Mechanical & Electrical Performance Specification

Air Handling Unit Refurbishment Works

National Oceanography Centre

National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

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1.0 Introductions

The Specification for the refurbishment of Air Handling Units (AHU's) at the National Oceanography Centre, Southampton includes the Performance Specification for the Mechanical, Electrical and Public Health Services associated with AHU's.

This Specification to be read in conjunction with the main Contract Documents.

2.0 Description of Engineering Services

2.1 Description

This project involves the refurbishment of the following air handling units at the National Oceanography centre, Southampton to improve system performance.

- 1/123
- 2/343
- 1/493
- 2/783
- 1/S1/37
- 1/492
- 2/123
- 3/785
- 2/233
- 2/343

2.2 Scope of Works

The Scope of Works for this Project includes the following:

1. Refurbish AHU 1/181, AHU 1/453, AHU 1/784, AHU 1/615, AHU 1/525, AHU 1/435, AHU 1/495 including:

    - Remove the existing centrifugal fans and motors
    - Provide new IE4 motors & plug fans, filters, and valve assemblies.
    - Modify the power and BMS controls to suit the new IE4 motors & plug fans.
    - Reinstate internal lighting and differential pressure gauges
    - Replace lthw frost and reheat coils.
    - Re-lag damaged lthw pipework sections.
    - Clean internal sections of ahus
    - Replace filters with new high efficient unit
    - Rebalance lthw frost and reheat coil flowrates
    - Modify BMS to suit new control valves and setpoint conditions of ventilation plant

2. Rebalance the laboratory ventilation systems.

3. Provide O&M manuals & drawings in line with NOC requirements.

4. Commissioning, testing and demonstration to the Client

5. All builders work, fire stopping and making good to building fabric.

It is Contractors responsibility to visit the site and make themselves aware of all governing factors which may affect the content and programme of his works.

2.3 Contractor Design Responsibilities

The Contractor will be aware that they are responsible for design of all the works described in this document. Detailed design responsibilities will include the activities listed below, in addition to those activities normally undertaken through the custom and practice of the industry.

The design responsibilities will include, but not necessarily be limited to:

- Detailed design and locations of brackets and supports

- Detailed design of scrubbers.
- Design of scrubber pumpsets and associated pipework.
- Final selection of supply ahu fans.
- Final selection of fume cupboard extract fans.
- Valve selections.
- Control modifications.
- Control valve selections.
- Detailed design of electrical systems.
- Connections of mechanical and public health systems
- Final valve locations
- Preparing detailed electrical wiring diagrams of all equipment supplied showing all interconnections between equipment location, routes and design of electrical conduit systems
- Safe operating and maintenance clearances are provided.
- Final locations of:
  a. Test points
  b. Control sensors
  c. Detectors
  d. Thermostats
  e. Gauges
- Sizing of cable terminations for all items of equipment
- Controls and wiring
- Builders work openings to suit the installation
- Structural design to support and confirm any builders work openings
- Laboratory gasses
- Co-ordination of all services to suit the new installation

2.4 Contractor Obligations

Undertake responsibility for all works defined in the Specification the following:

- Capacity,
- Provide a detailed programme their Works
- The Contractor will include in their tender for the timely delivery and protection of all equipment, materials and plant as may be necessary to ensure the works proceed in accordance with the overall programme, together with extended warranties to ensure all Manufacturers warranties run for at least the full defects liability period
- Undertake the detailed design of those services listed within the ‘Contractors Design Responsibility’
- section, of this document
- Undertake the responsibility for resolving final spatial co-ordination
- Co-ordinating the engineering services, with each other and with the building structure and fabric
- Provide the following drawings
  a. Installation
  b. Manufacturer’s certified
  c. Installation wiring drawings
  d. Control wiring diagrams
- Fully re-evaluate and take full responsibility for all parts of the design and building elements that may be affected by acceptance of alternative plant selections
- Undertake all on-site co-ordination with all other trades, disciplines, manufacturers and suppliers
- Provide:
  a. Suitable storage facilities
  b. Clearance on completion
- Supply, deliver to site, unload, store, protect and co-ordinate movement of all plant, equipment and
- materials required for the Works

