SLOVENSKI STANDARD
SIST-TP CEN/TR 15232-2:2018

01-maj-2018

Energijske lastnosti stavb - 2. del: Razlaga in utemeljitev prEN 15232-1:2015 - Moduli M10-4, 5, 6, 7, 8, 9, 10

Energy performance of buildings - Part 2: Accompanying TR prEN 15232-1:2015 - Modules M10-4,5,6,7,8,9,10

Performance énergétique des bâtiments - Partie 2 : Rapport technique accompagnant le prEN 15232-1:2015 - Modules M10-4,5,6,7,8,9,10

Ta slovenski standard je istoveten z: **CEN/TR 15232-2:2016**

ICS:

91.120.10	Toplotna izolacija stavb	Thermal insulation of buildings
97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

SIST-TP CEN/TR 15232-2:2018 **en**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 15232-2

September 2016

ICS 35.240.99; 91.120.10; 97.120

English Version

Energy performance of buildings - Part 2: Accompanying TR prEN 15232-1:2015 - Modules M10-4,5,6,7,8,9,10

This Technical Report was approved by CEN on 11 April 2016. It has been drawn up by the Technical Committee CEN/TC 247.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. CEN/TR 15232-2:2016 E

Contents

Page

European foreword

This document (CEN/TR 15232-2:2016) has been prepared by Technical Committee CEN/TC 247 "Building Automation, Controls and Building Management", the secretariat of which is held by SNV.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document is currently divided into the following parts:

— *Energy performance of buildings — Part 1: Impact of Building Automation, Controls and Building Management - Modules M10-4,5,6,7,8,9,10* [currently at Enquiry stage];

— *Energy performance of buildings — Part 2: Accompanying* prCEN/TR 15232-1:2015 *Modules M10-4,5,6,7,8,9,10* [the present Technical Report; currently at Voting stage].

Introduction

The CENSE project, the discussions between CEN and the Concerted action highlighted the high page count of the entire package due to a lot of “textbook” information. This resulted in flooding and confusing the normative text.

A huge amount of informative contents shall indeed be recorded and available for users to properly understand, apply and nationally adapt the EPB standards

The detailed technical rules in CEN/TS 16629, "Detailed Technical Rules" ask for a clear separation between normative and informative contents:

— to avoid flooding and confusing the actual normative part with informative content;

— to reduce the page count of the actual standard;

— to facilitate understanding of the package.

Therefore each EPB standard shall be accompanied by an informative technical report, like this one, where all informative contents is collected.

Table 1 — Position of this standard within the EPB set of standards

	Over-arching	Building (as such)	Technical Building System									
Submodule	**Descriptions**	**Descriptions**	**Descriptions**	**Heating**	**Cooling**	**Ventilation**	**Humidification**	**Dehumidification**	**Domestic Hot waters**	**Lighting**	**Building automation and control**	**PV, wind, ..**
sub1	**M1**	**M2**		**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
1	General	General	General									
2	Common terms and definitions; symbols, units and subscripts	Building Energy Needs	Needs									
3	Application	(Free) Indoor Conditions without Systems	Maximum Load and Power									
4	Ways to Express Energy Performance	Ways to Express Energy Performance	Ways to Express Energy Performance								x	
5	Building Functions and Building Boundaries	Heat Transfer by Transmission	Emission and control								x	
6	Building Occupancy and Operating Conditions	Heat Transfer by Infiltration and Ventilation	Distribution and control								x	

	Over-arching	Building (as such)	Technical Building System									
Submodule	**Descriptions**	**Descriptions**	**Descriptions**	**Heating**	**Cooling**	**Ventilation**	**Humidification**	**Dehumidification**	**Domestic Hot waters**	**Lighting**	**Building automation and control**	**PV, wind, ..**
sub1	**M1**	**M2**		**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**
7	Aggregation of Energy Services and Energy Carriers	Internal Heat Gains	Storage and control								x	
8	Building Partitioning	Solar Heat Gains	Generation and control								x	
9	Calculated Energy Performance	Building Dynamics (thermal mass)	Load dispatching and operating conditions								x	
10	Measured Energy Performance	Measured Energy Performance	Measured Energy Performance								x	
11	Inspection	Inspection	Inspection									
12	Ways to Express Indoor Comfort		BMS									
13	External Environment Conditions											
14	Economic Calculation											

1 Scope

This Technical Report refers to prEN 15232-1, *Energy performance of buildings — Part 1: Impact of Building Automation, Controls and Building Management - Modules M10-4,5,6,7,8,9,10*.

