

SECTION 230900 - DDC CONTROLS FOR HVAC

- K. ZONE CONTROLLER:
 1. THE ZONE CONTROLLER SHALL BE CAPABLE OF INDEPENDENT ZONE CONTROL.
 2. THE ZONE CONTROLLER SHALL BE FACTORY PROGRAMMED WITH A CONTINUOUS ADAPTIVE LOOP TUNING ALGORITHM THAT SENSES CHANGES IN THE PHYSICAL ENVIRONMENT AND CONTINUALLY ADJUSTS LOOP TUNING PARAMETERS APPROPRIATELY.
 3. THE ZONE CONTROLLER SHALL OPERATE IN A PRESSURE DEPENDENT MODE.
 4. THE ZONE CONTROLLER SHALL HAVE THE CAPABILITY TO SUPPORT ADJUSTABLE MINIMUM AND MAXIMUM DAMPER POSITIONS.
- L. BYPASS CONTROLLER:
 1. THE BYPASS CONTROLLER SHALL BE CAPABLE OF READING SUPPLY STATIC PRESSURE AND CONTROLLING THE BYPASS DAMPER TO MAINTAIN THE SUPPLY STATIC SETPOINT.
 2. THE BYPASS CONTROLLER SHALL PROVIDE CONFIGURABLE MINIMUM AND MAXIMUM DAMPER POSITION SETTINGS.
 3. THE BYPASS CONTROLLER SHALL HAVE THE CAPABILITY OF TRANSMITTING SYSTEM STATIC PRESSURE, STATIC PRESSURE SETPOINT AND DAMPER POSITION TO THE ZONE COORDINATOR.
 4. THE BYPASS CONTROLLER SHALL BE FACTORY PROGRAMMED WITH A CONTINUOUS ADAPTIVE LOOP TUNING ALGORITHM THAT SENSES CHANGES IN THE PHYSICAL ENVIRONMENT AND CONTINUALLY ADJUSTS LOOP TUNING PARAMETERS APPROPRIATELY.
- M. SINGLE PACKAGE UNIT (SPU) CONTROLLER:
 1. THE SPU CONTROLLER SHALL BE CAPABLE OF READING ZONE TEMPERATURE (FOR SINGLE ZONE APPLICATIONS) OR SUPPLY TEMPERATURE (FOR ZONING APPLICATIONS) AND CONTROLLING THE STAGES OF HEATING OR COOLING TO MAINTAIN THE TEMPERATURE SETPOINT. THIS OPERATION SHALL BE PROVIDED WHEN OPERATING WITHIN A SYSTEM APPLICATION OR IN A STAND-ALONE MODE.
 2. THE SPU CONTROLLER SHALL BE FACTORY PROGRAMMED WITH A CONTINUOUS ADAPTIVE LOOP TUNING ALGORITHM THAT SENSES CHANGES IN THE PHYSICAL ENVIRONMENT AND CONTINUALLY ADJUSTS LOOP TUNING PARAMETERS APPROPRIATELY.
 3. THE SPU CONTROLLER SHALL COMMUNICATE DIRECTLY TO THE UNIT CONTROL BOARD DIAGNOSTIC MEMORY. DIAGNOSTIC ALARM INFORMATION SHALL BE TRANSMITTED TO THE ZONE COORDINATOR FOR ANNUNCIATION.
- N. ZONE DAMPER ASSEMBLY:
 1. EACH ZONE DAMPER ASSEMBLY SHALL INCLUDE:
 1. A MOTORIZED DAMPER ASSEMBLY CONSTRUCTED OF 22 GAUGE GALVANIZED STEEL AND BE DESIGNED TO WITHSTAND A 125 HOUR SALT SPRAY TEST PER ASTM B-117.
 2. BLADE OPERATION PROVIDING FULL MODULATION FROM OPEN TO CLOSED POSITION.
 3. ROUND DAMPERS SHALL HAVE ELLIPTICAL BLADES WITH A SEAL AROUND THE ENTIRE DAMPER BLADE EDGE. RECTANGULAR DAMPERS SHALL HAVE FULLY SEALED EDGES.
 4. ALL DAMPER ASSEMBLIES SHALL INCLUDE A FACTORY MOUNTED AND WIRED DDC ZONE CONTROLLER.

