

Modify Section 25 90 00 per the following (deletions are shown struck through and additions are double underlined). Remainder of section is unchanged.

25 90 00 GUIDE SEQUENCES OF OPERATION

~~Professional shall carefully review and edit these guidelines, adapting them as needed to achieve application-specific, fully developed sequences for each project.~~

.01 General Owner Requirements and Design Intent

A. General

1. OPP Facility Automation Services (FAS) develops and maintains guideline control sequences of operation and schematics and, in some instances, the associated programming for common controlled mechanical systems and components.
2. These guide sequences are intended to provide the Designer of the control sequences with a basic guideline of minimum requirements for each type of equipment or system. The intent is to standardize to the fullest extent practical the control systems sequences, programming, and appearance of the control schematics to achieve greater consistency throughout the University's facilities.
3. OPP FAS has developed standard programming logic corresponding to these guide sequence for some vendors' products. The Design Professional and the Control System Contractor shall coordinate and clearly communicate all intended modifications to the written sequences so that associated changes can be made in the standardized programs.

B. Design Professional Requirements – Design Development Phase

1. The Design Professional shall contact FAS as the ~~mechanical~~ design is being developed to request the most current versions of these guide sequences that would be applicable to the project.
 - a. Contact: Robert R. Krasinski, rrk2@psu.edu
2. The Design Professional shall review and edit ~~all sequences~~, point lists, and generic schematics ~~provided by the University~~ to adapt them to application-specific requirements.

- a. Proposed modifications shall be proactively coordinated with OPP FAS Staff during design phases (prior to major milestone submissions) to allow adequate time for iterative process.
- b. It is not acceptable to submit all modifications without prior FAS involvement just at major milestones submissions and expect OPP/FAS to thoroughly review and comment then during a limited design review schedule.
- c. Once finalized versions of the sequences of control, point lists and schematics for all systems are acceptable to FAS, they shall be included on the project Contract Documents.

C. Control System Contractor Requirements: Pre-BAS Shop Drawing Submittal Phase:

- 1. The Control System Contractor (CSC) shall contact OPP FAS prior to beginning the development of the detailed design submittals for the control system to set up the BAS Intent Meetings as defined in the OPP BAS Guide Specifications. Contact: Tom Ertsgaard, P.E., tse3@psu.edu
 - a. The CSC shall at that time request from OPP FAS any current modifications to the OPP guide sequences and/or associated programming that should be included in the project. Contact: Robert R. Krasinski, rrk2@psu.edu
 - b. Any modifications that would impact the project cost shall be determined and reviewed with the OPP Project Manager.

Document	Version Date	Description
<u>Pumps with VFD's</u>	<u>January 2008</u>	<u>Intended for variable flow HVAC pumping systems using duty/standby pumps with monthly exercise cycle and variable speed drives.</u>
<u>Pumps without VFD's</u>	<u>January 2008</u>	<u>Intended for constant (or staged) flow HVAC pumping systems using duty/standby pumps with monthly exercise cycle.</u>
<u>Heat Exchanger with two valves, 1/3 - 2/3</u>	<u>January 2008</u>	<u>Intended for steam to hot water heat exchangers that have relatively standard operating range and control precision requirements.</u>

Heat Exchanger with two valves, 1/4 – 3/4	January 2008	Intended for steam to hot water heat exchangers that are anticipated to have a very wide operating range and/or require finer part load control precision.
Air Handling Units – Variable Air Volume	November 2010	Intended for typical central station VAV Air Handling Units. Includes strategies for automatic trim and respond reset of fan speed control, discharge air temperature, minimum ventilation, and reset of terminal unit minimum airflow setpoint when in economizer. Sequence was developed for units with chilled water cooling and hot water/steam heating coils. Confer with OPP for other applications.
Blow Through Relief Fan Schematic Blow Through Relief Fan Schematic PDF	November 2010	Control Schematic for typical central station VAV Air Handling Units: with 4 pipe, blow through supply fan, relief fan configuration
Blow Through Return Fan Schematic Blow Through Return Fan Schematic PDF	November 2010	Control Schematic for typical central station VAV Air Handling Units: with 4 pipe, blow through supply fan, return fan configuration.
Draw Through Relief Fan Schematic Draw Through Relief Fan Schematic PDF	November 2010	Control Schematic for typical central station VAV Air Handling Units: with 4 pipe, draw through supply fan, relief fan configuration.
Draw Through Return Fan Schematic Draw Through Return Fan Schematic PDF	November 2010	Control Schematic for typical central station VAV Air Handling Units: with 4 pipe, draw through supply fan, return fan configuration.
Air Terminal Units – Single Duct Variable Air Volume with Hot Water Reheat & Perimeter Heating	June 2013	Intended for typical single duct VAV terminal units. Includes requirements for dual maximum setpoint and discharge air temperature limiting controls.

Enterprise Utility Management System (EUMS) Equipment Control Strategies	October 2013	This document is intended to describe the sequences of operation necessary to accomplish the HVAC functions of the Enterprise Utility Management System (EUMS), a system which incorporates pieces of all the disparate building automation systems, utility monitoring and controls systems along with energy analysis and billing systems.
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END of revision

Update Commentary:

Section was updated primarily for the following reasons:

- 1) *To remove guide sequences of operation from the website because they are subject to frequent modifications and thus are impractical to keep updated on the website.*
- 2) *To require that the Designer and the Control System Contractor always contact OPP FAS contacted for the most current versions available for each project.*