- Fix and install correctly all plant, equipment and materials and ensuring that all associated works are correctly executed
- Install fire barriers where a fire rated partition is penetrated
- Safely decommission and decontaminate the fume cupboards and associated plant.
- Inspect all plant, equipment and materials as delivered or where specified at the manufacturer's works
- Preparation of the operating and maintenance manuals, planned maintenance schedules and record drawings. Provide hard and soft copies. The latter will be in both pdf and native editable formats i.e. AutoCAD drawings Word manuals
- Undertake the testing and commissioning of the Works
- Providing a commissioning report in accordance with Building Regulations
- Demonstrate the testing and commissioning has been carried out in accordance with industry standards, e.g. CIBSE Commissioning Codes, BRSIA Application Guides and manufacturer's recommendations
- Contractor to include for 1-year warranty on the Works carried out following handover.

Ascertain the nature of the site and all local conditions and restrictions likely to affect the execution of the

Works.

Before commencing work, carry out a survey and examination of buildings, structure and engineering services affected by the Works.

2.5 Site Dimensions and Levels

Install all engineering services using a laser levelling system wherever possible and co-ordinate the measurements with existing installation and building structure/fabric.

Obtain all dimensions and levels on site for the actual setting out of the Works.

2.6 Co-Operate

Co-operate with any other Contractors or maintenance personnel that maybe working in the area. Ensure the spaces are kept clear and access routes are not impeded. Take all necessary steps to ensure the operation of the building is not adversely affected beyond what has been previously agreed as necessary to execute

the Works.

2.7 Site Visit

Before tendering, ascertain the nature of the site, access thereto and all local conditions and restrictions likely to affect the execution of the Works.

2.8 Out of Hours Working

The Contractor will include for carrying out any Works that require a shutdown of the systems or access to internal areas during out of hour's working at a time to be agreed with the NOC. The Contractor will provide a programme prior to the start on site setting out their proposals for carrying out the Works, which will clearly identify any shutdowns that must be agreed with the NOC. The Contractor will provide a period of notice to NOC prior to carrying out any shutdown. Period of notice required will be agreed with the NOC before the works go ahead.

2.9 Existing services

Air handling units

Supply air handling units are generally manufactured by Woods and O&M information is ratings are listed below. The air handling units are original basebuild installations. The air handling units are generally arranged with the following components: lthw frost coil, bag filter, access panel, panel and bag filter pressure dials, lthw reheat and a direct drive centrifugal fan. The internal lighting in the in filter and fan access chambers may have been removed.

- 1/123 - 2.62m3/s
- 2/343 - 2.24m3/s
- 1/493 - 2.14m3/s
- 2/783 - 3.56m3/s
- 1/S1/37 - 4.36m3/s
- 1/492 - 1.2 m3/s
- 2/123 - 1.35 m3/s
- 3/785 - 1.16 m3/s
- 2/233 - 6.5 m3/s
- 2/343 - 2.24 m3/s

3.0 Mechanical, Electrical & Public Health Engineering Services

3.1 Air Handling Units (*generic)*

The existing AHU's and associated ductwork system will be refurbished. The works will consist of the following:

- Replace the existing isolation valves, commissioning station, test points, flexible connections, strainers and PICVs on a like for like basis on the frost and reheat coils.
- Thoroughly clean the internal sections and chambers of the air handling.
- Replace frost and reheat coils.
- Re-lag damaged sections of insulation and cladding on the lthw pipework in the air handling unit plantroom on a like for like basis
- Reinstate the internal lighting and filter differential pressure dial on a like for like basis.
- Stripout the existing fan, motor and inverter and replace with a new IE4 EC motor and plug fan. The power and controls will be provided with new/ modified to suit the new arrangement of motor and speed control. The speed controller to be located within the fan assembly. The fan supplier will attend site to provide fully dimensioned drawings showing the customised plug fan arrangement fitted within in the existing fan chamber - the See Appendix A for example Supply Fan Schedule.
- The Contractor will note the Supply Fan Schedule is for guidance only with the final selection of the supply fan the responsibility of the Contactor. The total pressure of the system is not known and will need to be measured by the Contractor.
- Replace the existing filter with a F7 A+Eurovent Energy Rating type supplied by Camfil ltd, Knowsley Road, Haslingden, Lancashire BB4 4EG. The Contractor will arrange for Camfil ltd to attend site to review the configuration of the filter in air handling unit to ensure optimum airflow through the unit.
- Rebalance the lthw flowrates to the frost and reheat coils
- Test & commission the new fan to meet O&M duties.

