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GENERAL SPECIFICATIONS FOR MANUFACTURE OF VACUUM TANKS FOR ELECTROSTATIC SEPTUM SES23

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Introduction

Cern operates a proton synchroton (PS) machine providing particle beams to the East Hall experimental area. The beam transfer from the PS utilises a slow extraction process involving a high voltage electrostatic septum providing an initial deflection to the beam trajectory.

The electrostatic septum is housed in a UHV tank incorporating high voltage feedthroughs, remote positioning system, bakeout equipment and various ports connected to vacuum pumping and measurement systems. In order to increase the performance and maintain reliability of this beam transfer, the existing tank will be replaced by a UHV construction. The tank will be constructed of vacuum quality stainless steel, i.e. low carbon non-magnetic austenitique, and be equipped with "Wheeler" flanges at each end.

The tank will operate under Ultra High Vacuum (UHV) and will occasionally be baked out at temperatures up to 300 degrees centigrade. Cern invites quotations for the manufacture of two vacuum tanks type SES23.

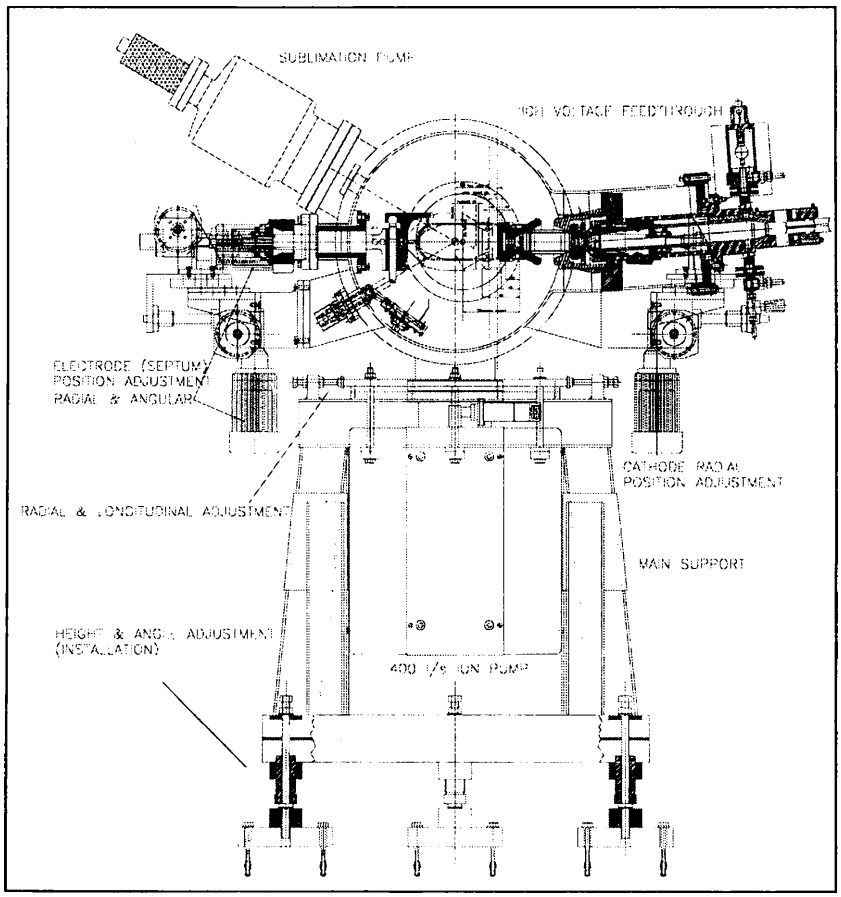

Fig. 1 Provisional Section of Electrostatic Septum SES23

Proposal for the manufacture of the vacuum tanks

The main drawing of the tank is provided for the purpose of cost estimate and may be subject to minor modifications during the period of tender. The detailed manufacturing drawing shall be provided to the company awarded with the contract.

