

BOSE INSTITUTE
Indo – FAIR Co-ordination Centre (IFCC)
KOLKATA

ADVT. No. BI-IFCC/ 31 /2017-18 dated: 15-10-2017

**Sub: Development, Fabrication, Manufacture, Testing, Supply, Installation
and Commissioning of Beam Stopper for Super-FRS in FAIR Project at
FAIR, GSI, Germany**

1. INTRODUCTION

Bose Institute, Kolkata, an autonomous R&D Institute, registered under Societies Registration Act, under Department of Science & Technology, Ministry of Science & Technology, Government of India, has been designated as the Indian shareholder in the Facility for Antiproton & Ion Research (FAIR) Company, GSI, Germany and the nodal Indian Institution for the management of FAIR programme in India.

Bose Institute Indo-FAIR Co-ordination Centre (BI-IFCC) established at Bose Institute by the DST, Govt. of India, as the implementing body of the Indo-FAIR Programme.

Bose Institute (IFCC) invites **Expression of Interest** for prequalification process to be followed by seeking 2-part tender from selected vendors from only reputed, renowned, experienced and highly skilled indigenous engineering & technology companies/manufacturers in India for development, fabrication, manufacture, testing of Beam Stoppers at their own site and delivery, installation, commissioning and testing at FAIR, GSI, Darmstadt, Germany. Total quantity of Beam Stopper for Super-FRS in FAIR Project will be 03 (three) slightly different from each other.

Based on the evaluation in the pre-qualification process, the list of selected vendors will be asked to submit two-part (1. Technical, 2. Commercial & Price) tender documents. The design, drawings & detailed Technical Guidelines will be supplied only to those vendors selected in prequalification process.

The final successful bidder shall be awarded the contract for manufacturing the Beam Stoppers for Super-FRS in FAIR Project as per the drawings, specifications & Technical Guidelines to be furnished before the start of manufacture.

2. TECHNICAL FEATURES OF BEAM STOPPER FOR SUPER-FRS IN FAIR PROJECT

Beam Stoppers (Beam Catchers) are important modules of Super-FRS branch and to be manufactured and tested (without beam) in India and finally commissioned in the underground tunnel at FAIR project site (GSI, Darmstadt, Germany). They primarily serve two purposes, firstly, absorb the main part of the primary beam of energetic ions and secondly, shield the subsequent parts of the accelerator and experimental equipment from a high level of secondary radiation.

Total requirement of Beam Stoppers to be manufactured, tested and commissioned at FAIR project site is 03 (three), namely BC-1, BC-2 and BC-3. The structural and functional design of these beam

stoppers are similar (not identical) and the major variation lies in the size and motion control of carbon absorbers within the vacuum chambers.

The design of Beam Stopper for Super-FRS in FAIR Project has been undertaken by CSIR-CMERI, Durgapur, in a collaborative project mode between CSIR-CMERI and BI-IFCC. To get an idea of the

Beam Stoppers, kindly refer Section 3.A, 3.B and Section 3.C of Pre-qualification process, which is hence forth called the “Technical Document”.

3. PRE-QUALIFICATION PROCESS

The company/manufacturer applying for pre-qualification must satisfy the following qualification criteria and manufacturer experience & credentials. A documentary proof in this regard shall be submitted. The pre-qualification process comprises of evaluation of the submitted documents, visits to the manufactures’ works site & detail technical discussion (wherever considered necessary) which will be minuted and short listed for the purpose of handing over the Tender Document with all the drawings & technical guidelines.

3.A. Technical Qualification Criteria

The company/manufacturer shall preferably have the facilities & expertise for prototyping, manufacture, testing, qualification, supply, installation & commissioning of Beam Stoppers at FAIR Darmstadt (Germany) and their maintenance during warranty period of 2 years after their satisfactory installation & commissioning. (In case all the facilities are not currently available, indicate the available facilities out of this list). This is to be read with Quality Assurance Guidelines in Section 3.b and Technical Drawings in Section 3.c.

- i. Quality Control & Quality Assurance Departments for all stages of manufacture including verification of material test acceptance of materials received, welding procedure and welders performance tests, metrology for detailed measurement of dimensions & tolerances, vacuum properties acceptance tests with/without bake out, cleaning, post cleaning handling, packaging, and transport. Quality management system shall conform to DIN EN ISO 9001:2000 / ISO 9001:2008.
- ii. Facility for machining/surface grinding of requisite travel (please refer technical document for overall cavity size) for welded structures and individual components as per technical document, in order to bring requisite surface finish and geometrical tolerances like parallelism, perpendicularity etc. Usually such machines comprises of General Purpose/NC/CNC vertical /horizontal milling, plano milling with grinding attachments, horizontal boring etc.
- iii. Material handling facility with Overhead/ EOT cranes for handling cavity and shielding structures along with their of sub assemblies, for assembly/re assembly in India at manufacturers site. Please refer technical document for an estimation of weight of individual sub assemblies.
- iv. Software & personnel for reading of digital drawings like Auto CAD (or similar) shall be required.
- v. Welding facilities for TIG, MIG, micro-plasma etc. for vacuum cavity and structural fabrication. Qualified welders according to DN EN 287-1/ISO 9606-1:2012 / IS 7310-1 shall exist in-house for the entire welding processes of the vacuum chambers. Facilities for completion of internal welding of the vacuum chamber weld joints without interruption of the welding process.

- vi. Facilities for UHV cleaning which should comprise of high pressure hot (~ 80 degree C) water cleaning, rinsing in cleaning agent, ultrasonic cleaning for at least 15 mins. in hot (~60 degree C) alkaline cleaner (example SurTec 138; pH-13) , de-mineralized water rinsing, ultrasonic cleaning for at least 15 mins. in hot (~60 degree C) alkaline cleaning fluid (example Almeco 18; pH-11), deionised water rinsing, hot air (~180 degree C) drying, baking of large vacuum cavities, dry air/Nitrogen injection system in to the cavities, covering of components with aluminum foil and sealing with PE (Polyethylene) foil etc.
- vii. Facilities for Vacuum brazing particularly brazing of Graphite-Cu plates/blocks with suitable filler material and intermediate elements. Access to mechanical testing of brazed joints under fatigue load is preferable.
- viii. Facilities for Vacuum Properties Acceptance Tests , which shall include Integral Helium Leak Detection, Leak rate measurement, Measurement of Residual Gas Composition, Measurements of outgassing rates, along with documentation. The desired vacuum level in the vacuum chamber during dry tests should be in the level of 10^{-7} mbar with std. UHV leak rates. Documentation of serial testing for feed through and connectors is also required.
- ix. Access to Material Testing Certifications as per DIN BSEN10204 : 2004 (3.1B and 3.1C Certification) are required for the following tests: Chemical composition, Eddy current test, Folding test, Inspection and checking of dimensions, Test of inter-crystalline corrosion, Hardness test, Ultrasonic testing, Test of magnetic permeability.

3.B Quality Assurance Guidelines

The summary of Quality Assurance Guide lines and standards which are to be followed and documented during manufacturing, testing and installation stages are mentioned below. This is only the part of information to be provided to the manufacturers in India along with the Technical Documents for getting “Expression of Interest” from them. Details of these guidelines, standards and procedures shall only be provided to interested manufacturers in the detail design stage.

- i. The Manufacturers should have ISO 9000 series quality management system certification (ISO 9001:2000 / ISO 9001:2008), to meet the statutory requirements of quality assurance documentation.
- ii. Standards to be adhered: (i) General Tolerances: DIN ISO 2768-mK (Equivalent Indian Standard IS:2102 Part-(1) and IS: 2102 Part (2)) (ii) General Tolerances for Welding DIN EN ISO 13920 BF :1996 (iii) Surface Properties/Finish as per DIN ISO 1302 :2002 / IS 10719 : 2015.
- iii. The vacuum chamber and shielding material inside the vacuum chamber must be non magnetic to avoid interference with the beam and with the surrounding magnets. Austenitic Stainless Steel with low sulphur content is the obvious choice. Typically AISI SS 304L / SS 304LN (nitrogen-strengthen).
- iv. The inner bulk shielding will be from Hot Rolled structural steel conforming to IS 2062:2011 (grade E250, up to 150mm thick plates) and for higher thickness, other hot rolled billets and slabs nearest to the requisite thickness. This is also equivalent to DIN EN 10025-2 standard and grade S-185). In the inner bulk shielding Cobalt content in the steel is to be restricted below 100ppm to avoid long lasting radioactivity of ^{60}Co .
- v. FAIR guide lines to be followed for welding of UHV systems, welding of CF Flanges, Design and Manufacturing of O-Ring Grooves, Manufacturing of CF Knife edge flanges, Surface conditions and treatment of Vacuum Chambers, Cleaning procedure for Vacuum Chamber and Vacuum Components along with the Transportation guidelines. Transportation with aircushions is required for heavy structures. After cleaning of the vacuum chamber all flanges have to be closed with clean covers and the chamber has to be

filled with dry nitrogen (quality 4.6 or higher). All vacuum chambers shall be properly supported (fixtures / cradles) and contained to prevent damage and contamination during transport.

