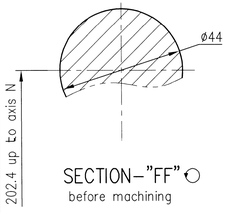
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"KK" (1:2)

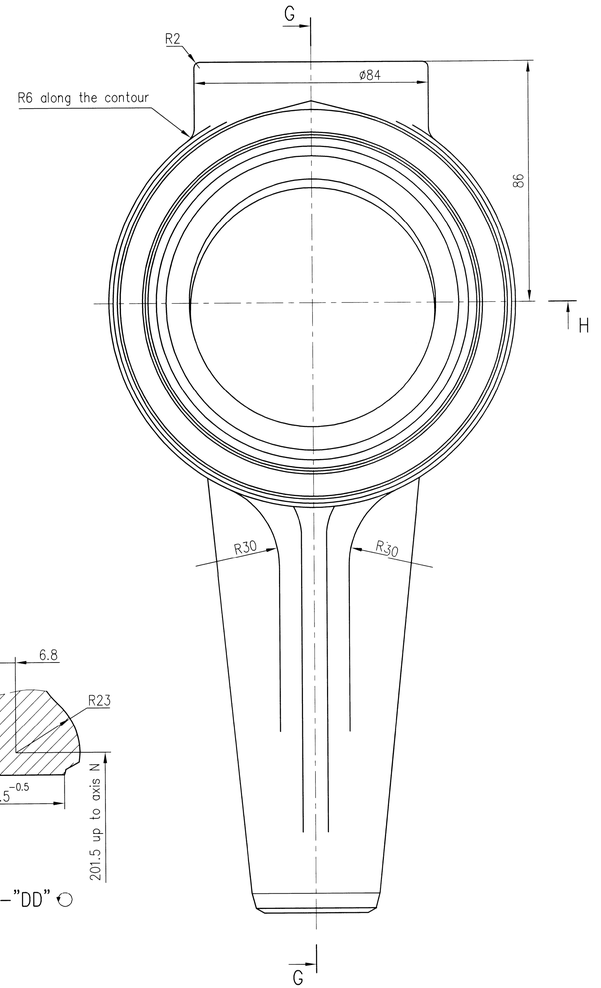


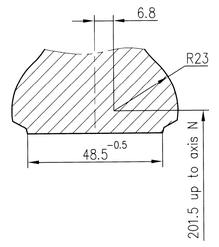
SECTION–"GG"





SECTION–"FF"
before machining





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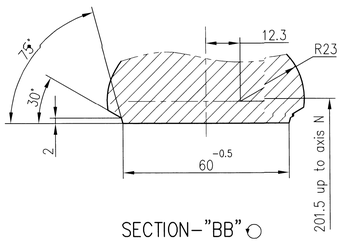

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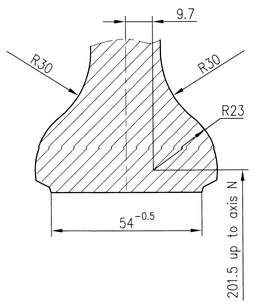
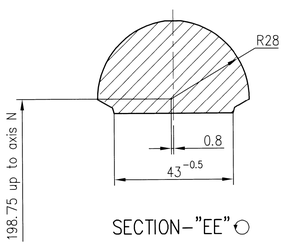


SECTION–"CC"



SECTION–"EE"

MACHINING FINISH IN MICRONS				
▽	▽▽	▽▽▽	▽▽▽▽	
8–25	1.6–8	0.025–1.6	< 0.025	

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 4000 ABOVE		UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0		±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

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MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5 (▽)

MARKING

Calculated Mass kg.

1. Engrave drawing number at P.

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TITLE: Manifold's sector

DGN.		11/11/16
D.CHD.		11/11/16
DRN.	Raghu	10/8/15
CHD.		11/11/16
APPD.		11/11/16
2016	SIGN.	DATE

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TPD–SC/CPEG
ISSUE No.

DRG.No. SE MOCK–UP.2200.0013.00.1
Rev. No.
FORMAT A1
SCALE 1:1
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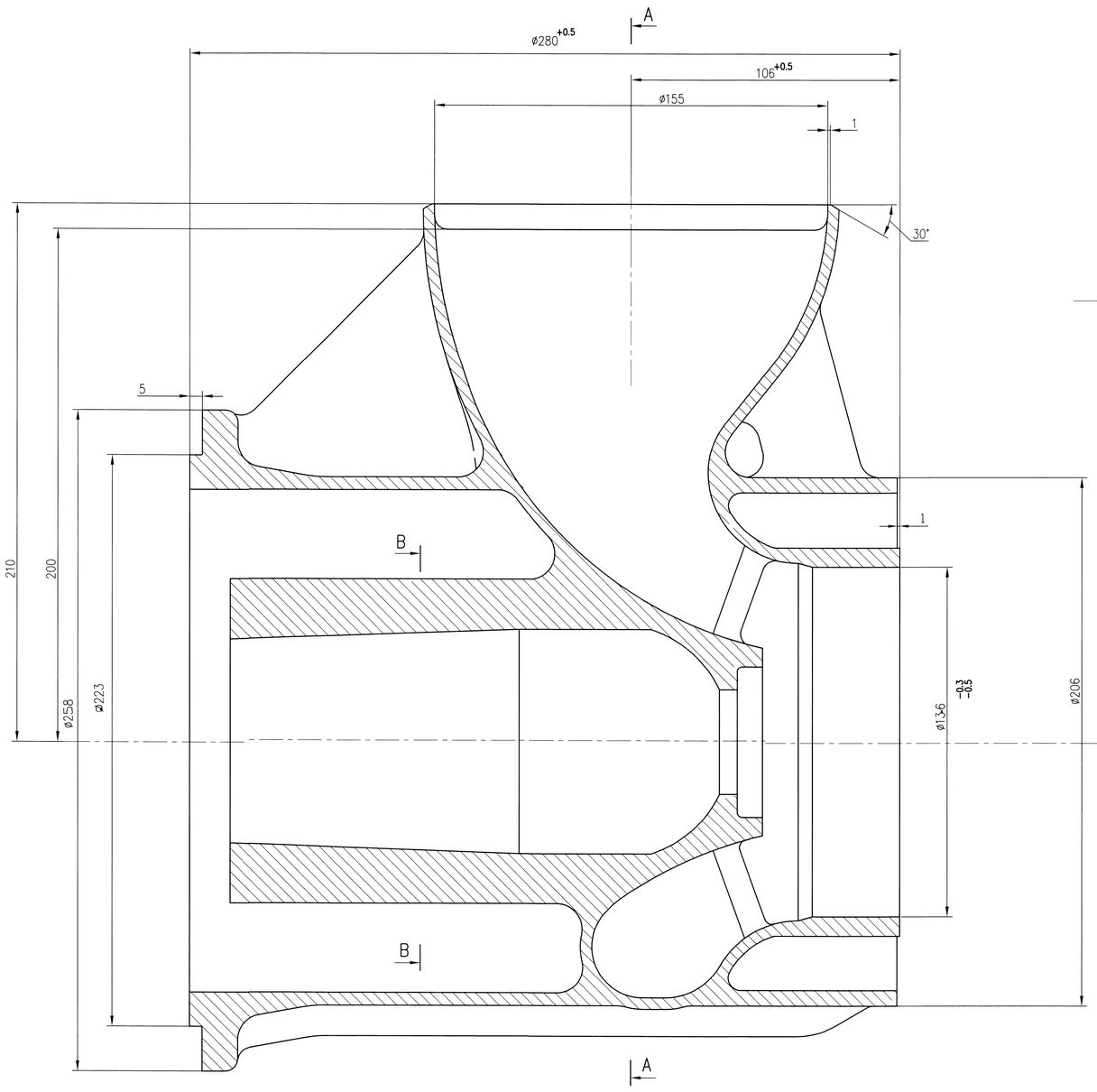
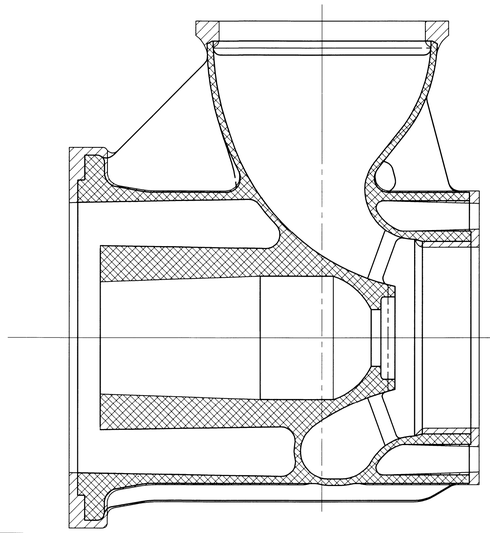
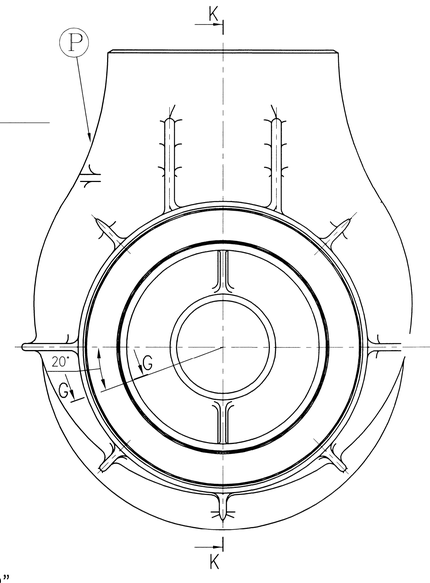
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"KK"



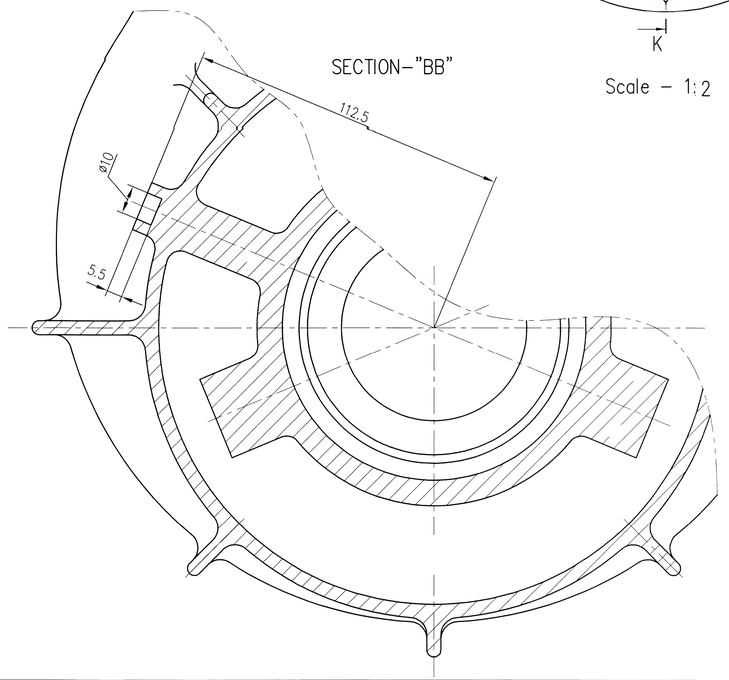


SUPERIMPOSED VIEW WITH CASTING

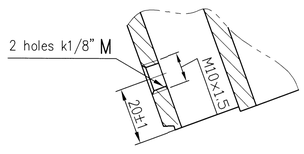


Scale – 1:2

SECTION–"BB"



SECTION–"GG"



1. Casting will be provided.
1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm. OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 8 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Steel 08X14H7MJI (casting)
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH Ra 2.5 (▽)

MARKING

Calculated Mass kg.

TITLE: Branch

DGN.		
D.CHD.		
DRN.		16/9/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK-UP.2200.0012.00.1
SCALE 1:1
SHEET 1 OF 1

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2		1	
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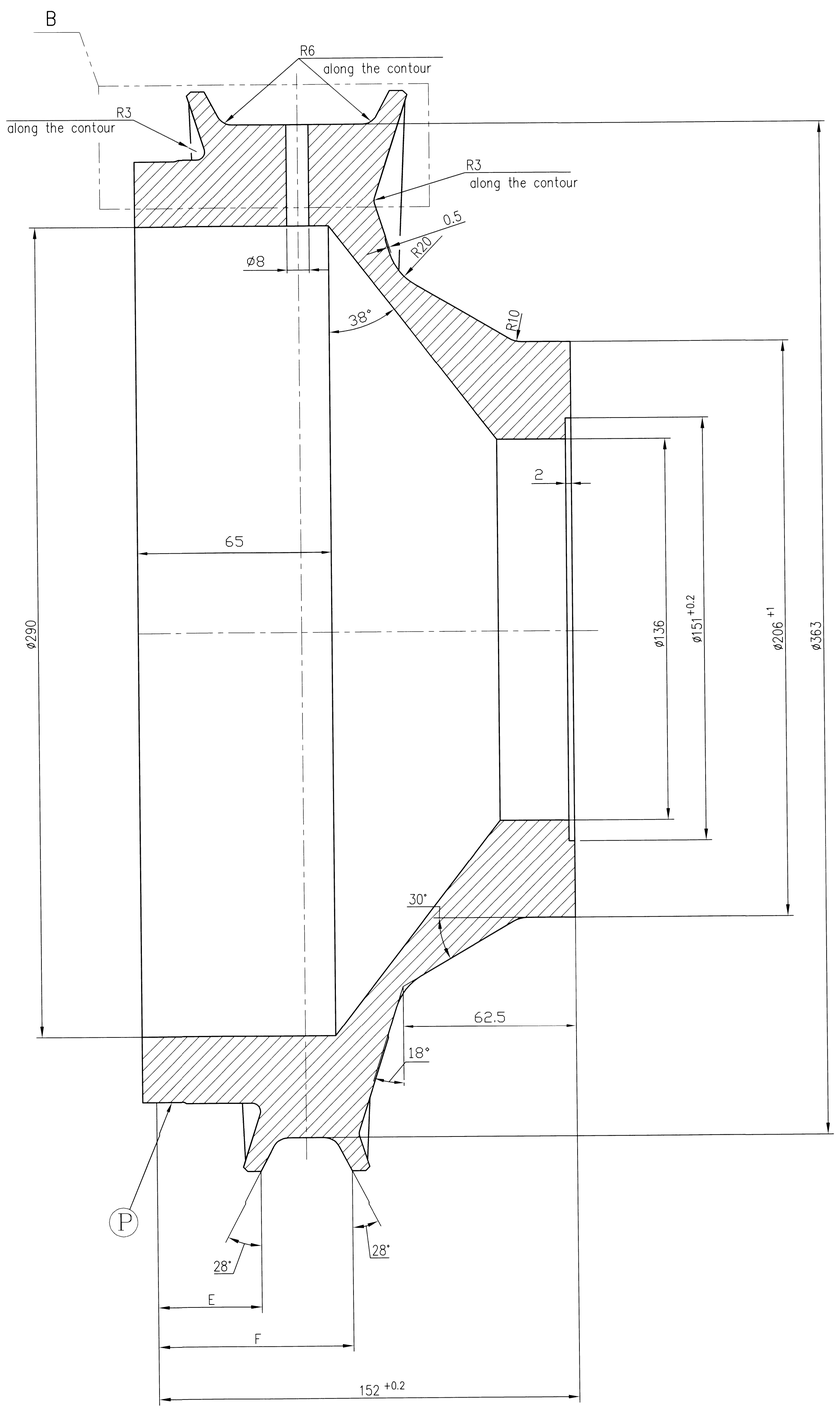
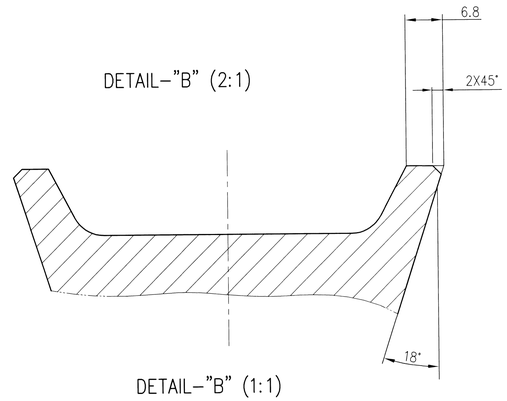
APPD.		APPD.	

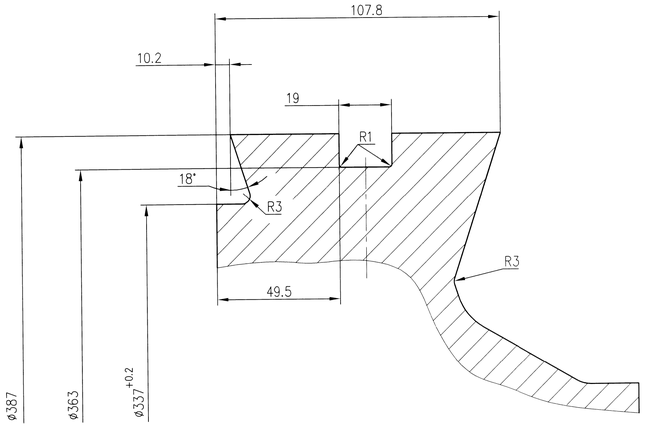
D°	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360
E, mm	37.5	36.09	34.67	33.25	31.84	30.42	29	27.59	26.17	24.75	23.36	21.92	20.5	19.09	16.67	16.25	14.84	13.42	12	16.25	20.5	24.75	29	33.25	37.5
F, mm	70.5	71.92	73.34	74.75	76.17	77.59	79	80.42	81.84	83.25	84.64	86.09	87.5	88.92	91.34	91.75	93.17	94.59	96	91.75	87.5	83.25	79	74.75	70.5





DETAIL–"B" (2:1)

DETAIL–"B" (1:1)
before milling



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
√Ra 2.5

MARKING

Qty. per Assembly

Calculated Mass kg.

DGN.			
D.CHD.		14/8/15	
DRN.		14/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

TITLE
Straightening device

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2200.0011.00.1
SCALE 1:1 SHEET 1 OF 1
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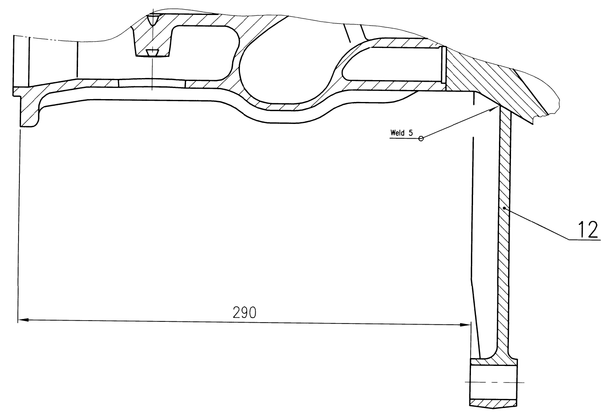
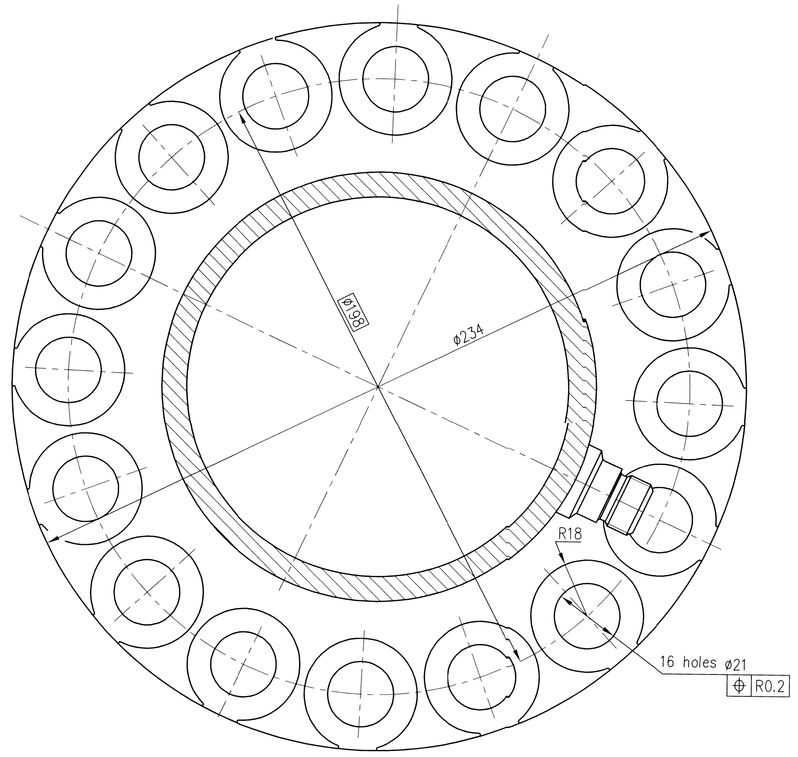
SECTION–"LL" (1:2)

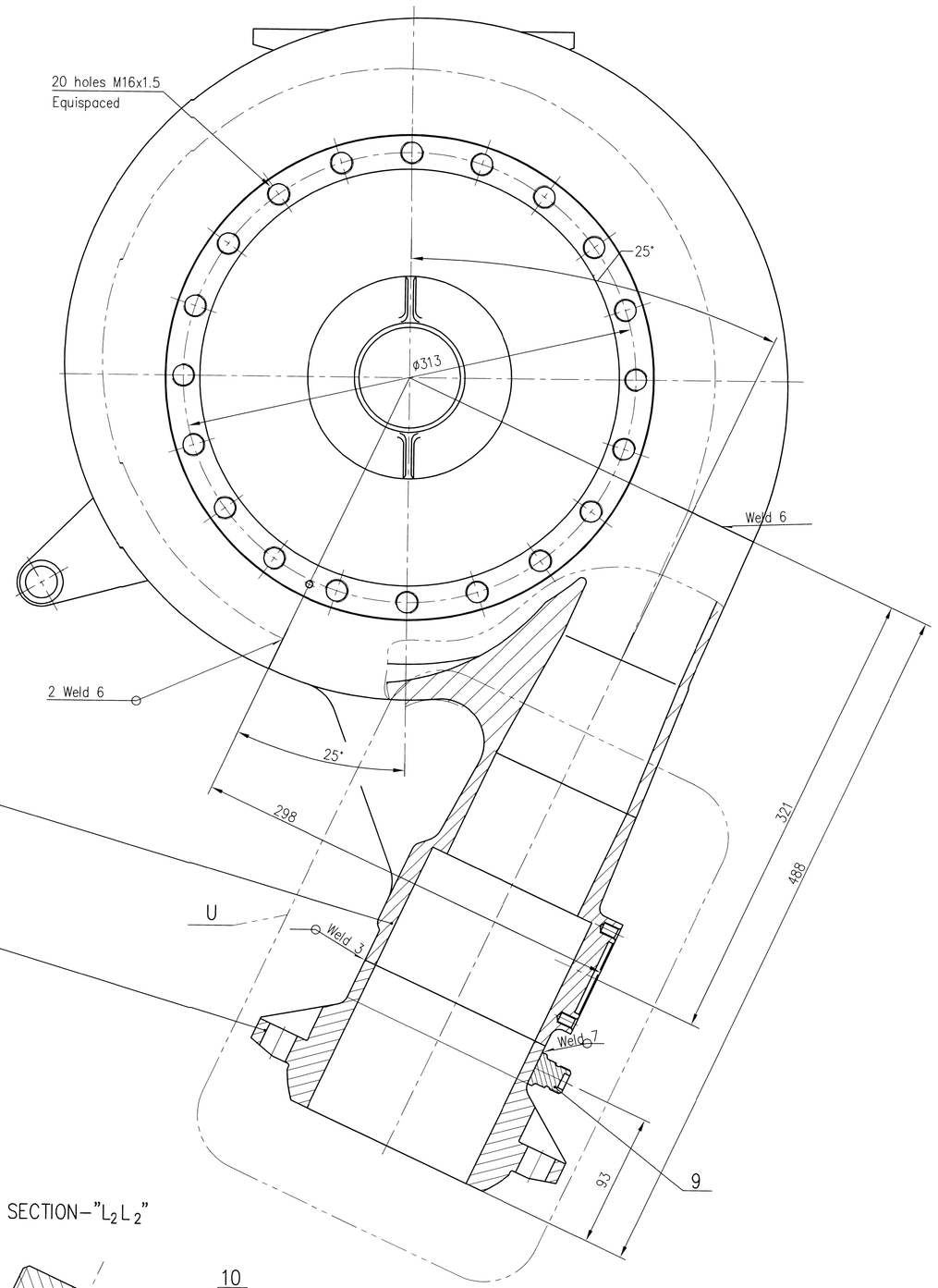


SECTION–"FF"



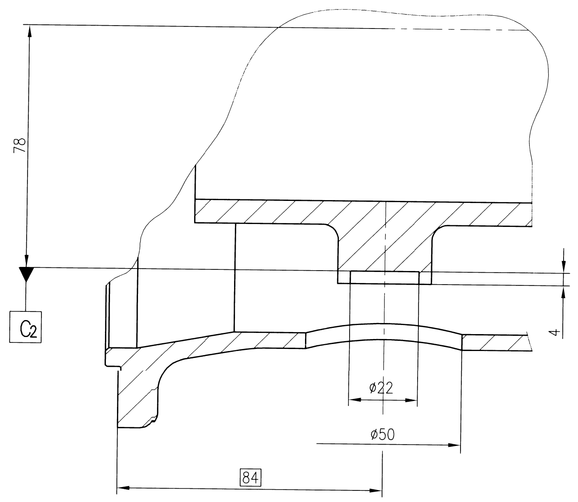
VIEW FROM–"D" (1:2)

SEE SHEET 1/2

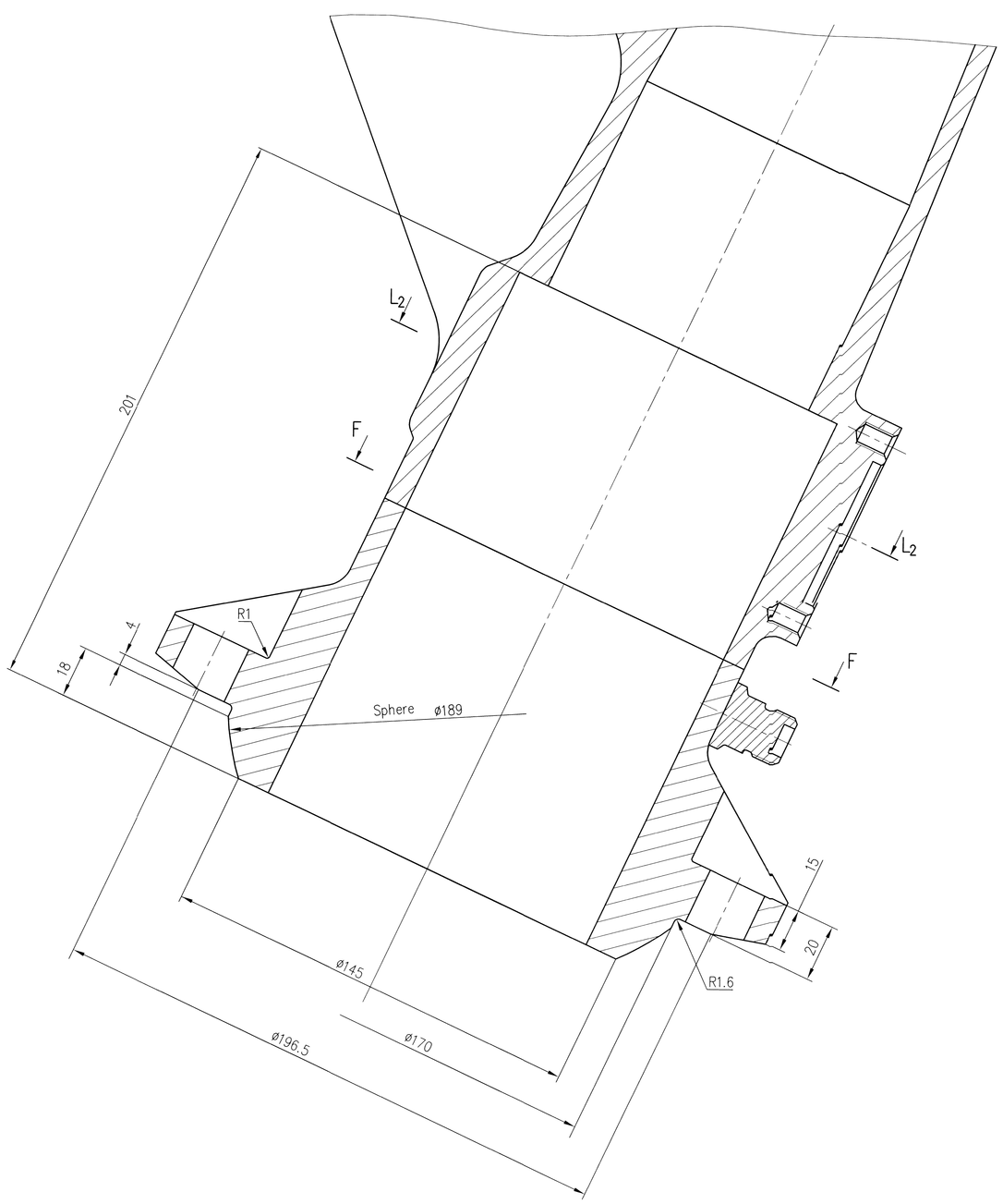


SECTION–"GG" AND SECTION–"G_1 G_1"

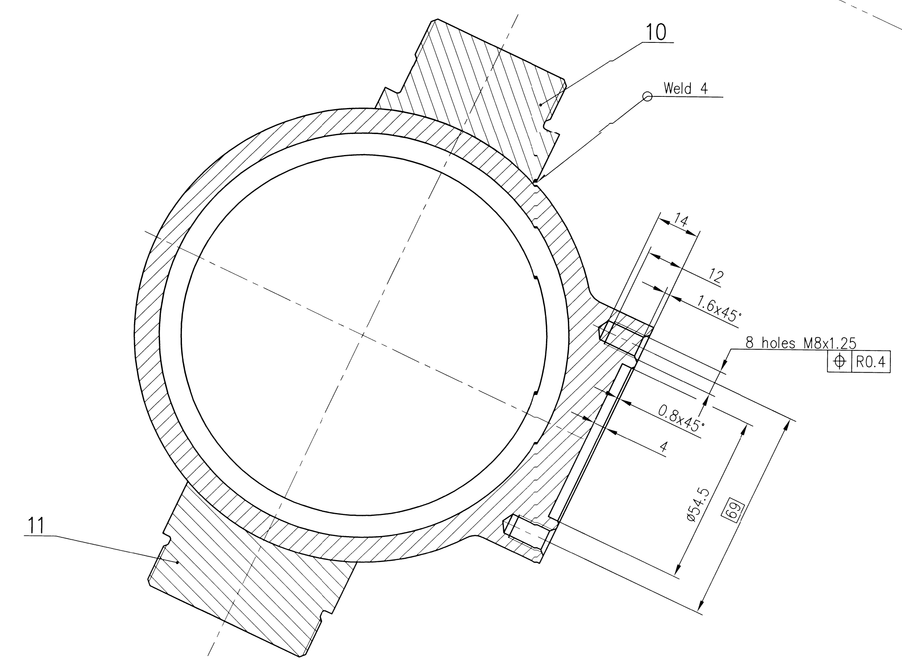
SEE SHEET–1/2



DETAIL–"U"

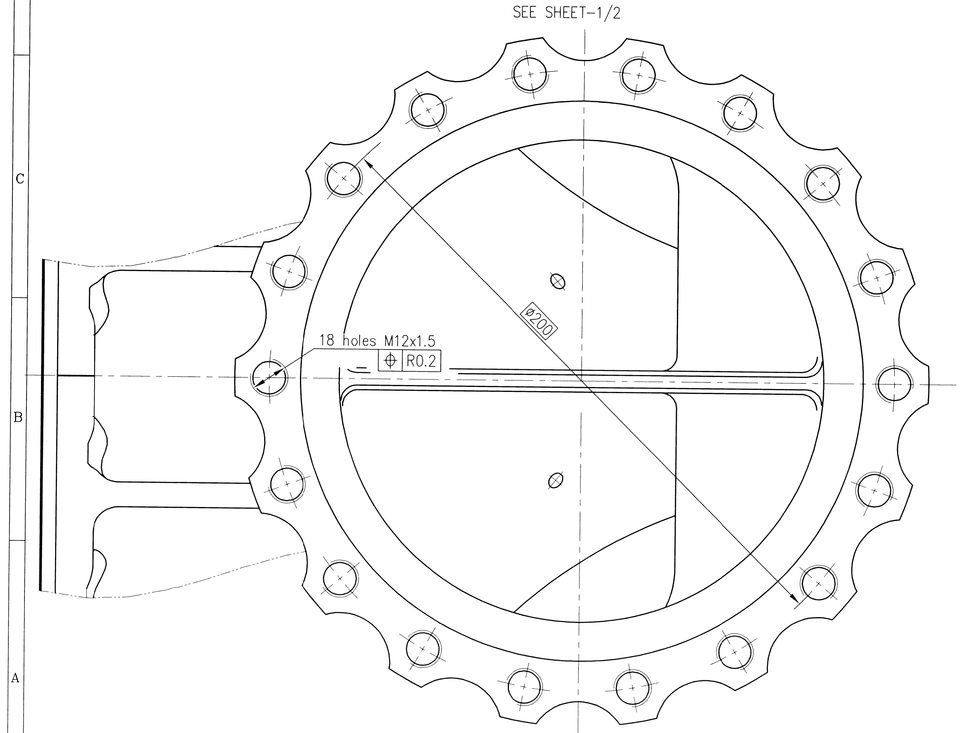


SECTION–"L_2 L_2"



VIEW FROM–"E"

SEE SHEET–1/2



MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 TO 30	UPTO 30 TO 120	UPTO 120 TO 315	UPTO 315 TO 1000	UPTO 1000 TO 2000	UPTO 2000 TO 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±15'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Mechanical p roperties	SURFACE TREATMENT	TITLE: Casing Assembly
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING	Calculated Mass kg.

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GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

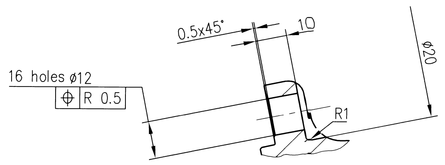
DGN.			ISSUE No.
D.CHD.			TPD–SC/CPEG
DRN.			
CHD.			
APPD.			
2016	SIGN.	DATE	

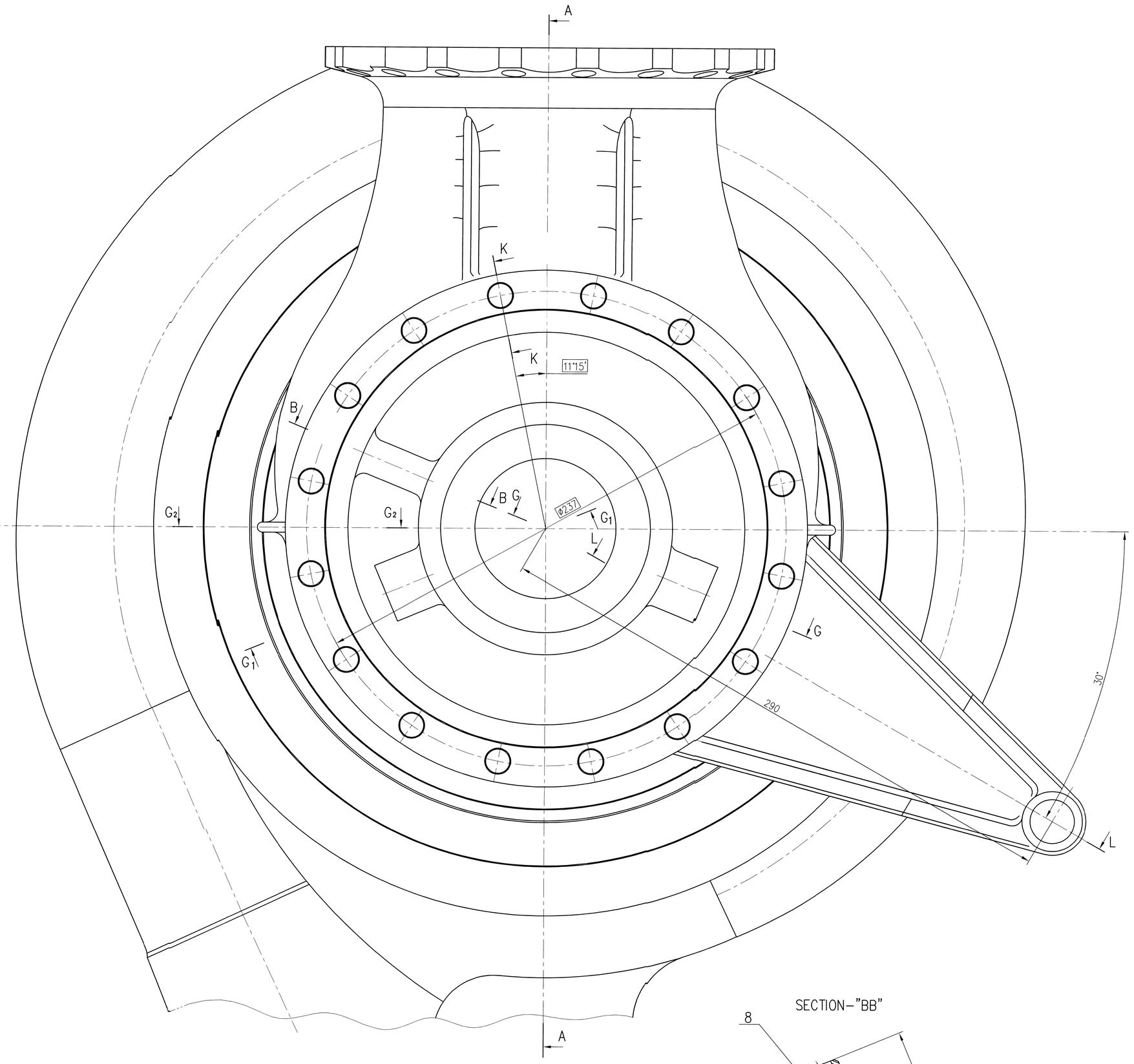
DRG No. SE MOCK–UP.2200.0010.00.0AD | Rev. No. | FORMAT A0

SCALE 1:1 SHEET 2 OF 2

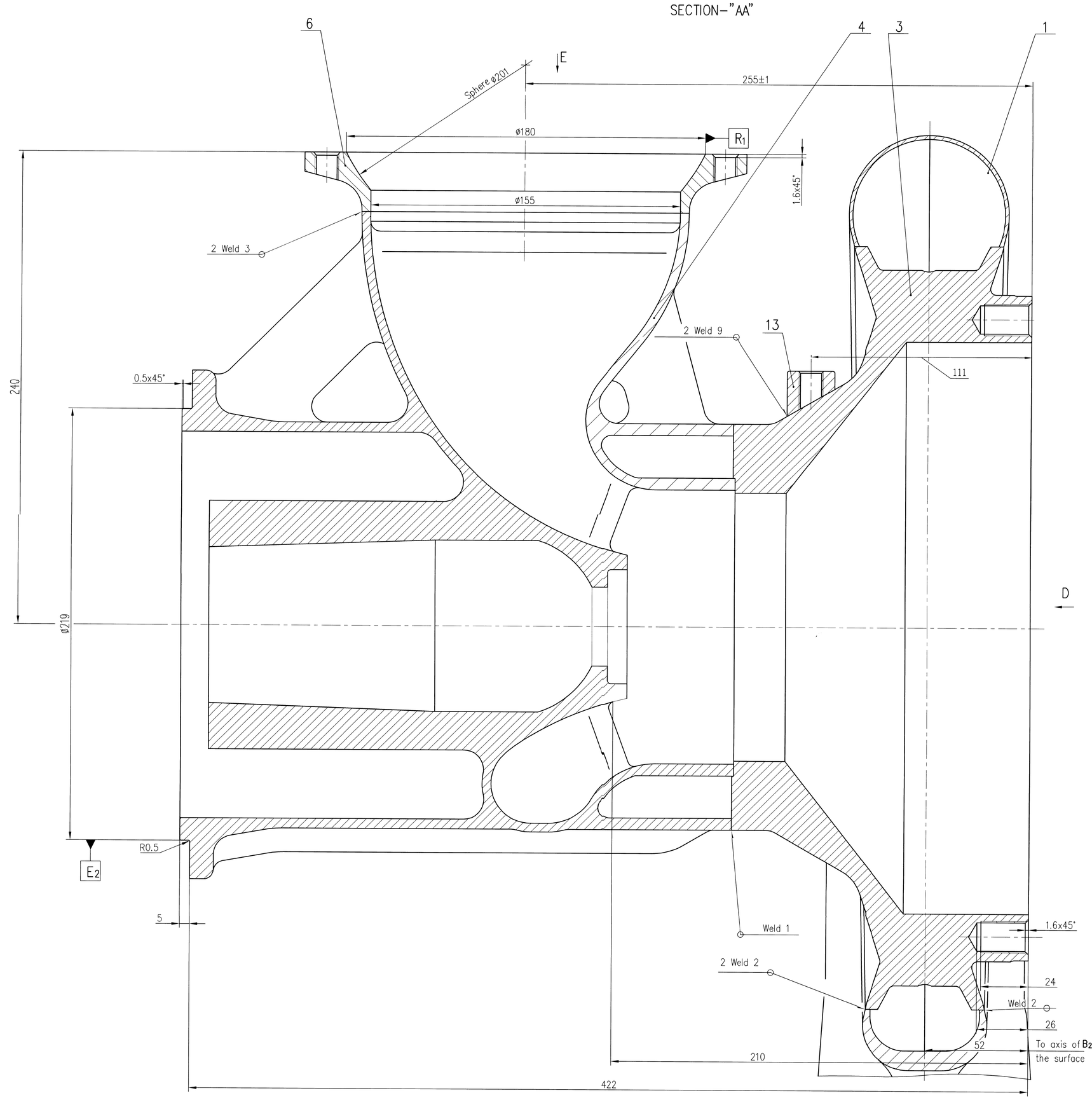
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"KK"

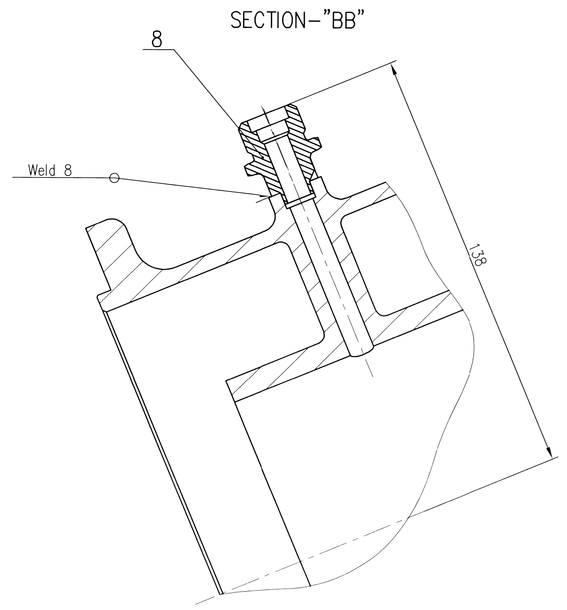




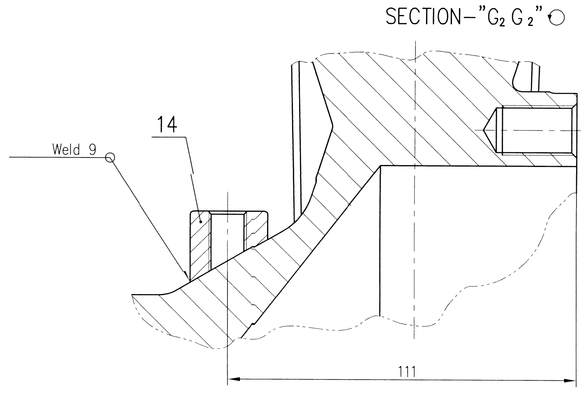
SECTION–"AA"



SECTION–"BB"



SECTION–"G2 G2"



NOTES

1. Threads should be free from chattering marks, burrs, peeling off etc. and should have ▽▽▽ finish.
2. Filler wire – AISI 316L/308– for welding.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							LENGTH IN mm. OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	ABOVE 4000	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±15'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg

TITLE
Casing Assembly

INDEX	MODIFICATION ORDER No. & DATE
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DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547
D.CHD.			
DRN.			
CHD.			
APPD.			
2016	SIGN.	DATE	

TPD–SC/CPEG

ISSUE No.

DRG No. SE MOCK–UP.2200.0010.00.OAD

Rev. No.

FORMAT A0

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SHEET 1 OF 2

Size		Part No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Parts		
A3		9	SE MOCK-UP.2200.0017.00.1		Connector	1	
A3		10	SE MOCK-UP.2200.0018.00.1		Connector	1	
A3		11	SE MOCK-UP.2200.0019.00.1		Connector	1	
A2		12	SE MOCK-UP.2200.0031.00.1		Bracket	1	
A3		13	SE MOCK-UP.2200.0032.00.1		Boss	1	
A3		14	SE MOCK-UP.2200.0033.00.1		Boss	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Casing

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	04/10/11
CHD.		1/11/16
APPD.		1/11/16
	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2200.0010.00.0

Rev. No.

FORMAT A4

SHEET 2 OF 2

Size		Part No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
*			SE MOCK-UP.2200.0010.00.0AD		Casing Assembly	1	*LFx2
					Units		
A4		1	SE MOCK-UP.2200.0020.00.0		Manifold Assembly	1	
					Parts		
A1		3	SE MOCK-UP.2200.0011.00.1		Straightening device	1	
A1		4	SE MOCK-UP.2200.0012.00.1		Branch (Casting)	1	*A0,A2
A1		5	SE MOCK-UP.2200.0013.00.1		Manifold's sector	1	
A2		6	SE MOCK-UP.2200.0014.00.1		Flange	1	
A2		7	SE MOCK-UP.2200.0015.00.1		Flange	1	
A3		8	SE MOCK-UP.2200.0016.00.1		Connector	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

INDEX	MODIFICATION ORDER No. & DATE

TITLE

Casing

REVISION

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	04/10/11
CHD.		1/11/16
APPD.		1/11/16
	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2200.0010.00.0

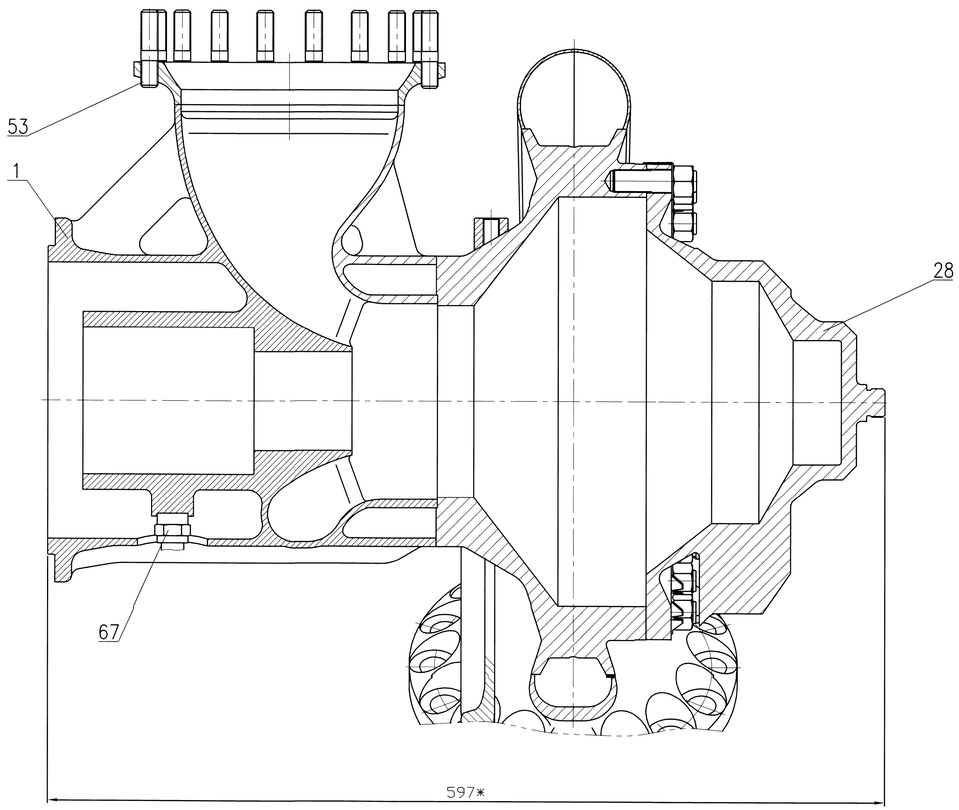
Rev. No.

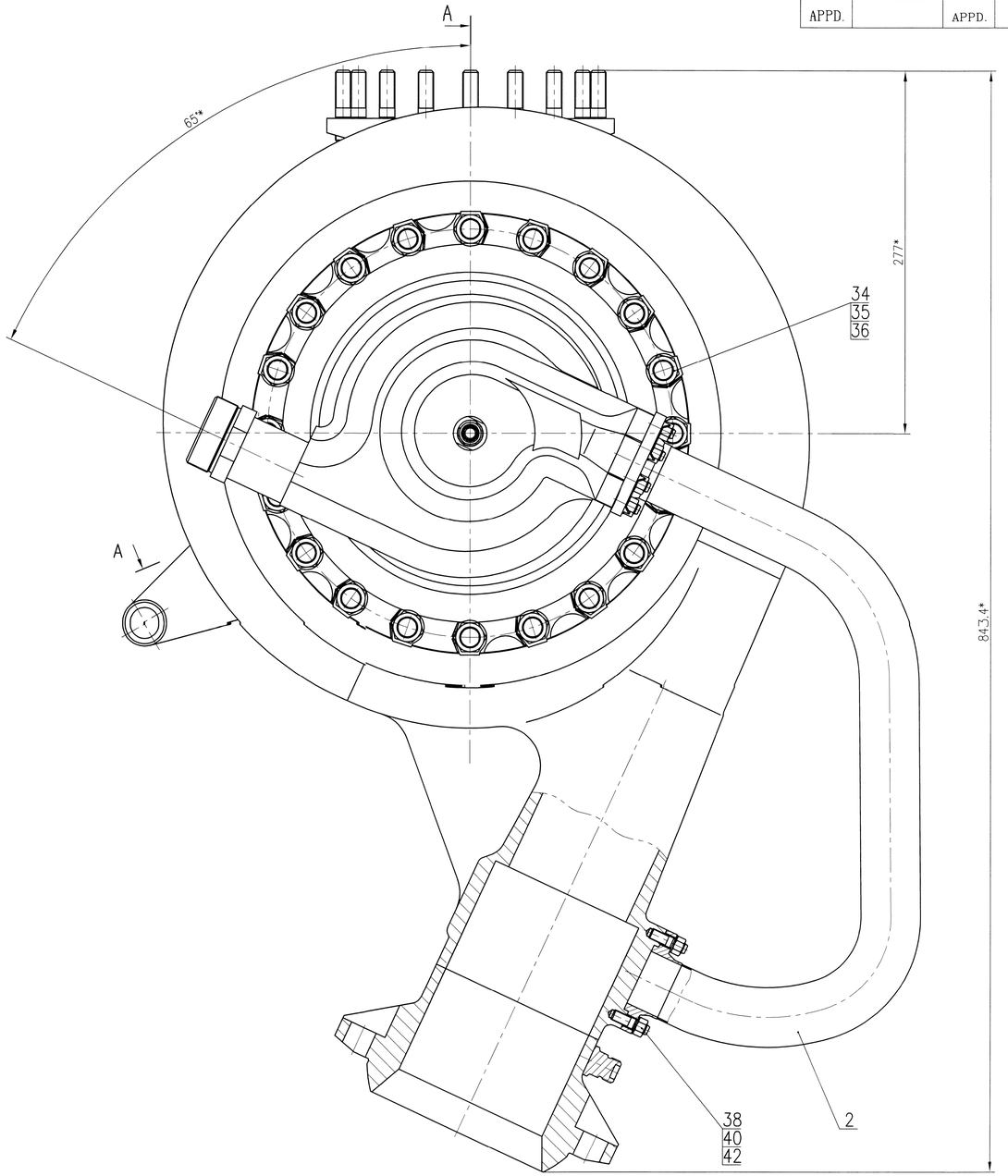
FORMAT A4

SHEET 1 OF 2

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





NOTE

1. *Reference dimension.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE

Fuel pump
Assembly

DGN.		
D.CHD.		
DRN.	Raghu	22/8/16
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK-UP.2200.0000.00.0AD
SCALE 1:2
SHEET 1 OF 1
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	ISSUE No.

