

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART I - GENERAL

1.1 SUMMARY

- A. Operation and Maintenance Data shall be submitted in appropriately-sized binders, with dividers, and organized by each piece of equipment or system.
- B. Operation and Maintenance Data include the following:
 - 1. Title Page.
 - 2. Spine Label.
 - 3. Table of Contents.
 - 4. Contact Information.
 - 5. Contents Specific to Type of Manual (Equipment and Systems, or Materials and Finishes).
- C. Store Operation and Maintenance Data in the field office apart from documents used for construction. Do not use Closeout Submittal Data for construction purposes. Maintain Closeout Submittal Data in good order and in a clean, dry, legible condition. Make all Closeout Submittal Data available at all times for the Owner's and PSC's inspections.
- D. Each Contractor is responsible for obtaining, recording, and maintaining Operation and Maintenance Data applicable to its own Work. The Coordinating Contractor is responsible for coordinating information, where information from more than one Contractor is to be integrated with information from other Contractors to form one Closeout Submittal.

1.2 RELATED SECTIONS:

[Note to PSC: Include these sections in the Contract Documents, even though some are not included in the U of I Facilities Standards]

- A. *Section 01 33 23 – Shop Drawings, Product Data, and Samples*
- B. *Section 01 78 39 – Project Record Documents*
- C. *Section 01 74 00 - Warranties and Bonds*
- D. *Exhibit 01 33 23-1 – F&S Electronic Construction Submittal Process*

PART 2 - PRODUCTS

2.1 MANUALS – GENERAL

- A. Format and organization:
 - 1. Format:
 - a. Binders: Heavy-duty, 3-ring, vinyl-covered binders, in thickness to match contents, sized to hold 8.5"x11" paper. Use multiple binders if contents are over 3" thick.
 - b. Binder dividers: Heavy-paper dividers with plastic-covered tabs for each section.
 - c. Drawings: If oversize drawings are necessary, fold drawings to same size as text pages and use as fold-outs. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes.

2. Organization:
 - a. Separate manuals by Specification Division. No manual should cover more than one Specification Division.
 - b. Divide each Specification Division by Specification Section.
 - c. Divide each Specification Section by piece of equipment (using equipment ID).
- B. General requirements. Each manual shall contain:
1. Cover and Title Page. Include the following:
 - a. U of I Official Project Name.
 - b. UI of I Official Project Number.
 - c. Words "Operation & Maintenance Manual".
 - d. Specification section covered, including number and name.
 - e. Name of Contractor.
 - f. Date of submittal.
 - g. Short list of contents.
 2. Spine Label. Include the following:
 - a. U of I Official Project Name.
 - b. Words "Operation & Maintenance Manual."
 - c. Specification section covered, including number and name.
 - d. Date of submittal.
 3. Table of Contents. Include the following:
 - a. List each item included in the manual, identified by product name and specification section.
 4. Contact Information. Include the following:
 - a. List each Contractor's name, contact, address, phone, and e-mail for each item covered, including emergency contact information.
 5. Contents specific to Manual Type. See next section.
- C. Manual Type: Equipment and Systems Manuals. Include the following contents:
1. Manufacturer's Product Data for each major component. Include the following:
 - a. Significant design criteria.
 - b. List of equipment components.
 - c. Product name, model number, and serial number, if applicable. If Product Data sheets contain information about multiple products, mark each sheet to identify product incorporated into Work in such a way as to be reproducible with black and white copying.
 - d. Manufacturer's name.
 - e. Equipment function description.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - i. Engineering data and tests.
 - j. Wiring, piping and control diagrams. Include color-coding key where required.
 - k. Troubleshooting guide. Preferably include chart with three columns (malfunction, probable cause, recommended action). Troubleshooting instructions shall be predicated upon a logical effect-to-cause philosophy and a rapid replacement procedure to minimize equipment downtime.
 - l. License requirements.
 - m. Manufacturer's Installation Instructions for each major component. Include instructions that ship with the unit.
 2. Manufacturer's Operational Instructions for each major component. Include the following:
 - a. Operating procedures, including sequence of operation for normal, seasonal, and special condition operations. Include start-up, break-in, and shut-down

- procedures. Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
 - b. Operating instructions that ship with the unit.
 - c. Checklists.
 - d. Operating logs, if recommended.
 - e. Precautions against improper use.
- 3. Supplemental Shop Drawings for entire equipment or system. Coordinate with information in Record Contract Drawings to ensure correct illustration of completed installation. Illustrate the following:
 - a. The relationship of equipment components and system components to each other.
 - b. Control sequences.
 - c. Flow diagrams.
 - d. If control drawings, include full points list, set point schedules, and set points after calibrations performed by contractor (not commissioning).
- 4. Manufacturer's Preventive Maintenance Instructions for each major component. Include the following:
 - a. Maintenance procedures, including test and inspection instructions, disassembly instructions, cleaning, minor repairs, and adjusting instructions that detail essential maintenance procedures. Include test points and values, and sensor calibration requirements and methods.
 - b. Maintenance and service schedules, including service and lubrication requirements, list of lubricants for equipment, cleaning, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - c. Spare parts documentation, including spare parts list, parts diagrams, complete nomenclature and number of parts, replacement and repair parts, parts identified and cross-referenced to maintenance documentation, and local sources of maintenance materials and related services.
 - d. Maintenance service contracts, including copy of service agreement and service agent name and contact information.
 - e. Exploded equipment views.
 - f. Precautions against improper maintenance.
- 5. Warranties and Bonds. Include the following:
 - a. Warranty and/or bond.
 - b. List of circumstances and conditions that would affect validity of warranty or bond.
- 6. Functional Performance Tests. Include the following:
 - a. Start-up record.
 - b. Copies of required tests, when required in Divisions 2 through 48 or when otherwise applicable (not including Test & Balance Reports – see 01 33 23), including submitting additional copies directly to governing authorities.
- 7. Safety Precautions. Include the following:
 - a. List of precautions to be following before, during, and after operation, maintenance, or emergencies.
 - b. Provide equipment- and/or system-specific Lockout/Tagout procedures for the isolation of hazardous energy and materials including but not limited to electrical, hydraulic, chemical, mechanical, pneumatic, thermal, gravitational, potential, and hazardous materials. Include the following:
 - 1) Equipment ID(s) and description(s);
 - 2) Location: building name, building number, location in building;
 - 3) Specific statement of intended use;
 - 4) Specific procedural steps for shutting down, isolating, blocking and securing machines and equipment; and
 - 5) Specific procedural steps for placement, removal and transfer of lockout devices or tagout devices, and the responsibility for them.

