Minimum Requirements for Energy Performance

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This Regulation is established on the basis of subsection 3 (7)[2] of the Building Act.

Chapter 1
GENERAL PROVISIONS

§ 1. Scope of application of regulation

(1) This Regulation establishes minimum requirements for the energy performance of buildings and the primary data and calculation methods required for verification of the conformity thereof.

(2) The scope of application of this Regulation includes residential buildings and other buildings with controlled indoor climate which are under construction or which undergo major renovation (hereinafter collectively also buildings), in which indoor climate requirements primarily result from human applications and energy is mainly used for ensuring indoor climate, for heating domestic water and for using domestic and other electrical appliances.

(3) According to the purpose of buildings, requirements shall be imposed on the following buildings:
1) residential buildings: small houses (residential buildings with one or two apartments, terraced houses with three or more apartments according to purpose); apartment buildings (residential buildings with three or more apartments, facilities of social welfare institutions and hostels according to purpose);
2) other non-residential buildings: office and administrative buildings; commercial buildings (hotels, other accommodation and catering facilities, trading and service facilities, with the exception of office buildings); public buildings (recreational, educational and other public buildings, with the exception of health care facilities and indoor swimming pools) and transport facilities (with the exception of garages); health care facilities (hospitals and other medical buildings, with the exception of social welfare institutions); indoor swimming pools.

(4) Scope of application of this Regulation does not include buildings, auxiliary buildings, garages and special buildings specified in subsection 3 (7)[1] of the Building Act.

(5) If a building has multiple purposes, each part of the building which has a separate purpose and the heated space of which exceeds 10% of the heated space of the entire building, shall be determined an energy performance ratio corresponding to the purpose. Zones with an area below 10% shall be included in the composition of other zones irrespective of purpose. Maximum permitted energy performance ratio of a building is the weighted average energy

performance ratio of the purposes of the parts of the building calculated on the basis of heated space.

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(6) Minimum requirements for energy performance shall be established for the building as a whole. In addition to the envelope and utility systems, composition of a building shall include energy supply systems installed into the building or onto the registered immovable (such as wind turbines, heat and electricity cogeneration stations). Utility networks connected with an energy network (such as district heating) are included in the composition of the building from the energy network supply point..

§ 2. Definitions

(1) The following general definitions are used in this Regulation,:
1) energy network – a system for transmission of energy and for distribution of energy to consumers (such as power network, district heating and district cooling network, gas network);
2) major renovation – renovation the cost of which exceeds one third of the average construction cost of a building comparable to the building to be renovated. For the purposes of this Regulation, major renovation also means renovation which includes changing the envelope of the building and/or the utility networks of the building, the cost of which exceeds one third of the average construction cost of a buildings comparable to the building to be renovated;
3) solar factor – ratio which indicates the amount of solar radiation energy which penetrates glass and is dispersed in the room through heat transmission. For the purposes of this Regulation, solar factor considers three components: short-wave solar radiation which penetrates glass, long wave heat radiation and heat transmission by mediation of air (convection) from the interior surface of glass;
4) utility networks – systems which are taken into consideration when calculating energy performance ratio, such systems are heating system, hot domestic water system, ventilation system, cooling system, lighting and other systems taken into consideration in energy calculation according to this Regulation;
5) free heat – solar radiation which enters the building, heat releases from people, equipment and utility systems;
6) air leakage ratio – indicator characterising the air-tightness of the envelope of a building, determined in air leakage test upon difference of pressures 50 pascals (Pa). Average air leakage ratio of a building [$m^3/(h\ m^2)$] shall be given per one square metre of the envelope. Area of the envelope shall be calculated on the basis of interior dimensions.

(2) The following energy performance and energy calculation definitions are used in this Regulation:
1) reference year for energy calculation – body of outdoor climate data compiled for indoor climate calculations and energy calculations, which is based on climate data from all over Estonia in the period of 1970–2000 and which is compiled according to the Estonian standard EVS-EN ISO 15927–4:2005;
2) energy performance ratio – reference summary weighted specific use of supplied energies upon standard use of a building;
3) specific use – annual energy use in kilowatt-hours per one square metre of the heated space of a building [$kWh/(a\ m^2)$];