Size		Part No.	Drg.No.	Rev. No.	Name	Quantity	Remark
					Documentation		
A4		38	SE MOCK-UP.2200.0228.00.1		Stud	16	
A4		40	SE MOCK-UP.2200.0231.00.1		Lock washer	8	
*		42	SE MOCK-UP.2200.0233.00.1		Nut	16	*See drawing of Part no. 34

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

INDEX	MODIFICATION ORDER No. & DATE

REVISION

TITLE

Fuel pump Assembly

DGN.		GOVERNMENT OF INDIA	TPD-SC/CPEG
D.CHD.		INDIAN SPACE RESEARCH ORGANISATION	
DRN.	Raghu 10/8/15	LIQUID PROPULSION SYSTEMS CENTRE	ISSUE No.
CHD.		VALIAMALA TRIVANDRUM-695547	
APPD.		DRG.No. SE MOCK-UP.2200.0000.00.0	Rev. No. / FORMAT A4
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Size		Part No.	Drg.No.	Rev. No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2200.0000.00.0AD		Fuel pump Assembly		
					Units		
A4		1	SE MOCK-UP.2200.0010.00.0		Casing	1	
A4		2	SE MOCK-UP.2200.0040.00.0		Pipeline	1	
					Parts		
LF		28	SE MOCK-UP.2200.0217.00.1		Casing	1	
A4		34	SE MOCK-UP.2200.0224.00.1		Nut	20	
A4		35	SE MOCK-UP.2200.0225.00.1		Stud	20	
A4		36	SE MOCK-UP.2200.0226.00.1		Lock washer	20	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

INDEX	MODIFICATION ORDER No. & DATE

REVISION

TITLE

Fuel pump Assembly

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
D.CHD.			
DRN.	Raghu	20/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

TPD-SC/CPEG

ISSUE No.

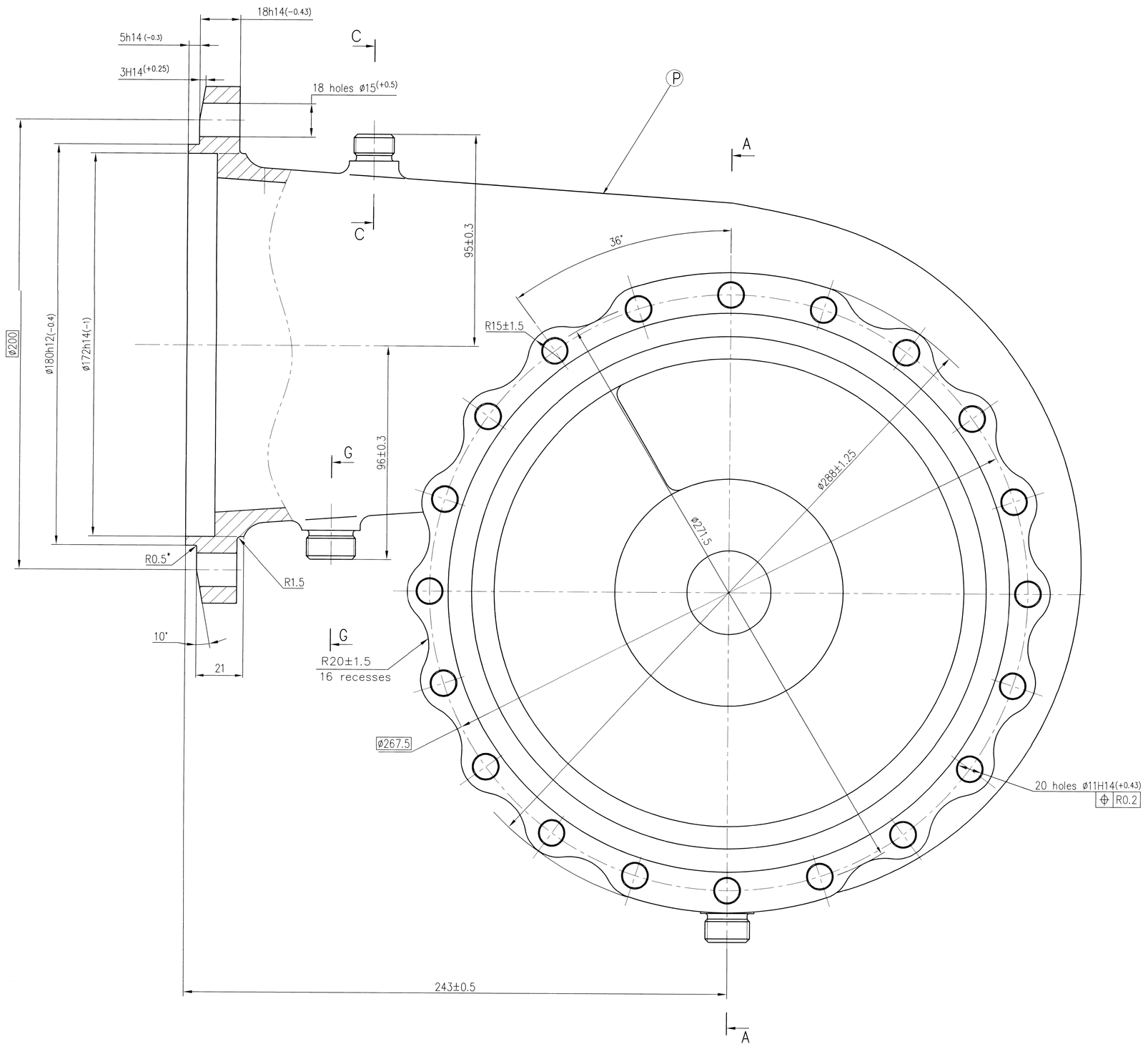
DRG.No. SE MOCK-UP.2200.0000.00.0

Rev. No.

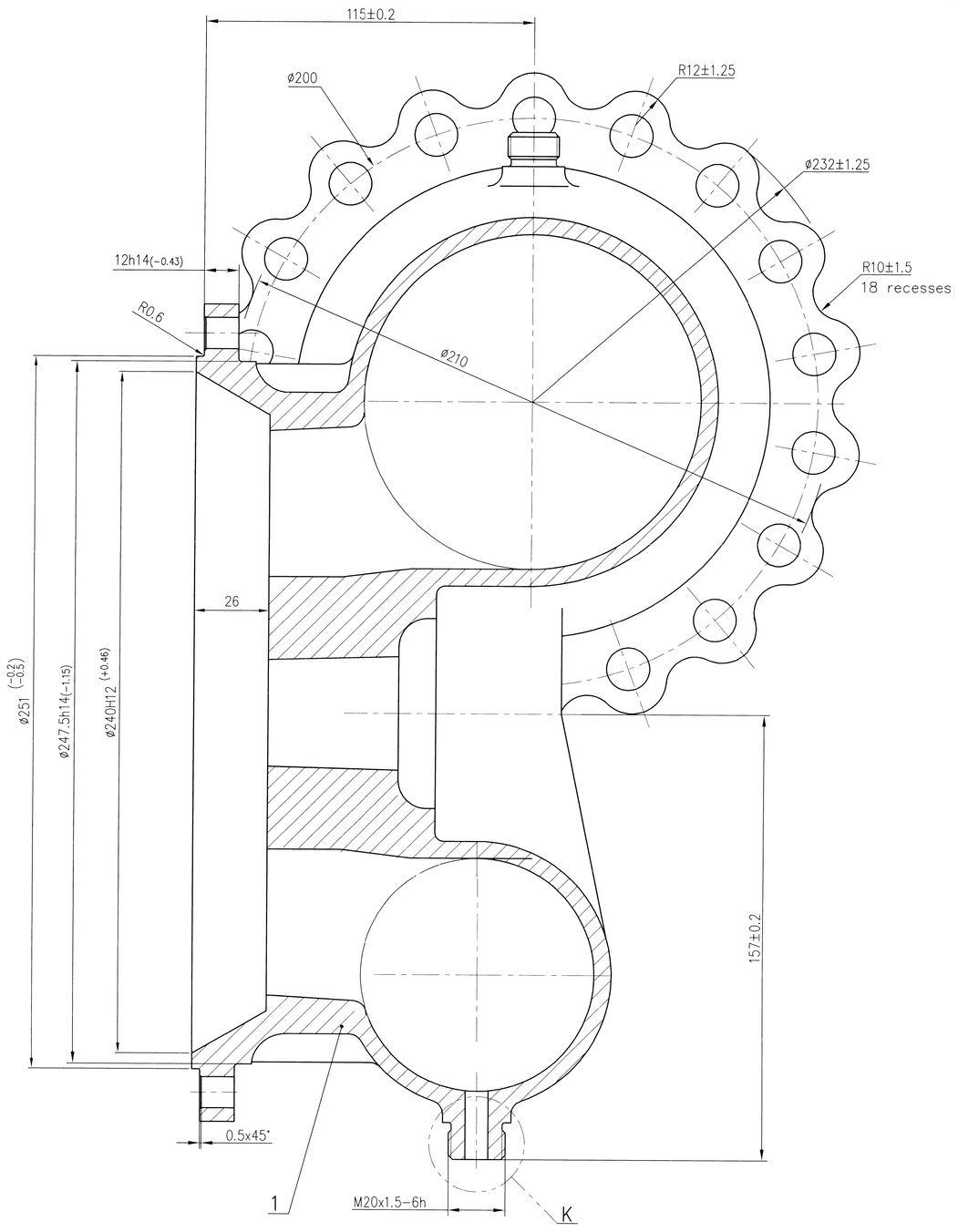
FORMAT A4

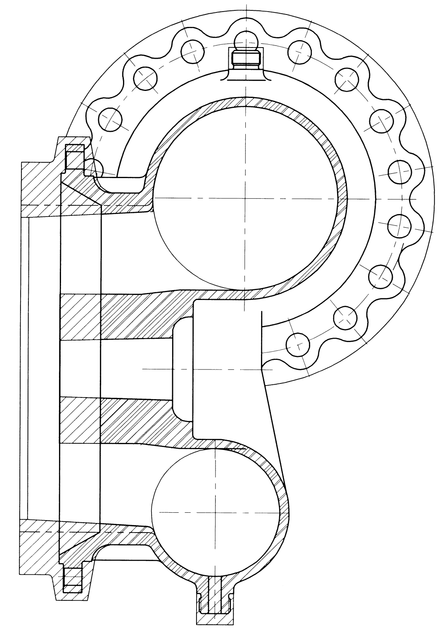
SHEET 1 OF 2

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



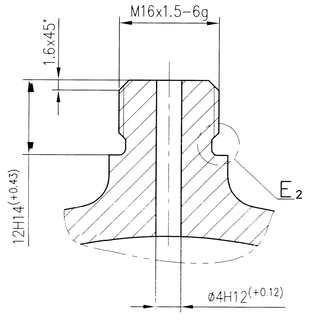
SECTION–"A–A"



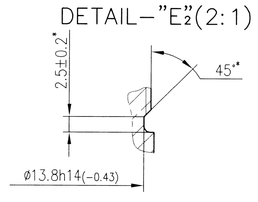


SUPERIMPOSED VIEW

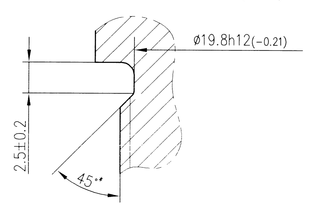
SECTION–"CC" (2:1)



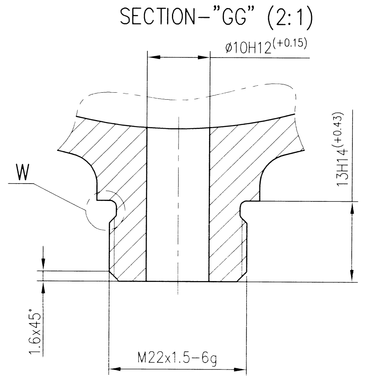
DETAIL–"E2"(2:1)



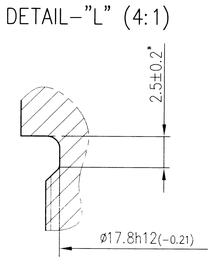
DETAIL–"W" (4:1)



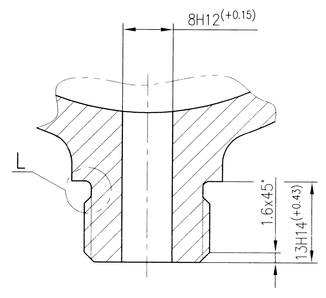
SECTION–"GG" (2:1)



DETAIL–"L" (4:1)



DETAIL–"K" (2:1)



Notes

1. * Dimension provided by tool.
2. Threads should be free from chattering marks, burrs, peeling off etc.
3. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–9	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	ABOVE 8000	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'	

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Steel (DIN14H7MT (casting)	SURFACE TREATMENT	TITLE: Outlet branch
Concentricity Perpendicularity Angularity Parallelism	Mechanical properties		INDEX / MODIFICATION ORDER No. & DATE: REVISION
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH Ra 2.5	DGN. / D CHD / DRN / CHD / APPD / 2016 SIGN. / DATE GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547 DRG.No. SE MODEL.2250.0050.00.1 SCALE 1 : 1 SHEET 1 OF 1
		MARKING	TPD-SC/CPEG ISSUE No. Rev. No. FORMAT A0
		Calculated Mass kg	

C:\Documents and Settings\Admin\Desktop\MOCK UP FINAL DRGMT (28-10-10)\7. joint UPPT mock up 29-10-10\

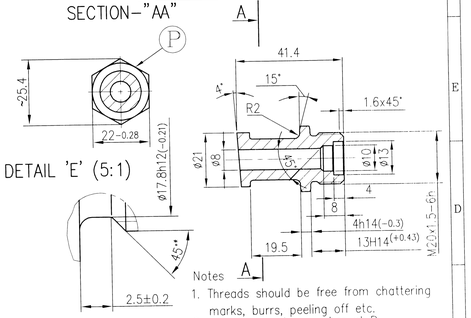
MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽
8-25	1.6-8	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

MACHINING DEVIATION TO IS 2102, MEDIUM GRADE, UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12500	UPTO 16000	UPTO 20000	UPTO 25000	UPTO 31500	UPTO 40000
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.5	±20.0	±31.5	±40.0

UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12500	UPTO 16000	UPTO 20000	UPTO 25000	UPTO 31500	UPTO 40000	
±0.5	±1	±1.5	±2.5	±4	±6	±10	±16	±25	±40	±63	±100	±160	±250	±315



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

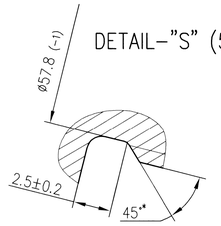
DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS 304 Mechanical properties		SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified		SURFACE FINISH ▽ 2.5 MARKING

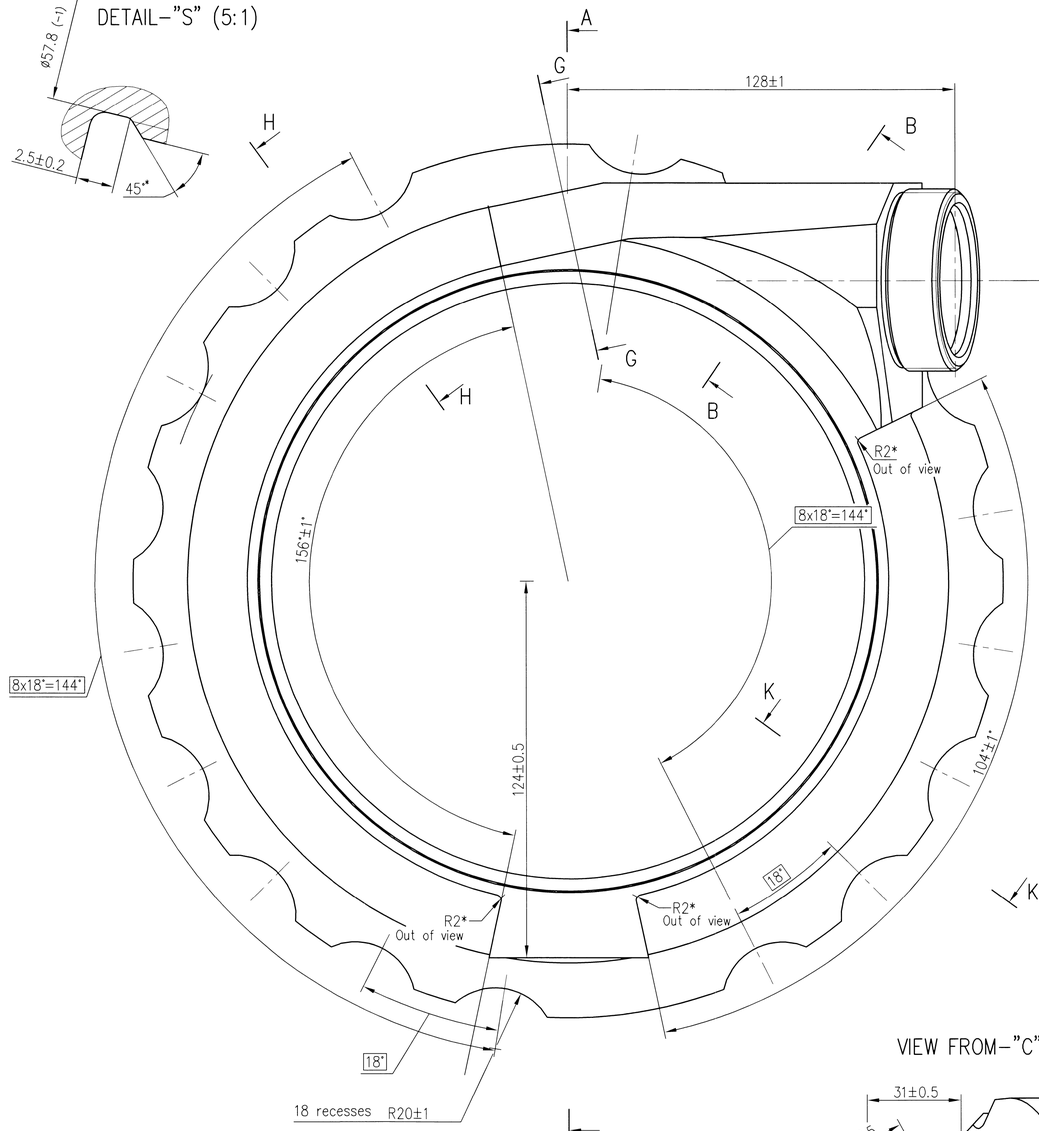
DATE	TITLE	Connector	Calculated Mass kg
AMEND.No.			
INDEX			

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547		TPD-SC/CPEG	
D.CHD				ISSUE No.	
DRN.	17/9/13				
CHD.		DRG.No. SE MODEL.2250.0043.00.1		Rev. No.	FORMAT A4
APPD.		SCALE 2:1		SHEET 1 OF 1	
2016	SIGN.	DATE			

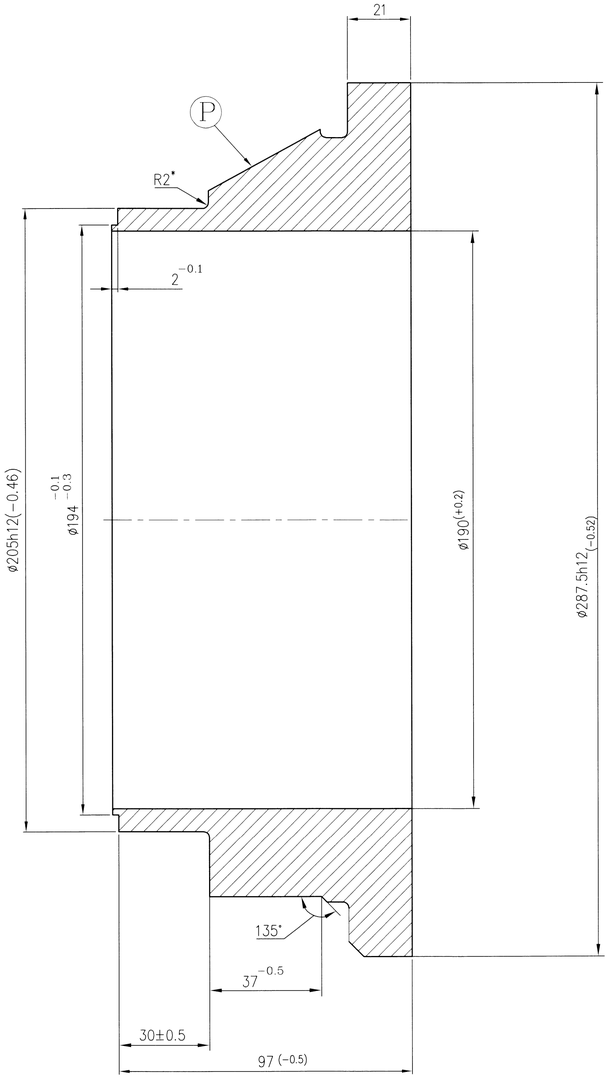
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

DETAIL–"S" (5:1)

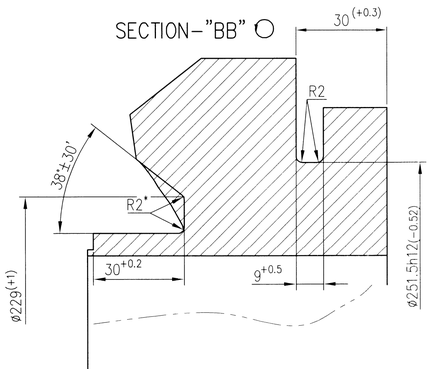


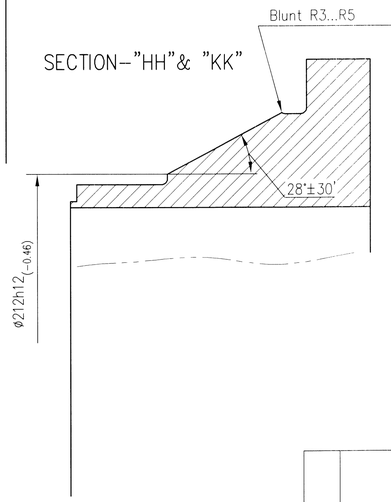


SECTION–"AA"

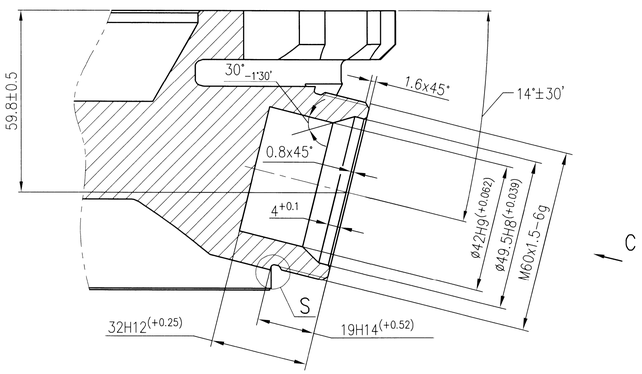


SECTION–"BB"

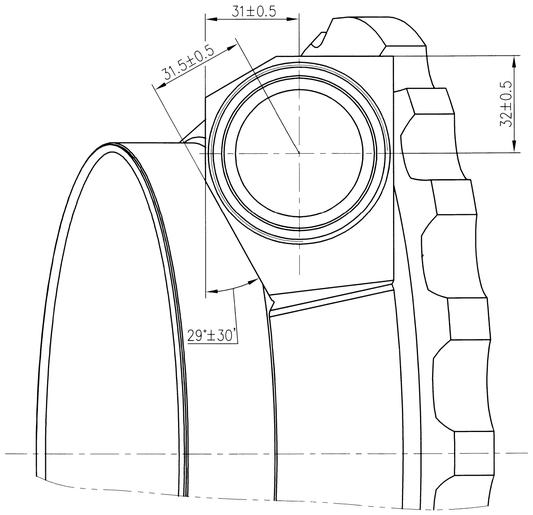




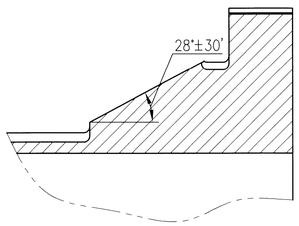
SECTION–"DD"



VIEW FROM–"C"



SECTION–"GG"



Notes

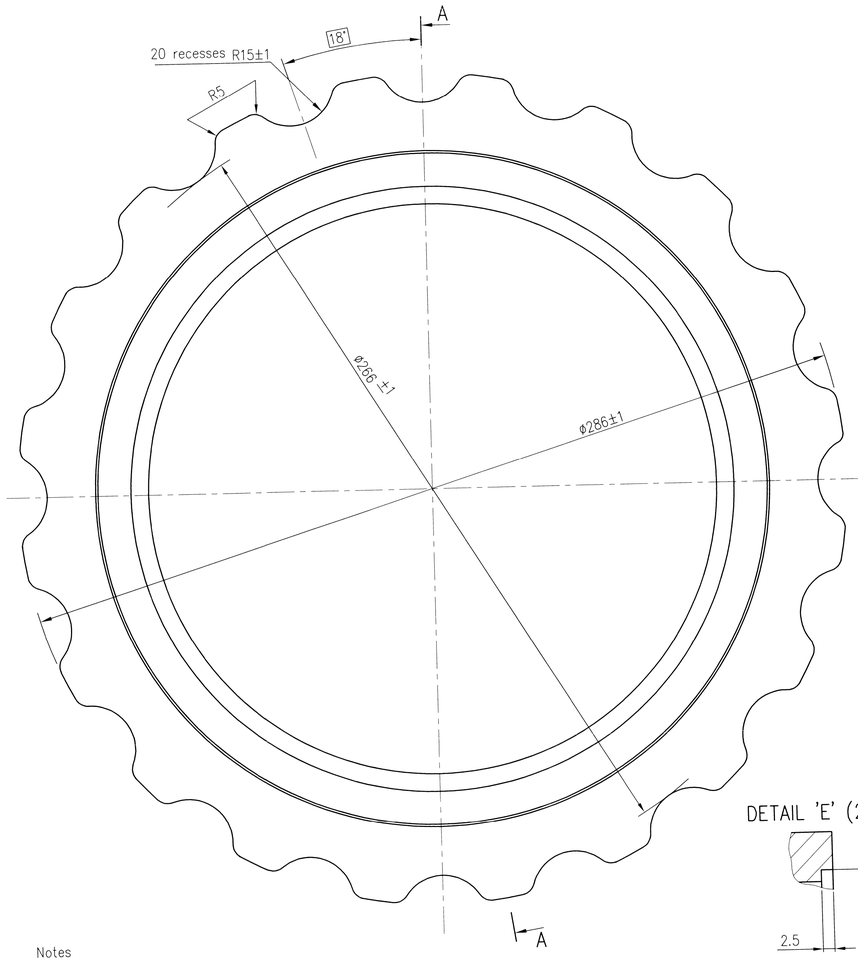
1. * Dimension provided by tool.
2. Engrave drawing number at P.

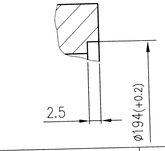
MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

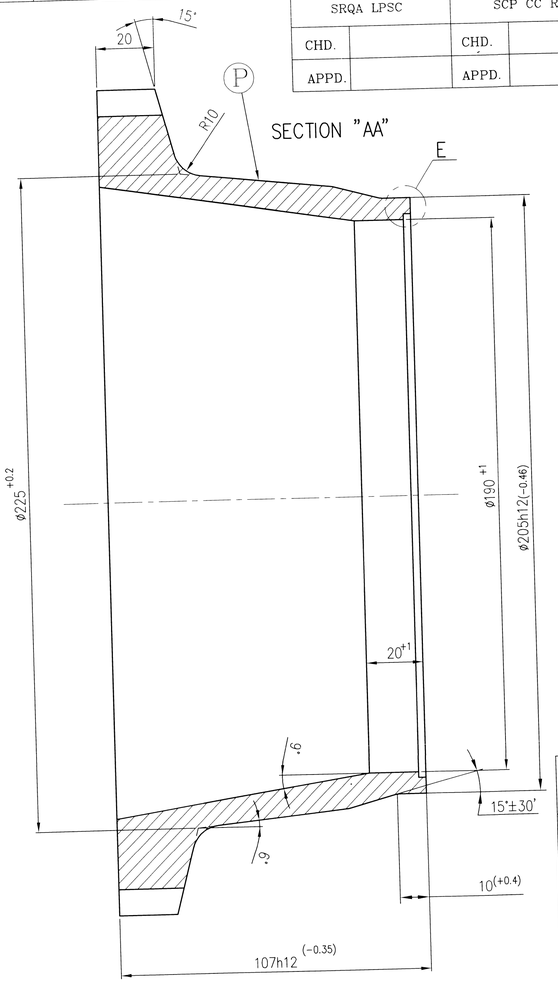
LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT		TITLE	INDEX / MODIFICATION ORDER No. & DATE
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH Ra 2.5		Nozzle set	REVISION
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		MARKING	Calculated Mass kg.	DGN. / D.CHD. / DRN. / CHD. / APPD. / 2016 SIGN. / DATE	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
					TPD–SC/CPEG ISSUE No.
					DRG.No. SE MODEL.2250.0042.00.1 Rev. No. / FORMAT A1 SCALE1:1 SHEET 1OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	







Notes

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 / 30	UPTO 30 / 120	UPTO 120 / 315	UPTO 315 / 1000	UPTO 1000 / 2000	UPTO 2000 / 4000	UPTO 4000 ABOVE		UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0		±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS 304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 1.6

MARKING

Calculated Mass kg.

TITLE

Inlet branch

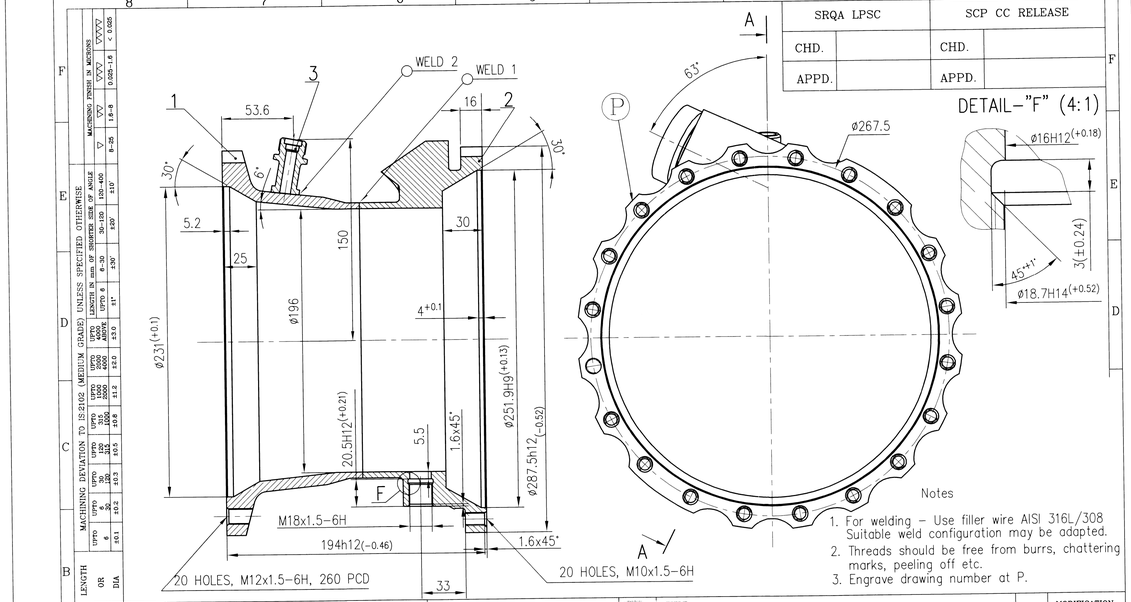
DGN.			
D.CHD.			
DRN.			
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MODEL.2250.0041.00.1
SCALE 1:1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TPD-SC/CPEG
ISSUE No.
Rev. No.
FORMAT A2
SHEET 1 OF 1



DETAIL-"F" (4:1)

Notes

1. For welding – Use filler wire AISI 316L/308 Suitable weld configuration may be adapted.
2. Threads should be free from burrs, chattering marks, peeling off etc.
3. Engrave drawing number at P.

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

MACHINING FINISH IN MICRONS

LENGTH OR DIA	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	4000 TO 8000	8000 TO 16000	16000 TO 32000	32000 TO 64000	64000 TO 128000
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±5.0	±8.0	±12.5	±20.0

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

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

MACHINING FINISH IN MICRONS				
▽	6-25	1.6-6	0.025-1.6	< 0.025
▽▽				
▽▽▽				
▽▽▽▽				

DO NOT SCALE THE DRAWING	MATERIAL
ASK IF IN DOUBT.	Mechanical properties
ALL DIMENSIONS ARE IN mm.	
Concentricity	General tolerance JS or js12
Perpendicularity	Thread tolerance
Angularity	Thread chamfer & under cut.
Parallelism	Radii not specified
	Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 1.6

MARKING

Calculated Mass kg

TITLE: Casing assembly

DGN.			
D.CHD.			
DRN.	Raghu	16/8/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MODEL.2250.0040.00.0AD
SCALE 1 : 2
SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TPD-SC/CPEG
ISSUE No.
Rev. No.
FORMAT A3

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Size	Zone	Part No.	Drawing No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A3			SE MODEL.2250.0040.00.0AD		Casing assembly		
					Parts		
A2		1	SE MODEL.2250.0041.00.1		Inlet branch	1	
A1		2	SE MODEL.2250.0042.00.1		Nozzle set	1	
A4		3	SE MODEL.2250.0043.00.1		Connector	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

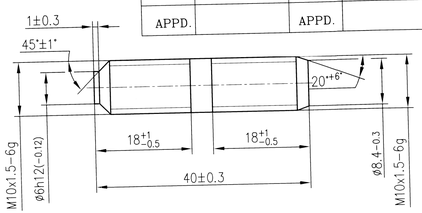
TITLE

Casing assembly

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.			ISSUE No.
DRN.			
CHD.			Rev. No.
APPD.		DRG.No. SE MODEL.2250.0040.00.0	FORMAT A4
2016	SIGN. DATE		SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8-25	1.6-8	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Mark drawing number on a tag.

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS 304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 3.2 MARKING

TITLE: Stud

Calculated Mass: kg

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DGN.		
D.CHD.		
DRN.	17/3/15	
CHD.		
APPD.		
2016	SIGN.	DATE

DRG.No. SE MODEL.2250.0016.00.1

Rev. No.

FORMAT A4

SCALE 2:1

SHEET 1 OF 1

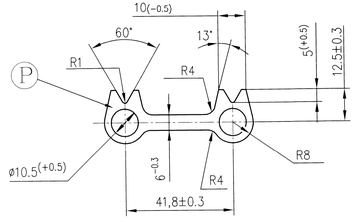
MACHINING DEVIATION TO IS:2102 MEDIUM (GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA.	ANGLE (DEGREES)				
	UPTO 10	10-50	50-120	120-400	±10'
UPTO 6	±1.0	±1°	±30'	±20'	±15'
6-30	±0.5	±30'	±20'	±15'	±10'
30-120	±0.8	±20'	±15'	±10'	±5'
120-315	±1.2	±15'	±10'	±5'	±2.5'
315-1000	±2.0	±10'	±5'	±2.5'	±1.5'
1000-2000	±3.0	±5'	±2.5'	±1.5'	±1'
2000-4000	±4.0	±2.5'	±1.5'	±1'	±0.5'
UPTO 6	±1°	±1.5'	±1'	±0.5'	±0.25'
6-30	±30'	±1'	±0.5'	±0.25'	±0.15'
30-120	±20'	±0.5'	±0.25'	±0.15'	±0.1'
120-400	±15'	±0.25'	±0.15'	±0.1'	±0.05'

INDEX	DATE	AMEND.No.
A		
B		
C		
D		
E		
F		

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT
ALL DIMENSIONS ARE IN mm.

MATERIAL 1mm sheet 304
Mechanical properties

SURFACE TREATMENT

Concentricity
Perpendicularity
Angularity
Parallelism

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE FINISH

MARKING

TITLE

Lock washer

Calculated Mass kg

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MODEL.2250.0015.00.1

Rev. No.

FORMAT A4

SCALE 1 : 1

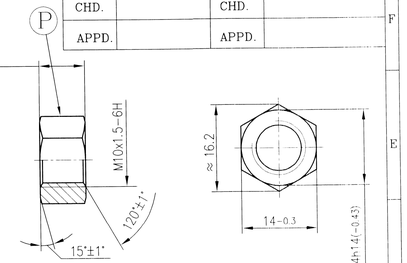
SHEET 1 OF 1

DGN
D CHD
DRN
CHD
APPD.
2016 SIGN. DATE

AMEND.No. DATE INDEX

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8-25	1.6-8	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

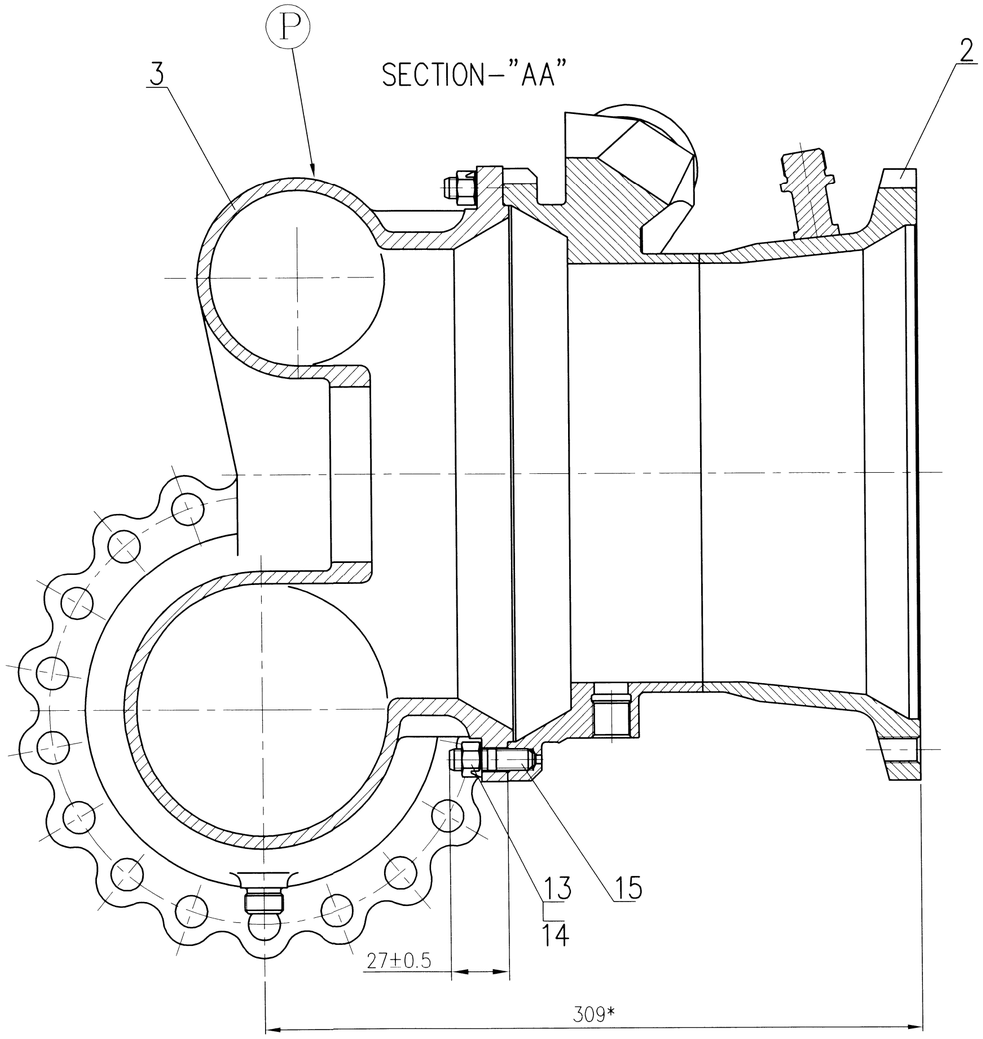


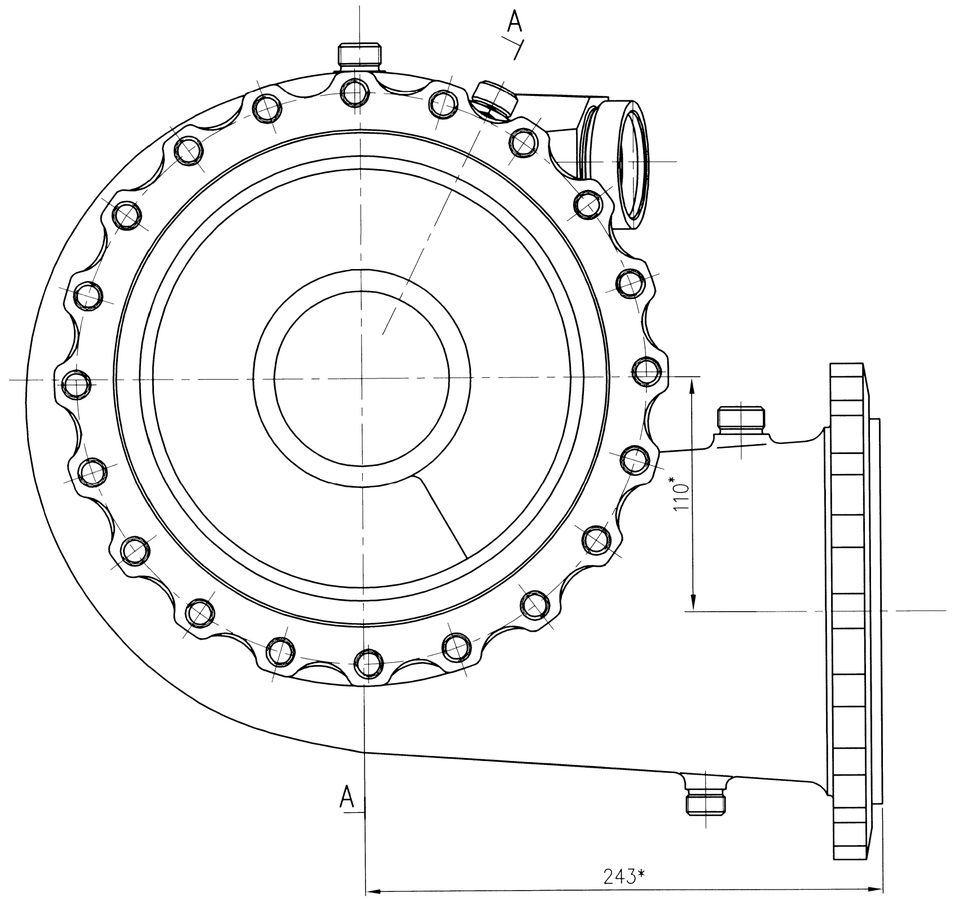
Note

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE. | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





Notes

1. * – Dimension for reference.
2. Engrave drawing number at P

MACHINING FINISH IN MICRONS				
▽	▽▽	▽▽▽	▽▽▽▽	
8–25	1.6–8	0.025–1.6	< 0.025	

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass
kg.

TITLE

Low Pressure Fuel Turbopump (LPFT) assembly

DGN.		4/11/16
D.CHD.		4/11/16
DRN.	Raghu	14/9/15
CHD.		
APPD.		4/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MODEL.2250.0000.00.0AD
Rev. No.
FORMAT A2
SCALE 1:2
SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
REVISION	
TPD–SC/CPEG	
ISSUE No.	

Size	Zone	Part No.	Drawing No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A2			SE MODEL.2250.0000.00.0AD		LPFT assembly		
					Units		
A4		2	SE MODEL.2250.0040.00.0		Casing	1	
					Parts		
A0		3	SE MODEL.2250.0050.00.1		Outlet branch	1	
A4		13	SE MODEL.2250.0014.00.1		Nut	20	
A4		14	SE MODEL.2250.0015.00.1		Lock washer	10	
A4		15	SE MODEL.2250.0016.00.1		Stud	20	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

		INDEX	MODIFICATION ORDER No. & DATE

TITLE

Low Pressure Fuel Turbopump (LPFT) assembly

REVISION

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	17/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

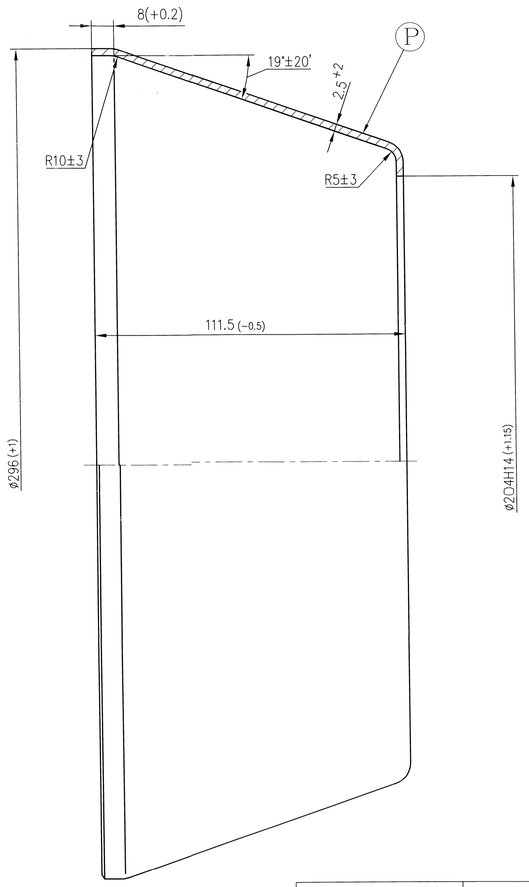
DRG.No. SE MODEL.2250.0000.00.0

Rev. No.

FORMAT A4

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. It is allowed to make in parts and join by welding.
2. Use filler wire: – AISI 316/308 for welding.
   Suitable weld configuration may be adopted.
3. Engrave drawing number at P.

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽ (√)

MARKING

Calculated Mass kg.

	SIGN.	DATE
DGN.		11/11/16
D.CHD.		11/11/16
DRN.	Raghu	10/11/16
CHD.		
APPD.		11/11/16

TITLE
Shell

GOVERNMENT OF INDIA
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VALIAMALA TRIVANDRUM-695547

TPD–SC/CPEG
ISSUE No.

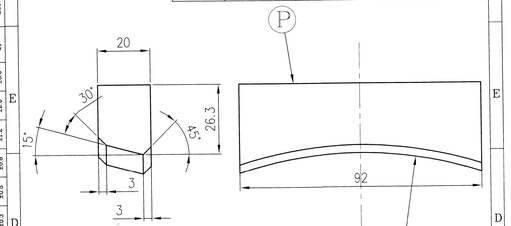
DRG No. SE MOCK-UP.2150.3100.00.0
Rev. No.
FORMAT A2
SCALE 1:1
SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-3	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

MACHINING DEVIATION TO IS:9492 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE UPTO 6	6-30	30-120	120-400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'



1. Engrave drawing number at P.

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH ▽Ra 2.5 MARKING

INDEX	DATE	AMEND.No.
A		
B		
C		
D		

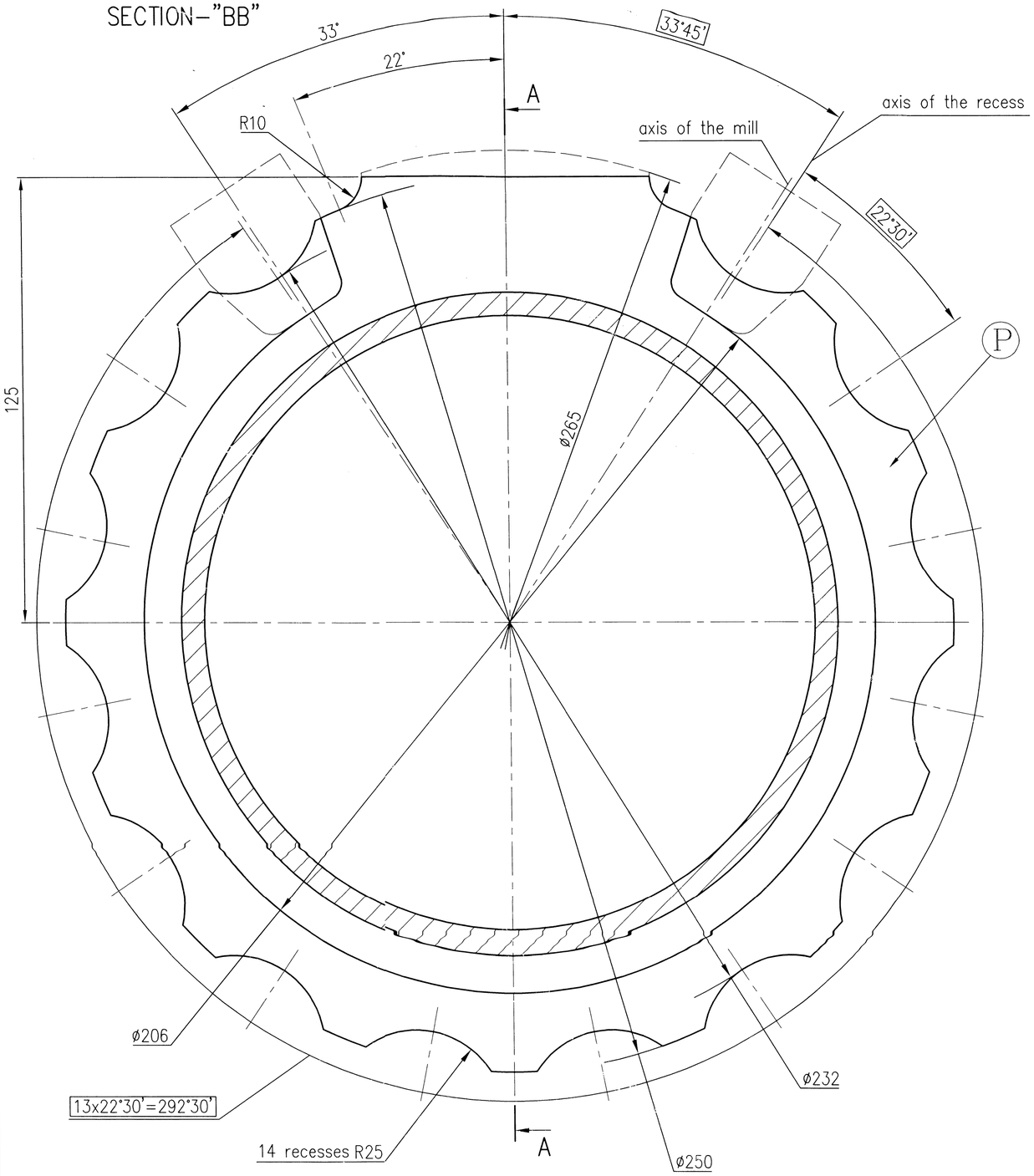
TITLE: Plate

Calculated Mass: kg

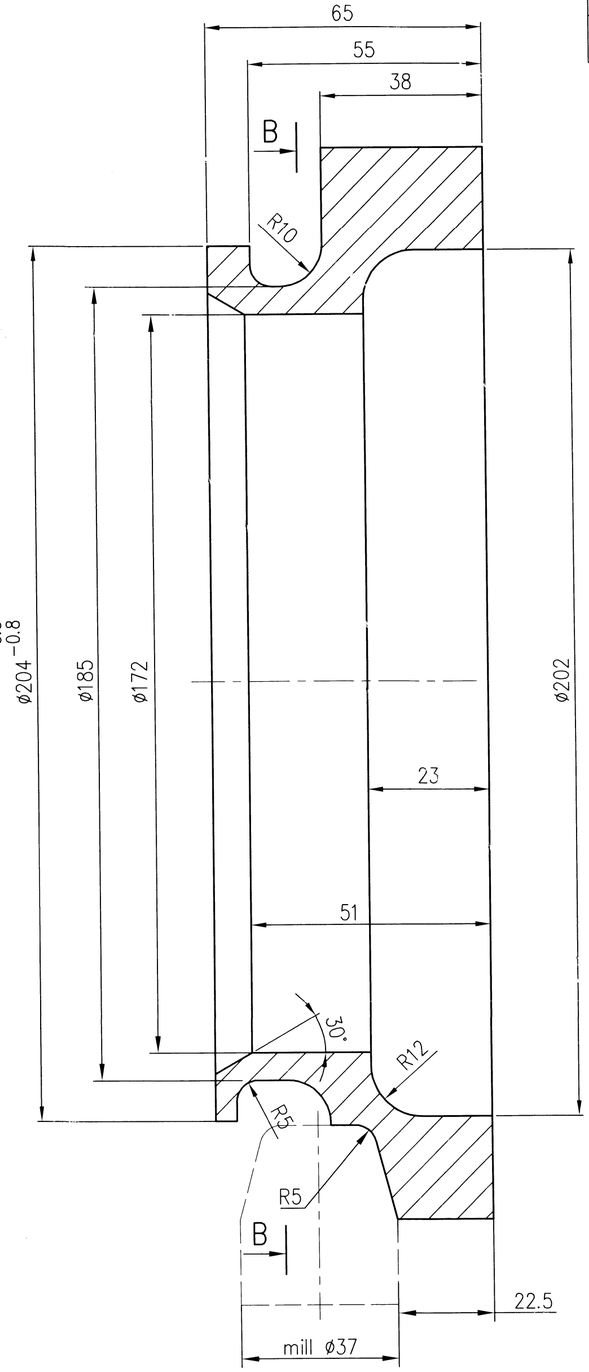
DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.	11/11/16		ISSUE No.
DRN.	10/8/16		
CHD.			Rev. No.
APPD.	11/11/16	DRG.No. SE MOCK-UP.2150.3004.00.1	FORMAT A4
2016 SIGN.	DATE	SCALE 1:1	SHEET 1 OF 1

SRQA LPSC		SCP cC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"BB"



SECTION–"AA"



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL SS304
Mechanical properties

SURFACE TREATMENT

Concentricity
Perpendicularity
Angularity
Parallelism

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE FINISH
√ Ra 1.6

MARKING

Calculated Mass
kg.

