EPBD BACS COMPLIANCE VERIFICATION CHECKLIST

INTRODUCTORY NOTES

eu.bac has supported European policymakers in the implementation of the Energy Performance of Buildings Directive (EPBD (EU) 2018/844) since its approval. Through exchanges with national level consultants and legislators, it became clear that further guidance is necessary on how to ensure compliance with the requirements introduced by Article 14 and Article 15, paragraph 4.

> "Member States shall lay down requirements to ensure that, where technically and economically feasible, **non-residential buildings** with an effective rated output for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air-conditioning and ventilation of **over 290kW** are equipped with building automation and control systems by 2025."
>
> "The building automation and control systems shall be capable of:
> (a) continuously monitoring, logging, analysing and allowing for adjusting energy usage;
> (b) benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for the facilities or technical building management about opportunities for energy efficiency improvement;
> (c) allowing communication with connected technical building systems and other appliances inside the building, and being interoperable with technical building systems across different types of proprietary technologies, devices and manufacturers."

It is necessary to prove the compliance of Building Automation and Control Systems (BACS) in the buildings falling within the set scope. This would help national market surveillance authorities distinguish between buildings complying with the legislation and those that do not comply, and which must therefore improve the BACS to the level required. Taking all this into consideration eu.bac has developed a checklist complemented by a self-declaration form for building owners to assess their level of BACS compliance.

This tool developed by industry experts at eu.bac is a clear, effective, and usable guide on BACS compliance with the EPBD. In this framework, eu.bac is not providing policy suggestions but rather acting as an expert body detailing the existing legal requirements.

WHO IS THE CHECKLIST FOR?

BUILDING INSPECTOR

Compliance needs to be confirmed by the national market surveillance authorities, for instance, a building inspector. Therefore, the checklist includes spot-checks intended to confirm whether all the necessary aspects of functionality can be provided by the installed BACS. The verification mechanism eu.bac proposes is simple and can be used by an inspector with limited BACS knowledge.

BUILDING OWNER

In order to make the compliance verification more efficient and more effective eu.bac proposes a separate self-declaration designed to be used by the building owner or a technical expert representing the building owner. This will help the owner asses their BACS compliance in preparation for the compliance verification by the national market surveillance authorities. Furthermore, it will inform the owner about the necessary supporting documentation and the checks carried out by the building inspector.

BUILDING DESIGNER

The technical specifications of new buildings and renovation projects in the design phase shall include the requirements for supporting records to ensure the EPBD BACS capabilities are met. The checklist provides the designer with the necessary clarifications to overcome any ambiguity within the compliance requirements in the legislation.

NATIONAL POLICYMAKER

Following the formal transposition of the EPBD, many Member States will need to approve further implementing decrees, specifying technical aspects which were not included in the first transposing provisions. While eu.bac suggests, consistently with previous guidelines, to translate these requirements into a requirement of EN 15232 level B for all buildings in scope, the checklist will be a helpful practical tool for the legislator to clarify details about what the functionalities mean in practice.

THE CHECKLIST STRUCTURE

The BACS compliance verification checklist is structured in a table form. The top row introduces the columns which either raise a question, provide information, or must be filled in by the inspector.

The "ID" column provides a reference indicator for each compliance check.

The "self-declaration compliance question" column shows the inspector, what aspect of the requirements the owner has been asked to comply with and for what purpose.

The "self-declaration compliance supporting records" column lists the set of documentation the owner has to provide in order to demonstrate compliance and offers examples of suitable records. Using any of these examples as evidence would be acceptable. Similar records to the ones described in the examples would also suffice as long as they fulfil the purpose of the specific check.

The "compliance verification checks" column describes the set of actions the inspector will have to take to confirm the individual aspects of compliance.

