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HVAC SEQUENCE OF OPERATION

1. GENERAL SYSTEM OPERATIONS.

1.1. TEMPERATURE CONTROL PANELS. TEMPERATURE CONTROL PANELS (TCP) AND EQUIPMENT CONTROL PANELS (ECP) IDENTIFIED IN THE SEQUENCE OF OPERATION SHALL BE PROVIDED WITH THE INDICATING LIGHTS, RUNNING LIGHTS, ALARM LIGHTS, AUDIBLE ALARMS, TIMERS, AND SELECTOR SWITCHES FOR CONTROL AND STATUS INDICATION OF THE EQUIPMENT SERVED.

RED - DE-ENERGIZED
GREEN - ENERGIZED
AMBER - ALARM
WHITE - STATUS

INDICATING LIGHTS AND SELECTOR SWITCHES SHALL BE LOCATED ON THE FACE OF THE TEMPERATURE CONTROL PANEL SERVING THE RESPECTIVE EQUIPMENT. IN ADDITION TO THE LIGHTS, TIMERS, AND SELECTOR SWITCHES DESCRIBED IN THE SEQUENCE OF OPERATION FOR THE INDIVIDUAL EQUIPMENT, EACH CONTROL PANEL SHALL BE PROVIDED WITH THE FOLLOWING:

"CONTROL POWER ON" STATUS LIGHT
"INDICATING LIGHT TEST" PUSHBUTTON
ALARM SILENCE PUSHBUTTON
"ALARM RESET" PUSHBUTTON (WHERE APPLICABLE)

CONTROL PANELS SPECIFIED TO BE PROVIDED WITH ALARM CONDITION INDICATING LIGHTS SHALL BE PROVIDED WITH AN ELECTRICALLY ISOLATED CONTACT TO PROVIDE A COMMON ALARM TO THE PLANT CONTROL SYSTEM (PCS). EACH CONTROL PANEL SHALL BE PROVIDED WITH A MINIMUM OF ONE COMMON ALARM OUTPUT POINT TO THE PCS AND ADDITIONAL INDIVIDUAL ALARM POINTS AS INDICATED BELOW.

TEMPERATURE CONTROL PANELS SHALL COME WITH PHENOLIC NAMEPLATES FOR EACH CONTROL SWITCH INDICATING SWITCH TYPE, EQUIPMENT CONTROLLED, ROOM OR AREA SERVED, AND SWITCH AUTOMATIC POSITION EQUIPMENT INTERLOCK.

1.2. SYSTEM INTERLOCKS AND ALARMS

UNLESS OTHERWISE INDICATED, ALL EQUIPMENT INTERLOCKING DEVICES AS DESCRIBED HEREIN SHALL BE PROVIDED WITHIN THE RESPECTIVE TEMPERATURE/EQUIPMENT CONTROL PANEL (TCP/ECP).

1.2.1. SMOKE DETECTION SYSTEMS

1.2.1.1. SMOKE DETECTION (DUCT MOUNTED DETECTORS). SMOKE DETECTORS SHALL BE LOCATED IN THE DUCT OF EQUIPMENT LISTED BELOW. IN THE EVENT SMOKE IS DETECTED BY A DETECTOR, A SMOKE DETECTED SIGNAL SHALL BE TRANSMITTED TO THE REMOTE TEST STATION AND FIRE ALARM PANEL OR PLANT CONTROL SYSTEM (PCS) AND TCP/ECP WHEN A FIRE ALARM PANEL IS NOT PRESENT.

IN THE EVENT A SMOKE DETECTOR MALFUNCTIONS, A MALFUNCTION SIGNAL SHALL BE TRANSMITTED TO THE REMOTE TEST STATION OR FIRE ALARM PANEL, ILLUMINATING A "SMOKE DETECTOR MALFUNCTION" INDICATING LIGHT.

Table with columns: DRYER BUILDING EQUIPMENT, SMOKE DETECTOR, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include MAU-101, MAU-201, DF-201, PAC-301.

Table with columns: MAINTENANCE BUILDING DE-ENERGIZED EQUIPMENT, SMOKE DETECTOR, TEMPERATURE/EQUIPMENT CONTROL PANEL. Row includes EDH-1.

