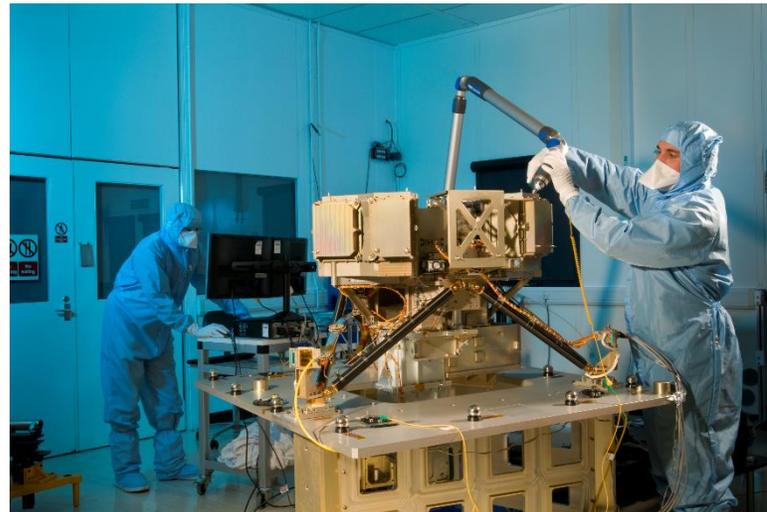




# STC-3 SIVL & Interface pipework supplier visit

9<sup>th</sup> July 2019



# Agenda

This presentation is intended to provide a summary of key information described in the Statement of Work ref: *ISO SOW R100 STC 00014 Statement of Work for SIVL & Pipework Issue 3*. The Statement of Work takes precedence over this presentation with regards to the scope of work required and supplier responsibilities.

## Agenda

1. Space test Chamber (STC-3) introduction
2. Scope of Tender
3. Technical Requirements
4. Installation & Acceptance
5. Schedule & Warranty

# Space Test Chamber (STC-3) introduction

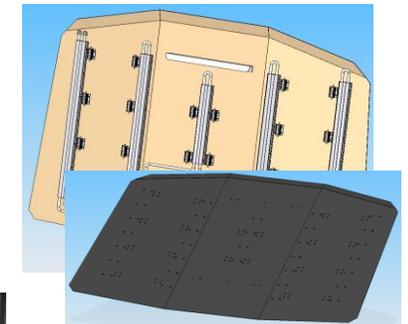


**OGSE Cleanroom**

- ✦ 5m diameter/6m long vacuum chamber used for Instrument Calibration Testing.
- ✦ STC3 is a close twin of STC2 with the exception of an additional observation window on the side of the vessel
- ✦ STC-3 vacuum system includes 1 roughing pump, and 6 cryogenic pumps enabling vacuum pressure in the range from 1e3 to 1e-7 mbar
- ✦ Chamber is lined with 46 zones of thermal shrouds that can be individually temperature-controlled in the range -193°C to 120°C
- ✦ During testing the instrument is supported on vibration isolated rails (via supports floating on a seismic block)

- ✦ STC-3 can be accessed from two doors/two cleanrooms (referred to as White & Black doors/cleanrooms)
- ✦ The white door/cleanroom is used for installation activities & instrument and Ground Support Equipment (GSE) equipment access into chamber
- ✦ The Black (Optical Ground Support Equipment (OGSE)) cleanroom is where optical equipment used to make measurements during calibration testing is installed. This equipment is installed in a way to provide a view inside the chamber through one of nine available optical windows in the Black door
- ✦ The first project scheduled to use STC3 for calibration testing is Sentinel 5 Ultra Violet Near Infrared and Short Wave Infrared Spectrometer instrument (S5UVNS) in 2020

**Door shroud panel showing Aluminium extrusion (for LN2 supply) and heaters**



**Cryo Pumps/ Services Side**

# Scope of tender

## ❖ Core requirement – STC-3

- ❖ The manufacture, assembly, testing, shipping and installation of the Pipework Assembly.
- ❖ The manufacture, assembly, testing, shipping and installation of the SIVL.
- ❖ The preparation and provision of the documentation necessary for the work.
- ❖ Provision of all tools, test equipment, etc., necessary for the work