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TITLE

Flange

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

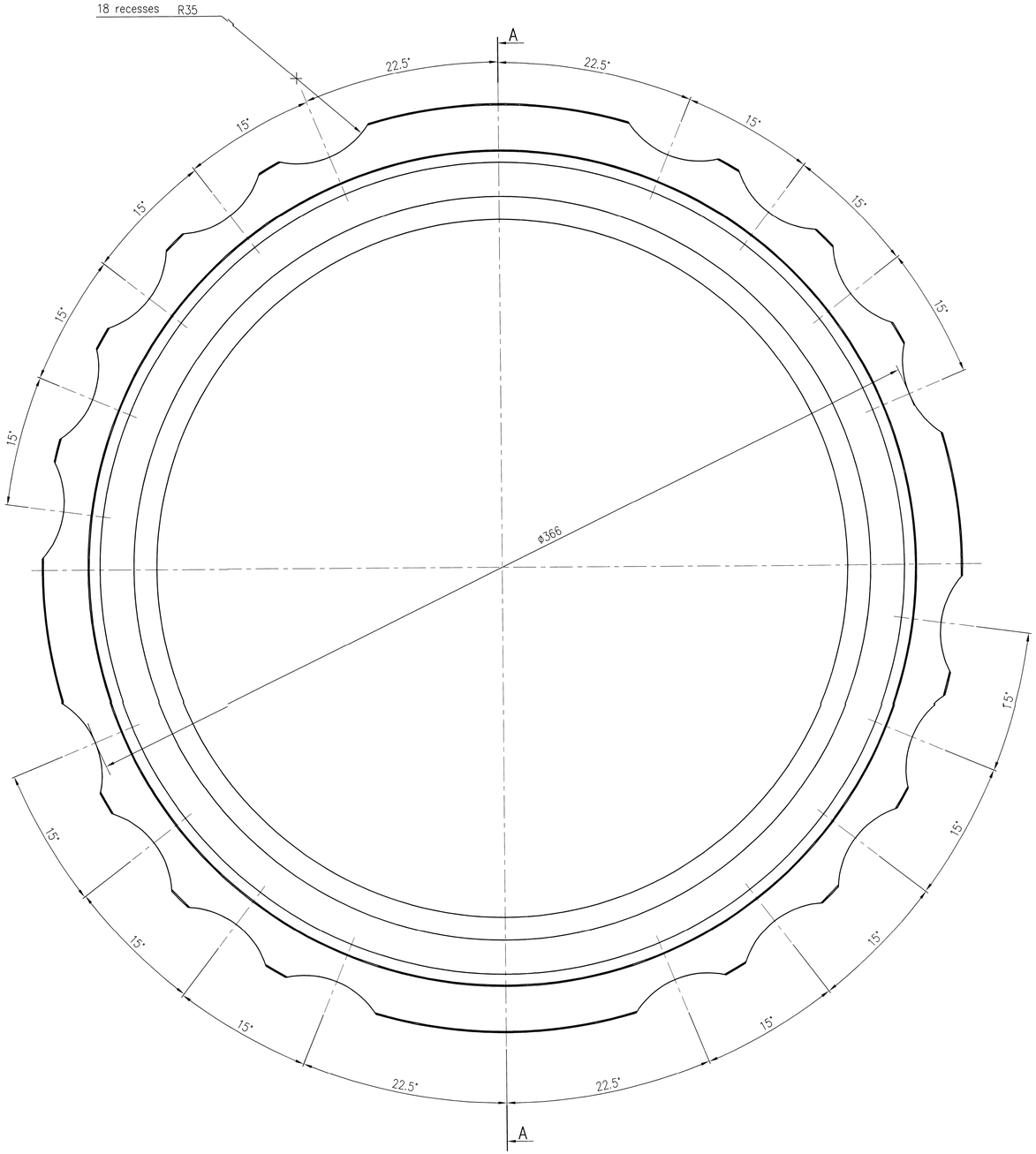
DGN.		1/11/16
D.CHD.		11/11/16
DRN.		11/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

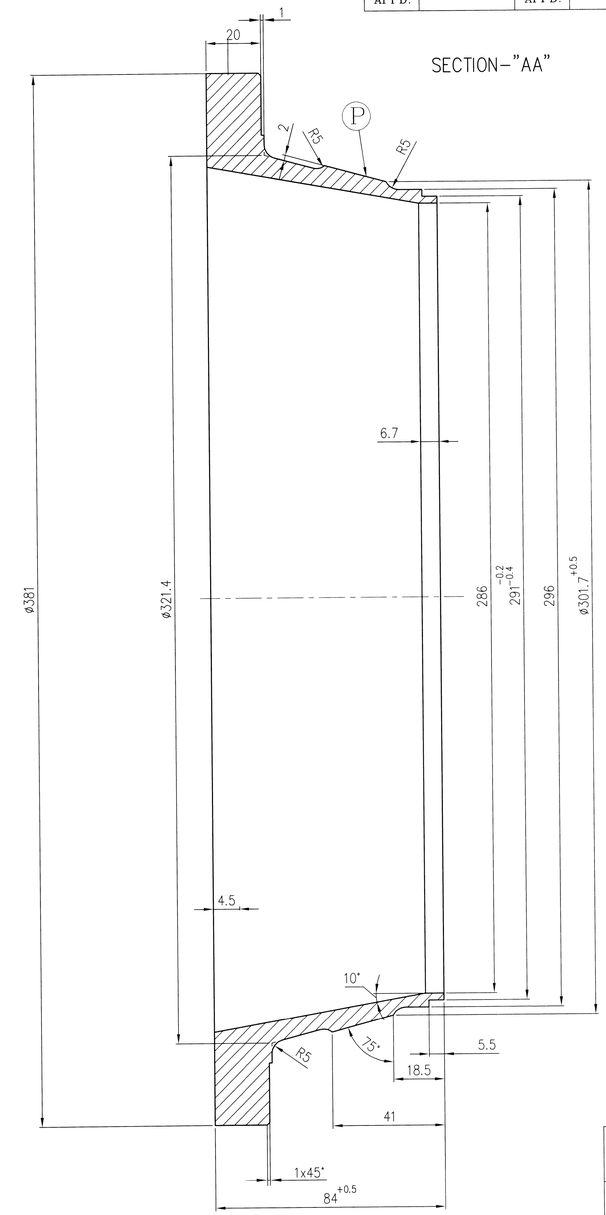
TPD–SC/CPEG
ISSUE No.

DRG.No. SE MOCK-UP.2150.3003.00.1
Rev. No.
FORMAT A2
SCALE 1:1
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA"



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 20	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30′	±20′	±10′

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of SDSC and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

TITLE

Flange

DGN.		1/11/16	
D.CHD.		1/11/16	
DRN.	Raghu	11/9/15	
CHD.		1/11/16	
APPD.		1/11/16	
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2150.3001.00.1
SCALE 1:1 SHEET 1 OF 1

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ISSUE No.
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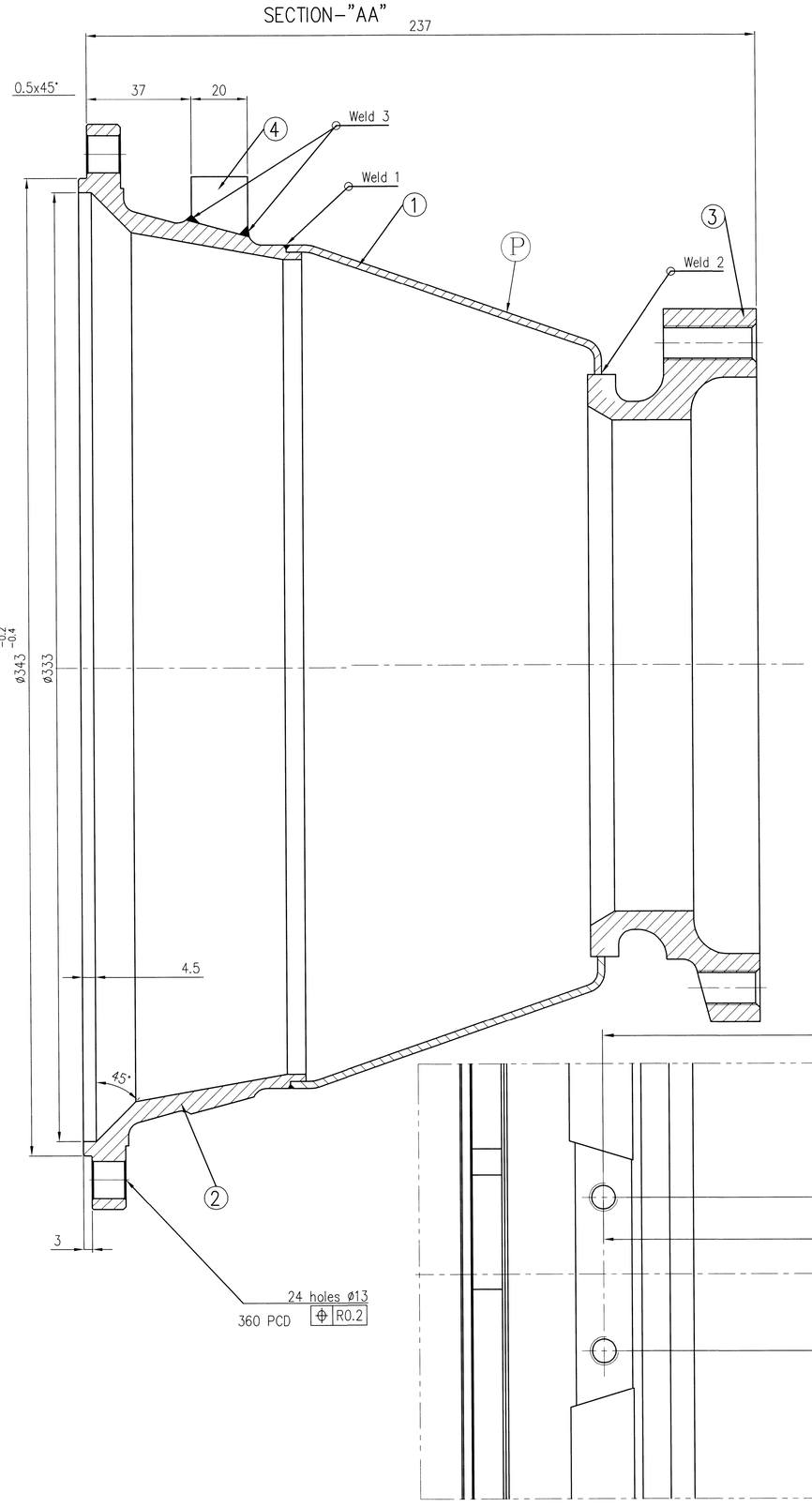
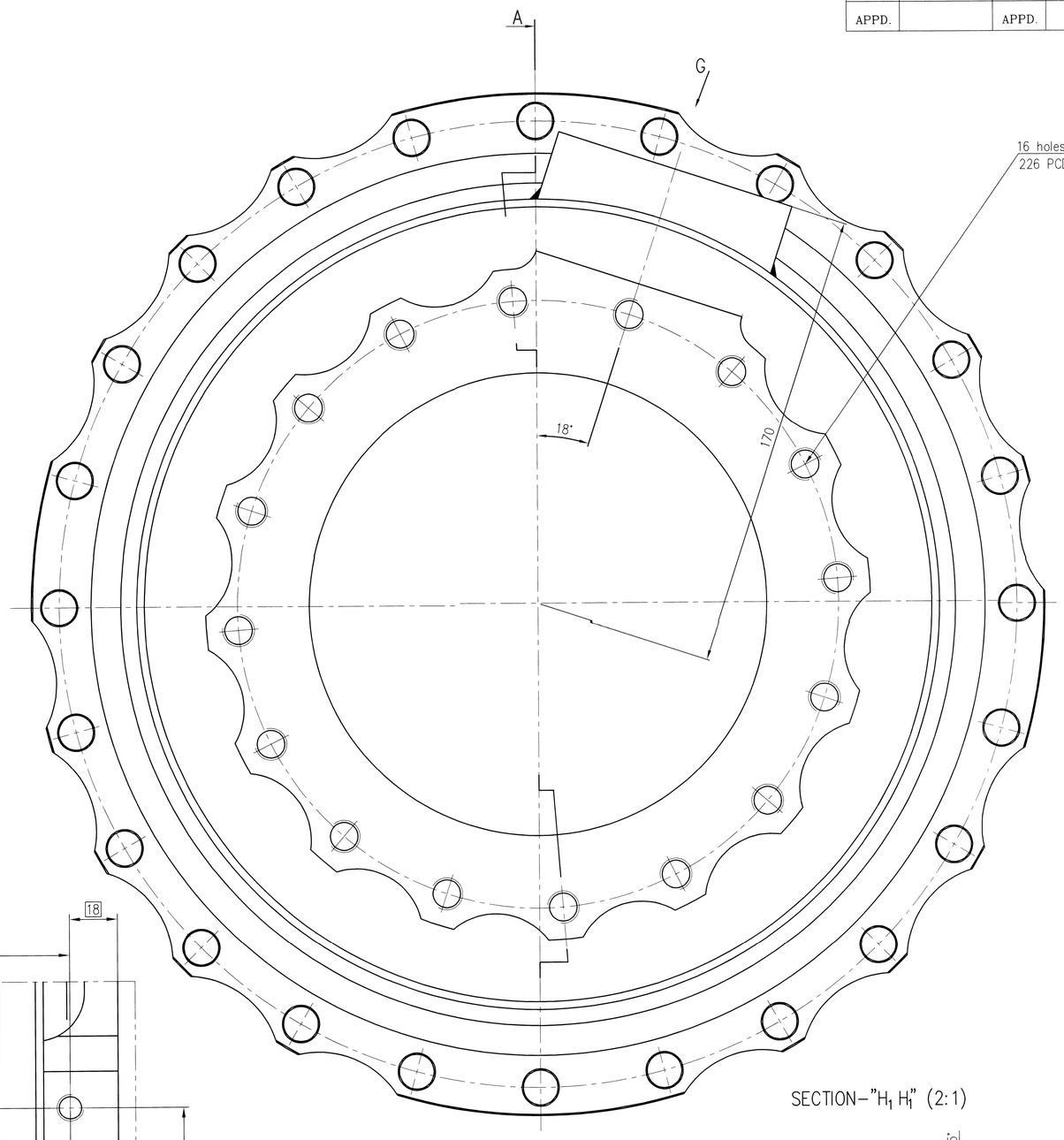
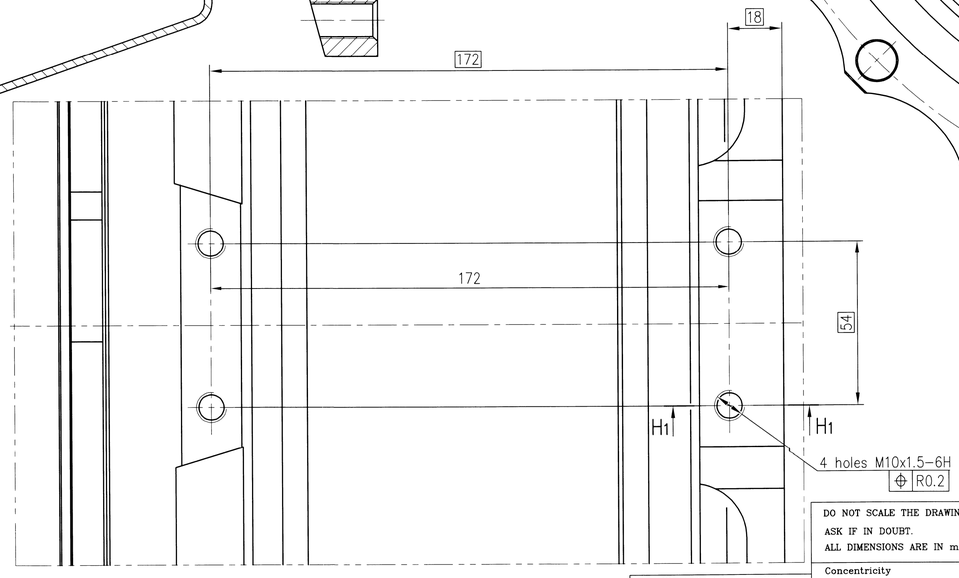
FORMAT A1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"

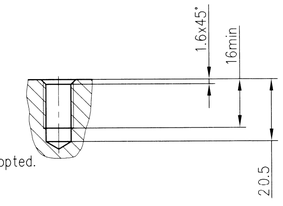






VIEW FROM–"G"

SECTION–"H_1 H_1" (2:1)



LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30′	±20′	±10′

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

Notes
1. Use filler wire:–AISI316/308 for welding. Suitable weld configuration may be adopted.
2. Threads should be free from chatterimg marks, burrs, peeling off etc.
3. Engrave drawing number at P.

TITLE
Outlet Branch Assembly

DGN.		
D.CHD.		
DRN.	Raghu	14/3/16
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

DRG.No. SE MOCK–UP.2150.3000.00.0AD
SCALE 1:1 SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

ISSUE No.
Rev. No.
FORMAT A1

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2150.3000.00.0AD		Outlet branch assembly		
					Parts		
A2		1	SE MOCK-UP.2150.3100.00.0		Shell	1	
A1		2	SE MOCK-UP.2150.3001.00.1		Flange	1	
A2		3	SE MOCK-UP.2150.3003.00.1		Flange	1	
A4		4	SE MOCK-UP.2150.3004.00.1		Plate	1	

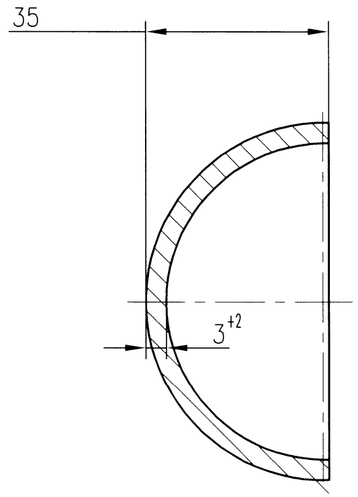
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

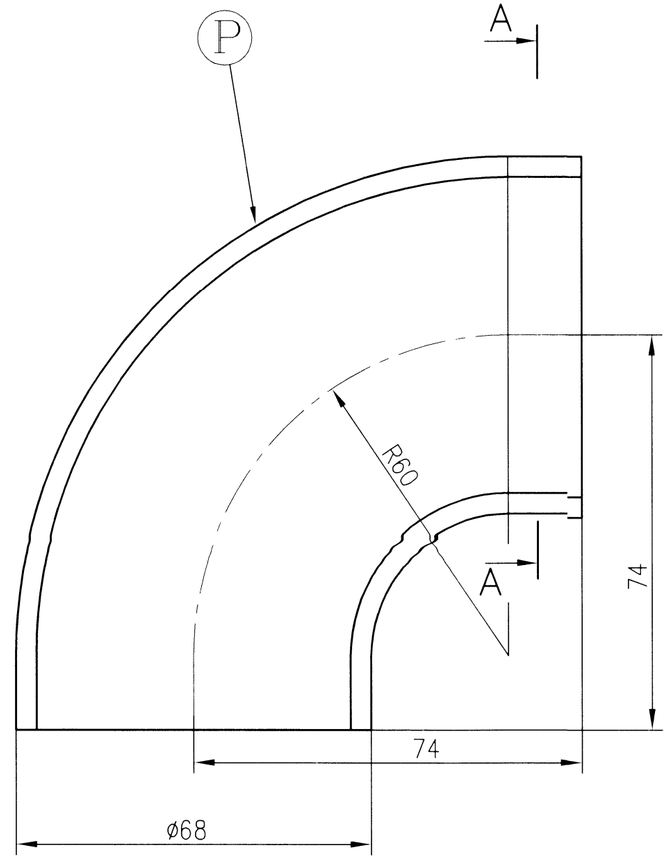
	TITLE	Outlet Branch Assembly		INDEX	MODIFICATION ORDER No. & DATE
					REVISION

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG	
D.CHD.		1/11/16		ISSUE No.	
DRN.		14/9/16			
CHD.				Rev. No.	FORMAT
APPD.			DRG.No. SE MOCK-UP.2150.3000.00.0		A4
2016	SIGN.	DATE	SHEET 1 OF 1		

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE UPTO 6	6–30	30–120	120–400	▽	▽▽	▽▽▽	▽▽▽▽
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'	6–25	1.6–6	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Sheet 3 mm. SS304 Mechanical properties	SURFACE TREATMENT		TITLE Half–branch	INDEX / MODIFICATION ORDER No. & DATE
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING	Calculated Mass kg.		REVISION

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DGN.		11/11/16	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547
D.CHD.		1/11/16	
DRN.	Raghu	14/9/15	
CHD.			
APPD.		1/11/16	
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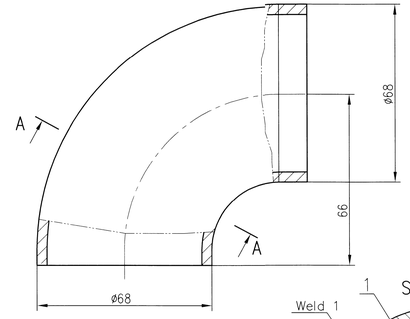
TPD–SC/CPEG

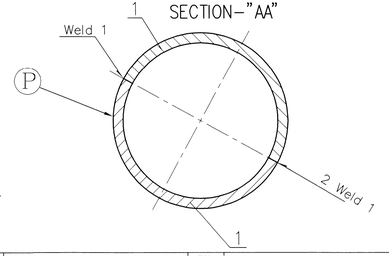
ISSUE No.

DRG.No. SE MOCK–UP.2150.2201.00.1 | Rev. No. | FORMAT A3

SCALE 1:1 | SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





Note
1. Use filler wire:–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

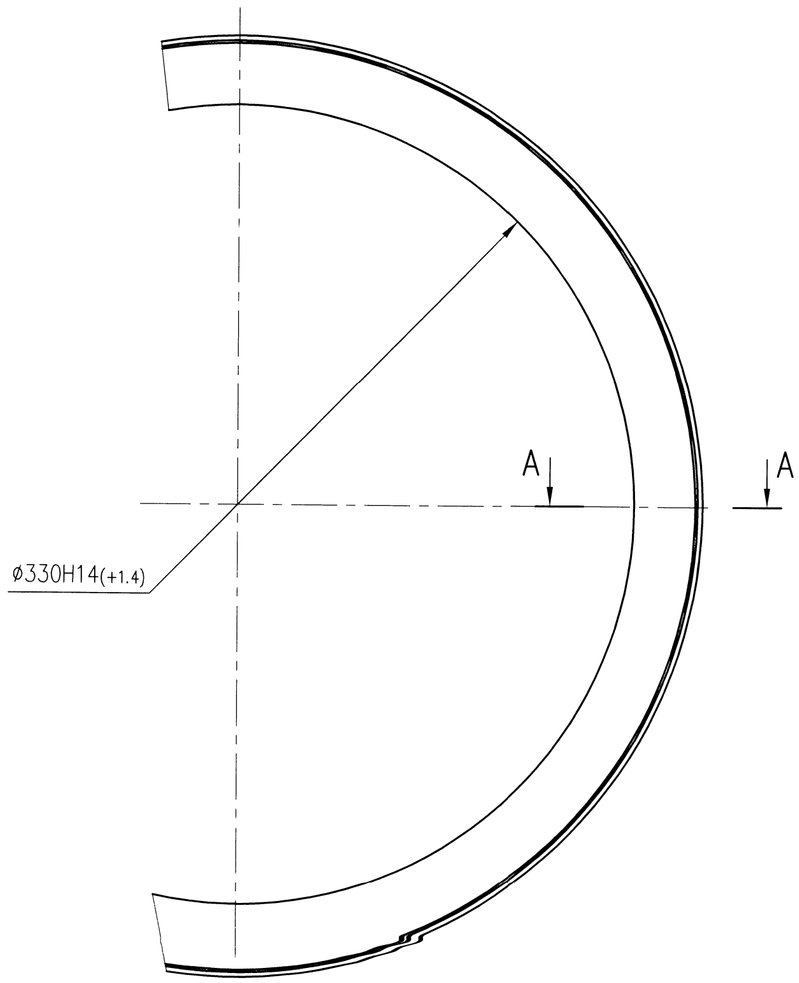
| MACHINING DEVIATION TO IS:2102 MEDIUM (GRADE) UNLESS SPECIFIED OTHERWISE | | |

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A3			SE MOCK-UP.2150.2200.00.0AD		Branch assembly		
					Parts		
A3		1	SE MOCK-UP.2150.2201.00.1		Half-branch	2	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

	TITLE: Branch assembly			INDEX	MODIFICATION ORDER No. & DATE
					REVISION
DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547		TPD-SC/CPEG
D.CHD.					ISSUE No.
DRN.					
CHD.					
APPD.			DRG.No. SE MOCK-UP.2150.2200.00.0	Rev. No.	FORMAT A4
2016	SIGN.	DATE	SHEET 1 OF 1		

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



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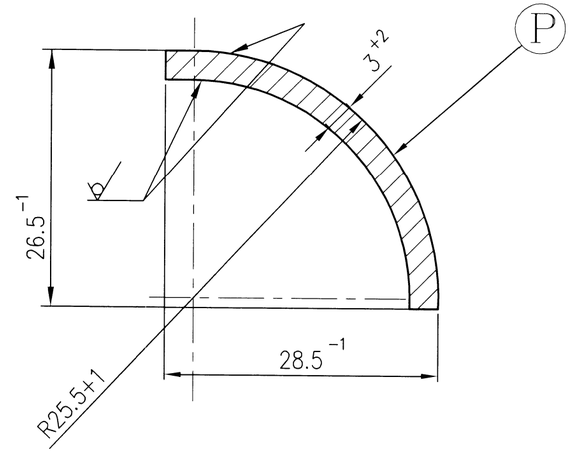

1. Engrave darwing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE												MACHINING FINISH IN MICRONS				LENGTH in mm OF SHORTER SIDE OF ANGLE				
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE					▽	▽▽	▽▽▽	▽▽▽▽	UPTO 6	6–30	30–120	120–400	
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0					8–25	1.6–8	0.025–1.6	< 0.025	±1°	±30'	±20'	±10'	
6 30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5													
30 120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0													
120 315	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±11.0													
315 1000	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±11.0	±18.0													
1000 2000	±1.2	±2.0	±3.0	±4.5	±7.0	±11.0	±18.0	±28.0													
2000 4000	±2.0	±3.0	±4.5	±7.0	±11.0	±18.0	±28.0	±44.0													
4000 ABOVE	±3.0	±4.5	±7.0	±11.0	±18.0	±28.0	±44.0	±70.0													

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet 3mm SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
√ Ra 12.5 (√)

MARKING

Calculated Mass
kg.

SCP

TITLE
Half–sector

DGN.			
D.CHD.		1/11/16	
DRN.	Raghu	30/11/16	
CHD.			
APPD.			
	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2150.2121.00.1
Rev. No.
FORMAT A3
SCALE 1:2
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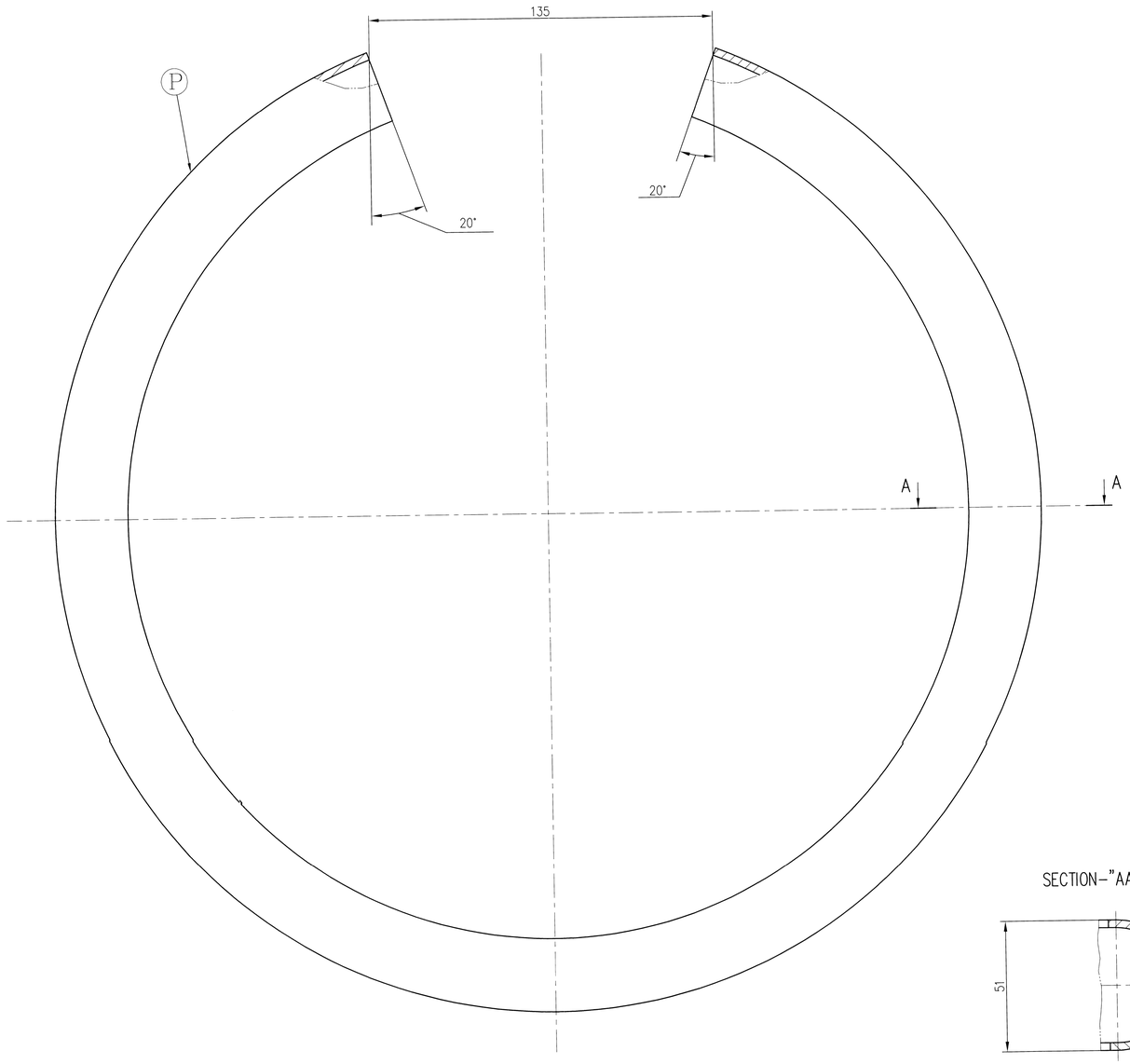
TPD–SC, CPEG
ISSUE No.

INDEX	MODIFICATION ORDER No. & DATE

REVISION

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



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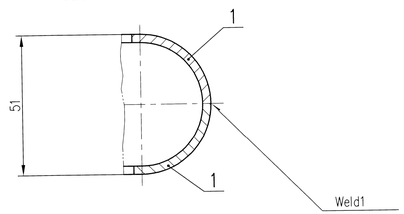

Note
1. Using filler wire :–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE
Manifold's sector assembly

DGN.		11/11/16
D.CHD.		11/11/16
DRN.	Raghu	11/11/16
CHD.		
APPD.		11/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK-UP.2150.2120.00.0AD
SCALE 1:1 SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
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TPD–SC/CPEG
ISSUE No.
Rev. No.
FORMAT A1

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2150.2120.00.0AD		Manifold's sector		
					assembly		
					Parts		
A3		1	SE MOCK-UP.2150.2121.00.1		Half-sector	2	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Manifold's sector assembly

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	11/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2150.2120.00.0

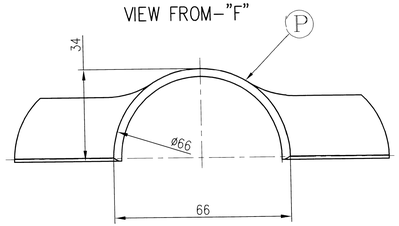
Rev. No.

FORMAT A4

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

VIEW FROM–"F"



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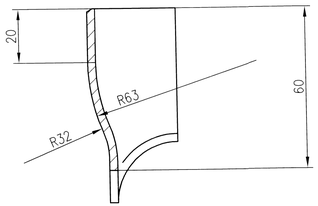

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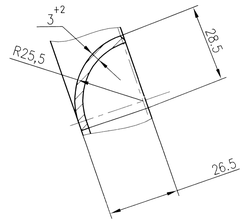

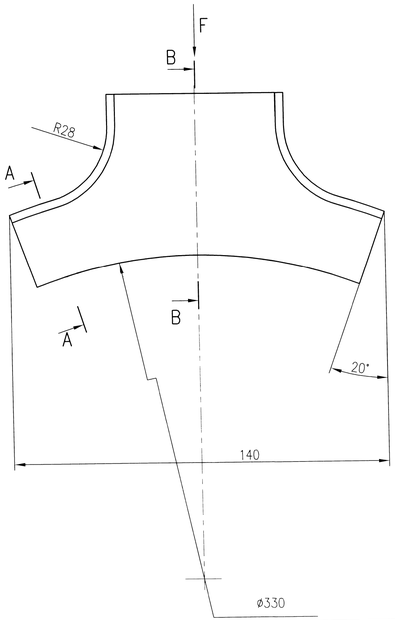

1. Engrave drawing number at P.

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH in mm OF SHORTER SIDE OF ANGLE			
OR	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

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MATERIAL Sheet 3.5mm SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽

MARKING

Calculated Mass — kg

TITLE

Half–branch

DGN.		11/11/16	
D.CHD		11/11/16	
DRN.		10/8/16	
CHD.			
APPD.		11/11/16	
	2016	SIGN	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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DRG.No. SE MOCK–UP.2150.2111.00.1

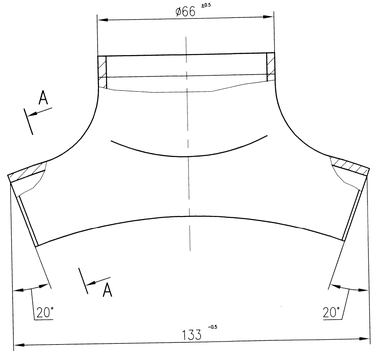
Rev. No.

FORMAT A2

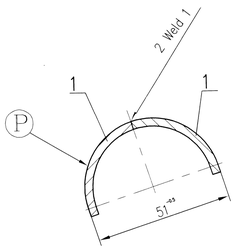
SCALE : :

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA"



Notes

1. Use filler wire:-AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS 2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	1000 TO 2000	2000 TO 4000	4000 AND MORE
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0
6 TO 30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±5.0
30 TO 120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±5.0	±8.0
120 TO 315	±0.5	±0.8	±1.2	±2.0	±3.0	±5.0	±8.0	±12.0
315 TO 1000	±0.8	±1.2	±2.0	±3.0	±5.0	±8.0	±12.0	±20.0
1000 TO 2000	±1.2	±2.0	±3.0	±5.0	±8.0	±12.0	±20.0	±30.0
2000 TO 4000	±2.0	±3.0	±5.0	±8.0	±12.0	±20.0	±30.0	±50.0
4000 AND MORE	±3.0	±5.0	±8.0	±12.0	±20.0	±30.0	±50.0	±80.0

UPTO 6	6 TO 30	30 TO 120	120 TO 400
±1°	±30'	±30'	±15'

MACHINING FINISH IN MICRONS

▽	▽▽	▽▽▽	▽▽▽▽
6.3–25	1.6–6.3	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Mechanical properties	SURFACE TREATMENT	TITLE: Branch assembly
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING Calculated Mass kg.	DGN. 1/11/16 D.CHD. 1/11/16 DRN. 11/3/15 CHD. APPD. 1/11/16 2016 SIGN. DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2150.2110.00.0AD

Rev. No.

FORMAT A3

SCALE 1:1

SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE

REVISION

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A3			SE MOCK-UP.2150.2110.00.0AD		Branch assembly		
					Parts		
A2		1	SE MOCK-UP.2150.2111.00.1		Half-branch	2	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Branch assembly

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DGN		
D.CHD.		17/11/16
DRN.		17/11/16
CHD.		
APPD.		17/11/16
2016	SIGN.	DATE

DRG No. SE MOCK-UP.2150.2110.00.0

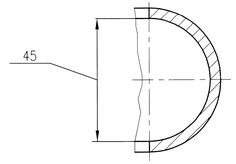
Rev. No.

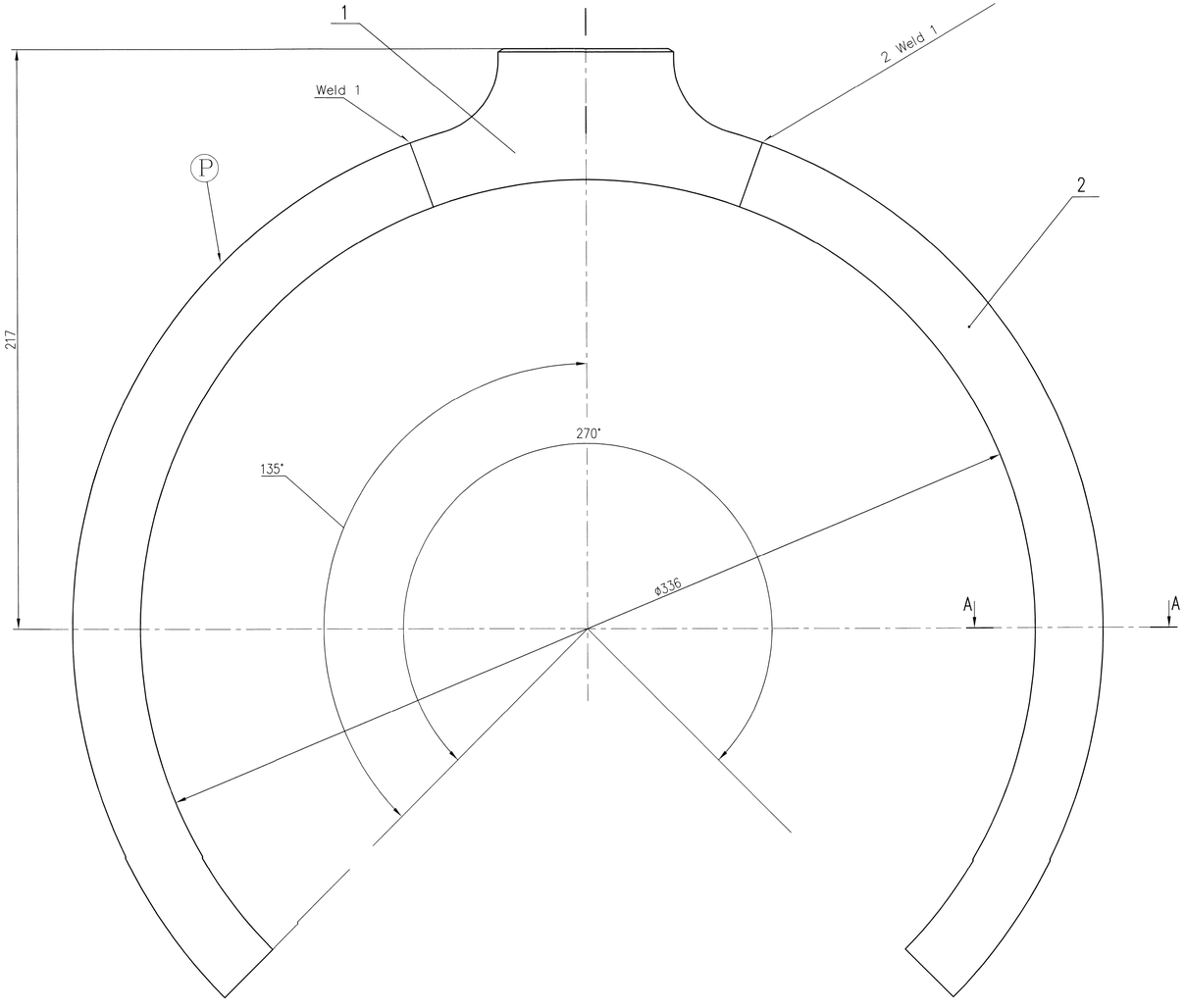
FORMAT A4

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





Notes

1. Using filler wire:–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE		
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE
Manifold assembly

DGN.		1/11/16
D.CHD.		1/11/16
DRN.		14/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2150.2100.00.0AD
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ISSUE No.
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Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2150.2100.00.0AD		Manifold assembly		
					Units		
A4		1	SE MOCK-UP.2150.2110.00.0		Branch	1	
A4		1	SE MOCK-UP.2150.2120.00.0		Manifold's sector	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Manifold assembly

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
D.CHD.		
DRN.		
CHD.		
APPD.		
2016	SIGN.	DATE

TPD-SC/CPEG

ISSUE No.

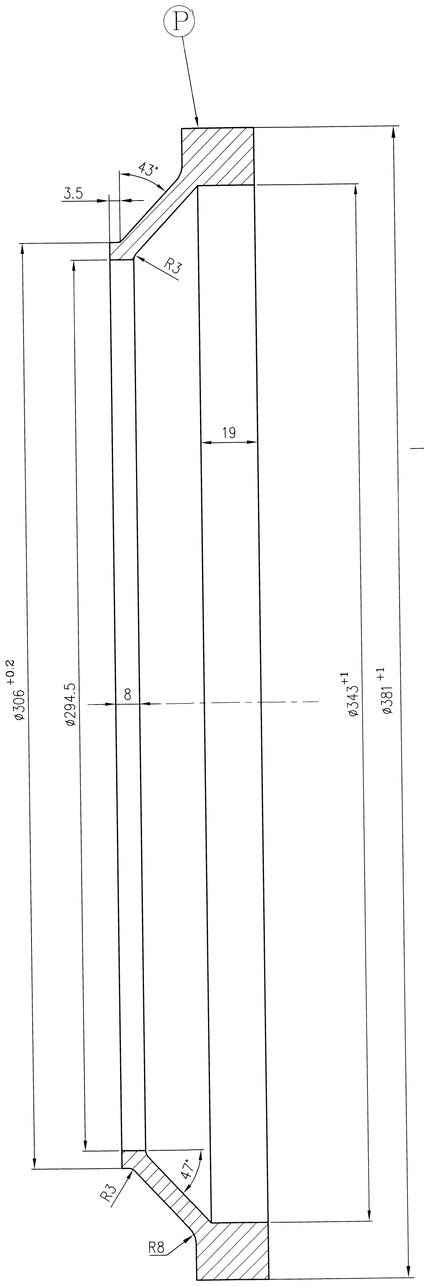
DRG.No. SE MOCK-UP.2150.2100.00.0

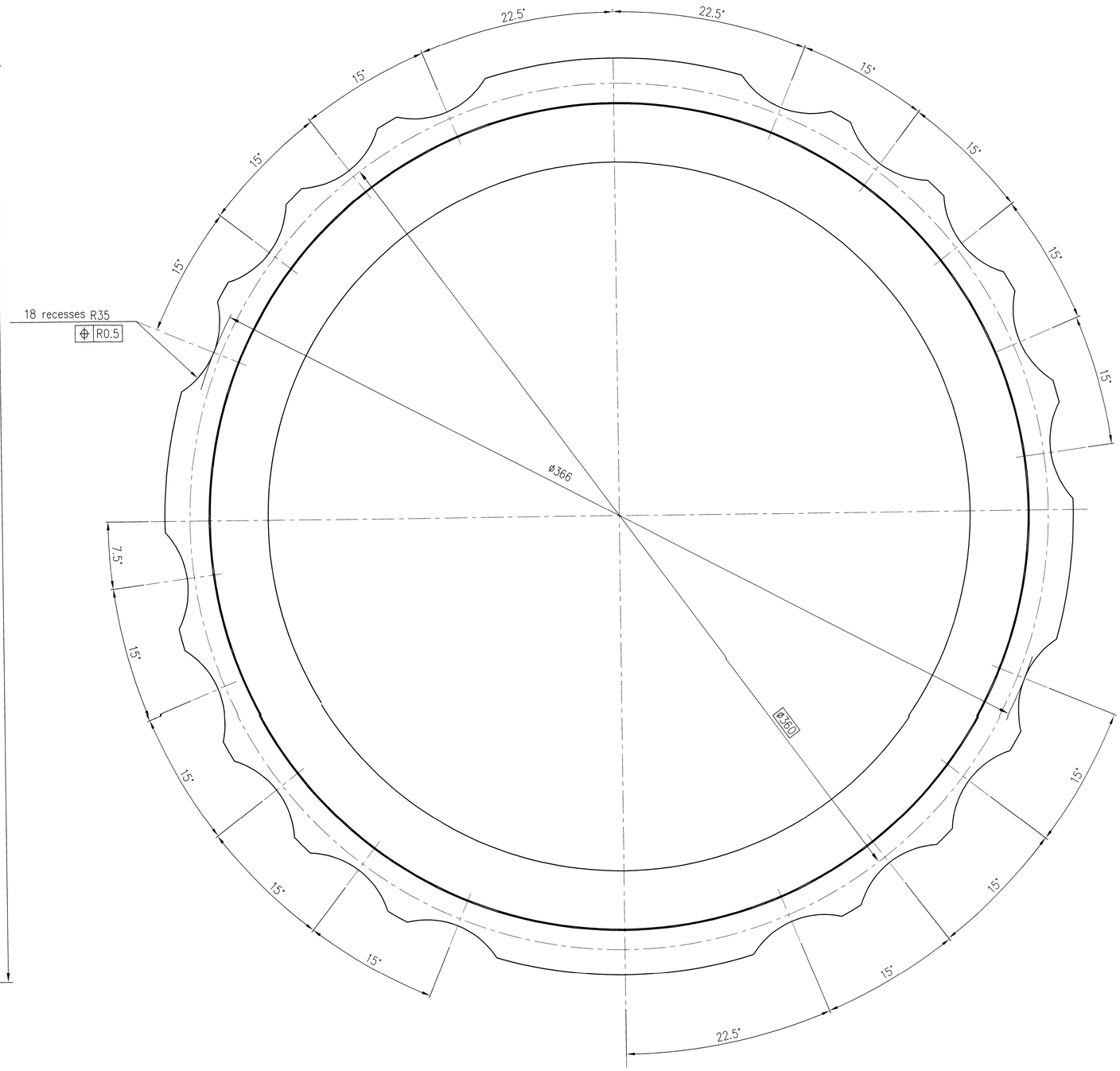
Rev. No.

FORMAT A4

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





Notes

1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	▽	▽▽	▽▽▽	▽▽▽▽
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	6-25	1.6-6	0.025-1.6	< 0.025

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

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg.

TITLE
Flange

DGN.			
D.CHD.		1/11/15	
DRN.	Raghu	01/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2150.2007.00.1
SCALE 1:1 SHEET 1 OF 1

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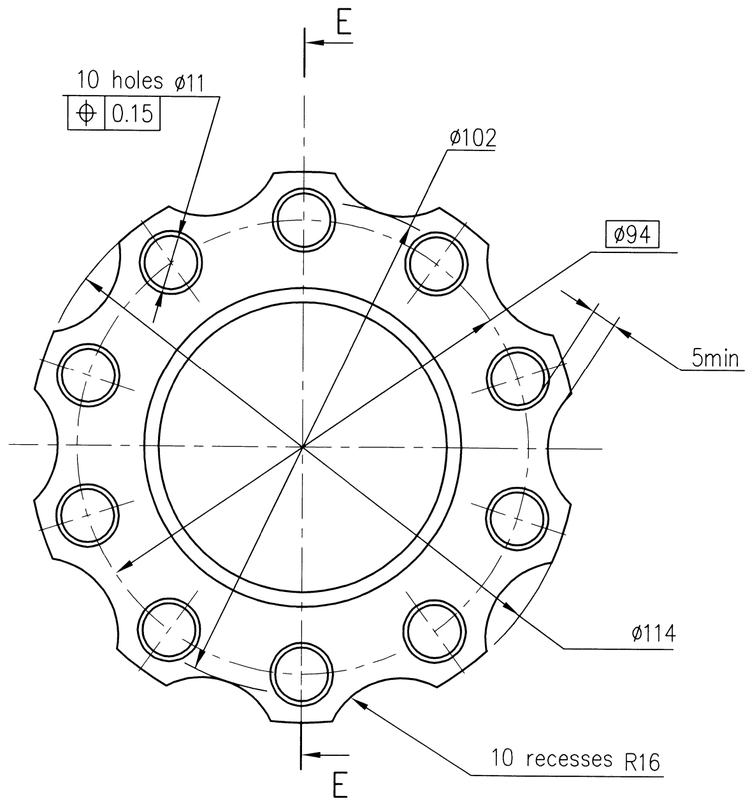
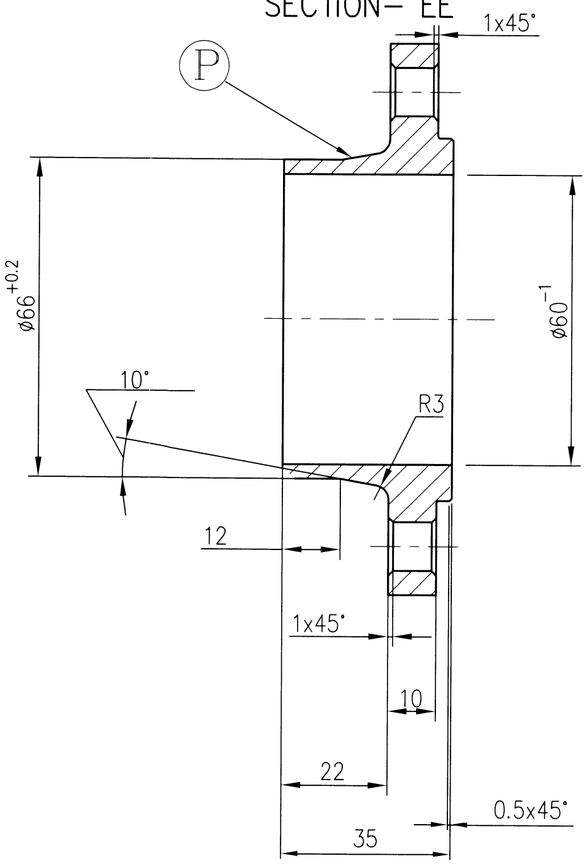
ISSUE No.
Rev. No.
FORMAT A1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE UPTO 6	6–30	30–120	120–400	▽ 8–25	▽▽ 1.6–8	▽▽▽ 0.025–1.6	▽▽▽▽ < 0.025
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'				
6–30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±30'	±20'	±10'	±5'				
30–120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±20'	±10'	±5'	±3'				
120–400	±0.5	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±10.0	±10'	±5'	±3'	±2'				
400–1000	±0.8	±1.2	±2.0	±3.0	±4.5	±7.0	±10.0	±14.0	±5'	±3'	±2'	±1'				
1000–2000	±1.2	±2.0	±3.0	±4.5	±7.0	±10.0	±14.0	±20.0	±3'	±2'	±1'	±30"				
2000–4000	±2.0	±3.0	±4.5	±7.0	±10.0	±14.0	±20.0	±28.0	±2'	±1'	±30"	±20"				

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg

TITLE
Flange

INDEX | MODIFICATION ORDER No. & DATE
REVISION

DGN.		17/11/16
D.CHD.		17/11/16
DRN.	Raghu	16/9/15
CHD.		
APPD.		17/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG
ISSUE No.

