

1 System description

1.1 General

1.1.1 Building automation and control system requirements

System requirements

General requirement including energy monitoring

Include a digital (DDC) building technology control system to operate technical equipment in buildings. The system must be able to carry out comprehensive measuring, control, optimization, and monitoring functions. The possibility for free programming of individual system components should be available to individually modify customer-specific requests.

All systems deployed supply information on operating states and energy use to render current energy efficiency transparent or to display weaknesses. Measures can be made pursuant to this information that contributes to increased energy efficiency.

User designation

The entire system (management, automation level including room automation) must be designed to define a clear, user designation UD encompassing 255 characters. The UD must be fully usable in the user programs on the management level. The UD structure must allow to use separators (e.g. -*/| etc.) in order to be better readable for the operator. On the automation level as well, the UD must at a minimum be able to query details via local operating units.

Requirement for a project as per BACnet

Communications through the entire building automation and control system must be based on the BACnet standard in a recent BACnet revision version (that qualifies as a "minimum protocol revision" according to the official BTL test policies at the time of the bidding and has been certified by BTL with a valid, official BACnet certificate / BTL Listing). It must be possible to change/assign the BACnet Object in according to the user preferences during the engineering process. All BACnet communication shall have the ability to be configured for encryption by utilizing BACnet/SC.

Specified product: Siemens / Desigo System or similar

System up-to-dateness

Product lifecycle

The system provider must offer a transparent product lifecycle to ensure the required consistency. All equipment offered for this project must be contained in the current product portfolio. The existing system environment must allow for easy and smooth integration of devices and extensions.

The system provider must offer Software- and Firmware-Patches during the lifecycle.

Specified product: Siemens / Desigo System or similar

System continuity

Products used must have a label for a global standard that ensures interaction with products from various manufacturers. Products with these labels can also be combined if manufactured at intervals of more than 10 years.

Specified product: Siemens / Desigo System or similar

Architecture

Three system levels

A building automation and control system featuring system architecture as per ISO EN 16484-3 is required. The three system levels must be interconnected via communications.

- Management level
- Automation level (building automation stations and individual room automation stations)
- Field level (field device)

Building automation stations

The system offered must provide largely decentralized intelligence to achieve high operational and plant availability. The devices are autonomous components that can independently execute assigned building automation and control.

Implement third-party systems

Third-party systems must be able to be integrated on both management and automation levels to ensure full system consistency. Default interfaces must be provided. Third-party protocol implementation must be possible and require little effort. To do this, all hardware and software required for integration, all required services, clarifications with other technical and mechanical building installations, interface testing, data transmission testing, data point generation/integration as well as plant picture creation, backup, test protocol generation and specific documentation must be included in total costs.

Location-independent operation

The building automation and control system technology must allow for location-independent operation and management of all messages and trends on all available types and views for the entire building automation and control system.

Specified product: Siemens / Desigo System or similar

Consistency

Uniform system

The supplier must prove that the required functions originate from a single manufacturer and using one automation and control system, where the hardware and software are developed in a manner that allow for simple modification while operational for subsequent function extensions or changes.

Implement new data points

Building automation and control must be coherent to ensure possibility of future extensions and changes. This means that data points must be acquired once only, and then be provided automatically as needed to operator units and management level.

Specified product: Siemens / Desigo System or similar

Integration of open standards

General

Implement via BACnet

Default protocols and suitable physical communications media must guarantee interoperability (ISO standard). Use only listed protocols and communications media. Third-party systems are integrated via BACnet. Provide only data required to operate building services plants efficiently and economically. BACnet communication, in compliance with the BACnet standard including B-BC profile.

Decentralized integration of communicating devices/equipment

A decentralized interface module must allow for connecting communicating pumps to a BACnet-capable building automation station. The building automation station provides the following functions:

- Event-oriented communications
- Peer-to-peer (cross communication)
- Alarm and message processing, distribution to local operator units and building automation and control system.
- Scheduler with days of the week
- Calendar function
- local trend recording in device buffer (long-term trend)

Communication & protocols

KNX PL-Link bus connection for sensors, actuators, and control units (including power supply of the devices) with "Plug and Play" connection to field devices with KNX PL-Link

BAS communication shall support KNX PL-Link bus connection for sensors, actuators, and control units (including power supply of the devices) with "Plug and Play" connection to field devices with KNX PL-Link .

