



Aimants pour accélérateurs de particules
Magnets for particle accelerators

PRICE PROPOSAL
N° A811/0921-A

MIT – Bates Laboratory
21 Manning Road
Middleton MA 01949
USA
For the attention of Mr Ernie Ihloff

Vannes on the 5th February 2009

Y/Ref.: JLAB Dipoles Compton Area
O/Ref.: DD/A811-0921-A

Dear Sirs,

In answer to your enquiry, please find our proposal for the delivery of magnets in accordance with the enclosed specification.

Technical description

See the attached documents rev. A (point 3.1 and 3.2 are modified).

Prices

Our prices for these magnets are as follow :

<u>Item</u>	<u>Ref.</u>	<u>Qty</u>	<u>Unit Price (\$)</u>	<u>Total Price (\$)</u>
Dipole Compton area	292111MIT0001	4	49.770,-	199.080,-
Design and tooling	292111MIT9000	1	12.940,-	12.940,-
TOTAL				212.020,-

All other conditions from our order A811/0921 dated 21st November 2008 are unchanged.

We are at your disposal for any complementary information you may need and we remain,

Very faithfully yours.

J.L. LANCELOT
Managing Director



This document comments, precises and if necessary amends the customer specification MIT-Dipole magnets for JLAB Compton area rev 1.0.

General Sigmaphi presentation

Sigmaphi is a 10 M\$ company specialized in magnets for particle accelerators. It has been supplying them for more than 25 years to most major labs all around the world (more than 80% is exported). It has all necessary experience, qualified engineers and equipments, to make any type of magnet, including taking the responsibility of the magnetic performance.

A few references in North America:

- Design, manufacture and measures of 2* EBIS 10 tons dipoles for BNL (in process)
- design and manufacturing of spectrometer (magnet, vacuum chamber, power supply) for ANL (Sigmaphi responsible of the magnetic performance)
- design and manufacturing of spectrometer (magnet, vacuum chamber, power supply) for ORNL (Sigmaphi responsible of the magnetic performance)
- manufacture of magnets for SLAC, Triumf

We made several contracts for light sources

- all SR multipoles for CLS, including chamfer optimization
- SR sextupoles and booster dipoles for Soleil
- SR dipoles and transfer line magnets for Diamond
- booster dipoles and transfer line magnets for Alba

And made many contracts with CERN, GSI, PSI...

See a reference list in appendix

We have increased over the years our capacity and skills in 3D design and magnetic measures in order to be able to be responsible of the end result, the magnetic performance. We have 3 engineers trained on Tosca, and built to performance represents today more than 50% of our contracts.

We also believe that it makes sense that the manufacturer be responsible for the magnetic performance, and propose these measurements in option.

This is based on our experience, but it can be modified as requested.

All processes take place in our 2500 m² factory in Vannes (South Brittany, France), except lamination stamping and machining, subcontracted to suppliers approved by our quality system

Sigmaphi has been ISO9001/2000 certified since 2003.

All our processes and equipments are maintained up to date and regularly audited.

A quality plan will be issued at the beginning of the contract, based on the attached manufacturing plan.



There is no specific challenge for this contract, the products being very similar to products we make very regularly.

We attached in appendix several documents:

- a reference list
- our equipment list
- our organization chart
- our magnetic design and measurement capabilities

Analysis of the specification

Clauses not listed here are accepted as they are.

- 1.2.2 A quality plan will be issued after contract review, based on the attached model.
- 3.1 Steel is AISI1006, and comes from the same heat.
A control report for the steel will be delivered
- 3.2.1/3.2.2 We could not find annealing under vacuum at a reasonable price being given the size of the blocks .
We then included in our proposal a normal annealing.
- 3.2.6 Interface surfaces and unpainted surfaces will be protected by our standard rust inhibitor.
- 3.3 A standard control plan is attached. It will be completed and blank control reports will be submitted for approval before manufacturing starts
- 4.3.2.3 Beyond what is recommended by the manufacturer, processes for the resins need to be validated, and also optimized. Using the same enables to optimize this curing process, and also avoids the risk of not using the proper curing cycle.
We then standardized our resin and have been using Araldite F905 for more than 10 years, for all our magnets to all labs.
It has a good radiation resistance ($5 \cdot 10^9$ rad). Technical data is attached.
- 4.3.4 We use Silfos 5283
- 4.4.6.1 Our brazing procedure is attached
- 4.6.2 The coil is placed in the mould, both are heated and put under vacuum.
This allows a better drying of the coil and to test mould airtightness.



4.9.3 We plan to mould the trim coil with the main coil. This also ensures a better cooling

4.1 (this seems to be a wrong numbering) Quality plan
Sigmaphi has been certified ISO 9001/2000 since 2003.
All what is required is part of our standard quality processes