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JOHNSEN ULTRAVAC (JUV) HV AND UHV CHAMBER MANUFACTURING PROCEDURES

1/ All materials are cleaned and inspected prior to machining. Sheets and tubes should be free of porosity. All flanges are cross forged stainless steel. Flange dimensions correspond to catalogue dimensions including flange thickness.

2/ All wall thicknesses are sufficient to prevent chamber distortion during welding.

3/ Machine the chamber from tubing and sheet in the final configuration. We do not punch oversize holes in sheet metal and then roll and weld the sheet into a cylinder to approximate the desired result.

We believe that a proper chamber is made only by cutting the chamber in its final geometric configuration to 0.001" tolerances. All angles and tolerances are checked during the machining stage in special machining jigs. Special vacuum compatible machining fluids are used at all stages to avoid metal/weld contamination. Grinding with abrasive is avoided.

4/ After machining, all parts are again inspected and cleaned prior to welding.

5/ Alignment and tolerances are continuously monitored during welding during welding. Weld distortion is kept to 0.020" and 0.5 degrees alignment, unless otherwise specified. Filler rod is not utilized unless permitted by Johnsen Ultravac. Welds will avoid weld burn-through caused by the use of too much heat. Tack welding is permitted on the outside surfaces for alignment during welding. All welds should be single pass continuous type either inside or full penetration outside (full penetration of weld lip, not wall), but not mixed inside-outside.

6/ All welded tubes from roll-up are welded on the inside only.

7/ All tubes are round to 0.060" including distortions from rolling.

8/ No external welds unless continuous and full penetration and no double welding of exterior and interior joints are permitted.

9/ All flanges are 100% free of scratches, nicks, marks, etc. and appear highly polished and bright.

10/ After welding and before coming in contact with cleaning fluids, the chamber is leak checked by two people and visually inspected for flaws under bright light. Vacuum acceptance is a $2x\ 10^{-10}$ Torr-L/sec-He leak rate or less measured against a calibrated leak.

11/ All metal (other than flanges) is subject to low pressure "clean" glass shot or electropolished inside and outside. All flanges are masked during glass shot finishing.

12/ Chambers that pass mechanical alignment and vacuum inspections are given a final multistage chemical cleaning.

13/ Final cleaning is by hand using lint free cloth and alcohol.

14/ All chambers are thoroughly dried and 100% clean, free of oils, grease, dirt fingerprints, water marks, weld oxides, etc. and then packed in clear double plastic bags, sealed to avoid contamination.

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15/ Our manufacturing process eliminates the possibility of virtual leaks and ensures vacuum performance to 10^{-11} Torr range.

STANDARD JUV BAKE-OUT PROCEDURES

As an option, chamber can be baked by JUV Vacuum engineers using JUV supplied instruments and components.

The details are:

A) Chamber is pumped by a JUV turbo molecular pump backed by a dry oil-free mechanical pump.

B) Chamber is fitted with a RGA, a thermocouple is connected to the chamber and an ion gauge is installed for pressure read-out.

C) The chamber is baked at 170 C for a period of 24 ~ 72 hours with an additional 4 or more hours ramp time up to bake-out temperature and 4 or more hours ramp down to room temperature.

D) The thermocouple output for the chamber temperature and the ion gauge output for the chamber pressure are connected to a chart recorder.

E) The chamber pressure and temperature is logged during the entire bake cycle.

F) A RGA spectrum is taken before bake-out, during bake-out and again after cool down when the pressure has reached the customer's specified pressure has reached, i.e. 6 x 10^{-10} Torr.

G) The RGA spectrum of a proper baked chamber by JUV Technical staff will show no evidence of hydrocarbons and no masses above mass 45 indicated. There must also be no indication of residual acid or alkali cleaning residue, or Halogen in the spectrum. Charts recordings and RGA data will be provided with each chamber.

A typical read-out sample is attached of a baked JUV chamber.

CUSTOM BAKE-OUT REQUIREMENTS

In the event, customer has specified their own bake-out procedures stating base pressure, bake-out temperature, JUV Technical staff will comply with customer's specifications and JUV will provide charts and read-outs in compliance to customer's request.

With respect to bake-out of a complete turn-key system, the pumps, gauging, bake-out components supplied with the system will be used and interfaced with our data recording instruments. Chart recordings and RGA data will be provided with each system.