BAS communication shall support Modbus and Mbus protocols.

Specified product: Siemens / Desigo System or similar

Electrical substations

Building automation and control systems to monitor decentralized electrical installations are used in electrical substations. To this end, the most important information (messages/monitoring) from the existing systems (fire detection plants, doors, elevators, etc.) is activated for takeover.

All technical installations in the building are joined in one building automation and control system and operated and optimized via the management station. The building automation and control system as a whole enables the building operator to acquire and influence processes and their effects throughout the building.

Specified product: Siemens / Desigo System or similar

Integrate fire detection systems

Fire detection system, BACnet-based

BACnet-based fire detection systems supporting BACnet BIBB AE-LS-B as well as objects LifeSafetyPoint and LifeSafetyZone as per the PICS (Protocol Implementation Conformance Statement) document must be able to be integrated for best deployment of a building automation and control system. The following functions must be supported:

- Alarms and events from the fire detection system must be identified clearly and unambiguously.
- Signaling device states must be displayed as per the BACnet standard.
- Instruction texts must be able to be added to detectors and zones.
- Situational and floor plans as well as dynamic symbols must be used for visualization.
- A technical hierarchy, e.g. building, building part, zone, detector, must be provided to the operator for ease of operation.

Specified product: Siemens / Desigo System or similar

Integrate Modbus devices

Integrate third-party devices via Modbus

Modbus-capable devices must be able to be connected to a BACnet-capable automation station for bidirectional data exchange. This connection must be direct via RS232 or RS485 interface and without conversion. The data points of the third-party system are mapped to input/output functions in BACnet and are then available as fully communicating data points for further processing and connection, e.g. for:

- Alarm handling and prioritization
- Override control, priority control and commands for central operation.
- Grouping
- Scheduler
- Trend recording

System must support the following Modbus properties:

- natively support Integration of Modbus devices via RTU and / or TCP
- Baud rate options of 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- integration of multiple Modbus RTU devices on the same trunk, even if the devices have different characteristics (e.g. baud rate, parity, stop bits)
- on-board bus termination, switchable with DIP switch
- on-board pull-up/pull-down resistances, switchable with DIP switch
- signed, unsigned, floats and double register data types
- support up to 64 bit big- and little-endian registers

Specified product: Siemens / Desigo System or similar

Power failure

Building automation station – on board power back-up

Building automation station must provide power to the real-time clock via a super capacitor.

Data backup

The data must be saved for extended periods of time in case of power failure or extensions or removal of building automation stations.

The applications and all vital operating parameters (including setpoints, scheduler values, etc.) must not be lost due to a power outage. Other operating values such as alarms, etc. must be capable of being saved locally on the building automation station.

Power restoration strategy based on backup power supply in case of power failure

Important and vital plant data including controls (building automation station) must continue to run during power failure (switch-off via power switch or control fuse, etc.).

The backup power supply continues to provide power to the power portion as well as plant control including building automation station. Power failure must be signaled via software, vital plants must continue to operate, non-vital plants and their aggregates and components must be switched to a safe operating mode or shut down immediately. After power returns, all building automation stations and plants including their aggregates and components must start automatically. The various plants must be switched on and released at intervals to prevent switch-on peak loads. The current status for all switching and positioning commands, setpoints, manual interventions, etc. remains saved in the building automation station and/or is reenabled following power restoration and used for the current operating mode.

Power restoration strategy in case of power failure

All plants and their aggregates and components as well as all building automation stations fail during a power failure (switch-off via power switch or control fuse, etc.).

After power returns, all building automation stations and plants including their aggregates and components must start automatically. The various plants must be switched on and released at intervals to prevent switch-on peak loads. The current status for all switching and positioning commands, setpoints, manual interventions, etc. remains saved in the building automation station and/or is reenabled following power restoration and used for the current operating mode.