- vi. The Vacuum Properties Acceptance Tests will include Integral Helium Leak Detection, Leak rate measurement, Measurement of Residual Gas Composition, Measurements of outgassing rates, along with documentation. The desired vacuum level in the vacuum chamber during dry tests should be in the level of 10^{-7} mbar with std. UHV leak rates. Documentation of serial testing for feed through and connectors is also required.
- vii. Factory Acceptance Tests (FAT) are to be carried out at the manufacturer's site (Component and Assembly level). SAT (Site Acceptance Tests) at the FAIR Site and are divided into parts A and B. SAT Part A includes the tests after delivery to the FAIR Company and but before the Technical system is integrated in its final installation place. SAT Aa is the incoming good inspection. SAT Ab contains all the other tests to be carried out to get the permission for transport to the final installation place. SAT Part B comprises all tests to be performed at the final installation place. SAT Ba includes all tests without beam whereas SAT Bb addresses the tests with beam.

3.C Technical drawings for Expression of Interest (EOI)

- i. The assembly drawings of Beam Stoppers BC1, BC2 and BC3 (BC028-01.00.00.00) version 9.4.0.1, in the tunnel, along with the relevant sub assemblies are attached with gross dimensions for EOI and estimation.
- ii. The sub assemblies which are under remark of "GSI@FAIR" in the drawing BC028-01.00.00.00, are not under the scope of expression of interest and manufacturing in India.
- iii. Major sub assemblies for BC3 (BC028-04.00.00.00) are only given for EOI. Major sub-assemblies of BC1 and BC2 are more or less similar to BC3 in configuration and gross dimensions, except [i] Linear drive sub-assemblies are absent in BC1 and BC2 and [ii] Depth of Top Plug shield is more by approx. 260mm in BC1 and BC2. Hence estimate for BC1 and BC2 can be made from BC3 sub-assembly drawings.
- iv. Please find attached the list of technical drawings for the purpose of EOI.

Drawing No. BC028-00.00.00.00 : Beam Stoppers for Super FRS General Assembly

Drawing No. BC028-01.00.00.00 : Beam Stopper – BC-1 assembly

Drawing No. BC028-02.00.00.00 : Shielding Collar BC-1 and BC-2 assly.

Drawing No. BC028-03.00.00.00 : Beam Stopper – BC-2 assembly.

Drawing No. BC028-04.00.00.00 : Beam Stopper – BC-3 assembly

Drawing No. BC028-04.01.00.00 : Cavity Frame Assly. – BC-3 (page 1/2)

Drawing No. BC028-04.01.00.00 : Cavity Frame Assly. – BC-3 (page 2/2)

Drawing No. BC028-04.02.00.00 : Top Plug Left Assly. – BC-3

Drawing No. BC028-04.03.00.00 : Top Plug Right Assly. – BC-3

Drawing No. BC028-01.04.00.00 : Vacuum Flange O-Ring Retainer assly.

Drawing No. BC028-01.05.00.00 : Associated Shielding Blocks

Drawing No. BC028-05.00.00.00 : Shielding Collar –BC3

Drawing No. BC028-08.00.00.00 : Exit Shielding blocks

- v. For any clarification on technical drawings CSIR-CMERI may be contacted.

3.D COMPANY / MANUFACTURER'S EXPERIENCE AND CREDENTIALS

The company/manufacturer shall also have the following:

- i. Bank Solvency Certificate of minimum value of Rs. 10.00 Crores.
- ii. Overall annual turnover during the last three years ending 31st March, 2017, shall be at least Rs. 25.00 Crores.
- iii. Experience of having completed similar works during last 5 years ending March 31, 2017. The company/manufacturer shall submit the performance data of the similar works to substantiate their statement.
- iv. Shall have company policy of research & development, and up gradation of infrastructure and technical skills.
- v. Shall have adequate experience in handling projects with reputed large research organizations.

Only Indian Company/Manufacturer shall submit their expression of interest. Price Quotation shall be only in INR for the two-part tender.

4. DOCUMENTS TO BE FURNISHED

Interested companies / manufacturers are requested to furnish the following documents:

- i. Company Name, Address and Profile.
- ii. Structure and organization chart of the company.
- iii. Name of contact person along with position in the company structure.
- iv. Registration numbers with Governments/Semi Government Organisations like DAE, Defence, ISRO, Railways, etc., having appropriate experience in carrying out similar types of works – value not less than Rs. 3.00 Crores in total.
- v. Annual Turn Over as per abridged Annual Financial Statements of Accounts for the last 5 years.
- vi. PAN Reference, TAN Reference and Unique Numbers.
- vii. Latest Bank Solvency Certificate.
- viii. Performance Certificate.
- ix. List of similar nature of works in hand and work carried out in last five years including agencies for whom executed and value of work. The company/manufacturer shall submit the performance data of the similar works to substantiate their statement.
- x. Completion time stipulated and actual or present position of work.

- xi. List of qualified and skilled technical staff they possess.
- xii. List of plants and machinery and infrastructural facilities they possess for execution of this work.
- xiii. List of contractors usually employed, their credentials, list of machinery and infrastructural facilities available, list of qualified and skilled technical staff, list of similar nature of work carried out.
- xiv. A brief description of the proposed plan for the execution of this work.

5. INSTRUCTIONS AND INFORMATION TO BIDDERS

Interested companies / manufacturers are requested to furnish all the required documents mentioned above. The submitted documents shall demonstrate compliance with the qualification criterion. Evaluation of the companies / manufacturers shall be carried out on the basis of information submitted as well as visit to their