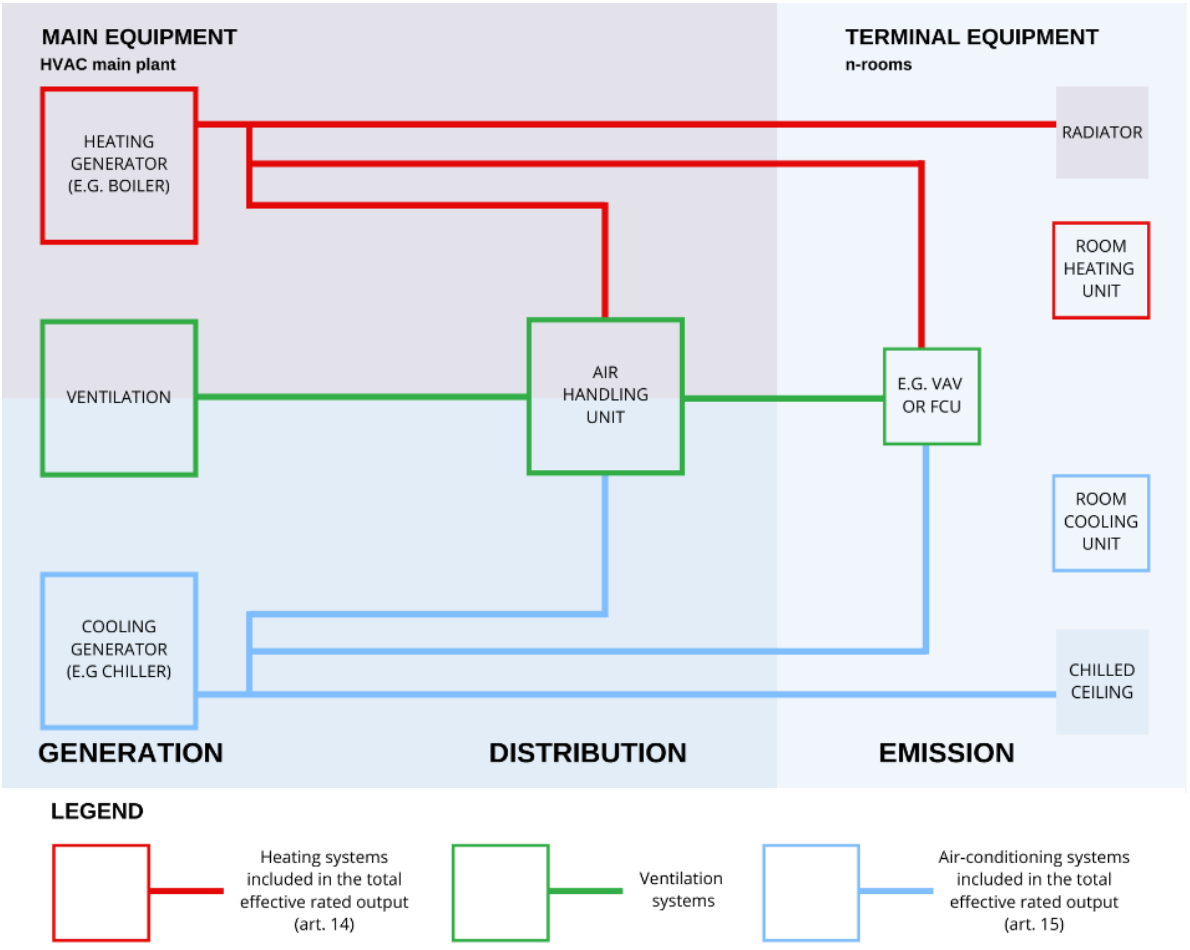
The "response" column is where the inspector indicates whether the individual aspects of compliance have been met.

The "boundary conditions/prerequisites" column is an informative description of what additional conditions should be in place in order to exploit the full potential of the BACS capabilities and ensure optimal performance. These additional requirements are not included in the law and are therefore not specifically mandated by the EPBD. The additional column is at the end of the row to clearly separate the legal requirements from recommendations.
The boundary condition inputs serve two purposes by providing:

- The owner and the building designer with information on prerequisites for the BACS capabilities to be effective, e.g. if no responsible person is nominated, the capability of BACS to inform a responsible person would be wasted
- Policymakers with information on additional possible requirements they can set at the national level, in addition to the ones found in the EPBD