Specified product: Siemens / Desigo System or similar

System time

General

System must support the maintenance of a real time clock up to 7 days.

Time synchronization in BACnet: Local time

The building automation and control system must have a uniform system time. To this end, a time master supporting BACnet BIBB DM-TS-A as per the PICS document must be defined. The time master must receive the DCF77, GPS or Internet NTP signal and provide it synchronized to all remaining system devices.

Time synchronization in BACnet: UTC time (coordinated universal time)

The building automation and control system must have a uniform system time. To this end, a time master supporting BACnet BIBB DM-UTC-A as per the PICS document must be defined. The time master must receive the DCF77, GPS or Internet NTP signal and provide it synchronized to all remaining system devices.

Subsystem autonomy

The building automation stations must autonomously run their own time if the time master fails. The building automation and control time must be resynchronized automatically after the time master becomes available again.

Specified product: Siemens / Desigo System or similar

Self monitoring and self diagnosis

Watchdog

The building automation and control system must monitor itself to always know its latest and current status. A watchdog function helps detect and signal failed system devices and restarts them in a defined mode.

Self diagnosis

Self diagnosis must be available to quickly detect errors. It must provide information on system function and load.

e.g. CPU and memory load must be displayed.

Specified product: Siemens / Desigo System or similar

General plant operating states

Overview of operating modes

There are five higher operating modes for all plants:

- Local emergency operation without building automation station functionality (direct via I/O module)

- or directly on the control cabinet as agreed to with owner).
- Local manual operation with building automation station functionality (control panel in the control cabinet).
- Local - manual operation via visualization on the management level (all functions on the local building automation station are set to Auto).
- Scheduler program under the condition that all plants are enabled for automatic operation.
- Automatic detection.

All control functions of the building automation stations must be set to and remain on automatic for highest plant availability if a plant or aggregate is switched to MANUAL. In individual cases, automatic mode must change over to this unit in case of redundancies when a plant or aggregate is switched off locally.

All safety and interlocking functions must take highest priority for operation independent of operating mode.

Automatic detection

The plants of the building automation and control system are switched on and off either automatic, or dependent on time or event. The following functions apply to the actual plant descriptions. All control loops, safety and interlocking functions must be guaranteed to work regardless of operating mode.

Controlled via scheduler program

All plants must be set to automatic for this operating mode. The plants of the building automation and control system must be switched on and off by individual use via a day, week, month, or annual scheduler program.

Manual operation

Different options are required for manual operation.

- Manual operation via management level (remote operation)
- Manual operation via local operator unit or laptop directly at the control cabinet.
- Manual operation via operator unit or directly at the control cabinet.

Manual operation generally is possible only if the corresponding building automation station is running. Manual operation allows for manually overriding scheduled plant switchings. Plants switched off by schedule can be switched on via plant switching command. Manual control of the plant switching command is equal to automatic control, i.e. the scheduled control is retained for as long as the scheduler remains active.

Emergency operation

Local priority override takes place directly via the I/O modules. To this end, the I/O modules must have an integrated local override priority as per ISO 16484-2. All aggregates on the module must be able to be switched via this operation. To this end, the I/O modules must feature preselection switches Automatic - Manual as well as LED status displays or LCDs.

Valves, dampers, etc. must allow for continuous manual adaption. All interventions are signaled to the management station via building automation station, and are then logged and visualized accordingly.

A manual operating level at the control cabinet must be included in the unit price if no integrated local priority override can be offered due to the system type.

Specified product: Siemens / Desigo System or similar

Energy efficiency and references to applicable standards

General

The building is constructed under strict energy guidelines. The control technology deployed must contain all functions required to efficiently consume energy.

Monitoring and evaluation

Automation level

Key performance indicators on the automation level

Monitoring and evaluation of measured values for primary plants (components and plant parts, software/program/system functions, setpoints, etc.) must occur directly on the automation level. Monitoring and evaluation is intended to recognize unfavorable operations of plants/components early on and thus lower or optimize energy consumption and wear and tear.