4) weighting factors for energy carriers – factors for taking account of the use of primary energy necessary for producing the supplied energy and for taking account of its environmental impact;
5) standard use of a building – ordinary use of a building for inspecting minimum requirements for energy performance. The usage purpose of the building, the outdoor and the indoor climate, the period of use of the building and the utility systems, the free heat, and the primary data for air-tightness of the building shall be taken into account when determining the standard use of a building;
6) summary energy use of a building (kWh/a) – use of heat and electrical energy in the utility systems necessary for ensuring the indoor climate of the building (heating, cooling, ventilation and lighting), for heating domestic water and for using electrical appliances, including all losses from the utility systems;
7) usage profile – the utility rate of a room, calculated as a ratio of the heat release from lighting, equipment and people to the maximum heat release;
8) presence profile – the ratio of presence of people and use of the relevant lighting and equipment to the maximum heat release;
9) net energy demand – heat energy required to ensure the indoor climate and to heat the domestic water, without system losses. The net energy demand is divided into net energy demand for heating of rooms, net energy demand for cooling of rooms, net energy demand for heating of ventilation air, and net energy demand for heating of domestic water;
10) net energy demand for cooling of rooms – heat energy required for cooling of rooms;
11) net energy demand for heating of rooms – heat energy required for heating of rooms, taking into account thermal conductance losses from the envelope, heat losses from non-airtight parts of the envelope (infiltration) and warming of incoming ventilation air to the room temperature;
12) net energy demand for heating of domestic water – heat energy required for heating of domestic water;
13) net energy demand for heating of ventilation air – heat energy required for heating of ventilation air to the required incoming temperature, minus heat recovery; in case of extraction-based ventilation, heat energy required for warming of incoming outdoor air to the room temperature;
14) primary energy – primary amount of energy required for producing one kilowatt-hour of supplied energy utilising renewable and non-renewable energy sources, including all losses from energy source extraction and from energy production, transmission and distribution;
15) summary weighted specific use of supplied energies – sum of products of weighting factors of supplied energies and energy carriers
16) supplied energy – annual electrical energy purchased from power networks or heat energy purchased from district heating networks in kilowatt-hours (kWh/a) or energy content of fuels purchased from fuel suppliers in kilowatt-hours, utilised for covering the summary annual energy use for heating of building, cooling of building, heating of domestic water, ventilation, lighting and use of electrical appliances;
17) summary specific heat loss from the envelope per square metre of heated space [W/(m^{2}K)] – heat loss via the envelope per one square metre of the building's heated space, if the temperature difference inside building and outside building is one degree. Specific heat loss is made up of a summary of all thermal conductance losses via the envelope and heat losses from non-airtight parts of the envelope (infiltration);
18) validated software – indoor climate and energy calculation software, validated no the basis of a comparison calculation pursuant to the relevant standard or method. For the purpose of this Regulation, the relevant European (EVS-EN), ISO, ASHRAE and CIBSE standards

and the IEA BESTEST methods or equivalent standards of other countries shall be accepted for validation of software.

Chapter 2
MINIMUM REQUIREMENTS FOR ENERGY PERFORMANCE

§ 3. Energy performance ratio

(1) Minimum requirements for energy performance shall be the limit rates of summary energy use of existing buildings and buildings under construction, taking account of the usage purpose and the technical characteristics of the buildings, or requirements for utility systems, utilised for measuring the characteristics related to efficiency and their functioning thereof. The conformity of a building to the minimum requirements for energy performance shall be assessed on the basis of the construction design documentation in the course of designing the building. Minimum requirements for energy performance shall be expressed as an energy performance ratio, which is the reference summary weighted specific use of supplied energies upon standard use of a building. The energy performance ratio reflects the complete energy use of the building for ensuring indoor climate, for heating of domestic water and for using domestic and other electrical appliances.

(1[1]) Conformity to the minimum requirements for energy performance shall be proven by calculation or by a simplified method of proof. The simplified method of proof may be used for buildings with the usage purpose code beginning with “1110” or “1121” or being “11221” pursuant to the Regulation No. 10 “List of usage purposes of constructions” of the Minister of Economic Affairs and Communications from the date of November 26, 2002.

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(2) The energy performance ratio of buildings under construction shall not exceed the following limit values:

1) annually 180 kWh per square metre for small residential buildings (incl. semi-detached houses and terraced houses);

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2) annually 150 kWh per square metre for apartment buildings;
3) annually 220 kWh per square metre for office and administrative buildings;

4) annually 300 kWh per square metre for commercial buildings, hotels, other accommodation and catering facilities, and trading and service facilities;

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4[1]) annually 300 kWh per square metre for public buildings and recreational buildings;

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4[2]) annually 300 kWh per square metre for educational buildings and research facilities (with the exception of student hostels, libraries and clinics);

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5) annually 400 kWh per square metre for health care facilities;
6) annually 800 kWh per square metre for indoor swimming pools.

(3) The energy performance ratio of buildings undergoing major renovation shall not exceed the following limit values:

1) annually 250 kWh per square metre for small residential buildings (incl. semi-detached houses and terraced houses);

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2) annually 200 kWh per square metre for apartment buildings;
3) annually 290 kWh per square metre for office and administrative buildings;

4) 390 kWh per square metre for commercial buildings, hotels, other accommodation and catering facilities, and trading and service facilities;

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4[1]) annually 390 kWh per square metre for public buildings and recreational buildings;

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4[2]) annually 390 kWh per square metre for educational buildings and research facilities (with the exception of student hostels, libraries and clinics);

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5) annually 520 kWh per square metre for health care facilities;
6) annually 1,000 kWh per square metre for indoor swimming pools.

(4) Energy performance ratio of the building shall be calculated if conformity to the minimum requirements for energy performance is proven by calculation. In order to calculate the energy performance ratio, the products of weighting factors of supplied energy (i.e. utilised electrical energy and energy content of utilised fuels) and weighting factors of energy carriers shall be summed up. The supplied energy use shall be calculated pursuant to the requirements provided for in this Regulation.

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(4[1]) The requirements provided for in Chapter 8[1] of this Regulation shall be applied if conformity to the minimum requirements for energy performance is proven by simplified method of proof. In such a case the energy performance ratio of the building shall not be calculated and the inspection of summer-time room temperature provided for in section 4 of this Regulation shall not be performed.