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Rev. No.
FORMAT A3
SCALE 1 : 2
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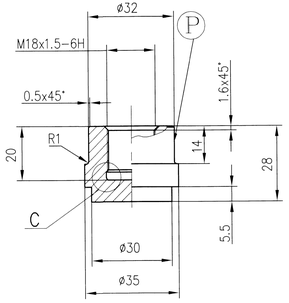
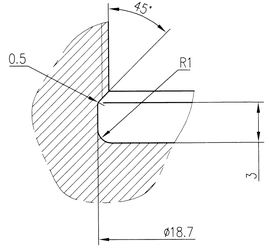
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



DETAIL–"C" (5:1)



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	4000 TO 8000	UPTO 6	6–30	30–120	120–400	MACHINING FINISH IN MICRONS			
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'	∇ 8–25	∇∇ 1.6–6	∇∇∇ 0.025–1.6	∇∇∇∇ < 0.025

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE Boss
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH Ra 2.5	MARKING
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		Calculated Mass kg.	

DGN.		11/11/16	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
D.CHD.		11/11/16	
DRN.		10/11/16	
CHD.			
APPD.		11/11/16	
2016	SIGN.	DATE	

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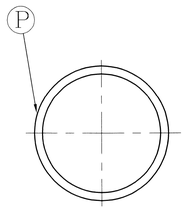
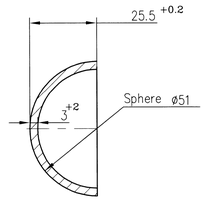
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE												MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12000	UPTO 16000	UPTO 20000	UPTO 25000	∇	∇∇	∇∇∇	∇∇∇∇
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4.0	±5.0	±6.0	±8.0	6.3-25	1.6-6.3	0.025-1.6	< 0.025

LENGTH OR DIA	UNLESS SPECIFIED OTHERWISE ANGULAR DEVIATION IN ± MIN. OF DEGREE & SIZE OF ANGLE						
	UPTO 10	UPTO 50	UPTO 120	UPTO 400	UPTO 1000	UPTO 2000	UPTO 4000
	1°	30'	20'	10'	5'	3'	2'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Sheet 3mm SS304 Mechanical properties	SURFACE TREATMENT	TITLE Bottom
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING	Calculated Mass kg.

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DGN.			
D.CHD.		1/11/16	
DRN.	Roopa	14/9/11	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

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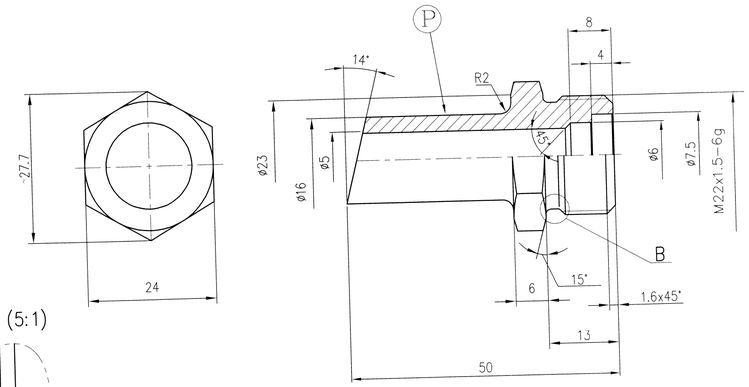
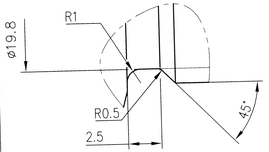
APPD.		APPD.	



DETAIL-"B" (5:1)



1. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 4	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE	UPTO 6	6–30	30–120	120–400
	1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS

▽	▽▽	▽▽▽	▽▽▽▽
8–32	1.6–8	0.05–1.6	0.025

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304L Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH Ra 1.6 MARKING

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

Calculated Mass ____ kg

TITLE: Connector

DGN.			
D.CHD.			
DRN.	Raghu	12/3/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2150.2003.00.1
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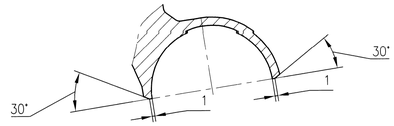
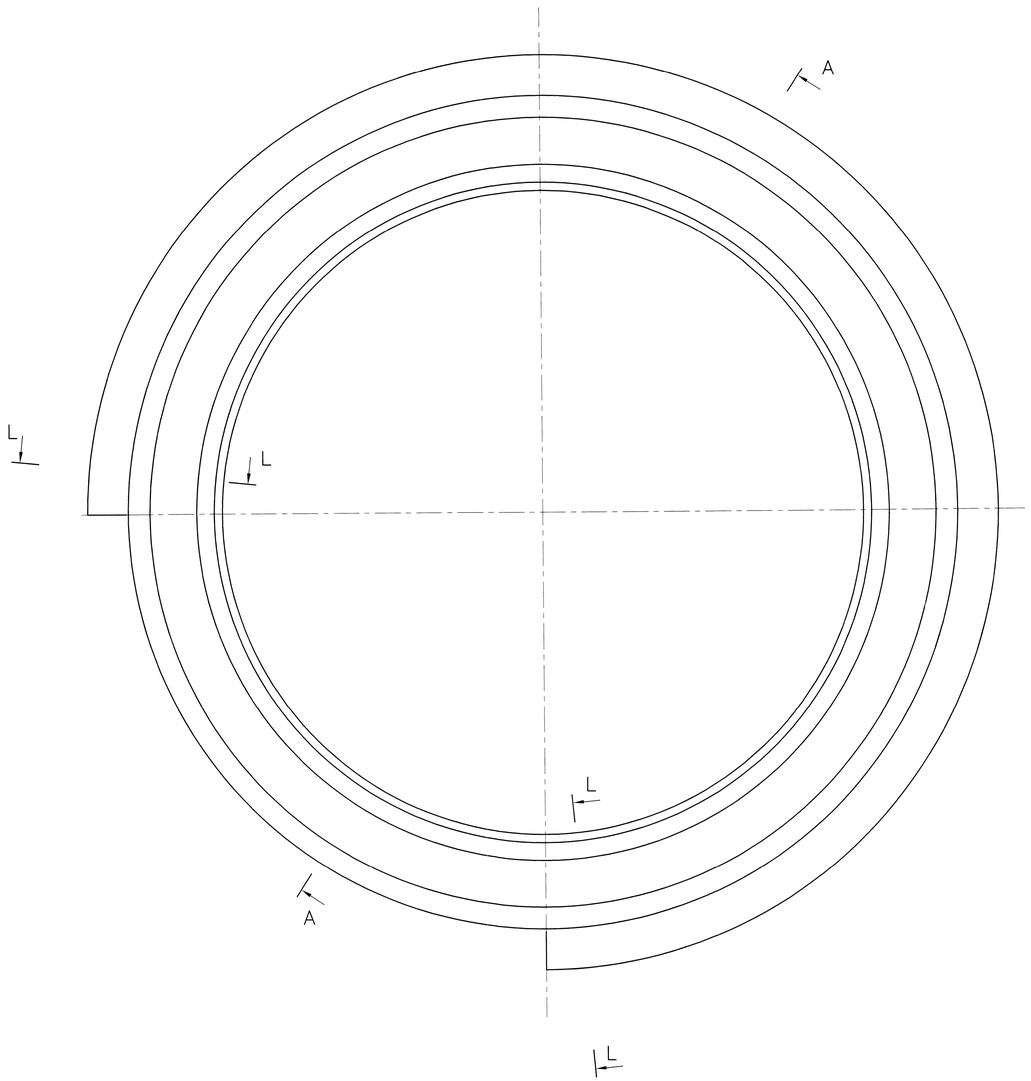
APPD.		APPD.	

SECTION–"LL"





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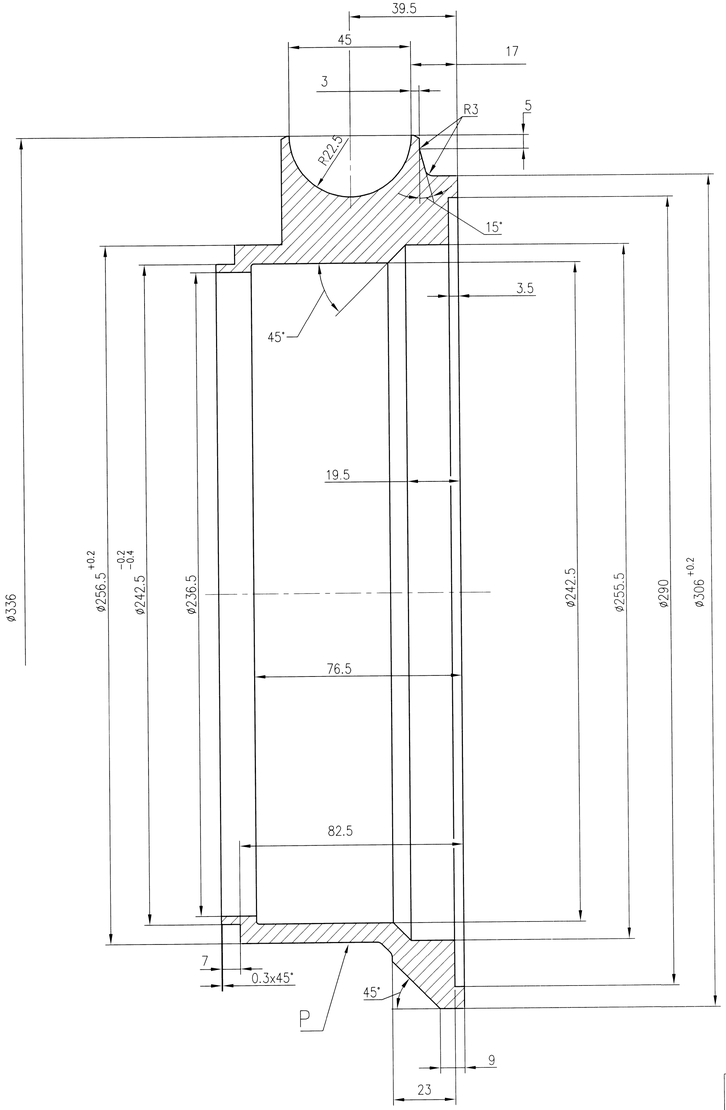

Note.
1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 1.6

MARKING

Calculated Mass kg.

TITLE
Nozzle set

DGN.		
D.CHD.		11/1/16
DRN.	Raghu	19/2/15
CHD.		
APPD.		11/1/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MODEL.2150.2002.00.1 | Rev. No. | FORMAT A1
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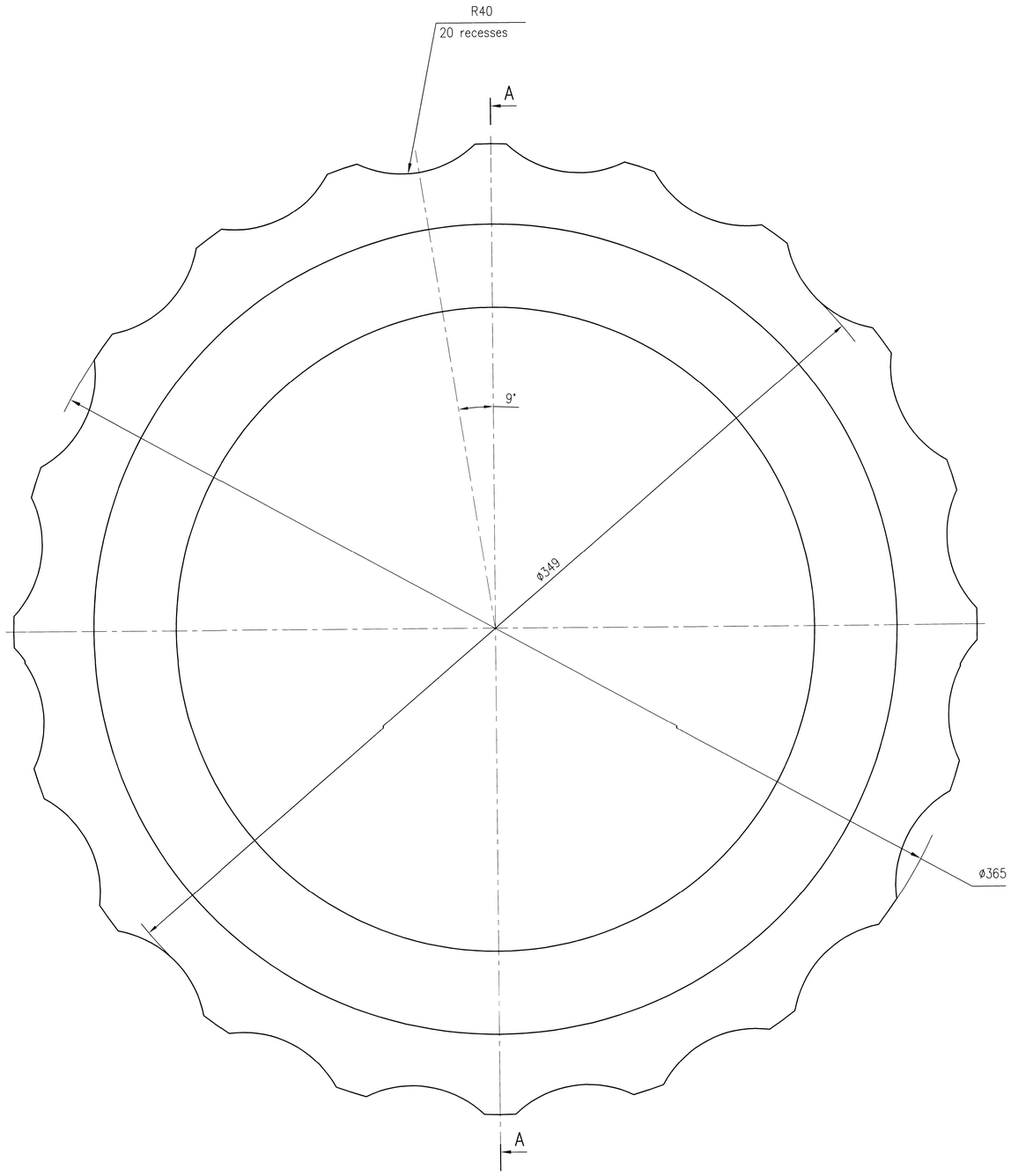
APPD.		APPD.	



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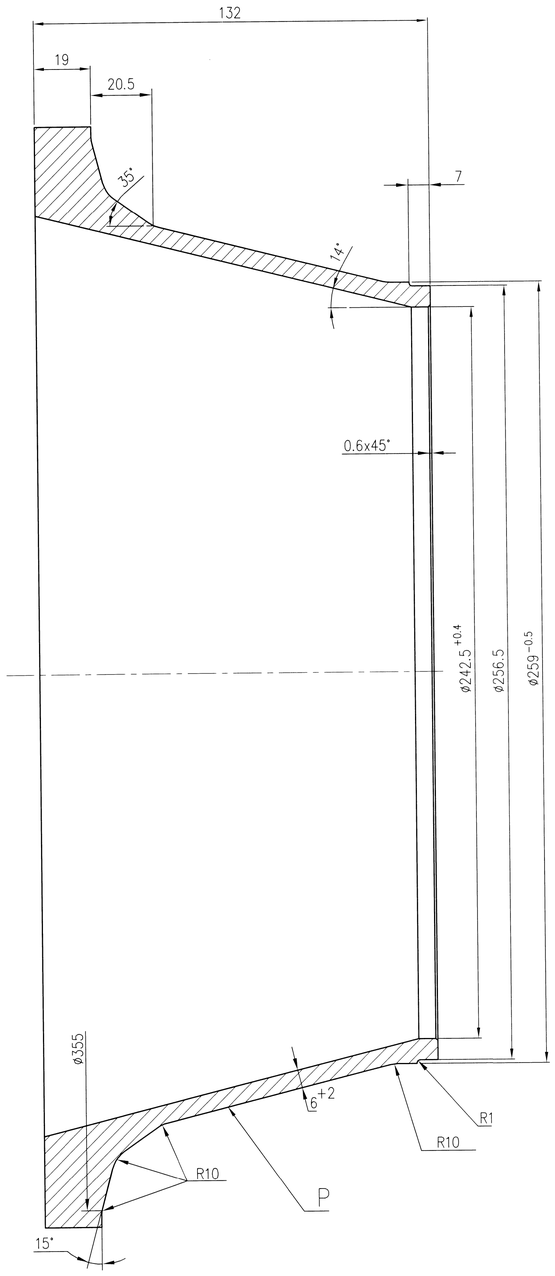

Note.
1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
√Ra 2.5

MARKING

Calculated Mass kg.

DGN. 11/11/16
D.CHD. 11/11/16
DRN. 21/8/15
CHD.
APPD. 11/11/16
2016 SIGN. DATE

TITLE
Inlet branch

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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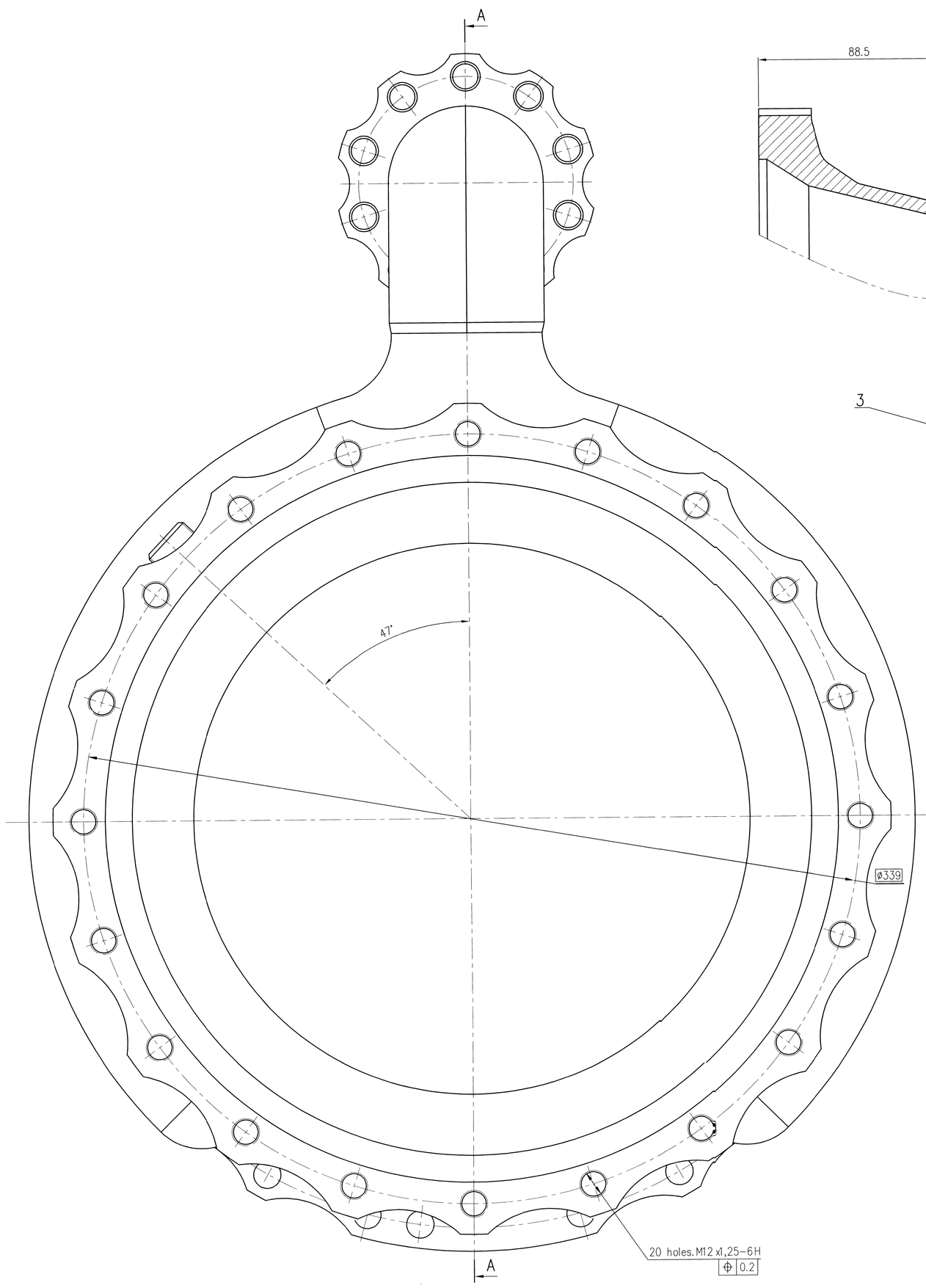

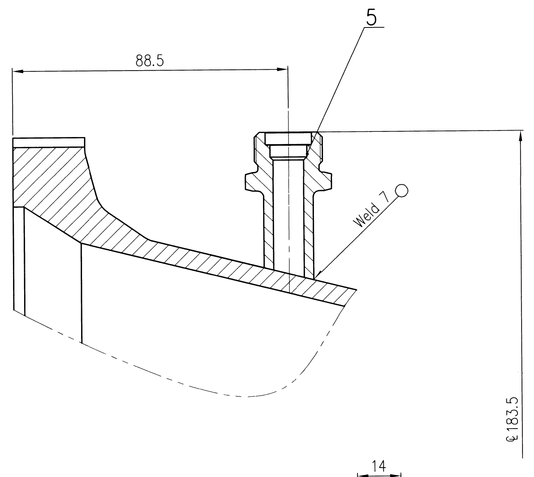

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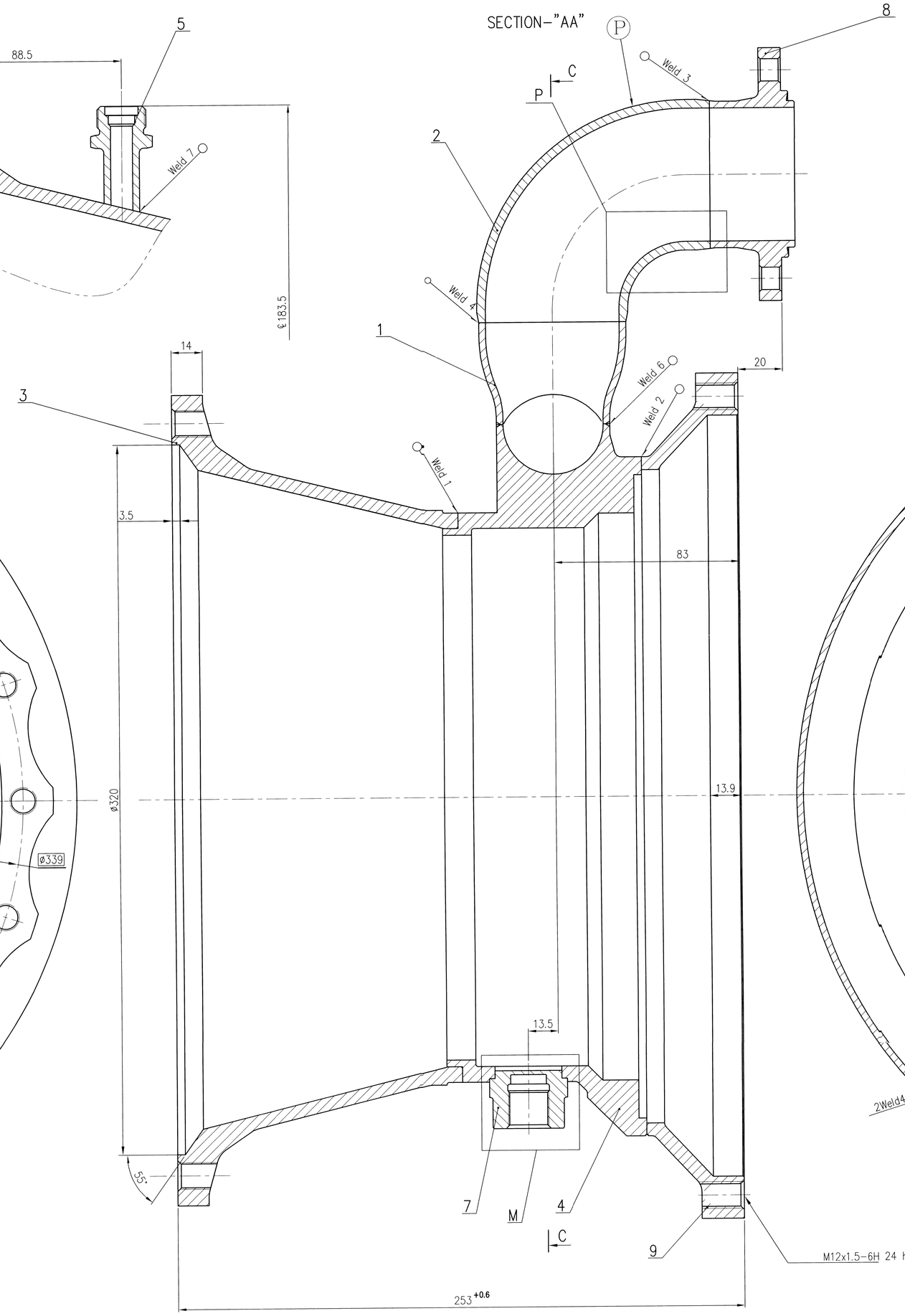

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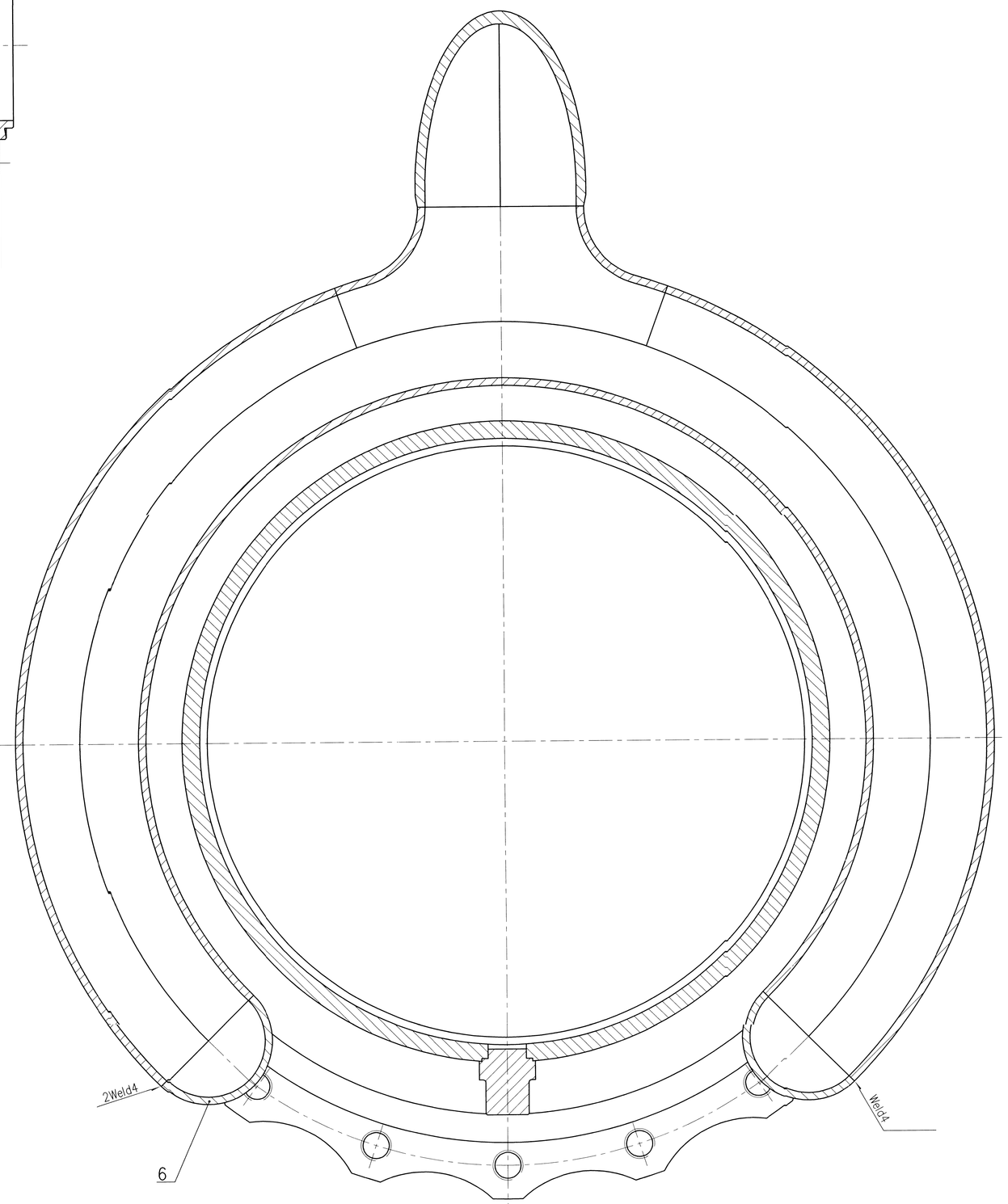
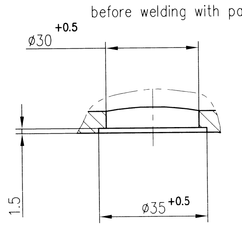
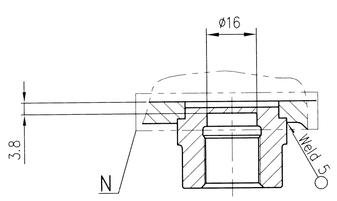


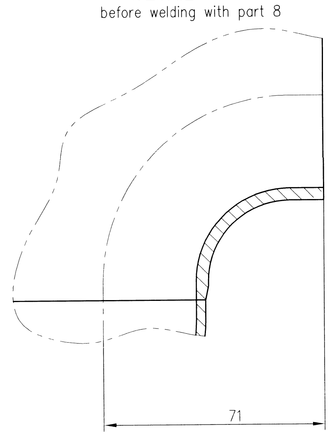
DETAIL–"N"
before welding with part 7



DETAIL–"M"



DETAIL–"P"
before welding with part 8



Notes
1. For welding – Use filler wire AISI 316L/308. Suitable weld configuration may be adapted.
2. Threads should be freefrom burrs, chattering marks, peeling off etc.
3. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE.											
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	ABOVE 4000	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±17

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.8–8	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Qty. per Assembly

Calculated Mass kg

TITLE
Casing Assembly

DGN.		
D.CHD.		
DRN.		
CHD.		
APPD.		
2016	SIGN	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA THIYANDRUM-695547

DRG No. SE MOCK-UP.2150.2000.00.0AD
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					Documentation		
A0			SE MOCK-UP.2150.2000.00.0AD		Casing assembly		
					Units		
A4		1	SE MOCK-UP.2150.2100.00.0		Manifold	1	
A4		2	SE MOCK-UP.2150.2200.00.0		Branch	1	
					Parts		
A1		3	SE MOCK-UP.2150.2001.00.1		Inlet branch	1	
A1		4	SE MOCK-UP.2150.2002.00.1		Nozzle set	1	
A3		5	SE MOCK-UP.2150.2003.00.1		Connector	1	
A3		6	SE MOCK-UP.2150.2004.00.1		Bottom	2	
A3		7	SE MOCK-UP.2150.2005.00.1		Boss	1	
A3		8	SE MOCK-UP.2150.2006.00.1		Flange	1	
A1		9	SE MOCK-UP.2150.2007.00.1		Flange	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Casing assembly

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

DGN.		
D.CHD.		1/11/16
DRN.	Raghu	14/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2150.2000.00.0

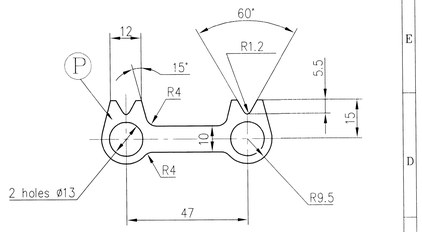
Rev. No.

FORMAT A4

SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P..

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Sheet 1mm 304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING

TITLE

Lock washer

Calculated Mass kg

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DGN. D.CHD. DRN. CHD. APPD. 2016 SIGN. DATE 13/8/15

DRG.No. SE MOCK-UP.2150.0013.00.1

Rev. No.

FORMAT A4

SCALE 1:1

SHEET 1 OF 1

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12000	UPTO 16000	UPTO 20000
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0

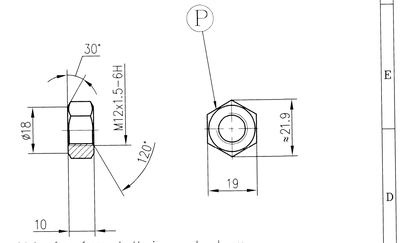
LENGTH IN mm OF SHORTER SIDE OF ANGLE

UPTO 6	UPTO 30	UPTO 120	UPTO 400	UPTO 1000	UPTO 2000	UPTO 4000
±1°	±30'	±20'	±10'	±5'	±3'	±2'

INDEX	AMEND.No.	DATE

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Commercially avaialbale M10 nut meeting the drawing diemsions can be used.
3. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														
LENGTH OR DIA	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	ABOVE 4000	UPTO 6	6–30	30–150	150–400	400–1000	1000 & ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±15'	±10'	±5'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH	MARKING

DATE	INDEX	AMEND.No.	DATE	INDEX	AMEND.No.
C	B	D	F	E	D

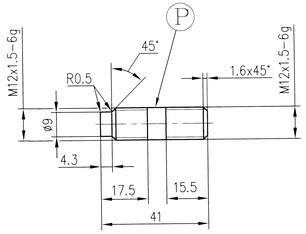
TITLE: Nut

Calculated Mass: ____ kg

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.			ISSUE No.
DRN.	Raghu 12/3/15		
CHD.			Rev. No.
APPD.		DRG.No. SE MOCK-UP.2150.0012.00.1	FORMAT A4
2016	SIGN. DATE	SCALE 1:1	SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.4	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes
1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √Ra 2.5 MARKING

DATE	TITLE: Stud	Calculated Mass: kg
AMEND.No.		
INDEX		

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.			ISSUE No.
DRN.			
CHD.		DRG.No. SE MOCK-UP.2150.0011.00.1	Rev. No. / FORMAT A4
APPD.		SCALE 1:1	SHEET 1 OF 1
2016	SIGN.	DATE	

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 16000	UPTO 32000
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0
6 TO 30	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0
30 TO 120	±0.3	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0	±20.0
120 TO 315	±0.5	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0	±20.0	±32.0
315 TO 1000	±0.8	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0	±20.0	±32.0	±50.0
1000 TO 2000	±1.2	±2.0	±3.2	±5.0	±8.0	±12.0	±20.0	±32.0	±50.0	±80.0
2000 TO 4000	±2.0	±3.2	±5.0	±8.0	±12.0	±20.0	±32.0	±50.0	±80.0	±120.0
4000 TO 8000	±3.2	±5.0	±8.0	±12.0	±20.0	±32.0	±50.0	±80.0	±120.0	±200.0
8000 TO 16000	±5.0	±8.0	±12.0	±20.0	±32.0	±50.0	±80.0	±120.0	±200.0	±320.0
16000 TO 32000	±8.0	±12.0	±20.0	±32.0	±50.0	±80.0	±120.0	±200.0	±320.0	±500.0

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 400
UPTO 10	±1°	±30'	±20'	±10'
10 TO 50	±30'	±20'	±10'	±5'
50 TO 120	±20'	±10'	±5'	±3'
120 TO 400	±10'	±5'	±3'	±2'
400 TO 1000	±5'	±3'	±2'	±1'
1000 TO 3200	±3'	±2'	±1'	±30"
3200 TO 10000	±2'	±1'	±30"	±20"
10000 TO 32000	±1'	±30"	±20"	±10"

MACHINING DEVIATION OF ANGLE IN mm OF SHORTER SIDE

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A0			SE MOCK-UP.2150.0000.00.0AD		LPOT Assembly		
					Units		
A4		2	SE MOCK-UP.2150.2000.00.0		Casing	1	
A4		3	SE MOCK-UP.2150.3000.00.0		Outlet branch	1	
					Parts		
A4		13	SE MOCK-UP.2150.0011.00.1		Stud	24	
A4		14	SE MOCK-UP.2150.0012.00.1		Nut	24	
A4		15	SE MOCK-UP.2150.0013.00.1		Lock washer	12	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

	TITLE: Low Pressure Oxidizer Turbopump (LPOT) assembly	INDEX	MODIFICATION ORDER No. & DATE
		REVISION	

DGN.		1/11/16
D.CHD.		1/11/16
DRN.	Raghu	14/9/15
CHD.		
APPD.		1/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2150.0000.00.0

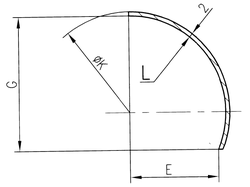
Rev. No.

FORMAT A4

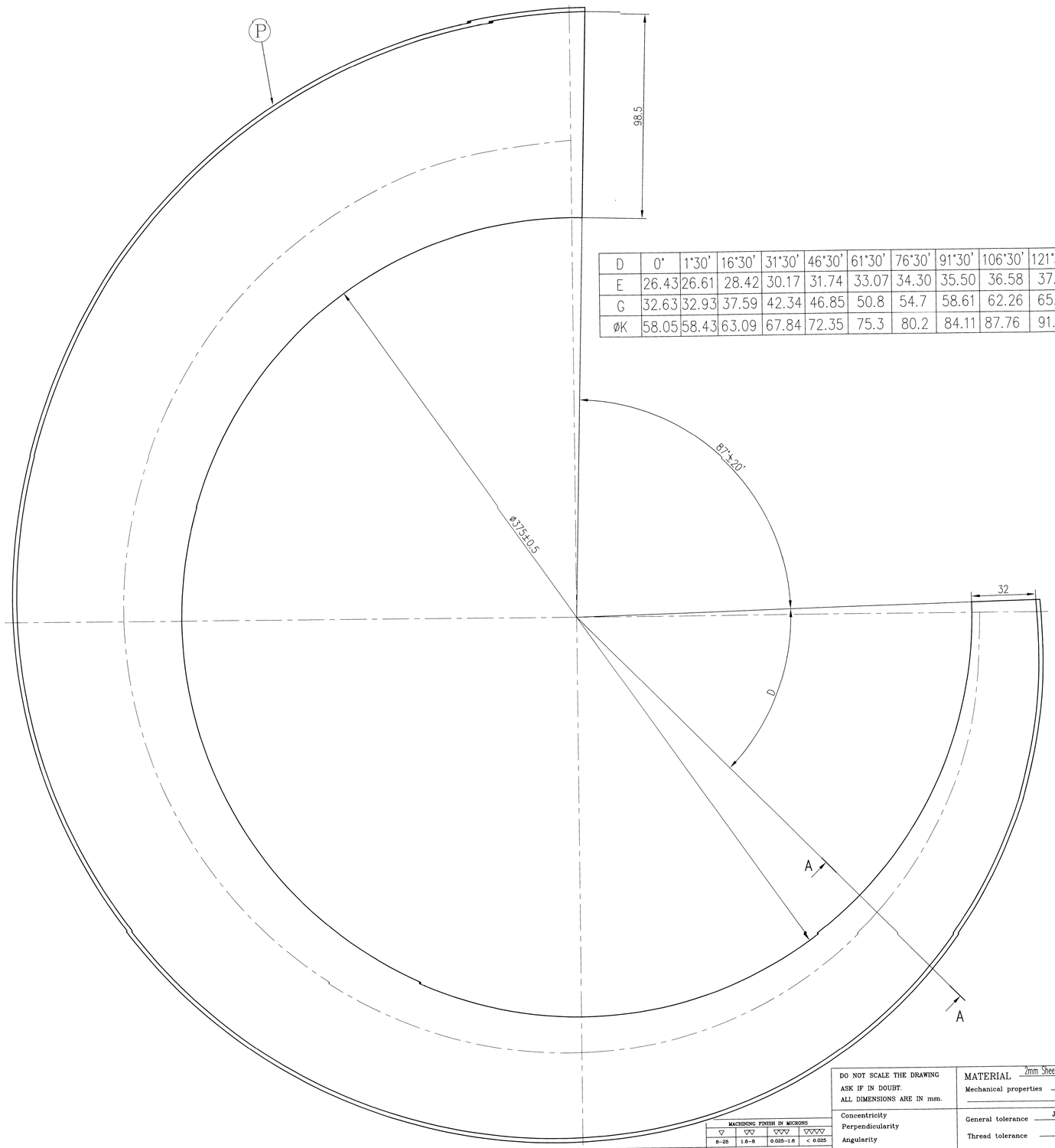
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"



D	0°	1°30'	16°30'	31°30'	46°30'	61°30'	76°30'	91°30'	106°30'	121°30'	136°30'	151°30'	166°30'	181°30'	196°30'	211°30'	226°30'	241°30'	256°30'	271°30'	273°
E	26.43	26.61	28.42	30.17	31.74	33.07	34.30	35.50	36.58	37.57	38.55	39.50	40.34	41.19	42.03	42.81	43.63	44.29	45.00	45.72	45.93
G	32.63	32.93	37.59	42.34	46.85	50.8	54.7	58.61	62.26	65.65	69.16	72.6	75.73	78.94	82.19	85.26	88.21	91.26	94.2	97.23	97.61
øK	58.05	58.43	63.09	67.84	72.35	75.3	80.2	84.11	87.76	91.15	94.66	98.1	101.23	104.44	107.69	110.76	113.71	116.76	119.7	122.73	123.23



1. Engrave drawing number at P.

	Qty.
SE 2000.2100.3101.00.1 – (shown);	1
SE 2000.2100.3102.00.1 – (mirror reflection).	1

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL 2mm Sheet SS304L
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽(√)

MARKING

Calculated Mass kg.

TITLE
Half–manifold
(See table)

DGN.		
D.CHD.		
DRN.	Raghu	27/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
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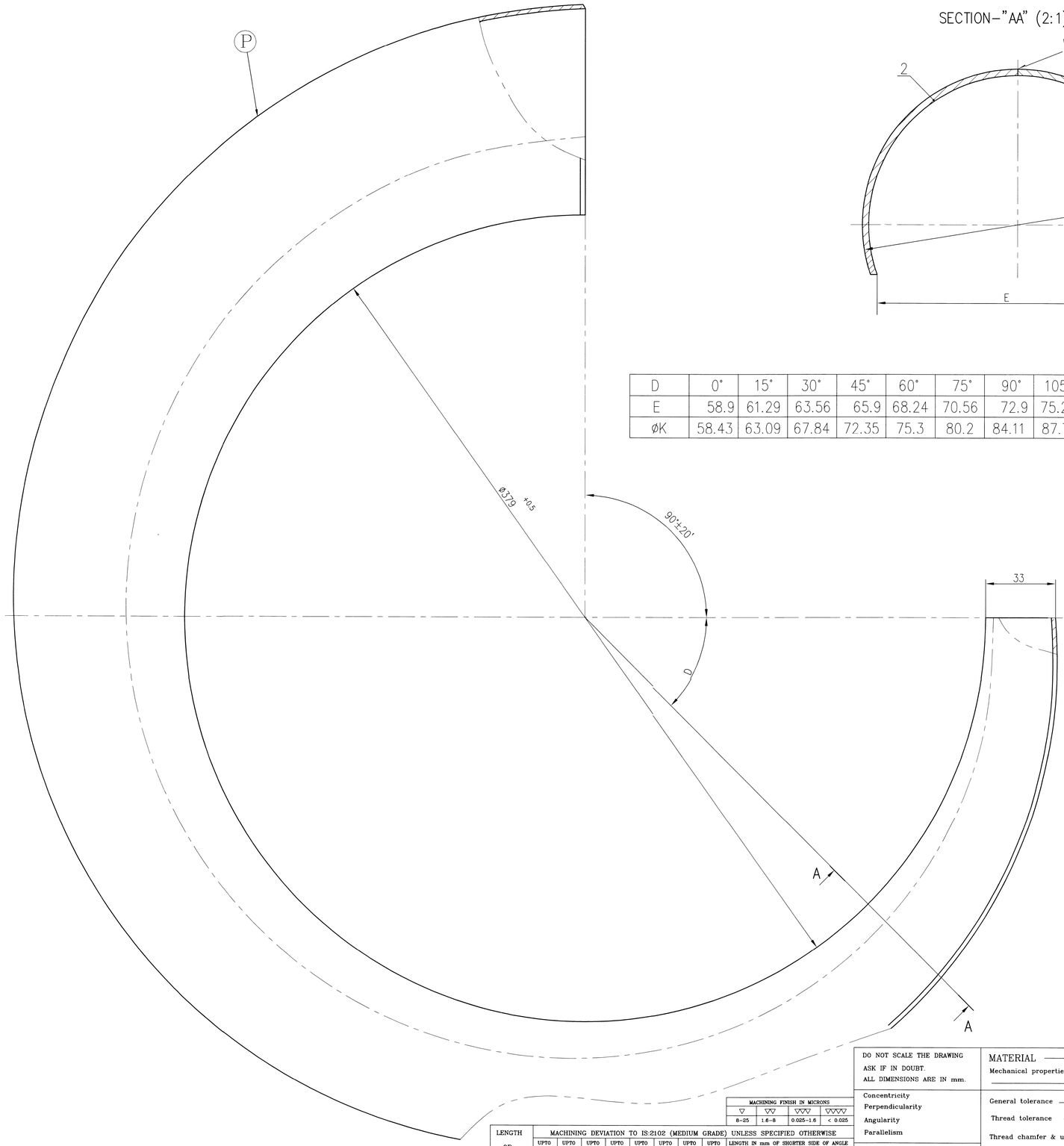
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2100.3101.00.1
SCALE 1:1
SHEET 1 OF 1

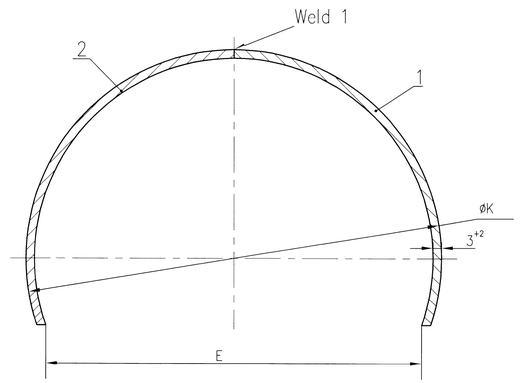
INDEX	MODIFICATION ORDER No. & DATE
	REVISION

TPD–SC/CPEG
ISSUE No.
Rev. No.
FORMAT A1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA" (2:1)



D	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°
E	58.9	61.29	63.56	65.9	68.24	70.56	72.9	75.24	77.56	79.9	82.24	84.56	86.9	88.56	91.56	93.9	96.24	98.56	100.9
ØK	58.43	63.09	67.84	72.35	75.3	80.2	84.11	87.76	91.15	94.66	98.1	101.23	104.44	107.69	110.76	113.71	116.76	119.7	122.73

NOTE

1.Use filler wire:–AISI316L/318 for welding.
Suitable weld configuration may be adopted.

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

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DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE

Manifold

DGN.		11/11/16	
D.CHD.		11/11/16	
DRN.	Raghu	27/8/15	
CHD.			
APPD.		11/11/16	
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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ISSUE No.

DRG.No. SE MOCK-UP.2100.3100.00.0AD

Rev. No.

FORMAT A1

SCALE 1:1

SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2100.3100.00.0AD		Manifold Assembly		
					Parts		
A1		1	SE MOCK-UP.2100.3101.00.0		Half-manifold	1	
		2	SE MOCK-UP.2100.3102.00.0		Half-manifold		No drg

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Manifold

INDEX	MODIFICATION ORDER No. & DATE

REVISION

DGN.		1/11/16
D.CHD.		
DRN.	Raghu	31/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
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ISSUE No.

DRG.No. SE MOCK-UP.2100.3100.00.0

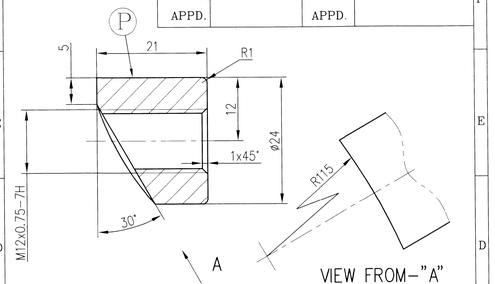
Rev. No.

FORMAT A4

SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

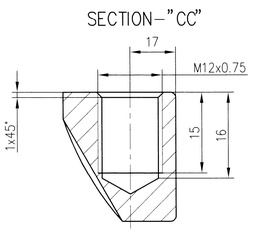
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

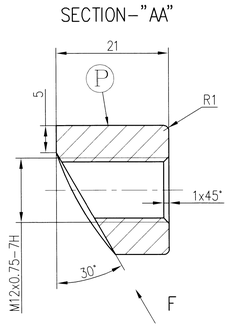


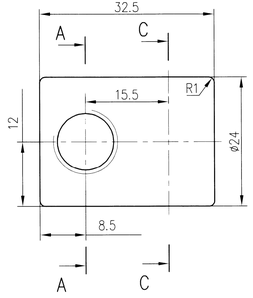
Notes
1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

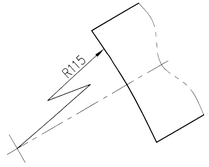
| MACHINING DEVIATION TO IS 2102 MEDIUM (GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	









VIEW FROM–"F"

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS 2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											MACHINING FINISH IN MICRONS				
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12500	UPTO 16000	UPTO 20000	UPTO 25	25-125	125-1.6	1.6-6	6-25
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±1.8	±2.5	±3.3	±4.2	±5.0	< 0.025	0.025-1.6	1.6-6	6-25	25-125
6-30	±0.1	±0.2	±0.4	±0.6	±0.9	±1.3	±2.1	±2.9	±3.8	±4.8	±5.8					
30-120	±0.2	±0.3	±0.5	±0.8	±1.1	±1.6	±2.5	±3.5	±4.6	±5.8	±7.0					
120-315	±0.3	±0.4	±0.6	±1.0	±1.4	±2.0	±3.0	±4.2	±5.5	±7.0	±8.5					
315-1000	±0.4	±0.5	±0.8	±1.2	±1.7	±2.5	±3.7	±5.0	±6.5	±8.5	±10.0					
1000-2000	±0.5	±0.6	±1.0	±1.5	±2.2	±3.0	±4.5	±6.0	±8.0	±10.0	±12.0					
2000-4000	±0.6	±0.8	±1.2	±1.8	±2.5	±3.5	±5.0	±7.0	±9.0	±11.5	±14.0					
4000-8000	±0.8	±1.0	±1.5	±2.2	±3.0	±4.0	±6.0	±8.0	±10.5	±13.5	±16.5					
8000-12500	±1.0	±1.2	±1.8	±2.5	±3.5	±4.5	±6.5	±9.0	±12.0	±15.5	±19.0					
12500-16000	±1.2	±1.5	±2.2	±3.0	±4.0	±5.0	±7.5	±10.0	±13.5	±17.5	±21.5					
16000-20000	±1.5	±1.8	±2.5	±3.5	±4.5	±5.5	±8.0	±11.0	±15.0	±19.5	±24.0					
20000-25000	±1.8	±2.0	±2.8	±4.0	±5.0	±6.0	±9.0	±12.0	±16.5	±21.5	±26.5					

LENGTH OR DIA	UPTO 6	6-30	30-120	120-400	ANGLE
UPTO 6	±0.1	±0.2	±0.3	±0.4	±30'
6-30	±0.2	±0.3	±0.4	±0.5	±20'
30-120	±0.3	±0.4	±0.5	±0.6	±15'
120-400	±0.4	±0.5	±0.6	±0.8	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg.