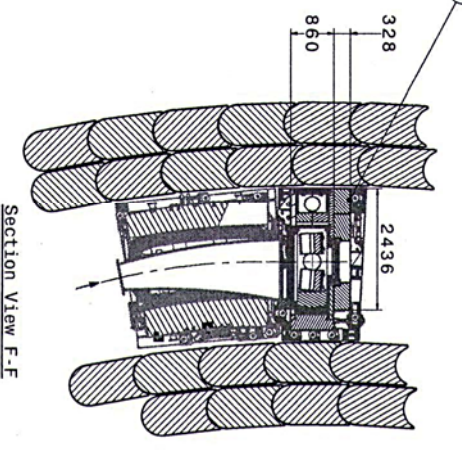
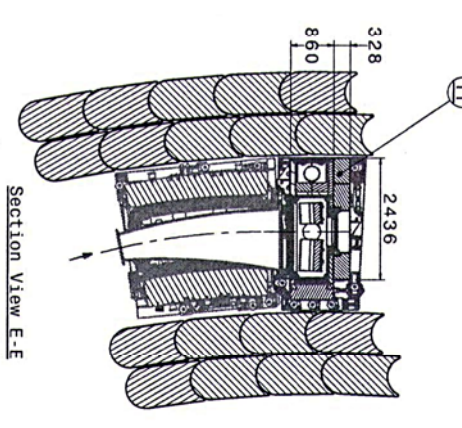
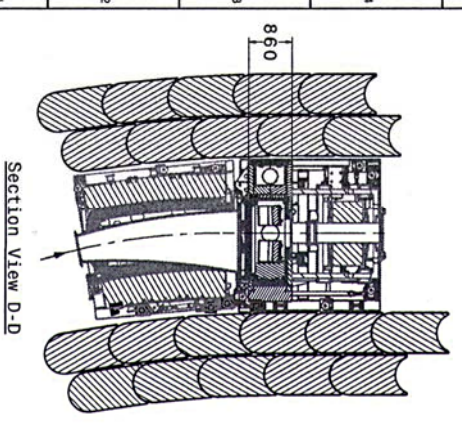
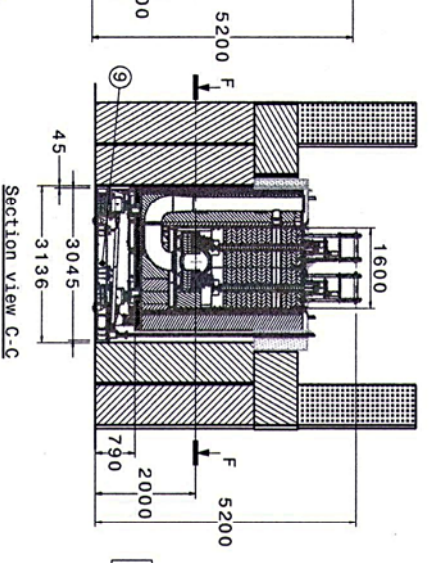
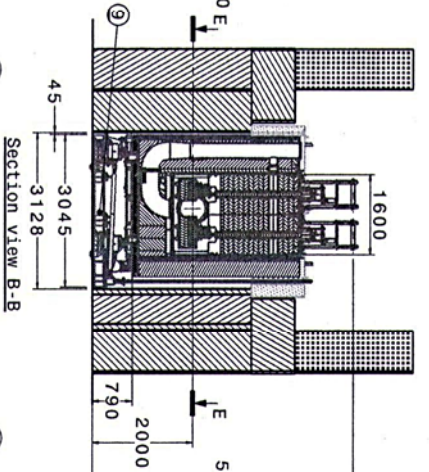
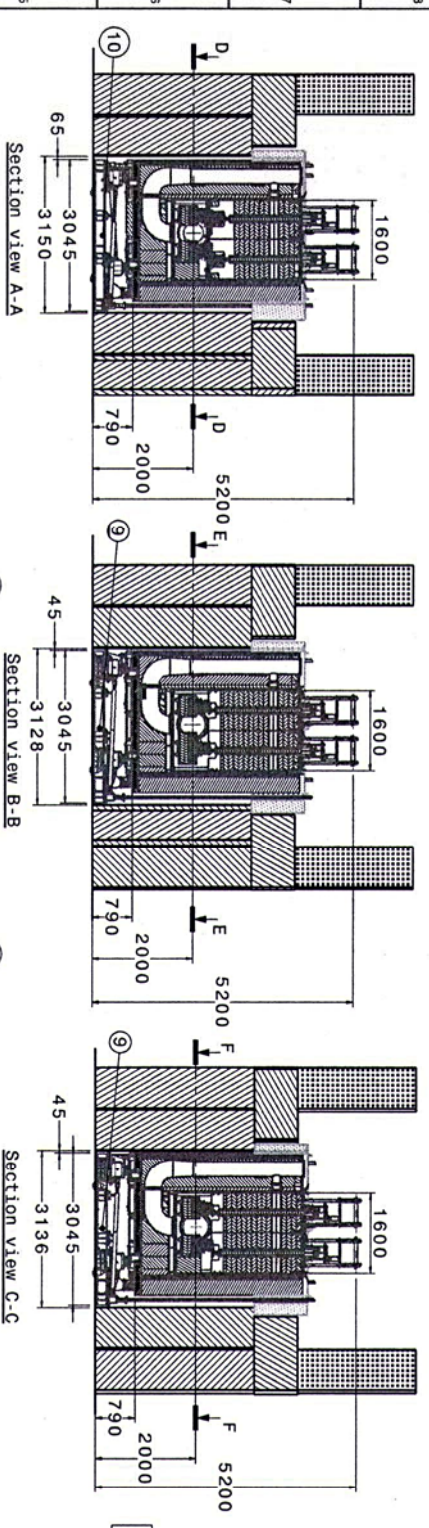
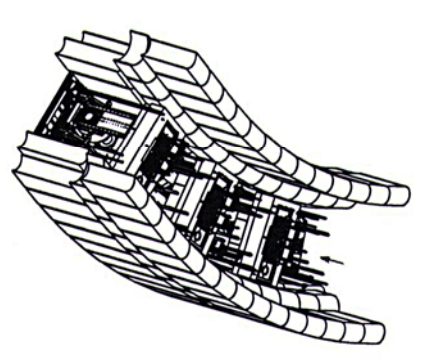
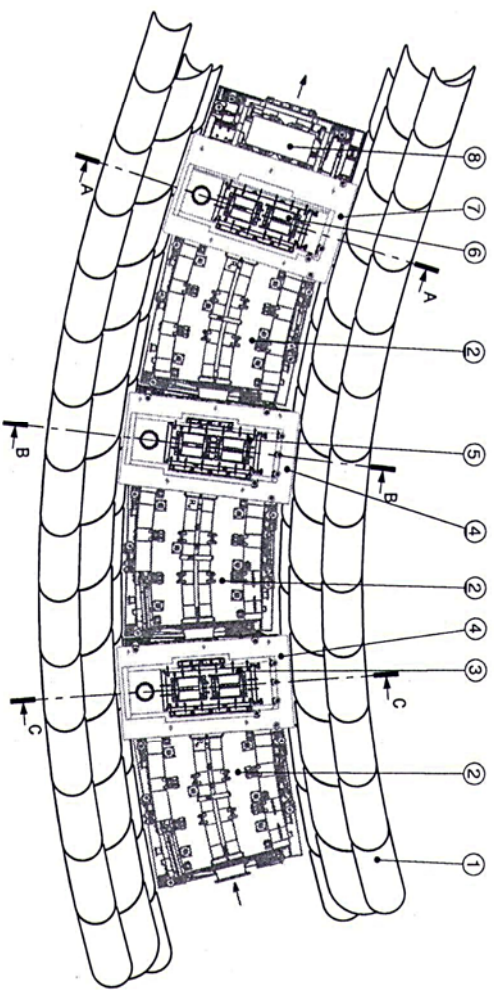
manufacturing facilities and infrastructure. If any information furnished by the applicant is found incorrect at a later stage they shall be liable to be debarred from further participation.

The interested & eligible companies / manufacturers are requested to submit their "Expression of Interest" with relevant documents as stated hereinabove to the office of the Administrative/Accounts Officer, Bose Institute (IFCC), at Bose Institute Centenary Building, P-1/12, CIT Scheme VII M, Kolkata- 700 054, on or before **14th November, 2017**, up to 15.00 hrs. (IST). In the event of the specified last date for the submission of EOI Bid being declared a holiday due to Strike/Bandh or on any account by the Institute, the EOI Bids will be received upto the appointed time on the next working day. Late Bid shall not be accepted.

After completion of the Pre-Qualification process (vide para 3), the short-listed companies/manufacturers will be contacted for the next step of the procedure, i.e., two-part tender.

Bose Institute (IFCC) reserves the right to reject any or all applications without assigning any reason whatsoever. Only those Bidders fulfill the eligibility criteria shall be allowed to participate in two-part tender.

Administrative/Accounts Officer
Indo-FAIR Co-ordination Centre
Bose Institute
Kolkata.



NOTE: Manufacturing of BC028-06, 00, 00, 00 and BC028-07, 00, 00, 00 are in the scope of GSI/FAIR and not included for EOI.

GSI/FAIR (GERMANY)/BL/REG
 PROVISIONAL DESIGN (REV. 9.4.0.1)
 FOR EXPRESSION OF INTEREST ONLY
 DATE: APR 2017

Handwritten signature: Anand Kumar
 14. Apr 17

Item No.	Description	Quantity	Unit	Material
11	Exit Shielding	1	Block Assy.	BC028-08, 00, 00, 00
10	Base Adjustment	1	BC3 Assy.	BC028-07, 00, 00, 00
9	Base Adjustment	2	BC1 & BC2 Assy.	BC028-06, 00, 00, 00
8	Sextupole Magnet	1		
7	Shielding Collar	1	BC3 Assy.	BC028-05, 00, 00, 00
6	Beam Stopper-BC3	1	BC3 Assy.	BC028-04, 00, 00, 00
5	Beam Stopper-BC2	1	BC2 Assy.	BC028-03, 00, 00, 00
4	Shielding Collar	2	BC1 & BC2 Assy.	BC028-02, 00, 00, 00
3	Beam Stopper-BC1	1	BC1 Assy.	BC028-01, 00, 00, 00
2	Dipole Magnet	2		
1	Tunnel	1		

Company of this document and giving it to others and the use of communication without express authority of the owner are prohibited in the event of the grant of a patent for the registration.

ORGANISATION NAME: GSI/FAIR (GERMANY) BL/REG
ADDRESS: GSI/FAIR (GERMANY) BL/REG
PHONE: +49 531 5105-2000
FAX: +49 531 5105-2000
EMAIL: gsi@gsi.de