Monitoring and evaluating analog measured values

The following monitoring and evaluation must be able to be implemented for analog measured values (sensors, setpoint, modulating control of valves, dampers, variable speed drives, etc.):

- Determine the minimum value (lowest value) within a defined timeframe.
- Determine the maximum value (lowest value) within a defined timeframe.

- Determine the average value (lowest value) within a defined timeframe.
- Determine the linger period (in hours) during which the measured value moves between freely definable limit values.
- Determine deviation that the measured value deviated from the upper and lower setpoint within a defined timeframe.

The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the measured value once again assumes a reliable state. This fact must also be recognizable in the trend data.

Monitoring and evaluation of digital and multi-stage measured values

Digital measured values (messages, switching commands, operating modes, etc.) must be definable as key performance indicators and make possible the following evaluation and monitoring:

- Determine the runtime (operating hours) within a defined timeframe.
- Determine the switch-on frequency within a defined timeframe.
- Determine the runtime (operating hours) for each stage within a defined timeframe.
- Determine the switch-on frequency for each stage within a defined timeframe.

The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the value once again assumes a reliable state. This fact must also be recognizable in the trend data.

Monitoring and evaluating metered values

Metered values (consumption meters, pulse meters, etc) must be definable as key performance indicators and make possible the following evaluation and monitoring:

- Determine the difference value (consumption value within a defined timeframe).

The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof.

The value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data. The evaluation ceases for a fault to the measured value (sensor interrupt, module fault, etc.), until the value once again assumes a reliable state. This fact must also be recognizable in the trend data.

Evaluation over different timeframes

Monitoring and evaluation must be able to occur over definable timeframes (annually, monthly, weekly, daily, hourly, 15-minutes).

Weighting of monitoring and evaluation criteria

Since an aggregate or component may include multiple evaluations, it is required to be able to weigh them so that they are included differently in the calculation of the resulting quality state.

Specified product: Siemens / Desigo System or similar

1.1.2 Network security

Network hardware

In general

Automation hardware shall have built in standard security features, including:

- support firmware signature for verifying the integrity of installed firmware
- provide encrypted communication via HTTPS with the embedded web interface, incl. TLS/SSL certificates handling
- ensure a password protection policy and the force of password change on the first use
- on board WLAN connection to be protected by WPA2

Specification and selection of required network devices

The supplier specifies and selects required network devices, required to build BACS network and interfaces to other networks as well as implementation of specified IT security functions. All network devices must have the latest available firmware.

Specified product: Siemens / Desigo System or similar

1.1.3 Engineering tools and engineering efficiency

Engineering efficiency

System and tool platform

Creating solutions must be as efficient as possible, i.e. programming on construction sites; use of pre-defined application blocks, fast exchange of standard functions, etc. The goal is to achieve the maximum required level of flexibility at as little expense as possible.

A version of the engineering tool must be freely distributed and license free base software. It must be possible to keep the tool up to date via unattended user interactions (e.g. patch distribution over cloud)

Specified product: Siemens / Desigo System or similar

Harmonized tools and workflows

Consistent tools

Uniform data and functions must be used by the building automation and control system in a consistent manner throughout all tools to achieve a high level of data consistency. In other words, all data is only entered once in the system. Consistent tool processes avoid a manual exchange of data (Import/Export).

One tool shall provide optimized workflow for both engineering and commissioning processes across the automation system. Commissioning workflows will also be supported with a mobile device based application, available for iOS and Android devices – it will enable simple workflows possible for non-expert users.

System must be freely programmable with resemblance to CEN standard 11312 using block programming

Specified product: Siemens / Desigo System or similar

Transparency for customers

Data backup

A data backup concept must be presented that provides the current state of a project in a form that is useable and complete to the customer. It includes raw data from plants, applications, engineering data (e.g. DP, labeling, links, parameters), documentation.

Customer changes

The technical operator at the customer be able independently make simple changes to the project. Potential training proposals must be appended to the bid.

Specified product: Siemens / Desigo System or similar

1.2 Automation level

1.2.1 Requirements on the automation level

General

Building automation station standard

Building automation stations must be intelligent. They must be autonomous. They must allow to build large systems with highly decentralized small units (DDC).