- O. DIAGNOSTICS:
 1. THE SPU CONTROLLERS SHALL PROVIDE SELF-TEST, ON BOARD DIAGNOSTICS AND ALARM CONDITIONS, AND SHALL BE CAPABLE OF PERFORMING DIAGNOSTICS ON ITS CRITICAL COMPONENTS AS WELL AS ALL HARD-WIRED SENSORS AND INPUTS. THE CONTROLLERS SHALL DISPLAY ANY ALARM MESSAGES ON THE ZONE COORDINATOR OR SYSTEM MANAGER UNTIL THE ALARM CONDITION HAS BEEN CORRECTED. THE CONTROLLERS SHALL STORE AT A MINIMUM THE LAST FIVE ALARM CONDITIONS. THE CONTROLLERS MAY BE CONFIGURED TO REPORT ALARMS LOCALLY ON THE TOUCH-SCREEN DISPLAY, REMOTELY VIA ALPHANUMERIC PAGING, OR THROUGH A SIMPLE E-MAIL CLIENT ON A NETWORK. ALL ALARMS SHALL BE CAPABLE OF BEING READ FROM THE ZONE COORDINATOR, SYSTEM MANAGER, OR REMOTE PC VIA A STANDARD WEB BROWSER.
- P. MONITORING:
 1. THE SYSTEM MANAGER AND ZONE COORDINATOR SHALL BE CAPABLE OF PROVIDING THE FOLLOWING INFORMATION FOR MONITORING OF SYSTEM PARAMETERS:
 1. SPACE TEMPERATURE
 2. SPACE SETPOINT
 3. STATIC PRESSURE
 4. STATIC SETPOINT
 5. ZONE DAMPER POSITION
 6. BYPASS DAMPER POSITION
 7. ZONE HEATING/COOLING REQUEST
 8. OCCUPANCY MODE
 9. SUPPLY AIR TEMPERATURES
 10. RETURN AIR TEMPERATURES
 11. HEAT/COOL MODE CONDITIONS
 12. UNIT ALARMS
 13. OUTSIDE AIR TEMPERATURE
 14. FAN STATUS

- 2.02 SOFTWARE
 - A. ACCESS CAPABILITY:
 1. ACCESS CAPABILITY TO THE SYSTEM, WHETHER LOCAL OR REMOTE, SHALL BE ACCOMPLISHED USING AN ETHERNET COMMUNICATIONS BUS, OR MODEM AND A PC WITH WEB BROWSER SOFTWARE (INTERNET EXPLORER).
 - B. INFORMATION RETRIEVAL:
 1. THE SOFTWARE SHALL BE CAPABLE OF, BUT NOT LIMITED TO, LISTING ALL CURRENT SYSTEM SENSOR READINGS, LISTING AND MODIFYING CONFIGURATION PARAMETERS SUCH AS SETPOINT, OCCUPANCY SCHEDULES, ALARM OPTIONS, TEMPERATURE LIMITS AND FUNCTIONAL CONFIGURATION DATA. THE FORMAT AND OPERATION OF THE REMOTE CLIENT SHALL BE THE SAME AS AT THE LOCAL TOUCH-SCREEN USER INTERFACE.
 - C. ALARM NOTIFICATION:
 1. ALARMS SHALL BE COMMUNICATED BY THE SYSTEM MANAGER AUTOMATICALLY VIA EMAIL OR TEXT MESSAGE.

