1. Introduction

1.1. General

For the construction of five C-core septum magnets a core profile is required as shown in fig. 1. The 720 mm long magnets weigh 160 kg each. The field strength in the 30 mm-gap will be 13.4 kGauss and be of a pulsed nature, 30 ms rise time and 400 ms in duration. The resulting flux density in the iron is then approximately 13.5 kGauss.

Removable noses made of stainless steel are used to prevent the septum conductors from being pushed outwards by the magnetic field. The baseplate serves to stiffen the core assembly and to mount the magnet in the vacuum chamber.

In order to keep the stray field low, the soft-magnetic material of which the laminations are made should have a high permeability.

Since quite a number of magnetic materials are suitable no definite trade-mark is given, but instead the tenderers are requested to suggest the material(s) they would like to use.

For the core assembly, two possible methods are foreseen:

1. The core is built up from single laminations clamped between two 5 mm soft-magnetic end plates. No glue will be used.
2. The core consists of 50 mm thick laminated and glued blocks, while the remaining length is made up with a split block. The whole assembly will be clamped between two 5 mm thick soft-magnetic end plates.

1.2. Scope of tender

It is understood that the contractor shall manufacture and deliver to CERN, Meyrin, the laminations or blocks respectively for the first core as per attached drawing. CERN reserves the right to make minor changes in the specification for the remaining four cores.

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1.3. Access to information and tests

It is demanded that CERN be informed about all technical details of the construction, the manufacture and any subcontracting. CERN also demands the right of access to the factory of the contractor and subcontractors during the fabrication.

1.4. Guarantee

It is understood that the contractor is entirely responsible for a faultless execution of the laminations or blocks in accordance with this specification. The contractor must submit typical magnetic characteristics of the material to be used. The supplied data should also include minimum parameters which must be guaranteed.

1.5. Delivery

CERN is interested in a short delivery time such as 6 months for the first core after the date of order and 12 months for the complete order.

2. The core

2.1. Mechanical construction

Laminations. Since a core is 720 mm long and consists of a number of laminations and two 5 mm thick end plates, the total length of the laminations is 710 mm. The exact number of laminations depends on the thickness which may vary between 0.5 mm and 1.0 mm. For 0.5 mm thick sheet, therefore, the number of laminations will be 1300 if a filling factor of 92% is assumed.

In order to obtain a uniform thickness of the laminations over the entire width of the gap, these should be stamped out of the metal strip in such a way that the center line of the gap, see fig. 2, coincides with the center line of the strip. It is important that the order of stamping is indicated on the laminations and that they are delivered bundled in batches of approximately 200. The details have to be discussed with the contractor. The stamping tool may either be provided by CERN or by the contractor.
It is very important to adhere to the given tolerances since otherwise the required degree of alignment and homogeneity of the magnetic field cannot be obtained.

**Insulation.** The laminations should be insulated by phosphorisation, oxydation or by coating with a suitable enamel, depending on the kind of soft magnetic material which is suggested. CERN insists on testing the samples to be provided by the contractor for degassing.

**Heat treatment.** The laminations should have undergone the final heat treatment before delivery.

**Finish.** The edge of the laminations should be smooth and clean to insure proper insulation when the laminations are pressed together.

**Core blocks.** For the production of core blocks, the laminations will be glued together with araldite A Z 15 and hardener H Z 15 (CIBA) using a gluing jig. The metal filling factor should exceed 92%. The jig may be provided either by CERN or the contractor.

The block height will be normally 50 ± 0.2 mm, but the two end faces should be parallel to within ± 0.05 mm. The latter dimension could be obtained by grinding, the blocks after gluing.

The blocks should be rectangular, i.e. the three faces of the 30 mm gap should nowhere deviate more than 0.03 mm from the perpendicular drawn to any of the two parallel surfaces.

**Insulation.** The insulation can be provided either by the araldite itself or by an oxyde, phosphate or enamel layer in combination with araldite. However, CERN insists on carrying out tests first on samples, to be provided by the contractor, to determine the adherence of the insulation to the metal and to test the strength of the band between the araldite and the laminations.

2.2. **Magnetic properties**

The laminations should be made of a soft magnetic material with a high permeability, not less than 4500, at a flux density of 13.5 kGauss. The coercive force should be small. The exact specification of the magnetic properties and the guarantee thereof will have to be decided after discussion with the contractor.

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The contractor must supply at least one sample per core of the material of which the laminations will be made i.e. five samples in total. To conform to our existing apparatus, the samples must be properly machined rings having an inner diameter of $76 \pm 0.1\, \text{mm}$, outer diameter $114 \pm 0.1\, \text{mm}$ and a width of $15 \pm 0.1\, \text{mm}$.

The samples will be measured at CERN and must satisfy the specification as detailed above. CERN reserves the right to reject laminations or core blocks presenting inhomogeneities of the magnetic field caused by defects in the iron body.
Fig. 1 Proposed construction of the 13.5 kg 30% SEPTUM MAGNET

Echelle 1/2 le 9.7.68 - J.R.
Fig. 2. Lamination for the 13.5 kg 30% SEPTUM MAGNET
Échelle 1/4 - le 9.7.68 - J.H.R

Rayons sur chaque arête - r = 0.5

* La reproduiblité d'une pièce à l'outre doit être mieux que 19.03