

Government of India  
Bhabha Atomic Research Centre  
Accelerator Control Division

Ref: ACnD/EMAS/17/637

Date: 06.09.2017

-----TO WHOM SO EVER IT MAY CONCERN-----

Sub: Fabrication, integration, testing, supply and installation of liquid helium cooled room temperature bore superconducting solenoid magnet conforming to technical specification no: SCM/17/12 dated 01.09.2017

Dear Sir/Madam,

1. Quotations are invited for fabrication, integration, testing, supply and installation of liquid helium cooled room temperature bore superconducting solenoid magnet conforming to technical specification no: SCM/17/12 dated 01.09.2017
2. Bidder shall quote for fabrication, assembly, testing and supply inclusive of raw material.
3. Taxes shall be quoted separately. Form AF / H whichever is applicable shall be provided, if required.

The quotation must reach The Head, Accelerator Control Division by 22.09.2017 and must be sent in a sealed envelope super scribed with the reference number & the due date given above only through India Ordinary Post/Speed Post.

4. The address on the envelop should read: The Head,  
Electromagnetic Applications Section  
Accelerator Control Division,  
RCnD Bldg., North Site  
BARC, Trombay,  
Mumbai - 400 085.  
(Kind Attn: S.Sundar Rajan, SO/F)
  5. The bidder shall complete the job within 4 months from the date of firm work order issued to the bidder.
  6. Head, Accelerator Control Division reserves the rights to accept / reject any or all quotations without assigning any reason.
  7. Quotation must also indicate the validity of offer. Quotation must also indicate the GST no and PAN no of the party.
  8. Drawings / Sketches, technical specification must be returned along with the offer.
  9. The quotation has to be signed by authorized person with company seal.
  10. Payment will be made by cheque only after satisfactory completion of work on production of bill, delivery challan and advance stamped receipt. It may be noted that IT @ 2% shall be deducted from your bills.
  11. In case of any technical clarifications, the supplier may kindly contact the following:  
S.Sundar Rajan , SO/F , EMAS,ACnD (Email ID :sundara@barc.gov.in, Tel No : 25591851)
- Encl.: Technical Specification Sheet no: SCM/17/12 dated 01.09.2017

*S.Sundar Rajan*  
S.Sundar Rajan  
SO/F , Indenting officer  
ACnD

Technical specification

Document no.	Revision no.	Date of Issue	No of pages
SCM/17/12	0	01.09.2017	10

Fabrication, integration, testing, supply and installation of liquid helium cooled room temperature bore superconducting solenoid magnet

1.      Scope of work

Tender is invited for fabrication, integration, testing, supply and installation of liquid helium cooled room temperature bore superconducting solenoid magnet. In this specification the seller shall be referred to as the “Supplier” and Bhabha Atomic Research Centre shall be referred to as the “Buyer”.

Supplier shall arrange required raw material, facilities, infrastructure for fabrication, integration, testing, supply, functional/type testing and installation. The list of Free Issue Material (FIM) is enclosed in Annexure-A. Suppliers recommended changes to the drawings will be evaluated and approved prior to fabrication to ensure that the proposed changes don't adversely impact any functional requirements.

The suppliers shall be evaluated based on the supplier's pre-qualification requirement mentioned in the Para 7.0. The detailed drawings will be sent to only the qualified suppliers as mentioned in this Para. Only overall cost will be compared.

The brief description of contents of the tender specification document is as described below.

Para 2.0 gives the details of deliverables.

Para 3.0 gives the general description and construction details.

Para 5.0 gives the engineering requirements.

Para 6.0 gives the documentation requirements.

Para 7.0 gives the suppliers pre-qualification requirements.

Para 8.0 gives the raw material requirements

Para 9.0 gives the dimensional and fabrication drawing requirements.

Para 10.0 gives the Manufacturing and workmanship requirements

Para 11.0 gives the welding specification and its quality requirements.

Para 12.0 gives the applicable codes and standards.

Para 13.0 gives the inspection and testing requirements.

Para 14.0 gives the quality assurance requirements.

Para 15.0 gives the progress monitoring requirements.

Para 16.0 gives the packaging and safe delivery requirements.

Para 17.0 gives the price and delivery schedule requirements.

2.0      Details of deliverables

S.No	Component	Nos
1.	Fabrication , integration , testing , supply and installation of liquid helium cooled room temperature bore superconducting solenoid magnet	01 system

### 3.0 General description and construction details

3.1 The liquid helium cooled room temperature bore superconducting solenoid magnet consists of vacuum vessel, thermal shield and liquid helium vessel with superconducting magnet.

3.2 The vacuum vessel, thermal shield shall be collected from BARC as Free Issue Material. The supplier has to carry out the development of liquid helium vessel and the cold mass (liquid helium vessel + thermal shield) assembly structure into the vacuum vessel.