TITLE
Boss

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

DGN.			
D.CHD.			
DRN.	Raghu	27/8/13	
CHD.			
APPD.			
2016	SIGN.	DATE	

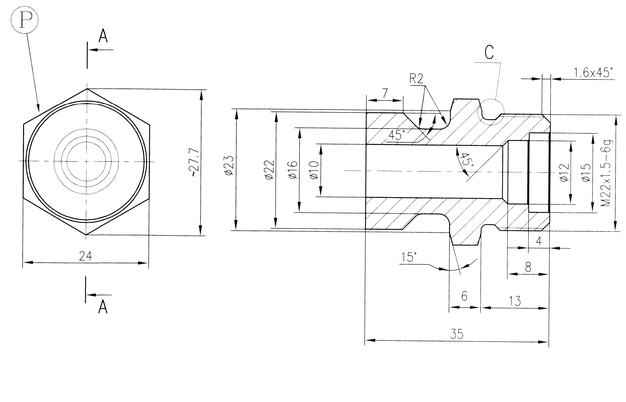
GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG
ISSUE No.

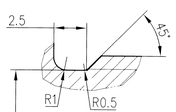
DRG.No. SE MOCK–UP.2100.3008.00.1
Rev. No.
FORMAT A3
SCALE 2:1
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"



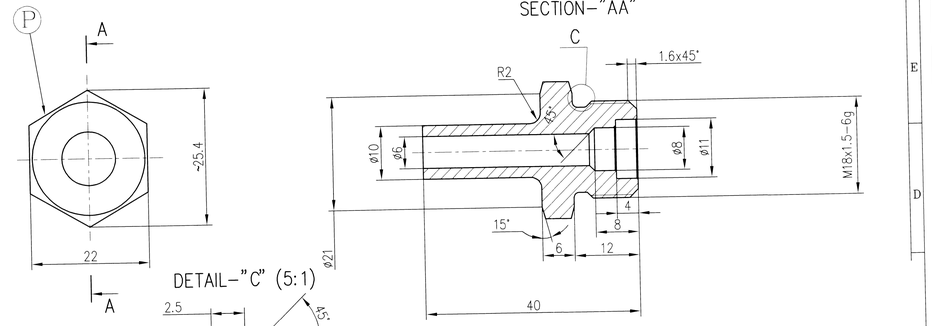
DETAIL–"C" (5:1)

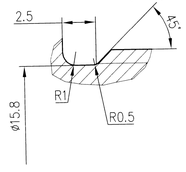


1. Engrave drawing number at P.

| MACHINING DEVIATION TO IS 2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

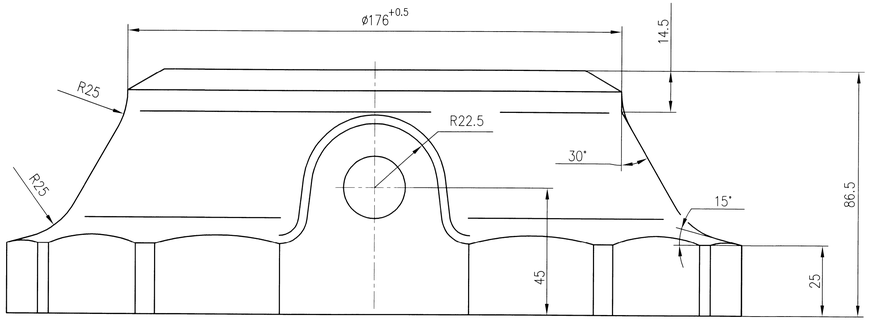




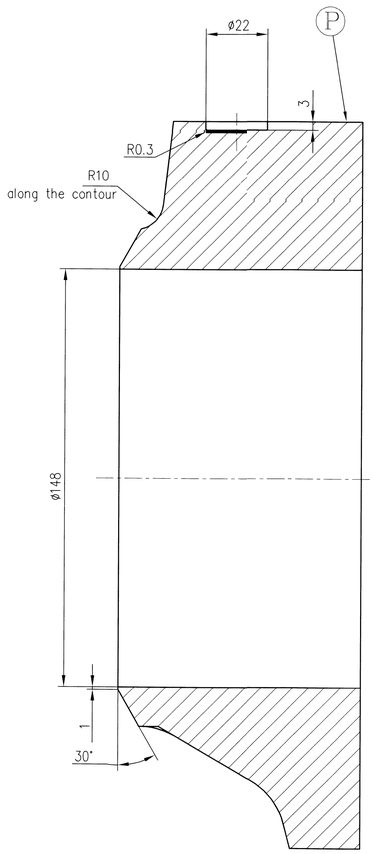
1. Engrave drawing number at P.

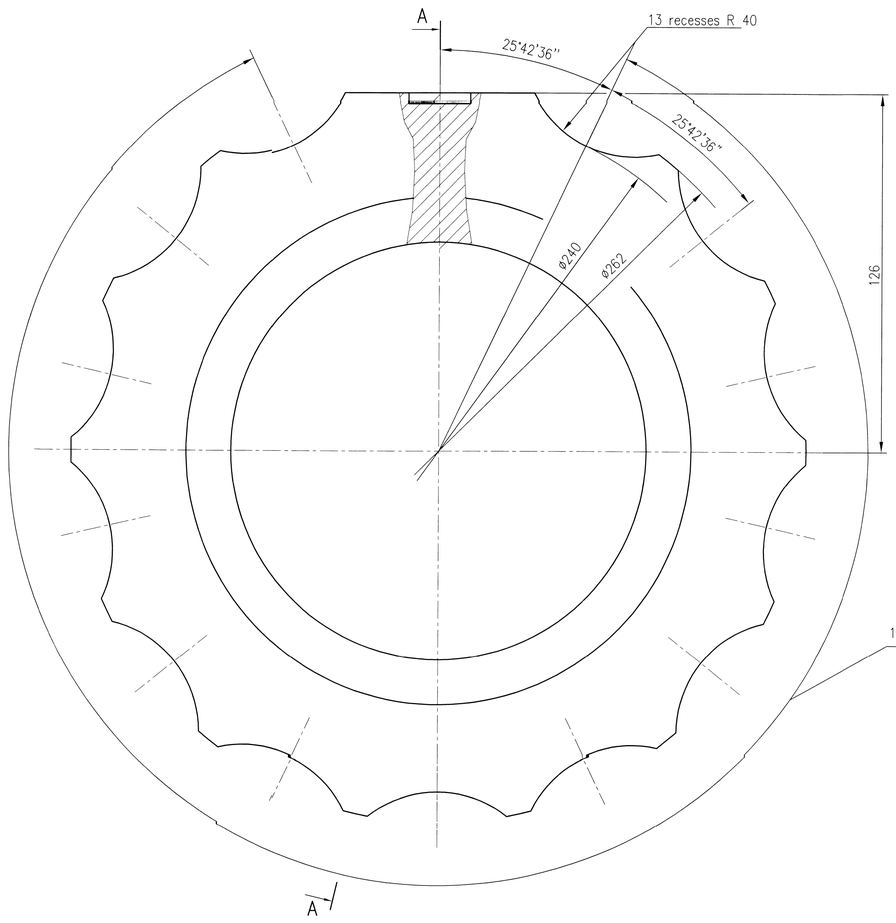
| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA"





1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg

TITLE
Flange

DGN.			
D.CHD			
DRN.	Raghu	22/8/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2100.3005.00.1
SCALE 1:1
SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
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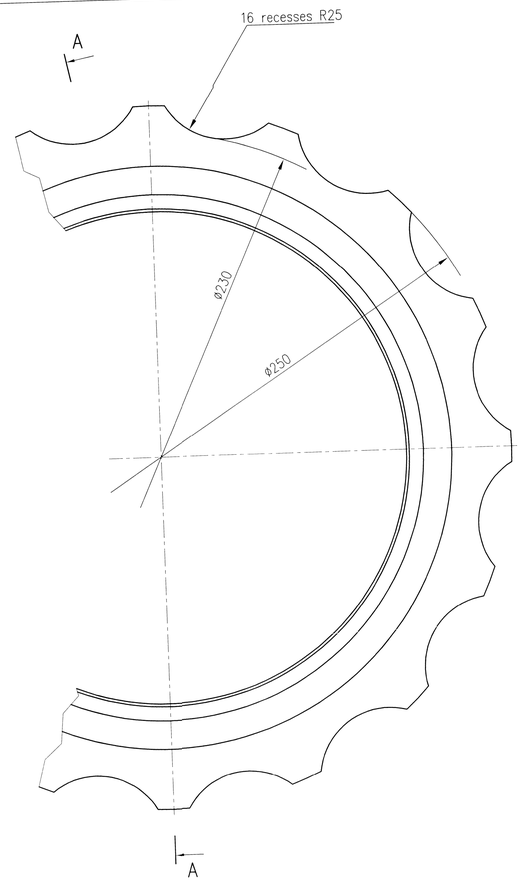
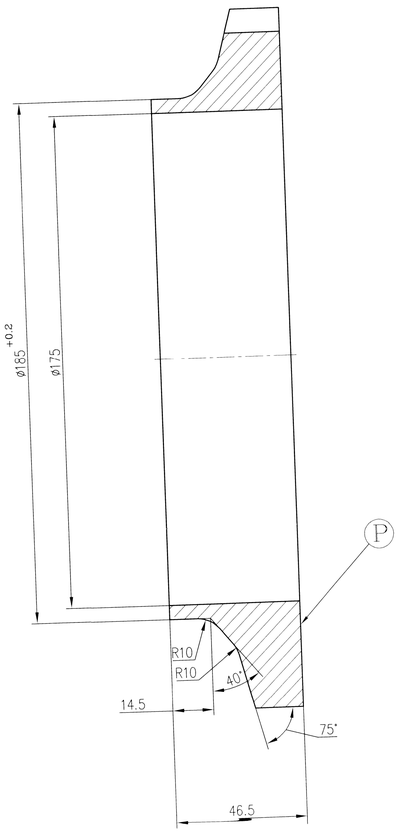
TCEID–SCE/CPEG
ISSUE No.
Rev. No.
FORMAT A1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA"



1. Engrave drawing number at P.

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

LENGTH OR DIA	MACHINING DEVIATION TO IS-2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL SS304
Mechanical properties

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut
Radii not specified
Chamfers not specified

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation

TITLE

Flange

DGN.	[illegible]		
D.CHD.	[illegible]		
DRN.	[illegible] 22/8/15		
CHD.			
APPD.	[illegible]		
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2100.3004.00.1

Rev. No.

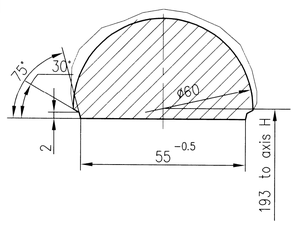
FORMAT A2

SCALE 1:1

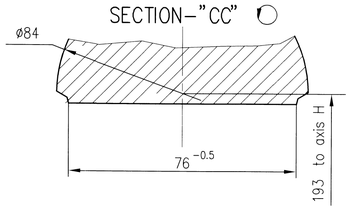
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

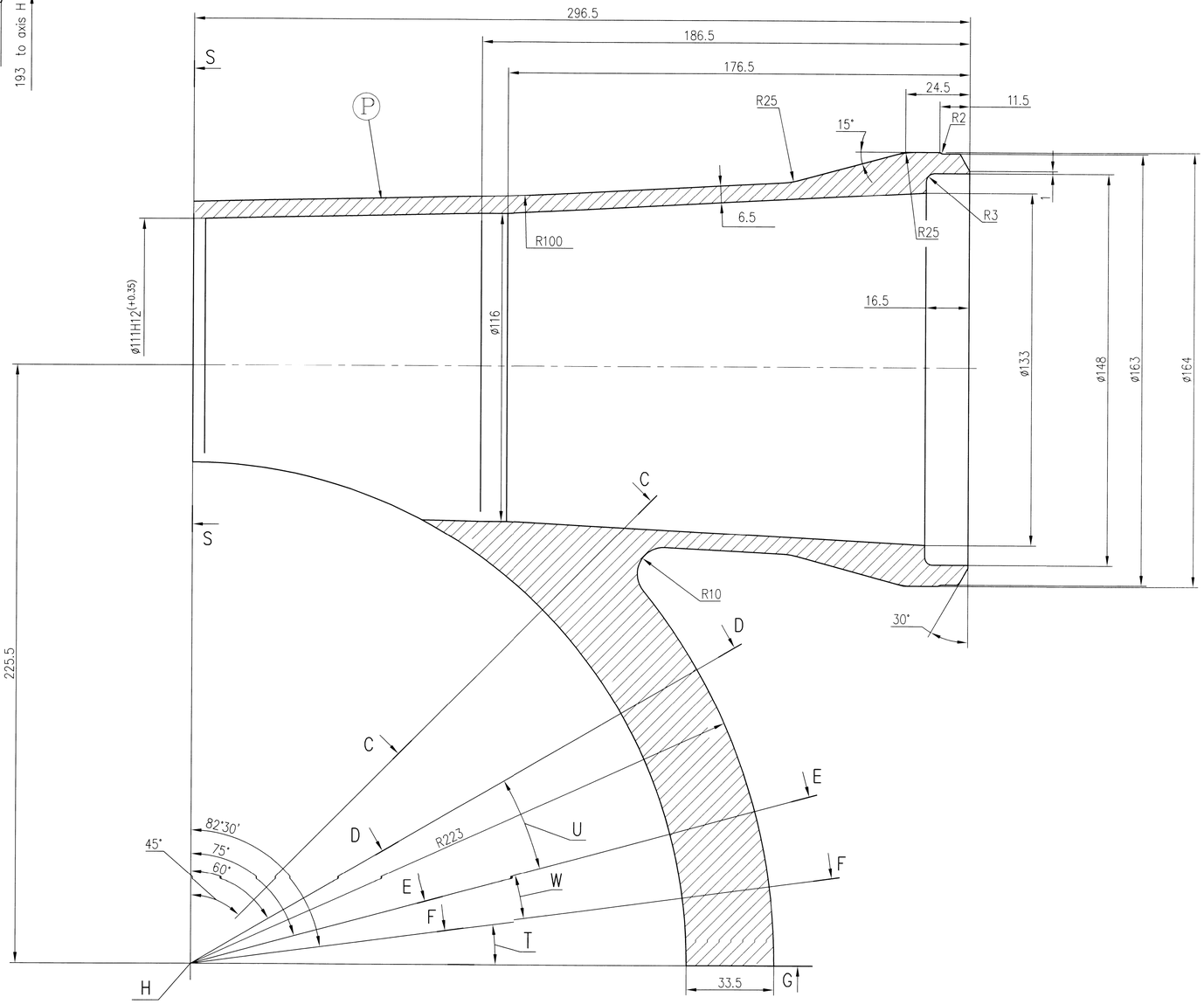
SECTION–"GG"



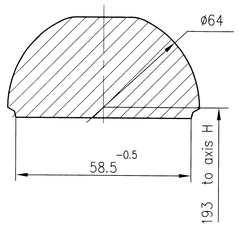
SECTION–"CC"



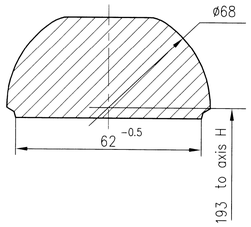
SECTION–"AA"

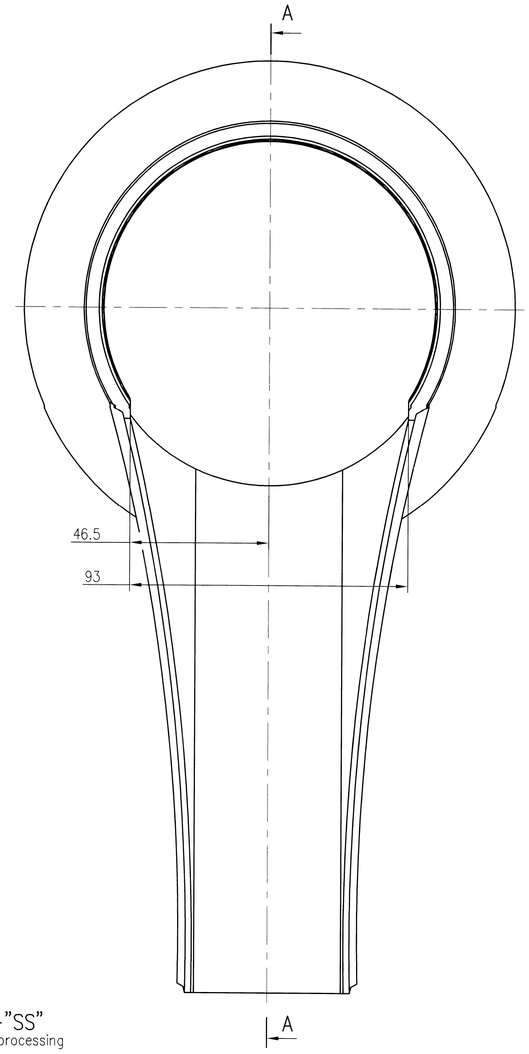


SECTION–"FF"

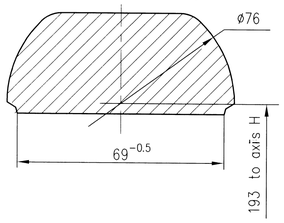


SECTION–"EE"

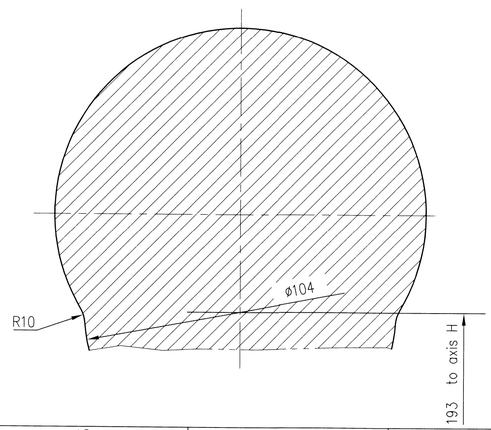




SECTION–"DD"



SECTION–"SS"
before mechanical processing



MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH Ra 2.5

MARKING

Calculated Mass kg.

1. Engrave drawing number at P.

TITLE

Manifold's Sector

INDEX	MODIFICATION ORDER No & DATE
REVISION	

DGN.		13/11/16
D.CHD		13/11/16
DRN.		07/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2100.3003.00.1

Rev. No.

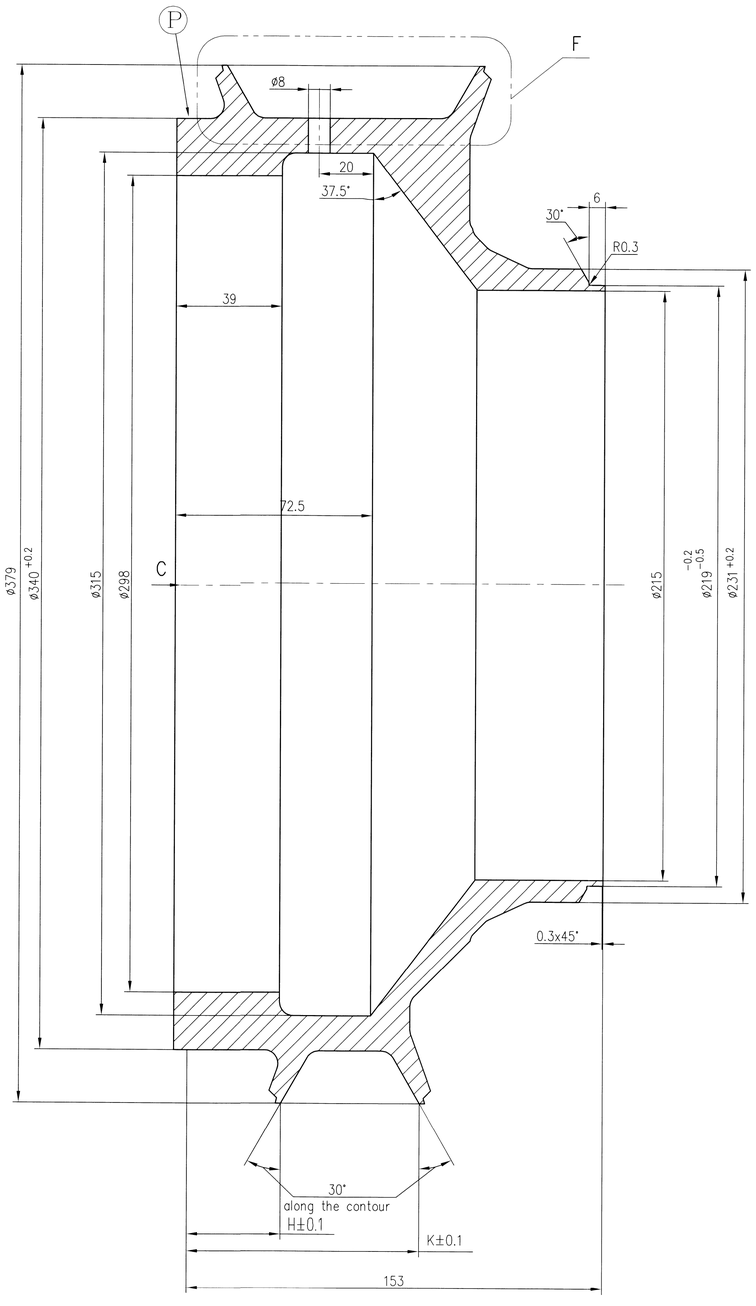
FORMAT A1

SCALE 1:1

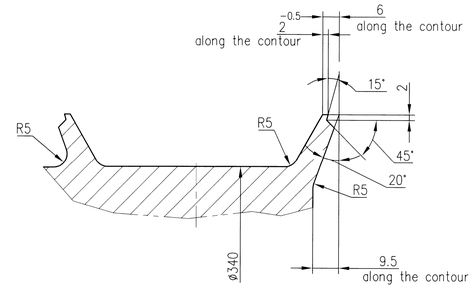
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"

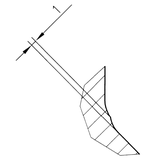


D (deg)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360
H	13.5	14.67	15.83	17	18.17	19.67	20.5	21.67	22.83	24	25.17	26.33	27.5	28.67	29.83	31	32.17	33.33	34.5	31	27.5	24	20.5	17	13.5
K	106.5	105.33	104.17	103	101.83	100.33	99.5	98.33	97.17	96	94.83	93.67	92.5	91.33	90.17	89	87.83	86.67	85.5	89	92.5	96	99.5	103	106.5

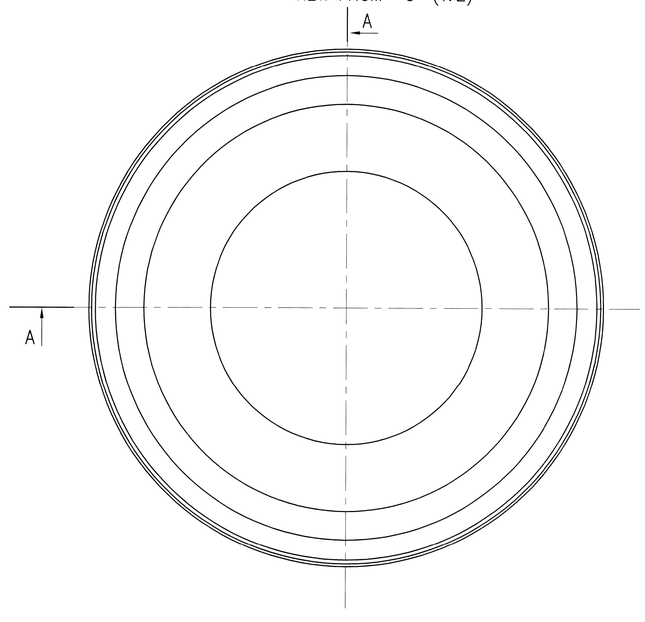


DETAIL–"F"

DETAIL–"B" (2:1)



VIEW FROM–"C" (1:2)



PART SECTION–"AA"
before milling

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30′	±20′	±10′

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Ring SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH — Ra 3.2

MARKING

Qty. per Assembly

Calculated Mass kg.

TITLE: Guiding device

DGN.		
D.CHD.		
DRN.	Raghu	26/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2100.3002.00.1 | Rev. No. | FORMAT A1
SCALE 1:1 | SHEET 1 OF 1

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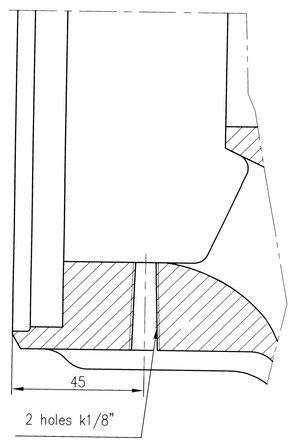
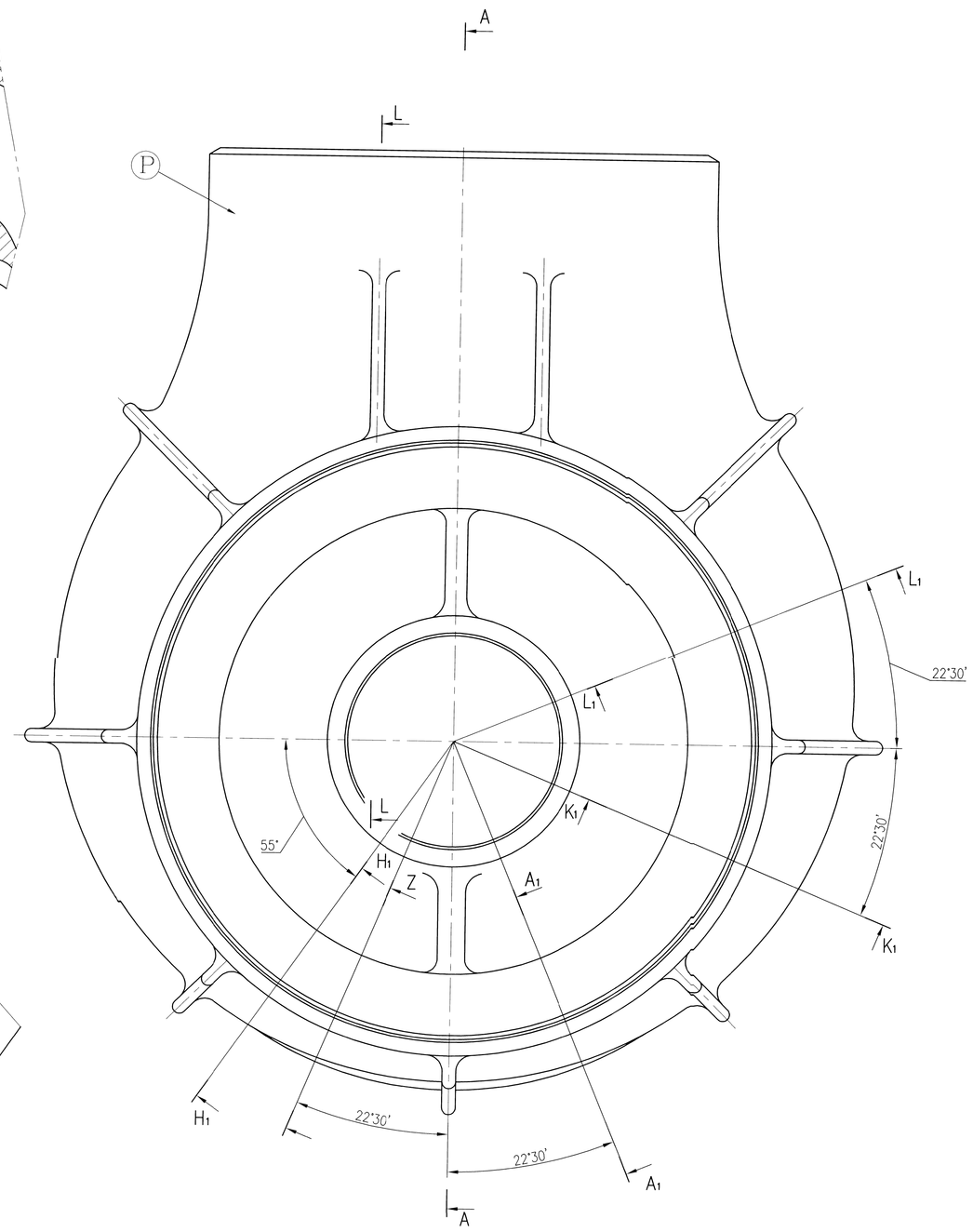
ISSUE No.	

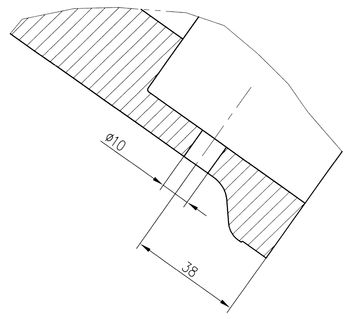
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

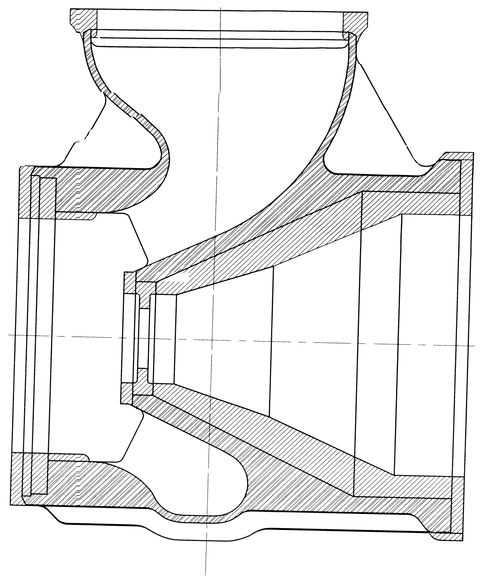
SECTION–"ZZ", $A_1 - A_1$





SECTION–"H_1 H_1"

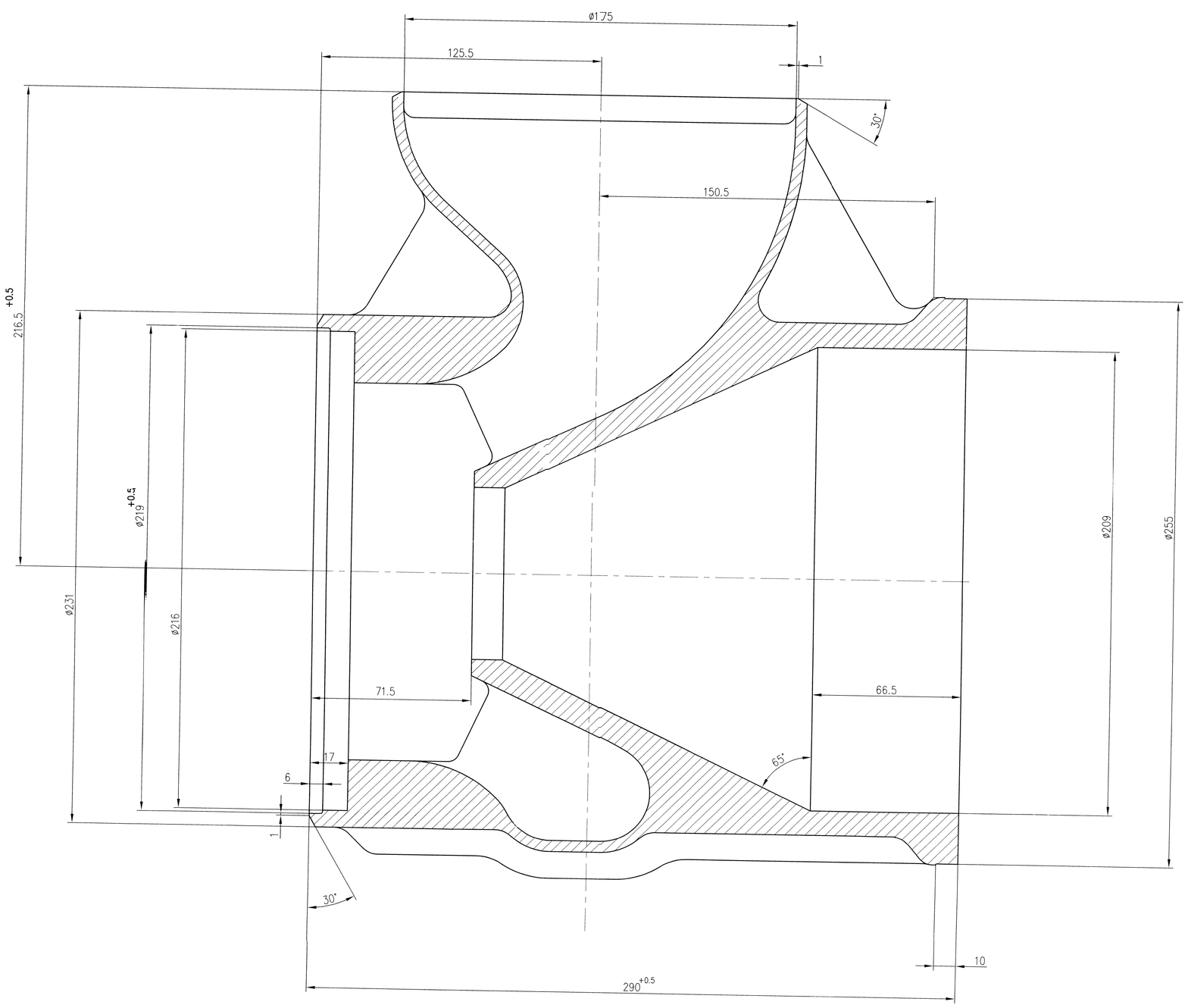




SUPERIMPOSED VIEW

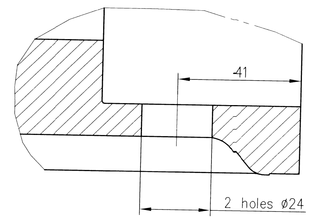
SECTION–"AA"

B



B

SECTION–"K_1 K_1","L_1 L_1"



1. Casting will be provided.
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	4000 AND ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE		
									UPTO 6	6–30	30–120	120–400
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Steel 08X14H7M/I (casting)
Mechanical properties

General tolerance IS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5 (✓)

MARKING

Calculated Mass kg

TITLE: Inlet branch

DGN.	Adm	11/11/16	
D.CHD.		11/11/16	
DRN		28/12/11	
CHD			
APPD		11/11/16	
2016	SIGN	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2100.3001.00.1
Rev. No.
FORMAT A0
SCALE 1:1
SHEET 1 OF 1

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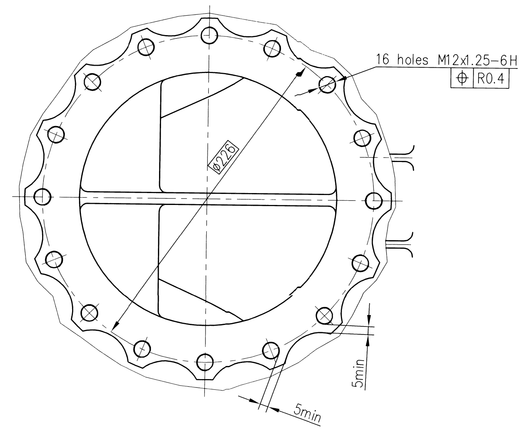
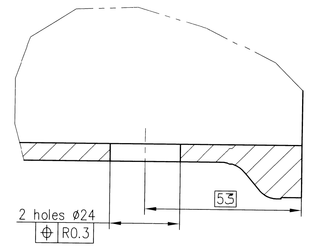
TPD–SC/CPEG

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

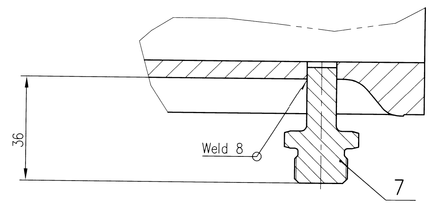
PARTIAL VIEW FROM – "F"

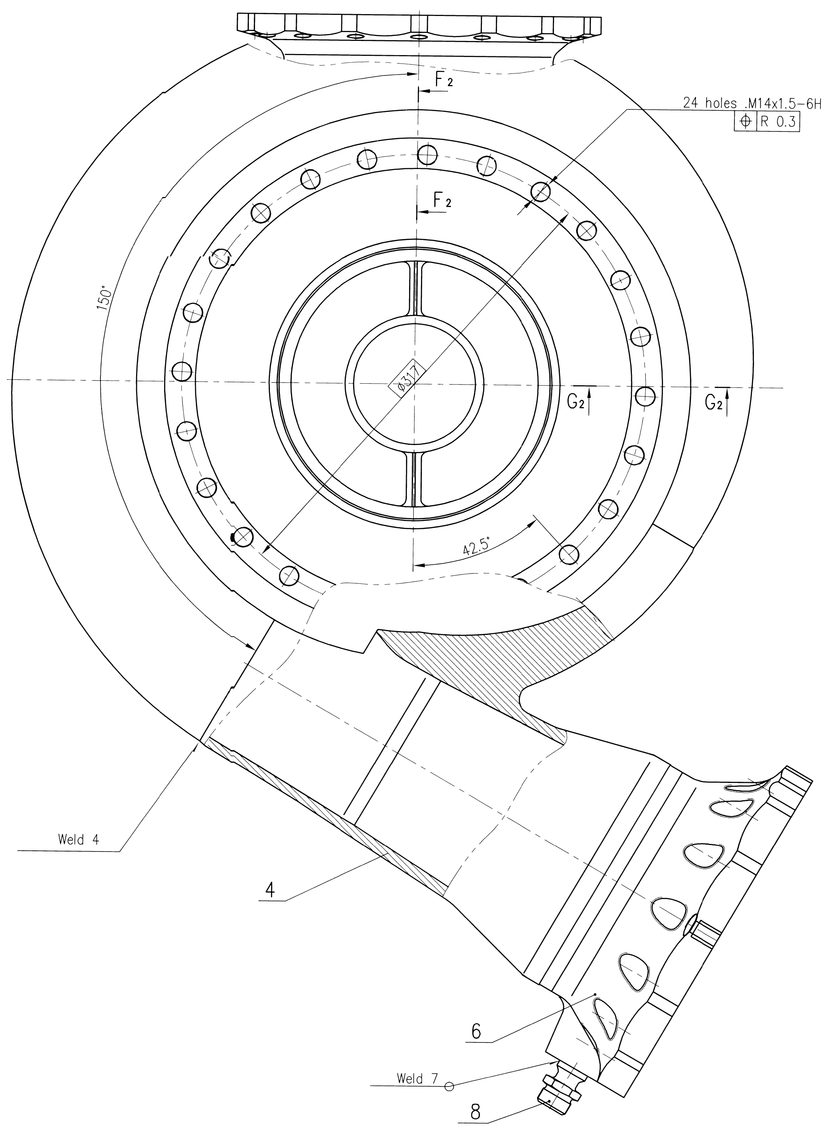


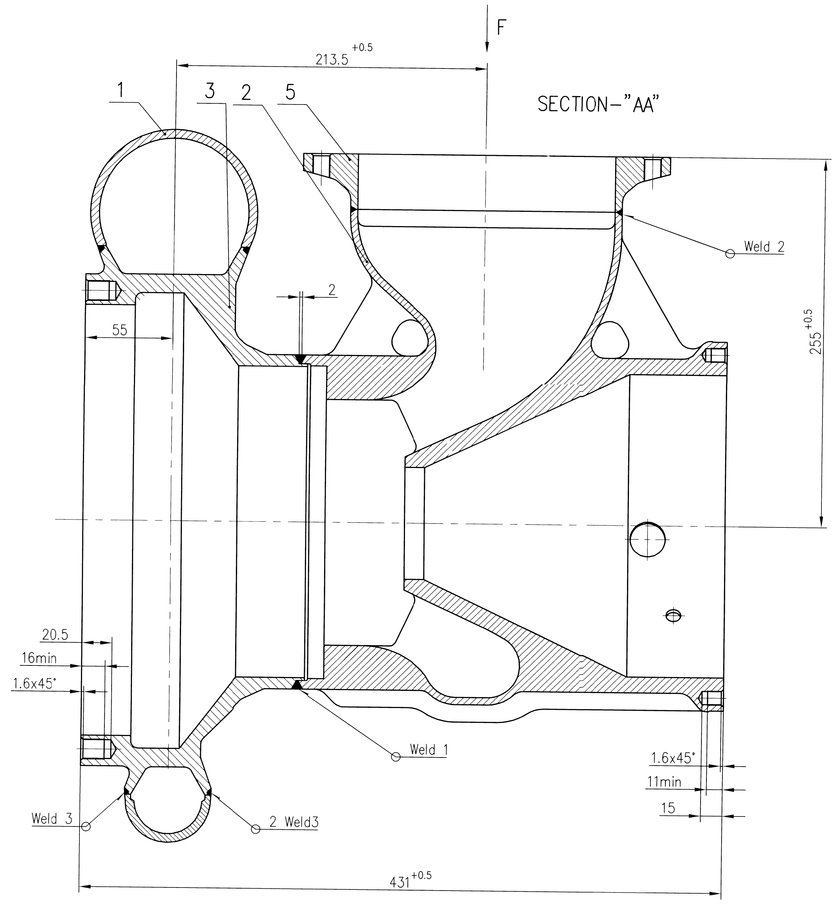
SECTION – "UU" & "WW" (1:1)

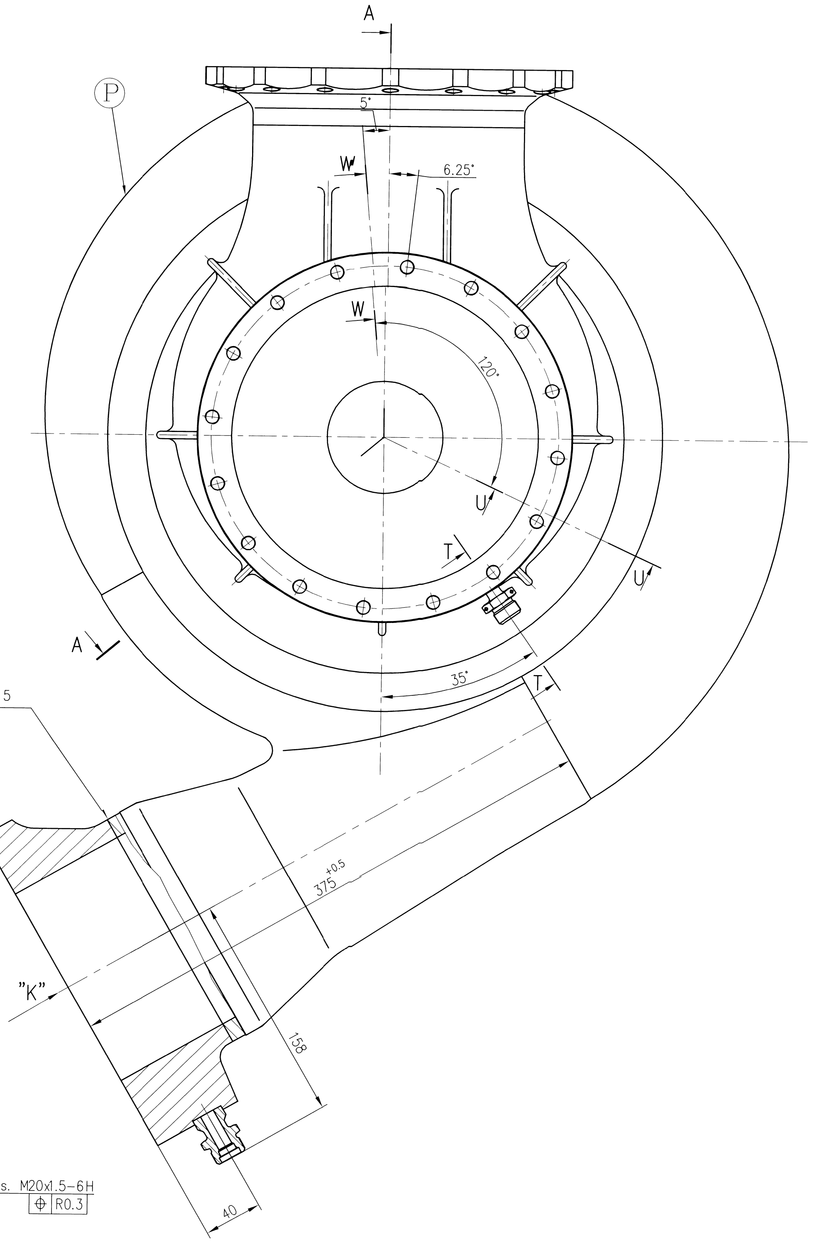


SECTION – "TT" (1:1)

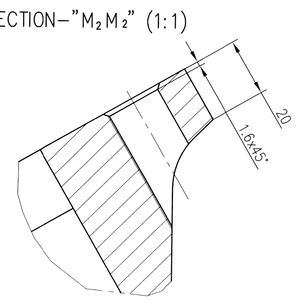




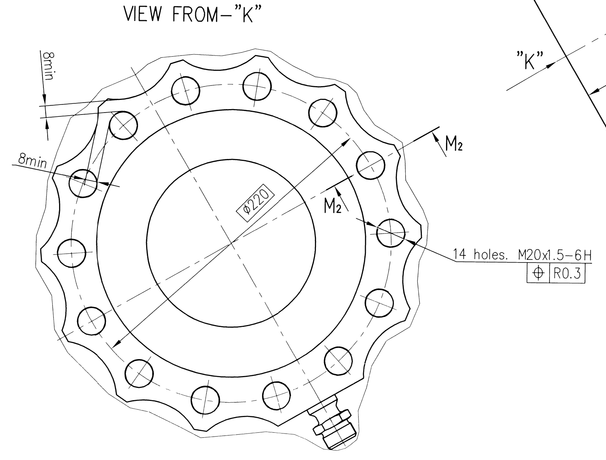




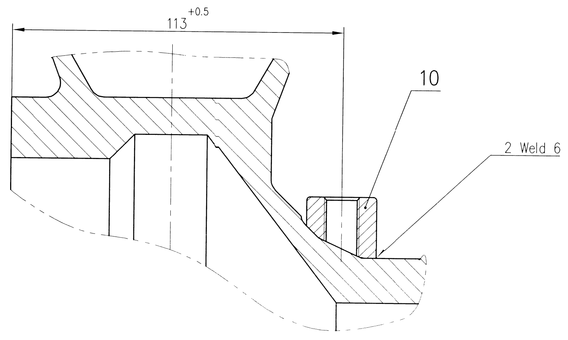
SECTION – "M2 M2" (1:1)



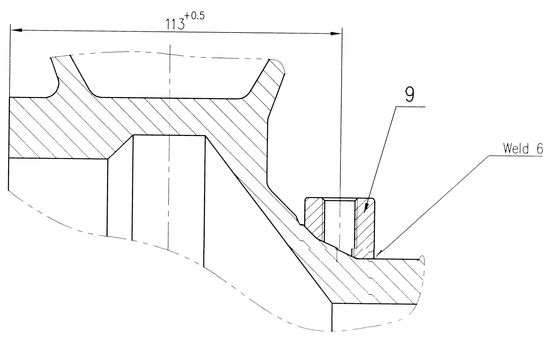
VIEW FROM – "K"



SECTION – "G2 G2"



SECTION – "F2 F2"



NOTE

1. Use filler wire: – AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Threads should be free from chattering marks, burrs, peeling off etc.
3. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000 ABOVE	UPTO 6	6–30	30–120	120–400
0 to 3	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±4°	±30'	±20'	±10'	

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Mechanical properties	SURFACE TREATMENT	TITLE Housing Assembly
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5	
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		MARKING	Calculated Mass kg.

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547
D.CHD.			
DRN.	Rinjith	27/9/17	
CHD			
APPD.			
2016	SIGN.	DATE	

INDEX	MODIFICATION ORDER No & DATE
	REVISION
TPD–SC/CPEG	ISSUE No.
DRG No. SE MOCK–UP.2100.3000.00.0AD	Rev. No.
SCALE 1:2	SHEET 1 OF 1
FORMAT A0	

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
A3		8	SE MOCK-UP.2100.3007.00.1		Connector	1	
A3		9	SE MOCK-UP.2100.3008.00.1		Boss	1	
A4		10	SE MOCK-UP.2100.3009.00.1		Boss	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Housing

INDEX	MODIFICATION ORDER No & DATE
	REVISION

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No

DGN.		
D.CHD		
DRN.	Raghu	27/11/15
CHD.		
APPD.		
2016	SIGN.	DATE

DRG.No SE MOCK-UP.2100.3000.00.0

Rev. No.

FORMAT A4

SHEET 2 OF 2

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A0			SE MOCK-UP.2100.3000.00.0AD		Housing Assembly		
					Units		
A4		1	SE MOCK-UP.2100.3100.00.0		Manifold	1	
					Parts		
A0		2	SE MOCK-UP.2100.3001.00.1		Inlet branch	1	
A1		3	SE MOCK-UP.2100.3002.00.1		Guiding device	1	
A1		4	SE MOCK-UP.2100.3003.00.1		Manifold's sector	1	
A2		5	SE MOCK-UP.2100.3004.00.1		Flange	1	
A1		6	SE MOCK-UP.2100.3005.00.1		Flange	1	
A3		7	SE MOCK-UP.2100.3006.00.1		Connector	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Housing

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
D.CHD.		
DRN.		
CHD		
APPD.		
2016	SIGN.	DATE

TPD-SC/CPEG

ISSUE No.

