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Design Review

date: April 2nd, 2007
to: J. Alessi, L. Snyder, A. Pikin, E. Beebe, J. Tuozzolo
from: Steven Bellavia / M. Grau
subject: EBIS Drift Tube Design Review

Discussion:

A design review was held for three of the major sub-assemblies for the Electron Beam Ion Source (EBIS) drift tubes and associated vacuum chambers. Detailed action items are listed in Appendix A.

Alignment and Survey: Overall alignment and survey of the various components, critical to the operation of the EBIS were discussed and action items generated.

High Voltage: Several parts need larger radii on edges and eliminate edges around holes, etc.

Materials: Where possible, use stainless steel and 98% pure alumina ceramic (as opposed to macor/machinable ceramic). The last suppressor plate should be molybdenum.

Vacuum: A continuous weld was requested around the baffle of the vacuum transition chamber, since any open area apparently contributes significantly to the conductance from one portion of the chamber to the next. All hardware to be of the vented type and silver-plated when stainless-stainless combinations occur.

Thermal: Bake-out should not cause temperature rise or decay in excess of 50 degrees Celsius/hour. The actual bake-out and cooling of the central drift tube chamber (in the magnet warm bore) was not discussed, as the detailed design is not yet complete and is a separate sub-assembly, to have it's own design review in the near future.

Structural: Lugs need to be added to the chambers for support. These lugs should not interfere with the trim coils. Vibration is not a concern in this assembly.

Summary:

All mechanical engineering issues were addressed and an action item list has been generated.

Please direct any questions or concerns to Steven Bellavia, x4846.

Appendix A: Action Items:

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HV stand-offs (Dwg 1150052 and 1150053):

- to be standard type ceramic (98% alumina, not Macor) if possible
- blind holes on each end
- no vent holes - use vented hardware instead
- will need to add a spacer so that 1.8 custom standoff becomes 1.5 std length (May incorporate into 1150052)

Sputter Shield Corona Ring (Dwg 1150051):

- thicker so can have a larger radius (or bend over at end)

Central Drift Tube Bracket (Dwg 1150047)

- make thicker so can have larger radius

HV Feed support arch (Dwg 1150037 and 1150039)

- change material to 98% alumina
- make larger in radial direction to prevent cracking
- radius all edges (with large tolerance)

Support Tray (Dwg 1150023):

- increase Slot length for both slots
- tighten tolerance in transverse direction, one slot only

Support Tray block (Dwg 1150025):

- Add a lead-in / taper for easier install

Upstream and downstream crosses (Dwg 1150040 and 1150042)

- add support lugs (not to interfere with trim coils)
- custom conflat flange with c'bore to seat spider assy
- make weld continuous on baffles
- Add note for 950 deg C vacuum fire prior to welding flanges
- tighter parallel tolerance for upstream and downstream flanges
- On downstream cross, move baffle in Z direction and use shims for drift tube placement

HV Feed (Dwg 1150012, 1150036, 1150038) Pins and voltage tubes (Dwg: 1150050)

- make blind tapped hole to eliminate sharp edges on downstream side and add vented stud on voltage tube)

Ion Chopper (Dwg 1150071):

- add shims to baffle

1150090:

- round corner near ceramic

General:

- specify looser fit for all threads (class 1 or perhaps oversized taps for female threads)