#### 3.3 Liquid helium vessel

3.3.1 The liquid helium shall be made up of AISI 316L stainless steel. The superconducting magnet cold mass is designed for internal pressure of 0.3 MPa as per ASME section VIII Division 1. The helium vessel is an annular cylinder of inner diameter 458 mm , outer diameter 750 mm and length of 830mm. The thickness of the inner and outer cylinders is of 3mm (min). The side flanges are of 15mm thick. Nozzles for transfer of liquid helium and collection of helium gas shall be provided in the helium vessel as per the attached drawing.

3.3.2 The inner shell along with side flanges shall be welded and supplied to magnet winder to carry out winding of the magnet and assembly of quench protection system. The helium vessel shall be collected back from the magnet winder after completing magnet winding.

3.3.3 Instrumentation wiring and temperature sensor mounting will be carried out by the buyer at the supplier premises. After approval from the purchaser, the helium vessel outer shell shall be welded.

3.3.4 Current leads will be connected to the magnet terminal by the purchaser. After approval from the purchaser the current lead port shall be welded to the helium vessel outer shell.

3.3.5 The helium vessel shall be tested for helium leak rate by connecting high vacuum pumping station to the helium gas collection nozzle. The base pressure of the helium vessel shall be less than  $10^{-3}$  torr and the helium leak rate shall be less than  $10^{-8}$  Torr.l/sec.

#### 3.4 Cold mass support post and assembly

3.4.1 Cold mass support post: The helium vessel shall be supported inside the vacuum vessel through cold mass support post. The cold mass support must have low heat leak at 4K (<0.1 Watt). The cold mass support post consists of glass fiber tube developed by vacuum impregnation of the tube inside a mold. The tube shall be made of triaxial braids and flanges shall be made up of biaxial braids. The dimension of the glass fiber tube required is clearly mentioned in the drawing. The cold mass support post must carry 5000N in longitudinal direction and 2000N in radial direction. Suitable jigs shall be developed to drill holes on the top and bottom flange of the glass fiber tube. The cold mass support post thermal intercepts are attached by shrink fitting the aluminum disc with the molded glass fiber tubes. Prototype cold mass support posts shall be developed and tested for 1.5 times the design force. The development method of the cold mass support post shall be approved by purchaser before fabrication of the final cold mass support post. The cold mass support post shall be wrapped with MLI to reduce the radiation losses.

3.5 Cold mass assembly: The cold mass support post shall be mounted on a stainless steel plate which, after assembly shall be moved into the vacuum vessel and bolted to the vacuum vessel base plate. The superconducting magnet shall be bolted to the cold mass support post top flange. To carry out assembly of the cold mass, assembly bench shall be designed and developed by the supplier. The assembly bench must be aligned with the vacuum vessel to insert the cold mass assembly.

#### 4.0 Job execution requirements

4.1 After placement of firm order, the bidder shall collect the 3D model of the drawings and prepare detailed engineering 2D and 3D drawings. Detailed QA/QC document, inspection and test report format document for approval.

4.2 The supplier shall carry out the development of the liquid helium vessel as per the enclosed drawing. The liquid helium vessel shall be transported to the magnet winder and after carrying out the winding of the magnet and shall be collected back.

4.3 The liquid helium vessel shall be integrated with the cold mass support post and thermal shield. Assembly jig/structure shall be developed to carry out the assembly of the cold mass inside vacuum vessel. Minor modification required in the vacuum vessel to carry integration and assembly of cold mass shall be carried out with prior approval from the supplier.

#### 5.0 Inspection and testing requirements

5.1 QA/QC documents: The supplier shall develop detailed QA/QC document of various fabrication process, inspection and testing requirements. The minimum required documentation is listed below. The QA/QC document shall be mutually agreed upon and signed by authorized persons of the supplier and purchaser.

5.2 Material certification: The supplier shall provide material certification/documents of all the materials which will be used in the liquid helium vessel , cold mass support and vacuum vessel.

5.3 Helium vessel weld inspection: All the welds on the helium vessel shall be conforming to ASME pressure vessel standard.

5.4 Helium vessel helium leak testing: The vacuum vessel and its components shall be assembled and tested for helium leak testing. The testing shall conform to ASTM/ISO standard. The leak test procedure shall be approved by the purchase before carrying out the testing.

#### 6.0 Documentation requirements

##### 6.1 Technical documentation to be furnished within one month from date of award of the contract

6.1.1 Detailed engineering drawing of the helium vessel and cold mass assembly procedure.

6.1.2 The Bidder shall submit a quality assurance (QA) plan to the buyer for acceptance.

6.1.2.1 The plan shall ensure that each item offered for acceptance conforms to the requirements herein.

6.1.2.2 The plan also lists out the leak test, individual welding qualification, ferrite number measurement, cleaning procedure for achieving high vacuum.

##### 6.2 Technical documents to be provided prior to starting the fabrication

6.2.1 Detailed fabrication drawing of the helium vessel and cold mass for approval of fabrication.

6.2.2 Qualification test certificates of welder and operators.

6.2.3 Welding procedure specifications and welding procedure qualification records.

6.2.4 The inspection procedure, which shall clearly say about the type of intervention required like review, witness or hold points.