- PART 3 SYSTEM REQUIREMENTS
 - 3.01 ZONE CONTROLLERS
 - A. MULTIPLE ZONE CONTROLLERS BEING SERVED BY THE SAME SINGLE PACKAGE UNIT SHALL BE NETWORKED TOGETHER.
 - B. EACH ZONE CONTROLLER SHALL INCLUDE THE ABILITY TO BE INCLUDED AS A MEMBER OF A SCHEDULED GROUP.
 - C. EACH ZONE CONTROLLER SHALL BE CAPABLE OF SUPPORTING SCHEDULE EXCEPTION PERIODS (HOLIDAYS OR ALTERNATE OCCUPANCY).
 - D. EACH ZONE CONTROLLER SHALL INCLUDE THE CAPABILITY TO MONITOR ONE SPACE TEMPERATURE SENSOR.
 - E. THE ZONE CONTROLLER SHALL MONITOR PRIMARY DAMPER POSITION, SPACE TEMPERATURE, AIR HANDLER STATUS AND MODE, SUPPLY-AIR TEMPERATURE (AS APPLICABLE) AND SHALL POSITION ITS TERMINAL DAMPER BASED ON ITS PID (PROPORTIONAL, INTEGRAL, DERIVATIVE) TEMPERATURE CONTROL ALGORITHM TO MAINTAIN THE DESIRED ZONE TEMPERATURE SETPOINT.
 - F. DEPENDING ON THE EQUIPMENT MODE OF OPERATION, SEPARATE HEAT/COOL, MINIMUM/MAXIMUM, DAMPER POSITION SETPOINTS SHALL BE USED TO HELP PROTECT THE EQUIPMENT FROM INSUFFICIENT AIRFLOW DURING HEATING (MINIMUM HEATING DAMPER POSITION) OR OVERLOAD (MAXIMUM HEATING AND MAXIMUM COOLING DAMPER POSITION).
 - G. EACH SPACE TEMPERATURE SENSOR SHALL INCLUDE AN OVERRIDE BUTTON AS AN INTEGRAL PART OF THE SENSOR. WHENEVER THE BUTTON IS PUSHED DURING THE UNOCCUPIED MODE, THE ZONE SHALL BE INDEXED TO CONTROL TO ITS OCCUPIED SETPOINTS, THE SPU SHALL START, AND THE ZONE SHALL STAY IN ITS OCCUPIED MODE FOR THE DURATION OF THE OVERRIDE PERIOD. THE TIMED OVERRIDE DURATION SHALL BE OPERATOR CONFIGURABLE FROM 1 MINUTE TO 4 HOURS IN ONE-MINUTE INCREMENTS.

- 3.02 SYSTEM MODES
 - A. EACH TERMINAL BOX MODE SHALL BE BASED ON THE CURRENT SPU MODE, SPACE TEMPERATURE, AND THE CURRENT TEMPERATURE SETPOINTS.
 - B. THE TERMINAL BOX OPERATION DEPENDS UPON THE AIR SOURCE OPERATION AND ZONE REQUIREMENTS AS FOLLOWS:
 1. COOLING MODE
 - a. IF THE ZONE IS SATISFIED, THEN THE ZONE CONTROLLERS SHALL MODULATE THE DAMPERS TO THEIR MINIMUM COOLING DAMPER POSITION.
 - b. IF THE ZONE IS CALLING FOR COOLING, THEN THE ZONE CONTROLLERS SHALL MODULATE THEIR AIR DAMPERS BETWEEN THEIR MINIMUM AND MAXIMUM COOLING DAMPER POSITION TO MAINTAIN THEIR COOLING SETPOINT.
 - c. IF THE ZONE IS CALLING FOR HEATING, THEN THE ZONE CONTROLLERS SHALL MODULATE THEIR DAMPERS TO MAINTAIN THEIR MINIMUM COOLING DAMPER POSITION.
 2. HEAT MODE:
 - a. IF THE ZONE IS SATISFIED, THEN THE ZONE CONTROLLER SHALL MAINTAIN ITS MINIMUM HEATING DAMPER POSITION.
 - b. IF THE ZONE IS CALLING FOR HEATING, THEN THE ZONE CONTROLLERS SHALL MODULATE THEIR AIR DAMPERS BETWEEN THEIR MINIMUM AND MAXIMUM HEATING DAMPER POSITION TO MAINTAIN THEIR HEATING SETPOINT.
 - c. IF THE ZONE IS CALLING FOR COOLING, THEN THE ZONE CONTROLLER SHALL MODULATE ITS DAMPER TO MAINTAIN ITS MINIMUM HEATING DAMPER POSITION.
 - C. SHUTDOWN:
 1. DURING THE SHUTDOWN MODE ALL SPU FANS SHALL BE DISABLED AND ALL DAMPERS SHALL CLOSE.