	STEP 3: The building automation and control systems shall be CAPABLE of:				
ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)	RESPONSE	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective
(a)	CONTINUOUSLY MONITORING, LOGGING, ANALYSING and ALLOWING for ADJUSTING ENERGY USAGE				
A1	Is the building energy meter data including (minimum the thermal energy for space heating, space cooling and electrical energy) integrated and analysed in BACS with at least hourly data granularity to identify energy optimisation opportunities in the building ? (according to Class B: 7.4.1 Trending functions and consumption determination)	PDF energy consumption reports for building electricity, heating and cooling consumption respectively that compare energy values in different time periods, e.g. cumulated daily values from last month (before the inspection) compared to the daily values for the same month from last year	Check the availability of energy consumption reports that compare current values with previous periods and indicates deviations	YES ☐ NO ☐	Energy metering should cover minimum 80% of total HVAC building energy consumption. A process to audit/validate/certify the meters readings should be in place. The energy data measuring systems relevant for HVAC shall be regularly checked for their function and accuracy. Monitoring and logging are prerequisites for the analysing capability. Data should be retained for historical analysis, so trends can be observed.

Before the core section of the checklist, there are two preliminary sections. These ensure that the building falls under the scope of the EPBD BACS compliance requirements. The sample HVAC architecture graphic below demonstrates the scope of the equipment covered by the BACS compliance verification checklist.



Please note the following definitions from the EPBD:

Heating system refers to the combination of the components required to provide a form of indoor air treatment, by which the temperature is increased.

Air-conditioning system refers to the combination of the components required to provide a form of indoor air treatment, by which temperature is controlled or can be lowered.

Effective rated output refers to the maximum calorific output, expressed in kW, specified, and guaranteed by the manufacturer as being deliverable during continuous operation while complying with the useful efficiency indicated by the manufacturer.

STEP 1: The BACS compliance verification shall be conducted only if the effective rated output for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air-conditioning and ventilation in the building is over 290kW. (EPBD)

Through a series of questions, this section provides information on the individual values of the effective rated output for the technical building systems in this particular building. When a technical building system (e.g. air-conditioning system) is not present in a building the respective BACS checks

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	STEP 1: The BACS compliance verification shall be conducted only if the effective rated output for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air-conditioning and ventilation in the building is over 290kW.				
I	**Information Section:** 290 kW COVERAGE				
	STEP 2: The compliance verification shall be conducted only if building automation and control systems (BACS) capabilities apply to a considerable extent in the building				
S	**Starting Section:** BACS COVERAGE				

will not be applicable and should be clearly marked with N/A.

STEP 2: "The compliance verification shall be conducted only if building automation and control systems (BACS) capabilities apply to a considerable extent in the building." (eu.bac)

For the BACS capabilities to have the EPBD intended impact on the building energy performance there should be a minimum coverage of BACS-controlled heating, ventilation, and air-conditioning building systems. In this section a series of questions confirm the proportion of technical building systems which are controlled by BACS. eu.bac recommends that the compliance verification shall be conducted only if BACS apply to a considerable extent in the building.

After ensuring the building can be considered eligible for the compliance check, individual compliance checks are clustered in three different groups (each of them representing one of the three capabilities listed in Art. 14/15 par.4). References to relevant control functions in EN 15232 are noted where necessary.

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I	**Information Section:** 290 kW COVERAGE				
	STEP 2: The compliance verification shall be conducted only if building automation and control systems (BACS) capabilities apply to a considerable extent in the building				
S	**Starting Section:** BACS COVERAGE				
	STEP 3: The building automation and control systems shall be CAPABLE of:				
(a)	CONTINUOUSLY MONITORING, LOGGING, ANALYSING and ALLOWING for ADJUSTING ENERGY USAGE				
(b)	benchmarking the building's energy efficiency, detecting losses in efficiency of technical building systems, and informing the person responsible for technical building management about opportunities for EE improvement				
(c)	ALLOWING COMMUNICATION with CONNECTED TBS and OTHER APPLIANCES inside the building, and BEING INTEROPERABLE with TBS across DIFFERENT TYPES of PROPRIETARY TECHNOLOGIES, DEVICES and MANUFACTURERS				

The building inspector is to use the “RESPONSE” column checkboxes “YES” and “NO” to mark the result of the specific check for each row. For each compliance verification check if the answer in the self-declaration was positive, the supporting records are available and the spot-check has confirmed it, “YES” should be marked in the checkbox. If any of these are missing “NO” should be marked. To comply with the legal requirements, all rows in the three groups of functionalities must be marked with a “YES”. If any is negative, the BACS do not comply with the legal requirements and must therefore be improved to the required state.

