



Hall C NPS Sweeper Magnet Yoke

TECHNICAL SPECIFICATION

67508-00004-SPEC

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1.0 INTRODUCTION

1.1 Purpose

The Thomas Jefferson National Accelerator Facility (Jefferson Lab) Hall C Neutral Particle Spectrometer (NPS) requires a dipole magnet to be installed in the Experimental Hall C facility. This Statement of Work covers the requirements for the NPS Sweeper Magnet Yoke.

1.2 Scope of Work

- 1.2.1 The subcontractor shall, unless otherwise noted, furnish all labor, materials, equipment and facilities to fabricate, test, inspect and deliver the NPS Sweeper Magnet Yoke in accordance with this specification and the specified drawings. Jefferson Lab will appoint a Subcontracting Officer Technical Representative (SOTR) upon award of this contract. Any deviation from this specification and/or specified drawings is to be submitted to the SOTR for approval. The SOTR will respond within 10 working days.
- 1.2.2 Jefferson Lab reserves the right to have its SOTR and/or Subcontracting Officer witness any or all manufacturing steps, tests and inspections. Jefferson Lab is to be notified 10 working days prior to any testing.
- 1.2.3 Upon receipt, Jefferson Lab will inspect the magnet yoke. Acceptance will be defined by full compliance with this specification, drawings and contract agreement.
- 1.2.4 The subcontractor shall supply all documentation required in this specification.

2.0 REQUIREMENTS

2.1 Dimensional Control

The NPS Sweeper Magnet shall conform to the geometry and tolerances stated on the drawings and within this specification.

2.2 Material and Parts

2.2.1 The subcontractor may choose to fabricate the NPS Sweeper Magnet Yoke from material supplied by Jefferson Lab and/or new material as defined on the drawings and within this specification. No alternate sources, types or methods are allowed to be used without written permission from the Jefferson Lab Subcontracting Officer's Technical Representative (SOTR).

2.2.2 New material Steel Chemistry:

Impurity	Wt. %
Carbon	0.04 – 0.08
Manganese	0.25 – 0.45
Phosphorus	≤ 0.04
Silicon	≤ 0.30
Aluminum	≤ 0.01
Nitrogen	≤ 0.012
Oxygen	≤ 0.035
Sulphur	≤ 0.025
Copper	≤ 0.15
Nickel	≤ 0.15
Chromium	≤ 0.09
Molybdenum	≤ 0.07

Lower carbon content is acceptable.

2.2.3 No magnetic chucks, lifting devices or degaussing coils shall be used in the handling, fabricating and processing of the magnet at any point in the manufacturing, assembly or transportation process.

2.2.4 Materials shall be rejected in the event that they have been shipped or stored improperly such that contamination or degradation has taken place.

- 2.2.5 All items listed by brand name are appended as “or Jefferson Lab approved equivalent”.

2.3 Annealing of Magnet Steel

All yoke pieces shall be fully annealed following rough cutting to shape. Rough machining is to be done before annealing, and final machining after annealing. In order to assure optimum magnetic performance, Jefferson Lab will use the following annealing cycle for a material similar to AISI-1010:

- a. Heat piece to 1650 °F at a rate of 100 °F per hour.
- b. Hold piece at 1650 °F \pm 50 °F for one hour per inch of thickness.
- c. Furnace-cool piece to 600 °F at a rate not to exceed 50 °F/hour, then air cool.

2.4 Yoke and Assembly

- 2.4.1 All surfaces and tapped holes shall be cleaned at stages of fabrication such that dusts, oils and other contaminants are removed prior to final assembly and preparation for delivery to Jefferson Lab.
- 2.4.2 The assembled magnet shall be dimensionally inspected and shown to be in conformance with dimensions of the stated drawings.
- 2.4.3 All parts are to be finished for safe handling. Remove all burrs and sharp edges. Surfaces in contact with coils are to be finished to prevent damage to the coils.
- 2.4.4 Final machining of the yoke pieces shall be such that work hardening is limited to less than 0.05 inches below the yoke surface.
- 2.4.5 The completed yoke assembly shall be cleaned, masked, primed and painted as noted on the assembly drawing. All assembly hardware and all holes shall be masked during painted. All unpainted surfaces are to be covered with a heavy duty rust inhibitor.

3.0 INSPECTION AND TESTING

- 3.1** Vendor shall document all material, dimensional and testing inspections during the manufacturing process in a quality control form. All results are to be supplied to Jefferson Lab on the quality control form.
- 3.2** The subcontractor shall perform detailed dimensional inspections on the yoke assembly during the manufacturing process to provide proof of compliance to the required tolerances. A report shall be submitted to the JLAB SOTR documenting these dimensional inspections for JLAB approval.

4.0 SHIPPING

- 4.1** The subcontractor shall package the magnet suitable for ground transportation. This shall include measures to protect the magnets from damage in transit and from weather during transit and outdoor storage. Crates or pallets shall be provided such that handling can be done with slings from overhead cranes and forklift transport.
- 4.2** The package shall be marked with the addressee, shipper, contract number, contents and shipping weight.
- 4.3** A complete copy of manufacturing records (quality control and test results) shall accompany the magnet assembly.
- 4.4** Subcontractor shall arrange and be responsible for the safe delivery of the magnet assembly to Jefferson Lab.

5.0 QUALITY ASSURANCE PROGRAM REQUIREMENTS

The subcontractor shall have written QA procedures that cover at least all of the below items. This QA process and procedure shall be described in a written manual or plan and shall be subject to review and approval by the Jefferson Lab Technical Representative and Jefferson Lab QA Department prior to start of work. This review will require fourteen calendar days after receipt of documents by Jefferson Lab. The manual or plan shall, as a minimum, cover the following requirements.

5.1 Organization

The subcontractor's organization, to be represented on an organizational chart, shall demonstrate that personnel responsible for quality assurance shall have sufficient authority and independence to identify quality problems, verify conformance of supplied items to specified requirements, control nonconformance and obtain satisfactory resolution of conflicts involving quality.

5.2 Scope of Quality Assurance Activity

The offeror shall demonstrate that a Quality Assurance Program that the offeror and subcontractor have utilized will be effective in all phases of the project. This shall include design, procurement, manufacturing, inspection, installation and test. There shall be hold points in the subcontractor's manufacturing plan for required JLAB witness inspections and a minimum of 10 days notice required for all JLAB witness inspections.

5.3 Procurement Control

The offeror shall prepare a manufacturing plan that will include milestones. This plan shall demonstrate the offeror's ability to meet the schedule required by Jefferson Lab. This plan shall require Jefferson Lab approval prior to award of subcontract. This plan must address the specific materials inventory control and traceability of materials.

5.4 Document Control

The subcontractor's Quality Assurance Program shall provide for a system of distribution and control of approved engineering and procurement documents (including specifications, drawings, CAD files, procedures, purchase orders, and other critical documents) as well as changes thereto. Such a system shall provide for control of superseded or voided documents by such means as recall, clearly marking as "VOID", or other effective means of assuring that superseded documents are not inadvertently used.