- PART 4 ABNORMAL CONDITIONS
 - 4.01 THE SYSTEM SHALL INCLUDE THE ABILITY TO DETECT ABNORMAL CONDITIONS, AND TO REACT TO THEM AUTOMATICALLY. A RETURN TO NORMAL CONDITIONS SHALL ALSO GENERATE A RETURN TO NORMAL NOTIFICATION AND THE SYSTEM SHALL REVERT BACK TO ITS ORIGINAL CONTROL SCHEME BEFORE THE ABNORMAL CONDITION EXISTED.
 1. WHEN ABNORMAL CONDITIONS EXIST, THE SYSTEM SHALL TAKE THE FOLLOWING ACTIONS:
 - A. IF A SPACE TEMPERATURE SENSOR IS DETERMINED BY THE ZONE CONTROLLER TO BE INVALID, THE ZONE CONTROLLER SHALL MAINTAIN ITS SAFE DAMPER POSITION.
 - B. IF A ZONE CONTROLLER LOSES COMMUNICATION WITH ITS ASSOCIATED ZONE COORDINATOR, THE ZONE CONTROLLER SHALL ASSUME IT IS IN COOLING MODE AND MODULATE ITS DAMPER BETWEEN ITS MINIMUM AND MAXIMUM DAMPER POSITION.
 - C. IF A ZONE COORDINATOR LOSES COMMUNICATIONS WITH THE SPU CONTROLLER, THE SPU CONTROLLER SHALL CONTINUE TO CONTINUE AT ITS LAST HEATING/COOLING COMMAND.
 - D. IF A ZONE COORDINATOR LOSES COMMUNICATION WITH AN ASSOCIATED ZONE CONTROLLER, THE ZONE COORDINATOR SHALL ALARM AND REMOVE THAT ZONE TEMPERATURE FROM ITS ZONE VOTING SCHEME. THE ZONE CONTROLLER SHALL CONTINUE TO OPERATE IN A STAND-ALONE MODE.
 - E. IF A ZONE COORDINATOR LOSES COMMUNICATION WITH ALL OF ITS ZONES, THE SPU CONTROLLER SHALL BE ISSUED A SHUTDOWN COMMAND.
 - F. IF A ZONE COORDINATOR LOSES COMMUNICATION WITH ITS BYPASS CONTROLLER, THE SPU CONTROLLER SHALL BE ISSUED A SHUTDOWN COMMAND.

- PART 5 SYSTEM
 - 5.01 THE SYSTEM SHALL INCLUDE THE ABILITY TO CONFIGURE AND DISPLAY UP TO 24 POINTS FOR EACH SPU. A ZONE SHALL BE DEFINED AS A SPACE TEMPERATURE SENSOR WIRED TO A ZONE CONTROLLER.
 - A. CONFIGURATION:
 1. EACH ZONE SHALL HAVE THE ABILITY TO CONFIGURE AND DISPLAY THE FOLLOWING:
 1. MINIMUM DAMPER POSITION LIMITS USED BY THE ZONE CONTROL WHEN THE SPU IS IN THE COOLING MODE.
 2. MINIMUM DAMPER POSITION LIMITS USED BY THE ZONE CONTROL WHEN THE SPU IS IN THE HEATING MODE.
 3. MAXIMUM DAMPER POSITION LIMITS USED BY THE ZONE CONTROL.
 4. OCCUPANCY OVERRIDE VALUE.
 5. HEATING AND COOLING OCCUPIED/UNOCCUPIED TEMPERATURE SETPOINTS.
 6. BASE ZONE SETPOINT
 7. REMOTE SETPOINT ADJUST ENABLE/DISABLE.
 - B. MAINTENANCE DISPLAY:
 1. MAINTENANCE SCREENS SHALL BE PROVIDED TO EASE AND EXPEDITE THE WORK OF TROUBLESHOOTING. THE SCREENS SHALL HAVE THE CAPABILITY TO DISPLAY THE FOLLOWING AS A MINIMUM:
 1. THE CURRENT CONTROL MODE.
 2. OCCUPANCY AND OVERRIDE STATUS.
 3. CURRENT USER SETPOINT OFFSET VALUE.
 4. CURRENT HEATING AND COOLING SETPOINTS.
 5. HEAT STATUS (IF APPLICABLE).
 6. DAMPER HEATING RESISTANCE TEMPERATURE.
 7. CURRENT HEATING TEMPERATURE.
 - C. TREND DISPLAY:
 1. THE FOLLOWING POINTS SHALL BE TRENDED IN THE ZONE COORDINATOR AND/OR THE SYSTEM MANAGER. ALL POINTS SHALL BE TRENDED AT 15 MINUTE INTERVALS FOR 72 HOURS (ANALOG POINTS) OR THE LAST 10 CHANGES OF STATE (BINARY POINTS).
 1. ZONE TEMPERATURE
 2. SINGLE PACKAGE UNIT (SPU)
 3. SUPPLY TEMPERATURE
 4. RETURN TEMPERATURE (IF EQUIPPED)
 5. OUTDOOR TEMPERATURE (IF EQUIPPED)
 6. SUPPLY FAN STATUS
 7. COOLING STAGE (1-4)
 8. HEATING STAGE (1-4)

