Request for Proposal Specification

Request for Proposal (RFP) on behalf of UK Research and Innovation

Subject: UK SBS PR19094 Vulcan Beamline Vacuum Chamber

Sourcing reference number: UK SBS PR19094

Vacuum & Cleanliness Specification for CLF Vacuum Hardware.

1 Introduction

The primary specification for the assemblies and components shall be the issued detail design drawings in conjunction with this specification. The vacuum vessels included in this contract are all to achieve $1x10^{-6}$mbar in normal operation and considered medium-high vacuum vessels. All supplier processes are to comply accordingly.

The performance of the vacuum systems are highly dependent on the cleanliness of the internal surfaces. Therefore it is essential that all components which form part of, or are placed within this vacuum system conform to the standards of cleanliness as laid out in this specification.

Many of the chemicals and processes described in this document are subject to control and regulation under various parts of Health and Safety Legislation or Regulations. Any persons or Companies implementing all or part of this specification must satisfy themselves that they are conversant with and adequately implementing any such Legislation or Regulations.

2 Cleaning

2.1 Clean for Vacuum Service

Unless specified otherwise on the drawing, all components are required to be supplied clean (as per the definition below) for medium to high vacuum use ($1x10^{-6}$ mbar).

- Raw materials should be processed to ensure any oil residue / surface ingress during their creation are removed, unless materials can be certified as oil free throughout the material lifecycle.
- All burrs to be removed
- Swarf and cutting material to be cleared from all holes (especially blind holes and threaded holes).
- All machining fluids, greases or dirt to be removed using hot water, detergent and cleaning wipes followed by Isopropanol and a clean lint free cloth prior to any post machining finish.
- Silicone based cutting fluids must not be used
- Dye penetrant must not be used.
- Use ScotchBrite or a stainless steel wire brush to clean heavily soiled areas prior to degreasing.
- Specific attention is drawn to all holes especially tapped holes where cutting residue and contamination can be difficult to remove
- Rinse thoroughly with hot demineralised water until all visible traces of detergent have been eliminated.
- Where bead blasting is specified, this shall occur at this stage and the preceding cleaning steps repeated again after bead blasting.
- Dry in warm clean air

- All cleaning is to be thorough and inspected prior to packaging and as appropriate, in preparation for further treatment i.e. bead blasting/anodising
- Cleaning of components to be repeated after finishing treatments and prior to assembly.

Supplier cleaning procedures may be used if given approval by STFC.

3 Finishes

3.1 Anodising

Where anodising is the specified finish on the drawing, the finish shall be:

- Hard anodising for improved wear resistance
- 25µm thick (range 25µm-50µm acceptable)
- Free from scratches, inclusions, defects
- Uniform and consistent appearance across all assembly components
- Threaded holes shall be masked or threads made good after anodising
- Holes with specified fits (e.g. H7) shall be masked and be free from anodising or may be machined after anodising
- Anodising around holes must not be damaged or incomplete through the process of masking or making good of threads.
- The dimensional tolerances on the drawings must be met after anodising. Any machining must take into consideration the expected anodising thickness. Since anodising converts rather than deposits, some of the anodising thickness will ingress the material and some will be growth out of the material – typically 50%, but manufacturers shall confirm with anticipated anodising supplier.

In order to ensure the quality of anodising required, it expected that the supplier will

- Ensure all surfaces on an assembly of components have a similar machining finish providing uniform and consistent anodising finish across each assembly.
- Ensure all surfaces are free from oils, greases, dirt and debris prior to anodising.
- Ensure that the anodising process is appropriately controlled, timings etc. calculated and monitored.
- The method of supporting components in the anodising bath is considered to avoid un-anodised or poorly anodised regions due to contact of support on component.
- Where anodising suppliers or procedures are not known, it is expected that the supplier will arranged sample anodising to be approved by STFC to ensure the quality of the final product

4 Assembly

The supplier will assemble the goods to ensure that they are fit for purpose, with due regard to the cleanliness requirements stated, by ensuring:

- Nitrile gloves are worn when handling cleaned components during assembly
- Assembly to occur in a clean and dust free environment

- Components are assembled square and flat
- Seals are appropriately made and fitted dry
- O-rings requiring cord (rather than premade diameter) should be spliced at the meeting point to avoid any regions without o-ring cord overlap.
- All fittings and fasteners shall be appropriately tightened for purpose

A final clean of the assembly shall occur before packing to remove any contamination occurring during the assembly process

5 Vacuum Testing

All components within this scope of contract are required for vacuum service. The requirement for the vessels and pipework is for medium to high vacuum ($1x10^{-6}$mbar). The vacuum leak rate for any component or full assembly is $1x10^{-8}$mbar.l/s.

It is expected (where relevant) that the supplier will test the vacuum leak rate of each component individually prior to assembly. The supplier shall then test each assembly for leak rate and base pressure. It is expected that the supplier will evacuate the vessel through a mass spectrometer and use Helium to probe all welds and seals.

The supplier is responsible for supplying any equipment for testing, for example blanking flanges that are machined and cleaned to the appropriate standard to avoid contamination. Similarly all vacuum pumps should be oil free.

All sealing faces and seals must be dry. It is not permissible to use vacuum greases, putty, epoxy or silver tape on any part of the assembly at any stage during assembly or testing. Attainment of leak rate and base pressure must occur with dry seals.

6 Packaging

- Nitrile gloves must be worn during packaging.
- Bubble wrap and sealable plastic bags shall be used as a packaging material for components and assemblies.
- Additional protective packaging of assemblies is to be such that the assembly is not damaged during transportation or storage.
- Sealing faces must be especially protected to avoid surface scratches and damage, with the method of packaging removal considered. The location of sealing faces should be labelled on the outside of the packaging.
- All packaging is to be labelled, with the component or assembly drawing number, quantity (if more than one) and with any other information deemed necessary by the supplier.

7 Communication

The supplier is expected and encouraged to raise any concerns or questions where any query arises, no matter how small, insignificant or inconsequential they appear.

Similarly the supplier is expected and encouraged to voice their concerns or opinions if a design or assembly does not appear correct.

Any recommendations on simple design changes that facilitate the achievement of our quality expectation are welcome from the supplier.

Any deviations from the specification or drawing must be agreed in writing by both parties.

Where any changes to the drawing are required, from a supplier request or STFC necessity, the drawing shall be re-issued by STFC at a higher version (based on increasing letter from A – Z). Upon the receipt of a newly issued drawing, all copies (hard or electronic) of previous versions must be deleted by the supplier to prevent incorrect manufacture of parts.