

Government of India
Bhabha Atomic Research Centre
Electromagnetic Applications & Instrumentation Division

Ref: EmA&ID/EMAS/21/12185

Date: 01/11/2021

Sub: Engineering & Technical Support for Buck coil alignment with main coil of superconducting magnet conforming to the technical specification No: EmA&ID/21/02 dated 01/10/2021

Dear Sir/Madam,

1. Quotations are invited for Engineering & Technical support for buck coil alignment with main coil of superconducting magnet as per the technical specification document No: EmA&ID/21/02 dated 01/10/2021.
 2. Bidder shall quote for engineering & technical support for buck coil alignment with main coil of superconducting magnet. There is no FIM.
 3. Taxes and Excise Duties shall be quoted separately. Form AF / H whichever is applicable shall be provided, if required.
 4. **The quotation must reach The Head, Electromagnetic Applications Section by 11th Nov, 2021 and must be sent in a sealed envelope super scribed with the reference number & the due date given above.**
 5. **The quotations shall be sent only through registered post/speed post through Indian postal services.**
 6. The address on the envelop should read:
**The Head,
Electromagnetic Applications & Instrumentation Division,
BARC, Trombay,
Mumbai - 400 085.
(Kind Attn: Shri. Udai Giri Pratap Singh Sachan, SO/D)**
 7. The assembly & thermal conductivity testing shall be carried in the presence of our engineer. The material shall not be dispatched prior to approval by our engineer at bidder's premises. Necessary inspection facilities shall be provided to our engineer during fabrication at bidder's premises.
 8. The bidder shall deliver the finished components after approval by our engineer within 4 weeks from the date of firm work order issued to the bidder. The finished components shall be delivered by the bidder at **Electromagnetic Applications & Instrumentation Division, BARC, Trombay, Mumbai - 400 085.**
 9. Head, Electromagnetic Applications & Instrumentation division reserves the rights to accept / reject any or all quotations without assigning any reason.
 10. Delivery charges if any must be clearly mentioned in the offer. Quotation must also indicate the validity of offer. Quotation must also indicate the GST no and PAN no of the party.
 11. The quotation has to be signed by authorized person with company seal.
 12. Job should be guaranteed against material and manufacturing defects for 1year from the date of supply.
- Encl.: Technical Specification Sheet no:- EmA&ID/21/02 dated 01/10/2021

Udai Giri
(Udai Giri Pratap Singh Sachan)
SO/D, EMAS, EmA&ID

वैज्ञानिक अधिकारी / Scientific Officer
ई एम ए आय डी / EmA&ID
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Bhabha Atomic Research Center
ट्रॉम्बे, मुंबई / Trombay, Mumbai - 400085

Specification for Minor fabrication Work order

Specification no.	Revision no.	Date of Issue	No of pages
EmA&ID/21/01	0	01/10/2021	03

Engineering & technical support for buck coil alignment with main coil of superconducting magnet

This specification specifies the requirements for engineering and technical support for buck coil alignment with main coil of superconducting magnet. Fabrication shall be carried out strictly as per specifications as detailed in this document.

Supplier shall arrange required raw material/ facilities for manufacturing and testing. Supplier shall be qualified on the basis of technical evaluation. (Refer Para 9.0). The brief description of contents of this tender specification document is as described below.

Para 2.0 gives intended application and operating service conditions.

Para 3.0 gives the details of deliverables.

Para 4.0 gives the general description details.

Para 5.0 gives engineering requirements.

Para 6.0 gives the requirement of raw material procurement.

Para 7.0 gives the inspection and testing.

Para 8.0 gives the requirements of packaging and safe delivery.

Para 9.0 gives the requirements of supplier qualifications.

Para 10.0 gives the requirements of price and delivery schedule.

2.0 INTENDED APPLICATION AND OPERATING SERVICE CONDITIONS

1.5 Tesla superconducting magnet is a multi-coil structure. It consists of 6 main coils and two buck coils. The purpose of buck coils is to reduce stray fields. The buck coil are the big coils and they are housed on the outer diameter of the main coils. To achieve the required uniformity in the magnet, buck coils needs to be aligned with the magnet main coil.

3.0 GENERAL DESCRIPTION

- a) 1.5 Tesla superconducting magnet consists of 6 main coils and two buck coils. The buck coils inner diameter is 620mm. Both the buck coils are supported on the main coil mandrel. The distance between the buck coils is 135mm. Both the buck coils are fitted with the help of aluminum spacers which are precisely machined and have tolerances in the range of 100 microns (max).
- b) The buck coils are also connected to each other with the help of high RRR cooling plates. Buck cooling plate is internally connected to main cooling plate.
- c) Cryocooler extenders connect the main cooling plates to the pulse tube cryocooler cold heads.
- d) The drawings of the complete system shall be shared with the supplier after awarding of the work order.
- e) Z axis of the shield coil need to be aligned with the main coil bobbin with in 0.2°
- f) Parallelism of both the faces shall be maintained within 10 microns.
- g) Commercially available tools based on time of flight measurements shall only be used for the alignment

- h) Suitable jigs and fixtures for buck coil mounting and sliding have to be developed by the supplier.
- i) After alignment, the complete assembly shall be inspected on CMM machine. The points/entity of inspection shall be decided by the engineer in charge which may vary between 300 to 500. As the magnet coil bobbins are delicate in nature, therefore CMM inspection has to be carried on site. Supplier has to arrange all the necessary hardware for the inspection.
- j) If the inspection report is found negative, supplier has to carry out alignment activities again and again.
- k) Manpower required for alignment is completely supplier's responsibility.
- l) During alignment process no components shall get damage.

ENGINEERING REQUIREMENTS APPROACH

3.1 All the alignment surfaces shall be cleaned with iso propyl alcohol only.

3.1.1 The spacers between the buck coils shall be made of Al-1100 only.

4.0 RAW MATERIAL PROCUREMENT

The following materials shall be used

4.1 Cryogenic grade Al-1100 for spacers.

4.2 Vacuum and cryogenic grade Lubricants for alignment purpose.

5.0 INSPECTION AND TESTING

5.1 Test reports generated from AT-403 and CMM inspection shall be used for finalization.

6.0 REQUIREMENT OF PACKAGING AND SAFE DELIVERY

6.1 The finished/rectified components boards shall be packed carefully before dispatch. Utmost care shall be taken during card installation.

6.2 **Protective covers:** Supplier shall make necessary arrangements for all components using a suitable PVC cover or moulded thermocol. Connectors shall be provided extra cushioning during transportation.

7.0 REQUIREMENTS OF SUPPLIER QUALIFICATIONS

7.1 **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.

8.0 REQUIREMENTS OF PRICE AND DELIVERY SCHEDULE

10.1 The supplier shall provide overall cost with delivery schedule.

Uday Giri