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(5) The weighting factors of energy carriers shall be as follows:
1) 0.75 for fuels based on renewable raw material (wood and wood-based fuels and other bio-fuels, excl. peat and peat briquettes) ;
2) 0.9 for district heating;
3) 1.0 for liquid fuels (heating oils and liquefied gas);
4) 1.0 for natural gas;
5) 1.0 for solid fossil fields (coal, etc.);
6) 1.0 for peat and peat briquettes;
7) 1.5 for electricity.

(6) The fuel energy content shall be calculated via calorific value. The lower calorific value provided by suppliers or the data provided for in Annex 1 of this Regulation shall be used as calorific value.

§ 4. Requirements for summer-time room temperature

(1) The requirement for summer-time room temperature shall be declared fulfilled if the room temperature in the period of 1 June to 31 August does not exceed the limit temperature provided for in Annex 2 of this Regulation (cooling temperature setting) by more than 150 degree hours (°Ch) in residential buildings and by more than 100 °Ch in other buildings provided for in clause 1 (3) 2) of this Regulation which are not residential buildings. The cooling period may exceed the above stated duration in some parts of the building, but this shall not be taken into account when inspecting conformity to the summer temperature requirement. The net energy demand for cooling and the energy use of the cooling system shall be calculated for the entire cooling period. Constructional solutions (e.g. sunshades, suitable dimensions and orientations of glass surfaces, massiveness of structures) and airing of rooms shall be the preferred measures for avoiding overheating of rooms.

(2) Use of a cooling system in the building may be necessary for fulfilling the requirement for summer-time room temperature. In such a case the energy calculation must include the net energy demand for cooling of rooms and the energy use for the cooling system. A description of the cooling system shall be required in design only for the scope necessary for performing the energy calculation. Actual construction of the cooling system shall not be required.

(3) In non-residential buildings, the temperature inspection of rooms shall be conducted by simulation calculation of standard rooms. If necessary, the simulation calculation may utilise a lower cooling setting than provided for in Annex 2, in order to take account of the room temperature exceeding the determined value due to temperature adjustments.

(4) Room temperature inspection of residential buildings may be performed by simulation calculation of standard rooms or by utilising simplified aid materials, e.g. graphs developed for that purpose. Small houses shall be exempt from temperature inspection if all of the following conditions are simultaneously fulfilled:
1) sunshade glass with a solar factor of $g \leq 0,4$ or other solutions to equivalent effect are utilised on window surfaces exceeding one square metre in exterior walls towards west and south;
2) the area of the glass part of living room windows and bedroom windows towards west and south comprise maximum 30% of the area of the exterior walls towards west and south;
3) the area of opening windows in living rooms and bedrooms comprises at least 5% of the floor area of these rooms.

§ 5. General requirements for building envelope

(1) The envelope of buildings shall be air-tight in long term and shall have sufficient thermal insulation. The energy performance requirements for the building, the comfortable temperature of rooms, and the prevention of mould and condensation at cold bridges, interior surfaces and structures shall be taken into account when determining purposeful thermal insulation.

(2) In order to ensure comfortable temperature in rooms, the thermal conductance of the envelope shall generally not exceed the value of 0.5 watts per square metre and degree [W/(m^2K)]. In case of windows with a higher thermal conductance, the comfortable temperature must be ensured with heating solutions. In order to prevent mould, condensate and excessive heat losses, the elements with higher thermal conductance shall generally have sufficient thermal insulation on the outside.

(3) Thermal insulation shall be selected so as to ensure good energy performance of the constructions. Upon selecting thermal insulation for small houses, the following primary values may be utilised as a basis for energy calculation: 0.2–0.25 W (m^2·K) for thermal conductance of exterior walls, 0.15–0.2 W(m^2·K) for thermal conductance of roofs and floors, 0,7–1,4 W(m^2·K) for thermal conductance of windows and doors, whereas the final choices shall depend on the compactness of the building and on the heating and ventilation solutions utilised. Additionally, the optimum thermal insulation of other buildings significantly depends on free heat.

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(4) The average air leakage ratio of the envelope shall generally not exceed one cubic metre per hour per square metre of the envelope [m^3/(hm^2)]. In order to avoid moisture convection risks, the critical elements of structures (e.g. connection between wall and the roof, joints of vapour or air barrier of the roofing deck, passages) shall be made practically completely air-tight.

§ 6. General requirements for utility systems

(1) The utility systems shall be designed and installed so as to ensure their long-term efficient functioning in the optimum working environment. Excessive heat losses shall be avoided by purposeful thermal insulation of pipes and heat capacitors.

(2) The required quality of indoor air shall generally be ensured with forced ventilation. Efficient heat recovery, piping and ventilation equipment components with low pressure losses, and ventilators and control equipment with as high efficiency as possible may be used for achieving efficiency factor of ventilation.

§ 6^1. Requirements for heating systems

(1) In case of buildings with controlled indoor climate being designed or undergoing major renovation, with construction design submitted upon applying for a construction permit after 30 June 2010 and with building parts intended for separate use possibly having separate owners or possibly being rented out separately, the design of the heating system serving the

building parts intended for separate use shall have designed and installed equipment allowing for determining the energy consumption for heating of the building part.