1.2.1.2. SMOKE DETECTION (AREA SMOKE DETECTION). A SMOKE DETECTED SIGNAL SHALL BE SENT FROM THE FIRE ALARM PANEL TO THE RESPECTIVE TEMPERATURE/EQUIPMENT CONTROL PANEL IN THE EVENT SMOKE IS DETECTED BY THE BUILDING SMOKE DETECTION SYSTEM.

Table with columns: DRYER BUILDING AREA, DE-ENERGIZED EQUIPMENT. Rows include DRYER ROOM, BOILER ROOM, ELECTRIC ROOM.

Table with columns: MAINTENANCE BUILDING AREA, DE-ENERGIZED EQUIPMENT. Row includes VEHICLE STORAGE.

1.2.2. LOW TEMPERATURE PROTECTION. LOW AIR TEMPERATURE THERMOSTATS SHALL BE LOCATED IN THE SYSTEMS INDICATED BELOW. UPON DETECTION OF LOW AIR TEMPERATURE, THE THERMOSTAT SHALL DE-ENERGIZE THE RESPECTIVE EQUIPMENT AND ALL INTERLOCKED EQUIPMENT, CONTROL DAMPER(S) OF THE RESPECTIVE EQUIPMENT AND INTERLOCKED EQUIPMENT SHALL RETURN TO THE NORMAL POSITION, AND A "LOW AIR TEMPERATURE" ALARM LIGHT ON THE FACE OF THE RESPECTIVE TEMPERATURE/EQUIPMENT CONTROL PANEL SHALL BE ILLUMINATED OR ALARM INDICATION SENT TO THE DIRECT DIGITAL CONTROL SYSTEM.

Table with columns: DRYER BUILDING EQUIPMENT, THERMOSTAT, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include MAU-101, MAU-201.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, THERMOSTAT, TEMPERATURE/EQUIPMENT CONTROL PANEL. Row includes EDH-101.

1.2.3. HIGH FILTER PRESSURE LOSS. A HIGH LIMIT PRESSURE DIFFERENTIAL FLOW SWITCH SHALL BE LOCATED ACROSS THE FILTER BANK OF THE EQUIPMENT INDICATED BELOW. IN THE EVENT THE PRESSURE DIFFERENTIAL ACROSS THE FILTER EXCEEDS THE PRESET VALUE, A "HIGH FILTER PRESSURE LOSS" ALARM LIGHT ON THE FACE OF THE RESPECTIVE TEMPERATURE/EQUIPMENT CONTROL PANEL OR THERMOSTAT (WHERE FURNISHED WITH LIGHTS) SHALL BE ILLUMINATED.

Table with columns: DRYER BUILDING EQUIPMENT, PRESSURE SWITCH, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include MAU-101, MAU-201, PAC-301, F-201.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, PRESSURE SWITCH, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include PAC-101, EDH-101.

1.2.4. VENTILATION SYSTEM FAILURE.

1.2.4.1. VENTILATION SYSTEM FAILURE (AIRFLOW SWITCHES). VENTILATION SYSTEM FAILURE PRESSURE DIFFERENTIAL SWITCHES SHALL BE LOCATED IN THE SYSTEMS INDICATED BELOW. IN THE EVENT THAT AIRFLOW IS NOT ATTAINED OR LOST AS DETERMINED BY THE PRESSURE DIFFERENTIAL FLOW SWITCH, A "VENTILATION SYSTEM FAILURE" SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SIGNALING SYSTEM.

Table with columns: DRYER BUILDING EQUIPMENT, PRESSURE SWITCH, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include MAU-101, MAU-201, DF-201, PAC-301.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, CURRENT SWITCH, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include EDH-101, WF-101.

1.2.4.2. VENTILATION SYSTEM FAILURE (CURRENT SENSOR SWITCHES). MOTOR CURRENT SENSOR SWITCHES SHALL BE INSTALLED ON THE EQUIPMENT OR AT THE EQUIPMENT MOTOR STARTER TO INDICATE VENTILATION SYSTEM FAILURE INCLUDING DETECTION OF BELT LOSS OR FAN MOTOR FAILURE. IN THE EVENT THAT THE EQUIPMENT FAILS TO OPERATE AS DETERMINED BY THE CURRENT SENSOR SWITCH, A "VENTILATION SYSTEM FAILURE" SIGNAL SHALL BE TRANSMITTED TO THE ALARM DESTINATION AS INDICATED BELOW.