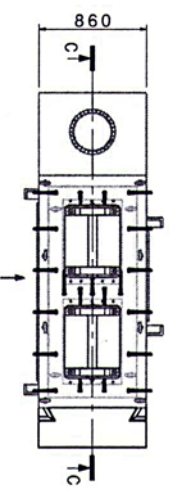
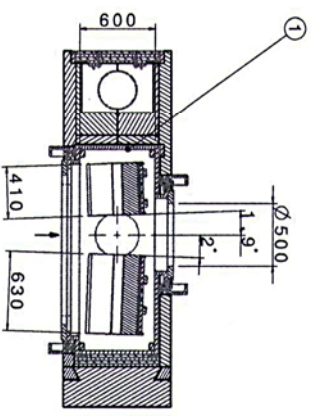
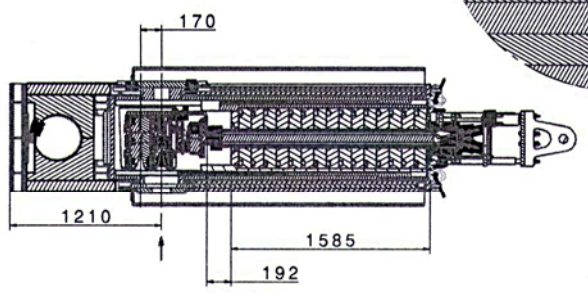
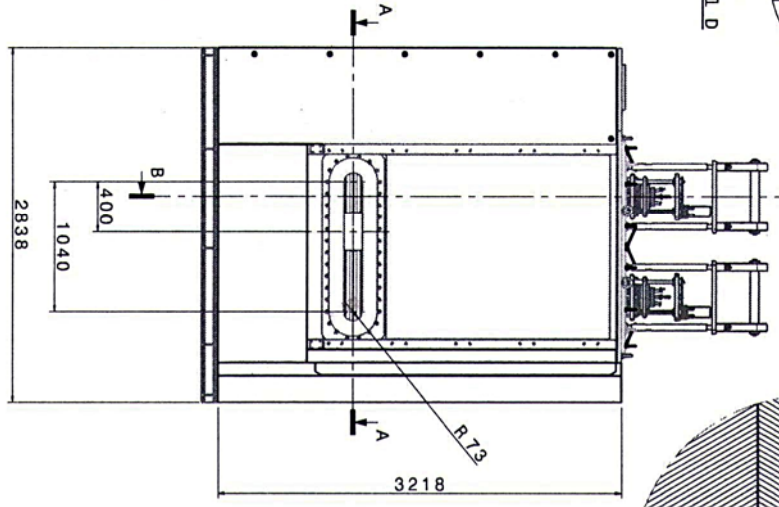
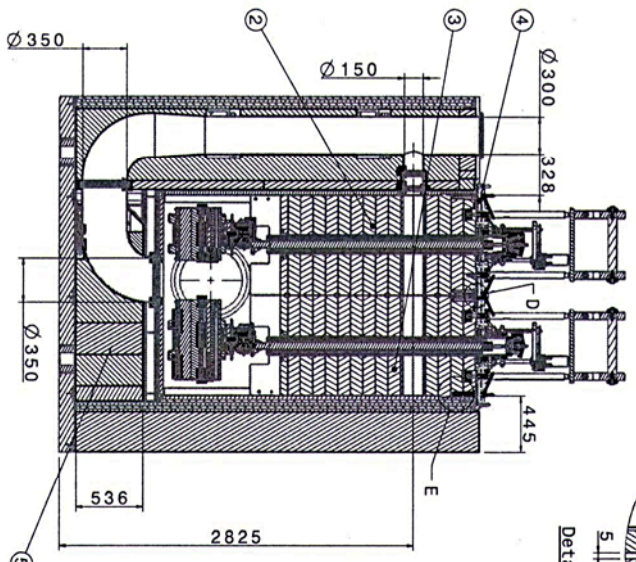
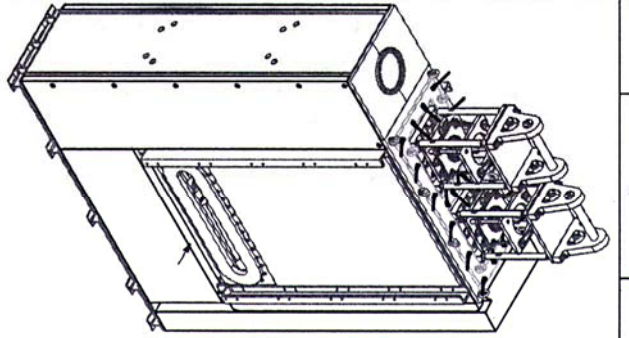
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PROJECT No.: GSI/FAIR (GERMANY) BL/REG

DATE: 14.04.2017
DATE: 14.04.2017
DATE: 14.04.2017

DESIGNER: A. CHATTERJEE
DESIGNER: A. CHATTERJEE
DESIGNER: A. CHATTERJEE

DRAWING No.: BC028-00, 00, 00, 00
DRAWING No.: BC028-00, 00, 00, 00
DRAWING No.: BC028-00, 00, 00, 00

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CSIR - CNERI
 GAE 096210:BEAM STOPPER, FAIR PROJECT
 PROVISIONAL DESIGN (REV. 9.4.0.1)
 FOR INTEREST ONLY
 DGN BY: _____
 DATE: _____

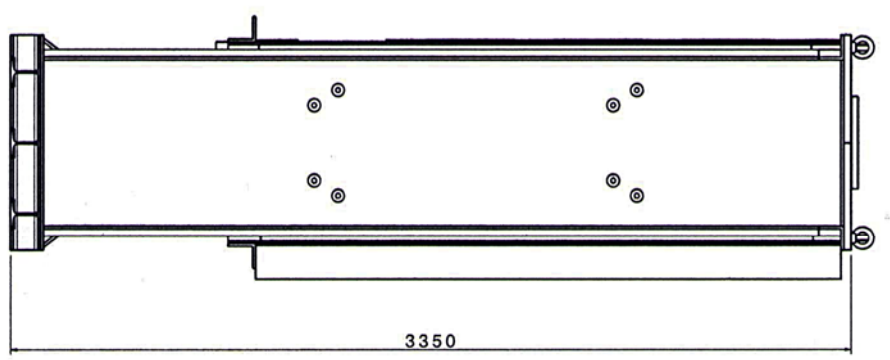
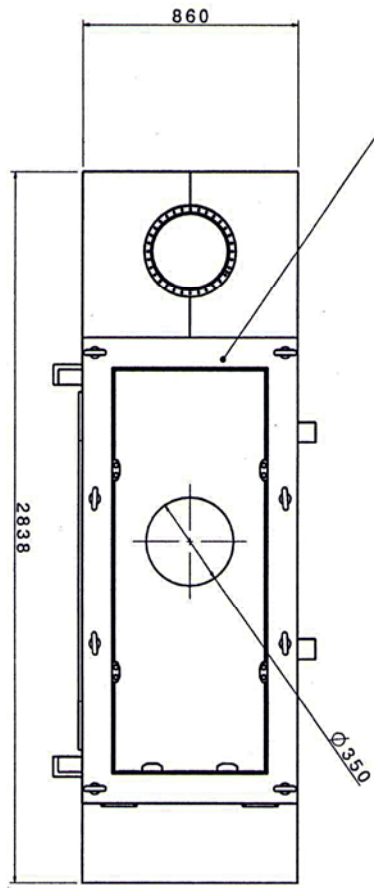
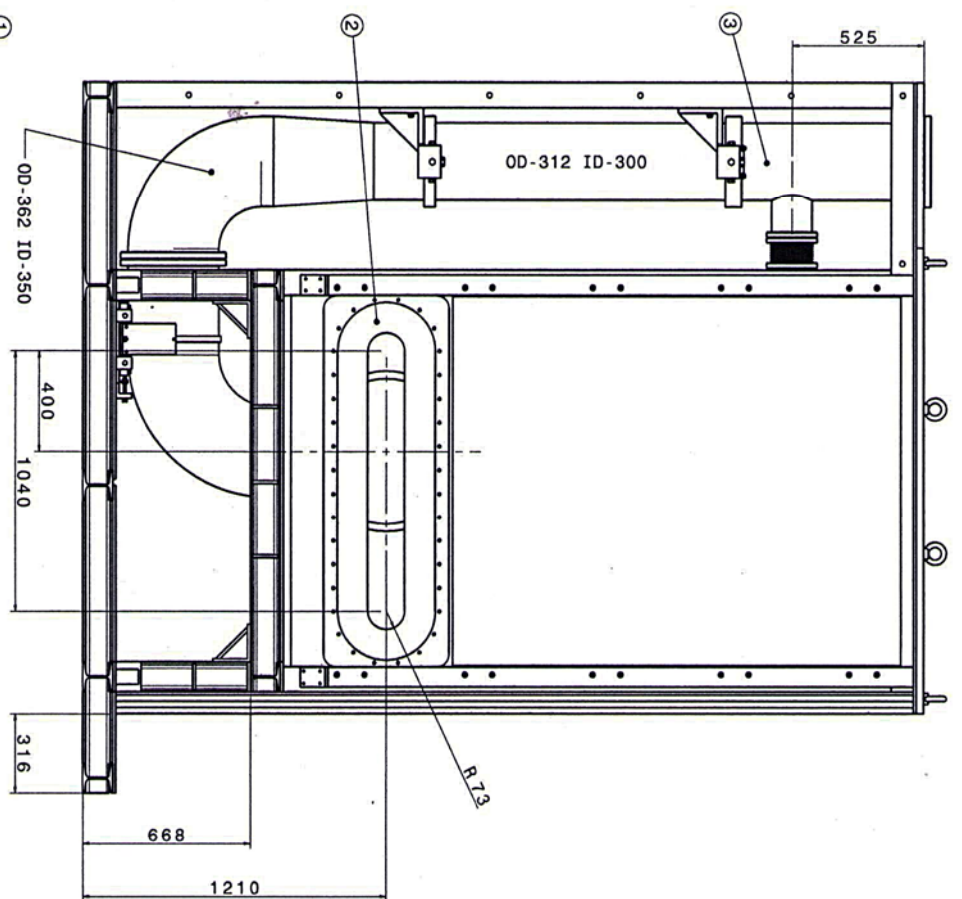
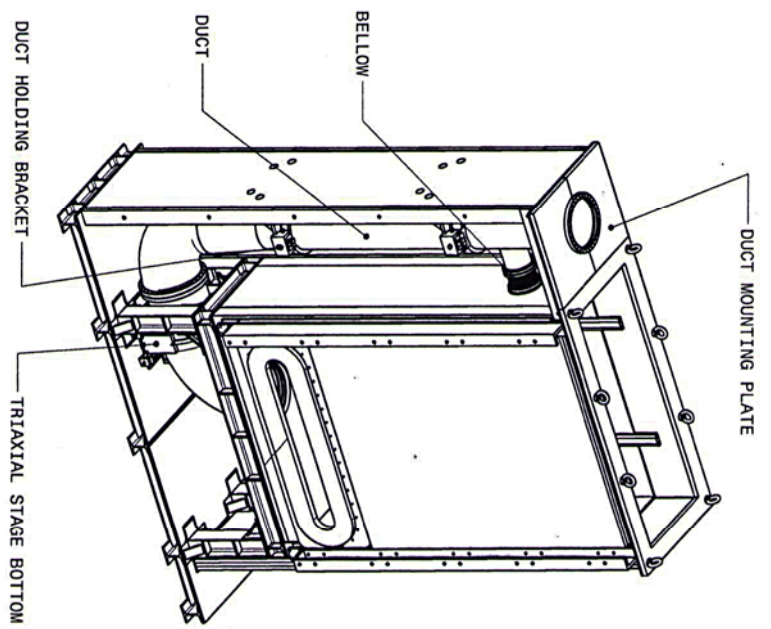
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Section view A-A