## ❖ Requested option – STC-2

- ❖ Manufacture and installation of 12 valve-assembly modules
- ❖ Modification of the existing SIVL currently installed as part of the STC-2 system

## ❖ 14 core technical requirements

- ❖ R1 [R, T] *The helium-gas leak rate for the SIVL and SIVL/PS interface pipework assembly shall be  $< 1e-9$  mbar.l / s. The leak rate is to be validated after installation for both the vacuum jacket and the fluid pipe.*
- ❖ R2 [R, T] *For a 28x1mm fluid pipe containing liquid nitrogen (LN2) at  $< 90K$ , the thermal heat leak rate shall be less than 0.3W per metre of length, less than 2.3W for a bayonet joint, and less than 2.8W for a welded coupling.*
- ❖ R3 [R, I] *The outside diameter of the SIVL should be  $75 \pm 5$  mm to interface with existing LN2 valve boxes.*
- ❖ R4 [R, I] *Each SIVL/PS interface pipework assembly shall include a pressure release valve (PRV) on the LN2 pipe, a pump-out port incorporating over-pressure release on the vacuum jacket, and a pneumatic valve to allow/stop LN2 flow*
- ❖ R5 [R, I] *PRVs shall have a suitable operating pressure which is above the operating pressure of the PRV on the phase separator, and with adequate flow rate.*
- ❖ R6 [R, I] *PRVs shall be installed at an appropriate angle so that all vented flows are directed safely away from areas where an operator might be situated.*
- ❖ R7 [R, I] *Each SIVL/PS interface pipework assembly shall have a burst disc in case the PRV fails to open.*
- ❖ R8 [R, T] *The SIVL and interface pipework shall be designed, manufactured, and tested to withstand pressures up to  $1.5 \times$  PRV.*
- ❖ R9 [R, I] *Pneumatic valves shall be DN20*
- ❖ R10 [R, I] *Pneumatic valves shall operate with compressed air at a supply pressure of 70-90 psig*
- ❖ R11 [R, I, A] *The SIVL/PS interface pipework and SIVL shall be designed and manufactured to withstand a useful working lifetime of 20 years.*
- ❖ R12 [R, I] *Pump out ports shall be easily accessible for regular maintenance and with minimum maintenance specialist equipment.*
- ❖ R13 [R, I] *A suitable pump cart shall be supplied to be used for future maintenance of the vacuum jacket of the SIVL*
- ❖ R14 [R, I] *The weight of the SIVL shall be supported by appropriate bracketry supplied by the Contractor and not impart any load onto the valves when connected*

# Installation, Acceptance & Schedule

## ✦ Installation

- ✦ Responsible for installing the PS/SIVL interface pipework assembly and SIVL; this includes providing all tools and identifying all assumptions and dependencies on RAL Space lifting equipment

## ✦ Acceptance - 2 key tests

- ✦ A helium-gas leak
  - ✦ Test shall be carried out on all pipes in pipework assembly and all SIVL (both the fluid volume and the vacuum line) after shock cooling the liquid-carrying pipes with liquid nitrogen to  $T < 90\text{K}$  twice. The leak rate should be less than  $1\text{e-}9 \text{ mbar.l / s}$
  - ✦ A pressure test shall also be carried out on all lines in accordance with requirement R8

## ✦ Schedule

- ✦ Schedule is critical for achievement of chamber commissioning testing in 2020 to support RAL customer contractual commitments
- ✦ Delivery and installation of the interface pipework assemblies and SIVL within 16 weeks of contract award is preferred but installation by 20 weeks of contract award is required
- ✦ Suppliers are invited to propose the best achievable schedule

# Deliverables & Warranty

- ✦ The following items are deliverable to STFC RAL:
  - ✦ Installation of the interface pipework assemblies at RAL
  - ✦ Installation of all 24 SIVL at RAL
  - ✦ Certificates of Conformance for all materials and tests
  - ✦ Test reports which state the results of the leak and pressure tests
  - ✦ 2 complete sets of any tools required for maintenance
  - ✦ Pump cart for maintenance testing
  
- ✦ **Warranty**
  - ✦ A 24 month warranty is required