

PART II - PRIMARY SYSTEMS INFORMATION

I. HVAC System

1. Operation

- c. Normal Operating Instructions-** Normal operation of the HVAC system consists of the following:

(1) The system shall operate through a direct digital control system (DDC). See Volume 3, Chapter 2 for the DDC System.

(2) **Air Distribution System:** The air handling units AHU-1 and AHU-2 shall operate subject to the DDC system control. When the DDC system has energized the unit start sequence, all dampers go to their respective positions and AHU supply, return and interlocked fans shall start, then other controls shall operate as follows: The supply fan operation for all units shall be controlled by a duct static pressure sensor controller (set at approximately 1.00 inch W.C.). This controller will provide a signal to the air handling variable frequency drive to vary the fan speed from the minimum air flow to the maximum air flow. An air flow measuring station located in the outside air duct and controller shall modulate the outside air and return air dampers to maintain a constant minimum outside air flow. Air flow measuring stations are located on the fan inlets of the supply and return fans for all air handling units. The variable speed drives on the return fans shall modulate the return fan speed to maintain a constant differential air flow between the supply and return fans. Prefilters mounted in the air handling unit shall provide minimum required filtration as indicated on Filter Schedule on Page 1-9-2. A discharge air thermostat and controller set at 12.7°C DB shall modulate a 3-way chilled water control valve on the cooling coil to maintain a constant leaving discharge air temperature of 12.7°C DB. Upon detection of smoke in the airstream, the smoke detector shall stop the fan and close all of the smoke dampers. Air shall be supplied to variable air volume and constant air volume reheat terminal units from the supply fans. Exhaust fans and return fans interlocked with air handling units shall operate whenever the AHU supply fan is in operation. See Fan Schedule, Page 2-1-1a3 for fan interlocks.

Terminal units for AHU-1 & AHU-2 shall be variable air volume with a hot water heating coil or constant volume with hot water heating coil. The constant volume type is the same as variable volume except it is set for constant volume air flow. A zone temperature sensor set at 23.8°C DB (75° F.) adj. shall modulate the terminal air flow from maximum to minimum, as required to maintain the zone temperature set point. When the minimum air flow is reached and on a further fall in the zone temperature, a hot water control valve shall modulate from closed to open to maintain space temperature. The terminal unit thermostat set points may be set from the DDC System processor. The terminal unit control has a timed override control for system override operation and a night low limit override control for building low limit heating control.

(3) **Building Heating – HWP-1 HWP-2, and Boiler B-1:** The hot water boiler control sequence shall be initiated from the DDC system as follows: When the control system is energized the hot water pumps shall start through the DDC system and “hand-off-auto” switches, when in the “auto” position. When water flow is proven, the boiler controls shall be energized

and shall operate through its own safety and operating controls. An outdoor air temperature sensor and reset controller shall reset the hot water supply discharge temperature from the boiler from 82°C (180° F.) water temperature at 6.1°C (43°F) outside temperature down to 48°C (119° F) water temperature at 15°C (59° F) outside air temperature.

(4) Cooling Operation – ACC-1, CWP-1 & CWP-2: The DDC system shall place the cooling system in operation when the outdoor air temperature is above 12°C (54°F) adjustable. When the control system is energized, the system shall monitor the schedule and temperature for “start” function. The chilled water pumps CWP-1 and CWP-2 shall start. When flow is proven at flow switches on the CWS piping discharge from the chiller the chiller controls shall be energized and the chillers shall operate through their own safety and operating controls to maintain the discharge water temperature set point. Temperature sensors located on CWS and CWR lines at each chiller shall measure water temperature. Differential pressure sensors across each chilled water pump shall signal system of status.

(5) ACC-5 & ACCU-5: The DDC system shall energize the unit controls to start and cycle ACCU-5 to maintain space cooling temperature and humidity. Unit operation shall be in conjunction with terminal unit 2-UU.

(6) Miscellaneous Controls:

Fans Controlled by a Space Thermostat: EF-3 through 7 and SF-1 & SF-4 shall be controlled by a space thermostat set at 30°C (85°F) adjustable. These fans are not subject to control from the DDC system. When the space temperature rises above the set point, the fan shall start. The fan shall stop when the space temperature drops below the set point. Any interlocked dampers shall open and close with fan operation.