

Brookhaven National Laboratory  
 Brookhaven Science Associates  
 Collider-Accelerator Department

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**Title: Statement of Work for EBIS HEBT Dipole Magnets**

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## 1.0 General

1.1 Scope. Brookhaven National Laboratory (BNL) will purchase two laminated dipole magnets for installation in the Electron Beam Ion Source (EBIS) injector system. Final selection of the vendor will depend on technical competence, cost and schedule. Delivery of the magnets on or before February 01, 2008 is required and should be strongly considered when responding to this RFQ.

1.2 Purpose. The purpose of the SOW is to define the requirements for project management, schedule, submittals, delivery and QA requirements that are applicable to the accompanying RFQ, and in the execution of the subsequent PO. The SOW is not intended to impose unreasonable requirements on the seller. The SOW serves to protect the interests of the seller and BNL in the execution of the PO. After issuance of the RFQ and prior to awarding a PO, all inquiries regarding the RFQ shall be directed to the BNL Division of Contracts and Procurement. After the award of the PO, all technical questions should be addressed to the cognizant engineer specified by the BNL Division of Contracts and Procurement. Questions regarding Contract Terms and Conditions, Price, and Delivery shall be directed to the BNL Division of Contracts and Procurement.

1.3.0 Responsibilities. The agreement will consist of cooperative participation of BNL and the seller in the design of the magnets. The responsibilities of each are outlined below:

### 1.3.1 Seller's Responsibilities

1. Mechanical design and fabrication of the magnets, magnet stands, manifolds and magnet coils.
2. Design and fabrication of all tooling.
3. Provide lamination steel magnetic properties and packing factor.
4. Status reports.
5. Dimensional measurement of magnets.
6. Packaging and delivery to BNL.

### 1.3.2 BNL's Responsibilities

1. Provide magnet core shape based on computer simulations.
2. Adjustment of edge chamfers based on steel properties and packing factor.
3. Approval of Sellers designs prior to fabrication.

## 2.0 Definitions

The following terms and abbreviations are used throughout this Statement of Work and Technical Specification.

<u>Term or Abbreviation</u>	<u>Definition</u>
BNL	Brookhaven National Laboratory
QA	Quality Assurance
RFQ	Request For Quote
CAD	Collider Accelerator Department
SOW	Statement of Work
PO	Purchase Order
Seller	Company or Vendor Awarded a PO
Magnets	EBIS HEBT Dipole Magnets

## 3.0 Documents and Standards

3.1 The following documents are an integral part of the statement of work (SOW):

3.1.1 Specification CAD-1194, "Specification for EBIS HEBT Dipoles"

3.1.2 BNL-QA-101, "BNL Seller Quality Assurance Requirements."

3.2 Revisions. Any specification and/or SOW revisions shall be documented and signed by both parties. Cost changes resulting from revisions shall be recorded and approved in writing by both parties. The seller is responsible for using the most current revision of the technical specification and statement of work.

## 4.0 Capability of Performance

The Buyer shall impose the following general requirements to minimize the technical and schedule risk:

1) The Buyer will solicit, as a minimum, vendors capable of complying with this procurement's technical specifications and this SOW. The Buyer reserves the right to perform source inspections, on mutually agreed terms, of any bidder, considered responsive to the RFQ, to verify capabilities of potential sellers.

2) The vendor awarded a contract to fabricate the first article and production magnets must have extensive manufacturing capabilities and experience in production of custom magnets. Bidders who do not currently have the capability or experience must explain in their quotation how they intend to acquire the needed capability and experience in a low risk and timely fashion to support the requirements this procurement.

3) Vendors are encouraged to submit any recommendations to improve or simplify the design and to reduce cost. Justification shall be provided along with each recommendation. Each recommendation shall be considered by BNL for inclusion in the RFQ. All recommendations must be submitted to the Buyer at least two weeks before the Bid Due Date. If any recommendations are incorporated, all bidders shall be provided an

amendment to this SOW that includes those incorporations.

## 6.0 Submittals

6.1 Schedule. A preliminary schedule with major milestones shall be submitted within 30 days of the P.O. date. Any potential program delays should be identified at this time. The schedule shall identify all aspects of the work from analysis and design through final delivery to BNL, including, but not limited to, the following:

1. Preliminary design
2. Preliminary design review
3. Final manufacturing drawings and specifications
4. Final Design Review
5. Manufacture of components and final assembly
6. Factory testing
7. Delivery of Magnets to BNL

6.2 Preliminary Design. The Seller shall submit three copies of the preliminary design documents in hard copy 2 weeks prior to the Preliminary Design Review (See 7.0). The preliminary design shall include specifications, analyses, and preliminary assembly drawings of the magnets. The preliminary drawings shall include, as a minimum, an assembly drawing of the magnets for review and evaluation, drawn to scale, showing basic configuration and all essential components. The properties of the lamination steel and packing factor will also be supplied. A configuration drawing of the magnet support stand shall be included.