Section view B-B

Item No.	Description	Quantity	Unit	Material	Remarks
5	1	Associated Shielding Block Assy.	30028-01.05.00.00	---	---
4	1	Vacuum Flange O-Ring Retainer Assy.	30028-01.04.00.00	---	---
3	1	Top Plug Right Assembly-BC2	30028-03.03.00.00	---	---
2	1	Top Plug Left Assembly-BC2	30028-03.02.00.00	---	---
1	1	Cavity Frame Assembly-BC2	30028-03.01.00.00	---	---

Checked: 14.08.2017 Approved: 14.08.2017 A. Chatterjee 14.08.2017	Date: 14.08.2017 Name: A. Chatterjee Design No: BCO28-03.00.00.00 Rev: 01	Project No: GAE096210 Project Name: BEAM STOPPER, FAIR PROJECT Drawing No: BCO28-03.00.00.00 Rev: 01	Sheet No: 1 of 1
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CSIR-CMERT
 GAP 009272: BEAM STOPPER-FAIR PROJECT,
 CSIR-PARADIGM/RI-1/CC
 PROVISIONAL DESIGN (REV.9.4.0.1)
 FOR EXPRESSION OF INTEREST ONLY
 APPR BY: _____ DATE: _____

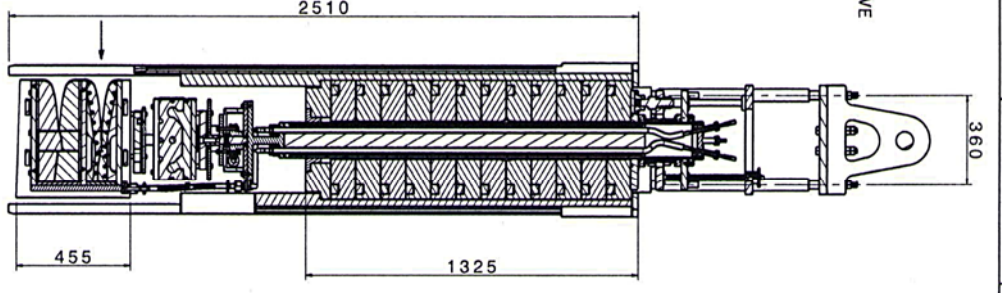
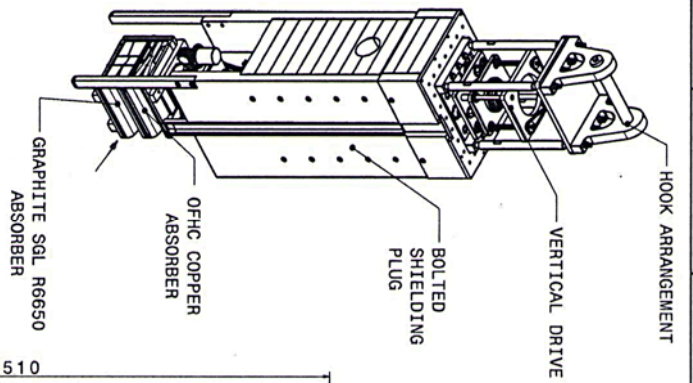
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 14.08.2017

NOTE: Material for Vacuum Cavity- AISI-304L & for Structural
 Frame- IS 2002:2011 Gr. E-250.

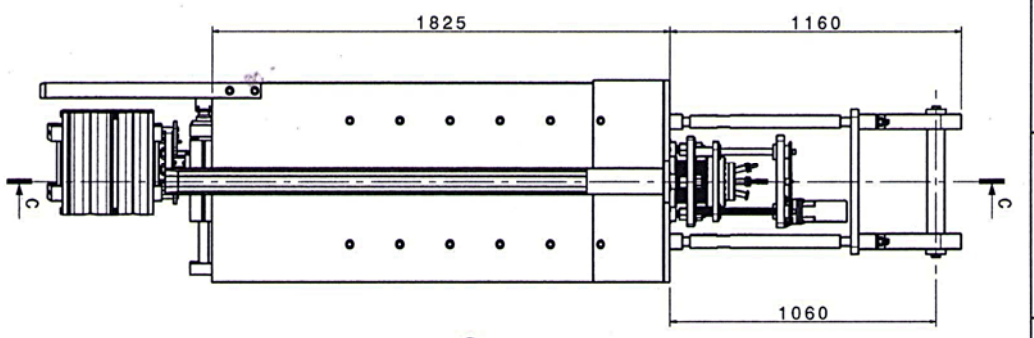
Item Qty.	Description	Drawing No.	Material
3. 1	Pumping Duct sub-assy.	BC028-04.01.01.00	AISI-304L
2. 1	Race Track Bolted Flange	BC028-04.01.00.02	AISI-304L
1. 1	Vacuum Cavity with Structural Frame	BC028-04.01.00.01	AISI-304L

<p>APPROVED FOR CONSTRUCTION</p> <p>DATE: 14.08.2017</p> <p>BY: A. Chatterjee</p>	<p>DESIGNED BY: A. Chatterjee</p> <p>DATE: 14.08.2017</p>
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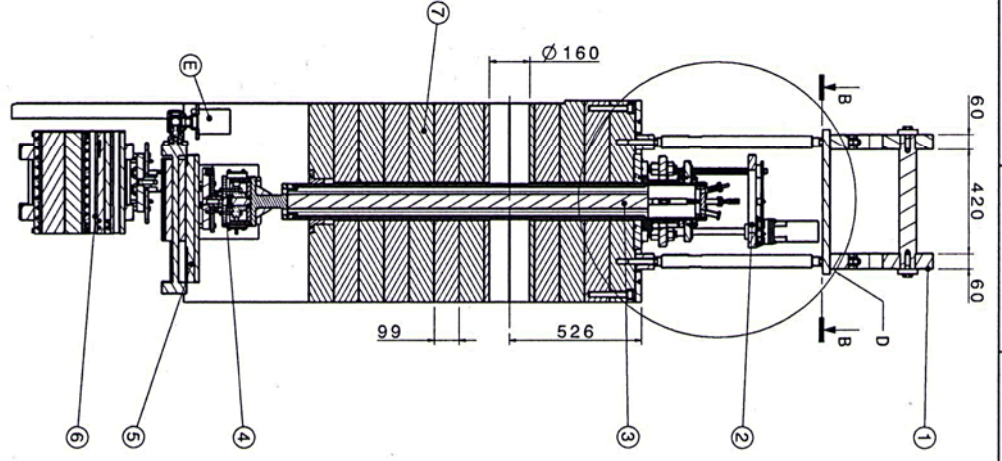
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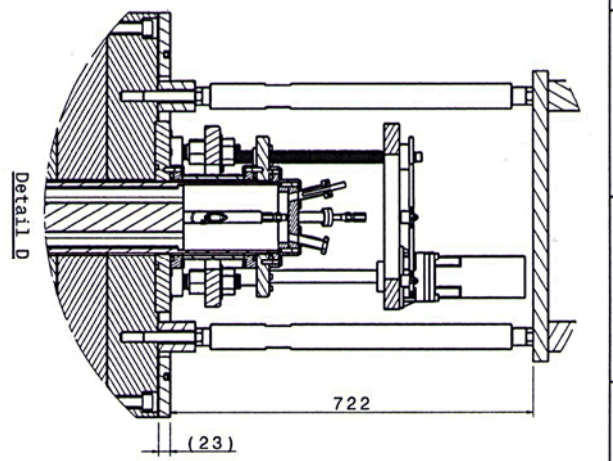
Section view C-C



Section view A-A



Section view B-B



CSIR-CMERI
 GAP 008212-BEAR STOPPER FAIR PROJECT.
 PROVISIONAL DESIGN (REV. 9.4.0.1)
 FOR EXPRESSION OF INTEREST ONLY.
 DDM BY: _____
 APPR BY: _____
 DATE: _____

Amr Kulkarni
 14.12.18

Note:
 E-RADIATION HARDENED MOTOR (STD.)