(2) Installation of equipment allowing for determining the energy consumption of a building part shall not be required:
1) if the user of the building part has no technical possibilities to adjust the energy consumption of the building part;
2) if the constructional solution of the building is such that the actions of the user of the building part have no influence on the energy consumption for heating of the building;
3) if installation of equipment allowing for determining the energy consumption of the building part is economically unfeasible or technically impossible.

(3) If installation of equipment allowing for determining of energy consumption is not specified for a building, the reasons therefore shall be given in the technical description of the heating and ventilation part of the construction design submitted upon applying for a construction permit.

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§ 7. General requirements for energy supply of buildings

(1) The energy supply of a building shall be energy efficient. A single heat source shall generally be installed in a building.

(2) In case of new buildings with the closed net space exceeding 1,000 m^2, alternative systems shall be preferred if possible, taking account of the relevant technical, ecological and economical feasibility. Alternative systems shall primarily be district heating and district cooling systems, energy systems based on a renewable energy source, cogenerating stations and heat pumps.

Chapter 3
PRIMARY DATA FOR CALCULATION OF ENERGY PERFORMANCE

§ 8. Energy calculation

(1) Conformity of the building to the minimum requirements for energy performance shall be inspected by way of an energy calculation upon standard use of a building, utilising primary data provided for in this Regulation regarding outdoor and indoor climate, periods of use and operation of the building and its utility systems, free heat, and air-tightness of the building. Other primary data required for the calculation shall be taken from the construction design documentation of the building.

(2) Energy calculation shall not assume detailed zoning of buildings. Small residential buildings and buildings with a single purpose may be calculated as a single zone. Larger buildings shall be divided into the required number of zones according to purposes and periods of use.

(3) Inspection of summer-time room temperature shall be performed for room types with the most free heat (presumably rooms at southern or western side of the building or with large glass surfaces) or with estimated continuous presence of room users. Calculation of summer-

time room temperature for residential buildings shall be performed for at least one bedroom and living room conforming to the provided requirements. Calculation of summer-time room temperature for other buildings shall be performed for all room types (e.g. open and closed offices, classrooms), with a single room conforming to the provided requirements being selected to represent each room type.

§ 9. Outdoor climate

Regardless of the building's location, the energy calculation and inspection of summer-time room temperature shall be performed utilising the Estonian reference year for energy calculations. The reference year represents the typical outdoor climate of the past three decades (1970–2000) and is thus not suitable for calculations of heating demand. The reference year may be used for calculations of cooling demand.

§ 10. Indoor climate

(1) Energy calculation shall utilise the data provided for in Annexes to this Regulation regarding reference temperatures, air flow volumes of ventilation, and other parameters of indoor climate. If the designed air flow volumes exceed the values provided for in Annexes to this Regulation or if the room temperature is higher upon heating or lower upon cooling when compared to the values provided for in Annexes to this Regulation, the energy calculation may be performed on the basis of the data stated in the construction design.

(2) Room temperature settings for standard use are provided for in Annex 2 to this Regulation. Simplified calculations with constant room temperature shall utilise the settings provided for in Annex 2 to this Regulation as room temperature (e.g. in residential buildings 21°C for heating and 27°C for cooling). Dynamic calculations shall utilise these values as temperature settings for heating and cooling thermostats. In case of buildings without a cooling system, the cooling temperature setting shall mean a limit temperature with requirements provided for in subsection 4 (1) of this Regulation.

(3) Air flow volumes during use of ventilation upon standard use and reference floor areas of standard rooms per person are provided for in Annexes 3 and 4 to this Regulation. In case of non-residential buildings outside the period of use, the air flow volume of ventilation in off-hours mode shall generally be 0.15 l/(cm^2).

(4) Air flow volumes of residential buildings shall be calculated as follows, utilising values provided for in Annex 4 to this Regulation:
1) calculating the summary air flow volume on the basis of the closed net space of the entire building (overall air replacement pursuant to Annex 4);
2) calculating the summary air flow volume on the basis of residential premises (floor area of living rooms and bedrooms) and adding the air flow volume of non-residential premises calculated on the basis of overall air replacement;
3) selecting the higher of the previous two calculated air flow volumes and utilising it as the summary air flow volume, whereas the air replacement rate calculated on the basis of the summary air flow volume shall not exceed one air replacement per hour;
4) selecting and calculating extractions so as to ensure that their sum equals the summary air flow volume.

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(5) The air flow volumes provided for in Annexes 3 and 4 to this Regulation shall be utilised as maximum air flow volumes for ventilation systems of non-residential buildings with variable air flow volumes adjusted according to the air quality (regarding carbon dioxide (CO_2) levels or regarding a combination of e.g. CO_2 and temperature or humidity levels). If a system with variable air flow volume is used for cooling purposes, the maximum air flow volume shall be determined on the basis of cooling demand. The minimum air flow volume and the control graph of the ventilation shall generally be chosen so as to ensure that the maximum concentration of 1,000 ppm CO_2 is not exceeded, whereas a reference concentration of 400 ppm in outdoor air shall be utilised.