Building automation stations must be freely programmable and feature graphical programming optimized for building automation and control. The following functions must be possible with it: Control, measure, signal at various priorities and by event, monitor, alarm, count, calculate, schedule, save trend values, and log as per DIN EN ISO 16484-5. BACnet server (building automation stations) certificates must be added to the bid.

Building automation stations must have:

- an embedded WLAN interface conforming to IEEE 802.11b/g/n, operating in the frequency band 2.4...2.462 GHz, protected by WPA2, Non-Wireless variants of the controllers shall be available to meet U.S. government and enterprise cybersecurity requirements.
- a 2-port Ethernet switch 10Base-T / 100Base-TX, IEEE 802.3 compatible
- a processor speed of at least 300MHz

- configurable RS485 interfaces either for integration of Modbus RTU, M-bus or BACnet MS/TP
- KNX PL-Link bus connection for sensors, actuators, and control units (including power supply of the devices) with "Plug and Play" connection to field devices with KNX PL-Link
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Building automation [station I/O](#)

Building automation station must have the ability to expand via I/O modules. Expanded I/O must support the following signal types:

- Passive sensors LG-Ni 1000, 2x LG-Ni1000, Pt 1000 (*75, 385)
- NTC 10k, NTC 100k
- Resistance sensors 1000 Ohm, 2500 Ohm, 2650 Ohm, 1000...1175 Ohm (for setpoint shift)
- Active sensors DC 0 ... 10 V
- Current measurement analog DC 0...20 mA or 4...20 mA
- Binary potential-free contacts for signaling functions
- Counter to 25 Hz (electronic switch to 100 Hz)
- Analog outputs DC 0...10 V
- Relay outputs for binary controls, changeover contact (NO, NC, pulse)

System design

Manufacturer must prove that they have various scalable building automation stations to ensure optimal building automation station design. Associated system documentation must be added to the bid and included in system evaluation. Documentation must show that the hardware (DDC and I/O modules) is designed optimally for the number of the required data points.

Delineation, primary and system automation to management level

All management level functions must be fully engineered in the building automation station to increase plant availability. Delineation is defined to ensure that no additional engineering is required at the management level (BACnet client).

Delineation, room automation to management level

All management level functions must be fully engineered in the room automation station to increase plant availability. Delineation is defined to ensure that no additional engineering is required at the management level (BACnet client).

Specified product: Siemens / Desigo System or similar

1.2.2 Operation concept at automation level

Local operation

General

Local operation with access for the corresponding building automation station, or network operation via BACnet to all or selected building automation stations, or simple room operation must be available.

Specified product: Siemens / Desigo System or similar

Operator and monitoring units

Requirements planned on operator and monitoring units

Networkable operator and monitoring unit

Plant operation must be possible both locally and via management level.

Operation must allow for access to all values (current values, setpoints, parameters, maintenance and fault messages) without special engineering as well as plant-specific composition of vital values.

Operation must allow for graphic display of weekday and exception programs, heating curves and trends set up individually.

Graphical plant operation via network-capable touch panel

The building management system is operated via a networked touch panel. They must inform the operator without log on using plant graphics on the present state of the plant. Multiple plants must be able to be operate via touch panel. Is must be capable of displaying and acknowledging alarms. The operator should be informed about faults directly by a common alarm display via faults even when the display is switched off. At the same time, functions to control the plant must be supported, so that plants must be able to be graphically operated and displayed using select data points, schedulers as well as trend views. A capacitive display is used to

operate. The touch panel as be added as an integral component of the overall system via a scalable web interface as well as a pleasant form of polished aluminum frames. User name and password is required to run functions that can change to plant settings in order to protect the plant. Authentication must be able to be disabled as an option.

Web operation independent of hardware

Operation must allow for graphic display of weekday and exception programs, heating curves and trends set up individually.

Operation via web browser or mobile clients

Vital functions must be viewable regardless of plant location. To this end, access is required via mobile clients (mobile phone, pocket PC, PDA, etc.) to all actual values and setpoints, plants and operating states.