6.2.5 The list of the jobs which they want to sub contract and the details of the sub-contractor. The same shall be approved by the buyer before subcontracting.

##### 6.3 Technical documentation prior to final inspection and testing

- 6.3.1 Weld inspection plan
- 6.3.2 Material certificates and traceability records
- 6.3.3 Leak test protocol
- 6.3.4 Pressure test protocol
- 6.3.5 Qualification certificates of leak testing personnel.
- 6.3.6 Qualification certificates of welding nondestructive testing personnel.
- 6.4 Technical documentation before shipping of the supply
- 6.4.1 The Mill test certificate of the raw materials as per code EN10204/2.2 with correlated heat marking in the plates, sheets etc.
- 6.4.2 The approved fabrication drawings.
- 6.4.3 Welding procedure specification and procedure qualification report as per ASME Section XI.
- 6.4.4 Leak test report of the sub assembly and the vacuum vessel and the respective leak detector calibration certificates.
- 6.4.5 Laydown, loading, preparation and shipping procedure for prior approval before shipping of items.
- 6.4.6 Dimensional check reports.

## 7.0 REQUIREMENTS OF SUPPLIER QUALIFICATIONS

- 7.1 Human resources: The supplier must give the details of human resources including Engineers, Draftsman, Electrical, Welder, assembly mechanic, quality control inspector, machinist etc.
- 7.2 Infrastructure: The supplier must give the details of infrastructure suitable for this job such as Manufacturing Machines, welding machining, electrical testing equipment, winding machine, Assembly room and other tools & tackles, Inspection facilities etc.
- 7.3 Past experience: The supplier must give their past three-year turnover and job executed by them with reference, volume of work and completion schedule, present commitments and anticipated commitments inside and outside India.
- 7.4 Sub contract: Supplier should list the jobs, which they want to sub-contract. They should also produce the list of sub-contractors and their infrastructures and facilities.
- 7.5 Supplier shall clearly mention the vacuum helium leak test facility available with them.

## 8.0 Manufacturing and workmanship requirements

- 8.1 The magnet shall be fabricated to meet the requirements of ASME code and their quality shall be consistent with vacuum service.
- 8.2 The fabrication quality of the piping shall be in accordance with ANSI standard B31.3 and consistent with the vacuum service.
- 8.3 Machining, deburring and polishing
- 8.3.1 Suitable precaution shall be taken to finish the surfaces communicating with the inside vacuum areas. The preferred technique for the finishing may be only machining. Metal removal other than by machining such as grinding, honing, EDM may be avoided. If polishing has to be done excessive pressure during polishing may be avoided.
- 8.3.2 The machining coolant shall be sulfur free to reduce outgassing.
- 8.3.3 Deburring may be with file, deburring knife or using abrasives. Deburring by abrasive vibrating or tumbling may be avoided.

#### 8.4 Cleanliness

8.4.1 The contamination of the stainless steel material shall be avoided. Surfaces shall be cleaned as fabrication is progressing.

8.4.2 Internal surfaces shall be cleaned to remove all trace of oil, grease and other chemical contaminations. Visual examination shall demonstrate the absence of all contaminants and if at all any defects such as dirt, metal chips and sharp edges.

8.4.3 The surfaces communicating with the inside vacuum areas may be subjected to ultrasonic cleaning, high pressure water jet cleaning as per ASTM A380-06.

8.4.4 Parts and assemblies of cryogenic system must be cleaned following a procedure which conforms to the requirements of ISO 23208.

#### 8.5 Electro polishing and Surface finish

8.5.1 The surfaces communicating with the inside vacuum areas shall have a mirror polished (better than 1.6 micron) surface finish.

8.5.2 Electro polishing may be done to the inner surfaces. The electro polishing shall be done as per ASTM B912-02. The surfaces shall be cleaned prior to electro polishing as per ASTM B322-99.

8.6 Buyer reserves the right to witness any or all the fabrication process at the Bidder's facility.

#### 9.0 Welding specification and its quality requirements

9.1 All welding shall be performed by qualified welders in accordance with section IX of ASME code or approved equivalent. The certificate of the same shall be send to the buyer if asked. The welding procedure shall also be qualified in accordance with section IX of ASME code or equivalent.

9.2 All the welds shall be identified by a unique number. All documents related to weld (welder name and qualification, welding procedure and qualification, filler material certificate, results of nondestructive test etc) shall reference the identifier of the weld.

9.3 All butt welds shall be made with through-thickness penetration.

9.4 Weld surfaces shall not be modified by grinding or by any other form of mechanical abrasion.

9.5 It is the responsibility of the Bidder to evaluate whether post –welding heat treatment is necessary for stress relieving prior to final machining. If necessary, all heat treatment shall be executed according to written procedures, which shall be submitted to buyer for approval.

