**SECTION 01 78 23**

**OPERATION AND MAINTENANCE DATA**

**PART 1 GENERAL**

1. SECTION INCLUDES:
	1. Format and content of manuals
	2. Instruction of Owner's personnel
	3. Schedule of submittals
2. QUALITY ASSURANCE
	1. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
3. FORMAT
	1. Prepare data in the form of an instructional manual.
	2. Prepare data in electronic format and submit on CD or DVD.
		1. Submit four (4) copies of the CD or DVD
		2. When multiple disks are used, correlate data into related consistent groupings
	3. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of project; identify subject matter of contents.
	4. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
	5. Provide manufacturer's printed data, or typewritten data.
	6. Drawings: Provide with reinforced punched binder tab; fold larger drawings to size of text pages.
	7. Prepare a table of contents for each volume, with each product or system description identified, in three parts as follows:
		1. Part 1: Directory listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
		2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section for each category, identify names, addresses, and telephone numbers of subcontractors and suppliers.
			1. Significant design criteria
			2. List of equipment and parts list for each component
			3. Operating instructions
			4. Maintenance instructions for equipment and systems
			5. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
		3. Part 3: Project documents and certificates, including the following:
			1. Shop drawings and product data
			2. Product submittals as outlined in Section 01 33 00, Paragraph 1.5.
			3. Certificates and originals of warranties and bonds
4. CONTENTS, EACH VOLUME
	1. Provide a table of contents with title of project; names, addresses, and telephone numbers of Architect, Sub-consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
	2. For each product or system list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
	3. Product data - mark each document sheet to identify specific products and component parts, and data applicable to installation, delete inapplicable information.
	4. Drawings - supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
	5. Typed text as required supplementing product data, providing logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 40 00.
	6. Warranties - bind in a copy of each as specified in Section 01 78 36.
	7. Bonds - bind in photocopy and original of each.
5. MANUAL FOR MATERIALS AND FINISHES
	1. Building products, applied materials, and finishes - include product data, with catalog number, size, composition, and color and texture designations.
		1. Provide information for reordering custom manufactured products.
		2. Provide complete itemized paint color list stating manufacturer, color name, interior or exterior, and finish for each color used.
	2. Instructions for care and maintenance - include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
	3. Moisture protection and weather-exposed products - include product data listing applicable reference standards, chemical composition, and details of installation.
		1. Provide recommendations for inspections, maintenance, and repair.
	4. Additional requirements as specified in individual product specification sections.
6. MANUAL FOR EQUIPMENT AND SYSTEMS
	1. Refer to Section 01 91 00 – Commissioning for additional requirements concerning Systems Operations & Maintenance Manuals.
	2. For each item of equipment and each system, include the description of the unit or system, and component parts identifying function, normal operating characteristics, and limiting conditions.
		1. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
	3. Panel board circuit directories - provide electrical service characteristics, controls, and communications by label machine.
		1. Include color-coded wiring diagrams as installed.
	4. Operating procedures include:
		1. Startup, break-in, and routine normal operating instructions and sequences
		2. Regulation, control, stopping, shut down, and emergency instructions
		3. Summer, winter, and any special operating instructions
	5. Maintenance Requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
	6. Provide servicing and lubrication schedule, and list of lubricants required.
	7. Include manufacturer's printed operation and maintenance instructions.
	8. Include sequence of operation by controls manufacturer.
	9. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
	10. Provide control diagrams by controls manufacturer as installed.
	11. Provide Contractor's coordination drawings, with color-coded piping diagrams as installed.
	12. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
7. INSTRUCTION OF OWNER PERSONNEL
	1. See Section 01 91 00 – "Commissioning" for requirements on Instruction of Owner Personnel.
	2. Before final inspection, instruct the Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
	3. List all equipment requiring seasonal operation performance instructions for other seasons within six months.
	4. Use operation and maintenance manuals as basis for instruction.
8. SUBMITTALS
	1. Submit two final draft copies of completed volumes fifteen days prior to the scheduled Functional Performance Testing, the Architect/Engineer, and Commissioning Authority will return with comments after functional performance testing.
		1. Revise content of all document sets as required prior to final submission.
		2. Final Draft Operations and Maintenance Manuals will include updated information from the Preliminary Draft Operations and Maintenance Manuals.
		3. Final Draft Operations and Maintenance Manuals will include System Sequence of Operations, including all set points, as approved prior to Functional Performance Testing.
	2. Submit two sets of Final Operations and Maintenance Manuals, within ten days after final inspection at least fifteen days prior to substantial completion.
	3. The Final Operations and Maintenance Manuals will incorporate review comments from the Owner, Commissioning Authority, and Architect/Engineer.
	4. The Final Operations and Maintenance Manuals shall incorporate any changes in the Systems Sequences of Operations identified during Functional Performance Testing.
	5. See Section 01 91 00 – Commissioning for requirements on Submittals of Operation & Maintenance Data.

**PART 2 PRODUCTS**

1. Not Used.

**PART 3 EXECUTION**

1. Not Used.

END OF SECTION