Procurement Strategy

Dipoles D1
Quadrupole Q8
Corrector C8

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1. Introduction

1.1 Purpose of the document

This document describes the strategy planned to organize the procurement and construction of the dipole magnets of the family D1, of the quadrupole magnets of the family Q8 and the corrector magnets of the family C8.

1.2 Definitions, acronyms and abbreviations

Acronym	Explanation
A2T	Accelerator-To-Target
CAD	Computer Aided Design
CDR	Critical Design Review
C5	Corrector Magnet type 5
C6	Corrector Magnet type 6
C8	Corrector Magnet type 8
DmpL	Dump Line
D1	Dipole Magnet type 1
Elettra	Elettra – Sincrotrone Trieste S.C.p.A.
ESS ERIC	European Spallation Source ERIC
FAT	Factory Acceptance Test
FE	Finite Element
FEM	Finite Element Method
HEBT	High Energy Beam Transport
HBL	High-Beta Linac
IKA	In-Kind Agreement
IKC	In-Kind Contribution
IKRC	In-Kind Review Committee

INFN	Istituto Nazionale di Fisica Nucleare
Linac	Linear Accelerator
LWU	Linac Warm Unit
Magnets	This item corresponds to the product contribution of the Partner. It is an element of the ESS Product Breakdown Structure
MBL	Medium Beta Linac
P&ID	Literally 'Piping and Installation Diagram' or 'Piping & Instrumentation Drawings' but P&ID may also refer to electrical circuit diagrams, logic diagrams, flow diagrams and any other such design descriptions as schematic representation.
PBS	Product Breakdown Structure
PDR	Preliminary Design Review
QA	Quality Assurance
QC	Quality Control
Q5	Quadrupole Magnet type 5
Q6	Quadrupole Magnet type 6
Q7	Quadrupole Magnet type 7
Q8	Quadrupole Magnet type 8
RAMI	Reliability, Availability, Maintainability, Inspectability
SAR	System Acceptance Review
SAT	Site Acceptance Test
SoW	Scope of Work
SPK	Spoke Linac
TRR	Test Readiness Review
WBS	Work Breakdown Structure
WP	Work Package
WU	Work Unit

1.3 References

- Trilateral In-kind Contribution Agreement between European Spallation Source ERIC and Istituto Nazionale di Fisica Nucleare and Elettra – Sincrotrone Trieste S.C.p.A. – Document Number ESS-0093299
- Schedule AIK2.1 – MAGNETS FOR THE ESS LINAC (Version2) to the Trilateral In-kind Contribution Agreement between European Spallation Source ERIC and Istituto Nazionale di Fisica Nucleare and Elettra – Sincrotrone Trieste S.C.p.A.

2. Scope of Work

The scope of the work subject of the present document includes the provision of the magnets listed in table 1. These magnets and their specifications are described in the relevant documents.
Reference is made to the time schedule reported in the Schedule AIK2.1.

Type	***Description***	***Quantity***
D1	Dipole Magnet for HEBT and A2T	2
Q8	Quadrupole magnet for A2T	6
C8	Dual-plane corrector magnet A2T	4

Table 1: Magnet types and quantities

INFN has been appointed by the Italian Government as the Representing Entity for Italy in ESS-ERIC. In accordance with art. 9, paragraph 4, of the European Regulation n. 723/2009 and the Statute of ESS-ERIC, the Representing Entity is entitled to exercise the rights and fulfillment of obligations deriving from Italy's participation in ESS-ERIC.
According to the Agreement signed between INFN, Electra and CNR on 13 July 2015, it was agreed that INFN, as an entity admitted to tax exemptions for transactions related to the Italian participation in the ESS project, will take over the financial responsibility for the implementation of in-kind contributions of Italy, including the conduct of public procedures that may be necessary.

3. Procurement

Magnets D1, Q8 and C8 will be outsourced to industry.

Procurement of all Magnets D1, Q8 and C8 will be made in the frame of the same procurement procedure to reduce the number of call for tenders, thus saving time.