9.6 All welding repairs shall be documented.

9.7 Welding Procedure Specifications (WPS) for all weld joint configurations shall be prepared and submitted for approval. Details for the welding filler to be used in welding (if any) shall be mentioned in WPS along with other details. Welding procedure and parameters shall be established based on based on the test samples prepared on the basis of WPS. All the welding parameters shall be recorded in Procedure Qualification Report (PQR). All welded samples shall be subjected to tests. After test specimens qualify all the testing, the submitted WPS shall be approved and followed during entire fabrication activities.

9.8 Individual welding of the superconducting magnet cold mass shall be tested in the presence of the buyer. The interval of the ferrite number measurement on the welding will be decided by the buyer.

9.9 Radiography and other non-destructive evaluation requirements shall be as per ASME Section V. Nondestructive testing personnel shall be qualified to ISO 9712 to the minimum level 2, industrial sector welding.

9.10 General Guidelines to be followed during entire welding/fabrication:

9.10.1 Before welding all parts shall be cleaned initially with detergent and then with acetone or 1:1:1 Tri-Chloro-Ethane.

9.10.2 As specified in the drawings all welds which are to be done should be Tungsten argon arc welding (TIG) according to ASME – Sec. IX.

9.10.3 During welding high purity (99.99%) Argon purge gas shall be used to reduce or eliminate oxygen entrainment and carbide precipitation that cause outgassing.

9.10.4 Whenever possible welds shall be made on the inside vacuum side. Trapped volume shall be avoided during welding on vacuum side surfaces. Full penetration weld shall be employed wherever it is possible. When welding is to be done on both sides of the wall, continuous welding on inner side (high vacuum side) and tack welding outside is to be done.

9.10.5 Single pass welds up to a maximum extent is preferred. Interruption during welding shall be reduced to a minimum possible extent.

9.10.6 Filler material, if used, shall be compatible with the parent material and procured from original manufacturer. Bidder shall submit the material test certificate of filler material from the original Bidder. Bidder shall take approval from buyers, for the use of filler material needed.

#### 10.0 Applicable codes and standards

10.1 Construction of Vacuum and pressure vessel: ASME Boiler pressure vessel Code Section VIII Division I & II latest Version.

10.2 Welding Qualifications: ASME Boiler pressure vessel code Section IX latest version or ISO equivalent.

10.3 Nondestructive testing as per ASME BPVC section V.

10.4 ASTM E-45 – “Standard Test methods for determining the inclusion content of steel”.

10.5 ASTM A240/240M –“Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels”.

10.6 ASTM A182/182M –“ Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings “

10.7 ASTM A312/312M –“ Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes”

10.8 ASTM B152M – “Standard for hot rolled and soft annealed C10100 OFE copper plates/Sheets”

10.9 Process Piping (Flanges & Fittings): ASME B31.3 Standard.

10.10 EN 10204 – “Metallic Products – Types of inspection documents”

10.11 ISO 3506 – “Mechanical properties of corrosion resistant stainless steel fasteners”

10.12 ASTM A380-06 Standard Practice for cleaning, descaling and passivation of stainless steel parts, equipment’s and systems.

10.13 ASTM B322-99 Standard Guide for cleaning Metals prior to Electroplating.

10.14 ASTM B912-02 Standard specification for passivation of stainless steels using Electro polishing.

10.15 ASTM E1003-05 Standard test method for hydrostatic leak testing.

10.16 ASTM E1603-99 or equivalent Standard Test Methods for Leakage Measurement Using the Mass Spectrometer Leak Detector or Residual Gas Analyzer in the Hood Mode.

## 11.0 Quality assurance requirements

11.1 The Bidder shall maintain a documented quality assurance program that will insure that each item offered for acceptance or approval conforms to the requirements. The requirements of the ISO9001 shall be considered as a guideline for the QA plan.

11.2 Quality surveillance and expediting, relating to all the aspects of the contract will be carried out by the buyer or his authorized representative for which purpose the Bidder and his subcontractor shall

11.2.1 Allow access at all reasonable times during manufacture, assembly and testing to the premises in which the work is being carried out.

11.2.2 Furnish the latest drawings and/or tooling, gauges, instruments, testing equipment etc. required for inspecting the jobs. Prints of all the latest required drawings and approved procedures shall be made available for inspection and retention, if so desired.

11.2.3 Produce an inspection plan to the buyer's satisfaction and notify when checkpoints on the plan are imminent so that the buyer's representative may be present, if it is so desired.

11.2.4 Obtain acceptance of the components in the form of a shipping release from the buyer's representative before the shipment.

11.3 The Bidder shall be responsible for the inspection of the components that is subcontracted by him.

11.4 Waiving of quality surveillance by the buyer's or acceptance of the items by the buyer or his authorized agent, shall not relieve the Bidder from the responsibility for supplying the items in accordance with specification requirements of this document and purchase order.

