



Operating & Maintenance Manual

Enter Building or Project
name here

for
Mechanical Services

Items in Blue are for information or identifies input change

Section	Title
1	Contents
2	General Description
3	Emergency Shut Down Procedures
4	Essential Contact in case of Breakdown
5	Design & Construction Team Members
6	Design Parameters/ Des Ops
7	Controls Philosophy
8	Automatic control system settings
9	Schedule of components
10	Manufacturers contact details
11	Operating Instructions
12	Technical Literature Manual
13	Preventative Maintenance Procedures & Equipment
14	List of spares
15	Fault Finding Procedures
16	Commissioning Results, Test Records, Test Certificates & General Certificates.
17	Index of record drawing numbers and titles
18	As Fitted / Built CAD DWG Drawings

ISSUED COPY

1 Contents

Add details as required here and anywhere that follows in the rest of the document.

ISSUED COPY

2 General Description

A General description of the scope, purpose and manner of working of each system or equipment forming part of the works.

Four (4) weeks prior to Practical Completion the Contractor shall issue one (1) set of draft O & M manuals for comment. On Projects of less than 8 Weeks duration a draft H&S file is to be presented at Practical

Completion. This is to be returned with suitable comments one week after Practical Completion and the CDM Coordinator is to ensure this is returned by 4 weeks after PC.

These comments shall be incorporated into the manuals prior to the Final issue **of electronic copy** of the Manuals at Practical Completion. The availability of this information is essential to enable the Employer to satisfactorily operate and maintain the plant and hence the Contractor should note that the Practical Completion Certificate will not be issued by the Contractor Administrator until these instructions have been approved by the Engineer and issued to the Employer.

The Manual shall be created by us of the University Templates at all times which are indexed, divided and appropriately cover titled.

The manual shall contain full operating and maintenance instructions for each item of equipment included in the Works presented in a form to deal systematically with each system and shall include the following where applicable:-

The installation shall be deemed incomplete if the contractor or sub-contractor fails to provide sufficient information to allow the systems to be easily maintained.

Upon completion all accessories, components, spares and tools shall be provided. Testing, commissioning, and instruction shall be satisfactorily completed and all "As Fitted / Built" drawings, Operating and Maintenance manuals shall be complete and available for issue.

Certification of Practical Completion will not be issued until testing and commissioning of the installations has been carried out to the satisfaction of the CU Project Building Services Engineer.

FAILURE TO PROVIDE MAINTENANCE MANUALS, RECORDS, RECORD DRAWINGS & SPARES

If the Operating and Maintenance Manuals and CAD "As Fitted / Built" and/or Record Drawings and spares are not provided by the Contractor in compliance with Clauses within the Specification, then either the Engineer via the CU Project Manager, Contractor Administrator and/or Main Contractor may arrange without further notification to the Contractor for them to be prepared by other persons.

The full and total cost of this work along with all associated costs incurred by any other party shall then be deducted from the Consultant's or Contractor's account. Negative results will be achieved during the University post contract reviews which will affect the future use of a Consultant or Contractor who failed to deliver what is requested.

3. Emergency Shutdown Procedures

This information should be referred to in an emergency situation in plain terms for use in emergencies covering possible out of hours use.

ISSUED COPY

Companies and Organisations that were responsible for break down cover during the 12 months defect warranty period. This should support a formal reporting process of all defect works during this period.



O&M_00002.3

Estates - Operations & Maintenance

Version 2.0 27/01/2020

Mechanical Services Installation Contractor

Sub Contractor

Sub Contractor

5 Design & Construction Team Members

Companies and Organisations that were responsible for the design, construction and installation of this project are listed below for reference purposes.

Client

Architect

Main Contactor

Mechanical Services Consultant

Mechanical Services Installation Contractor

Sub Contractor

6 Design Parameters

Data on general design parameters and associated normal operating temperatures, pressures, etc., based on the commissioning tests and detailed results of all commission tests and regulating valve and damper settings are to be recorded, and pump and fans performance curves with actual performance point marked.

ISSUED COPY

7 Controls Philosophy

A detailed description of the scope, purpose and manner of working of each system of automatic controls and/or monitoring instruments.

ISSUED COPY

8 Automatic Control System Settings

System settings for achieve design parameters, including internal wiring diagrams of equipment and panels

ISSUED COPY

9 Schedule of Components

Schedule of all plant, equipment, fixtures and fittings. Their manufacturers details, locations and settings.
Legend for colour coding of all services

10 Manufacturers Contact Details

ISSUED COPY

The names and addresses of suppliers of all major components of the works as may potentially be required to obtain spare parts or replacements. The names and addresses of suppliers of oils and greases together with a schedule of various types required, and where applicable any special limitation on usage

ISSUED COPY

11 Operating Instructions

O&M_00002
Estates - Operations & Maintenance

Version 2.0 27/01/2020

Clear and comprehensive instructions for the starting up, running and shutdown of each system or apparatus. Instructions in respect of the care of apparatus normally subject to seasonal disuse.

Instructions in respect of any precautionary measures from time to time as necessary.