Table with columns: DRYER BUILDING EQUIPMENT, CURRENT SWITCH, TEMPERATURE/EQUIPMENT CONTROL PANEL. Rows include WF-101, WF-102, WF-103, WF-104, WF-201, WF-202, WF-203.

2. HEATING SYSTEMS.

2.1. UNIT HEATERS. UNIT HEATERS SHALL BE CONTROLLED BY THEIR RESPECTIVE THERMOSTATS. LOCATE UNIT HEATER THERMOSTAT ON WALL OR COLUMN BELOW UNIT HEATER OR AS INDICATED ON PLANS AT 60" AFF.

2.2. CABINET HEATERS. CABINET HEATERS SHALL BE CONTROLLED BY THEIR RESPECTIVE BUILT-IN THERMOSTATS.

2.3. WALL HEATERS. WALL HEATERS SHALL BE CONTROLLED BY THEIR RESPECTIVE BUILT-IN THERMOSTATS.

3. VENTILATING/EXHAUST SYSTEMS.

3.1. "ON-OFF" EQUIPMENT CONTROL. EQUIPMENT INDICATED FOR "ON-OFF" CONTROL SHALL EACH BE CONTROLLED BY AN INDIVIDUAL "ON-OFF" FAN SELECTOR SWITCH. THE SWITCH LOCATION SHALL BE AS INDICATED BELOW. WHEN THE SWITCH IS PLACED IN THE "ON" POSITION, THE RESPECTIVE EQUIPMENT FAN SHALL BE ENERGIZED.

Table with columns: DRYER BUILDING EQUIPMENT, SWITCH LOCATION, FAN INTERLOCK, CONTROL DAMPER(S). Rows include MAU-101, MAU-201, WF-101, WF-102, WF-103, WF-104, DF-201, WF-201.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, SWITCH LOCATION, FAN INTERLOCK, CONTROL DAMPER(S). Rows include EDH-101, WF-102.

4. HEATING AND VENTILATING SYSTEMS.

4.1. MAINTENANCE BUILDING MAKEUP AIR UNIT (100% OUTSIDE AIR). MAKEUP AIR UNIT SHALL EACH BE CONTROLLED BY AN INDIVIDUAL "SUMMER-OFF-WINTER" SYSTEM SELECTOR SWITCH. THE SWITCH LOCATION SHALL BE AS INDICATED BELOW. WHEN THE SWITCH IS PLACED IN THE "WINTER" POSITION, THE FAN SHALL OPERATE AND THE SUPPLY AIR SENSOR/THERMOSTAT SHALL MODULATE THE HEATING OUTPUT OF THE UNIT TO MAINTAIN THE DESIRED SUPPLY AIR TEMPERATURE.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, SWITCH LOCATION, FAN INTERLOCK, CONTROL DAMPER(S). Rows include EDH-101, WF-102, WF-101, WF-103.

4.2. DRYER BUILDING MAKEUP AIR UNIT (100% OUTSIDE AIR). MAKEUP AIR UNIT SHALL EACH BE CONTROLLED BY AN INDIVIDUAL "SUMMER-OFF-WINTER" SYSTEM SELECTOR SWITCH LOCATED AT THE MAIN CONTROL PANEL AND TWO OCCUPIED/UNOCCUPIED SWITCHES LOCATED AT MAIN CONTROL PANEL AND AT THE EXTERIOR OF THE BUILDING NEXT TO THE DESIGNATED MAIN PERSONNEL ENTRANCE.

Table with columns: DRYER BUILDING EQUIPMENT, SWITCH LOCATION, FAN INTERLOCK, CONTROL DAMPER(S). Rows include MAU-101, WF-101, WF-102, WF-103, WF-104.