## 12.0 Packaging and safe delivery requirements

12.1 The vessel shall be engraved with a unique identification marking composed of the corresponding drawing number followed by a serial number. The engraving shall be made such as to remain readable after assembly. Its placement shall be agreed between the buyer and Bidder.

12.2 The Bidder shall develop detailed procedure for handling and shipping the magnet. The container shall be constructed such that they can be handled by forklift and no palletized load shall exceed 2 MT.

12.3 Each component shall be marked with Bidder's identification as well as the identification indicated in drawing in such a way that the markings can be conveniently read and cannot get destroyed during handling, cleaning, etc.

12.4 Bidder shall make necessary arrangements for all components using a suitable PVC cover or molded thermocol. Proper care should be taken while handling the component during fabrication, inspection, testing and packing. Acceptance of the magnet will be made only after the vacuum integrity is tested at buyer's premises.

12.5 After completion of all testing and identifying the components, the components shall be packed suitably for shipment, so that no damage occurs in transit. The buyer shall subject the packing procedure to prior approval. At least one copy of packing list shall be kept in the package for quick and easy verification.

12.6 The Bidder shall be responsible for proper and safe delivery. The Bidder shall provide support for the installation of the magnet inside buyer's premises.

12.7 The delivery of the magnet shall be made at BARC, Trombay, Mumbai, 400094, India.



### 13.0 Price and delivery schedule requirements

13.1 The delivery of the vessel with its relevant technical documentation is expected within 6 months from date of placement of purchase order.

13.2 The Bidder shall detailed break up cost with delivery schedule. However only overall cost will be compared.

### 14.0 CONFIDENTIALITY CLAUSE

14.1 No party shall disclose any information to any third party concerning the matters under this Contract generally. In particular, any information identified as "Proprietary" in nature by disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party. This clause shall apply to sub-contractors, consultants, advisors or the employees engaged by a party with equal force.

14.2 . "Restricted information" categories under section 18 of the Atomic Energy Act, 1962 and "Official secrets" under section 5 of the Official Secrets Act, 1923: Any contravention of the above mentioned provisions by any contractor / sub-contractor, consultant, advisor or the employees of the contractor will invite penal consequences under the aforesaid legislation.

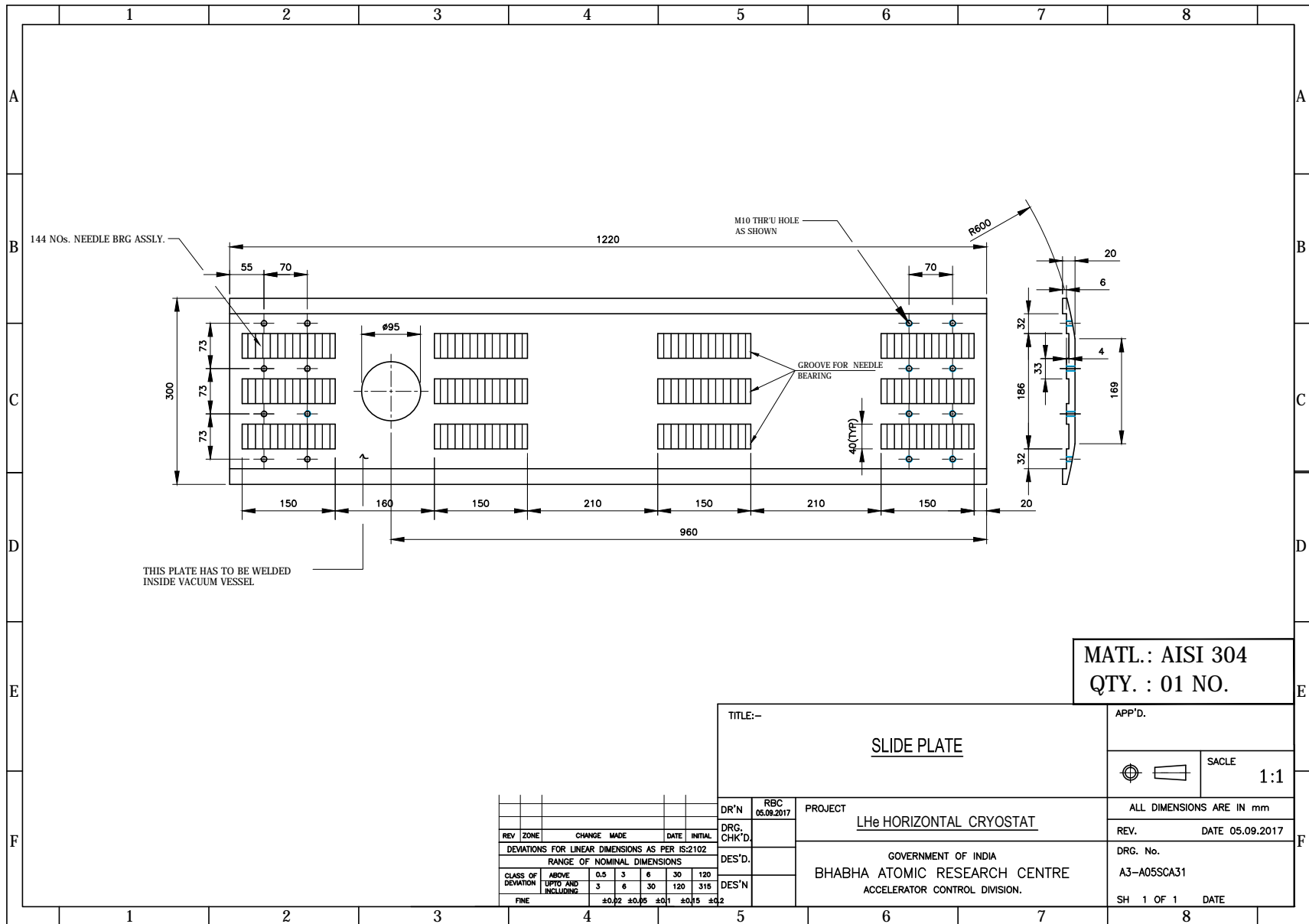
14.3 Prohibition against the use of BARC's name without permission for publicity purpose. The contractor or sub-contractors, consultants, advisors or the employees engaged by a party shall not use BARC's name for publicity purpose through any public media like: press, radio, TV or Internet without any prior approval of BARC (wide circular ref.: 2/Misc-9/Lgl/2001/92 date 30/04/2001)