THE SELF-DECLARATION

A separate self-declaration designed to be used by the building owner or a technical expert representing the building owner is the final element of the BACS compliance verification toolkit. The owner can use the list to answer the self-declaration questions and provide the necessary supporting records. The self-declaration starts with a building information section to be filled in and signed accordingly. The building inspector column is visible only for information purposes to anticipate what checks will be carried out.

BUILDING INFORMATION

BUILDING NAME	
BUILDING ADDRESS	
FLOOR AREA	
BUILDING OWNERS NAME	
OWNERS SIGNATURE AND DATE	
RESPONSIBLE EXPERT	
EXPERTS SIGNATURE AND DATE	

SELF-DECLARATION

STEP 1: The BACS compliance verification shall be conducted only if the effective rated output for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air-conditioning and ventilation in the building is over 290kW.					
ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	RESPONSE	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)
I	Information Section: 290 kW COVERAGE				
I1	"What is the effective rated output (calorific output as per EPBD) of the Heating equipment in the building Heating systems (output of all heat generators in the building including main Heating equipment in plantrooms, e.g. boiler, solar heat system, CHP and heat-generating terminal equipment in rooms, e.g. electric direct heater)? NOTE: Every heat generator that adds heat to the building space regardless of its locations (generation in main HVAC plant, distribution and emission in the room) should be added in the sum for the output."	<kW>	PDF list of Heating system main equipment with indication of the maximum calorific output, expressed in kW, per piece of equipment		Check equipment nameplates of main Heating systems equipment in main HVAC plant or the building Operation & Maintenance Manual

ABBREVIATIONS USED

BACS	Building Automation and Control System
EPBD	Energy Performance of Buildings Directive
HVAC	Heating, Ventilation, and Air-conditioning
TBS	Technical Building Systems
FCU	Fan Coil Unit
VAV	Variable Air Volume

SOURCES AND REFERENCES

Energy Performance of Buildings Directive
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.156.01.0075.01.ENG&toc=OJ:L:2018:156:TOC

eu.bac, Guidelines for the transposition of the new Energy Performance Buildings Directive
https://www.eubac.org/cms/upload/eu.bac_guidelines_on_revised_EPBD_June_2019.pdf

Waide Strategic Efficiency Limited, The impact of the revision of the EPBD on energy savings from the use of building automation and controls
https://www.eubac.org/cms/upload/downloads/position_papers/EPBD_impacts_from_building_automation_controls.pdf

EU.BAC

eu.bac is the European Building Automation and Controls Association. It represents the major European manufacturers of products and systems for home and building automation. Its vision is a world where everyone lives in buildings that are smart, decarbonised, and efficient. eu.bac has founded the European Association of Energy Services Companies (eu.esco) for promoting Energy Performance Contracting as the economically sustainable solution for improving the energy performance of existing buildings using the guaranteed energy savings to pay for the installation. For a full and updated overview of our membership, please see www.eubac.org.

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EPBD BACS COMPLIANCE VERIFICATION CHECKLIST

STEP 1: The BACS compliance verification shall be conducted only if the effective rated output for heating (Art.14)/air-conditioning (Art.15) systems or systems for combined space heating/air-conditioning and ventilation in the building is over 290kW.