PART 6 SYSTEM INTEGRATION

- 6.01 EACH ZONE CONTROLLER SHALL HAVE THE CAPABILITY TO COMMUNICATE TO A FACTORY INSTALLED SPU CONTROLLER VIA THE ZONE COORDINATOR AND TO PROVIDE A TOTALLY INTEGRATED AND COORDINATED SYSTEM.
 - A. THE INTEGRATION SHALL INCLUDE THE FOLLOWING SPU MODES FOR USE BY THE ZONE COORDINATOR AS A MINIMUM: OFF, COOLING, HEATING, AND EMERGENCY SHUTDOWN.
 - B. THE INTEGRATION SHALL ALSO PROVIDE SYSTEM DATA TO THE SPU CONTROLLER FOR USE IN ITS ALGORITHMS.
 - C. THE ZONE COORDINATOR SHALL PERIODICALLY POLL ITS ASSIGNED ZONES TO ACQUIRE THEIR UPDATED VALUES.
 - D. ONLY THOSE ZONES WITH VALID TEMPERATURE READINGS SHALL BE INCLUDED.
- A: THE ZONE COORDINATOR OR SYSTEM MANAGER WILL RECEIVE AND STORE DIAGNOSTICS FROM THE UNIT CONTROL SAFETY BOARD. ALARMS TO STORE FOR DIAGNOSTIC PURPOSES ARE :
 1. COMPRESSOR HIGH PRESSURE ALARM
 2. COMPRESSOR LOW PRESSURE ALARM
 3. COMPRESSOR MOTOR OVERLOAD ALARM
 4. UNIT FREEZE/STAG ALARM
 5. FAN OVERLOAD ALARM
 6. LOW CONTROL VOLTAGE ALARM