It contains information to support the correct understanding, use and national adaption of standard prEN 15232-1:2015.

This technical report does not contain any normative provision.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 12098-1:2015, *Controls for heating systems — Part 1: Control equipment for hot water heating systems - Modules M3-5,6,7,8*

prEN 12098-3:2015, *Controls for heating systems — Part 3: Control equipment for electrical heating systems - Modules M3-5,6,7,8*

prEN 12098-5:2015, *Controls for heating systems — Part 3: Control equipment for electrical heating systems — Modules M3-5,6,7,8*

EN 13779, *Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems*

EN 15217, *Energy performance of buildings - Methods for expressing energy performance and for energy certification of buildings*

prEN 15232-1:2015, *Energy performance of buildings — Part 1: Impact of Building Automation, Controls and Building Management — Modules M10-4,5,6,7,8,9,10*

EN 15241:2007, *Ventilation for buildings - Calculation methods for energy losses due to ventilation and infiltration in commercial buildings*

EN 15242:2007, *Ventilation for buildings - Calculation methods for the determination of air flow rates in buildings including infiltration*

EN 15243:2007, *Ventilation for buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems*

EN 15316-1:2007, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 1: General*

EN 15316-2-1:2007, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2-1: Space heating emission systems*

EN 15316-2-3:2007, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 2-3: Space heating distribution systems*

EN 15316-3-2, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-2: Domestic hot water systems, distribution*

EN 15316-3-3, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-3: Domestic hot water systems, generation*

EN 15316-4-1:2008, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-1: Space heating generation systems, combustion systems (boilers)*

EN 15316-4-2, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-2: Space heating generation systems, heat pump systems*

EN 15316-4-4, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-4: Heat generation systems, building-integrated cogeneration systems*

EN 15316-4-5, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-5: Space heating generation systems, the performance and quality of district heating and large volume systems*

EN 15316-4-6, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-6: Heat generation systems, photovoltaic systems*

EN 15316-4-7, *Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-7: Space heating generation systems, biomass combustion systems*

EN 15378, *Heating systems in buildings - Inspection of boilers and heating systems*

EN 15239, *Ventilation for buildings - Energy performance of buildings - Guidelines for inspection of ventilation systems*

EN 15240, *Ventilation for buildings - Energy performance of buildings - Guidelines for inspection of air-conditioning systems*

prEN 15500-1:2015, *Control for heating, ventilating and air-conditioning applications — Part 1: Electronic individual zone control equipment — Modules M3-5,M4-5,M5-5*

EN 15603:2008, *Energy performance of buildings - Overall energy use and definition of energy ratings*

prEN 16798–5-1, *Energy performance of buildings — Modules M5-6, M5-8, M6-5, M6-8, M7-5, M7-8 — Ventilation for buildings — Calculation methods for energy requirements of ventilation and air conditioning systems — Part 5-1: Distribution and generation (revision of EN 15241) — Method 1*

prEN 16798–5-2:2015, *Energy performance of buildings — Modules M5-6, M5-8 — Ventilation for buildings — Calculation methods for energy requirements of ventilation systems — Part 5-2: Distribution and generation (revision of EN 15241) — method 2*

prEN 16798-7:2014, *Energy performance of buildings — Part 7: Ventilation for buildings — Modules M5-1, M5-5, M5-6, M5-8 — Calculation methods for the determination of air flow rates in buildings including infiltration*

prEN 16947-1:2015, *Building Management System — Module M10-12*

FprCEN/TR 16947-2:2015, *Accompanying TR for New Work Item — Building Management System*