4.0 LTHW systems

4.1 System outline

Replacing valve and pipework connections AHU's.

Pipelines:

Type: Heavy grade steel to BS EN 10255

Connection: Threaded up to 50mm, all other joints and all joints 65 mm and over will be welded. Screwed joints to BS EN10266.

Valves:

Isolating valves:

Manufacture: Crane or approved equivalent

Type: Globe/Ball/Butterfly

Pressure Rating: PN 25 or PN 16

Regulating valves:

Manufacture: Crane or approved equivalent

Pressure Rating: PN 25

Independent Control Valves

Manufacture: Seimens or approved equivalent

Selection: By Controls Specialist

Pipeline strainers

Manufacturer: Crane or approved equivalent

Pattern: Y pattern. Pressure Rating: PN 25

Pipe sleeves

Pipework passing through walls, floor, ceilings and partitions will be fitted with sleeves of internal diameter at least 10 mm larger than the external diameter of the pipework passing through the sleeve. Pipework subject to sideways movements due to expansion or where insulation is continuous, will be fitted with oversize sleeves. Sleeves will be of a material similar to that of the pipe, steel or copper and for plastic pipes, rigid plastic or copper, with lugs to locate in floors and ceiling and treated against corrosion.

Pipework passing through the structure and fitted with sleeves in areas occupied or otherwise in regular usage will have cover plates fitted around the pipes (or sleeve in wet areas) to suitably conceal the gap and sleeve end Pipework passing through fire rated compartments to be provided with FloPlast Intumescent Wrap

Pipelines accessories:

Venting devices: At all high points. Submit proposal. Expansion devices: Contractor's design.

Gauges: Submit proposal.

Draining devices: At all low points and to aid draining down plant - contractor's design. Flow Measurement Devices: On all main sub branches

Thermal insulation: See 90-90-40 Insulation and protection products

Vibration isolation: Contractor's design.

Protection: See 90-90-40 Insulation and protection products

Controls: Refer to BMS Section

EXECUTION

PIPELINES INSTALLATION GENERALLY

Installation: In accordance with the latest edition of HVCA TR/20.

Appearance: Install exposed pipe runs parallel with other pipe or service runs and building structure, taking account of gradients for draining or venting. Set vertical pipes plumb, or follow building line.

Gradients: Install with gradients to allow drainage and air release. Air venting: Provide vents at high points.

Draining: Provide drains at low points.

Pipeline expansion and contraction: Arrange supports and fixings to accommodate pipeline movement caused by the thermal changes. Allow for movement at branch connections.

Pipeline support: Arrange supports and accessories for equipment, appliances and ancillary fitments in pipelines, so that no undue strain is imposed upon pipes.

650 Hydraulic pressure testing of low temperature hot water heating systems

Testing: In accordance with BS EN 14336, Appendix B.

Notice (minimum): 5 working days.

Pressure: 1.5 times working pressure.

Duration of test: 1 h.

System completion

810 Commissioning water heating systems

Pre-commissioning: In accordance with BSRIA 2/89.3 and Commissioning Code: Water distribution systems.

Commissioning: In accordance with BSRIA AG 2/89.3 and Commissioning Code: Water distribution systems.

Variable flow systems: In accordance with CIBSE KS09 Commissioning variable flow pipework systems.

Notice (minimum): One week.

840 Performance testing

General: Demonstrate the performance of the installations.