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I	**Information Section:** 290 kW COVERAGE				
I1	What is the effective rated output (calorific output as per EPBD) of the Heating equipment in the building Heating systems (output of all heat generators in the building including main Heating equipment in plantrooms, e.g. boiler, solar heat system, CHP and heat-generating terminal equipment in rooms, e.g. electric direct heater)? NOTE: Every heat generator that adds heat to the building space regardless of its location (generation in main HVAC plant, distribution and emission in the room) should be added in the sum for the output.	PDF list of Heating system main equipment with indication of the maximum calorific output, expressed in kW, per piece of equipment	Check equipment nameplates of main Heating system equipment in main HVAC plant or the building Operation & Maintenance Manual.	<kW>	
I2	What is the effective rated output (calorific output as per EPBD) of the Air-conditioning systems in the building (output of all cold generators in the building including main cooling equipment in plantrooms, e.g. chiller, heat-pump, and cooling-generating terminal equipment in rooms)? NOTE: Every cooling generator that adds cooling to the building space regardless of its location (generation in main plant, distribution and emission in the room) should be added in the sum for the output.	PDF list of Air-conditioning system main equipment with indication of the maximum calorific output, expressed in kW, per piece of equipment	Check equipment nameplates of main Air-conditioning systems equipment in HVAC main plant or the building Operation & Maintenance Manual.	<kW>	

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I3	What are the 3 representative rooms in this building in which the heating, cooling and/or ventilation is/are BACS controlled? Please enter their types, names, and floor area in the Response column. NOTE: Representative rooms/spaces should represent the room/space types that are the most typical for the inspected building, e.g. an individual office, an open office zone and a meeting room in an office building.	PDF floor plans with marked representative rooms	Check PDF floor plans where the 3 representative rooms are marked.	Room 1: type, name, size in m2 Room 2: type, name, size in m2 Room 3: type, name, size in m2	

STEP 2: The compliance verification shall be conducted only if building automation and control systems (BACS) capabilities apply to a considerable extent in the building

ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)	RESPONSE	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective
S	**Starting Section:** BACS COVERAGE				
S1	Is 80% of the effective rated output in kW for Heating systems in the building, both main equipment and terminal equipment, controlled by BACS - relates to the figure in I1	Indicate in the list of I1 which heat-generating equipment/devices are integrated in BACS and provide corresponding diagrams of controls	Spot-check BACS heating controls equipment in HVAC main plant to confirm the information provided by the Building Owner	YES ☐ NO ☐	BACS should control a minimum 80% of the Heating systems in the building for it to have any effect on the heating energy performance
S2	Is 80% of the effective rated output in kW for Air-Conditioning systems in the building, both main equipment and terminal equipment, controlled by BACS - relates to the figure in I2	Indicate in the list of I2 which cold-generating equipment/devices are integrated in BACS and provide corresponding diagrams of controls	Check BACS air-conditioning controls equipment in HVAC main plant to confirm the information provided by the Building Owner	YES ☐ NO ☐	BACS should control a minimum 80% of the Air-conditioning systems in the building for it to have any effect on the heating energy performance To count stand-alone split units in the 80% these units should be at least monitored by BACS, e.g. energy consumption, status, interlock with heating control
S3	Is 80% of the nominal electrical output in kW for Ventilation systems in the building, both main equipment and terminal equipment, controlled by BACS?	Indicate in the list of all ventilation equipment/devices with corresponding electrical output in KW which of them are integrated in BACS and provide corresponding diagrams of controls	Check BACS ventilation controls equipment in HVAC main plant to confirm the information provided by the Building Owner	YES ☐ NO ☐	BACS should control a minimum 80% of the Ventilation systems in the building for it to have any effect on the ventilation energy performance Stand-alone occupancy-driven control of exhaust fans (through presence detectors) should be included in the 80%, e.g. toilet exhaust fans.

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S4	Does 80% of the building floor area designed for continuous occupancy during building operating hours (rooms/zones) have room/zone automation controls integrated into BACS?	PDF floor plans with marked individual room controls	Check the availability of PDF floor plans with marked individual room controls	YES ☐ NO ☐	BACS should control a minimum 80% of the building floor area designed for continuous occupancy during building operating hours for it to have any effect on the building energy performance and IEQ Rooms/zones that are designed for continuous occupancy during operating hours shall have controls equipment that meet at least class B according to EN 15232.