EN ISO 7345:1995, *Thermal insulation - Physical quantities and definitions (ISO 7345:1987)*

EN ISO 13790:2008, *Energy performance of buildings - Calculation of energy use for space heating and cooling (ISO 13790:2008)*

EN ISO 16484-3:2005, *Building automation and control systems (BACS) - Part 3: Functions (ISO 16484-3:2005)*

prEN ISO 52000-1:2015, *Energy performance of buildings — Overarching EPB assessment — Part 1: General framework and procedures (ISO/DIS 52000-1:2015)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995, prEN ISO 52000-1:2015 and prEN 15232-1:2015 (the accompanied EPB standard) apply.

4 Symbols and abbreviations

4.1 Symbols

For the purposes of this Technical Report, the symbols given in prEN ISO 52000-1:2015, in EN 15232-1:2015 (the accompanied EPB standard) apply.

4.2 Abbreviations

For the purposes of this Technical Report, the abbreviations in prEN 15232-1:2015 (the accompanied EPB standard) apply.

5 Method description

5.1 Effect of building automation and control (BAC) and technical building management (TBM)

5.1.1 General

The key-role of Building Automation and Control and TBM is to ensure the balance between the desired human comfort - which shall be maximal, and energy used to obtain this goal - which shall be minimal!

The scope of BAC and TBM covers in accordance with their role from one side all Technical Building Systems (where the effect of the BAC is used in the calculation procedures) and from another side the global optimization Energy Performance of a Building.

We could identify several categories of controls:

— Technical Building Systems specific controls; these controllers are dedicated to the physical chain of transformation of the energy, from Generation, to Storage, Distribution and Emission. We find them in the matrix starting with the Modules M3-5 to M9-5 and finishing with M3-8 till M9-8. We could consider that it exist one controller by module, but some time one controller do the control among several modules. More often, these controllers are communicating between them via a standardized open bus, such as BACnet, KNX or LON

— BAC used for all or several Technical Building Systems who do multidiscipline (heating, cooling, ventilation, DHW, lighting…) optimization and complex control functions. For example, one of them is INTERLOCK, a control function who avoids heating and cooling in same time.

— If all Technical Building System are used in the building, we have (depending of the size of the building) a Technical Building Management System. Specific global functions are implemented here, necessary to reach the key-role mentioned above. Usually, in this case, an interrelation with the

Building as such (Module M2) will occur, mainly to take in consideration the building needs; for example due to outside temperature, taken into account the inertia of the building when the control will reach the set point in a room.

In a control system dedicated to a building, who is BAC and TBM we can distinguish three main characteristics as described in 5.1.2, 5.1.3 and 5.1.4.

5.1.2 Control accuracy

Control accuracy is the degree of correspondence between the ultimately controlled variable and the ideal value in a feedback control system. The controlled variable could be any physical variable such as a temperature, humidity, pressure, etc. The ideal value is in fact the SET POINT established by the user (occupant) when he determines his level of comfort. It is clear that the entire control loop is concerned with all the elements constituent, such as sensors, valves and actuators. The equipment itself is another important element and usually specific equipment asks for a specific controller. For the energy carrier hot water, an important issue is the balancing of the hydraulic circuits. For that purposes, balancing hydraulic valves are need it.

The temperature control accuracy (CA) for a zone temperature is a key number that allows calculating the additional energy need for heating or cooling caused by the inaccuracy of zone temperature control. The temperature Control Accuracy (CA) can be calculated from Control Variation (CV) and Control Set point Deviation (CSD) as described in the main text of prEN 15500:2015. The compliance with CA is also defined in the standard. This is an important input for EN 15316-2 and for prEN 16798-7, where the effect of the control for heating, cooling and ventilation is taken into account.

The same standard (prEN 15500-1:2015) describes also the 4 operations modes who deal with the levels of temperatures: Comfort, Precomfort, Economy and Frost/Building Protection. These 4 predefined operation modes are parameters that could be set by the users (occupant) – the temperature allocate to each operation mode. These operations modes are important for the control strategy used for intermittence, which will be described below.