Annexure-A

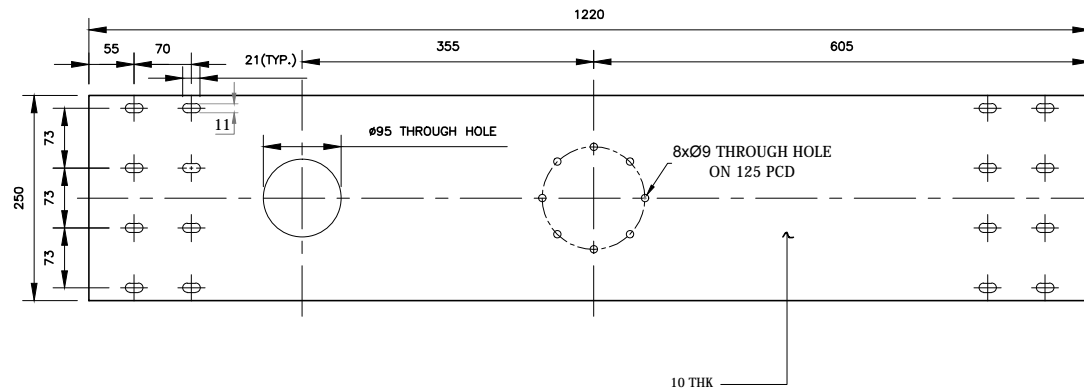
List of free Issue material

S.No	Description	Total Cost
01	Superconducting magnet integrated vacuum vessel -01 Set	₹ 25 Lakhs

The FIM will be issued against submission of insurance policy with risks to be covered for any loss or damage to the purchaser materials due to fire, theft, riot , burglary , strike , civil commotion etc and any damage arising out of other causes such as other material falling on purchasers material. The beneficiary shall be the "The President of India acting through Head, ACnD, MRG , BARC".