Chapter 4
STANDARD USE OF A BUILDING; FREE HEAT

§ 11. Periods of use and free heat

(1) Standard use of buildings and the relevant heat release from equipment, lighting and people are given in Annex 5 to this Regulation, providing the building's number of usage hours per 24-hour period and the number of usage days per week and the maximum heat releases from lighting, equipment and people in standard rooms during the building's usage period. Heat releases shall not include heat releases from utility systems, which shall be calculated upon calculations for utility systems pursuant to the requirements provided for in Chapter 7 of this Regulation.

(2) Utility rate shall be the average utility rate of lighting and equipment and presence of people during the building's usage period. Maximum heat releases shall be utilised in calculations of room temperatures and cooling capacity. For energy calculation, the maximum heat releases shall be multiplied by the utility rate. The annual heat release from lighting or equipment or people Q [kWh/(m^2a)] shall be calculated according to the following formula:

$$Q = kP \frac{\tau_d}{24} \frac{\tau_w}{7} \frac{8760}{1000},$$

where k shall mean the utility rate;
P shall mean the heat release (W/m^2);
τ_d shall mean the number of building's usage hours per 24-hour period (h);
τ_w shall mean the number of building's usage days per week (d).

(3) Electricity consumption of lighting and equipment in buildings provided for in clause 1 (3) 2) shall equal the heat release from lighting and equipment pursuant to Annex 5 of this Regulation. In case of residential buildings, the heat release from equipment shall be multiplied by the factor 0.7, to which the heat release from lighting shall be added.

(4) Calculations of ventilation demand shall be based on the assumption that the ventilation system starts up one hour before the start of the building's period of use and switches into off-hours mode one hour after the end of the building's period of use (excl. buildings used around the clock).

(5) Dynamic energy calculations for residential buildings, offices, schools and nursery schools shall utilise the detailed usage profiles provided for in Annex 6 to this Regulation.

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(6) Dynamic calculation of summer-time room temperature inspection and cooling capacity of residential buildings and open offices shall utilise energy calculation profiles provided for in Annex 6 to this Regulation.

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(7) Dynamic calculations shall utilise the value of 125 W as the total heat release of people (apparent heat 85 W). In schools and nursery schools, the value of 110 W shall be utilised as the total heat release of children (apparent heat 75 W). These values relate to 1.2 and 1.0 heat release units (met) in case of body area of 1.8 m^2. Free heat from people shall be calculated on the basis of the heated space and the free heat from people provided for in Annex 5.

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§ 12. Hot water consumption

Specific consumption of hot domestic water is given in Annex 8 to this Regulation in litres per person per 24-hour period for residential buildings and in litres per square metre per year for other buildings. The temperature difference between hot and cold water shall be considered 50°C.

§ 13. Stoves, fireplaces and sauna heaters

(1) Stoves and fireplaces as a part of a combined heating system may be taken into account in energy calculations if the fireplaces are heat-accumulating and have a combustion air channel supplying outdoor air. Fireplaces with direct flue, no heat accumulation and utilising indoor air for combustion shall not be taken into account in energy calculations. Stoves utilising indoor air for combustion shall not be taken into account. Stoves utilised as the main heating equipment shall be taken into account even without a combustion air channel.

(2) Calculations of heat output of accounted stoves and fireplaces shall be based on the assumption of being heated once per 24-hour period.

(3) Sauna heaters utilising wood as fuel shall not be taken into account in energy calculations. The value of 500 kWh shall be utilised as the annual electricity consumption of electric sauna heaters in small houses and apartments.

§ 14. Air-tightness of buildings

If the building’s air-tightness has not been measured or proven in any other way, then the energy calculation shall utilise the base value of a building’s air leakage ratio as provided for in Annex 9 to this Regulation. If the air-tightness has been measured pursuant to the standard EVS-EN 13829 or proven by the building’s possessor, then the relevant measured or proven value shall be utilised in energy calculations.

Chapter 5
GENERAL CLAUSES FOR ENERGY PERFORMANCE CALCULATIONS

§ 15. Calculating building's summary energy use

Energy calculation shall determine the building's summary energy use for ensuring the building's indoor climate (heating, cooling, ventilation and lighting), for heating of domestic water, and for use of electrical appliances (e.g. home appliances and other electrical domestic or office appliances, and equipment used in other buildings). Heat energy and electrical energy shall be considered separate in all stages of energy calculation and upon presenting the results of the calculation. The building's summary energy use shall be comprised of the energy uses of the building's utility systems.

§ 16. Stages of energy calculation

Energy calculation shall include at least the following stages:
1) calculation of net energy demands, including calculations of net energy demand for heating of rooms, net energy demand for heating ventilation air, net energy demand for heating of domestic water, and net energy demand for cooling or rooms;
2) calculation of summer-time room temperatures;
3) calculation of energy use of utility systems, including the calculation for heat recovery of the ventilation system, the calculation of heat energy and the calculation of electrical energy;
4) approximate calculation of the heating system on the basis of the efficiency factor of the heat source or the thermal factor of the heat pump system and the electricity consumption of the auxiliary equipment;
5) approximate calculation of the cooling system, taking account of the condensate losses and heat losses of the cooling system and the cold production;
6) calculation of electricity consumption of the electrical system according to the primary data of lighting and equipment use;
7) presenting of calculation results as the building's summary annual energy use pursuant to the procedure provided for in Chapter 8 of this Regulation.

