

## Section 01 07900 | Demonstration and Training

### 1. GENERAL

- 1.1. This standard sets the expectations for how University employees will be trained on new equipment and systems and how that training will be documented.

### 2. APPLICABILITY

- 2.1. By default, this standard applies to projects of all sizes on both the healthcare campus and the education campus. Discuss any deviations with the UK Project Manager

### 3. REQUIREMENTS

- 3.1. The attached specification, 017900 - DEMONSTRATION AND TRAINING, provides details on the administrative and procedural requirements for instructing personnel at the University. This specification shall be included in the bid documents. The technical specifications shall indicate what equipment and systems require training. Specification 017900 should be referenced within the technical specifications. An example is below:

#### 3.6 DEMONSTRATION

*A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain VFD.*

- 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.*
- 2. Review data in maintenance manuals.*
- 3. Refer to Specification 017900 DEMONSTRATION AND TRAINING for specific training requirements.*

- 3.2. Any minimum time requirement should be noted in the technical specification for which it applies.

### 4. TRAINING BY DESIGN TEAM

- 4.1. The design team shall provide system-level overview training to the University's staff to familiarize them with the mechanical, electrical, and plumbing systems. Using the design drawings, the design team shall provide the design intent and general operation of each system and its equipment, including interactions with other systems. The overview shall include drawing review and a building walk-through. Systems to be specifically included:

#### 4.1.1. Fire protection system:

- 4.1.1.1. Entry and backflow preventer location
- 4.1.1.2. System main locations
- 4.1.1.3. Risers and zone valves

#### 4.1.2. Plumbing systems:

- 4.1.2.1. Water entry and backflow preventer location
- 4.1.2.2. Domestic hot water system design (heating, storage, and recirculation)
- 4.1.2.3. Natural gas system
- 4.1.2.4. Sanitary System (including grease/oil/acid separators)

- 4.1.2.5. Storm System (including sump pumps)
- 4.1.2.6. Medical gas system and distribution
- 4.1.3.HVAC systems:
  - 4.1.3.1. Air handling systems and duct distribution
  - 4.1.3.2. Heating and chilled water production and distribution
  - 4.1.3.3. Steam systems and equipment
  - 4.1.3.4. HVAC Controls
- 4.1.4.Electrical systems
  - 4.1.4.1. Main power entry and switchgear
  - 4.1.4.2. Power distribution strategy
  - 4.1.4.3. Emergency systems
  - 4.1.4.4. Lighting Systems

## **5. REQUIREMENTS OF A COMMISSIONING AGENT**

- 5.1. For projects with a commissioning agent, the commissioning agent shall have the following responsibilities as it relates to demonstration and training:
  - 5.1.1.Review of specifications and related bid documents to ensure demonstration and training is properly included.
  - 5.1.2.Review of schedules and agendas for the training for adherence to this standard.
  - 5.1.3.Attendance of all training and documentation of attendance (sign-in sheets)
  - 5.1.4.The commissioning agent shall provide professional videographer services. Note that the attached specification will need to be edited to state that the videographer will be provided by the commissioning agent.

## **6. ATTACHMENTS**

Specification 017900 - DEMONSTRATION AND TRAINING

## 017900 – DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video.
- B. Related Sections include the following:
  - 1. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
  - 2. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

## 1.3 SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, include topic of training, instructor's name and title, and expected duration. Include learning objective and outline for each training module. This submission is due when the project is 75% complete.
- B. Qualification Data: For instructor and photographer. Photographer shall be acquired and coordinated by the general contractor or construction manager.
  - 1. If it is decided that a professional photographer will not be required due to the size of a project (at the discretion of the Project Manager), the proposed video and audio recording equipment shall be submitted for approval.
- C. Attendance Record: For each training module, submit list of participants, sign-in sheet, and length of instruction time.
- D. Demonstration and Training Video Files: Submit files within seven days of end of each training module.

## 1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.
- C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  - 1. Inspect and discuss locations and other facilities required for instruction.

2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### 1.5 COORDINATION

- A. Coordinate instruction schedule with the Project Manager. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
  - a. Do not schedule owner training to coincide with the start-up of a piece of equipment or system. The university staff may be invited to watch a start-up, but the formal training shall occur on a date after the equipment or system has been started-up and is operating correctly. All integration to the campus BAS monitoring and control system shall be complete prior to owner training.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

### PART 2 - PRODUCTS

#### 1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows but not limited to:
  1. Motorized doors, including overhead coiling grilles, fire and smoke shutters, and automatic entrance doors.
  2. Equipment, including projection screens, loading dock equipment, vacuum waste systems, food-service equipment and laboratory fume hoods.
  3. Fire-protection systems, including fire alarm, fire pumps and fire-extinguishing systems.
  4. Intrusion detection systems.
  5. Conveying systems, including elevators.
  6. Laboratory equipment, including laboratory water and vacuum equipment and piping.
  7. Medical air, gas, and vacuum equipment and distribution.
  8. Sanitary sewer systems including grease interceptors and acid dilution systems.
  9. Storm systems including sump pumps.
  10. Heat generation, including boilers, feedwater equipment, pumps, steam distribution piping and water distribution piping.

11. Refrigeration systems, including chillers, cooling towers, condensers, pumps and distribution piping.
  12. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
  13. HVAC instrumentation and controls.
  14. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
  15. Packaged engine generators, including transfer switches.
  16. Lighting equipment and controls.
  17. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data and television equipment.
  18. Other Contractor furnished and installed systems and equipment.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project Record Documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.

- b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and re-assembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual. Provide handouts of pertinent training information for each class attendee.
- B. Set up instructional equipment at instruction location.

### 3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed on times. **At least two sessions of the same information for each training module for accommodation of the maintenance staff are required. This requirement accounts for staff working off-shifts. The second training will be required during the off-shift.** More sessions may be required for specific modules which will be noted in project specifications when warranted by equipment type.
- C. Schedule training with Owner with at least 30 days' advance notice.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING VIDEO

- A. General: Engage a qualified commercial photographer to record demonstration and training video. The photographer shall be consistent across all trainings. For this reason, the photographer services shall be acquired and coordinated by the general contractor or

construction manager. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Format: High definition video format in mp4 files.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
- D. Audio: Audio of instruction must be clear and understandable – whether filming takes place in a classroom or an operational mechanical room. Instructor is required to wear a lapel mic or similar.