



01782

Operation and Maintenance Data

This document provides design standards only, and is not intended for use, in whole or in part, as a specification. Do not copy this information verbatim in specifications or in notes on drawings. Refer questions and comments regarding the content and use of this document to the Yale University Project Manager.

CONTENTS

- A. [Summary](#)
- B. [Definitions](#)
- C. [Submittals](#)
- D. [Operation and Maintenance Documentation Directory](#)
- E. [O&M Manual Organization](#)
- F. [Special Control System O&M Manuals](#)
- G. [Product Safety/Data Manual](#)

A. Summary

This section includes administrative and procedural requirements for preparing and submitting operation and maintenance manuals.

B. Definitions

1. System—an organized collection of parts, equipment, or subsystems united by regular interaction.
2. Subsystem—a portion of a system with characteristics similar to a system.

C. Submittals

Submit operation and maintenance documentation in accordance with the following requirements.

1. Submittal Schedule

Submit three copies of each O&M manual in final form at least 15 days before final inspection. O&M documentation is required before occupation of the building by Yale University.



2. Coordination

Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by the representatives, and prepare the manuals.

3. Binding

- a. Bind each manual in a loose-leaf, three-ring binder of the following size and quality:
 - Ring size (thickness): as necessary to accommodate the contents
 - Dimensions: 8-1/2" x 11"
 - Covering: vinyl
 - Quality: heavy-duty, commercial-quality
- b. The binder must include pockets inside the front and back covers to hold folded sheets.
- c. The binder must include clear plastic sleeves on the front cover and spine to hold a cover sheet and label containing the following information:
 - Title: Operation and Maintenance Manual
 - Project name
 - System, subsystem, or equipment name
 - Volume number (as appropriate)
- d. If necessary, separate the contents of the manual into two or more volumes to accommodate the data. Group the information in each volume by subsystem and related components. Provide appropriate cross-references to information contained in other volumes.
- e. Provide heavy, paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate its contents. Include a description of the section contents on the front of each divider.
- f. Use the manufacturer's standard printed material. If unavailable, print the required content on 8-1/2" x 11", 20 lb/sq ft, white bond paper.



- g. Attach reinforced, punched binder tabs on drawings and bind them with the text. Fold oversize drawings to the same size as the text pages for use as fold-outs. If a drawing is too large for a fold-out, fold it neatly and place it in the front or back pocket of the binder. Insert a page at the appropriate place in the manual containing the drawing title, a description of the drawing, and its location (front or back pocket).
- h. Place diagnostic software CDs for computerized electronic equipment inside protective, transparent, plastic sleeves.

D. Operation and Maintenance Documentation Directory

Provide an operation and maintenance documentation directory that includes the following elements.

1. Organization

Include a section in the directory for each of the following:

- List of documents
- List of systems
- List of equipment
- Table of contents

2. List of Systems and Subsystems

List systems alphabetically. Include references to O&M manuals that contain information about each system.

3. List of Equipment

List equipment for each system, organized alphabetically by system. List pieces of equipment not part of a system alphabetically in separate list.

4. Tables of Contents

Include a table of contents for each O&M manual.



5. Identification

In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the contract documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

E. O&M Manual Organization

Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual must contain a title page; a table of contents; copies of product data supplemented by drawings and written text; and copies of each warranty, bond, and service contract issued.

1. Title Page

Provide a title page in a transparent, plastic envelope as the first sheet of each manual. The title sheet must contain the following information.

- Subject matter covered in the manual
- Name and address of the project
- Date of submittal
- Name, address, and telephone number of the contractor
- Name and address of the architect/engineer

2. Contractor List

Provide contact information for the following project personnel:

- General Contractor
- Sub-contractors
- Primary Vendors
- Primary Suppliers

The contact information should include the following information.

- Company name
- Address
- Phone number
- Name and phone number for main contact person for project
- Company web address/URL



3. Table of Contents

Provide a table of contents for each volume, after the title page.

4. General Information

Provide a general information section immediately following the table of contents. List each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or installer and the maintenance contractor. Clearly delineate the extent of their responsibility for the product. Include a local source for replacement parts and equipment.

5. Product Data/Systems and Equipment

Where the manuals include the manufacturer's standard printed data, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the project includes more than one item in a tabular format, identify each item, using appropriate references from the contract documents. Identify data that is applicable to the installation, and delete references to information that is not applicable. Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.

a. Description

Provide a complete description of each unit and related component parts, including:

- Name of manufacturer, model number, serial number, and equipment tag number
- General description of system or equipment function and its purpose
- Operating characteristics
- Limiting conditions
- Performance curves
- Engineering data and tests
- Complete nomenclature and number of replacement parts
- Design factors and assumptions



b. Manufacturers' Information

Provide the following information for each manufacturer of a component part or piece of equipment.

- Printed operation and maintenance instructions
- Assembly drawings, wiring diagrams, and diagrams required for maintenance
- List of items recommended to be stocked as spare parts
- Shop drawings, engineering data, and product data
- Warranty data and copies of warranties

c. Maintenance Procedures

Provide essential maintenance procedures, including:

- Routine operating procedures
- Troubleshooting procedures
- Calibration procedures
- Disassembly, repair, and reassembly procedures
- Alignment, adjusting, and checking procedures
- Inspection and testing procedures

d. Operating Procedures

Provide equipment and system operating procedures, including:

- Testing procedures
- Startup procedures
- Equipment or system break-in procedures
- Routine and normal operating procedures
- Regulation and control procedures
- Stopping procedures
- Shutdown and emergency procedures
- Summer and winter operating procedures
- Special operating procedures
- Required sequences for electric or electronic systems
- Precautions against improper use



e. Servicing Schedule

Provide a schedule of routine preventative maintenance and lubrication requirements, including a list of required lubricants for equipment with moving parts.

f. Controls

Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls. Refer to the requirements in specification section 15950, Energy Management and Controls System, and section 15960, Laboratory Airflow Control System.

g. Coordination Drawings

Provide each contractor's coordination drawings.

- (1) Provide as-installed, color-coded, piping diagrams, where required for identification.
- (2) Provide charts of valve-tag numbers, with the location and function of each valve.

h. Circuit Directories

- (1) Provide complete panel-board circuit directories for electric and electronic systems, including:
 - Electric service
 - Controls
 - Communication
- (2) Refer to the requirements in specification section 15950, Energy Management and Controls System, and section 15960, Laboratory Airflow Control System.

F. Special Control System O&M Manuals

See the content requirement in specification section 15950, Energy Management and Controls System, and section 15960, Laboratory Airflow Control System.

G. Product Safety/Data Manual

Provide three copies of a manual containing product safety/data sheets for all project products, arranged in accordance with CSI MasterFormat®