5.1.3 Control function

The control function is the ability of a controller (or set of communicative controllers) to perform a determined task(s). Usually the functions implemented in the controllers are parametrable or free programmable. The functions could be performed by a single controller or by a set of communicative controllers. A controller could perform several functions.

The CONTROL FUNCTIONS present in a BAC or TBM, are present in prEN 15232-1:2015 Table 4. These functions in Table 4 are organized in the matrix given by Modular Structure of EPB standards. Table 4 starts with Heating Emission, Distribution, Storage and Generation (M3-5, M3-6, M3-7, M3-8) follow by Domestic Hot Water, Cooling, Ventilation and Lighting (M9-5, M9-6, M9-7, M9-8). Each function is described in detail, in accordance with the type (level) of the function: from the lower type (NO AUTOMATIC CONTROL Type = 0) to most advanced types. For each function, an IDENTIFIER who is the software language for BAC and TBM is also defined, as the destination of the module where the control function gives his effect. An example of Table 4 is given bellow, as abstract from prEN 15232-1:2015 Table 4.

For practical reasons, four different BAC efficiency classes (A, B, C, D) of functions are defined both for non-residential and residential buildings. This is the fastest way to specify a BAC or a TBM.

— Class D corresponds to non-energy efficient BAC. Building with such systems shall be retrofitted. New buildings shall not be built with such systems.

— Class C corresponds to standard BAC.

— Class B corresponds to advanced BAC and some specific TBM functions.

— Class A corresponds to high-energy performance BAC and TBM.

One is in class D: If the minimum functions to be in class C are not implemented.

To be in class C: Minimum functions defined in Table B.1 shall be implemented.

To be in class B: Building automation function plus some specific functions defined in Table 4 shall be implemented in addition to class C. Room controllers shall be able to communicate with a building automation system.

To be in class A: Technical building management function plus some specific functions defined in Table 4 shall be implemented in addition to class B. Room controllers shall be able for demand controlled HVAC (e.g. adaptive set point based on sensing of occupancy, air quality, etc.) including additional integrated functions for multi-discipline interrelationships between HVAC and various building services (e.g. electricity, lighting, solar shading, etc.)

In addition, the hydraulic system should be properly balanced.

The functions assignment to the BACS efficiency classes are listed in prEN 15232-1:2015, Table 5.

BAC functions with the purpose to control or monitor a plant or part of a plant which is not installed in the building do not have to be considered when determining the class even if they are shaded for that class. For example, to be in class B for a building with no cooling system no Individual room control with communication is required for emission control of cooling systems.

If a specific function is required to be in a specific BAC efficiency class, it is not required that it is strictly required everywhere in the building: if the designer can give good reasons that the application of a function does not bring a benefit in a specific case it can be ignored. For example, if the designer can show that the heating load of a set of rooms is only dependant on the outdoor temperature and can be compensated with one central controller, no individual room control by thermostatic valves or electronic controllers is required to be in class C.

A reference list of BACS functions to reach is defined in prEN 15232-1:2015, Table 6. That table defines the minimum requirements of BACS functions according to BACS efficiency class C of Table 5.

Unless differently specified this list shall be used for the following:

— to specify the minimum functions to be implemented for a project;

— to define the BACS function to take into account for the calculation of energy consumption of a building when the BACS functions are not defined in detail.

— to calculate the energy use for the reference case in step 1 of the BACS efficiency factor method.

5.1.4 Control strategy

The control function is the methods employed to achieve a given level of control to reach a goal. Optimal control strategies deliver a desired level of control at a minimum cost (minimum energy demand). A CONTROL STRATEGY could consist by a CONTROL FUNCTION or a group of CONTROL FUNCTIONS. An example of a CONTROL STRATEGY consist by a CONTROL FUNCTION is OPTIMUM START, OPTIMUM STOP, Night SET BACK described in the standards prEN 12098-1:2015 and prEN 12098-3:2015. The Timer function is described in prEN 12098-5:2015.