The procurement will be implemented according the trilateral Agreement between

As stated in Schedule AIK2.1:

- Elettra
  - Performs the development of the required technical specifications
  - Performs the construction of the magnets
  - Performs, defines and documents required QA/QC activities
  - Performs the required verification and validation of the magnets
- INFN
  - Performs development and compilation of required documents regarding the tenders for the purchasing of Q8 quadrupole magnets, D1 dipoles and C8 corrector magnets
  - Performs and conducts the procurement process to source the magnets.

In this framework:

- INFN will nominate the Responsible in charge of the procedure (Responsabile Unico del Procedimento)
- The Responsible for the Execution of the contract should come from Elettra.

4. Timing for procurement

As in schedule AIK 2.1:

Description	Planned date	Comment
PDR Q8, C8, D1 magnets	June 26, 2017	Planned on June 27
Tender documentation ready for publishing (Q8, C8, D1 magnets)	September 28, 2017	
Contract signed (Q8, C8, D1 magnets	June 28, 2018	
SAR-ESS Q8, C8, D1 magnets	August 28, 2019	

5. Dipole magnets D1

The magnetic design of the dipole magnets type D1 has been developed by Elettra. These magnets will be outsourced to an external supplier and will be built under the supervision of Elettra. The manufacturer is expected to develop the mechanical design based on the magnetic design provided, build, test and verify the magnets, performing all the magnetic measurements and the validation tests required as detailed in the corresponding documents.
All fabrication phases both externally or internal performed will be followed and monitored according to the adopted quality plan.
The first magnet built will be subject to a more extensive test to assess the performance and to qualify the test sequence that will be applied to the remaining magnets.

6. Quadrupole magnets Q8

The magnetic design of the quadrupole magnets type Q8 has been performed by Elettra. These magnets will be outsourced to an external supplier and will be built under the supervision of Elettra. The manufacturer is expected to develop the mechanical design based on the magnetic design provided, build, test and verify the magnets, performing all the magnetic measurements and the validation tests required as detailed in the corresponding documents.
All fabrication phases both externally or internal performed will be followed and monitored according to the adopted quality plan.
The first magnet built will be subject to a more extensive test to assess the performance and to qualify the test sequence that will be applied to the remaining magnets.

7. Corrector magnets C8

The magnetic design of the corrector magnets type C8 thas been performed by Elettra. These magnets will be outsourced to an external supplier and will be built under the supervision of Elettra. The manufacturer is expected to develop the mechanical design based on the magnetic design provided, build, test and verify the magnets, performing all the magnetic measurements and the validation tests required as detailed in the corresponding documents.
All fabrication phases both externally or internal performed will be followed and monitored according to the adopted quality plan.
The first magnet built will be subject to a more extensive test to assess the performance and to qualify the test sequence that will be applied to the remaining magnets.

8. Language

Technical specifications for the tender will be in English, administrative and contractual documents will be in Italian.

During the execution of the contract all technical documentation and reports, including drawings, monthly reports and test certificates will be in English.

9. Contract Management

9.1. Contract Engineer

The Contractor shall appoint a technical manager (Contract Engineer) in charge of the contract, who will coordinate the technical and organizational communications between the parties for the entire contract duration and, in the following, during the period of warranty.

9.2. Contract scheduling

Within two weeks from the contract signature, the Contractor shall submit in writing, a detailed Production Schedule Document describing the scheduling of the following steps:

- mechanical design
- construction (including the lead time of the procurement of the material)
- dimensional checks
- all envisaged tests
- assembly
- magnetic measurements
- FAT,
- shipping of the magnets.

The Production Schedule Document shall be in accordance with the deadlines specified in the time-schedule that will be attached to the contract.

The Contract Engineer shall send in writing a progress report, regularly on a monthly basis, highlighting the correspondence, or any deviations, between the planned baseline and the actual work achievement.

9.3. Validations

The 1st off magnet and/or the prototype of the main components and other sub-components of the magnets shall be checked prior to their mass production and/or assembly.

9.4. Delivery address

The goods shall be delivered to ESS ERIC.