6.3 Final Design Documents. The Seller shall submit three copies of the final design documents in hard copy within 3 months after the P.O. date which includes the following:

1. Manufacturing and assembly drawings, including the top assembly drawing(s), and detail drawings for the magnets showing lamination assembly, coils, coil terminations, water manifolds, and support stand.
2. Technical specifications.
3. Spare parts list, identifying standard and non-standard replacement parts and quantities.
4. Power supply specifications.
5. Final list of utility requirements. Water cooling pressure, temperature, and flow requirements.

Upon delivery of the magnets to BNL, three hard copies of updated, as-built manufacturing drawings and specifications shall be submitted. At this time computer files of the drawings shall be provided as AutoCAD 2000 .dwg or .dxf compatible. A 3D drawing of the full assembly shall be provided, preferably as a simplified

representation or 'shrinkwrap' file compatible with (or can be imported into) ProEngineer, AutoCAD Desktop, or Inventor.

## 7.0 Design Reviews

Preliminary Design Review. Within 45 days after the P.O. date a review of the preliminary design will be conducted. The review will consist of a submission of the preliminary design documents to BNL. Within two weeks BNL will submit comments to the Seller.

## 8.0 Inspections and Tests

8.1 'In Process' Testing and Inspections. Witnessing of inspection, testing, or manufacturing milestones given in the manufacturing plan may be conducted at the discretion of BNL.

8.2 Rework and Repairs. The following definitions apply:

1. Repair - Restoration of an item to conform to the manufacturing drawing or an acceptable condition through BNL approved repair procedures (e.g. welding).
2. Rework - The completion or correction of an item to a conforming condition using conventional operations, which are part of the normal manufacturing process. Notification of rework is not required.

If repairs are required to any component during manufacturing, the process shall stop and BNL shall be immediately notified and plans for repair shall be submitted. BNL may at their discretion ask for retesting or additional information to support the planned repair. Proposals for repair shall include testing the effectiveness of the repair and for evaluating potential damage to the existing work. No proposed repair shall be initiated without approval of BNL, and no repair shall be considered successful without inspection and approval by BNL.

8.3 Dimensional Inspection. At certain stages of the manufacturing process the seller will inspect and record critical magnet core dimensions. The dimensions to be inspected are given in Specification CAD-1194. The records of the dimensional inspections will be supplied to BNL 4 weeks prior to the Pre-shipment testing.

8.4 Pre-Shipment Testing. Prior to shipment to BNL, the magnets will be tested at the Seller's facility in accordance with the test plan. Performance criteria will be demonstrated and recorded. BNL shall be provided 4 weeks notice prior to the tests to witness all or a subset of this testing

## 9.0 Delivery.

Delivery shall be made at Brookhaven National Laboratory, Upton, Long Island, New York. The Seller shall coordinate delivery with Collider Accelerator Department personnel.

## 10.0 Shipping

The seller shall design and fabricate packaging to protect against loads and environments that may be incurred during handling and shipment. Wooden containers that prevent impact damage and bending shall be used. System components shall be blocked, braced, and protected from damage using polymer blocks, 'foam-in-place' technology, or other suitable means. Two sets of recording accelerometers rated at 2 and 5 g's for three directions of motion shall be firmly attached to each susceptible truck package. The packaging shall include lifting points suitable for lifting the system skid from above as well as provisions for lifting with a fork truck. The seller shall be responsible for procuring all permits, etc. necessary for the delivery of the magnet system to the BNL's facility.

## 11.0 Quality Assurance

11.1 The Quality Assurance applicable requirements of BNL-QA-101, BNL Seller Quality Assurance Requirements are listed in Specification CAD-1194, Section 4.0.

11.2 Subcontractors. The Seller is responsible for the performance of its subcontractors. BNL may inspect the facility of any subcontractor at BNL's discretion. The Seller is responsible to provide and control all specifications and drawings to be used by subcontractors. This technical documentation shall be available for review by BNL if requested.

11.3 Responsibility for Inspections and Tests. The Seller shall be responsible for the performance of the Pre-Shipment Tests and all inspections. The Seller shall provide the space, personnel, and test equipment to conduct the Pre-Shipment Tests and inspections. The Pre-Shipment Tests shall be performed at the Seller's site or other facilities acceptable to BNL. The tests specified are the minimum required by BNL and are not intended to replace any tests and inspections normally performed by the Seller to assure conformance of the magnets to the specification.

11.4 Records. Records of QA documentation, visual, dimensional and other in process inspections, tests, chemical treatment and cleaning procedures, plating operations, documentation of manufacturing irregularities and repairs, etc. shall be retained and made available for a period of one year after delivery of the magnets.