PART 7 SEQUENCE OF OPERATION

- 7.1 THE SINGLE PACKAGED UNIT CONTROLLER (SPU) WILL INDEX EACH OF THE INDIVIDUAL UNITS TO THE OCCUPIED OR UNOCCUPIED MODE ON A SCHEDULE PROVIDED BY THE OWNER.
- 7.2 ALL UNITS OVER 2000 CFM SHALL BE SUPPLIED BY DIVISION 28 FIRE ALARM CONTRACTOR WITH DUCT SMOKE DETECTORS. THE CONTROL CONTRACTOR SHALL BE RESPONSIBLE FOR WIRING BETWEEN SMOKE DETECTORS AND THE UNIT FOR SHUTDOWN. SMOKE DETECTOR CONNECTED TO FIRE ALARM BY FIRE ALARM CONTRACTOR.
 - a. ENERGY RECOVERY UNIT
 1. A SINGLE PACKAGED UNIT CONTROLLER (SPU) WILL CONTROL THE OPERATION OF UNIT. A PUSH BUTTON OVERRIDE ON THE SENSOR WILL ALLOW THE UNIT TO OPERATE FOR A SPECIFIED PERIOD OF TIME (SOFTWARE ADJUSTABLE). DURING UNOCCUPIED MODE, THE SPU WILL MAINTAIN THE NIGHT SETPOINTS.
 2. EACH UNITS AIR TEMPERATURES (SUPPLY, FRESH, RETURN, AND EXHAUST) SHALL ALSO BE MONITORED. PROVIDE FOR ROTATION SENSOR AND FILTER SENSOR ALARMS. SEE SCHEDULE ON DRAWINGS FOR ADDITIONAL OPTIONS AND REQUIREMENTS.
 - b. HEAT PUMPS
 1. A SINGLE PACKAGED UNIT CONTROLLER (SPU) WILL CONTROL THE OPERATION OF UNIT. THE SPU WILL CYCLE THE COOLING AND HEAT TO MAINTAIN THE ROOM SETPOINT. A PUSH BUTTON OVERRIDE ON THE SENSOR WILL ALLOW THE UNIT TO OPERATE FOR A SPECIFIED PERIOD OF TIME (SOFTWARE ADJUSTABLE). DURING UNOCCUPIED MODE, THE TEC WILL MAINTAIN THE NIGHT SETPOINTS OF THE UNIT.
 2. EACH UNITS SUPPLY AIR TEMPERATURE SHALL BE MONITORED.
 3. SEE SCHEDULE ON DRAWINGS FOR ADDITIONAL OPTIONS AND REQUIREMENTS.
 4. UNITS IN THE GYM SHALL BE STAGED IN THEIR (4) STAGES AS NECESSARY.
 5. ECONOMIZER: ENABLE OPERATION IF OUTSIDE AIR IS 62 DEGREES OR LOWER. DISABLE ERV'S WHEN ECONOMIZER IS IN OPERATION.
 - c. 100% FRESH AIR RTU
 1. A SINGLE PACKAGED UNIT CONTROLLER (SPU) WILL CONTROL THE OPERATION OF UNIT. THE SPU WILL CYCLE THE COOLING AND HEAT TO MAINTAIN DISCHARGE TEMPERATURE OF 70 DEGREES. A PUSH BUTTON OVERRIDE ON THE SENSOR WILL ALLOW THE UNIT TO OPERATE FOR A SPECIFIED PERIOD OF TIME (SOFTWARE ADJUSTABLE). UNIT SHALL BE SCHEDULED TO RUN ONLY DURING OCCUPIED TIMES.
- 7.3 EXHAUST FAN SEQUENCES
 1. THE EXHAUST FANS SHALL SWITCHED ON AND OFF WITH THE ROOM LIGHTS.
- 7.4 MISCELLANEOUS POINTS OF CONTROL
 1. OUTSIDE AIR TEMPERATURE - OUTSIDE AIR TEMPERATURE SENSOR SHALL BE INSTALLED AT EACH ENERGY RECOVERY UNIT. AND AS NECESSARY TO CONTROL ALL ECONOMIZERS.