SLIDE PLATE

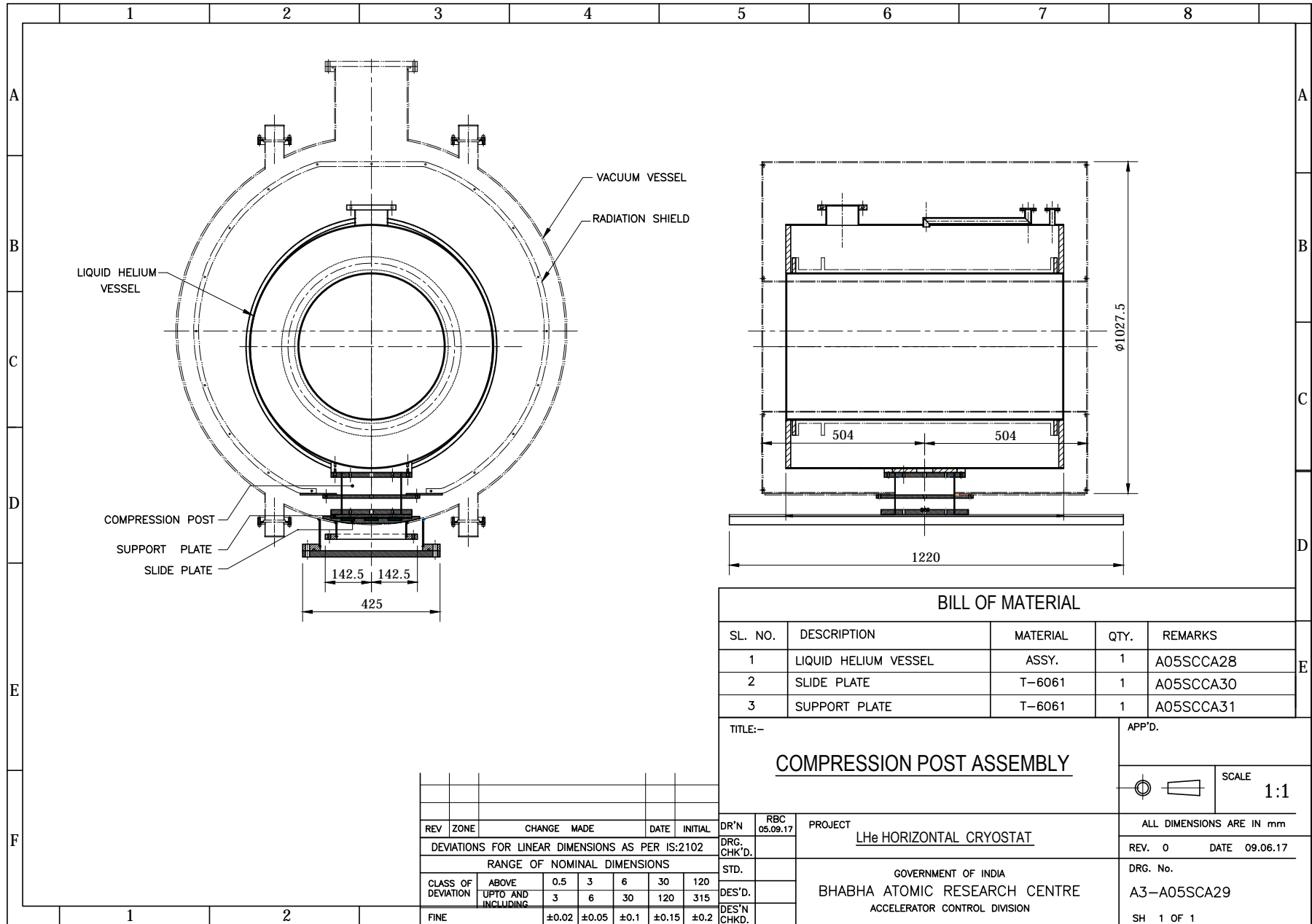


MATL. : AISI 304  
 QTY. : 01 NO.

TITLE:-		SUPPORT PLATE		APP'D.	
				SACLE 1:1	
		PROJECT		ALL DIMENSIONS ARE IN mm	
		LHe HORIZONTAL CRYOSTAT		REV. DATE 05.09.2017	
		GOVERNMENT OF INDIA		DRG. No.	
		BHABHA ATOMIC RESEARCH CENTRE		A3-A05SCA30	
		ACCELERATOR CONTROL DIVISION.		SH 1 OF 1 DATE	

REV	ZONE	CHANGE MADE	DATE	INITIAL		
DEVIATIONS FOR LINEAR DIMENSIONS AS PER IS:2102						
RANGE OF NOMINAL DIMENSIONS						
CLASS OF DEVIATION	ABOVE	0.5	3	6	30	120
	"UP TO" AND INCLUDING	3	6	30	120	315
FINE		±0.12	±0.15	±0.1	±0.15	±0.2

DR'N	RBC
	05.09.2017
DRG. CHK'D	
DES'D.	
DES'N	



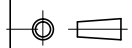
**BILL OF MATERIAL**

SL. NO.	DESCRIPTION	MATERIAL	QTY.	REMARKS
1	LIQUID HELIUM VESSEL	ASSY.	1	A05SCCA28
2	SLIDE PLATE	T-6061	1	A05SCCA30
3	SUPPORT PLATE	T-6061	1	A05SCCA31

TITLE:--

**COMPRESSION POST ASSEMBLY**

APP'D.



SCALE  
**1:1**

ALL DIMENSIONS ARE IN mm

REV	ZONE	CHANGE MADE	DATE	INITIAL		
DEVIATIONS FOR LINEAR DIMENSIONS AS PER IS:2102						
RANGE OF NOMINAL DIMENSIONS						
CLASS OF DEVIATION	ABOVE	0.5	3	6	30	120
	UPTO AND INCLUDING	3	6	30	120	315
FINE		±0.02	±0.05	±0.1	±0.15	±0.2

DR'N	RBC 05.09.17
DRG. CHK'D.	
STD.	
DES'D.	
DES'N CHKD.	

