



2/21/14
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- 2.11. Building Automation Systems (BAS).
- 2.11.1. To the greatest extent possible, pneumatic controls are to be eliminated and replaced with electrically actuated Direct Digital Control (DDC) supervision.
- 2.11.2. It is recognized that control firmware and software technology advances at such a rate that a 15 year application life is difficult to attain with backwards compatibility. All firmware and software being proposed for projects in AFMS properties must be compliant with Hq AFCEC Engineering Technical Letter (ETL) 09-11 dated 26 Oct 2009 titled "Civil Engineering Industrial Control Information Assurance Compliance," and be approved for use on DoD / Air Force distributed networks. The software must of cutting edge technology most recent version with an anticipated remaining application life and compatibility of future systems at least six (6) months before becoming "legacy." If a new version is to be released and approved for use on AF networks within 6 months of the substantial completion, the contractor shall provide, install and commission an update to the most recent version without additional cost to the Government.
- 2.11.3. Include a desk top computer with Microsoft Windows 7 operating system (having the necessary DoD required security patches) and 21 inch flat screen monitor (minimum), for access to the BAS by the maintenance personnel, and an ink jet printer capable of printing trend logs, alarms and other control related data.
- 2.11.4. The BAS graphical user interface (GUI) shall be user friendly, incorporate animated illustrations of all major equipment to depict piping flow and indicate status of operation. The access and update time between screen displays shall not be greater than 2 seconds following initiation of change. The GUI shall at minimum include animated illustrations, but not limited to the following displays:
- 2.11.4.1. Floor plans with room numbers, temperature sensors, terminal boxes and AHU's accurately located.
- 2.11.4.2. Include all control schematics.
- 2.11.4.3. VAV boxes with CFM, damper position (percentage), space temperature and reheat valve position (percentage)
- 2.11.4.4. AHU depicting fan operation, preheat mode, cooling modes, control valve status (percentage), CHW and HW coil temperatures supply, return and mix air temperatures, total supply air CFM, outside air temperature, etc.
- 2.11.4.5. Where the BAS is going to be installed in a foreign location, maintained and operated by local foreign nationals, the BAS shall be so equipped to easily toggle the graphical interface and text to be displayed in both the local native language and modern English; and the system measurements will be toggled between SAE and metric.
- 2.11.5. The installer/contractor shall train maintenance personnel in the use of the building control system to the level where they can independently control room set points, adjust operating schedules, recognize abnormal performance, acknowledge alarms, utilize the event log, generate system performance trend logs and optimize the system for most efficient performance. Operators must demonstrate their proficiency in these skills at final commissioning and before acceptance of the system.
- 2.11.6. The installing contractor shall establish user specific access password protection that is specific to each authorized operator and that will not allow any operator to access functions for which they have not demonstrated competency. Generic passwords, such as "Operator", are not acceptable and must be removed at time of acceptance. BAS system security

- protocols and passwords must comply with Hq AFCEC Engineering Technical Letter (ETL) 09-11 dated 26 Oct 2009 titled "Civil Engineering Industrial Control Information Assurance Compliance" (See Attachment 2).
- 2.11.7. Provide aftermarket support for the control system and its operators from the local system service office for a period of twelve (12) months from date of acceptance of the total system. This will require a physical connection and a technician available on call to provide the support. Provide both an IP connection and a high speed telephone modem port.
- 2.11.8. Provide a BACnet Object List that includes the hardware (input/output) points and also includes software points such as set points, trends and alarms. Identify points in language that is understandable to maintenance personnel. Computer point designators are not acceptable.
- 2.11.9. Provide detailed written Sequences of Operation for all controlled systems that describes how the system is designed to function under an array of anticipated conditions. Night set-back and Antiterrorist Force Protection (ATFP) emergency shutdown must be included in control sequences. Sequences of Operation must be submitted with the 65% design submittal and approved by AFMSA/SG8FE (Engineering).
- 2.11.10. Provide Control Schematics for all controlled equipment and systems. Identify control points with the same designator used above in the BACnet Object List.
- 2.11.11. All new systems shall utilize a BACnet/IP "backbone" for connection to system level panels and computer access terminals, as a minimum.
- 2.11.12. As a minimum, use BACnet communications protocol at the system level and provide for data access and sharing with other BACnet compatible vendors.
- 2.11.13. All devices below the system level (end device unit controllers) shall communicate in open (non-proprietary) protocol
- 2.11.14. Leave the project in a state that with the consent all approval of the government, other vendors could be permitted to tie in and access for future alteration and expansion.
- 2.11.15. Provide lightning and transient voltage protection for system level panels.
- 2.11.16. Provide auto archiving/back-up software program for routine back-up of the programs, including historical trending.
- 2.11.17. Provide one hour minimum UPS for system level panels mounted securely and safely off of the floor.
- 2.11.18. All controllers are to utilize non-volatile (or "flash") memory.

- 2.11.19. All new HVAC control systems shall be native BACNet type that can communicate in an auto-recognizable (plug-n-play) manner with other installed systems and do so without the need for intermediary translation device or "gateway." Systems shall be BACNet compliant down to the end device without need for intermediary translation device or "gateway."
- 2.11.20. A complete set of trend logs of system operation shall be submitted to the government prior functional performance testing and final commissioning to demonstrate system performance. One purpose of the trend log(s) is to determine the stability of the system at the device level in automatic mode and without human intervention. These trend logs are to be recoreded after the control system is in automatic mode, all global setpoints and limits removed, all control loop tuning and the TAB is complete. The trend logs must contain at minimum five (5) consecutive days of trends two of which are Saturday and Sunday. A Federal Holiday can be substituted for one of the weekend days.
- 2.11.20.1. Trend logs for air handlers should contain the following:
- 2.11.20.1.1. Outside Air Temperature
- 2.11.20.1.2. Return Air Temperature
- 2.11.20.1.3. Mixed Air Temperature
- 2.11.20.1.4. Supply Air Temperature
- 2.11.20.1.5. Mixed Air Damper Position
- 2.11.20.1.6. Chilled Water Coil Position
- 2.11.20.1.7. Fan Speeds
- 2.11.20.1.8. Duct Static Pressure
- 2.11.20.1.9. Preheat Coil Valve Position
- 2.11.20.1.10. Reheat Coil Valve Position
- 2.11.20.1.11. Space Relative Humidity
- 2.11.20.2. For VAV boxes the trend log shall include:
- 2.11.20.2.1. Inlet Air Temperature
- 2.11.20.2.2. Discharge Air Temperature,
- 2.11.20.2.3. Reheat Valve Position
- 2.11.20.2.4. Air Damper Position
- 2.11.20.2.5. Air Volume

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