ISSUED COPY

12 Technical Literature Manual

Manufacturer's literature for all plant and equipment, fixtures and fittings. Copies of manufacturers data with respect of the nature, type and method of operation of individual pieces of equipment, together with their detailed Maintenance Instructions. General manufacturers information will not be acceptable without specific details clearly marked up. Such data, in the form of individual booklets and the like shall be indexed and cross-referenced to the Operating and Maintenance Instructions and may be presented, suitably protected, in box files or folders

ISSUED COPY

13 Preventative Maintenance Procedures & Equipment

Instructions as to the nature, extent and frequency of servicing necessary to properly maintain the works in good condition, and the materials to be utilised for this purpose. This information may be supported in detail but not replaced by Maintenance Instructions provided by the suppliers of particular component apparatus.

ISSUED COPY

Spares, tools, and test equipment being supplied under contract including types of lubricant required for each item and frequency of lubrication plus list of additional recommended spares

Should the Contractor be required to provide any spare equipment as part of the Contract, the exact requirements and details shall be as defined in the particular specification.

Any spare items of equipment which may be specified shall be handed over to the Engineer or Clerk of Works, and written receipt obtained. Two sets of any special tools required for maintenance shall be provided. At least two keys are to be provided for each individual lock.

The Contractor shall provide to the Employer the following items for maintenance and operation of the plant.

- a) Cleaning tools and tool holder for boiler(s).
- b) Two spare washers and renewable discs for each size of valve as necessary
- c) Sufficient lubricating oils, greases, packing materials as appropriate for plant, valves etc., for twelve month period after handover.
- d) Two keys for each size of lockshield valve
- e) Two keys for air vents.
- f) Other specialist tools etc., as may be supplied by manufacturers or necessary in maintaining the plant in good operation. In addition a small tool kit containing pliers, 1 small and 1 large screwdriver, 1 set of open ended and 1 set of ring spanners.
- g) 2 No. fusible links for each fire damper, up to a total of 24
- h) 1 set of each sized strainer. In additional strainers shall be cleaned before and after testing/commissioning.
- i) One set of spare filter material for each plant, in addition to a clean set of filter media, which shall be provided after completion of plant testing and commissioning.
- j) 1 No. spare load limit relay to be provided when screw or centrifugal refrigeration machines are installed or when specifically called for.
- k) 1 No. spare set of 'O' rings for evaporator/condenser when required
- l) 1 No. spare set of bursting discs when applicable.
- m) 1 No. spare set of joint rings for each calorifier/ storage cylinder/heat exchanger.
- n) 1 No. bulb for each run and trip light, up to a total of 24.
- o) 1 No. spare set of vee belts for each motor/fan or pump drive
- p) 6 No. spare control relays.
- q) 3 No. spare fuses for each fuse rating installed.

The contractor shall submit a schedule to the C.A. of spare parts recommended to be obtained and kept in stock by the Employer for the maintenance of the services installations. State against each item the manufacturer's current price including packaging and delivery to site.

15 Fault Finding Procedures

Procedures for fault finding.

Procedures to adopt in an emergency should any item fail in its operation

ISSUED COPY

16 Commissioning Results & Test Records

Statutory Test and Inspection Certificates for Pressure vessels (Including a written scheme of examination), Fire Protection Services (dry risers/sprinklers etc.), Water Hygiene (DHWS/CWS systems certified as meeting the requirements of BS6700).

Full commissioning data for all air / water & refrigerant based systems including schedule of actual measured duties as a percentage of design.

ISSUED COPY

17 Index of Record Drawing Numbers and Titles

ISSUED COPY

18 As Fitted Drawings

All to be Supplied In plastic wallets, minimum size of A1, or A0 where required

Prior to Practical Completion the contractor shall maintain on site a marked up set of working drawings indicating any changes that occur.

Record drawings shall be produced from these and shall reflect a true representation of the installation.. The drawings shall include all information necessary (or refer to the relevant section of the O & M manuals) so that each installation can be operated, maintained, inspected and tested so as to prevent danger as far as practical.

One Set of drawing shall be submitted with the O&M Contractor for comment. At Practical Completion the Contractor shall supply one set of "As Fitted" record drawings of the whole of the works of each installation. These shall incorporate comments made by the Engineer on the preliminary Record Drawings.

The drawings shall comprise but not be limited to: -

- a) General arrangements of all services to at least 1:50 scale unless agreed otherwise with the Engineer.
Separate drawing for Foul & Storm Drainage, HWS, CWS, Heating & Ventilation Systems and any other installed mechanical system as instructed by the mechanical systems project consultant.

Please follow the University BIM protocol, EIR and AIR and assets template issued for this project

A BIM model should be handed over alongside extracted DWG CAD drawings and PDF versions of the drawings.

Native Revit BIM models should be handed over alongside the IFC and any NWD files.

Files shall be uncorrupted and configured in a manner to enable further revisions to be undertaken at a later date. Copyright of Record drawings shall pass to the Employer.

Note that all drawings must be produced in accordance with current Coventry University Estates BIM Protocol

In addition the Contractor shall obtain and provide one set of manufacturers' detailed drawings of all switchgear, wiring diagrams, etc., as may be appropriate. These drawings need not be prepared especially as record drawings but may be copies of the manufacturers working drawings with suitable titles and reference numbers added. Where the drawings are of a generic nature a specific reference to the equipment installed shall be added