EDR Performance Brief

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Introduction

The purpose of this performance brief is to outline the mechanical and electrical requirements for the Energy Dry Room on the Graphene Engineering Innovation Centre (GEIC) project.

The contractor shall be responsible for the turn key package including

- Construction of the dry room including suitable walls floors and ceiling, incorporating any airlock.
- Supply and locating of dehumidifier and chiller
- Electrical fit out of the room (fed from local distribution board)
- Interconnecting of all ductwork and pipework, excluding natural gas

The floor shall be liquid damp proof membrane with anti-static coating.

Design Parameters

The design of the unit should be based on the following criteria

- Ambient design conditions – Summer: 27deg C / 12.23g/kg. Winter: -5degC / Saturated (2.48g/kg)
- Latent Load – Three people (max) within the dry room. Held at -40deg C dpt. 55 watts/person
- Sensible Loads – Total internal sensible room heat load of 55kW
  Temperature difference across room 8 deg C
- Fresh Air Load –10 l/s/p totalling 110m3/hr
- Room Temperature 21deg C +/-2deg C
- Noise Criteria in Room 40dBa at 1m from inlet wall
- Noise criteria at chiller 52dBa at 10m
- Lighting level in room to be 450-500 Lux

Dry Room

- The Energy Dry Room will be notionally 7m x 7m x 3m high
- The system shall be a full recirculating system. There should be no allowance for any exhaust
- Laminar airflow shall run the length of the room
- The walls should be constructed of 60mm thick load bearing mineral insulated rock wool cored steel faced wall panels finished in a white food safe polyester paint finish. The panels should have interlocking joints which can be sealed from the inside with a suitable neoprene based flexible sealant suitable for use at a condition of -40°C dew point. The panels should have a half hour fire rating. Suitable coving should be installed at ceiling and wall joints. A single point service penetration using a gland plate should be made

- The roof structure should be 150mm thickness load bearing mineral wool cored steel faced panels finished in in white food safe polyester paint finish. The panels should have interlocking joints which can be sealed from the inside with a suitable silicone sealant suitable for use at a condition of -40°C dew point. The panels should have the same fire rating as the walls and doors. The finished internal room height should be 3000mm (minimum). The roof support structure will be able to support ducting, services, ceiling with lighting. All service penetrations shall be kept to a minimum.
- The floor shall be cleaned and if required, repaired in readiness to accept the new floor. A damp proof membrane epoxy system will be applied including lapping up the walls by 100mm to provide a vapour seal. An antistatic floor using Altroscreed Quartz EP-SD solvent free epoxy screed (colour to be advised) shall be fitted complete with welded in skirting at all internal wall/floor junctions.
- The floor shall be suitably protected during the works and until handover.
- The airlock shall have 2 off doors and will have a hermetic sealing system with a cold room face type foam filled metal skinned construction with cold room type furniture and latches.
- A pressure relief valve shall be fitted between the dry room and airlock and airlock and outside the dry room. This should be a type which will only open when a pre-set overpressure in the room is detected and contain its own control mechanism.
- A supply air plenum chamber should be constructed on one wall. The plenum chamber should be across the entire wall. A stainless steel frame should be manufactured and fixed approx. 750mm from the wall to form a plenum chamber. Individual perforated plate panels shall be fixed to the frame. The perforated plate panels shall be manufactured from 304 stainless steel and have 5mm diameter holes giving a free area between 40% and 50%. The frame should be fixed to the room walls, ceiling and floor. The individual panels should be bolted to the frame.
- 2 off gland boxes should be provided for any services or electrical services to penetrate the dry room.

Dehumidification Unit

There are 3 options considered for the location of the dehumidification unit and chiller.

Option 1

Locate dehumidification unit, externally, at ground level adjacent to the Energy Dry Room. Chiller located in plant well

Option 2

Locate dehumidification unit, externally, on roof well level adjacent to chiller.

Option 3

Locate dehumidification unit, internally, within the main equipment plantroom. Chiller located in plant well

In all options, the Natural Gas and Main Electrical requirements will be supplied from the main equipment plantroom.

For details of the supplies please refer to the following drawings:

Natural Gas - 6241_CH2_00_XX-SC_I_83601
Electric – 6241_CH2_00_XX_SC_E_06005

The unit should be a Munters Unit, Model MDU1500, or equal and approved.

The unit will come complete with a humidity control system, direct gas fire reactivation heater, soft purge with energy efficient reactivation air circuit and a chiller with multi stage scroll compressor.

The unit will be equipped with

- Mixing Box, return air and fresh air make-up
- Rain hood on fresh air inlet (if applicable)
- G4 Process inlet filter
- Process fan
- Pre cooling coil
- HPS Rotor
- LTHW (heat recovery) Post heating coil
- F8 Post filter
- F4 React inlet filter
- Direct Gas reactivation heater
- React fan

Controls

The unit should consist of an HMI touch screen and have the capability of BACnet interface.
The panel will incorporate all relevant controls and safety devices including but not limited to

- Local control for humidifier
- Local control for chiller
- Status displays using coloured lamps

Chiller Unit

The unit shall be a total heat recovery unit, complete with scroll compressor, buffer tank, integral heat recovery pump, soft start, Power factor correction and be fitted with anti-vibration(spring) mounts.

Pipework

The pipework should be in accordance with the existing pipework specifications adopted in the project. The pipework, valves and flanged joints should be insulated in accordance with the existing project requirements.

Ductwork

All ductwork should be installed and tested in accordance with the existing project requirements

Controls Training

The contractor shall allow for training of 6-off Client personnel on Site. Duration to be confirmed.

Earth Bonding

Earth bonding of the dry room floor, dehumidification system, mezzanine floor and chiller unit should be provided

Commissioning

The contractor shall issue a pre-commissioning checklist for perusal by the client. This should be issued a minimum of 7 days prior to the start of commissioning.