Operator intervention via operator units

Plant operators must be able to switch via operator units the plant and individual aggregates and components and deactivate Auto mode via operator units. Read/write access rights must be considered in this regard.

Manual intervention signal

An alarm message must be generated following manual operator intervention as the plants are designed and controlled for highest possible energy efficiency.

Monitoring

Manual intervention (override), switching frequency

Monitoring, evaluation, and display of switching frequency is required for manual interventions over a defined timeframe. The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The determined value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data.

Manual intervention (override), runtime

Monitoring, evaluation, and display of runtime is required for manual interventions over a defined timeframe. The determined value is monitored to a minimum and maximum and displayed as quality state for breach and/or exceeding thereof. The determined value from the current timeframe is displayed; the value from the previous timeframe is also displayed and made available to the trend data.

Specified product: Siemens / Desigo System or similar

1.2.3 I/O modules

General

Construction

As highly flexible I/O modules are needed for complex and large technical equipment in buildings, they must be composed individually for each plant. To this end, modules must be configurable for various signal types, grouped, labeled per channel with clear text, two-sided readable, and distributed or set across several control cabinets/panels. Building automation stations must allow for flexible expansion of I/O via these modules. The entire module electronics must be protected by a stable plastic housing against touch and soiling.

Diagnostic function

A status diagnosis for each channel is required to quickly locate installation or plant errors. The status is displayed by LED or on the module.

LED display

The color of the status LED must be configurable to correspond with message type to provide an easy overview in the control cabinet. Feedback: green, maintenance: yellow, warning: red.

Remote I/O modules

Remote I/O modules must be able to be used for small plants or parts thereof to keep the size and number of control cabinets/panels as low as possible. The modules must be able to be as far as 200 m from the building automation station. The maximum number of data points edited this way may only be limited by the maximum

capacity of the building automation station.

Isolating terminal functionality

The electronic modules must have isolating terminals to simplify hardware tests and commissioning. As a result, connected field devices can be measured at the test plug sockets without module electronics influence. At the same time, the connection terminals must act as cabinet/panel terminal strips. If the bidder cannot provide proof for this function, all inputs and outputs must be run via separate isolating terminals. The resulting costs must be included in the unit prices.

Specified product: Siemens / Desigo System or similar

Local priority control

Level for manual local priority control

The module must have an optical status message facility to avoid faulty positions.

Monitoring local priority control

The building automation and control system must be able to indicate any intervention via the local priority control. This indication must be well displayed at the management level.

Specified product: Siemens / Desigo System or similar

Connection

Short-circuit proof

Field devices and motors must be connected directly without requiring coupling relays or other proprietary hardware. All terminals are protected against short circuit and incorrect wiring using AC/DC 24 V. Field device errors must be recognized and displayed reliably to retain high plant availability.

Broken wire interlock

Interlocks (hardware) and fault messages must be designed for possible wire breaks or loose terminals under closed-loop rules, i.e. the building automation station then has status "1" OK (closed monitoring loop) or no fault, and status "0" (interrupted monitoring loop) or fault.

Specified product: Siemens / Desigo System or similar

Connect field devices

Field device standards

The building automation stations and I/O modules must support all common sensors (e.g. temperature, humidity) and actuators (valves, damper actuators) without requiring additional conversion hardware. The bidder must provide proof that the field devices used for the project were tested under the entire system and documented accordingly.

Use of I/O modules on the automation level

Functionality for the I/O system must be implemented on the automation level.

Specified product: Siemens / Desigo System or similar

1.2.4 Updates and adaptations

Updates

Changes during operation

Customer-specific plant programs must allow for minor adjustments without having to switch off unrelated plants and without changing set parameters and setpoints.

Changes to applications during operation

Minor program changes must be able to be introduced without operational interruptions.

Adaptations

Access to system network

Operators must be able to enter adapted parameters, setpoints, times etc. in each building automation station via the system network under their password.

Specified product: Siemens / Desigo System or similar

1.3 Communication

1.3.1 Standard BACnet / AMEV

DIN EN ISO 16484-5 / AMEV

BACnet conformance and BTL logo

The BACnet servers (building automation stations) used must support at least BACnet in a recent BACnet revision version (=that qualifies as a "minimum protocol revision" according to the official BTL test policies at the time of the bidding).