Chapter 6
CALCULATION OF NET ENERGY DEMANDS AND SUMMER-TIME TEMPERATURES

Section 1
Calculation of net energy demands

§ 17. General Provisions

(1) Calculation of net energy demands shall follow the principles of the standard EVS-EN ISO 13790, the application of which is described in the following subsections.

(2) The net energy demand for heating of rooms shall be calculated, taking into account the need for heating the infiltration air and the heating of the ventilation air in the room from the incoming temperature to the room temperature.

(3) The net energy demand for heating of ventilation air shall be calculated together with the heat recovery of the ventilation system and utilising the air flow volumes pursuant to subsections 10 (2)–(5). The net energy demand for heating of ventilation air shall include the heating of ventilation air before and/or after the heat recovery device or, in case of ventilation

systems without blowing air in, the warming of incoming outdoor air in the room from the outdoor temperature to the room temperature.

(4) Free heat shall be calculated pursuant to the requirements provided for in subsections 11 (1)–(7). Calculation of the solar radiation entering the building through glass surfaces shall take account of various solar protection solutions (e.g. sunshade glass, interior and exterior blinds, grilles, sunblinds) according to the manufacturer's data and shall also account for shadows of surrounding objects and parts of the building itself on the glass surfaces, whereas the value of 0.75 shall be utilised as the shadow factor of such shadows, unless more specific data is available.

(5) The net energy demand for heating of domestic water shall be calculated pursuant to section 12. The number of bedrooms plus one shall generally be utilised as the number of people in residential buildings.

(6) The net energy demand for cooling of rooms shall be calculated pursuant to the requirements provided for in subsections 11 (1)–(7).

(7) Calculation of summer-time room temperatures shall be performed pursuant to the requirements provided for in section 4, utilising the primary data provided for in section 11. The existence of opening windows may be taken into account in the calculation of airing of rooms, but the room temperature shall not decrease below the heating setting provided for in Annex 2.

Section 2
Calculation of heat losses from building envelope

§ 18. Basis for calculation of heat losses from building envelope

(1) Calculation of heat losses shall utilise the areas of the envelope according to the interior dimensions (dimensions between the exterior walls or between the roofing deck and the interior surface of the floor, together with rooms and load-bearing and non-structural partition walls). Calculation of heat losses per rooms shall utilise the area of the envelope according to the axial dimensions of partition walls and inserted ceilings.

(2) Heat losses from the envelope (exterior walls, floors and roofs) shall be calculated on the basis of the envelope part's thermal conductance (U-value) and area based on interior dimensions. The additional heat losses from corners (exterior wall to exterior wall, floor to exterior wall and roofing deck to exterior wall) shall be accounted separately, utilising additional conductance values of geometrical linear cold bridges (additional heat loss in watts upon temperature difference of one degree). Also, other possible cold bridges resulting from structures (e.g. fixing elements of windows on walls, stiffening elements, masonry anchors) shall be taken into account, utilising additional conductance values of the relevant cold bridge. If necessary, the conductance value of the envelope calculated according to the above stated method shall be converted into the average thermal conductance of the envelope, by dividing the summary conductance value of the envelope with the area of the envelope determined according to the rules of the utilised calculation software.

(3) Thermal conductance values (U-values) of the envelope shall be calculated on the basis of the data given in the construction design. The reference thermal conductance values for

materials shall preferably be determined pursuant to the standard EVS-EN ISO 10456:2008 and the thermal resistances of homogeneous and non-homogeneous material layers shall be determined pursuant to the standard EVS-EN ISO 6946-2008.

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(4) Heat losses into soil shall be calculated by dynamic one-dimensional calculation taking into account at least one metre thick layer of heat-accumulating soil with a constant temperature of 7°C below it, or by dynamic three-dimensional calculation, or by utilising the table of temperature values of soil under the floor, or pursuant to the standard EVS-EN ISO 13370. As soil characteristics, the value of 1.4 W/(m K) may be used for thermal conductance and the value of 1.5 MJ/(m^{3}K) may be used for thermal capacity or, in case of non-drained soil, the value of 2.0 W/(m K) may be used for thermal conductance and the value of 2.0 MJ/(m^{3}K) may be used for thermal capacity, unless more specific data is available.

§ 19. Calculation of cold bridges

(1) The data provided by the manufacturer of the materials or construction products shall be utilised as additional conductance values for cold bridges or these values shall be calculated by a detailed or simplified calculation pursuant to the relevant standards (e.g. EVS-EN ISO 10211, EVS-EN ISO 10077, EVS-EN ISO 14683, ISO 15099). The additional conductance values for geometrical cold bridges shall be taken from Annex 10 to this Regulation, unless more specific data is available. The additional conductance value $\Delta\Psi$ (W/K) of a cold bridge of the envelope part shall be calculated according to the following formula:

$$\Delta\Psi = \sum \Psi_j l_j + \sum \Psi_p n_p,$$

where Ψ_j shall mean the additional conductance value of the linear cold bridge (W/(mK));
l_j shall mean the length of a linear cold bridge (m);
Ψ_p shall mean the additional conductance value of a point cold bridge (W/K);
n_p shall mean the number of similar point cold bridges in the envelope part.

