

Mechanical – Purchase Specs

23 08 00.11 Mechanical Meter Integration and Commissioning

PART 1 – GENERAL

1.01 DESCRIPTION

A. Purpose

1. The purpose of this section is to specify Contractor responsibilities and participation in the mechanical meter integration and commissioning process.

B. General

1. Commissioning support is the responsibility of the Contractor (including subcontractors and vendors).
 - a. The commissioning process requires Contractor participation to ensure all portions of the work have been completed in a satisfactory and fully operational manner. The Contractor is responsible to provide all support required for start-up, testing, and commissioning.
2. Work of this section includes the following:
 - a. Start-up and testing of the equipment
 - b. Assistance in testing, adjusting and balancing
 - c. Operating equipment and systems as required for commissioning tests
 - d. Provide Testing Plans to the Owner for review and approval prior to commissioning.
 - e. Providing qualified personnel for participation in commissioning test, including seasonal testing required after the initial commissioning
 - f. Providing equipment, materials, and labor necessary to correct deficiencies found during the commissioning process, which fulfill contract and warranty requirements
 - g. Providing operation and maintenance information and as-built drawings to the Owner for verification.
 - h. Providing training for the systems specified in this Division with the Owner's Representative.
3. The project shall reimburse Facilities Services for cost of the owner's System Integration contractor services.

1.02 RELATED SECTIONS

- A. All start-up and testing procedures and documentation requirements specified within Division 23 and Division 33.

1.03 REFERENCES

- A. Applicable codes, standards, and references □ All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein:
 - 1. International Electrical Testing Association - NETA
 - 2. National Electrical Manufacturer's Association - NEMA
 - 3. American Society for Testing and Materials - ASTM
 - 4. American Water Works Association - AWWA
 - 5. American National Standards Institute - ANSI
 - 6. National Electrical Safety Code - C2
 - 7. State and local codes and ordinances
 - 8. Occupational Safety and Health Administration - OSHA 29CFR Part 1910.269
 - 9. National Fire Protection Association - NFPA
- B. All inspections and tests shall utilize the following references:
 - 1. Project design drawings and specifications
 - 2. Shop drawings and submittals
 - 3. Approved manufacturer's instruction manuals applicable to each particular apparatus
 - 4. Applicable NETA acceptance testing work scope sections per NETA ATS 1999

1.04 COORDINATION

- A. Coordinate the completion of all mechanical testing, inspection, and calibration prior to the start of commissioning activities.
- B. Coordinate factory field-testing and assistance per the requirements of this section.
- C. The Contractor shall coordinate and cooperate in the following manner:
 - 1. Allow a minimum of 10 working days before final commissioning dates to complete mechanical testing, inspection, and calibration to avoid delays in the commissioning process.
 - 2. During the commissioning activities, provide labor and material to make corrections when required, without undue delay.

1.05 UW NETWORK INTEGRATION

- A. Owner's System Integration (SI) contractor shall program the Owner's aggregation software to read the installed mechanical metering equipment. Contractor shall coordinate this work with the Owner and Owner's SI contractor to ensure all programming is complete prior to commissioning.

1.06 SUBMITTALS

- A. General
 - 1. Submittals shall be in accordance with all Contract Documents and Division 01 Specification Sections.

2. Contractor shall provide information required on form found in Appendix A and submit to Owner.

1.07 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Operations and Maintenance Manuals shall be in accordance with Conditions of the Contract and Division 01 Specification Sections.

1.08 SCHEDULE

- A. Complete and make fully functional all phases of electrical work pertinent to the Commissioning Tests, prior to the testing date.

1.09 MEETINGS

- A. Attend Commissioning Meetings as required by the Owner.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide test equipment as necessary for start-up and commissioning of the mechanical equipment and systems.

2.02 TEST EQUIPMENT - PROPRIETARY

- A. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment.
 1. Manufacturer shall demonstrate its use, and assist the Contractor in the commissioning process.
 2. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
- B. Identify the proprietary test equipment required in the test procedure submittals and in a separate list of equipment to be included in the Operations and Maintenance Manuals.

PART 3 - EXECUTION

3.01 REQUIREMENTS

- A. Work prior to commissioning:
 1. Complete all phases of work so the system can be started, tested, adjusted, balanced, and otherwise commissioned.