An example of a CONTROL STRATEGY who is realized by a group of CONTROL FUNCTIONS is the CONTROL STRATEGY used by INTERMITENCE. This function uses several CONTROL FUNCTIONS, OPERATION MODES, OPTIMUM START-STOP and TIMER in same time. All elements together are called either Building Profile or User Pattern. Usually, to implement such Building profile, a TBM is a prerequisite.

The most important CONTROL STRATEGY described and implemented in prEN 15232-1:2015 is DEMAND ORIENTED CONTROL. Usually these strategies implement the sense of the energy flow (from GENERATION to EMISSION) with flow of calculation (from building needs to delivered energy). Usually for this complex CONTROL STRATEGY, a TBM is necessary with a distributed specific control for each Technical Building System who communicates in system architecture via a communication standardized bus such as BACnet, KNX or LON.

More clear, this Demand Oriented Control works as follows: When the comfort is reach in the Emission area, the controller from the Emission sent the message to the controller in charge of Distribution to stop to distribute energy, who sent the message to the controller in charge of Storage either to store the energy and if the Storage cannot store more energy sent the message to the controller in charge with the Generation to stop to generate more energy.

Another important Control Strategy is the control strategy for multi generators either from same type (e.g. several boilers) or different types (e.g. a boiler and heat pump) including also the Renewable Energy Sources. The strategy could be based as follow:

— Priorities only based on running time

— Fixed sequencing based on loads only: e.g. depending on the generators characteristics, e.g. hot water boiler vs. heat pump

— Priorities based on generator efficiency and characteristics: The generator operational control is set individually to available generators so that they operate with an overall high degree of efficiency (e.g. solar, geothermic heat, cogeneration plant, fossil fuels)

— Load prediction based sequencing: The sequence is based on e.g. efficiency and available power of a device and the predicted required power

The standards enabling to calculate the effect of BACS and TBM functions on energy consumption use different approaches to calculate this impact. The approaches are described in prEN 15232-1:2015, 6.4.2.

5.2 Description of BAC functions

5.2.1 General

The numbers in italics refer to the numbers in prEN 15232-1:2015, Table 4.

5.2.2 Heating control

1.1 Heating – Emission control

1.1.0 No automatic control

Description: No automatic control of the room temperature.

1.1.1 Central automatic control

Description: Central automatic control of temperature in rooms by means of heating, is acting either on the distribution or on the generation. Heating control is performed without consideration of local demand of different rooms, possibly by using one room as reference. This can be achieved for example by an outside temperature controller conforming to prEN 12098-1:2015 or prEN 12098-3:2015.

Target: To improve EP by minimizing emitted heat by emitters (e.g. radiators) or by air in the building using central control of temperature and/or flow. This control may be based on outside temperature and/or a reference sensor inside the building and assumes similar demands in different parts/rooms of the building.

1.1.2 Individual room control

Description: Individual room control by thermostatic valves or electronic controllers. The individual room control of heating temperature in rooms is performed either by thermostatic valves or local (non-communicating) electronic control units. The individual control should/may be combined with scheduler programs providing different operating modes.

Target: To improve EP by minimizing emitted heat by emitters (e.g. radiators) or by air in the building using local control of temperature and/or flow in the rooms, thereby adapting to local demand, i.e. different loads in different rooms.

1.1.3 Individual room control with communication

Description: Individual room control with communication between controllers and to BACS. Individual control of temperature in rooms by means of heating, with communication between controllers and to BACS, allows exchange of setpoints, demand and other status information.

Target: To improve EP by minimizing emitted heat by emitters (e.g. radiators) or by air in the building using local control of temperature and/or flow in the rooms, thereby adapting to local demand, i.e. different loads in different rooms. Furthermore to obtain energy demand for further use to control distribution and generators, keeping run time at minimum and setpoints optimal.

