Vacuum Group Meeting 4/14/14
10 AM Loft

Attendees:
Alex, Bill D, James W, Ron K, Dave A, Lucy, Linda

Agenda:
1) Interesting points of OLAV IV, (Alex)
2) Continue to develop the document of guidance

OLAV IV:
Alex sent out a link to presentations.
Alex to go over one presentation each month at vacuum group meeting. Several interesting ones to be shared.

Today:
Unbaked vacuum device - presentation from CERN (Paolo Chiggiato)
"Go/no go test for the acceptance of components for unbaked vacuum sectors"

Large vacuum group, 70-100 people.

CERN policy: all vacuum components must be tested before installation in particle accelerators, even if they were already installed in accelerators.

acceptance tests rely on two criteria:
1. the pump down curve
2. relative comparison of RGA spectra.

vacuum system exposed to air overnight, then pump down 10 hours.
slope of pressure change is calculated, then outgassing rate after 10 hours of pumping is calculated and converted and compared to stainless steel.
The acceptance condition is pumping slope less than or equal to -.85.
If slope is not good enough, may indicate contamination, virtual leak, etc.

10 hours is used to take out the effect of the change in volume of air removed. This amount of time makes the outgassing rate the more dominant characteristic of the curve.

Question was raised - why pump for 10 hours if going to run RGA anyway?
Discussion…
(one reason is to not subject RGA to sample if it is clearly contaminated)

Noted that RGA filament only on for 3 hours before scan, where we typically prefer 24 hours.

Acceptance for RGA spectra:
1. All mass peaks between 18 and 44 AMU shall be 100 times lower than the 18 peak (water)
2. All peaks greater than 44 AMU must be 1000 times lower than the 18 peak (hydrocarbons to be 3 decades lower)
(see slide 8 for description, slides 9 and 10 for example graphs)
This seems similar to our RR certification, though we use hydrogen peak (baked systems) rather than water.

What about instrumentation devices which outgas greatly and require high levels of pumping?
Even so, they should pass this test.

vented system with four different types of gas (N2, dry air, air, water vapor)
RGA scans for each gas, and also consideration of perceived hydrocarbons resulting from water vapor reacting with RGA filament.

This test system has now become mandatory for normal CERN vacuum practice.

Next OLAV will be at DESY in early 2017. Lutz Lilje will be organizing it.

MSD guidelines for vacuum systems - document:

Started with Lucy's section about drawing notes. Perhaps need to add more about welding?

Discussion about welding - some welders put too much heat into the flange, which adds magnetic permeability, distortion, discoloration, etc. Some welders have pipe welding experience and are used to 100% welds rather than fusion welds.

Two ways to approach this:
1. engineers/techs talk directly to welder to ensure delicate nature is conveyed.
2. talk to welding supervisor (Jim O'Neil, who is very good at vacuum welding) and ask him to hold workshop to all welders on site demonstrating how to weld vacuum properly.
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Alex presented section 2.2 and 2.3 for document (vacuum loading and thermal requirements).
section 2.2 looks good so far (three bullets).
add vacuum thin window guidance to section 2.2?
(must be designed in accordance with FESHM chapter X and have an engineering note)

viewports - difficulty with permeation lately? more about leaking than about safety. Does not need to be in 2.2.

The purpose of this document is not to say HOW to do everything. (Ex - how to constrain system so there is no lateral or axial movements due to pressure loading). This is job of engineer assigned to project. If appropriate, can add some guidance for additional information on "how" to do things in an appendix.

Thermal requirements:
Recommend (not require) that more than one weld/braze joint separates water from vacuum systems. Should use an insulating vacuum/air layer between them (see figure 1). Best practice to do this when possible.
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Discussion of H-seal draft section provided by Linda.
Not sure what info to include in main document and which to move to detailed appendix. (Feedback welcomed.)
add ability to use Viton gaskets to store under vacuum.
clarify photo of gasket to show shoulder and sealing surface more clearly.

Dave asked to confirm the leak check groove is in the flange design. If these grooves are put 90 degrees to each other, it is possible to determine which side is leaking.

James and Kevin had H-seal flange from Bostec and compared to our machined flanges - obvious differences. Photos were taken. James to share photos to be added to appendix. Also add QC procedure - James can check a flange in a matter of minutes using a microscope (50-60x).

recommended gap may be less than .014 - last shutdown was too much gap, and tightening more improved the leak rate. Also check what happens when flange to flange (no gap).

can snap into place if oblong. can also do as standard conflat practice. Recommend showing the test photos of the deformation to ease the nerves of techs and encourage use of snapping ring into place.
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Discussed Dave's valve specifications briefly.
Recommend making it generic for the document.

All to continue to work on this document.

Next meeting should be 5/5 at 10 AM.