- a. Contractor has primary start-up responsibilities with obligations to complete systems, including all sub-systems so they are fully functional.
 - b. This includes the complete installation of all equipment, materials, conduit, wire, controls, etc., per the contract documents and related directives, clarifications, change orders, etc.
2. Complete all equipment programming prior to commissioning.
- a. Steam Condensate Meters, Steam Condensate Submeters, and Hot Water Submeters
 - i. Meters shall be programmed by the Owner prior to connecting the meter to the Data Collection controller.
 - ii. Meter program parameters shall be approved by the Owner or the SI.
 - b. Central Cooling Water Meters
 - i. Meters shall be programmed by the owner prior to connecting the meter to the Data Collection Controller.
 - ii. Meter program parameters shall include at a minimum the following outputs: supply temperature, return temperature, gallons per minute (GPM), btu/hr, gallons and btu (dual mode). Meter programming parameters shall be approved by the Owner or the SI.
 - c. Sewer Submeter
 - i. Meter shall be programmed by the owner to meet Seattle Public Utilities (SPU) requirements.
 - ii. Meter programming parameters shall be approved by the Owner or the SI
 - d. UW Water Meter and Submeters
 - i. Meters shall be programmed by the owner prior to connecting the meter to the Data Collection controller.
 - ii. Meter program parameters shall be approved by the Owner or the SI.
 - e. UW Gas Meter and Submeters
 - i. Meter shall be programmed by the owner prior to connecting the meter to the Data Collection Controller.
 - ii. Meter programming parameters shall be approved by the Owner or the SI
 - f. Data Collection Controller
 - i. Data Collection Controller shall be programmed by the Owner or SI prior to connecting to the Owner's facility network.
 - ii. Data Collection Controller program parameters shall be approved by the Owner or the SI.
 - iii. Data Collection Controller shall be connected to all applicable meters and all wiring shall be approved before being connected to the Owner's facility network.
 - g. Aggregation Software

- i. Aggregation software shall be programmed by the SI
 - ii. Aggregation software shall have new screens created by the SI.
 - iii. The SI shall ensure each meter is being read by the aggregation software.
- 3. A commissioning plan will be developed by the Owner's Representative and approved by the Owner.
 - a. Minimum requirements for the commissioning plan shall include the following:
 - i. Verify meter part number
 - ii. Review of the mechanical meter's programming parameters:
 - (a) Verify flow rates
 - (b) Verify temperature readings
 - (c) Verify wiring configuration
 - (d) Verify display screens are in accordance with Owner's requirements
 - iii. Verify meter readings
 - (a) Contractor shall provide personnel support the verification of meter readings
 - iv. Verify Data Collection Controller part number
 - v. Verify all meters are properly connected to the Data Collection Controller
 - vi. Verify all meters are properly connected to the facility network
 - vii. Verify communication signals from the meters
 - (a) 4-20 mA communication shall be tested by the test personnel sending a test 4 – 20 mA signal from the transmitter through the receiving device to verify correct wire terminations, and engineering scaling units. A Loop Check testing procedure shall be used and all testing results shall be documented.
 - (b) Modbus TCP/IP communication shall be tested by the test personnel at the server room of the aggregation software.
 - viii. Verify communication between Data Collection Controller and the facility network.
 - (a) Verify data collection controller's IP address
 - ix. Verify all meters are being read by the Owner's aggregation software
 - x. Verify new screens are created in the aggregation software for the new meters
 - b. Standards used in instrument testing must be traceable to the International System of Units (SI) 5. The SI is used by the International Bureau of Weights and Measures (BIPM) to ensure worldwide unification of measurements. The traceability of the standards are maintained by an unbroken chain of calibrations or comparisons linking them to the relevant SI unit of measurement. The test equipment shall display the calibration date, and the calibration due date.

- c. Calibration/test personnel should be trained, qualified, field-experienced metrologists or technicians well-versed in the practices, considerations, and terminology of the user's industry.
 - d. If system modifications/clarifications are in the contractual requirements of this and related sections of work, they will be made at no additional cost to the Owner.
 - e. If Contractor-initiated system changes have been made that alter the commissioning process, the Contractor will notify the Owner's Representative for approval.
- 4. The Contractor shall be responsible for the installation of all equipment prior to commissioning the system. The Contractor shall ensure at a minimum that the following equipment is installed:
 - a. Mechanical meters
 - b. Data Collection Controller
 - c. Communication cable
 - d. Power cables
- 5. Normal start-up services required to bring each system into a fully operational state:
 - a. These include cleaning, testing, control sequences of operation, full and part load performance, etc.
 - b. The Contractor will not begin the commissioning process until each system is complete
- 6. Commissioning is intended to begin upon completion of a system.
 - a. Commissioning may proceed prior to the completion of systems, or sub-systems, and will be coordinated with the General Contractor and Testing Contractor.
 - b. Contractor shall coordinate with the SI to provide programming and configuration prior to commissioning.
 - c. Start of commissioning before system completion will not relieve Contractor from completing those systems as per the schedule.