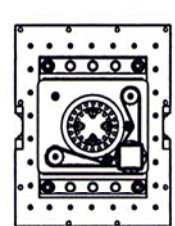
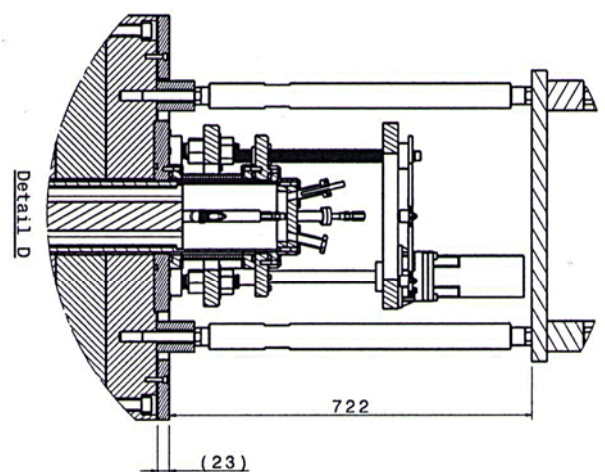
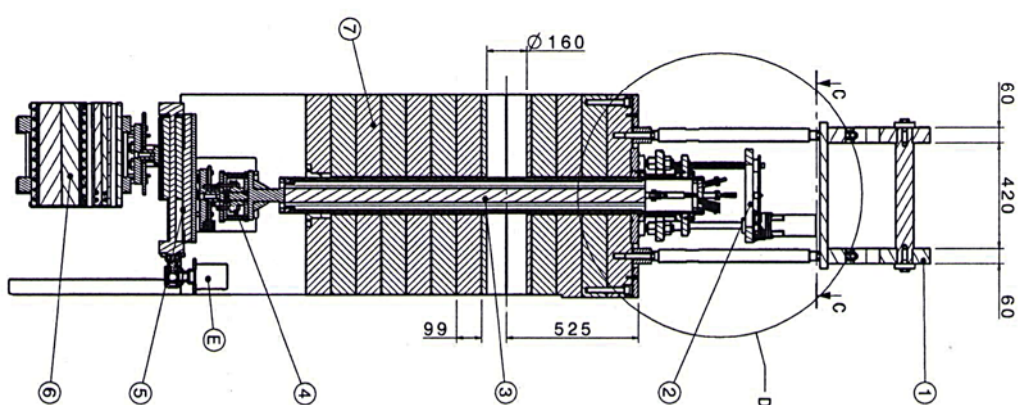
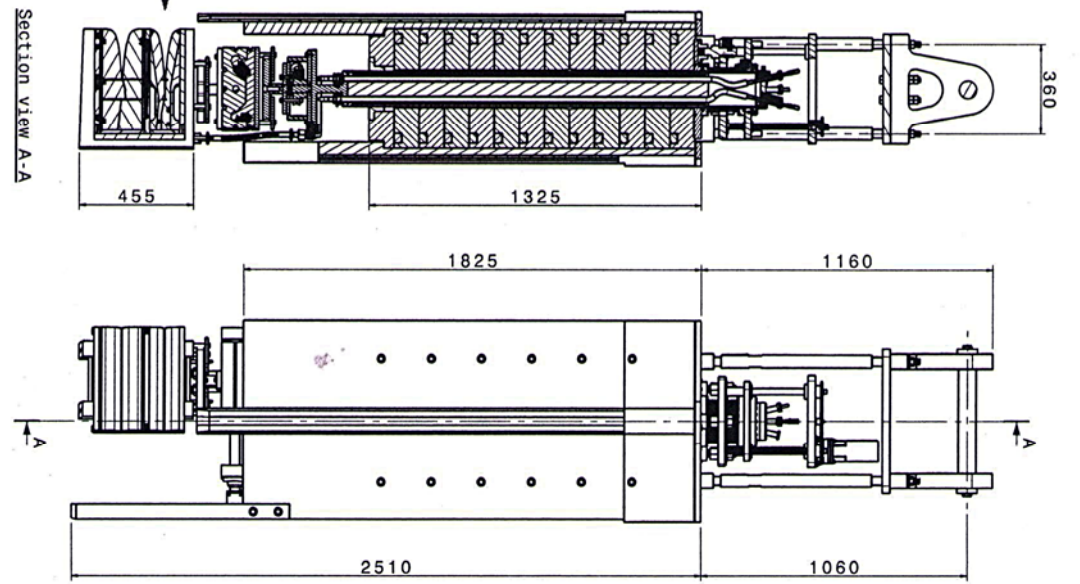
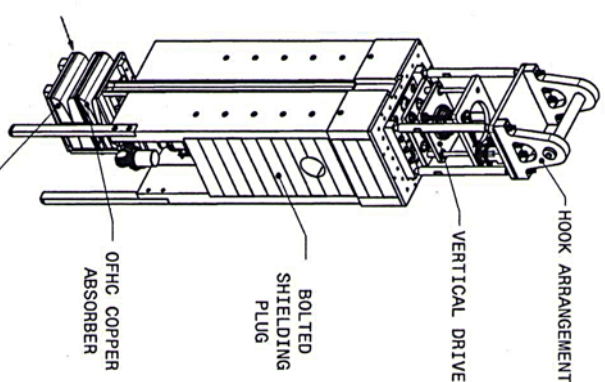
NOTE: Material for (1) Heat Sink and Slow extraction Absorber is OFHC COPPER, (2) Fast extraction Absorber is GRAPHITE SGL R6650, (3) All other parts are of AISI-304L.

Item Qty.	Description	Drawing No.	Material
1	Hook sub Assy.	BC028-04.02.01.00	-
2	Vertical Drive sub Assy.	BC028-04.02.02.00	-
3	Hollow Shaft sub Assy.	BC028-04.02.03.00	-
4	Absorber Swivelling Arrangement sub Assy.	BC028-04.02.04.00	-
5	Linear Drive sub-assy.	BC028-04.02.05.00	-
6	Heat Sink Absorber sub Assy.	BC028-04.02.06.00	-
7	Bolted Shielding Plug sub Assy.	BC028-04.02.07.00	-

Drawn	DATE	CHKD	DATE
_____	14.08.2017	_____	_____
_____	14.08.2017	_____	_____

Top Plug Left Assembly-
 BC3

Project No.	GAP098212
Version	6.0T
Scale	1:1
Sheet	1 of 1



CSIR-CNERI
 GAP 098212-BEAM STOPPER-FAIR PROJECT.
 GSIR-FAIR(GERMANY)/BI-IFCC
 PROVISIONAL DESIGN (REV.9.4.0.1)
 FOR EXPRESSION OF INTEREST ONLY
 DSN BY: _____ DATE: _____
 APPR BY: _____

Handwritten signature and date:
 16.09.17

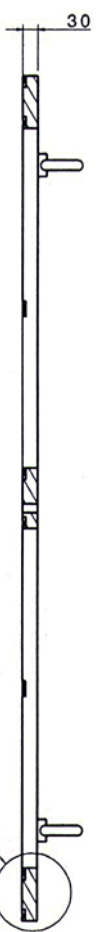
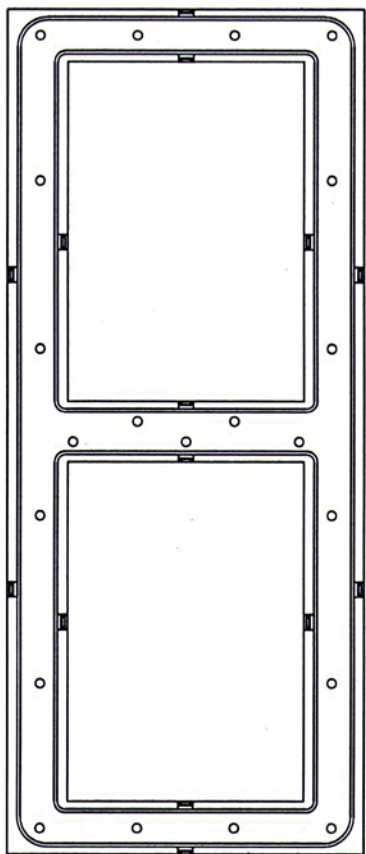
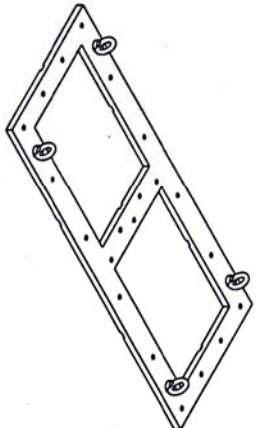
Note:
 E-RADIATION HARDENED MOTOR (STD.)

NOTE: Material for (1) Heat Sink and Slow extraction Absorber is OFHC COPPER, (2) Fast extraction Absorber is GRAPHITE SGL R6650, (3) All other parts are of AISI-304L.