	STEP 3: The building automation and control systems shall be CAPABLE of:				
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(a)	CONTINUOUSLY MONITORING, LOGGING, ANALYSING and ALLOWING for ADJUSTING ENERGY USAGE				
A1	Is the building energy meter data integrated and analysed in BACS with at least hourly data granularity to identify energy optimisation opportunities in the building? (according to Class B: 7.4.1 Trending functions and consumption determination) Including as a minimum the following total energy data for: - total building thermal energy for space heating, and - total building thermal energy for space cooling and - total building electrical energy	PDF energy consumption reports for building electricity, heating and cooling consumption respectively that compare energy values over different time periods, e.g. cumulated daily values from last month (before the inspection) compared to the daily values for the same month from last year	Check the availability of energy consumption reports that compare current values with previous periods and indicate deviations.	YES ☐ NO ☐	Energy metering should cover a minimum 80% of total HVAC building energy consumption. A process to audit/validate/certify the meters' readings should be in place. The energy data measuring systems relevant for HVAC shall be regularly checked for their function and accuracy. Monitoring and logging are prerequisites for the analysing capability. Data should be retained for historical analysis, so trends can be observed.

ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)	RESPONSE	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective
A2	Is HVAC energy-relevant process data monitored and analysed to detect recurring energy wasting deviations and to trigger respective corrective actions?	"PDF snapshot of output used for analytics with 2 example views and a rationale on how corrective actions can be derived from it. Example 1. A graph with runtime values for main HVAC equipment vs room occupancy times for the 3 representative rooms of the last 6 months before the planned inspection, ideally 1-minute log interval Example 2. A graph including room setpoint +/- deadband, room temperature values, action/control signal on the terminal unit (or the equipment controlling the temperature) and room occupancy for the 3 representative rooms for four 24 hour periods (one in each season), ideally 1 minute log interval OR SIMILAR examples accompanied with an explanation of how this proof is similar in fulfilling the specific requirement"	Check the availability of example snapshots for consistency and continuity	YES ☐ NO ☐	There should be a process in place to regularly analyse the information provided by BACS and track corrective actions. Additional information on occupant feedback/behaviour should be considered to define corrective actions.
A3	Does BACS allow adjustment of setpoints (fixed or calculated) of all relevant supplying HVAC plants to optimize demand-driven operation?	Print screen/photo of the BACS interface that shows the possibility for setpoint adjustment from a central GUI (e.g. work station, web operation; room operating units are excluded) for HVAC main plant (main generation and distribution equipment), combined with a clear naming /description of the setpoints linked to energy.	Check the availability of selected print screens for main HVAC plants that clearly show setpoint adjustment possibilities	YES ☐ NO ☐	

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A4	Is there a runtime management as per EN 15232 Class A: 7.2.2 Individual setting following a predefined time schedule; adaptation from a central point (e.g. workstation, web operation; room operating units are excluded)?	Print screens showing that runtime schedules for HVAC equipment could be adjusted. The number of print screens depends on the HVAC systems present in the specific building (one per system): Example 1. Adjusting runtime of heating system including the runtime schedule for at least 1 heat generator Example 2. Adjusting runtime of air-conditioning system including the runtime schedule for at least 1 cooling generator Example 3. Adjusting runtime of ventilation system including the runtime schedule for at least 1 major fan Example 4. Adjusting runtime of room HVAC equipment (e.g. FCU, VRF unit) for at least one of the representative rooms	Check the availability of selected print screens for main HVAC plants that clearly show runtime management possibilities	YES ☐ NO ☐	
A5	Is there a setpoint adjustment or reset from a central point (e.g. workstation, web operation) for individual spaces? (according to EN 15232 7.1.2)	Print screens from the BACS User Interface where the temperature setpoint for cooling, the temperature setpoint for heating and the ventilation setpoint (CO2 or air flow), for the selected representative rooms are clearly visible.	Check the availability of selected print screens for the representative rooms that clearly show setpoint adjustment possibilities	YES ☐ NO ☐	eu.bac recommend applying EN 15232 7.1.3 Class A which ensures automatic reset back to the present setpoint.