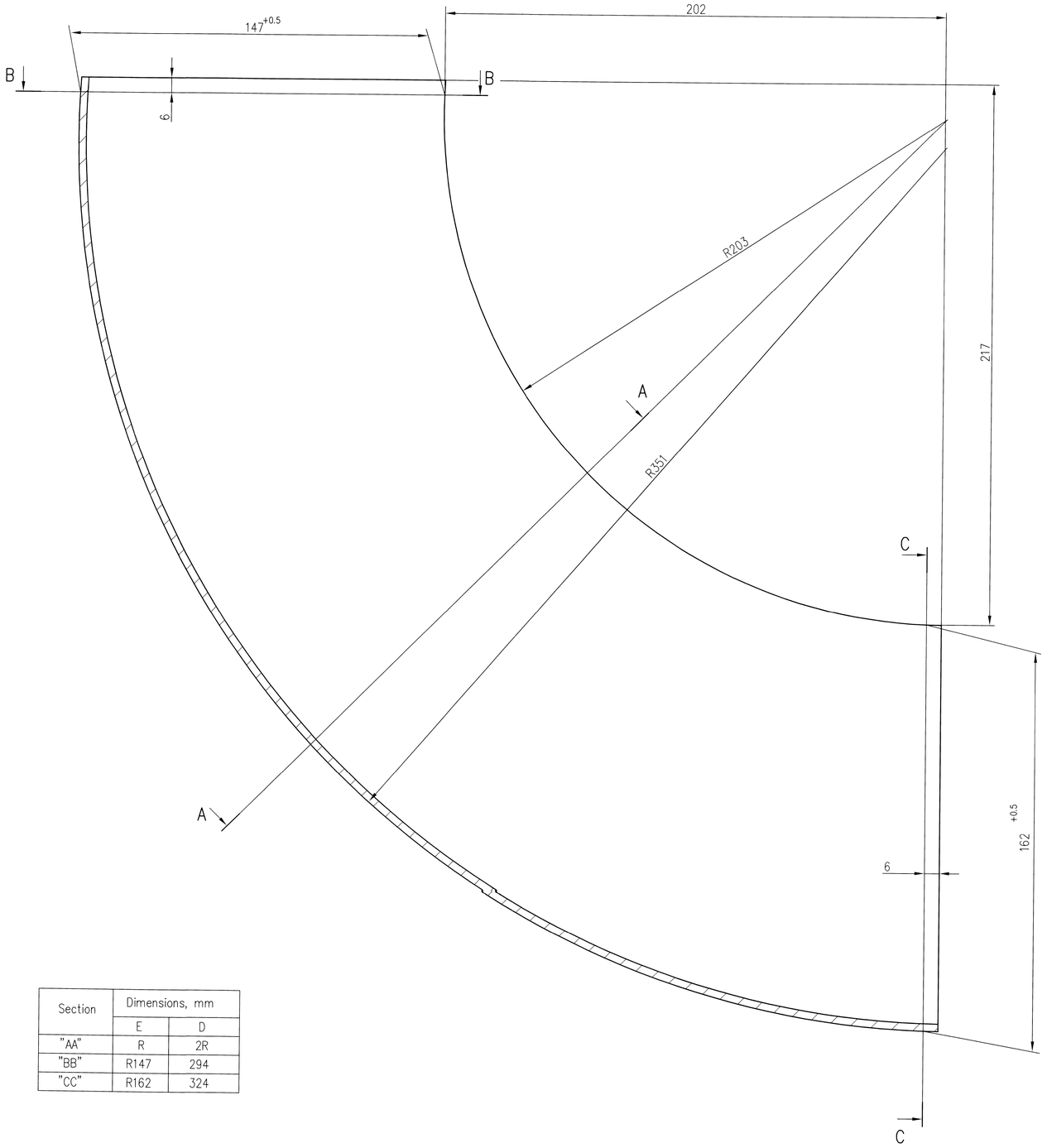
DRG No. SE MOCK-UP.2100.3000.00.0

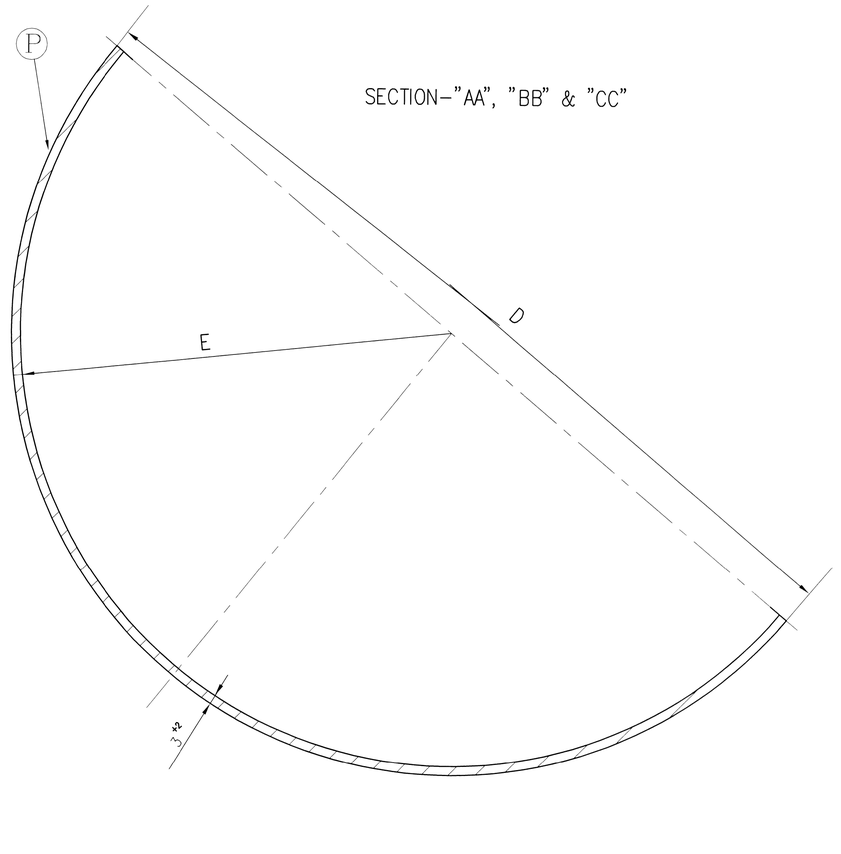
Rev. No.

FORMAT A4

SHEET 1 OF 2

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





SECTION–"AA", "BB" & "CC"

Section	Dimensions, mm	
	E	D
"AA"	R	2R
"BB"	R147	294
"CC"	R162	324

1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
	UPTO 6	6 30	30 120	120 315	315 1000	1000 2000	2000 4000	4000 ABOVE
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

LENGTH IN mm OF SHORTER SIDE OF ANGLE			
UPTO 6	6–30	30–120	120–400
±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet 3mm 304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ( )

MARKING

Calculated Mass kg.

TITLE

Half branch

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

DGN.		11/11/16
D.CHD.		11/11/16
DRN.	Raghu	27/9/16
CHD.		
APPD.		11/11/16
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2100.2102.00.1

Rev. No.

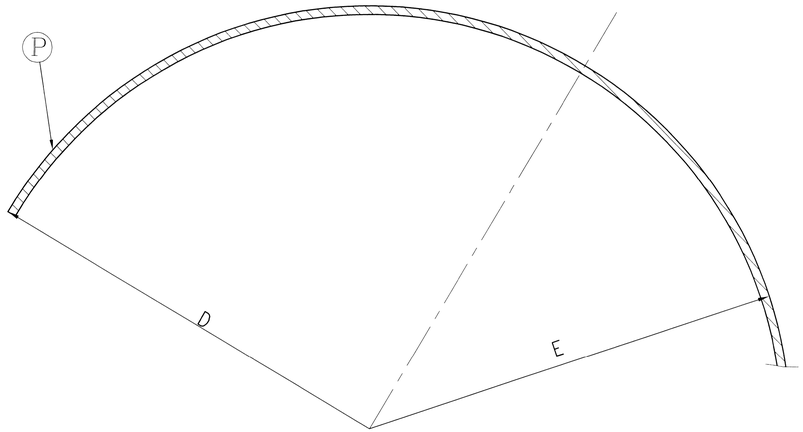
FORMAT A1

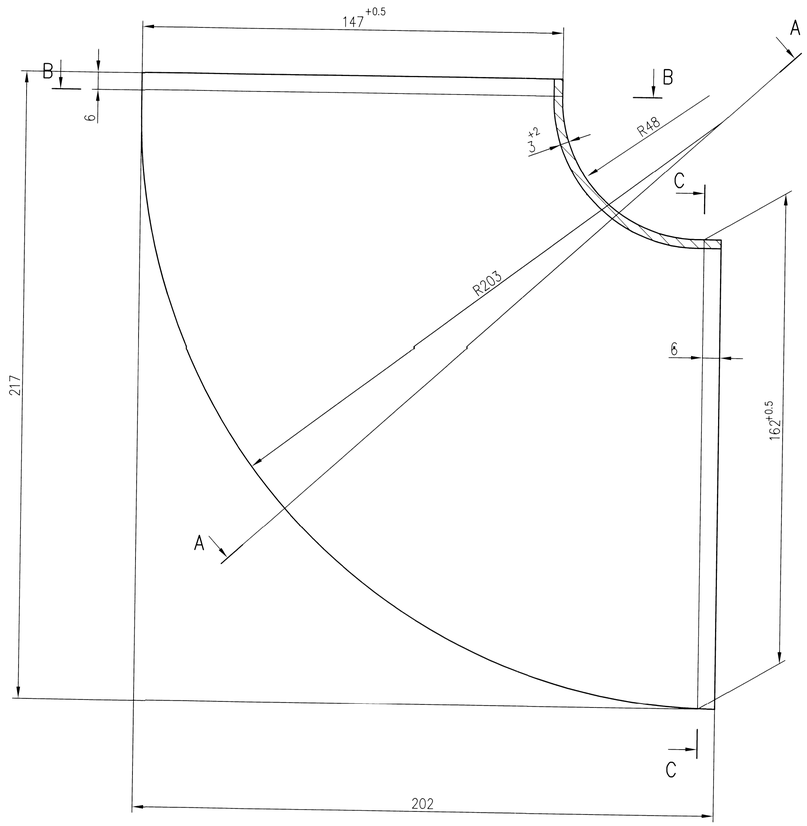
SCALE 1:1

SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA", "BB" & "CC"





Section	Dimension, mm	
	E	D
"AA"	R	2R
"BB"	R147	294
"CC"	R162	324

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet 3mm SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽(√)

MARKING

Calculated Mass kg.

TITLE: Half branch

DGN.			
D.CHD			
DRN.		21/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
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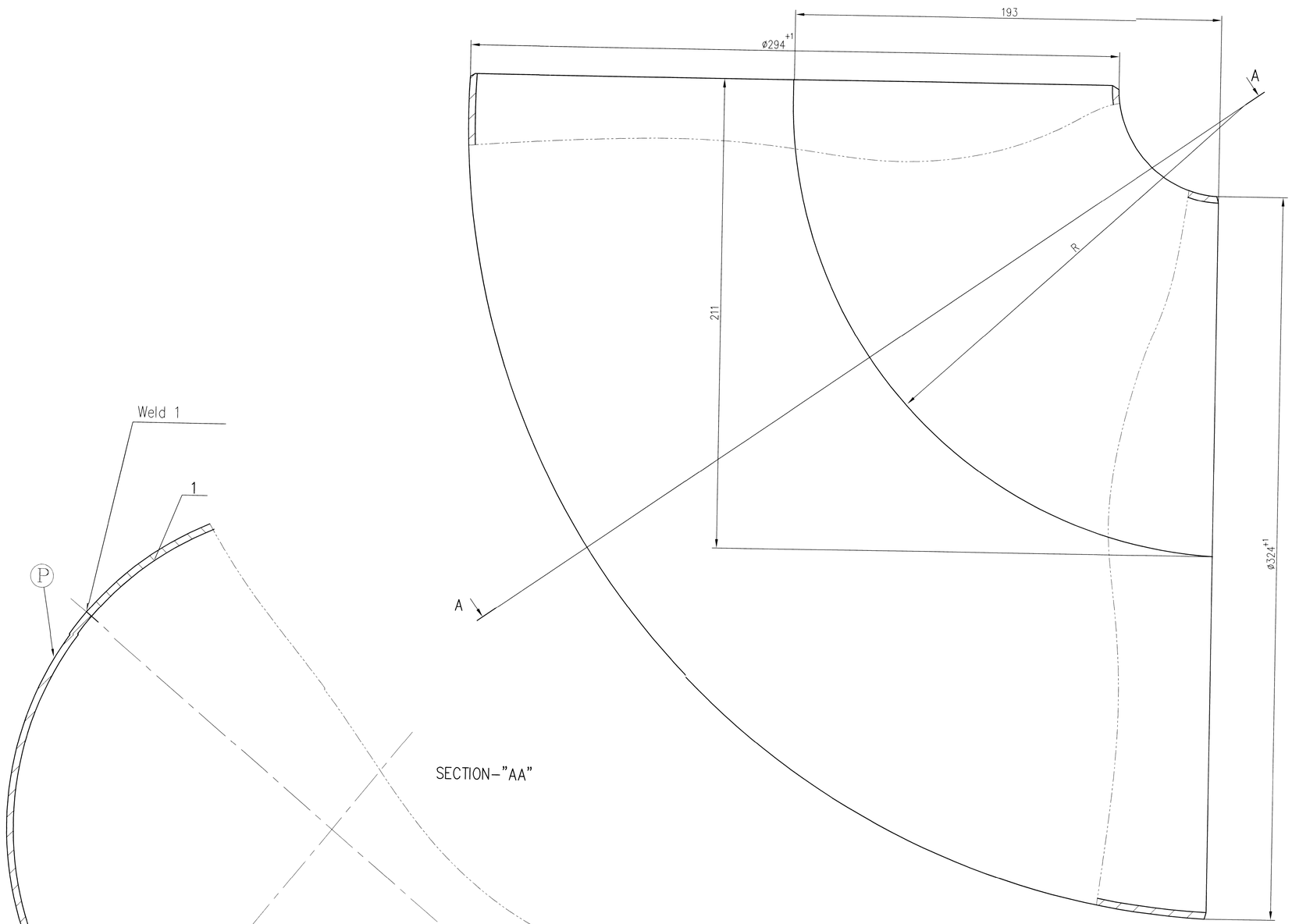
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



NOTE

1. Use filler wire:–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg

TITLE

Branch
Assembly

DGN.			
D.CHD.			
DRN.	Raghu	01/9/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
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SCALE 1:1
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Rev. No.
FORMAT A1

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2100.2100.00.0AD		Branch Assembly		
					Parts		
A1		1	SE MOCK-UP.2100.2101.00.1		Half branch	1	
A1		2	SE MOCK-UP.2100.2102.00.1		Half branch	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Branch

INDEX	MODIFICATION ORDER No. & DATE

REVISION

DGN.		
D.CHD.		07/8/15
DRN.	Raghu	07/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
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TPD-SC/CPEG

ISSUE No.

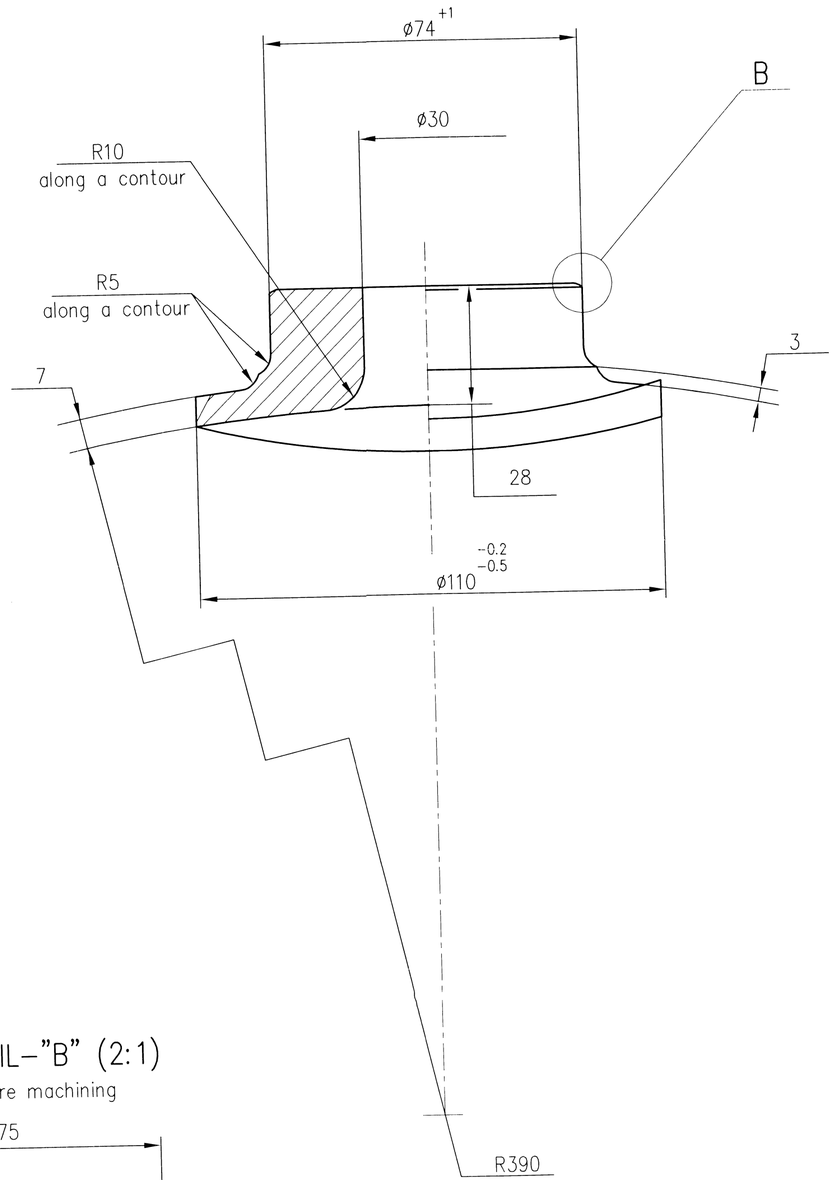
DRG.No. SE MOCK-UP.2100.2100.00.0

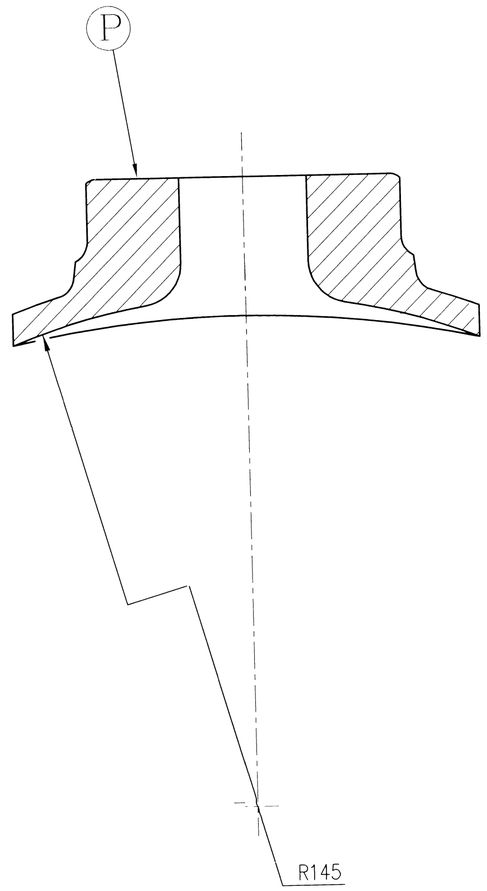
Rev. No.

FORMAT A4

SHEET 1 OF 1

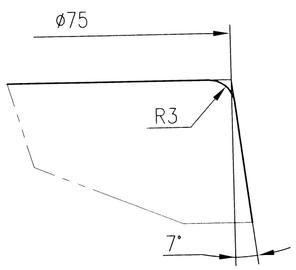
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





DETAIL–"B" (2:1)

Before machining



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass
kg.

DGN.			
D.CHD.			
DRN.	Raghu	01/9/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

TITLE

Flange

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GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2100.2007.00.1

Rev. No.

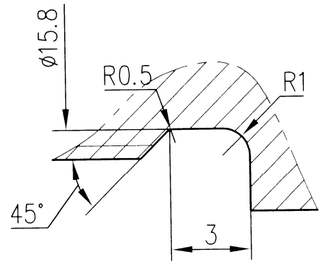
FORMAT A2

SCALE 1:1

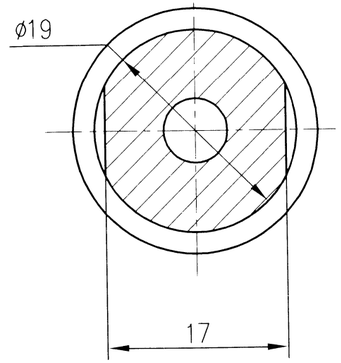
SHEET 1 OFF 1

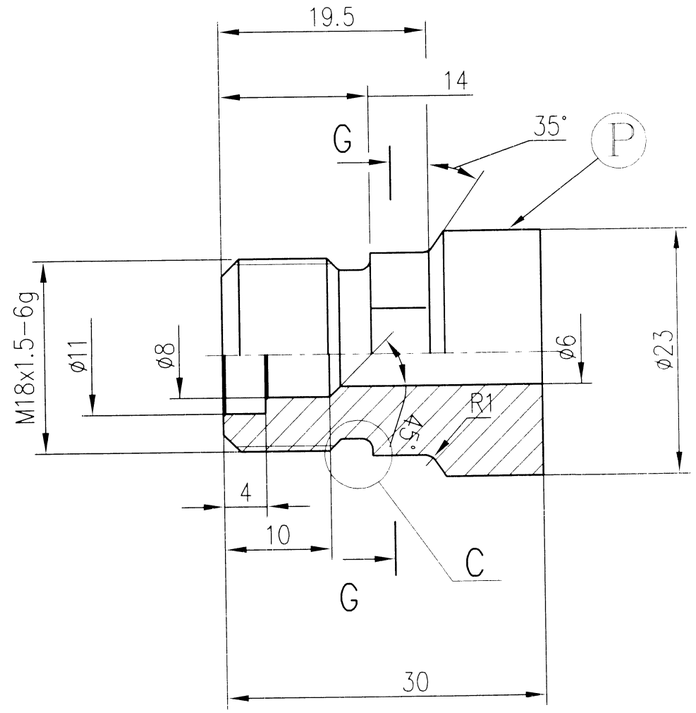
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

DETAIL–"C" (5:1)



SECTION–"GG"



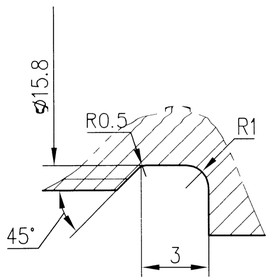


NOTE

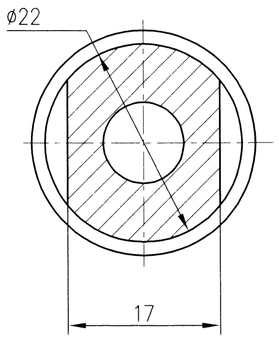
1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

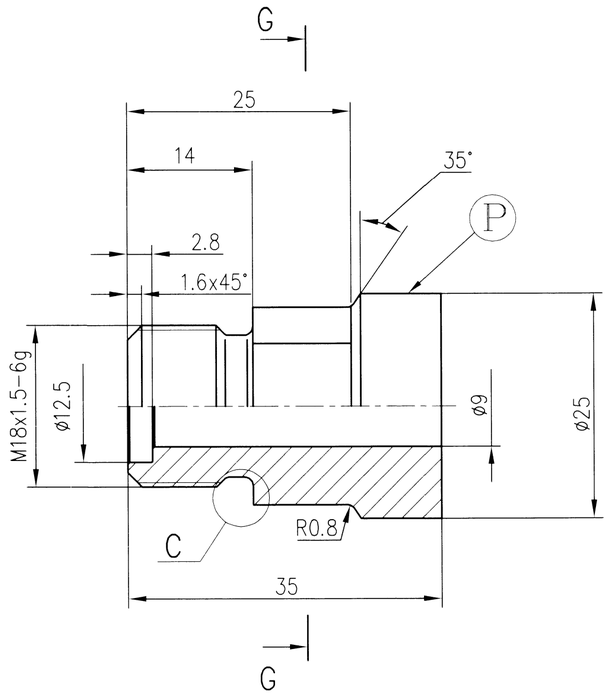
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



DETAIL–"C" (5:1)



SECTION–"GG"



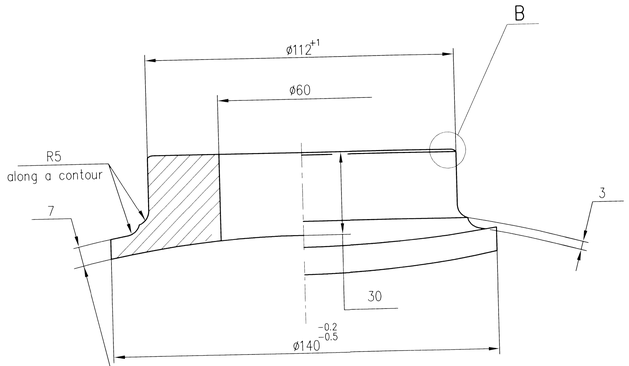
NOTE

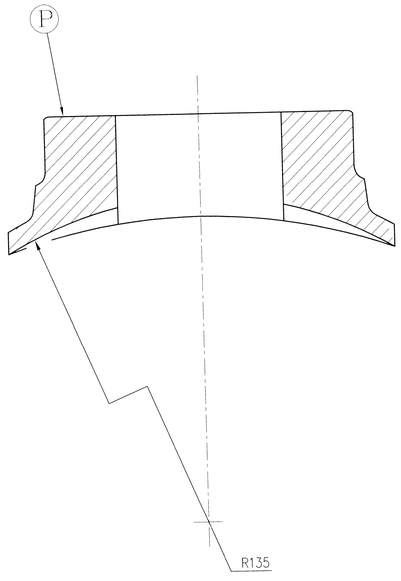
1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE														MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE UPTO 6	6–30	30–120	120–400	▽	▽▽	▽▽▽	▽▽▽▽
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'	8–25	1.6–8	0.025–1.6	< 0.025

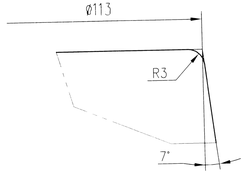
DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE	Connector	INDEX / MODIFICATION ORDER No. & DATE
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5 MARKING	Calculated Mass kg		REVISION
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.			DGN. / D.CHD. / DRN. Raghu 16/9/15 / CHD. / APPD. / 2016 SIGN. DATE	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547	TPD–SC/CPEG ISSUE No.
				DRG.No. SE MOCK–UP.2100.2005.00.1 SCALE 2:1	Rev. No. / FORMAT A3 SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





B (2:1)
Before machining



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS				
▽	▽▽	▽▽▽	▽▽▽▽	
6-25	1.6-6	0.025-1.6	< 0.025	

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6-30	30-120	120-400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg

DGN.		
D.CHD.		
DRN.		01/12/15
CHD.		
APPD.		
2016	SIGN.	DATE

TITLE
Flange

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2100.2004.00.1
SCALE 1:1
SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

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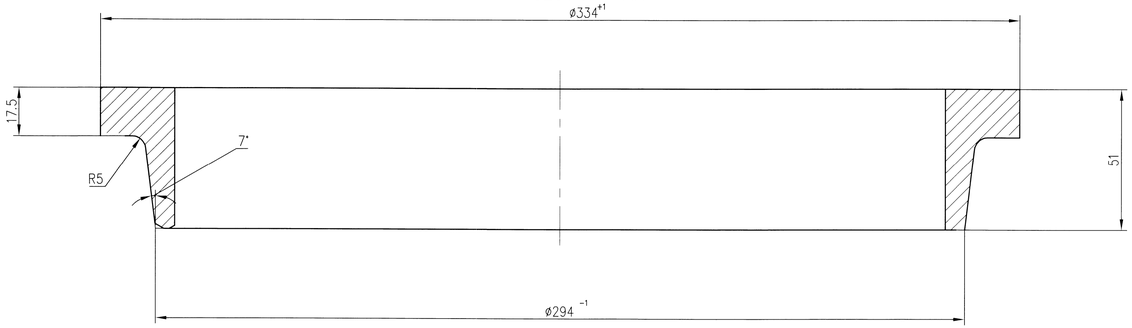
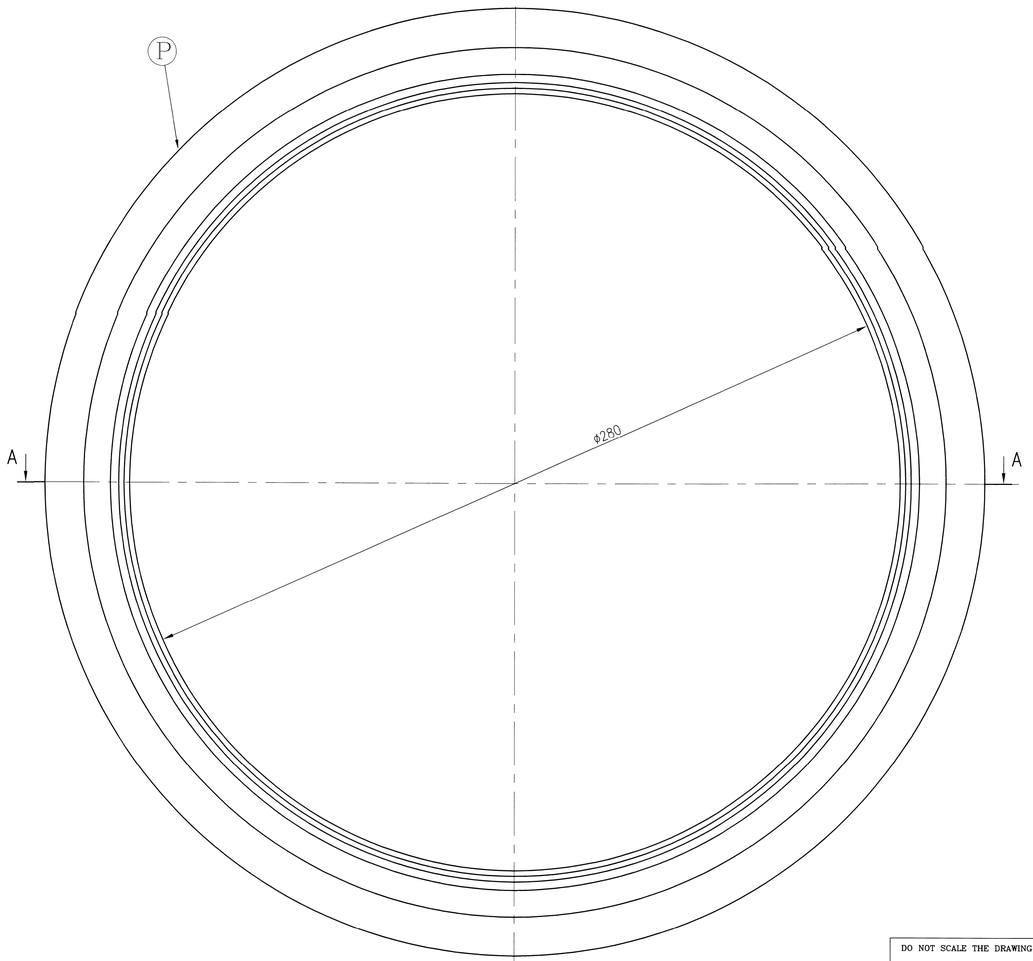
FORMAT A2

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	6 to 30	UPTO 30 to 120	UPTO 120 to 315	UPTO 315 to 1000	UPTO 1000 to 2000	UPTO 2000 to 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS				
▽	▽▽	▽▽▽	▽▽▽▽	
8–25	1.6–8	0.025–1.6	< 0.025	

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

TITLE

Flange

DGN.			
D.CHD.			
DRN.	Raghu	04/9/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2100.2003.00.1
SCALE 1:1 SHEET 1 OF 1

INDEX	MODIFICATION ORDER No. & DATE
REVISION	

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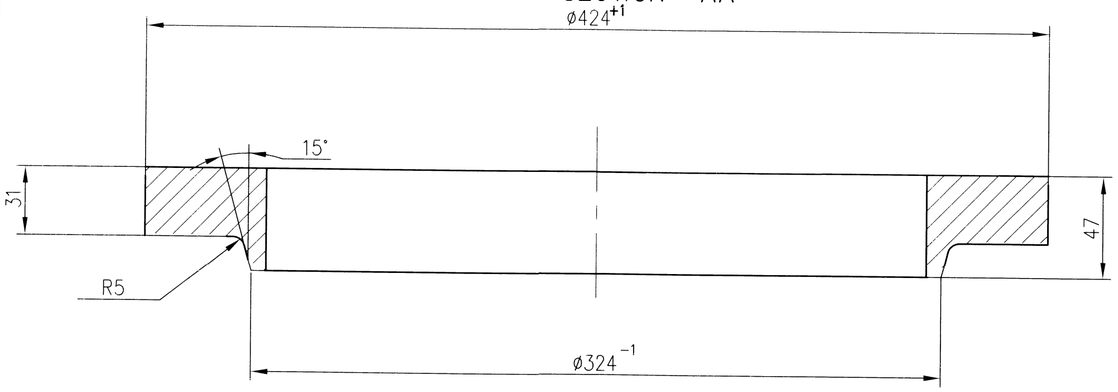
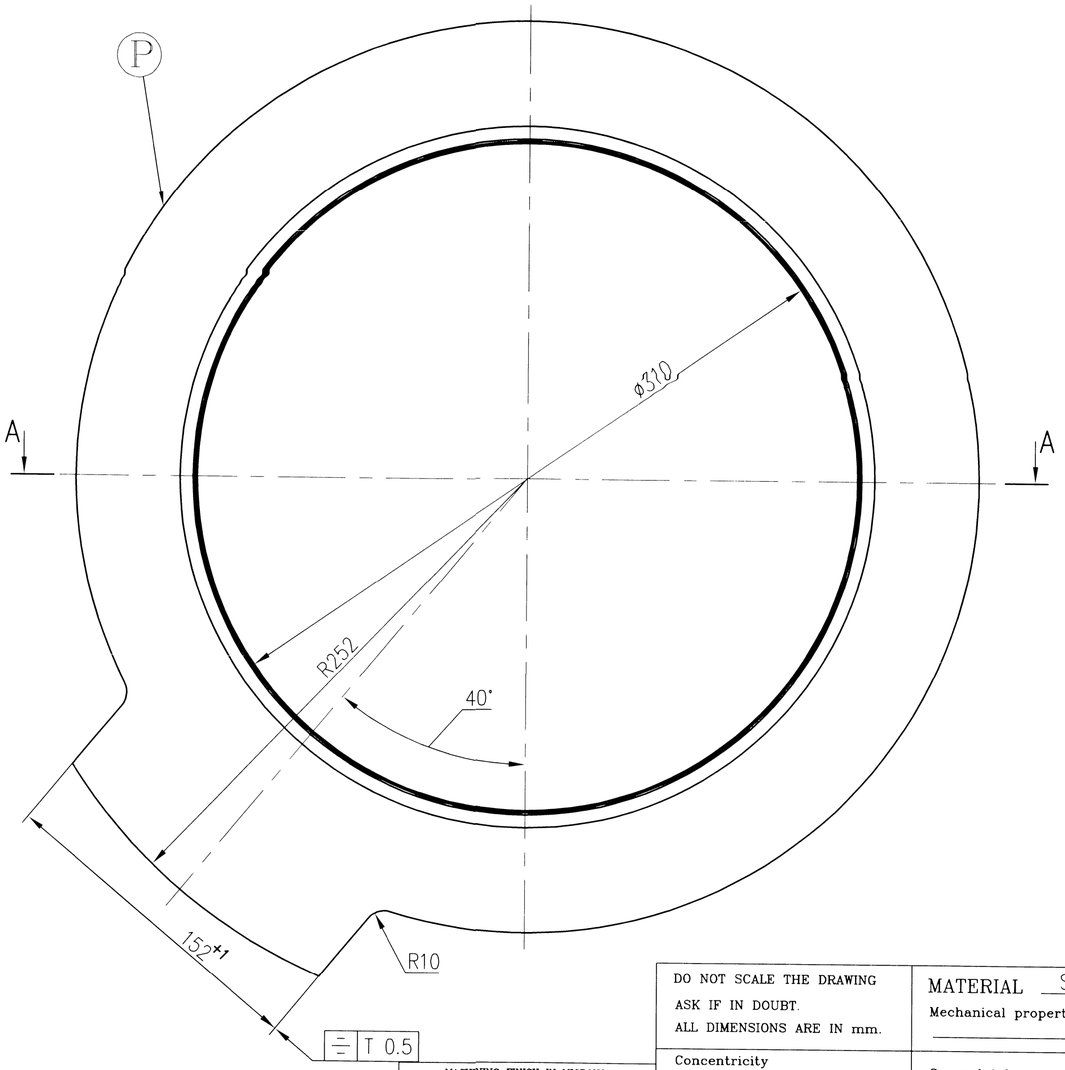
ISSUE No.
Rev. No.
FORMAT A1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS 304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
√Ra 2.5

MARKING

Calculated Mass
kg.

DGN.			
D.CHD.			
DRN.	Raghu	14/9/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

TITLE

Flange

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

INDEX	MODIFICATION ORDER No. & DATE

REVISION

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK–UP.2100.2002.00.1

Rev. No.

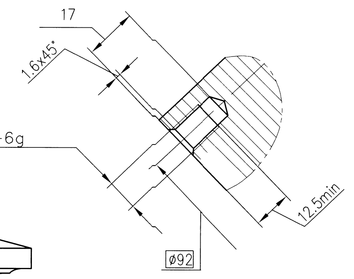
FORMAT A2

SCALE 1:2

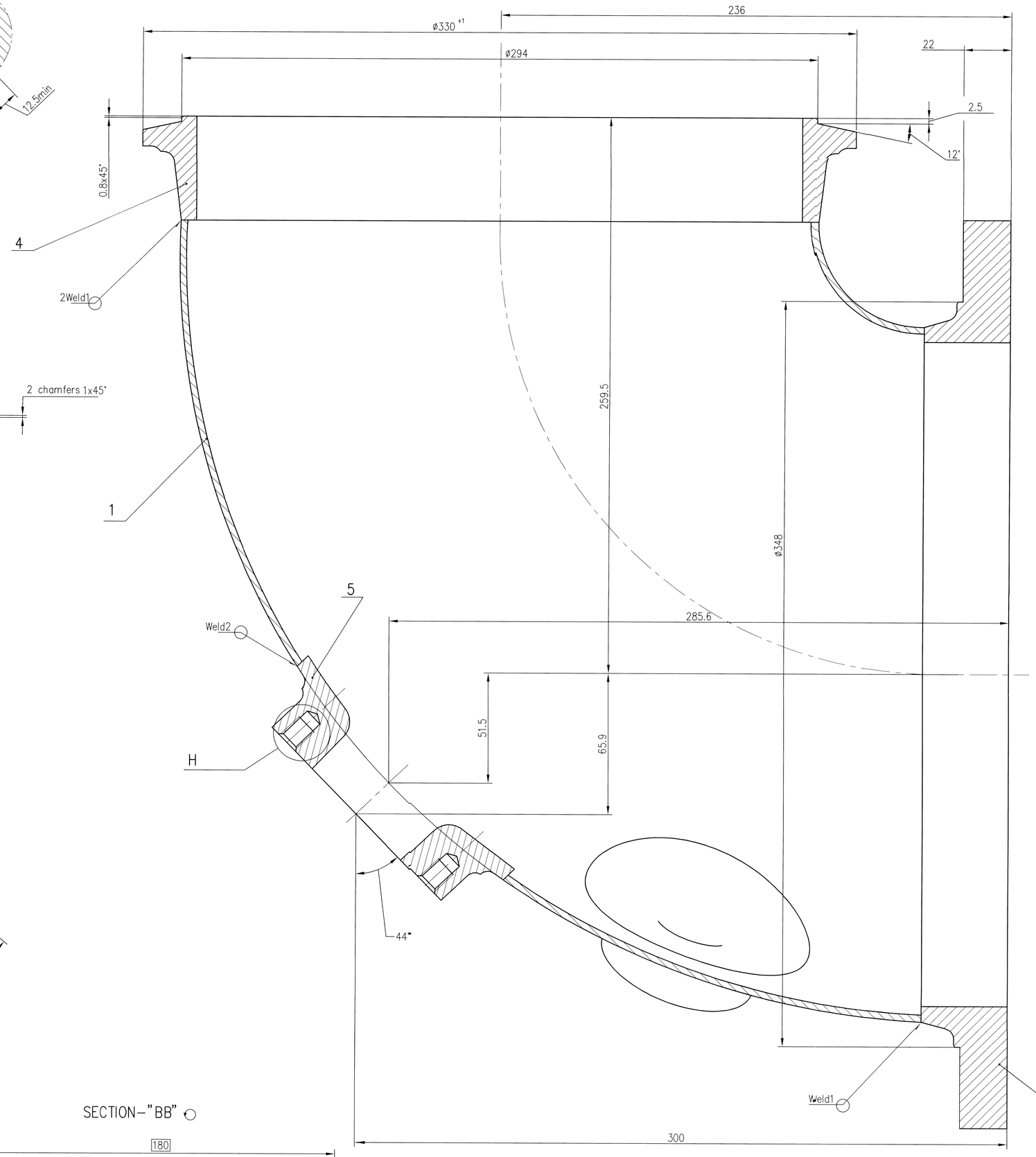
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

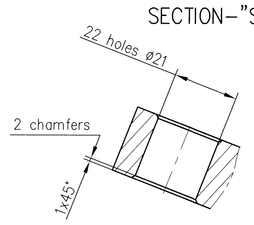
DETAIL–"H"



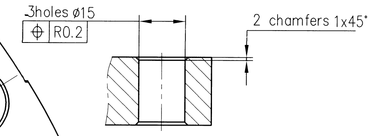
SECTION–"AA"

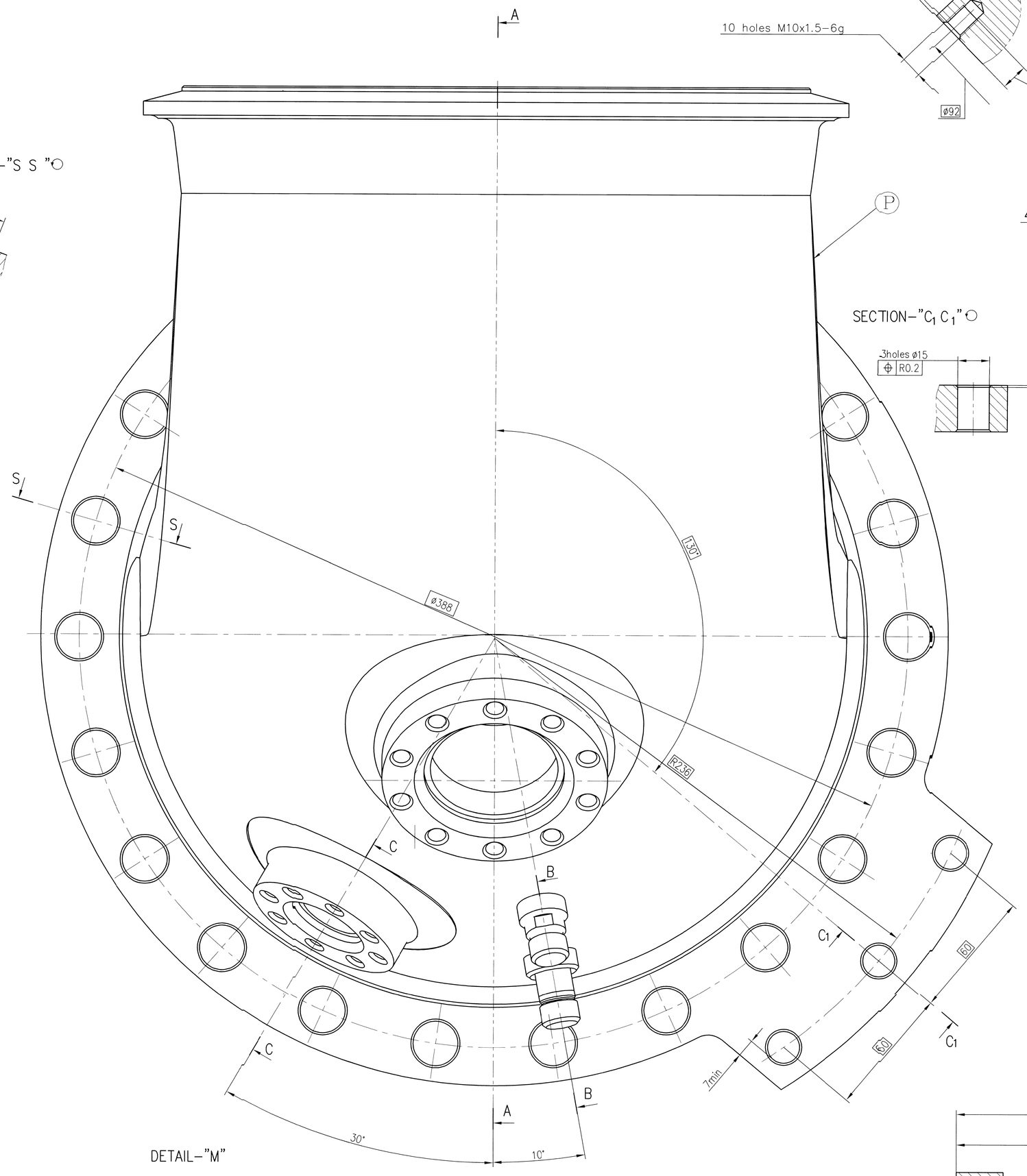


SECTION–"S S"

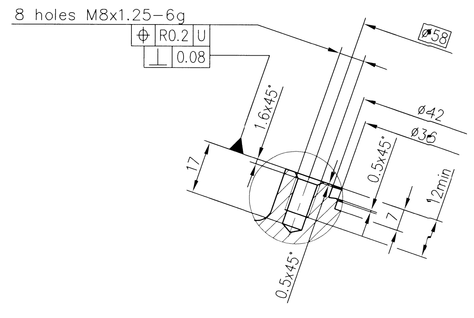


SECTION–"C1 C1"

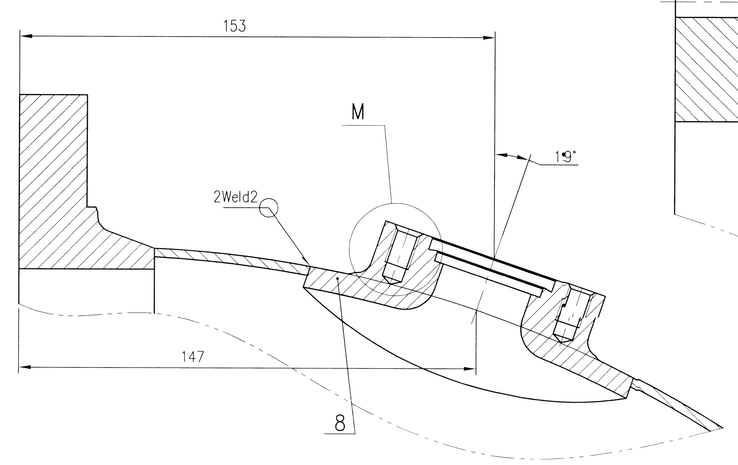




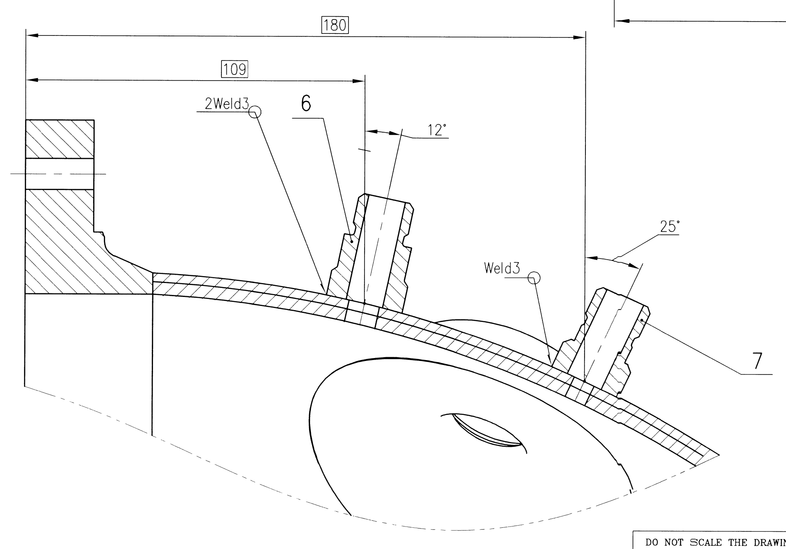
DETAIL–"M"



SECTION–"CC"



SECTION–"BB"



NOTE

1. Use filler wire:–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Threads should be free from chattering marks, burrs, peeling off etc.
3. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–32	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6 ±0.1	UPTO 30 ±0.2	UPTO 120 ±0.3	UPTO 315 ±0.5	UPTO 1000 ±0.8	UPTO 2500 ±1.2	UPTO 4000 ±2.0	UPTO 6000 ABOVE ±3.0	UPTO 4 ±1°	4–30 ±30'	30–120 ±20'	120–400 ±15'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Mechanical properties	SURFACE TREATMENT	TITLE Exhaust manifold Assembly	INDEX	MODIFICATION ORDER No. & DATE
Concentricity Perpendicularity Angularity Parallelism	General tolerance IS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH			REVISION
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.		MARKING	GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547		TCEID–SCE/CPEG
		Calculated Mass kg	DGN / D.CHD / DSN / CHD / APPD / 2016 SIGN. / DATE	ISSUE No.	
			DRG No. SE MOCK–UP.2100.2000.00.0AD SCALE 1:1	Rev No	FORMAT A0 SHEET 1 OF 1

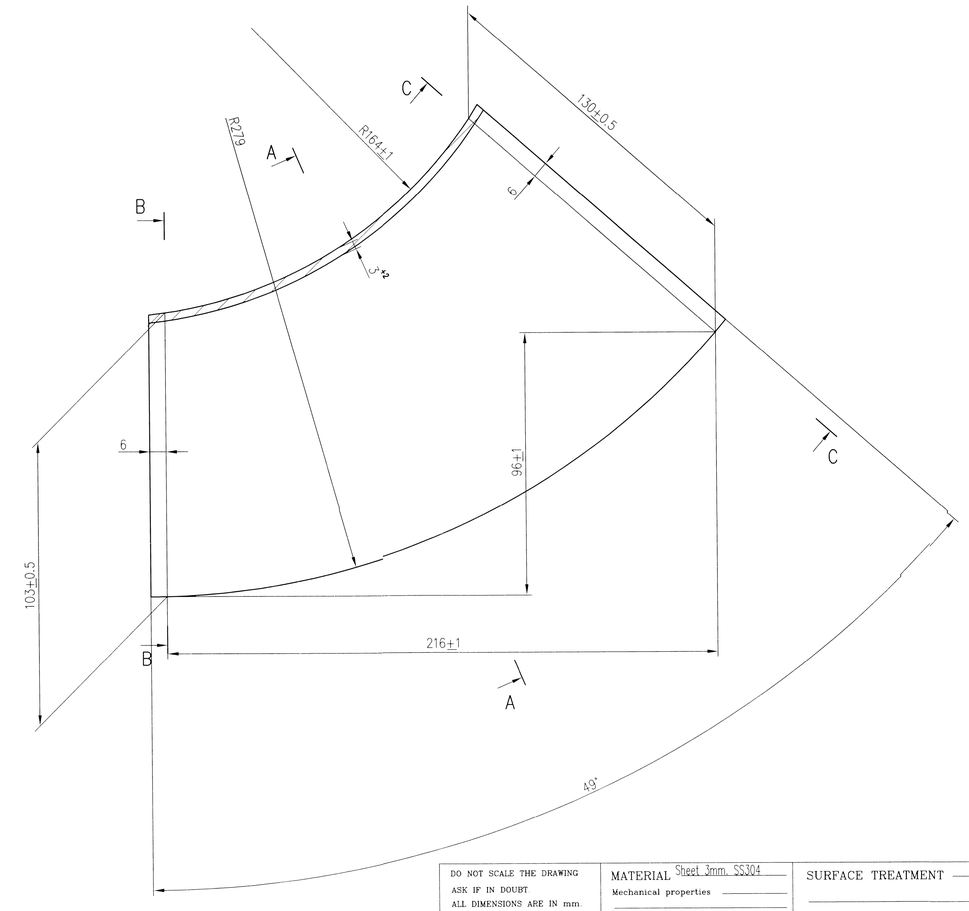
Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A0			SE MOCK-UP.2100.2000.00.0AD		Exhaust Manifold Assembly		
					Units		
A4		1	SE MOCK-UP.2100.2100.00.0		Branch	1	
					Parts		
A2		3	SE MOCK-UP.2100.2002.00.1		Flange	1	
A1		4	SE MOCK-UP.2100.2003.00.1		Flange	1	
A2		5	SE MOCK-UP.2100.2004.00.1		Flange	1	
A3		6	SE MOCK-UP.2100.2005.00.1		Connector	1	
A3		7	SE MOCK-UP.2100.2006.00.1		Connector	1	
A2		8	SE MOCK-UP.2100.2007.00.1		Flange	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

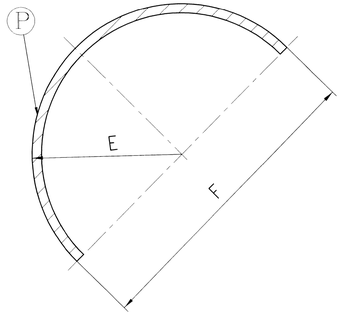
	TITLE	INDEX	MODIFICATION ORDER No. & DATE
	Exhaust manifold		REVISION

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG	
D.CHD.			ISSUE No.	
DRN.	Raghu 09/11/15			
CHD.		DRG.No. SE MODEL.2100.2000.00.0	Rev. No.	FORMAT A4
APPD.				
2016	SIGN.	DATE	SHEET 1 OF 1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



SECTION–"AA, BB, CC"
(1:2)



Section	Dimensions, mm	
	E	F
A–A	R	2R
B–B	R103	206
C–C	R130	260

1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL Sheet 3mm. SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽ (√)

MARKING

Calculated Mass kg

TITLE: Half branch

DGN			
D.CHD			
DRN	Roopa	22/8/15	
CHD			
APPD			
2016	SIGN	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG No. SE MOCK-UP.2100.1102.00.1
SCALE 1:1
SHEET 1 OFF 1

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ISSUE No.
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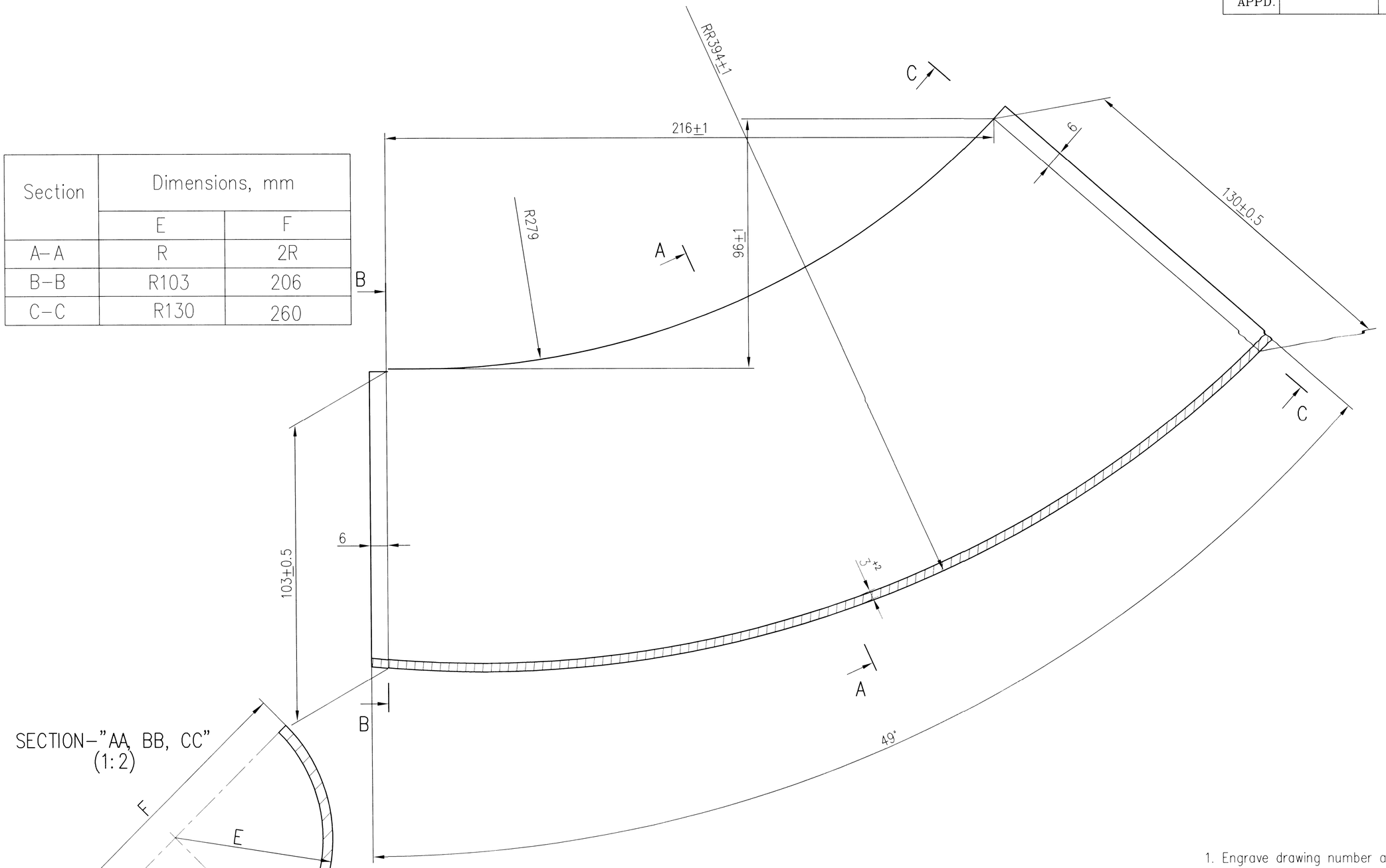
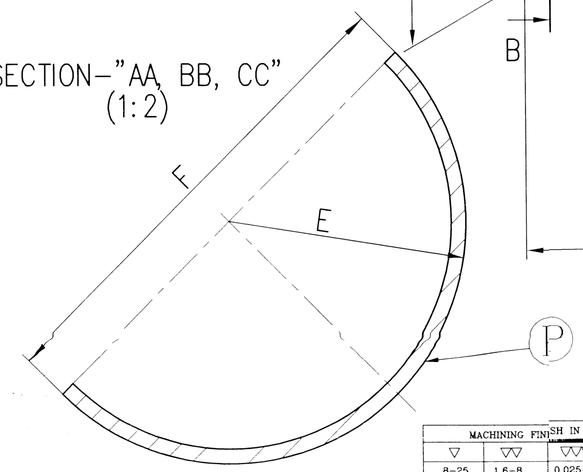
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

Section	Dimensions, mm	
	E	F
A–A	R	2R
B–B	R103	206
C–C	R130	260





1. Engrave drawing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

MATERIAL Sheet 3mm SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH ▽ (√)

MARKING

Calculated Mass kg.