B-BC (building automation station)

Building automation stations must match the BACnet Profile B-BC, B-AWS / B-ALWS (Building Controller) as per the BTL Listing.

AMEV (Building automation station)

The building automation stations must meet AMEV profiles for at least AS-D as per AMEV guideline "BACnet 2017".

Conformance declaration

Protocol implementation, and conformance statement (PICS)

Manufacturer self-declaration PICS is required prior to executing work to gain information on the type of communication for the building automation and control system.

Communication via BACnet / IP

BACnet/IP(v4) to BACnet/MS/TP

The building automation station must be able to integrate, using a BACnet router manufactured by the same vendor, the MS/TP protocol via BACnet/IP.

Specified product: Siemens / Desigo System or similar

Communication via BACnet / SC

Responsibility of certificates

The end customer shall define the responsibility to generate and maintain required TLS certificates

BACnet/IP to BACnet/SC

Automation Stations and Management Stations shall support BACnet/SC datalink to ensure secure communication. If not all devices of the BACnet system can support BACnet/SC, the alternative solution shall consist of a mix with a recommendation to migrate all devices to BACnet/SC (future upgrade via firmware must be possible).

The building automation stations supporting BACnet/IP must also support BACnet/SC or at least allow for a software upgrade to BACnet/SC (without exchanging the hardware).

Building automation stations that support BACnet/SC must support both self-signed certificates as well as the use of digital certificates that are generated by an arbitrary 3rd party certification authority ("CA"). The engineering tool shall also be capable of handling TLS certificates generated by an external CA.

Building automation stations that work as a BACnet/SC "hub" must also simultaneously work as BACnet/IP router to support an easy parallel use of both BACnet datalinks and a step-wise migration towards a secure system-wide BACnet communication and to support a mixed system.

Building automation stations that work as BACnet/SC "hub" must support at least 100 simultaneous BACnet/SC

"node" connections. It shall be possible to build systems larger than a single BACnet/SC hub supports.

BACnet/SC devices shall be tested and certified by the BACnet Testing Laboratory.

The automation equipment manufacturer must ensure cyber secure product development process and demonstrate compliance with IEC62443 4-1.

Specified product: Siemens / Desigo System or similar

1.3.2 Physical structure

Network structure

Structure

The offered network must be flexible and allow for all types of networks (line, star, ring, tree, etc.) to satisfy all owner/operator needs.

1.3.3 Building automation and control system - Building automation stations

Openness

Integration of third-party systems

If possible, the same communication protocol must be used as for the existing technical equipment in the building to integrate third-party systems (refrigeration machines, lighting and building automation and control systems, etc.). Building automation and control systems not offering this integration as specified must include and clearly declare any additional conversion hardware (gateways) in their price.

Open and neutral communication via BACnet

Building automation stations are connected to the management level via communication bus. System structure must allow open, neutral and manufacturer-independent communication. Communications must take place in principle via BACnet even if proprietary communications would be possible based on the building automation stations used. Intermediate OPC servers are not allowed.

Specified product: Siemens / Desigo System or similar

1.3.4 Building automation station - Building automation station

Standard protocol

Uniform protocol

Communication must also be standardized even between individual modules and building automation stations. All devices must communicate on the same protocol on the entire primary and room system levels.

Specified product: Siemens / Desigo System or similar

1.3.5 Building automation station - Field level

Field device connection

Connect field devices

The building automation stations and I/O modules must support all common sensors (e.g. temperature, humidity) and actuators (valves, damper actuators, lighting control, blinds drives) without requiring additional conversion hardware. The bidder must provide proof that the field devices used for the project were tested under the entire system and documented accordingly.

Connect communicating field devices

Common manufacturers must be integrable to connect third-party devices and subsystems. (e.g. communicating pumps, Modbus subsystems etc.).

Third-party system connection

A interface is required to connect various third-party devices that supports communication protocols such as Modbus

Specified product: Siemens / Desigo System or similar