Strict attention should be paid to the machining of reference surfaces. Following completion of the tanks a dimensional control should be carried out on the functional dimensions as indicated on the final manufacturing drawing.

The tanks should be manufactured according to the general specifications as described in "CERN / PS / ML /Spec. 84-7, Specification for welded stainless steel chambers for the ultra high vacuum system".

Surface Finish

Particular attention should be paid to the tank interior surface finish since the electrostatique septum will operate under high voltage, (up to 300kV) and UHV conditions. To avoid voltage breakdowns the surface should be smooth and free of imperfections such as scoring, cavities, grinding traces and discontinuities (oxide impregnations). Finished welds must not be "ground" but "brushing" with a stainless steel wire brush is allowed.

Emery cloth (grain 240) may be used to dry polish welds inside the tank but on no account should any paste or oil based material be used to assist polishing.

The surface quality of the interior surfaces of the tank shall be inspected by a CERN representative prior to vacuum firing.

Geometric Tolerance

During pumpdown of the tanks some deformation will occur and this is proportional to the error between the ideal form and the real (as manufactured) form of the tank. The deformation should be reduced to a minimum and it is for this reason that that the tolerance on the form of the tank is ± 2mm.

Manufacturing Procedure

Central section (see drawing PS CA 10030.0)

-The tank body shall be cold rolled and butt welded according to the drawing.
-Weld the pre-machined rings for the 'Wheeler' flanges to the tank.
-Extrude and weld all tubes for the 'Conflat' flanges, internal and external supports, and the survey target supports. This will be followed by rough machining.
-Inspection of surface quality by a technical representative from CERN, prior to vacuum firing, is imperative.
-Vacuum bake out of the tank according to the procedure indicated in appendix annex II
-Final machining of the reference surfaces
-Final machining of the surfaces of the 'Wheeler' flanges (see drawing PS CA 10031.1)
-Welding the 'Conflat' flanges (these will not be refinished after welding)

Endcovers (see drawing PS CA 10032.1)

-Pre-machine the 'Wheeler' flange
-Machine the tubes for flanges ∅ 250mm and DN35 Conflats (drawing MPS 3A81 130-4)
-Weld the machined cover in place
-Vacuum bake out cover and flanges according to the specifications in annex II
-Final machining of the surface of the 'Wheeler' flange
-Weld quick disconnect flanges in place (drawings MPS 3A81 130-4)

A stress relieving heat treatment is described in " CERN PS / ML / Spec. 84-7" , section 6.3, " Specification for welded stainless steel chambers for the ultra high vacuum system ". It is the responsibility of the constructor to ensure all mechanical tolerances are respected and this heat treatment is optional and is provided for constructor information.

Material

The constructor will provide all the material needed for the manufacture of the two vacuum tanks except for the following list of material which will be provided by CERN,

Forged Rings for wheeler flanges (see drawing PS CA 9868.4) *
All UHV Conflat flanges
Copper seals for wheeler flanges
All quick disconnect flanges (see drawing MPS_3A81_130_4)

All material will be annealed according to the specifications described in appendix II.

* Cern will provide pre-annealed forged rings, Ø 520 /430 x 54 mm thick according to drawing PS CA 9868.4, annex IV, for the manufacture of the Wheeler flanges.

Cleaning

Before the vacuum leak tests are conducted, the tanks should be cleaned. This cleaning procedure is described in annex I.

Tests

Before shipment of the tanks to Cern, the company is requested to perform a leak test according to the specifications in annex III. A technical representative from Cern may request to be present during leak testing. The results of this leak test must be made available to Cern upon delivery.

Transport

Cern insists that upon transport the tanks will be closed off, and filled with nitrogen under a small overpressure, to avoid contamination. Care must be taken to protect the tanks mechanically during transport.

Quotation

Cern requests quotations for two vacuum tanks as described in this specification. If test material needs to be supplied by CERN, or certain procedures need to be subcontracted, this should be indicated on the quotation.

Delivery

The two tanks should be delivered to CERN no later than 11th February 2000.