(2) The thermal conductance U_a (W/(m^{2}K)) of a window shall be calculated according to the following formula:

$$U_a = \frac{U_k A_k + U_r A_r + \Psi_k l_k}{A_k + A_r},$$

where U_k shall mean the U-value of the glass part (W/(m^{2}K));
A_k shall mean the area of the glass part (m^2);
U_r shall mean the U-value of the jamb and frame part (W/(m^{2}K));
A_r shall mean the area of the jamb and frame part (m^2);
Ψ_k shall mean the additional conductance value of the linear cold bridge at the glass edge (at the window jamb perimeter) (W/(mK));
l_k shall mean the length of the glass edge perimeter (m).

Manufacturer's data shall be utilised for U-values of the glass and frame parts and for values of the linear cold bridge at the glass edge. The value of 1.4 shall be utilised for the U-value of the frame part of PVC windows; the value of 1.7 shall be utilised in case of wooden frame windows with a 70 mm jamb and frame thickness; the value of 1.7 shall be utilised in case of wooden and aluminium frame windows with a 110–130 mm jamb and frame thickness; the value of 1.1 shall be utilised in case of wooden and aluminium frame windows with a 130 mm jamb thickness and a 170 mm frame thickness; the value of 4.0 shall be utilised in case of metal profiles with thermal interruption; the value of 7.0 shall be utilised in case of metal profiles without thermal interruption, unless more specific data is available.

(3) Thermal resistance of the jamb and frame part of wooden frame windows may be calculated as thermal resistance of a homogeneous material layer with average jamb and frame thickness, multiplied with the factor of 0.7 in order to take account of two-dimensional thermal conductance.

(4) The value of 0.06 shall be utilised as the linear cold bridge of glass edge of PVC and wooden frame windows, the value of 0.08 shall be utilised in case of metal profiles with thermal interruption, and the value of 0.02 shall be utilised in case of metal profiles without thermal interruption, unless more specific data is available.

Section 3
Infiltration

§ 20. Determining infiltration air flow volume

(1) Infiltration air flow volume q_i (l/s) shall be calculated according to the following formula:

$$q_i = \frac{q_{50}}{3,6 \cdot x} A,$$

where q_{50} shall mean the average air leakage ratio of the building's envelope ($m^3/(h \cdot m^2)$), determined pursuant to section 14 of this Regulation;
A shall mean the area of the building's envelope (including floors) (m^2);
x shall mean the factor of 35 in case of single-storey buildings, 24 in case of double-storey buildings, 20 in case of buildings with three or four storeys and 15 in case of buildings with five or more storeys;
3,6 shall mean the factor for converting the air flow volume from m^3/h to l/s.

[RT I 2009, 45, 301 – entered into force 12.09.2009]

(2) If the air extraction of the ventilation is significantly higher than air intake, then the infiltration air flow volume may be calculated according to the following formula:

$$q_i = \frac{0,25 q_{50} A}{1 + 2780 \left(\frac{q_v - q_s}{q_{50} A} \right)},$$

where q_{50} shall mean the average air leakage ratio of the building's envelope ($m^3/(h \cdot m^2)$), determined pursuant to section 14 of this Regulation;
A shall mean the area of the building's envelope (m^2);
q_v shall mean the extraction air flow volume (l/s);
q_s shall mean the incoming air flow volume (l/s).

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(3) In case of simultaneous use the formulas provided for in subsections (1) and (2), the infiltration air flow volume shall be the lower of the two air flow volume values calculated according to the two formulas.

Chapter 7
RULES FOR CALCULATION OF ENERGY USE OF UTILITY SYSTEMS

Section 1
Heating systems

§ 21. General Provisions

(1) Calculation of the heating system shall include the calculations of energy use for heating of rooms, for heating of ventilation air and for heating of domestic water. The energy use (kWh/a) shall be calculated on the basis of the relevant net energy demand and free heat. Heat energy use and electrical energy use shall not be summed, but shall instead be treated separately in order to allow further calculations of supplied energies.

(2) Heat energy use and electrical energy use of the heating system shall be calculated on the basis of the efficiency factor of the heating system (thermal factor in case of heat pump systems) and the electricity consumption of the auxiliary equipment. Efficiency factor of the heating system shall be used for taking account of losses in the heat source (e.g. losses in the heat exchanger of the boiler or the district heating system), losses in the distribution and delivery of heat, and losses from imprecision of room temperature adjustment. Energy use of the heating system shall be calculated as energy use without losses divided by the efficiency factor of the heating system. Efficiency factor of heating systems and electricity consumption of auxiliary equipment shall be determined by a detailed simulation calculation of the heating system or utilising the data provided for in Annexes 11 and 12 to this Regulation. Efficiency factors of heat sources are provided for in Annex 11 (thermal factor shall instead be used in case of heat pump systems) and efficiency factors of heat distribution and delivery are provided for in Annex 12. The efficiency factor of a heating system shall be calculated as a product of these two efficiency factors. In case of radiators without thermostats, the energy factors provided for in Annex 12 to this Regulation shall be reduced by 0.1.

(3) Losses from the heating system and electricity consumption of the auxiliary equipment shall not be accounted as free heat in energy calculations. Up to 10% of the net energy demand for heating of domestic water may be accounted as free heat, converting it into continuous year-round load (W/m^2).