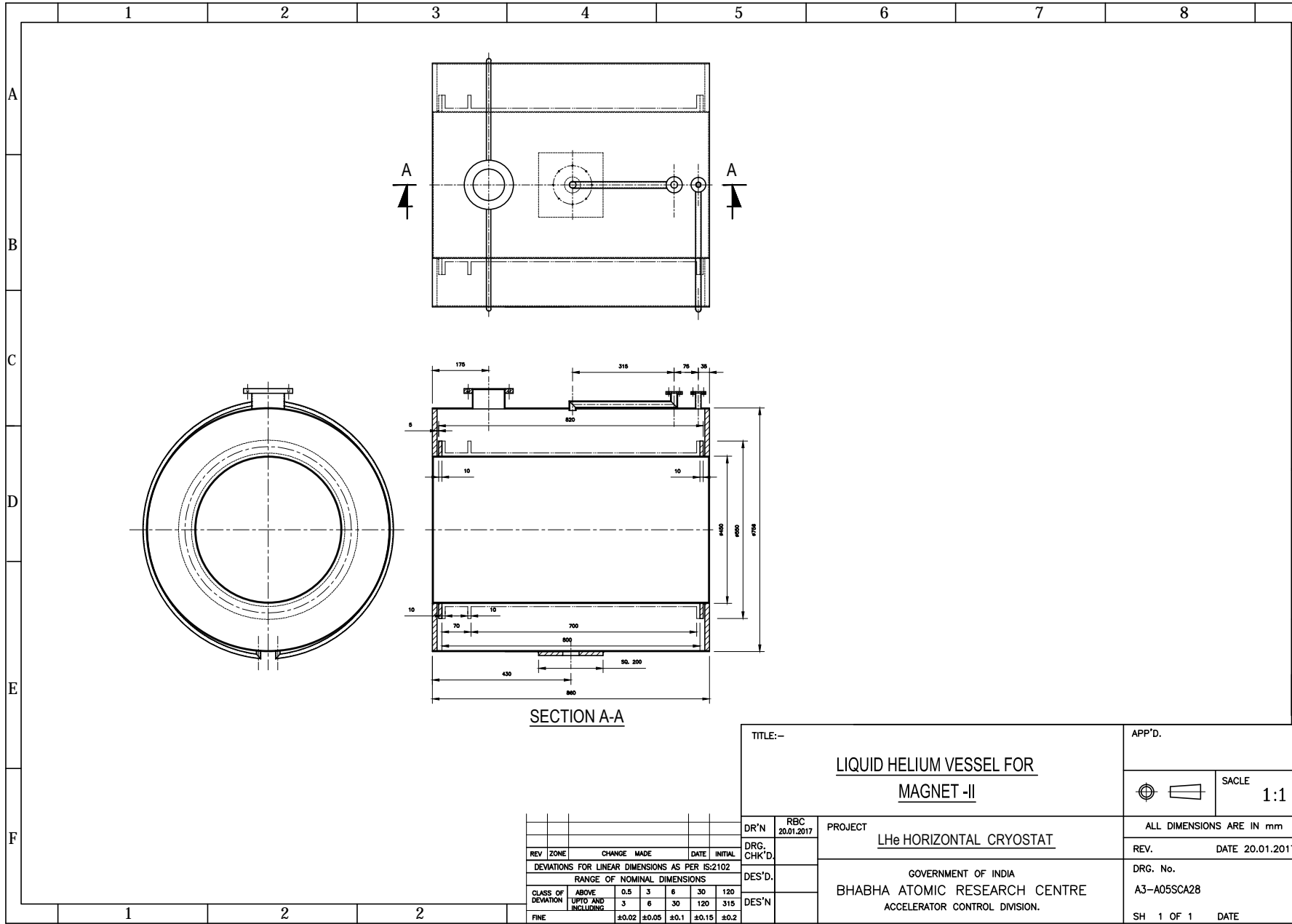
PROJECT  
**LHe HORIZONTAL CRYOSTAT**

GOVERNMENT OF INDIA  
**BHABHA ATOMIC RESEARCH CENTRE**  
ACCELERATOR CONTROL DIVISION

REV. 0 DATE 09.06.17

DRG. No.  
**A3-A05SCA29**

SH 1 OF 1



SECTION A-A

TITLE:-		LIQUID HELIUM VESSEL FOR MAGNET -II		APP'D.
				SCALE 1:1
PROJECT		LHe HORIZONTAL CRYOSTAT		ALL DIMENSIONS ARE IN mm
DR'N	RBC 20.01.2017			REV. DATE 20.01.2017
DRG. CHK'D				DRG. No. A3-A05SCA28
DES'D.		GOVERNMENT OF INDIA BHABHA ATOMIC RESEARCH CENTRE ACCELERATOR CONTROL DIVISION.		SH 1 OF 1 DATE
DES'N				

REV	ZONE	CHANGE MADE	DATE	INITIAL		
DEVIATIONS FOR LINEAR DIMENSIONS AS PER IS:2102						
RANGE OF NOMINAL DIMENSIONS						
CLASS OF DEVIATION	ABOVE	0.5	3	6	30	120
	UP TO AND INCLUDING	3	6	30	120	315
FINE		±0.02	±0.05	±0.1	±0.15	±0.2