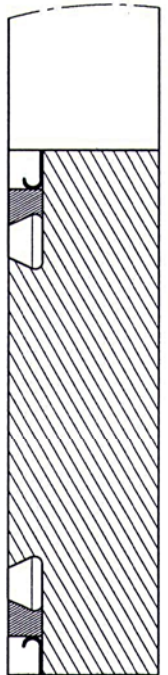
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2.	1	Vertical Drive sub Assy.	BC028-04.03.02.00	-
3.	1	Hollow Shaft sub Assy.	BC028-04.03.03.00	-
4.	1	Absorber Swallowing Arrangement sub Assy.	BC028-04.03.04.00	-
5.	1	Linear Drive sub-assy.	BC028-04.03.05.00	-
6.	1	Heat Sink Absorber sub Assy.	BC028-04.03.06.00	-
7.	1	Bolted Shielding Plug sub Assy.	BC028-04.03.07.00	-

DATE	BY	NAME	REVISION
14.08.2017	A. SURESH	DESIGNER	1
14.08.2017	A. CHAKRABARTI	CHECKER	2

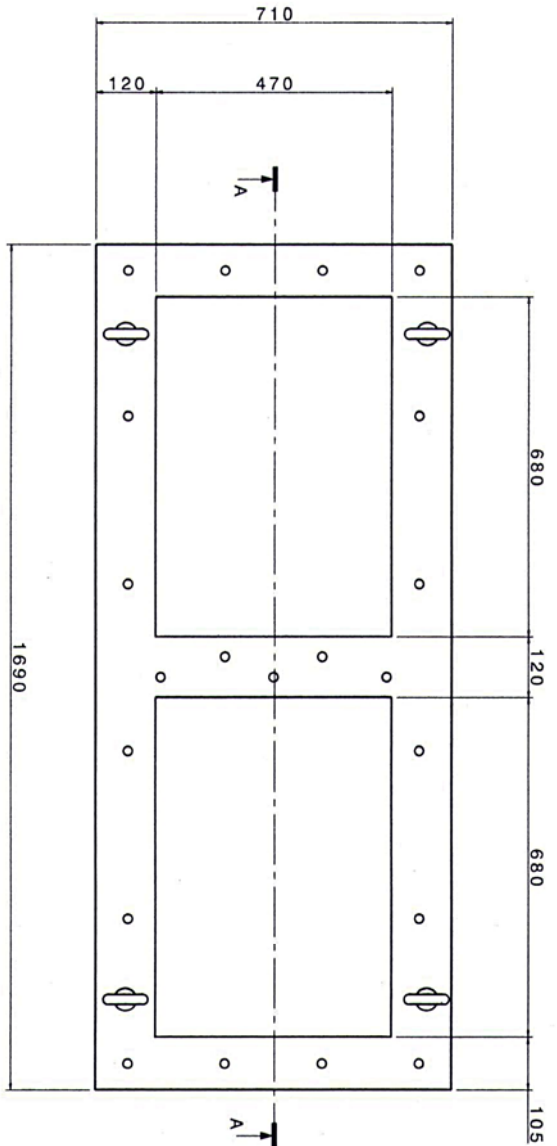
PROJECT NO.	GAP098212
DESIGN NO.	BC028-04.03.00.00
DATE	14.08.2017
SCALE	1:1
SHEET	1 OF 1



Section view A-A



Detail C



CSIR-OMERI
 GAP 000272-BEAM STOPPER FAIR PROJECT.
 DESIGN (DESIGN) BY: ENDO
 PROVISIONAL DESIGN (REV:9.4.0.1)
 FOR EXPOSITION OF INTEREST ONLY
 DSN: B-7
 APPR. BY: _____ DATE: _____

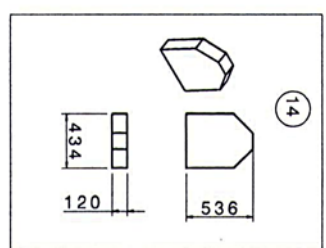
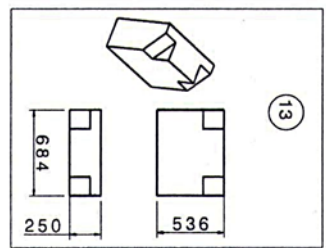
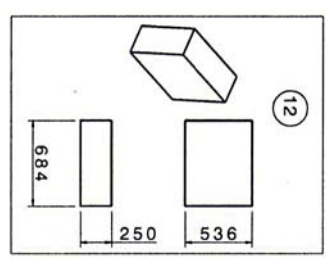
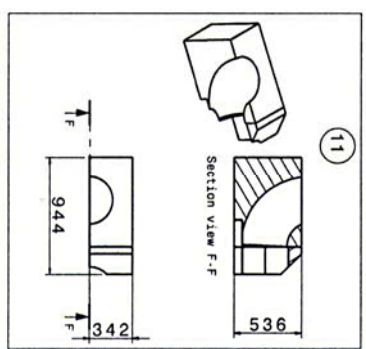
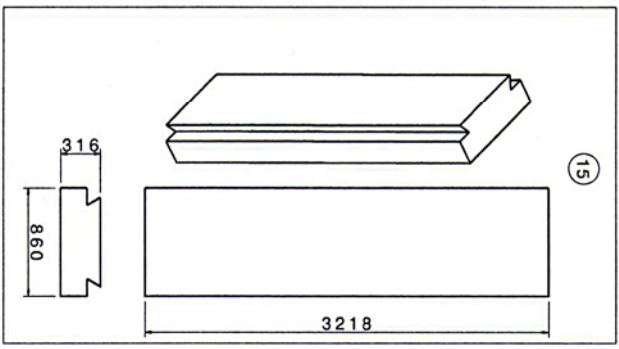
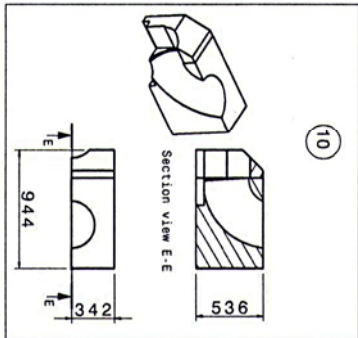
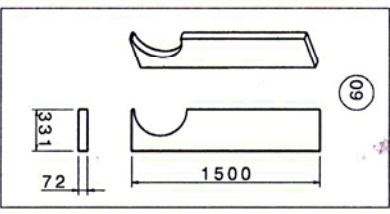
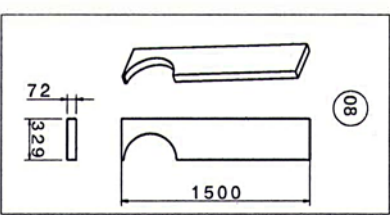
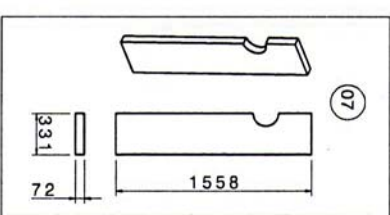
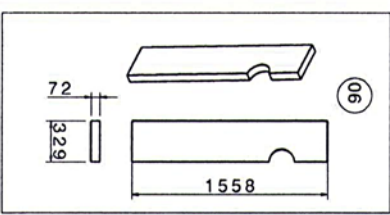
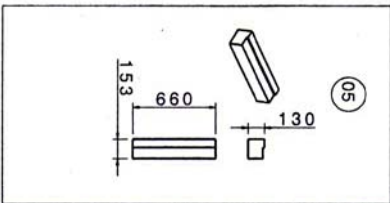
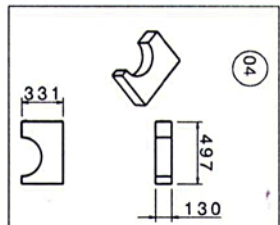
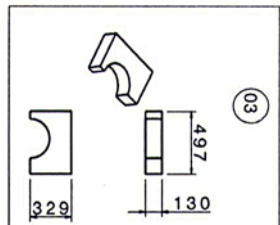
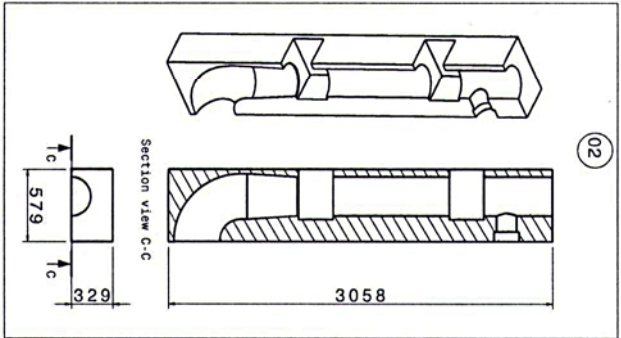
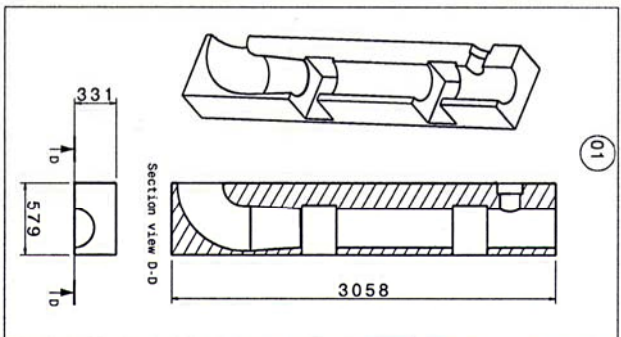
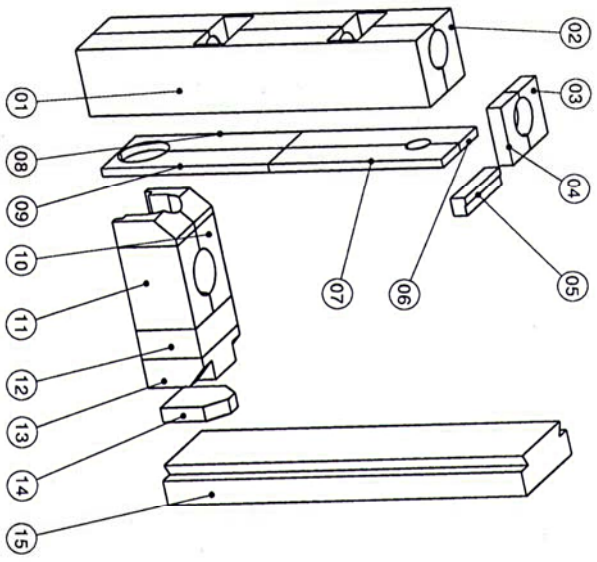
Amal Das
 11/11/2017

ALL SURFACES TO BE MACHINED. $\sqrt{Rz\ 12.5}$

<p>CSIR-CENTRAL MECHANICAL LAB 101A, 100, 27th Mile, Hosur, Bengaluru-560029, INDIA.</p>		<p>PROPERTIES</p>	
<p>Surface finish Ra: 1.25 Rz: 12.5</p>	<p>Material 304L</p>	<p>Part No. GAP098212</p>	<p>Rev. 01</p>
<p>Design ENDO</p>	<p>Check AMAL DAS</p>	<p>Project No. GAP098212</p>	<p>Date 14/08/2017</p>
<p>Checked A. CALVERTER</p>	<p>Date 14/08/2017</p>	<p>Ordering Authority CSIR-OMERI</p>	<p>Part 1 of 1</p>
<p>Approved A. CALVERTER</p>	<p>Date 14/08/2017</p>	<p>Quantity 1</p>	<p>Sheet 1 of 1</p>

Vacuum Flange O-Ring Retainer Assy.