TITLE

Half branch

DGN.			
D.CHD.			
DRN.	Raghu	26/8/15	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2100.1101.00.1 Rev. No

SCALE 1:1 SHEET 1 OFF 1 FORMAT A2

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

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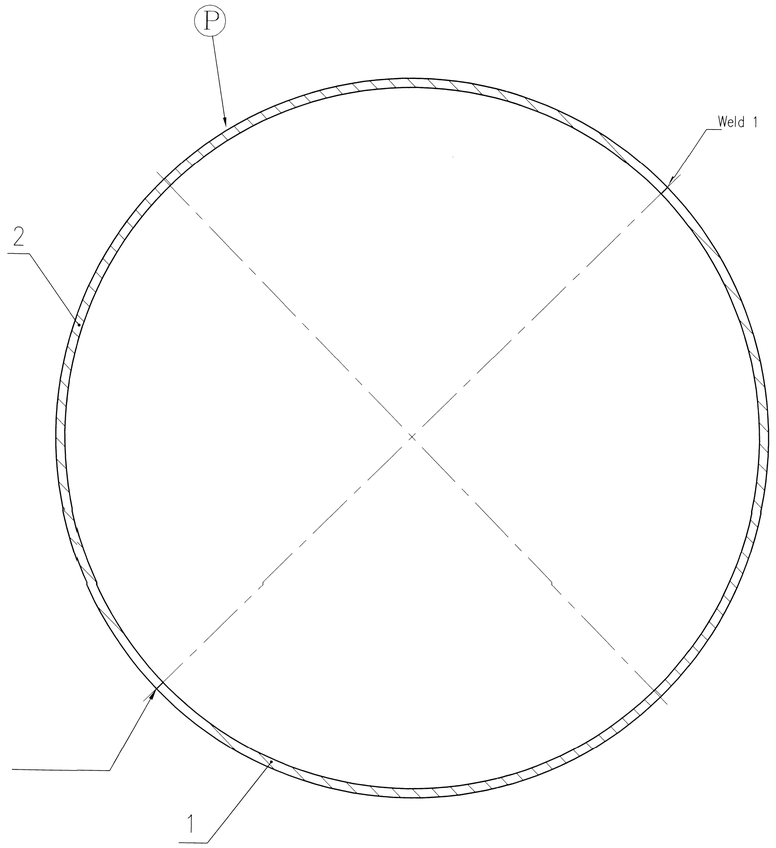
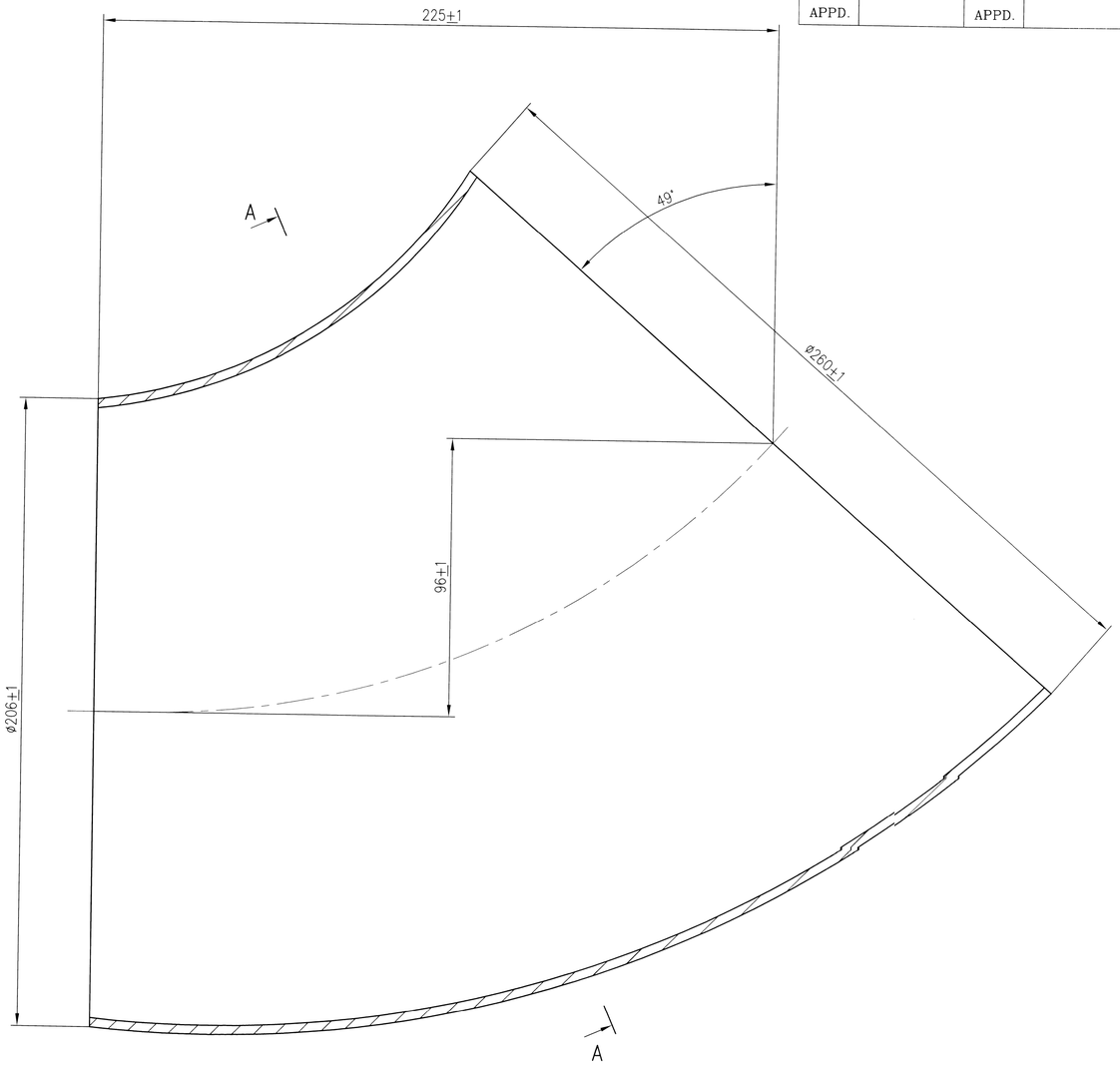
CHD.		CHD.	
APPD.		APPD.	

SECTION–"AA"





NOTE

1. Use filler wire:–AISI316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm OF SHORTER SIDE OF ANGLE			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30′	±20′	±10′

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg

TITLE

Branch
Assembly

DGN.			
D.CHD.			
DRN.	Raghu	26/8/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

DRG.No. SE MOCK–UP.2100.1100.00.0AD

SCALE 1:1 SHEET 1 OF 1

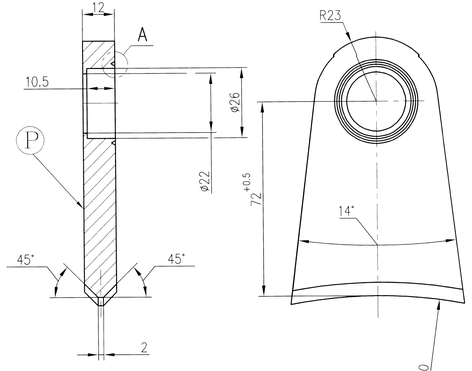
INDEX	MODIFICATION ORDER No. & DATE	Rev. No.	FORMAT
REVISION		ISSUE No.	A1

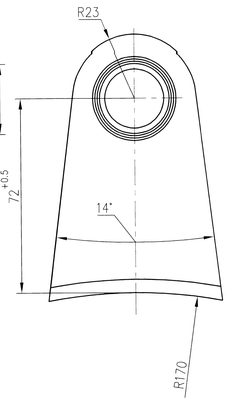
Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A1			SE MOCK-UP.2100.1100.00.0AD		Branch Assembly		
					Parts		
A2		1	SE MOCK-UP.2100.1101.00.1		Half branch	1	
A2		2	SE MOCK-UP.2100.1102.00.1		Half branch	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

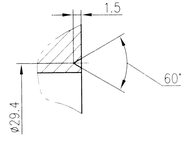
	TITLE: Branch			INDEX	MODIFICATION ORDER No. & DATE
					REVISION
DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547		TPD-SC/CPEG	
D.CHD.				ISSUE No.	
DRN.					
CHD.		DRG.No. SE MOCK-UP.2100.1100.00.0		Rev. No.	FORMAT A4
APPD.					
2016	SIGN.	DATE		SHEET 1 OF 1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





DETAIL–"A" (2:1)

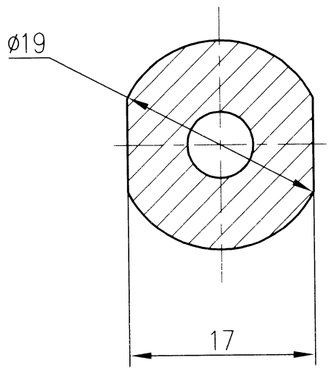


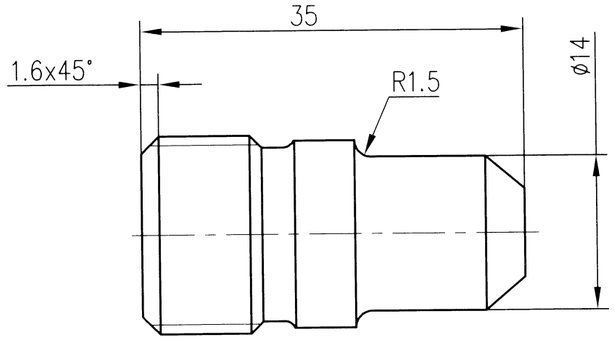
1. Engrave drawing number at P.

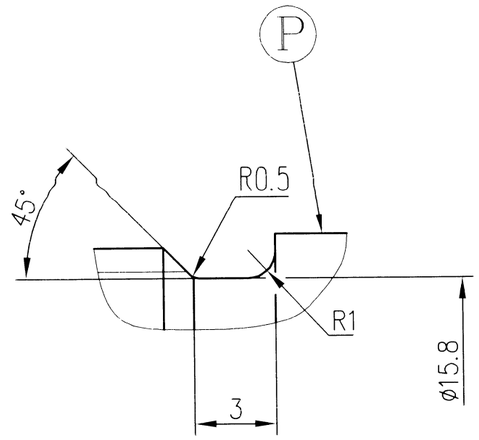
| LENGTH OR DIA | MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | | | | | | | | | | | | | MACHINING FINISH IN MICRONS | | | | | | | | | | | | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

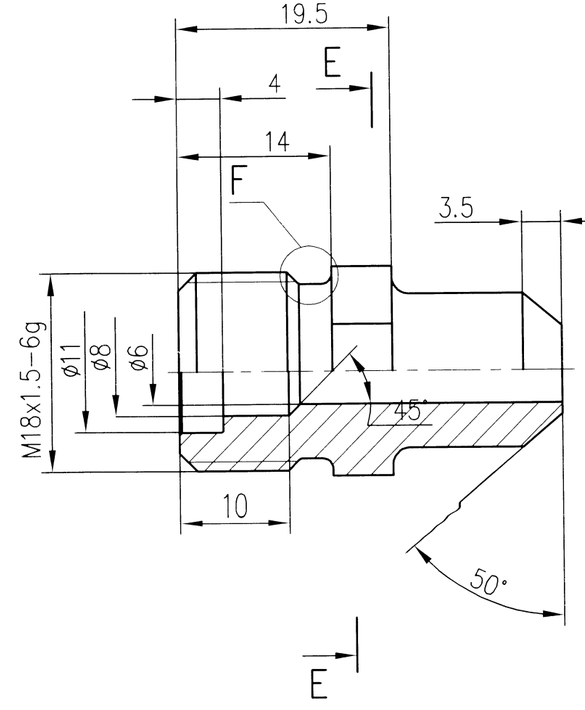
SECTION–"EE"







DETAIL–"F" (5:1)



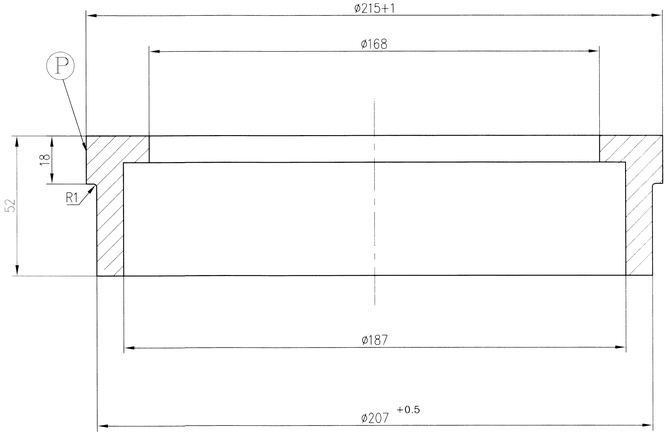
Note

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave darwing number at P.

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										MACHINING FINISH IN MICRONS			
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE UPTO 6	6–30	30–120	120–400	▽ 8–25	▽▽ 1.6–8	▽▽▽ 0.025–1.6	▽▽▽▽ < 0.025
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'				

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	TITLE: Connector	INDEX / MODIFICATION ORDER No. & DATE: REVISION
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √ Ra 2.5 MARKING	Calculated Mass kg	DGN. / D.CHD. / DRN. Raghu 16/9/15 / CHD. / APPD. / 2016 SIGN. DATE
This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.				GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM–695547
				DRG.No. SE MOCK–UP.2100.1011.00.1 · Rev. No. · FORMAT A3 SCALE 1 : 2 · SHEET 1 OF 1
				TPD–SC/CPEG ISSUE No.

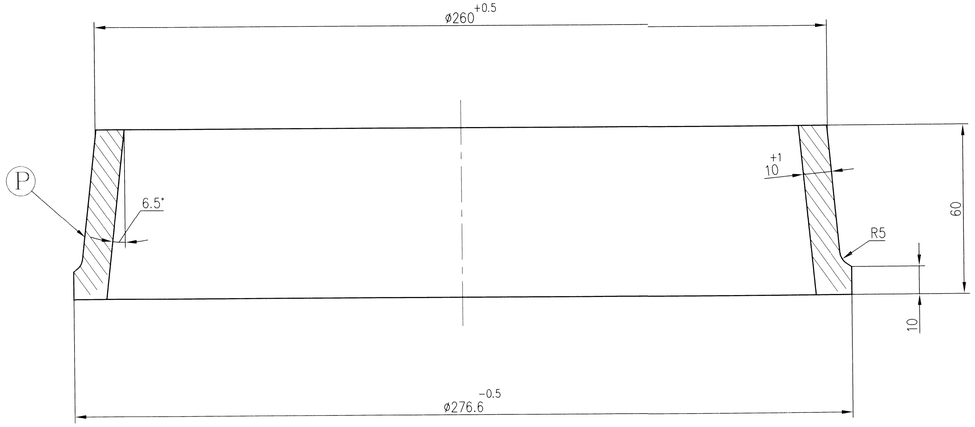
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

LENGTH	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE								LENGTH IN mm. OF SHORTER SIDE OF ANGLE			
OR DIA	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	UPTO 6	6-30	30-120	120-400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

DGN.		
D.CHD.		
DRN.	Raghu	22/8/16
CHD.		
APPD.		
2016	SIGN.	DATE

TITLE
Ring

INDEX	MODIFICATION ORDER No. & DATE

REVISION

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG
ISSUE No.

DRG.No. SE MOCK-UP.2100.1006.00.1
Rev. No.
FORMAT A2
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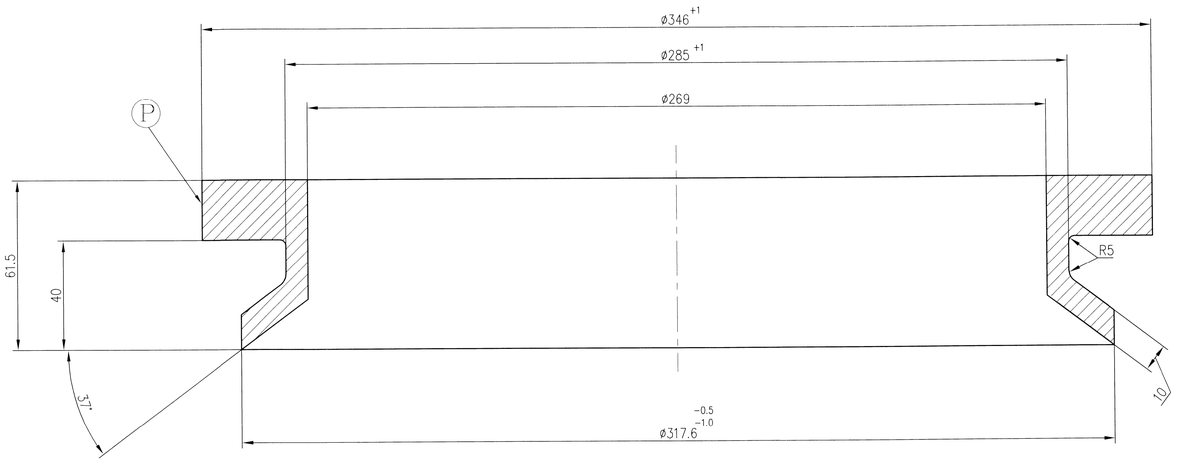
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg.

DGN.			
D.CHD.			
DRN.	Raghu	22/2/16	
CHD.			
APPD.			
2016	SIGN.	DATE	

TITLE

Flange

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

DRG.No. SE MOCK-UP.2100.1004.00.1
Rev. No.
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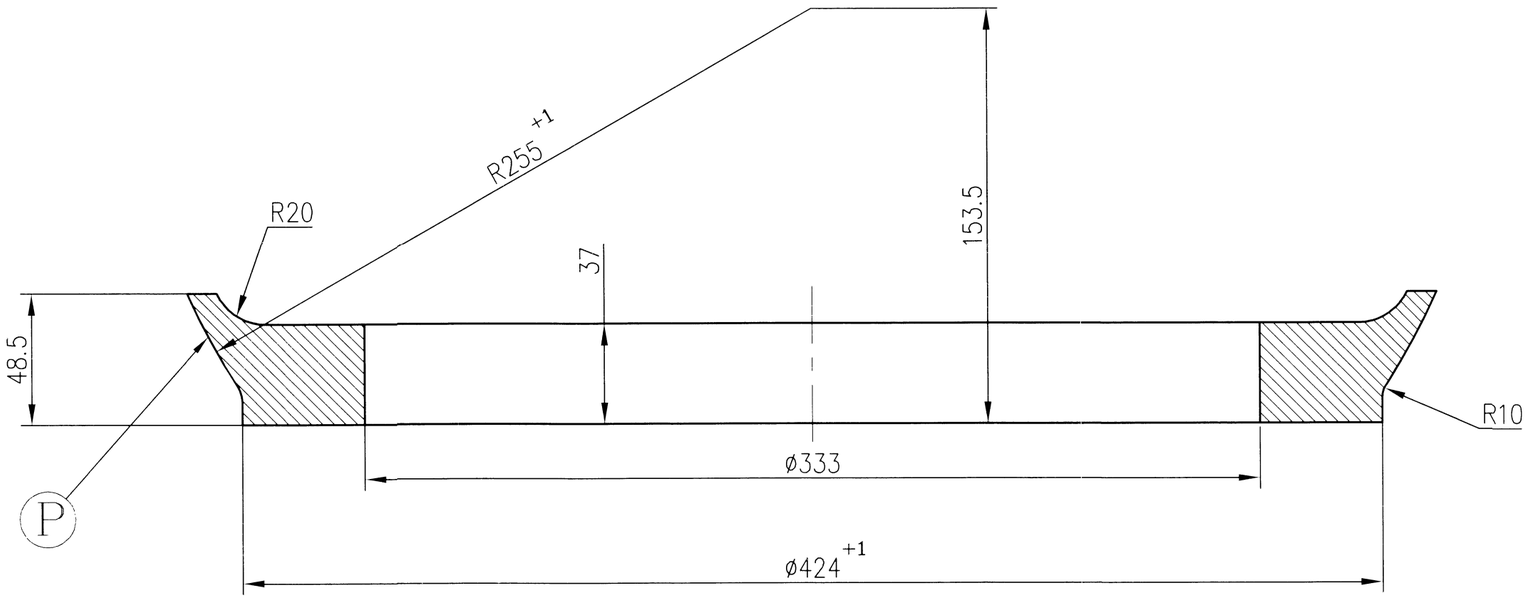
	ISSUE No.

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

LENGTH OR DIA	UPTO 6	UPTO 6–30	UPTO 30–120	UPTO 120–315	UPTO 315–1000	UPTO 1000–2000	UPTO 2000–4000	UPTO 4000 ABOVE
MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0

LENGTH IN mm OF SHORTER SIDE OF ANGLE	UPTO 6	6–30	30–120	120–400
	±1°	±30′	±20′	±10′

MACHINING FINISH IN MICRONS	▽	▽▽	▽▽▽	▽▽▽▽
	8–25	1.6–6	0.025–1.6	< 0.025

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL SS304
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH
Ra 2.5

MARKING

Calculated Mass kg

DGN.		
D.CHD.		
DRN.	Raghu	16/9/15
CHD.		
APPD.		
2016	SIGN.	DATE

TITLE
Sphere flange

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GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG
ISSUE No.

DRG.No. SE MOCK-UP.2100.1003.00.1
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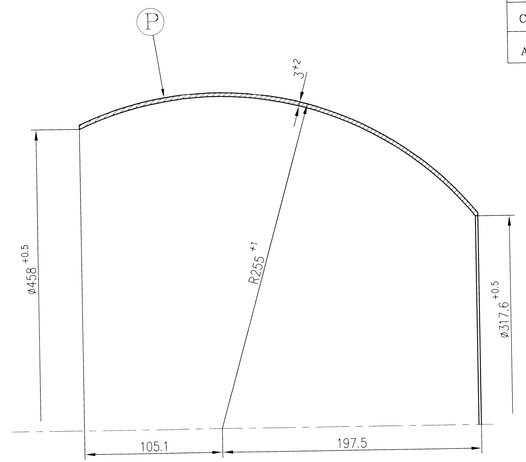
SHEET 1 OF 1

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



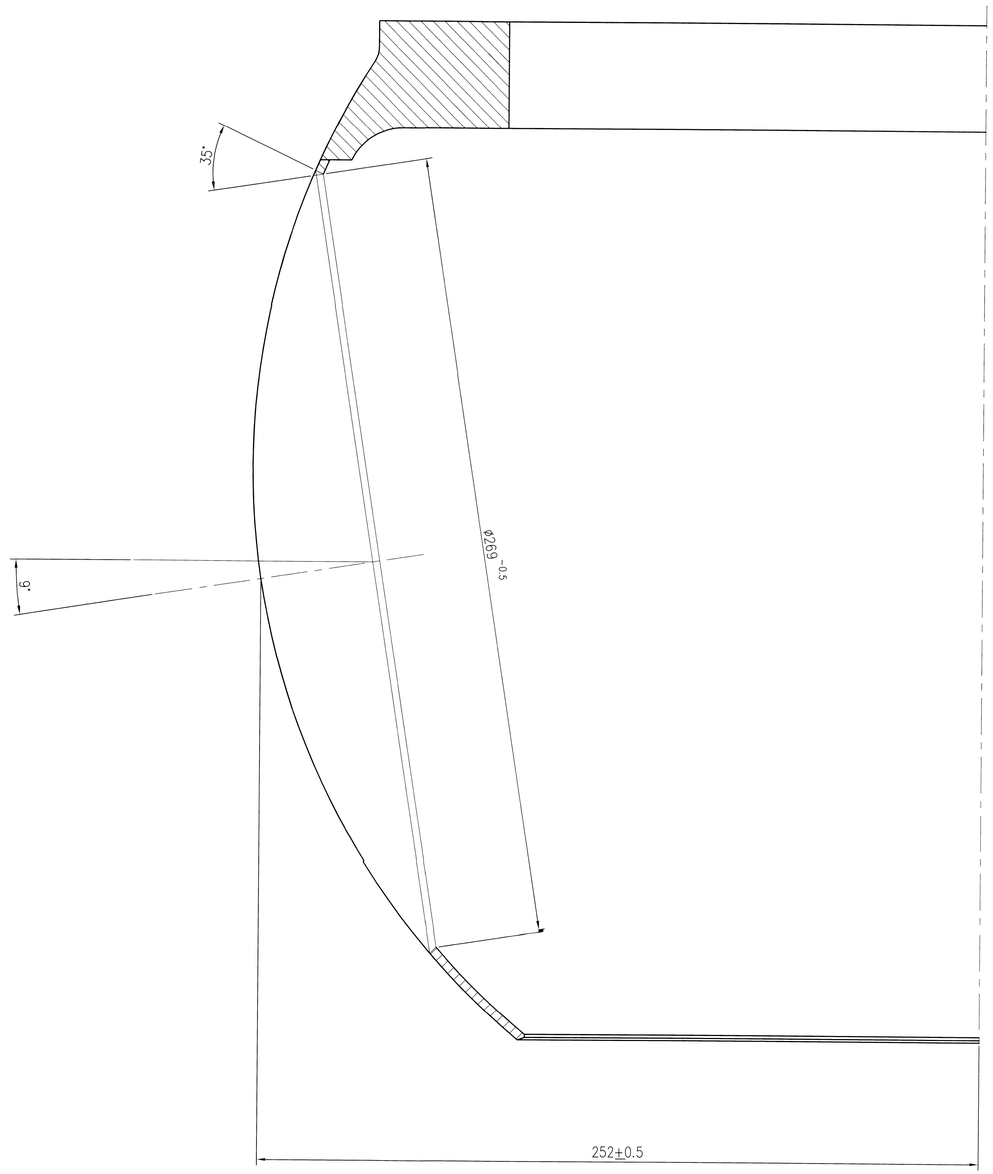
1. Engrave drawing number at P.

| MACHINING FINISH IN MICRONS | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

DETAIL–"M2 " (3)

before welding with the part 5



MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 TO 30	UPTO 30 TO 120	UPTO 120 TO 315	UPTO 315 TO 1000	UPTO 1000 TO 2000	UPTO 2000 TO 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Qty. per Assembly

Calculated Mass kg.

DGN.			
D.CHD.		11/11/16	
DRN.	Raghu	29/8/16	
CHD.			
APPD.		1/11/16	
	2016	SIGN.	DATE

TITLE

Stator Assembly

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

DRG.No. SE MOCK–UP.2100.1000.00.0AD
Rev. No.
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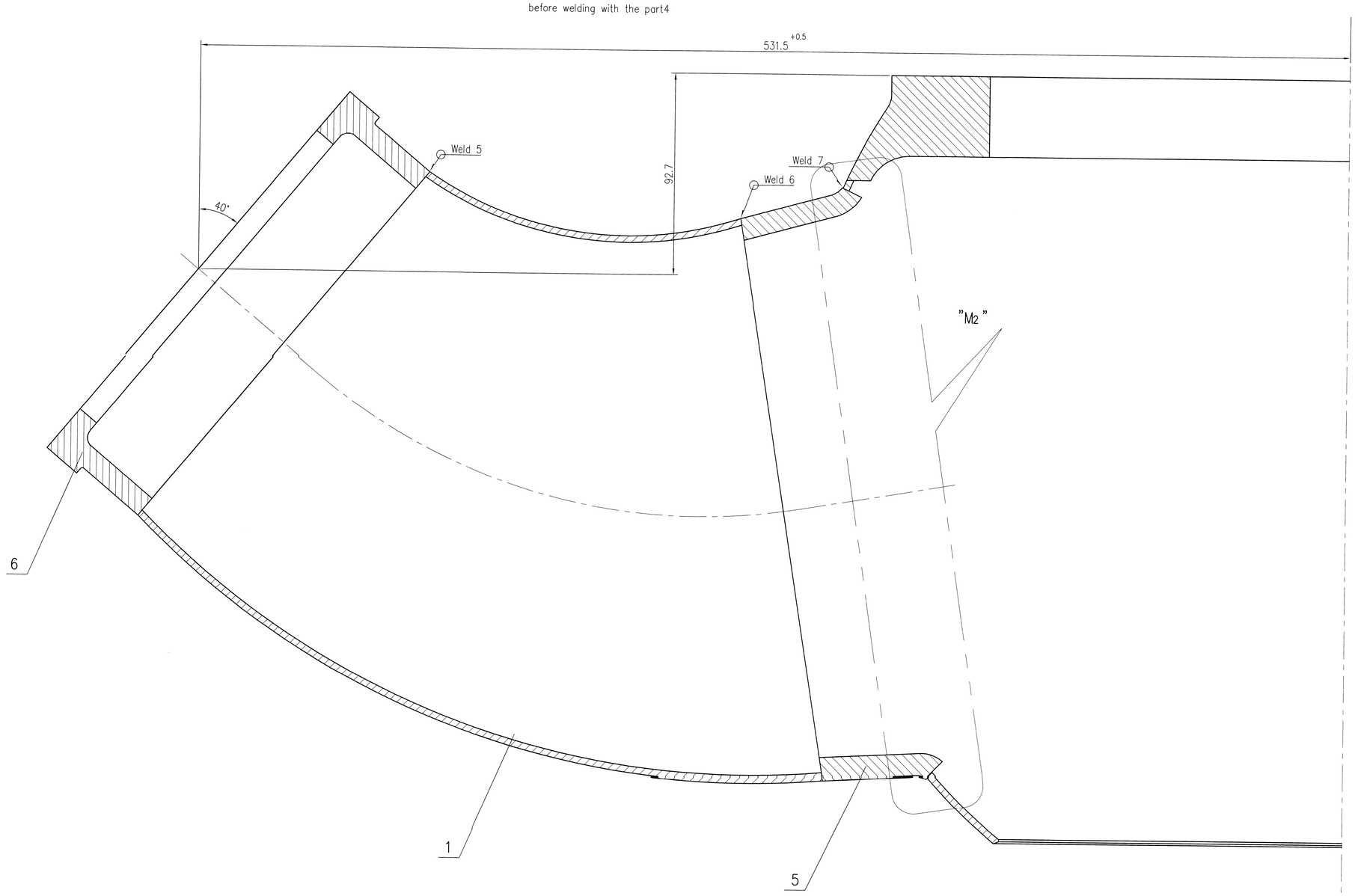
CHD.		CHD.	
APPD.		APPD.	

DETAIL–"D2" (3)

before welding with the part4



MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE											
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

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MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Qty. per Assembly

Calculated Mass kg. 2016

DGN.		
D.CHD.		11/9/14
DRN.	Raghu	26/8/14
CHD.		11/9/14
APPD.		11/9/14
SIGN.		DATE

TITLE

Stator Assembly

INDEX	MODIFICATION ORDER No. & DATE
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INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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ISSUE No.

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Rev. No.
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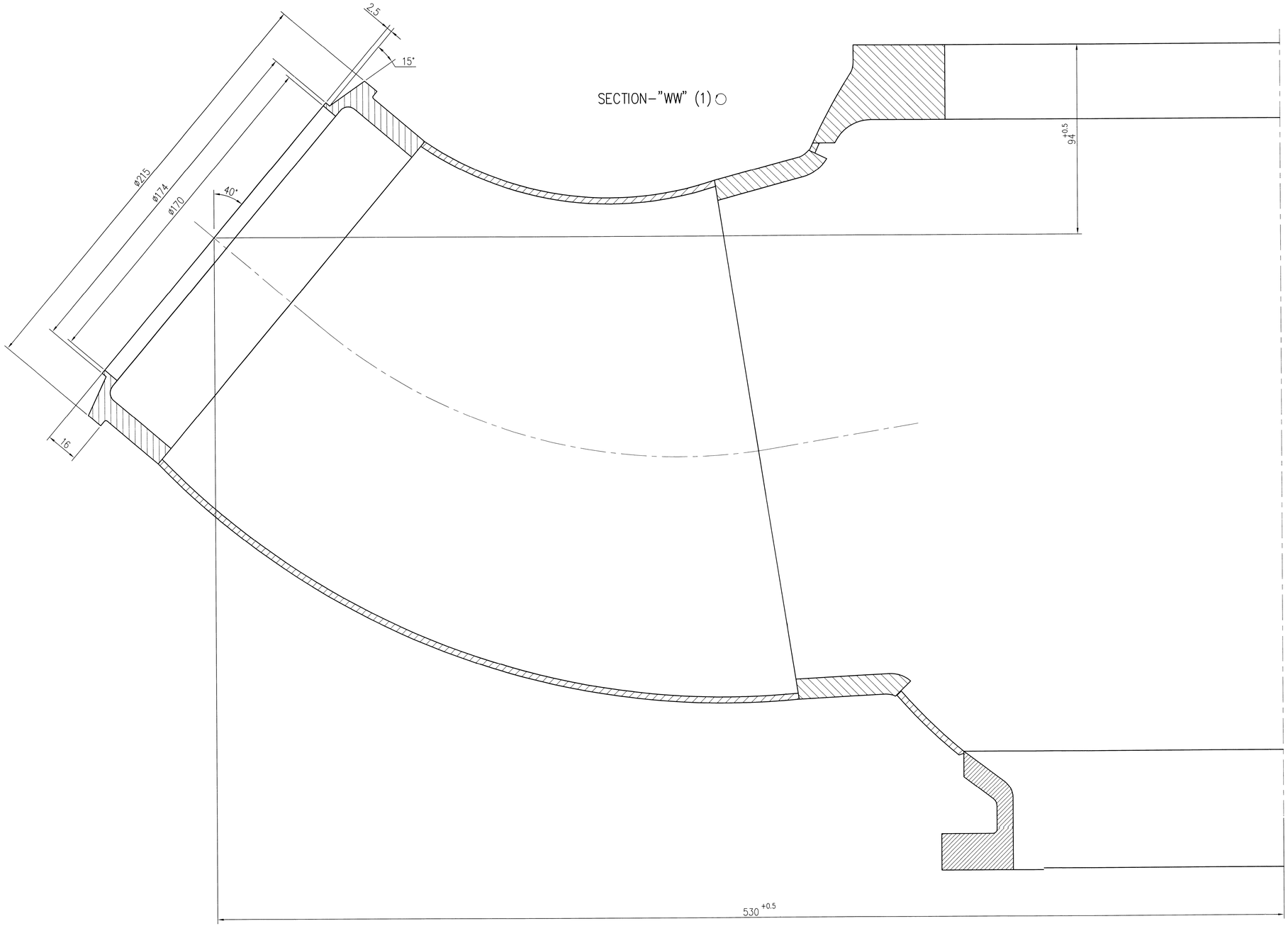
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

SECTION–"WW" (1)



MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE										
	UPTO 6	UPTO 6 30	UPTO 30 120	UPTO 120 315	UPTO 315 1000	UPTO 1000 2000	UPTO 2000 4000	UPTO 4000 ABOVE	LENGTH IN mm OF SHORTER SIDE OF ANGLE			
									UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30′	±20′	±10′

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Qty. per Assembly

Calculated Mass
2016 kg.

TITLE
Stator Assembly

DGN.			
D.CHD.		1/10/15	
DRN.	Raghu	26/9/15	
CHD.		1/10/15	
APPD.		1/10/15	
	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

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SRQA LPSC		SCP CC RELEASE	
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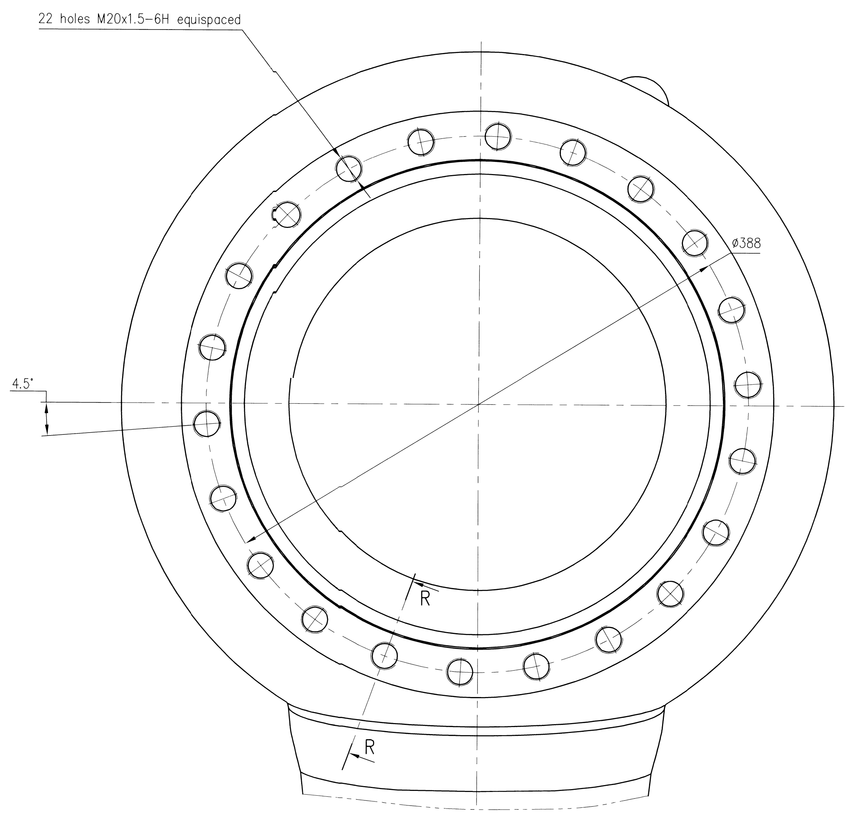
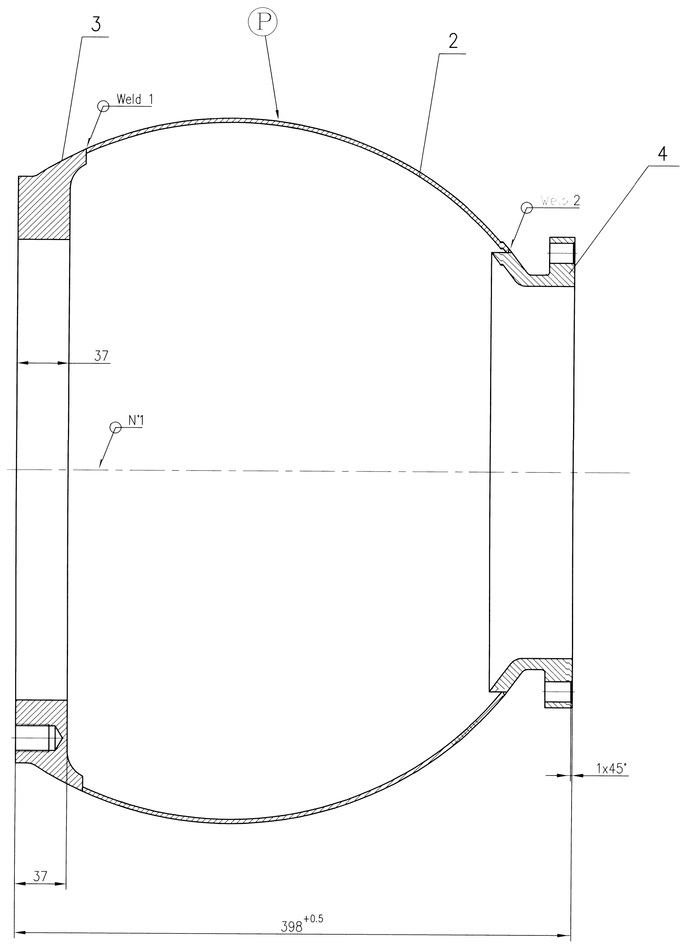
APPD.		APPD.	

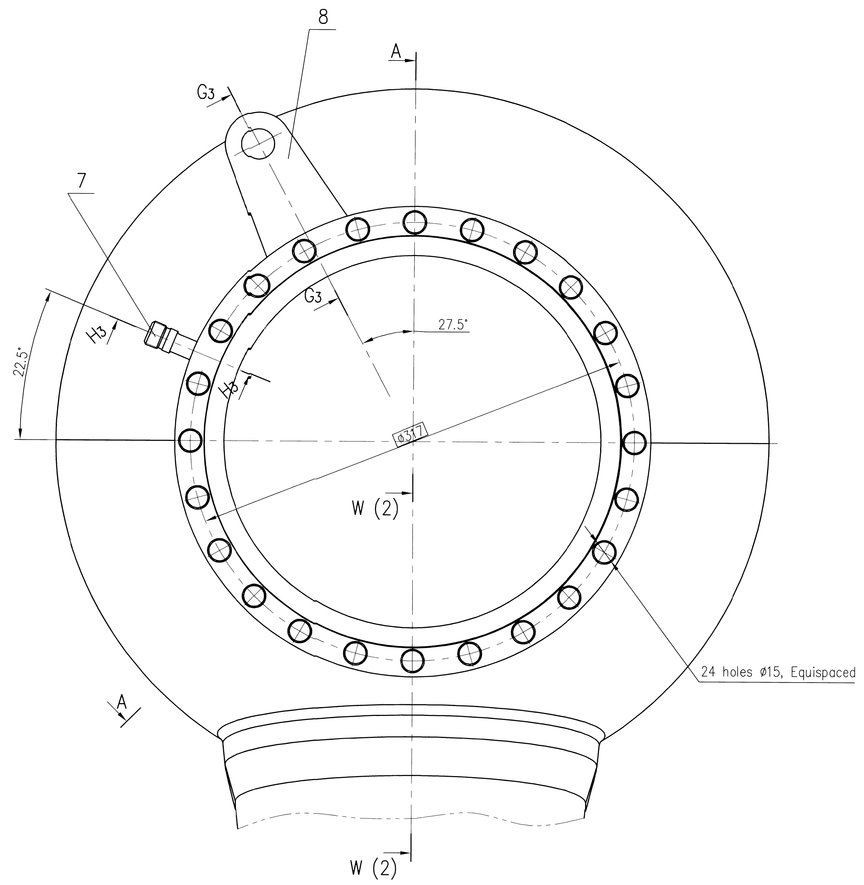
VIEW FROM–"B" ○



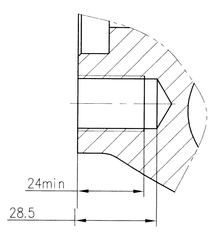
B

SECTION–"AA"

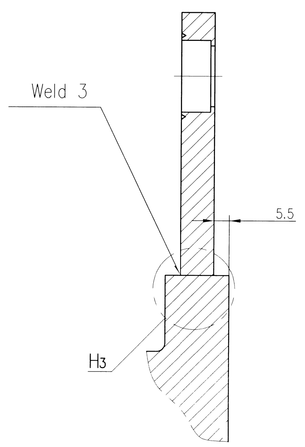




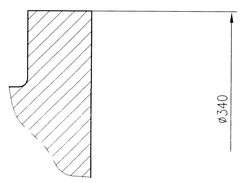
SECTION–"RR"○



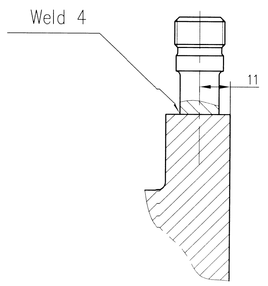
SECTION–"G3G3"
Before final machining



DETAIL–"H3"
Before welding with the part 3



SECTION–"H3H3" (1) ○
before welding with the part 7



NOTE

1. Use filler wire: – AIS:316L/308 for welding.
   Suitable weld configuration may be adopted.
2. Threads should be free from chattering marks, burrs, peeling off etc.
3. Engrave drawing number at P.

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

LENGTH OR DIA	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE									LENGTH IN mm OF SHORTER SIDE OF ANGLE		
	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	ABOVE 8000	UPTO 6	6–30	30–120	120–400
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0	±1°	±30'	±20'	±10	

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg

TITLE
Stator Assembly

DGN.	Ajoy	11/11/16	
D.CHD.	Sunil	11/11/16	
DRN	Raghu	11/11/16	
CHD			
APPD			
2016	SIGN.	DATE	

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA THIVANDRUM–695547

DRG.No. SE MOCK–UP.2100.1000.00.0AD
SCALE 1:2 SHEET 1 OF 4

INDEX	MODIFICATION ORDER No. & DATE
REVISION	
ISSUE No.	
Rev. No.	FORMAT
	A0

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
*			SE MOCK-UP.2100.1000.00.0AD		Stator Assembly		*A0,A1x3
					Units		
A4		1	SE MOCK-UP.2100.1100.00.0AD		Branch	1	
					Parts		
A3		2	SE MOCK-UP.2100.1002.00.1		Half Sphere	2	
A3		3	SE MOCK-UP.2100.1003.00.1		Sphere flange	1	
A2		4	SE MOCK-UP.2100.1004.00.1		Flange	1	
A2		5	SE MOCK-UP.2100.1006.00.1		Ring	1	
A3		6	SE MOCK-UP.2100.1009.00.1		Ring	1	
A3		7	SE MOCK-UP.2100.1011.00.1		Connector	1	
A3		8	SE MOCK-UP.2100.1012.00.1		Bracket	1	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Stator

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		
D.CHD.		
DRN.	Raghu	26/8/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No

DRG.No. SE MOCK-UP.2100.1000.00.0

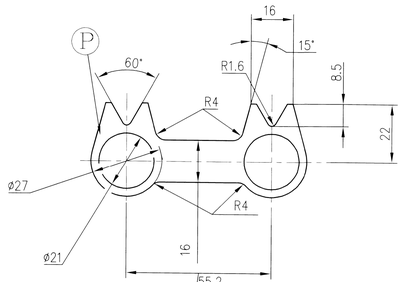
Rev. No.

FORMAT A4

SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8-25	1.6-8	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



1. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO ABOVE
UPTO 6	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0
6-30	±0.2	±0.3	±0.4	±0.6	±1.0	±1.5	±2.5	±4.0
30-120	±0.3	±0.4	±0.5	±0.8	±1.2	±2.0	±3.0	±5.0
120-400	±0.4	±0.5	±0.6	±1.0	±1.5	±2.5	±4.0	±6.0

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL Sheet 1mm SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH MARKING

AMEND No.	DATE	INDEX

TITLE: Locking washer

Qty. per Assembly:

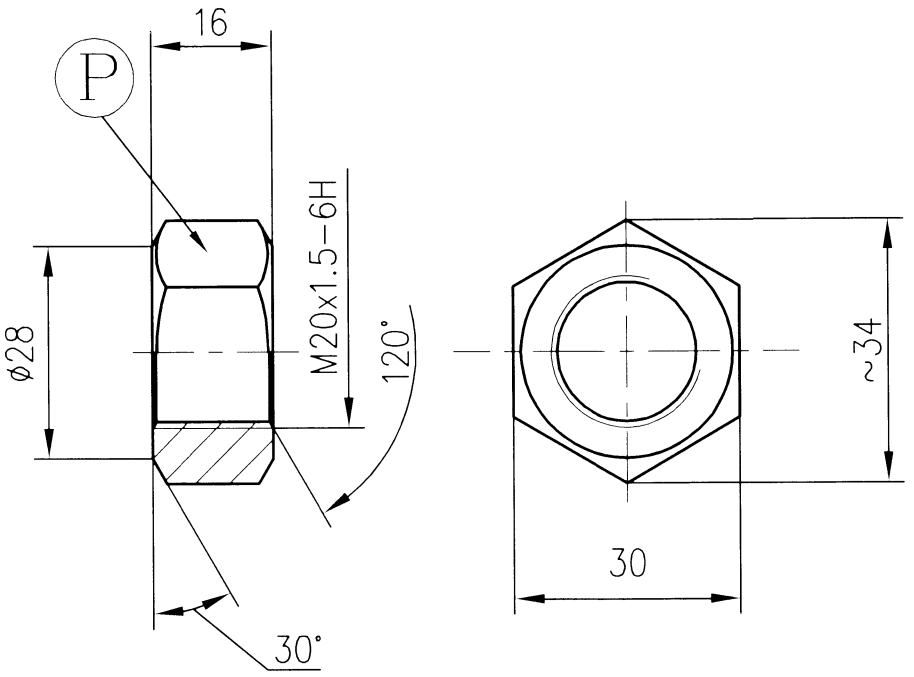
Calculated Weight: Kg

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.			ISSUE No.
DRN.	Raghu 12/9/13		
CHD.			
APPD.		DRG.No. SE MOCK-UP.2100.0063.00.1	Rev. No.
2016 SIGN. DATE		SCALE 1:1	SHEET 1 OF 1

FORMAT A4

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–8	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Commercially avaialbale M20 nut meeting the drawing diemsions can be used.
3. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE																							
LENGTH OR DIA	UPTO 6		UPTO 6 30		UPTO 30 120		UPTO 120 315		UPTO 315 1000		UPTO 1000 2000		UPTO 2000 4000		UPTO 4000 ABOVE		LENGTH IN mm OF SHORTER SIDE OF ANGLE	UPTO 6		6–30		30–120		120–400	
	±0.1		±0.2		±0.3		±0.5		±0.8		±1.2		±2.0		±3.0			±1°		±30′		±20′		±10′	

DATE				
AMEND.No.				
INDEX				

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT	
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √Ra 2.5	MARKING

DATE			
AMEND.No.			
INDEX			

TITLE

Nut

Calculated Weight ____ Kg

DGN.		1/11/16
D.CHD.		
DRN.	Raghu	02/9/15
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

TPD–SC/CPEG

ISSUE No.