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(b)	BENCHMARKING the building's energy efficiency, DETECTING LOSSES in efficiency of technical building systems, and INFORMING THE PERSON RESPONSIBLE for technical building management about opportunities for EE improvement				
B1	Is the building's HVAC plant energy consumption data or its energy consumption data recorded at least once a day and benchmarked to defined reference objects (e.g. different HVAC plant in the same building) or reference time intervals for the same building (e.g. monthly using TBM)?	PDF report that clearly shows that data is collected regularly, including benchmarking data, for at least the last month (preceding the inspection). Data can be presented as a table with numeric values, if it includes the time stamp for each reading, or a in a graph. Example 1: A report that benchmarks HVAC plant energy consumption data against a target value(s) Example 2: PDF weather-normalised energy reports (HDD and CDD) for the last 12 months compared to the previous year or a baseline year or a target value. OR SIMILAR reports accompanied with an explanation of how this alternative proof fulfils the specific requirement	Check the availability of an HVAC plant energy consumption report that compares current values with previous periods	YES ☐ NO ☐	Documented rationale and justification that collected data and reference data are comparable (e.g. normalisation, similarities, previous time intervals, exceptions) should be available.
B2	Is there energy-relevant process data from HVAC sub-systems that is used to analyse deviations compared to defined benchmarks (e.g. big deviation from design coefficient of performance COP) using TBM?	PDF report for at least the last month (preceding the inspection) containing energy performance data for relevant HVAC sub-systems: Example 1: A report that compares the actual efficiency of heating/cooling generators, e.g. “coefficient of performance”, with the design COP; Example 2: A report that compares the measured supply and return water temperature difference for a heat generator with the design temperature difference; OR SIMILAR reports accompanied with an explanation of how this alternative proof fulfils the specific requirement	Check the availability of benchmark report for a significant HVAC sub-system (consuming over 15% of total building energy consumption) that compares current values with defined benchmarks	YES ☐ NO ☐	

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B3	Is there automatic detection of HVAC equipment running in manual override/exception mode logged and flagged centrally?	PDF report showing manual override events for main HVAC plant items. It is not necessary to cover a specific period (the building may be running always in auto) but the report must show at least the last test run on site or the commissioning of the BACS	Check the availability of a record (e.g. use activity log print-out) for the last 3 examples of when HVAC equipment was set in manual operation for more than 24hrs	YES ☐ NO ☐	
B4	Is there automatic detection of faults in HVAC equipment that is it logged and flagged centrally?	A PDF report showing fault alarms for main HVAC plant items. The proof depends on the HVAC systems present in the specific building - equipment faults in heating system including the equipment fault for at least 1 heat generator - equipment faults in air-conditioning system including the equipment fault for at least 1 cooling generator - equipment faults in ventilation system including the equipment fault for at least 1 major fan - equipment faults of room HVAC equipment for at least 1 of the representative rooms	Check the availability of a record showing fault alarms related to main HVAC plant equipment were reported by the BACS	YES ☐ NO ☐	

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B5	Is there automatic detection of loss in efficiency in the HVAC-related TBS with central indication of detected faults and alarms/diagnosing functions that is used to derive corrective actions and fix recurring suboptimal energy performance? (according to EN 15232 7.3.2)	PDF report showing relevant HVAC system events/alarms: Example 1: A report that notifies deviations of current efficiency for heating/cooling generator, e.g. “coefficient of performance”, from its efficiency in the last heating/cooling season; Example 2: A report that notifies deviations in pressure drop across a main AHU; OR SIMILAR reports accompanied with an explanation of how this alternative proof fulfils the specific requirement	Check the availability of an event report for considerable deviations in the operating parameters of a main HVAC sub-system	YES ☐ NO ☐	
B6	Is the person responsible for TBM informed by BACS about any main HVAC equipment faults?	A PDF extract/print screen from Alarm/Activity log, provided by the BACS, that shows the last 3 examples when the BACS system sent a message/alarm about faults on main HVAC equipment to the responsible person, also including the status of this alarm (e.g. acknowledged status)	Check the availability of BACS activity log record	YES ☐ NO ☐	There has to be a nominated responsible person(s) for the operation and optimization of the TBM. There should be a process in place to inform & involve the nominated Building operators instantly to implement corrective actions for HVAC equipment faults

ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)	RESPONSE	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective
B7	Is the person responsible for TBM/ responsible Building Operator reliably and quickly informed by BACS about energy waste and/or comfort compromised operation of HVAC systems with an indication of where/how to take corrective action?	A PDF extract/print screen from Alarm/Activity log, provided by the BACS, that shows the last 3 examples when the BACS system sent a message/alarm about deviations from expected energy performance of HVAC and / or indoor comfort conditions to the responsible person, also including the status of this alarm (e.g. acknowledged status) Examples for Energy Waste: 1. Notification of pre-defined % deviation (for a pre-defined duration) between the measured supply and return water temperature difference for a heating coil and the design temperature difference; 2. Notification of pre-defined % deviation (for a pre-defined duration) between the actual efficiency of heating/cooling generators, e.g. “coefficient of performance”, and the design efficiency 3. Notification related to any of the evidence provided in the supporting records used in B1-B6 checks Examples for Comfort-Compromised Operation: 1. Notification of deviations in space temperature outside of operator-defined comfort range. 2. Notification of deviations in CO2 level above the operator-defined comfort acceptable limit.	Check the availability of BACS activity log record	YES ☐ NO ☐	There must be a nominated responsible person(s) for the operation and optimization of the TBM. There should be a process in place to inform & involve the nominated Building operator instantly to implement corrective actions to maintain and improve EE

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(c)	ALLOWING COMMUNICATION with CONNECTED TBS and OTHER APPLIANCES inside the building, and BEING INTEROPERABLE with TBS across DIFFERENT TYPES of PROPRIETARY TECHNOLOGIES, DEVICES and MANUFACTURERS				
C1	Can BACS manage relevant information with other connected TBS and devices, and enable "global" cross TBS optimization strategies while improving operation at "individual" equipment level?	A PDF report of an example that shows coordination in the operation of 2 or more individual systems/devices: Example 1: Interlock between heating and cooling control to prevent simultaneous heating and cooling Example 2: Combined light/blind/HVAC control in rooms Example 3: Sequencing of different heat/cold generators OR SIMILAR reports accompanied with an explanation of how this alternative proof fulfils the specific requirement	Check the availability of an example BACS report that proves exchange of information between BACS connected systems / devices	YES ☐ NO ☐	
C2	Does BACS control the start/stop of HVAC-related systems / devices?	A PDF print screen/photo of BACS connected and controlled equipment / devices, e.g. chiller, fan coil unit, lighting system, solar protection system, solar heat system, CHP If possible, provide an example with different proprietary technologies. Example: Re-use the check for A4, and add the make/model number of the system/device, e.g. air handling unit, domestic hot water system, room controls from different manufacturer that BACS interfaces with	Check the availability of selected print screens that show BACS control of various systems / devices	YES ☐ NO ☐	Only connected HVAC-related systems and appliances in the sense of EPBD are in scope – refer to the Starting section S

ID	SELF-DECLARATION COMPLIANCE QUESTIONS (answered by Building Owner)	SELF-DECLARATION COMPLIANCE SUPPORTING RECORDS (provided by Building Owner)	COMPLIANCE VERIFICATION CHECKS (conducted by Building Inspector)	RESPONSE	Boundary Conditions / PREREQUISITES for the BACS capabilities to be effective
C3	Does BACS have the possibility potential to set and modify setpoints for HVAC-related systems / devices?	A PDF print screen/photo of BACS interface that shows the possibility for setpoint adjustment for BACS connected and controlled systems / devices, e.g. air handling unit, domestic hot water system, room controls by different manufacturer Example: Re-use the check for A5, and add the make/model number of the system/device, e.g. air handling unit, domestic hot water system, room controls from different manufacturer that BACS interfaces with	Check the availability of selected print screens that clearly show setpoint adjustment possibilities	YES ☐ NO ☐	Only connected HVAC-related systems and appliances in the sense of EPBD are in scope – refer to the Starting section S