<p>Operating No. EC028-01-04.00-00</p>	<p>Part No. GAP098212</p>
<p>Part 1 of 1</p>	<p>Sheet 1 of 1</p>



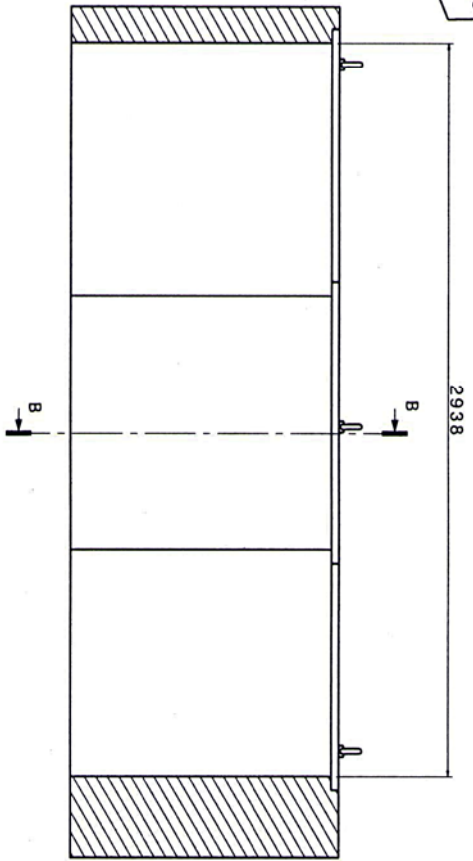
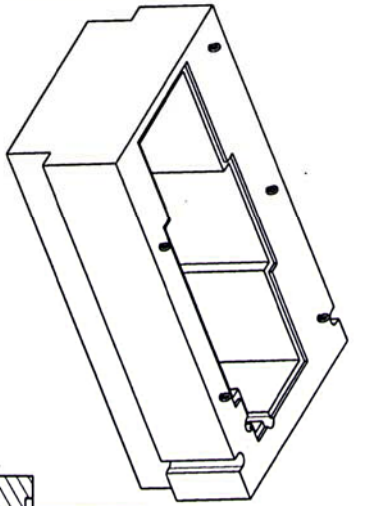
CSIR-CMERI
 GAP 098212: BEAM STOPPER-FAIR PROJECT.
 GSIMFAIR(GERMANY)/BI-IFCC
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 DGM BY: APPR BY: DATE:

NOTE: Standard available hot rolled slabs to be machined and stacked to obtain required shapes.

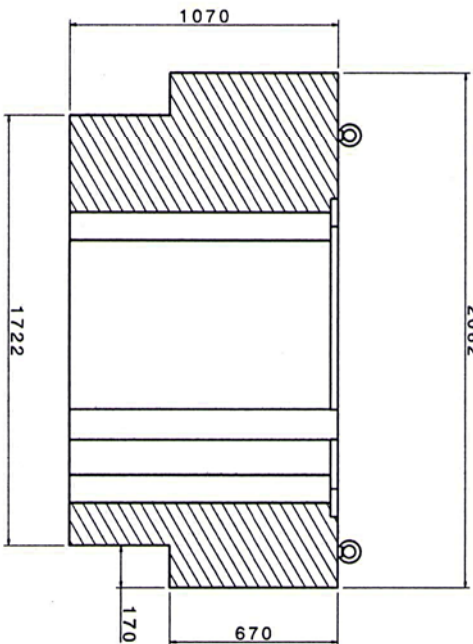
ALL SURFACES TO BE MACHINED. Rz 12.5

Approved by M. S. G. Pillai

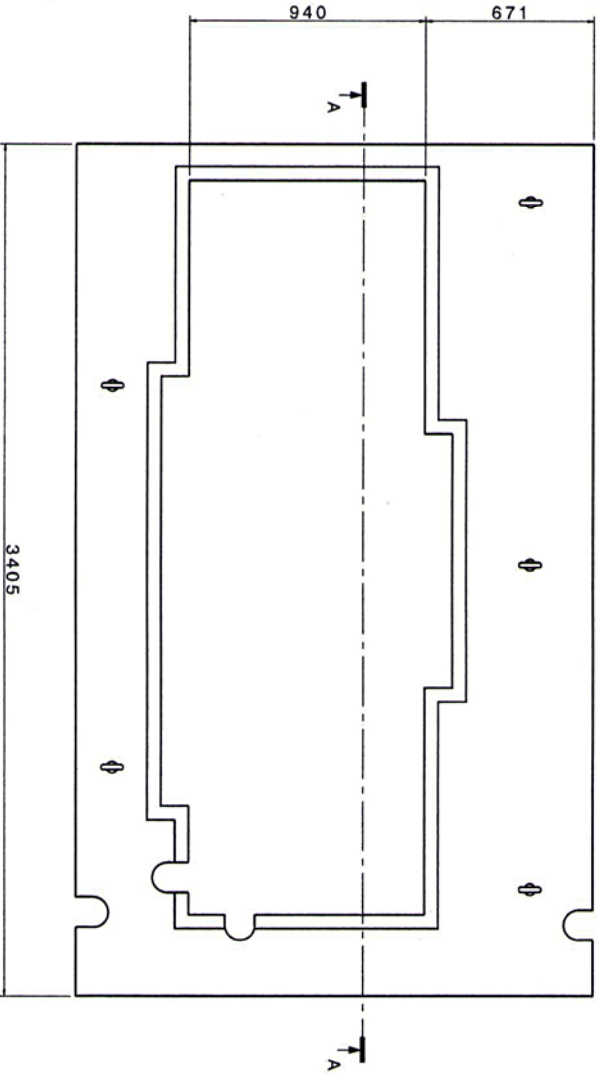
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<p>CSIR-CMERI CENTRAL MECHANICAL WORKS CHANDIGARH-160012, INDIA.</p>	<p>PROJECT NO: GAP098212 DRAWING NO: TS-2062-2011 SHEET NO: 1 OF 1</p>
<p>DATE: 14.08.2017 CHECKED: K. CHATTERJEE APPROVED: M. S. G. PILLAI</p>	<p>OPERATING NO: BCC028-01-05-00-00 PREP. DESK: 14.08.2017</p>
<p>ASSOCIATED SHIELDING BLOCK ASSY.</p>	<p>SCALE: 1:1</p>



Section view A-A



Section view B-B



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 GMP 098212-GEAR STOPPER FAIR PROJECT.
 CSIR-CMERI, GATEWAY, B-1, HEC
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 FOR EXPRESSION OF INTEREST DATE:
 APRN 09/17
 DSR BY: *[Signature]*

NOTE: Standard available hot rolled slabs to be machined and stacked to obtain required shapes.

ALL SURFACES TO BE MACHINED. $\sqrt{Rz 12.5}$

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Project No. 098212 Project Name GEAR STOPPER FAIR PROJECT Project Location CSIR-CMERI, GATEWAY, B-1, HEC Project Start Date 14.08.2017 Project End Date 14.08.2017 Project Manager A. SUNDARAJAN Project Engineer K. CHITRAKUMAR	Drawing No. BC028-05.00.00.00 Drawing Title Shelding Collar Assy. Scale 1:1 Date 14.08.2017 Author A. SUNDARAJAN Checker K. CHITRAKUMAR Approved 14.08.2017 Designated Authority A. SUNDARAJAN
Project No. 098212 Project Name GEAR STOPPER FAIR PROJECT Project Location CSIR-CMERI, GATEWAY, B-1, HEC Project Start Date 14.08.2017 Project End Date 14.08.2017 Project Manager A. SUNDARAJAN Project Engineer K. CHITRAKUMAR	Drawing No. BC028-05.00.00.00 Drawing Title Shelding Collar Assy. Scale 1:1 Date 14.08.2017 Author A. SUNDARAJAN Checker K. CHITRAKUMAR Approved 14.08.2017 Designated Authority A. SUNDARAJAN