PART 8 EXECUTION

- 8.1 INSTALLATION REQUIREMENTS
 1. ALL ELECTRICAL WORK PERFORMED IN THE INSTALLATION OF THE BCS AS DESCRIBED IN THIS SPECIFICATION SHALL BE PER THE NATIONAL ELECTRIC CODE (NEC) AND PER APPLICABLE STATE AND LOCAL CODES. WHERE EXPOSED, CONDUIT SHALL BE RUN PARALLEL TO BUILDING LINES PROPERLY SUPPORTED AND SIZED AT A MAXIMUM OF 40% FILL. IN NO CASES SHALL FIELD INSTALLED CONDUIT SMALLER THAN 1/2" TRADE SIZE BE ALLOWED. ATC CONTRACTOR SHALL PROVIDE ATC CONDUCTORS. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE CONDUIT FOR THE ATC SYSTEM.
- 8.2 OPERATOR TRAINING
 1. THE CONTROL SYSTEM CONTRACTOR SHALL PROVIDE 3 COPIES OF AN OPERATOR'S MANUAL DESCRIBING ALL OPERATING AND ROUTINE MAINTENANCE SERVICE PROCEDURES TO BE USED WITH THE TEMPERATURE CONTROL AND BUILDING AUTOMATION SYSTEM SUPPLIED. THIS CONTRACTOR SHALL INSTRUCT THE OWNER'S DESIGNATED REPRESENTATIVES IN THESE PROCEDURES DURING THE STARTUP AND TEST PERIOD. THE DURATION OF THE INSTRUCTION PERIOD SHALL BE NO LESS THAN 16 HOURS, DURING NORMAL WORKING HOURS. THE INSTRUCTIONS SHALL CONSIST OF BOTH HANDS-ON AND CLASSROOM TRAINING AT THE JOB SITE. THE CONTROL SYSTEM CONTRACTOR SHALL PROVIDE AN ADDITIONAL PERIOD OF TRAINING (1/2 DAY) AT THE END OF SIX MONTHS AFTER ACCEPTANCE AND ANOTHER 1/2 DAY AT THE END OF THE FIRST YEAR WARRANTY PERIOD. THE CONTROL SYSTEM CONTRACTOR SHALL PROVIDE THE OWNER WITH A LAMINATED INSTRUCTION SHEET WITH STEP-BY-STEP PROCEDURE INSTRUCTIONS ON HOW TO TURN THE SYSTEM ON AND HOW TO ADJUST THE SET POINTS OF THE AIR CONDITIONING UNITS.
- 8.3 CALIBRATION AND ADJUSTMENTS
 1. AFTER COMPLETION OF THE INSTALLATION, PERFORM FINAL CALIBRATIONS AND ADJUSTMENTS OF THE EQUIPMENT PROVIDED UNDER THIS CONTRACT AND SUPPLY SERVICES INCIDENTAL TO THE PROPER PERFORMANCE OF THE BCS SYSTEM UNDER WARRANTY BELOW.
- 8.4 ACCEPTANCE PROCEDURE
 1. UPON COMPLETION OF THE CALIBRATION, CONTRACTOR SHALL STARTUP THE SYSTEM AND PERFORM ALL NECESSARY TESTING AND RUN DIAGNOSTIC TESTS TO ENSURE PROPER OPERATION. CONTRACTOR SHALL BE RESPONSIBLE FOR GENERATING ALL SOFTWARE AND ENTERING ALL DATABASE NECESSARY TO PERFORM THE SEQUENCE OF CONTROL AND SPECIFIED SOFTWARE ROUTINES. AN ACCEPTANCE TEST IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE OR ENGINEER SHALL BE PERFORMED.
- 8.5 WARRANTY
 1. ALL BCS DEVICES AND INSTALLATION SHALL BE WARRANTED TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF JOB ACCEPTANCE BY THE OWNER. ANY EQUIPMENT, SOFTWARE, OR LABOR FOUND TO BE DEFECTIVE DURING THIS PERIOD SHALL BE REPAIRED OR REPLACED WITHOUT EXPENSE TO THE OWNER. FACTORY AUTHORIZED WARRANTY SERVICE SHALL BE AVAILABLE WITHIN 100 MILES OF JOB SITE.

END OF SECTION

Georgetown
County
Regional Parks
Address
Recreation Center

Owner:
Georgetown County
716 Prince Street
Georgetown, SC 29442

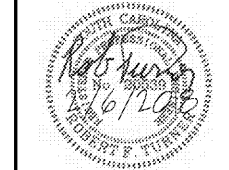
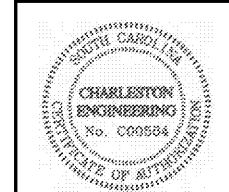
SGA ARCHITECTURE
Pawleys Island / Charleston / GREENVILLE
8243 Ocean Hwy., / PO Box 1859
Pawleys Island, SC 29385
Phone: 843.237.2421 / Fax: 843.237.1992
www.sgaarchitecture.com

Civil Consultant:
ETS
ENGINEERING AND TECHNICAL
SERVICES, INC.
CONSULTING ENGINEERS
58 Calumet Lane
P.O. Box 2392
Phone: (843) 237-3002 Fax: (843) 237-2269

MEP Consultant:
Charleston Engineering
125 B Wagon Creek Dr.
Charleston, SC 29412
843-762-4242
Mechanical, Plumbing & Electrical

Structural Consultant:
WEATHERLY STRUCTURAL ENGINEERS
1000 North Main Street, Suite 100, Charleston, SC 29401

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