The Contractor shall deliver the goods only after receiving written authorization.

9.5. Quality certifications

The Contractor shall be certified according to a quality system ISO-9001, or equivalent, for the design, construction and testing of specified goods. Furthermore the Contractor shall verify that all its sub-contractors shall follow the same quality system.

9.6. Warranty

The warranty period for the magnets, object of this document, will be 24 (twenty-four) months, with possibility to ask for an additional warranty period up to 36 (thirty-six) months. The warranty period shall start from the date of the formal acceptance of the magnets.

9.7. Safety and prescriptions

The goods and all their components will be built according to the "state of the art" or according to the best engineering practice as established by the Italian Laws.

Labels and indications of potential dangers must be exposed in a clear way.

10.Supply's contract

10.1. Contractual responsibility

The Contractor shall be responsible

- for the mechanical design
- for the construction, including all the necessary tool and instrumentation (both mechanical and electrical),
- for the dimensional, electrical and hydraulic tests,
- for the packaging, the insurance and the delivery of the magnets
    - 2 dipoles D1
    - 6 quadrupoles Q8
    - 4 correctors C8.

The Contractor shall prepare all the technical documentation necessary for the construction phases. The documentation shall be in paper or digital format, in English.

The Contractor shall provide

- The design and construction of all the equipment and/or tools, mechanical and/or electrical, necessary for the realization of the magnets.

- The set of construction drawings relating to the above mentioned equipment and/or tools; these drawings shall be included in the Technical File and shall be integral part of the delivery.
- The list of procedures to be adopted to perform the required verifications/tests and the FAT as well as the detailed list of the actions envisaged for each procedure. The above lists shall be included in the Technical File and shall be integral part of the supply.
- The construction of all the equipment necessary for the realization of the magnets.
- The assembly of the magnets.
- The execution of the FAT.
- All the certificates and data-sheets of the purchased materials.
- The insurance and shipping to ESS ERIC of the assembled magnets

10.2. Phases of the supply

The supply of the magnets shall be divided into two phases specified by the time-schedule that will be attached to the contract.

The first phase will include:

- The startup of the procurement of the materials/components necessary for the realization of the magnets.
- The engineering of all the instruments and equipment necessary for the realization of the magnets.
- The setup of a Production Schedule Document for the construction.
- The setup of a Technical File.
- The holding of a Design Review Meeting (CDR) during which the Technical File shall be discussed and approved.

For each type of magnet the second phase will include:

- The supply and/or construction of all the necessary equipment for the realization of the magnets.
- The completion of the procurement of all the materials/components necessary for the realization of the magnets.
- The construction and dimensional testing of the magnetic yokes.
- The construction and dimensional, electrical and hydraulic tests of the coils.
- The construction and/or the supply of the mechanical and hydraulic accessories.
- The assembly and dimensional, electrical and hydraulic tests of the magnets.
- The execution of the FAT.
- The formal acceptance of the magnets.
- The deilvery of the magnets to ESS ERIC.

The Technical File shall include:

- A detailed description of the mechanical design of the equipment and instrumentation needed for the construction of the magnets.
- A complete set of construction drawings (on paper and in digital format, to be defined in agreement with INFN and Elettra), including cross-references, such as to ensure the possibility of replicating the construction of the magnets in all their parts (yokes, coils and accessories). These drawings shall be developed using a CAD system (preferred software is CATIA) and must meet the UNI – ISO 128 standards.
- The detailed description of the realization process of the yokes and the coils, which includes the adopted procedures and specifications as well as the list of the selected materials for the construction.
- The detailed description of the procedure of the verifications/tests envisaged in this specifications document.
- The detailed description and planning of the Factory Acceptance Tests envisaged in this specifications document.

The Technical File shall be completed and delivered within the deadlines indicated in the time-schedule attached to the contract. The delivery of the Technical File shall be compliant with the offer. The approval of the Technical File will take place during the Design Review Meeting, to be held at Elettra. Following the successful conclusion of the Design Review Meeting, INFN, in agreement with Elettra, will issue the formal written authorization to proceed with the second phase of the supply.