1.1.4 Individual room control with communication and presence control

Description: Individual room control with communication between controllers and to BACS, and presence control performed by occupancy. Individual control of temperature in rooms by means of heating, with communication between controllers and to BACS, allows exchange of setpoints, demand and other status information.

Target: To improve EP by minimizing emitted heat by emitters (e.g. radiators) or by air in the building using local control of temperature and/or flow in the rooms, thereby adapting to local demand, i.e. different loads in different rooms. Furthermore to obtain energy demand for further use to control distribution and generators, keeping run time at minimum and setpoints optimal.

1.2 Heating – Emission control for TABS

1.2.0 No automatic control

Description: There's no automatic control of the room temperature implemented.

Target: Manual controls of a loop apply.

1.2.1 Central automatic control

Description: The central automatic control for a TABS zone (which comprises all rooms which get the same supply water temperature) typically is a supply water temperature control loop whose setpoint is dependent on the filtered outside temperature, e.g. the average of the previous 24 h.

Target: The supply water temperature shall be set according to the filtered outside air temperature (filtered -weather compensated supply water temperature).

1.2.2 Advanced central automatic control

Description: This is an automatic control of the TABS zone that fulfils the following conditions

— If the TABS is used only for heating: The central automatic control is designed and tuned to achieve an optimal self-regulating of the room temperature within the required comfort range (specified by the room temperature heating setpoint). "Optimal" means that the room temperatures of all rooms of the TABS zone remain during operation periods in the comfort range, to meet comfort requirements, but also is as low as possible to reduce the energy demand for heating.

— If the TABS is used for heating and cooling: The central automatic control is designed and tuned to achieve an optimal self-regulating of the room temperature within the required comfort range (specified by room temperature heating and cooling setpoints). “Optimal” means that the room temperatures of all rooms of the TABS zone remain during operation periods in the comfort range, to meet comfort requirements, but also uses as far as possible the full range to reduce the energy demand for heating and cooling.

— If the TABS are used for heating and cooling: the automatic switching between heating and cooling is not done only dependent on the outside temperature, but also taking at least indirectly the heat gains (internal and solar) into account.

One solution to achieve these requirements can be found in [2] and [3].

Target: Achieve temperatures within the desired bandwidth for all rooms in the heating/cooling group.

1.2.3 Advanced central automatic control with intermittent operation and/or room temperature feedback control

Description: Advanced central automatic control with room temperature feedback control:

— Advanced central automatic control with intermittent operation. This is an advanced central automatic control according to 2) with the following supplement: The pump is switched off regularly to save electrical energy, either with a fast frequency - typically 6 h on/off cycle time - or with a slow frequency, corresponding to 24 h on/off cycle time. If the TABS are used for cooling, intermittent operation with 24 h on/off cycle time can also be used to reject the heat to the outside air if the outside air is cold. One solution to achieve this requirement can be found in [2] and [4].

— Advanced central automatic control with room temperature feedback control. This is an advanced central automatic control according to 2) with the following supplement: The supply water temperature setpoint is corrected by the output of a room temperature feedback controller, to adapt the setpoint to non-predictable day-to-day variation of the heat gain. Since TABS react slowly, only day-to-day room temperature correction is applied, an instant correction cannot be achieved with TABS. The room temperature that is fed back is the temperature of a reference room or another temperature representative for the zone. One solution to achieve this requirement can be found in [2].

— Advanced central automatic control with intermittent operation and room temperature feedback control.

Target: The goal is to compensate room/zone behaviour into the supply water temperature control in order to optimize emissions taking into account heat gain and radiation.

1.3 Heating – Control of distribution network hot water (supply or return)

1.3.0 No automatic control

Description: The distribution network temperature of the hot water is not controlled.

1.3.1 Outside temperature compensated control

Description: Control of the temperature of the hot water distribution based on outside temperature compensation.

Target: To improve EP by lowering the mean temperature of the flow, thereby minimizing heat losses.

1.3.2 Demand based control

Description: Control of the temperature of the hot water distribution is based on indoor temperature measurements.

Prerequisite: Communicating system to room control units.