DRG.No SE MOCK–UP.2100.0062.00.1

Rev. No.

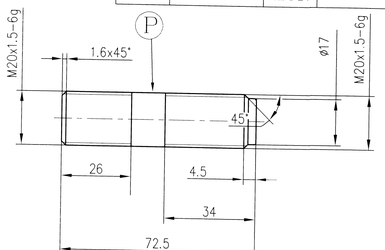
FORMAT A4

SCALE 1:1

SHEET 1 OF 1

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS 9102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE															
LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 6	6–30	30–120	120–400	400–1000	1000–2000	2000–4000	4000–8000
	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±0.5	±1°	±30'	±20'	±10'	±5'	±3'	±2'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties		SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified		SURFACE FINISH √Ra 2.5 MARKING

DATE	AMEND No.	INDEX	

TITLE

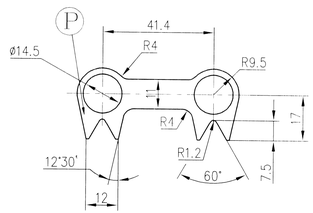
Stud

Calculated Weight ___ Kg

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.			ISSUE No.
DRN.			
CHD.		DRG.No. SE MOCK-UP.2100.0061.00.1	Rev. No.
APPD.		SCALE 1:1	SHEET 1 OF 1
2016	SIGN. DATE		FORMAT A4

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

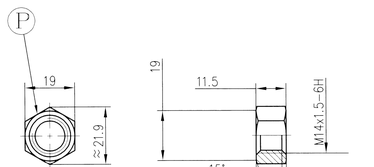


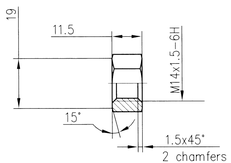
1. Engrave drawing number at P.

| MACHINING DEVIATION TO BS 4500 MEDIUM GRADE UNLESS SPECIFIED OTHERWISE | | |

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	





Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS 2102: MEDIUM GRADE, UNLESS SPECIFIED OTHERWISE																
LENGTH OR DIA	UPTO 6	6 TO 30	30 TO 120	120 TO 315	315 TO 1000	1000 TO 2000	2000 TO 4000	UPTO 6	6 TO 30	30-120	120-400	±10'	±30'	±20'	±17'	±3.5	±2.5	±1.2	±0.8	±0.5	±0.3	±0.2	±0.1
	LENGTH IN mm							ANGLES IN mm OF SHORTER SIDE															

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH √Ra 2.5 MARKING

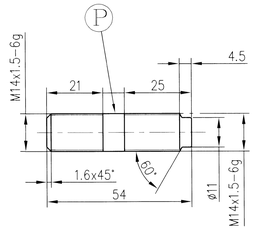
TITLE	Qty. per Assembly	Calculated Weight
Nut		Kg

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TPD-SC/CPEG
D.CHD.				ISSUE No.
DRN	Raghu	02/2/12		
CHD.			DRG.No. SE MOCK-UP.2100.0058.00.1	Rev. No.
APPD.			SCALE 1:1	SHEET 1 OF 1
2016	SIGN.	DATE		FORMAT A4

DATE | AMEND.No. | INDEX | AMEND.No. | DATE | INDEX

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

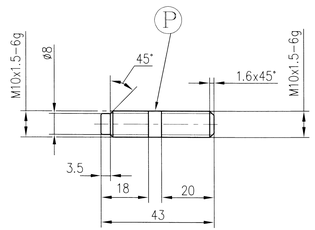
1. Threads should be free from chattering marks, burrs, peeling off etc. and should have ▽▽▽ finish.
2. Engrave drawing number at P.

MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

| LENGTH OR DIA | UPTO | UPTO | UPTO

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

MACHINING ALLOWANCE TO BE GIVEN ON MEDIUM SCALE UNLESS SPECIFIED ELSEWHERE														
LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 3150	UPTO 4000	UPTO 6300	UPTO 10000	UPTO 16000	UPTO 20000	UPTO 25000	UPTO 31500
6	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5
6-30	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5	4.0
30-120	0.3	0.4	0.5	0.6	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5	4.0	4.5
120-400	0.4	0.5	0.6	0.8	1.0	1.2	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0

ANGLE UNLESS SPECIFIED ELSEWHERE

LENGTH IN mm OF SHORTER SIDE OF ANGLE	UPTO 6	6-30	30-120	120-400
ALLOWANCE	2°	1°	30'	15'

DO NOT SCALE THE DRAWING ASK IF IN DOUBT. ALL DIMENSIONS ARE IN mm.	MATERIAL SS304 Mechanical properties	SURFACE TREATMENT
Concentricity	General tolerance JS or js12	SURFACE FINISH
Perpendicularity	Thread tolerance	Ra 2.5
Angularity	Thread chamfer & under cut.	MARKING
Parallelism	Radii not specified Chamfers not specified	

TITLE

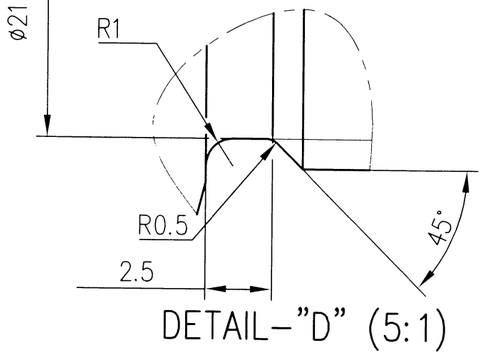
Stud

Calculated Weight ____ Kg

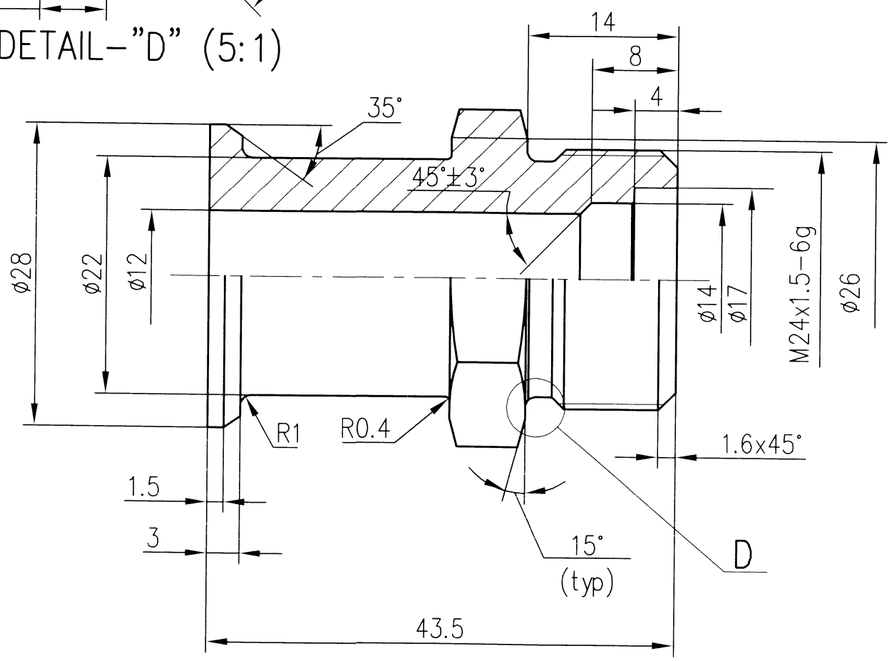
DGN.		GOVERNMENT OF INDIA	TPD-SC/CPEG
D.CHD.		INDIAN SPACE RESEARCH ORGANISATION	
DRN.	Raghu 22/3/16	LIQUID PROPULSION SYSTEMS CENTRE	ISSUE No.
CHD		VALIAMALA TRIVANDRUM-695547	
APPD.		DRG.No. SE MOCK-UP.2100.0052.00.1	Rev. No.
2016 SIGN. DATE		SCALE 1:1 SHEET 1 OF 1	FORMAT A4

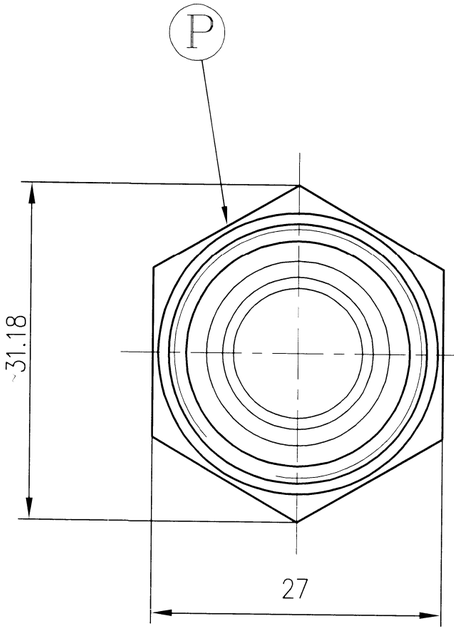
DATE | AMEND No. | INDEX

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



DETAIL–"D" (5:1)





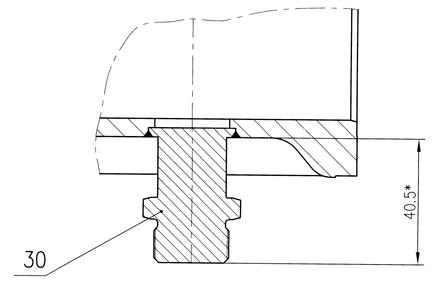
Notes

1. Threads should be free from chattering marks, burrs, peeling off etc.
2. Engrave drawing number at P.

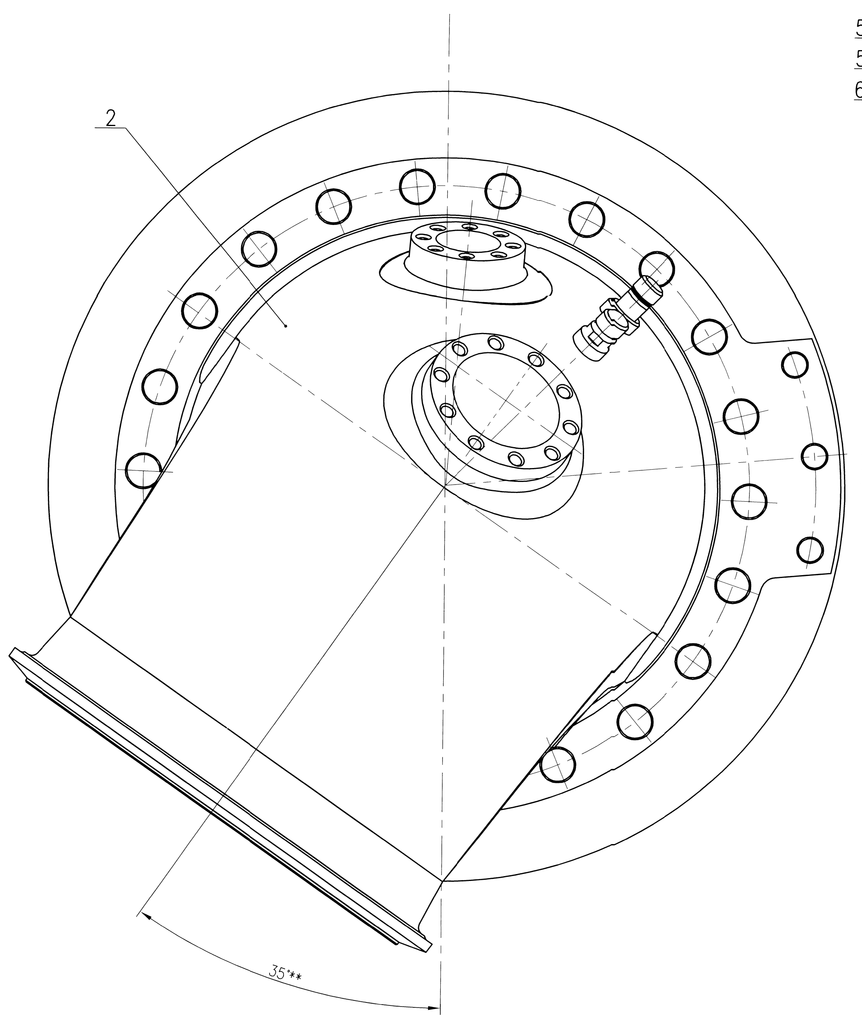
| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

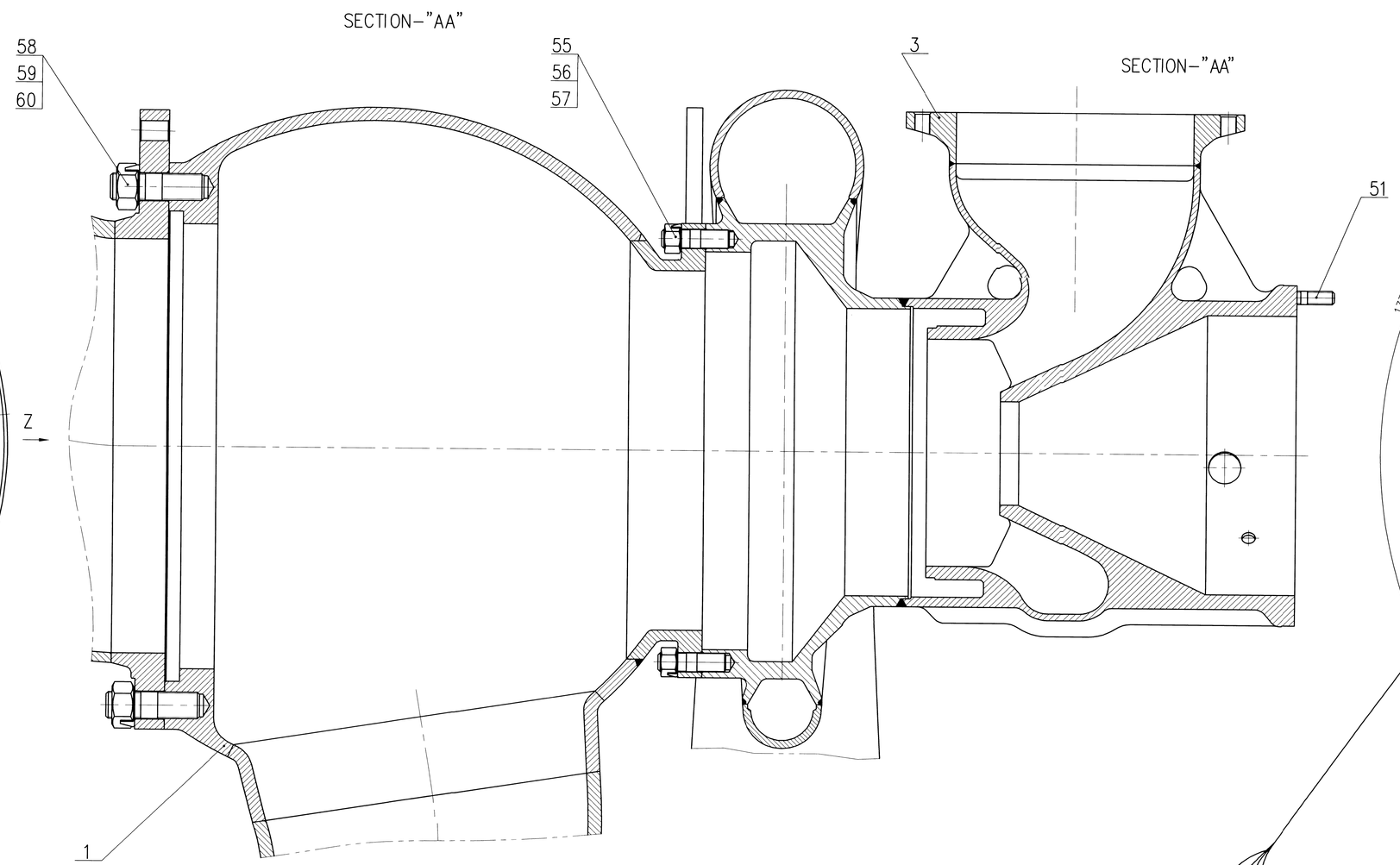
PART SECTION–"PP" (1:1)



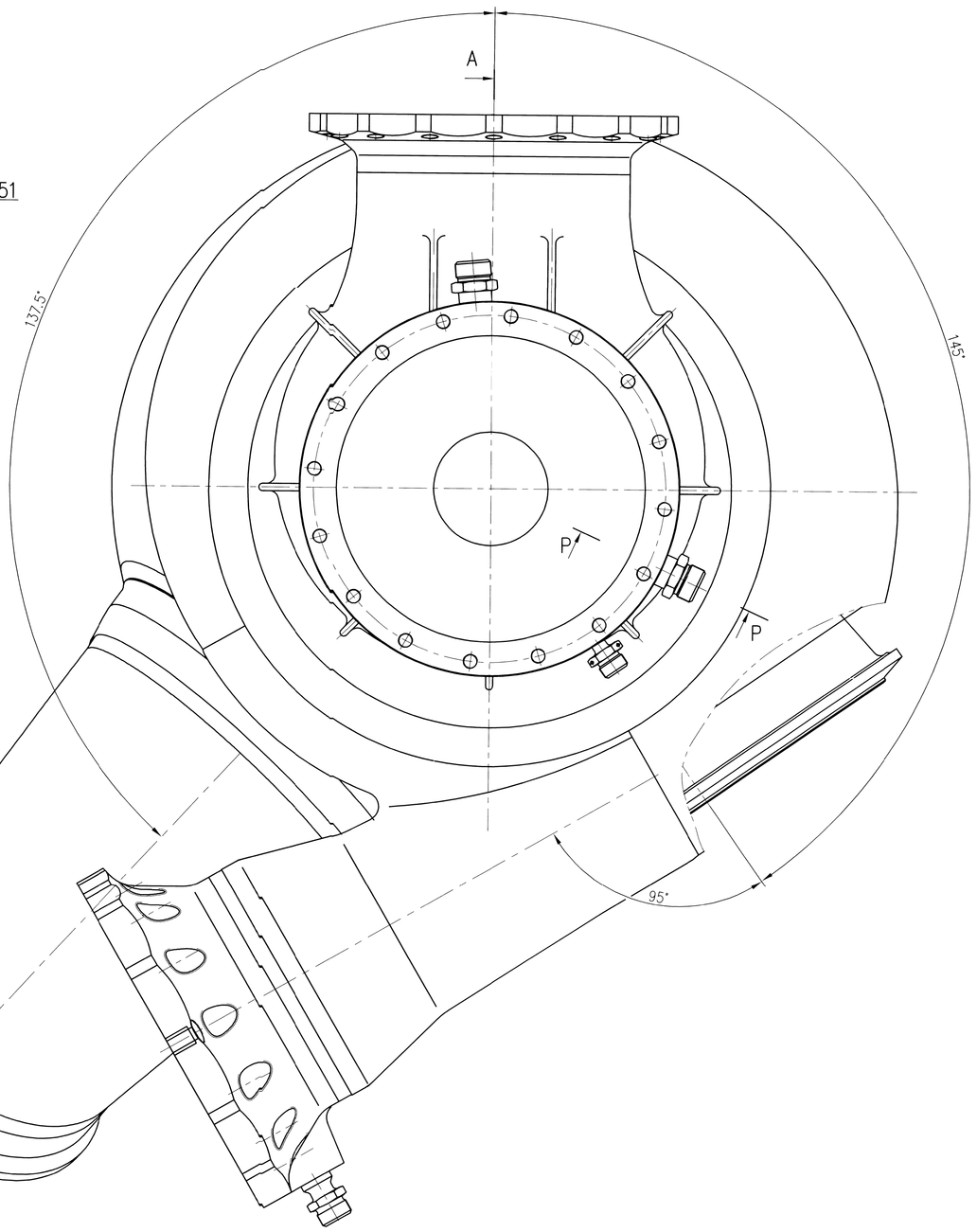
PARTIAL VIEW FROM–"Z"



SECTION–"AA"



SECTION–"AA"



NOTE
1. * Reference dimension.

LENGTH	MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE							
OR	UPTO 6	UPTO 30	UPTO 120	UPTO 315	UPTO 1000	UPTO 2000	UPTO 4000	UPTO ±OVER
DIA	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±2.0

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6–25	1.6–6	0.025–1.6	< 0.025

LENGTH OR DIA	LENGTH in mm OF SHORTER SIDE OF ANGLE			
	UPTO 5	6–30	30–120	120–400
	±1°	±30'	±20'	±10'

DO NOT SCALE THE DRAWING
ASK IF IN DOUBT.
ALL DIMENSIONS ARE IN mm.

Concentricity
Perpendicularity
Angularity
Parallelism

This drawing is the exclusive property of ISRO and shall not be copied, reproduced or communicated to others without proper authorisation.

MATERIAL
Mechanical properties

General tolerance JS or js12
Thread tolerance
Thread chamfer & under cut.
Radii not specified
Chamfers not specified

SURFACE TREATMENT

SURFACE FINISH

MARKING

Calculated Mass kg.

TITLE
Oxidiser pump with turbine Assembly

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM–695547

	NAME	SIGN.	DATE
DGN.			
D.CHD.			
DRN.			
CHD.			
APPD.			
2016			

DRG No. SE MOCK-UP.2100.0000.00.0AD
SCALE 1:2
Rev No.
FORMAT A0
SHEET 1 OF 1

INDEX | MODIFICATION ORDER No. & DATE | REVISION
TPD–SC/CPEG
ISSUE No.

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
A4		57	SE MOCK-UP.2100.0059.00.1		Lock washer	12	
A4		58	SE MOCK-UP.2100.0061.00.1		Stud	22	
A4		59	SE MOCK-UP.2100.0062.00.1		Nut	22	
A4		60	SE MOCK-UP.2100.0063.00.1		Lock washer	11	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Oxidiser pump with turbine

INDEX	MODIFICATION ORDER No & DATE
REVISION	

DGN.		GOVERNMENT OF INDIA	TPD-SC/CPEG
D.CHD.		INDIAN SPACE RESEARCH ORGANISATION	
DRN.		LIQUID PROPULSION SYSTEMS CENTRE	ISSUE No.
CHD.		VALIAMALA TRIVANDRUM-695547	
APPD.		DRG.No. SE MOCK-UP.2100.0000.00.0	Rev. No. / FORMAT
2016	SIGN. / DATE	SHEET 2 OF 2	A4

Size	Zone	Part. No.	Drg.No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A0			SE MOCKUP.2100.0000.00.0AD		Oxidiser pump with turbine		
					Assembly		
					Units		
A4		1	SE MOCK-UP.2100.1000.00.0		Stator	1	
A4		2	SE MOCK-UP.2100.2000.00.0		Exhaust manifold	1	
A4		3	SE MOCK-UP.2100.3000.00.0		Housing	1	
					Parts		
A3		30	SE MOCK-UP.2100.0026.00.1		Connector	2	
A4		51	SE MOCK-UP.2100.0052.00.1		Stud	16	
A4		55	SE MOCK-UP.2100.0057.00.1		Stud	24	
A4		56	SE MOCK-UP.2100.0058.00.1		Nut	24	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Oxidiser pump with turbine

INDEX	MODIFICATION ORDER No. & DATE
	REVISION

DGN.		
D.CHD.		
DRN.		
CHD.		
APPD.		
2016	SIGN.	DATE

GOVERNMENT OF INDIA
INDIAN SPACE RESEARCH ORGANISATION
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA TRIVANDRUM-695547

TPD-SC/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2100.0000.00.0

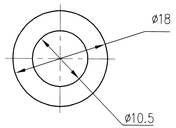
Rev. No.

FORMAT A4

SHEET 1 OF 2

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
6-25	1.6-6	0.025-1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



MACHINING DEVIATION TO IS:2102, MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE

LENGTH OR DIA	UPTO 6	UPTO 30	UPTO 120	UPTO 400	UPTO 1000	UPTO 2000	UPTO 4000	UPTO 8000	UPTO 12000	UPTO 16000	UPTO 20000
LENGTH IN mm OF SHORTER SIDE OF ANGLE	0-6	6-30	30-120	120-400							
ANGULAR	±1°	±30'	±20'	±10'							
LINEAR	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2.0	±3.0			

DO NOT SCALE THE DRAWING ASK IF IN DOUBT ALL DIMENSIONS ARE IN mm.	MATERIAL Sheet 1.5mm. SS304/304L Mechanical properties	SURFACE TREATMENT
Concentricity Perpendicularity Angularity Parallelism	General tolerance JS or js12 Thread tolerance Thread chamfer & under cut. Radii not specified Chamfers not specified	SURFACE FINISH ▽ (√) MARKING

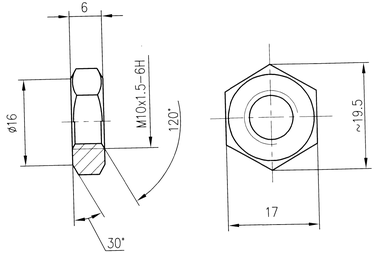
TITLE	Qty. per Assembly	Calculated Weight
Washer		Kg

DGN.		GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547	TCEID-SCE/CPEG
D.CHD.			ISSUE No.
DRN.	Raghu 27/3/15		
CHD.		DRG.No. SE MOCK-UP.2000.0004.00.1	Rev. No. / FORMAT A4
APPD.		SCALE 2:1	SHEET OF
2015	SIGN.	DATE	

INDEX | AMEND No. | DATE | INDEX | AMEND No. | DATE

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



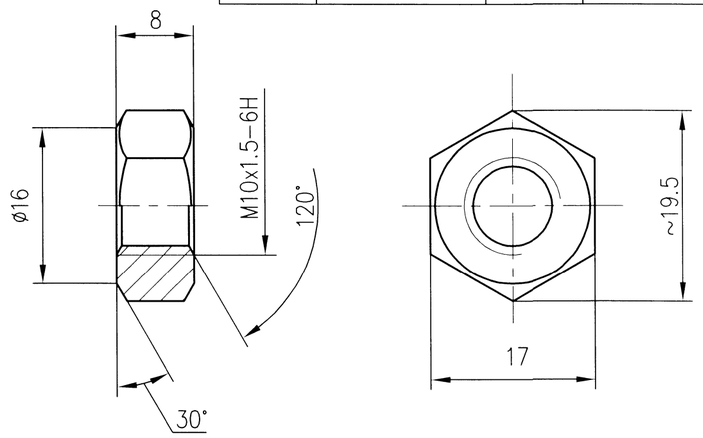
Note

1. Threads should be free from chattering marks, burrs, peeling off etc. and should have ▽▽ finish.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |

MACHINING FINISH IN MICRONS			
▽	▽▽	▽▽▽	▽▽▽▽
8–25	1.6–8	0.025–1.6	< 0.025

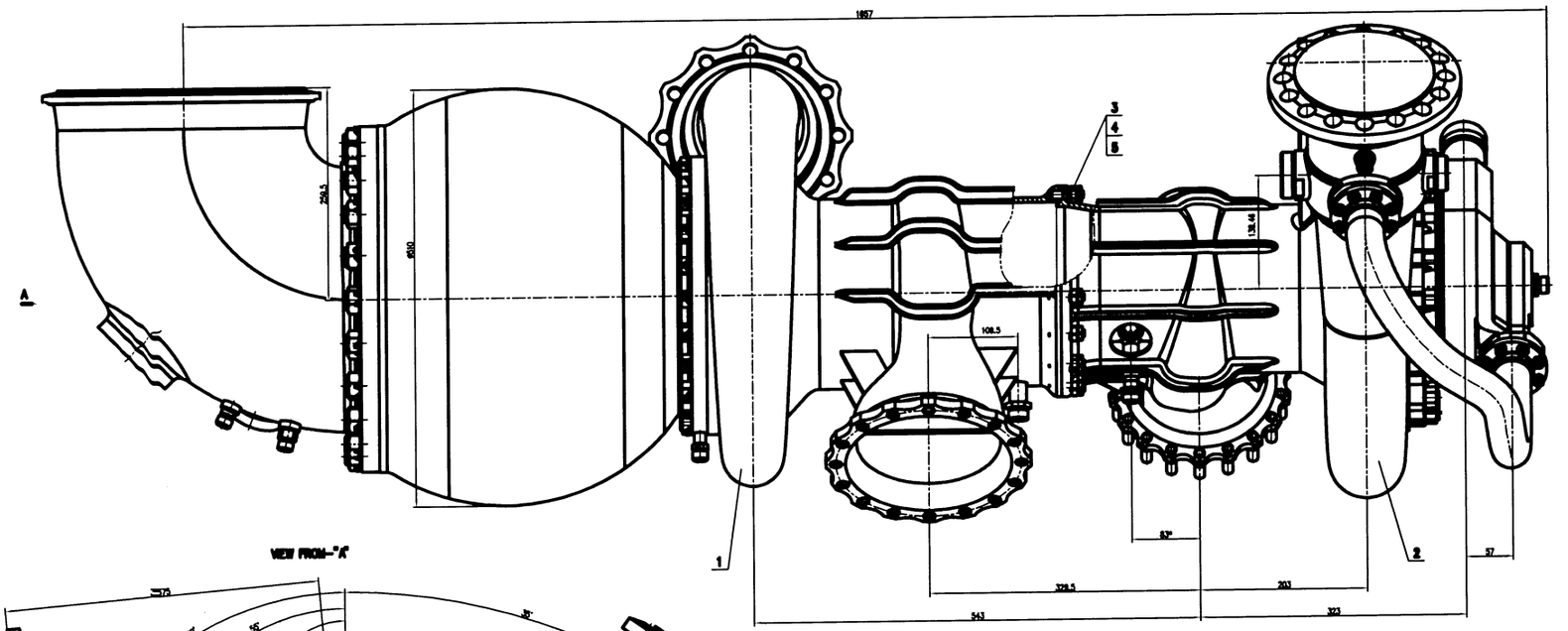
SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	



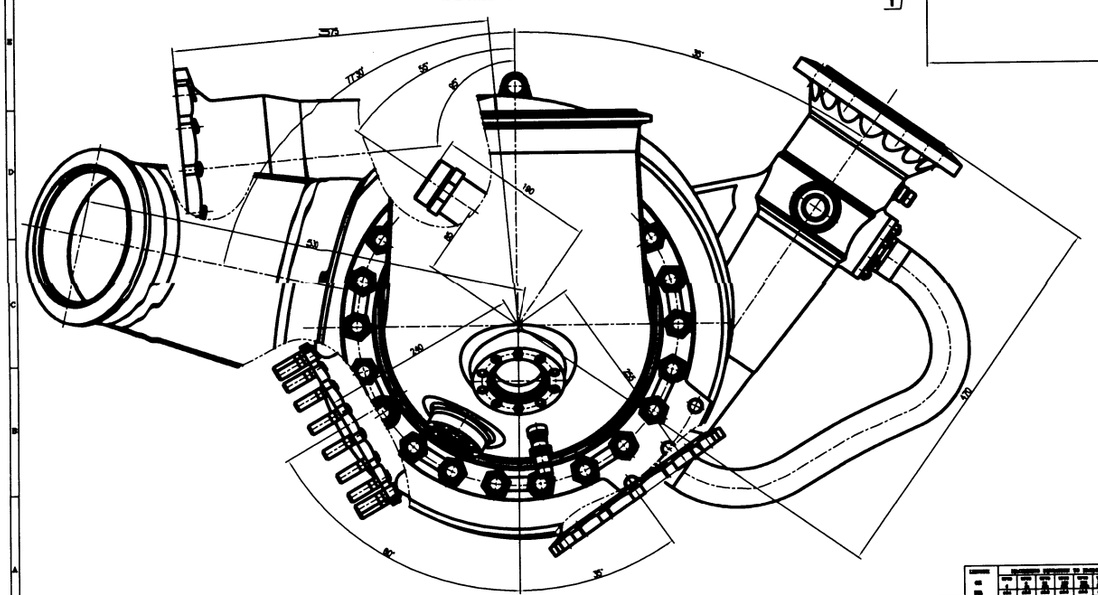
Note

1. Threads should be free from chattering marks, burrs, peeling off etc. and should have ▽▽ finish.

| MACHINING DEVIATION TO IS:2102 (MEDIUM GRADE) UNLESS SPECIFIED OTHERWISE | | |



VIEW FROM-"A"



ISRO LPSC

CHD.

APPD.

SCP CC RELEASE

CHD.

APPD.

Turbopump Assembly

GOVERNMENT OF INDIA
LIQUID PROPULSION SYSTEMS CENTRE

POMD-SCH/CPRO

REVISION

A0

Size	Zone	Part No.	Drg. No.	Rev.No.	Name	Quantity	Remark
					Documentation		
A0			SE MOCK-UP.2000.0000.00.0AD		Turbopump Assembly		
					Units		
A4		1	SE MOCK-UP.2100.0000.00.0		Oxidizer pump with turbine	1	
A4		2	SE MOCK-UP.2200.0000.00.0		Fuel pump	1	
					Parts		
A4		3	SE MOCK-UP.2001.0002.00.1		Nut	16	
A4		4	SE MOCK-UP.2000.0003.00.1		Nut	16	
A4		5	SE MOCK-UP.2000.0004.00.1		Washer	16	

SRQA LPSC		SCP CC RELEASE	
CHD.		CHD.	
APPD.		APPD.	

TITLE

Turbopump

INDEX	MODIFICATION ORDER No. & DATE

REVISION

DGN.			GOVERNMENT OF INDIA INDIAN SPACE RESEARCH ORGANISATION LIQUID PROPULSION SYSTEMS CENTRE VALIAMALA TRIVANDRUM-695547
D.CHD.			
DRN.	Raghu	02/9/15	
CHD.			
APPD.			
2015	SIGN.	DATE	

TCEID-SCE/CPEG

ISSUE No.

DRG.No. SE MOCK-UP.2000.0000.00.0

Rev. No.

FORMAT A4

SHEET 1 OF 1

COMPLIANCE STATEMENT FOR COMMERCIAL TERMS

Sl. No.	Description (Commercial terms & conditions)	Compliance to Col. (2) [YES/NO]	If 'NO' Specify deviations explicitly	Remarks
(1)	(2)	(3)	(4)	(5)
1.	P & F charges, if any, please mention percentage/amount in Col.5.			
2.	ISRO is exempted from payment of Excise Duty vide Ministry of Finance, Department of Revenue Notification No. 10/97-CE dtd. 01.03.97 as amended by Notification No. 16/2007-CE dtd 01.03.07 (We will provide Excise Duty Exemption Certificate).			
3.	CST/VAT without C/D Form applicable (Please mention percentage of CST/VAT in Col. 5).			
4.	ISRO is exempted from payment of Customs Duty vide Notification No.12/2012-Customs dated 17.03.2012. (We will provide Customs Duty Exemption Certificate in case of Import Orders/ imported supplies/ High Sea Sales).			
5.	Installation Charges, if any, (Please mention the percentage / amount in Col.5).			
6.	Service Tax, if any (Please mention the percentage / amount in Col.5).			
7.	**Delivery Term** :- • FOR LPSC, VALIAMALA/BENGALURU • In case of Foreign orders, FOB or FCA			
8.	Freight charges, if any. If 'YES' please mention the percentage / amount in Col.5.			
9.	Delivery Period (Please mention in Col.5)			

Sl. No.	Description (Commercial terms & conditions)	Compliance to Col. (2) [YES/NO]	If 'NO' Specify deviations explicitly	Remarks
(1)	(2)	(3)	(4)	(5)
10.	**Payment Term :-** (a) 100% payment shall be made through RTGS within 30 days of receipt and acceptance of the item at our site. Please note that advance payment shall be entertained only against submission of Bank Guarantee from a Nationalized / Scheduled Bank for equal value of advance valid till the completion of supply / acceptance plus three months claim period. (b) In case of foreign orders, Payment term shall be SIGHT DRAFT.			
11.	**Liquidated Damages (LD) :- Since delivery is the essence of this order, LD @ 0.5% per week or part thereof subject to a maximum of 10% of the order value for the delayed period of supply.**			
12.	**Warranty :- Warranty for the offered item shall be from the date of installation/acceptance of the item at our site. Please mention the warranty period, if any, in Col. No.5**			
13.	**Performance Bank Guarantee (PBG) :-** You have to submit a PBG from a Nationalized / Scheduled Bank for 10% of the order value at the time of supply valid till the completion of warranty period plus 3 months claim period.			
14.	**Security Deposit (SD) :-** 10% value of the order shall be deposited with LPSC within 10 days from the date of the Purchase Order towards security deposit in the form of Bank Guarantee towards performance of the Contract. (This will be returned by LPSC immediately on execution of the order satisfactorily as per order terms. If not, the amount will be forfeited).			
15.	**Insurance :-** Being a Govt. Of India Dept., we don't want insurance at our cost and hence we will not provide insurance. Please ensure the safe delivery of the ordered item.			

Sl. No.	**Description** **(Commercial terms & conditions)**	Compliance to Col. (2) [YES/NO]	If 'NO' Specify deviations explicitly	Remarks
(1)	(2)	(3)	(4)	(5)
16.	**Validity of Offer :-** The offer shall be valid for 90 days from the date of opening.			
17	**Special conditions against Indian Agents submitting quotations in Foreign Currency.**			
17-a	The tenders received from Indian agents on behalf of their foreign Principals/OEMs (in cases where the Principals/OEMs also submit their tenders simultaneously for the same item/product in the same tender) the **same will be not be considered.**			
17-b	In case two or more tenders are received from an Indian agent on behalf of more than one foreign Principal/OEM, in the same tender for the same item/product **will not be considered.**			
18-a	Foreign Principal's pro-forma invoice indicating the commission payable to the Indian Agent and nature of after sales service to be rendered by the Indian Agent.			
18-b	Copy of Agency agreement with the Foreign Principal, precise relationship between them and their mutual interest in the business.			
18-c	The enlistment of the Indian Agent with Director-General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.			
19	**Purchase/Preference to MSEs** Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small & Medium Enterprises Development Act 2006. Necessary authenticated documentary evidences shall be submitted along with your offer. MSEs will be exempted from submission of EMD.			
20	**The Tenders submitted by you shall be compulsorily signed and unsigned tenders will be summarily excluded from the procurement process**			

STANDARD TENDER FORM

(Seal of the Company)

Tender No. : 01TE 201602809201

Due on : 16.07.2016 14.30 Hrs.

Ref. No. : .....

Date : .....

TENDER FORM

From:

.....

.....

.....

To:

The Sr./Purchase & Stores Officer,
Liquid Propulsion Systems Centre
Valiamala

Dear Sir,

I/We hereby offer to supply the stores detailed below at the price hereunder quoted and agree to hold this offer open till..... I/we shall be bound to supply the stores hereby offered upon the issue of the Purchase Order communicating the acceptance thereof on or before the expiry of the last mentioned date. You are at liberty to accept any one or more of the items of stores tendered for or any portion of any one or more of the items of such stores. I/We, notwithstanding that the offer in this tender has not been accepted in whole, shall be bound to supply to you such items and such items and such portion or portions of one or more of the items as may be specified in the said Purchase Order communicating the acceptance:

Sl. No.	Description	Quantity	Unit	Rate ₹	Delivery Date

Note: All the rates should be given both in figures and words

Place at which delivery will be made	
Date by which the ordered item/s will be supplied	

2. I/We have understood the items of the tender annexed to the invitation to tender and have thoroughly examined the specifications/drawing and/or pattern quoted or referred to herein and am/are fully aware of the nature of the stores required and my/our offer is to supply the stores strictly in accordance with the requirements subject to the terms and conditions stipulated in the enquiry and contained in the Purchase Order communicating the acceptance of this tender either in whole or in part.

Signature of Tenderer

Date:.....

(Seal)

INSTRUCTIONS TO TENDERERS AND TERMS & CONDITIONS OF TENDER

INSTRUCTIONS TO TENDERERS

1. Tenders should be sent in sealed envelopes superscribing the relevant tender No, and the due date of opening. Only one tender should be sent in each envelope.

2. Late tenders and delayed tenders will not be considered.

3. Sales Tax and/or other duties/levies legally leviable and intended to be claimed should be distinctly shown separately in the tender.

4. As a Government of India Department, this office is exempted from payment of Octroi and similar local levies. Tenderers shall ensure that necessary Exemption Certificates are obtained by them from the Purchase Officer concerned to avoid any payment of such levies.

5. a) Your quotation should be valid for 90 days from the date of opening of the tender.

   b) Prices are required to be quoted according to the units indicated in annexed tender form. When quotations are given in terms of units other than those specified in the tender form,relationship between the two sets of units must be furnished.

6. Preference will be given to those tenders offering supplies from ready stocks and on the basis of FOR destination/delivery at site.

7. (a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.

   (b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of non- acceptance of tender, the tenderer will have to remove the samples at his own expense.

   (c) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should also be indicated in your offer.

   (d) **Specifications**: Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

8. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderers shall supply the same at the rates quoted.

9. Corrections, if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.

10. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office, if required by the Purchaser.

11. The Purchaser reserves the right to place order on the successful tenderer for additional quantity up to 25% of the quantity offered by them at the rates quoted.

12. The authority of the person signing the tender, if called for, should be produced.

TERMS & CONDITIONS OF TENDER

1. DEFINITIONS:

(a) The term 'Purchaser' shall mean the President of India or his successors or assigns.

(b) The term 'Contractor' shall mean, the person, firm or company with whom or with which the order for the supply of stores is placed and shall be deemed to include the Contractor's successors, representative, heirs, executors and administrators unless excluded by the Contract.

c) The term 'Stores' shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order including erection of plants & machinery and subsequent testing, should such a condition is included in the Purchase Order.

d) The term 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an Officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the tender or offer of the Contractor for supply of stores or plant, machinery or equipment or part thereof.

2. PRICES:

Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variations.

3. SECURITY DEPOSIT:

On acceptance of the tender, the Contractor shall, at the option of the Purchaser and within the period specified by him, deposit with him, in cash or in any other form as the Purchaser may determine, security deposit not exceeding ten percent of the value of the Contract as the Purchaser shall specify. If the Contractor is called upon by the Purchaser to deposit, 'Security' and the Contractor fails to provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores Contracted at the risk of the Contractor in terms of Sub-Clause (ii) and (iii) of clause 10(b) hereof and/or to recover from the Contractor, damages arising from such cancellation.

4. GUARANTEE & REPLACEMENT:

(a) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid down, for material, workmanship and performance.

(b) For a period of twelve months after the acceptance of the stores, if any defects are discovered therein or any defects therein found to have developed Under proper use, arising from faulty stores design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within a period of 14 months from the date of acceptance thereof by the purchaser who shall state in writing in what respect the stores or any part thereof are faulty.

(c) If, in the opinion of the purchaser, it becomes necessary to replace or renew any defective stores such replacement or renewal shall be made by the Contractor free of all costs to the purchaser, provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of 14 months from the date of acceptance thereof.

(d) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores.

(e) The decision of the purchaser notwithstanding any prior approval or acceptance or inspection thereof on behalf of the purchaser, as to whether or not the stores supplied by the Contractor are defective or any defect has developed within the said period of 12 months or as to whether the nature of the defects requires renewal or replacement, shall be final, conclusive and binding on the Contractor.

(f) To fulfil guarantee conditions outlined in clause 4 (a) to (e) above, the Contractor shall, at the option of the purchaser, furnish a Bank Guarantee (as prescribed by the purchaser) from a Bank approved by the purchaser for an amount equivalent to 10% of the value of the Contract along with first shipment documents. On the performance and completion of the Contract in all respects, the Bank Guarantee will be returned to the Contractor without any interest.

(g) All the replacement stores shall also be guaranteed for a period of 12 months from the date of arrival of the stores at purchaser's site.

(h) Even while the 12 months guarantee applies to all stores, in case where a greater period is called for by our specifications then such a specification shall apply in such cases the period of 14 months referred to in para 4 (b) & (c) shall be the 'asked for' guarantee period plus two months.

5. PACKING FORWARDING & INSURANCE:

The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packages shall be done by and at the expense of the Contractor. The purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Contractor and the Purchaser shall pay only for such stores as are actually received in good condition in accordance with the Contract.

6. DESPATCH:

The Contractor is responsible for obtaining a clear receipt from the Transport Authorities specifying the goods despatched. The consignment should be despatched with clear Railway Receipt/Lorry Receipt. If sent in any other mode, it shall be at the risk of the Contractor. Purchaser will take no responsibility for short deliveries or wrong supply of goods when the same are booked on 'said to contain' basis. Purchaser shall pay for only such stores as are actually received by them in accordance with the Contract.

7. TEST CERTIFICATE:

Wherever required, test certificates should be sent along with the despatch documents.

8. ACCEPTANCE OF STORES:

(a) The stores shall be tendered by the Contractor for inspection at such places as may be specified by the purchaser at the Contractor's own risk, expense and cost.

(b) It is expressly agreed that the acceptance of the stores Contracted for, is subject to final approval by the purchaser, whose decision shall be final.

(c) If, in the opinion of the purchaser, all or any of the stores do not meet the performance or quality requirements specified in the Purchase Order, they may be either rejected or accepted at a price to be fixed by the purchaser and his decision as to rejection and the prices to be fixed shall be final and binding on the Contractor.

(d) If the whole or any part of the stores supplied are rejected in accordance with Clause No. 8 (c) above, the purchaser shall be at liberty, with or without notice to the Contractor, to purchase in the open market at the expense of the Contractor stores meeting the necessary performance and quality Contracted for in place of those rejected, provided that either the purchase, or the agreement to purchase, from another supplier is made within six months from the date of rejection of the stores as aforesaid.

9. REJECTED STORES:

Rejected stores will remain at destination at the Contractor's risk and responsibility. If instructions for their disposal are not received from the Contractor within a period of 14 days from the date of receipt of the advice of rejection, the purchaser or his representative has, at his discretion, the right to scrap or sell or consign the rejected stores to Contractor's address at the Contractor's entire risk and expense, freight being payable by the Contractor at actuals.

10. DELIVERY:

(a) The time for and the date of delivery of the stores stipulated in the Purchase Order shall be deemed to be the essence of the Contract and delivery must be completed on or before the specified dates.

(b) Should the Contractor fail to deliver the stores or any consignment thereof within the period prescribed for such delivery, the purchaser shall be entitled at his option either.

(i) to recover from the Contractor as agreed liquidated damages and not by way of penalty, a sum of 0.5% per week of the price of any stores which the Contractor has failed to deliver as aforesaid or during which the delivery of such store may be in arrears subject to a minimum of 10%, or

(II) to purchase from elsewhere, without notice to the Contractor on the account and at the risk of the Contractor, the stores not delivered or others of a similar description (where others exactly complying with the particulars, are not, in the opinion of the purchaser, readily procurable, such opinion being final) without cancelling the Contract in respect of the consignment (s) not yet due for delivery, or

(iii) to cancel the Contract or a portion thereof and if so desired to purchase or authorise the purchase of stores not so delivered or others of a similar description (where others exactly if complying with the particulars are not, in the opinion of the purchaser, readily procurable, such opinion final) at the risk and cost of the Contractor.

In the event of action being taken under sub-clause (ii) & (iii) of clause 10 (b) above, the Contractor shall be liable for any loss which the purchaser may sustain on that account, provided that the re-purchase or if there is an agreement to re- purchase then such agreement is made within six months from the date of such failure. But the Contractor shall not be entitled to any gain on such re-purchase made against default. The manner and method of such re-purchase shall be at the discretion of the purchaser, whose decision shall be final. It shall not be necessary for the purchaser to serve a notice of such re-purchase on the defaulting Contractor. This right shall be without prejudice to the right of the purchaser to recover damages for breach of Contract by the Contractor.

11. EXTENSION OF TIME:

As soon as it is apparent that the Contract dates cannot be adhered to, an application shall be sent by the Contractor to the purchaser. If failure, on the part of the Contractor, to deliver the stores in proper time shall have arisen from any cause which the purchaser may admit as reasonable ground for an extension of the time (and his decision shall be final) he may allow such additional time as he considers it to be justified by circumstances, of the case without prejudice to the purchaser's right to recover liquidated damages under clause 10 thereof.

12. ERECTION OF PLANT & MACHINERY:

Wherever erection of a plant or machinery is the responsibility of the Contractor as per the terms of the Contract and in case the Contractor fails to carry out the erection as and when called upon to do so within the period specified by the purchaser, the purchaser shall have the right to get the erection done through any source of his choice. In such an event, the Contractor shall be liable to bear any additional expenditure that the purchaser is liable to incur towards erection. The Contractor shall, however, not be entitled to any gain due to such an action by the purchaser.

13. PAYMENT:

Contractor's bill will be passed for payment only after the stores have been received, inspected and accepted by the Purchaser.

14. MODE OF PAYMENT:

Normally payment will be made for the accepted stores within 30 days from the date of receipt of the materials.

15. RECOVERY OF SUM DUE:

Whenever any claim for the payment of, whether liquidated or not, money arising out of or under this Contract against the Contractor, the purchaser shall be entitled to recover such sum by appropriating in part or whole, the security deposited by the Contractor, if a security is taken against the Contract. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor under this or any other Contract with the purchaser. Should this sum be not sufficient to cover the full amount recoverable, the Contractor shall pay to the purchaser on demand the remaining balance due. Similarly, if the purchaser has or makes any claim, whether liquidated or not, against the Contractor under any other Contract with the purchaser, the payment of all moneys payable under the Contract to the Contractor including the security deposit shall be withheld till such claims of the purchaser are finally adjudicated upon and paid by the Contractor.

16. INDEMNITY:

The Contractor shall warrant and be deemed to have warranted that all stores supplied against this Contract are free and clean of infringement of any Patent, Copyright or Trademark, and shall at all times indemnify the purchaser against all claims which may be made in respect of the stores for infringement of any right protected by Patent Registration of design or Trade mark and shall take all risk of accidents or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for sufficiency of all means used by him for the fulfilment of the contract.

17. ARBITRATION:

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

If the arbitrator be the Head of the Centre/Unit –

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

(ii) In the event of his being unwilling or unable to act for any reason, it shall be lawful for the Head of the Centre/Unit to appoint another person as arbitrator.

If the arbitrator be a person appointed by the Head of the Purchase Office – In the event of his dying, neglecting or refusing to act or resigning or being unable to act, for any reason, it shall be lawful for the Head of the Centre/Unit either to proceed with the reference himself or appoint another person as arbitrator in place of the outgoing arbitrator.

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

In the event of any dispute or difference relating to the interpretation and application for the provisions of the Contracts, such dispute or difference shall be referred by either party to Arbitration of one of the Arbitrations in the Department of Public Enterprises. The Arbitration Act

1996 shall not be applicable to arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute provided however any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs. Ministry of Law & Justice, Govt. of India. The parties to the dispute will share equally, the cost of arbitration as intimated by Arbitrator.

18. COUNTER TERMS AND CONDITION OF SUPPLIERS:

Where counter terms and conditions printed or cyclostyled conditions have been offered by the supplier, the same shall not be deemed to have been accepted by the Purchaser, unless specific written acceptance thereof is obtained.

19. SECURITY FOR PURCHASE OF MATERIALS:

Successful tenderer will have to furnish in the form of a bank guarantee or any other form as called for by the purchaser towards adequate security for the materials and properties provided by the Purchaser for the due execution of the Contract