3.02 PARTICIPATION IN COMMISSIONING

- A. Provide skilled technicians to start up all systems within Division 23 and Division 33.
 - 1. Contractor will ensure that the qualified technician(s) are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustment, and/or problem resolutions.
- B. System problems and discrepancies may require additional Contractor time, redesign and/or reconstruction of systems and system components. The additional Contractor time shall be made available for the subsequent commissioning periods until the required system performance is obtained.
- C. The Owner's Representative reserves the right to judge the appropriateness and qualifications of the Contractor's technicians relative to each item of equipment or system. Qualifications of Contractor's technicians include expert knowledge relative to the specific

equipment involved, adequate documentation and tools to service/commission the equipment, and an attitude/willingness to get the job done in a timely manner.

- D. Contractor shall remove and replace covers of electrical equipment, open access panels, etc., to permit Owner's Representative to observe equipment and controllers provided.
- E. Furnish ladders, flashlights, tools and equipment as necessary.

3.03 WORK TO RESOLVE DEFICIENCIES

- A. In some systems, misadjustments, misapplied equipment and/or deficient performance under varying loads will result in additional work being required to commission the systems.
 - 1. This work will be completed under the direction of the Owner's Representative, with input from the Contractor and equipment supplier.
 - 2. Whereas all members will have input and the opportunity to discuss the work and resolve problems, the Owner's Representative will have final jurisdiction over the work necessary to achieve performance.
- B. Corrective work shall be completed in a timely fashion to permit timely completion of the commissioning process.
 - 1. Experimentation to render system performance will be permitted.
 - 2. If the Owner's Representative deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Contractor shall schedule a meeting with the Owner to discuss the nature of the problem, expected steps to be taken, and the deadline for completion of activities.
 - 3. If deadlines pass without resolution of the problem, the Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem.
 - 4. Any costs incurred to solve the problems in an expeditious manner shall be the Contractor's responsibility.

3.04 SYSTEMS DOCUMENTATION

- A. In addition to the requirements of Division 1, update contract documents to incorporate field changes and revisions to system designs to account for actual constructed configurations.
 - 1. All drawings shall be red-lined on two sets.
 - 2. Contractor as-built drawings shall include architectural floor plans, elevations and details, and the individual electrical systems in relation to actual building layout. Dimensions from a wall or permanent structure shall be shown for any equipment, conduit, cable, etc. installed in a different location than identified in the Contract documents.
- B. Maintain as-built red-lines as required by Division 1.
 - 1. Red-lining of drawings at completion of construction, based on memory of key personnel, is not satisfactory.
 - 2. Continuous and regular red-lining is considered essential and mandatory.

Mechanical Meter Profile Report

Model:	
ID Number:	
Name:	
NVRAM:	

Firmware Versions

FirmWare	Boot	Runtime	Xilinx
Comm			
DSP			

Communication Settings

Item	Port 1	Optical	Port 4
Address			
Baud Rate			
Data Bits			
Parity			
Stop Bits 1			
Tx Delay			
Protocol			
Mode			

Time Setup

Time Zone:	
DST Enabled:	

DST Start:	
DST End:	
Line Sync:	
Frequency:	

Demand Setup**Block Window Sync**

Thermal Averaging Window:		Use Sync Pulse:	
Block Averaging Window:		High Speed Input #:	
Rolling Averaging Sub-Interval Window:		Generate End of Interval Pulse:	
Rolling Sub-Intervals:		Relay #:	
Predictive Rolling Window Average:		Pulse Width (ms):	

Trending Log 1 Interval

Hours	Minutes	Seconds

Trending Log 2 Interval

Hours	Minutes	Seconds

Network Settings

IP Address	
Subnet Mask	
Default Gateway	
Gateway Port Baud Rate	
Gateway Port Delay	

MAC Address (IEEE Registered)	
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DNS Servers

DNS Server 1	
DNS Server 2	

Services

Modbus TCP Server	
Modbus TCP Client	
BACnet IP Server	
BACnet IP Client	
Web Server	
SMTP Server	
SMTP Client	
FTP Server	
FTP Client	
HTTP/Modbus RTU Server	

Alarm/Email

Email Server IP Address/Name	
Email Server Port	
Email Monitor Address	
Return/Reply Address	
Email Subject Text	
Email Server Requires Authentication	
Username	

Password	
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FTP Client

FTP Server IP Address/Name	
FTP Server Port	
Startup Remote Directory	
Username	
Password	

Network Card Firmware Update Via Network

Enabled	
Server Port	
Server IP Address	
Client IP Address	
Subnet Mask	
Default Gateway	
Download Filename	

DNP LAN/WAN Settings

Mode:	
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Connection:

DNP over TCP:		Listen on Port:			
DNP over UDP:		Listen on Port:			
Respond to:					

A	
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