8. Emergency Procedures. Include the following:
 - a. Emergency response instructions, organized by type of emergency, including equipment trouble indications and specific response procedure.
 - b. Operating instructions for partial equipment failure conditions.
 9. Building Management System/Building Automation System Information:
 - a. BMS/BAS Network Architecture Diagrams
 - b. BMS/BAS Input / Output Point List
 - c. BMS/BAS Integration and Mapping Details
 - d. BAS Licensing, Programming, and Engineering Tools
 - e. Images and/or screen shots of final graphical user interfaces for each installed
- D. Manual Type: Materials and Finishes. Include the following contents:
1. Manufacturer's Product Data. Include the following:
 - a. Product name and model number. If Product Data sheets contain information about multiple products, mark each sheet to identify product incorporated into Work in such a way as to be reproducible with black & white copying.
 - b. Color, pattern, size and texture.
 - c. Material and chemical composition.
 - d. Reordering information for specially manufactured products.
 2. Manufacturer's Maintenance Procedures. Include the following:
 - a. Inspection procedures.
 - b. Schedule for maintenance.
 - c. Types of cleaning agents.
 - d. Methods of cleaning.
 - e. Schedule for cleaning.
 3. Manufacturer's recommended Repair Materials and Sources. Include the following:
 - a. List of repair materials.
 - b. List of local sources of materials and related services.
 - c. Repair instructions.
 4. Warranties and Bonds. Include the following:
 - a. Warranty and/or bond.
 - b. List of circumstances and conditions that would affect validity of warranty or bond.

PART 3 - EXECUTION

3.1 RECORDING

- A. During construction, maintain a set of Operation and Maintenance Data specifically for the purpose of creating Close-out Submittals, separate from the set used for construction.
- B. Maintain Operation and Maintenance Data in good order and in a clean, dry, legible condition.
- C. Mark Operation and Maintenance Data to indicate actual work details.
- D. Mark important additional information that was either shown schematically or omitted from Contract Documents.
- E. Mark Operation and Maintenance Data completely and accurately.
- F. Mark Operation and Maintenance Data in such a way as to be reproducible in black and white copying.

- G. Make all Operation and Maintenance Data available at all times for the Owner's and AE's inspections.

3.2 RESPONSIBILITY FOR MARKUP

- A. The individual or entity responsible for the Work involving the equipment, system, or product is responsible for maintaining Operation and Maintenance Data Closeout Submittals.
 - 1. Record changes and modifications as they occur – do not wait until the end of the Project.
 - 2. Record and check the markup prior to enclosing concealed installations.

3.3 SUBMISSION AND DISTRIBUTION

- A. After completing Work, prepare Operation and Maintenance Data Closeout Submittals for submission.
 - 1. Each Contractor is responsible for submitting Operation and Maintenance Data Closeout Submittals to the Coordinating Contractor.
 - 2. Each Contractor shall submit all Operation and Maintenance Manuals related to each Contractor's particular Work, whether or not changes and additional information were recorded.
 - 3. For equipment that requires commissioning, within sixty (60) calendar days after review of equipment shop drawings, Coordinating Contractor shall submit one (1) draft copy of the Operation and Maintenance Manual on CD to the PSC and Contracted Commissioning Agent for review . Review comments will be returned to the Coordinating Contractor within thirty (30) days after receipt by the PSC and Contracted Commissioning Agent. Manuals must be submitted no later than thirty (30) days prior to final requirements in paragraph 4.
 - 4. Prior to Substantial Completion, the Coordinating Contractor shall submit to the PSC one (1) copy of each final approved Operation and Maintenance Manual, and _____ copy on CD (minimum one for owner) (electronic copy shall follow all formatting requirements of *Exhibit 01 33 23-1 – F&S Electronic Construction Submittal Process*, "File Naming and File Formats" section for "O&M Manuals") – all items in pdf format with as-built drawings also in cad (such as controls and fire alarm) and schedules also in excel (such as valve, equipment, finishes).
 - 5. Follow "File Naming and File Formats" requirements found in Exhibit 01 33 23-01 "F&S Electronic Construction Submittal Process"
 - 6. Transmit each submittal by use of a transmittal form.

END OF SECTION 01 78 23

This section of the *U of I Facilities Standards* establishes minimum requirements only.
It should not be used as a complete specification.