4.3. BOILER ROOM COMBUSTION AIR. THE MAKEUP AIR UNIT FAN SHALL BE PROVIDED WITH A TWO-SPEED MOTOR OR VARIABLE FREQUENCY DRIVE. THE FAN MOTOR SHALL OPERATE AT HALF SPEED WHEN ONE HOT WATER BOILER IS ENABLED AND FULL SPEED WHEN TWO HOT WATER BOILERS ARE ENABLED.

Table with columns: DRYER BUILDING EQUIPMENT, SWITCH LOCATION, SA THERMOSTAT, CONTROL DAMPER(S). Row includes MAU-201.

5. AIR CONDITIONING SYSTEMS.

5.1. PACKAGED SYSTEMS. PACKAGED SYSTEMS SHALL BE CONTROLLED BY THEIR RESPECTIVE THERMOSTAT. SYSTEM OPERATION SHALL BE CONTROLLED BY A "HEAT-OFF-COOL" (MANUAL CHANGEOVER) OR AN "OFF-HEAT-AUTO-COOL" (AUTOMATIC CHANGEOVER, PROGRAMMABLE) SYSTEM SWITCH AND AN "AUTO-ON" FAN SWITCH LOCATED ON THE THERMOSTAT SUB-BASE.

EACH SYSTEM SHALL BE IN THE OCCUPIED MODE WHEN THE AREA SERVED IS OCCUPIED. IN THIS MODE, THE FAN SHALL OPERATE CONTINUOUSLY AND THE OUTSIDE AIR CONTROLS SHALL BE SET AT THE MINIMUM OUTSIDE AIR POSITION OR BE UNDER THE ECONOMIZER CONTROL (IF EQUIPPED) AS DESCRIBED BELOW. WHEN THE AREA SERVED IS UNOCCUPIED, THE FAN SHALL BE DE-ENERGIZED AND ONLY OPERATE WHEN HEATING OR COOLING IS REQUIRED TO MAINTAIN THE SETBACK TEMPERATURES.

THE ELECTRIC ROOM COOLING UNIT SHALL BE PROVIDED WITH AN ECONOMIZER. THE SYSTEM SHALL BE IN THE ECONOMIZER MODE WHEN THE SYSTEM IS IN THE OCCUPIED MODE, COOLING IS REQUIRED, AND THE OUTSIDE AIR IS SUITABLE FOR COOLING. OUTSIDE AIR IS SUITABLE FOR COOLING WHEN THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY ON SYSTEMS EQUIPPED WITH DIFFERENTIAL ENTHALPY CONTROL, OR WHEN THE OUTSIDE AIR CONDITIONS ARE BELOW THE "A" SETPOINT CURVE ON SYSTEMS WITH ELECTRONIC ENTHALPY CONTROLS.

Table with columns: DRYER BUILDING EQUIPMENT, SWITCH LOCATION, THERMOSTAT. Rows include PAC-301, FCU-501.

Table with columns: MAINTENANCE BUILDING EQUIPMENT, SWITCH LOCATION, THERMOSTAT. Row includes PAC-101.

6. THERMOSTAT SETPOINTS

6.1. THERMOSTAT SETPOINTS SHALL BE AS INDICATED BELOW, UNLESS THE SETPOINT HAS BEEN DESCRIBED PREVIOUSLY IN THIS SEQUENCE OF OPERATIONS.

Table with columns: ALL LOCATIONS, LOW TEMPERATURE THERMOSTATS, HEATERS, MAKEUP AIR SUPPLY HEATING, VENTILATING EQUIPMENT, DRYER BUILDING ELECTRIC ROOM AIR CONDITIONING, PROGRAMMABLE THERMOSTATS. Values include 40F, 60F, 55F, 90F, 80F, 75F COOLING, 72F HEATING.

ONE INCH AT FULL SIZE IF NOT ONE INCH SCALE ACCORDINGLY

Table with columns: DATE, REVISION. Includes a revision table with arrows pointing right.



ROGERS, ARKANSAS
ROGERS POLLUTION CONTROL FACILITY (PCF)
SOLIDS HANDLING IMPROVEMENTS, PHASE II
HVAC SEQUENCE OF OPERATIONS
FOR: ROGERS WATER UTILITIES

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