§ 22. Calculation of heating systems with heat pumps

(1) Calculation of heat pump systems shall be based on the thermal factor which indicates the number of kWh units of heat energy that can be produced from one kWh of electrical energy with the heat pump.

(2) Heat pump's functioning as part of a combined heating system shall be taken into account if part of the top loads of heat demand is covered by another heat source (e.g. an electric heater or a boiler utilising oil or gas). Geothermal heat pumps may cover the heating demand in full or in part. Other types of heat pumps shall always be calculated in combination as parts of a heating system.

§ 23. Calculation of heating systems in combination with heat pump systems

(1) Heat energy produced by heat pumps in combined heating systems shall be calculated on the basis of the heat output of the heat pump, the momentary power demand, and the free heat output reducing the momentary power demand, pursuant to section 11. The momentary power demand (which, for the purposes of this subsection, shall not mean the power demand utilised for dimensioning the heat pump system) for heating of rooms and for heating of ventilation air shall depend on the outdoor temperature.

(2) The heat power demands of a heating system shall be calculated per hour. The heat energy (kWh/a) produced by a heat pump shall be calculated as the sum of the power demands for the hours when the output of the heat pump is higher than or equal to the power demand (calculated per hour for the entire reference year). The calculation shall take into account the reduction of the maximum output of heat pumps utilising outdoor air due to decrease of the outdoor temperature, and calculation shall be performed for the relevant temperature ranges.

(3) The heat energy (kWh/a) produced from other heat sources shall be calculated as the power demands not covered by the heat pump, i.e. as the power demand minus the output of the heat pump (calculated per hour for the entire reference year, considering the output of the heat pump to be lower than or equal to the power demand of the heating system). The energy use of other heat source shall be calculated pursuant to requirements provided for in subsection 20 (2).

(4) Electrical energy use of a heat pump system shall be calculated as the heat energy produced by the heat pump divided by the average thermal factor of the heat pump system for the heating period, taking into account the electricity consumption of all circulation pumps and possible auxiliary equipment related to the heating system and also the efficiency factor of heat distribution and delivery, pursuant to section 21. The thermal factor shall be determined on the basis of the values provided for in Annex 13 to this Regulation or on the basis of calculation utilising the manufacturer's data, considering the heat pump to be working at partial outputs capacities and various outdoor temperatures. If the data provided for in Annexes 12 and 13 is utilised, then the average thermal factor of the heat pump system shall be calculated as the thermal factor provided for in Annex 13 multiplied by the efficiency factor provided for in Annex 12.

(5) Electrical energy use of heat pumps transferring heat from outdoor air shall be calculated separately for the relevant outdoor temperature ranges.

Section 2
Ventilation systems

§ 24. Calculating air flow volumes of ventilation systems

(1) Energy calculations shall utilise the air flow volumes calculated pursuant to section 10 as the air flow volumes of ventilation systems. Calculations shall take account of the possible difference between the air flow volumes of extraction air and incoming air, both regarding one ventilation device and due to separate extraction ventilators. The difference between the air flow volumes of extraction air and incoming air shall be considered additional intake of outdoor air without heat recovery.

(2) The energy uses of ventilation devices with different periods of use shall be calculated separately. The air flow volumes of ventilation devices with identical periods of use shall generally be summed up.

(3) The infiltration air flow volume shall not be included in the calculation of air flow volumes of a ventilation system and it shall instead be calculated separately pursuant to section 20, whereas the possible difference between the air flow volumes of extraction air and incoming air may be taken into account in the formula of infiltration air flow volume.

§ 25. Calculation of heat recovery

(1) Heat recovery from the ventilation shall be calculated simultaneously with the calculation of net energy demand for heating of rooms and for heating of ventilation air.

(2) Heat recovery calculations shall be based on the temperature ratio of the heat exchanger (difference between the temperatures of the warming air flow before and after the heat exchanger, divided by the maximum temperature difference across the heat exchanger), on the temperature of the incoming air, and on the icing prevention of the heat exchanger. The following ratios shall be used in absence of the manufacturer’s data:
1) 0.6 in case of cross-flow plate heat exchangers;
2) 0.8 in case of counter-flow plate heat exchangers;
3) 0.8 in case of rotor heat exchangers.

(3) In order to prevent icing of the heat exchanger, the lowest temperature of the exhaust air (the air exiting the ventilation device) shall be limited by way of reducing the temperature ratio at low outdoor temperatures. For prevention of icing, the minimum temperature of exhaust air shall be limited as follows:
1) in residential buildings, limited to +5°C for plate heat exchangers and limited to 0°C for plate heat exchangers with moisture recovery and for rotor heat exchangers;
2) in non-residential buildings without humidifying and without excessive moisture production, limited to 0°C for plate heat exchangers and limited to –5°C for rotor heat exchangers.

(4) The additional heat demand and energy demand due to prevention of icing of the heat exchanger shall be taken into account in heating system calculations.

(5) In order to avoid overheating of rooms, the selected incoming air temperature shall be lower than the room temperature. In case of systems with a constant incoming air temperature, the incoming temperature shall generally be 18°C. Warming of incoming air in the room to the room temperature shall be included in the calculation of the net energy demand for heating.

§ 26. Calculation of electrical energy use of ventilation systems

(1) Electricity use of the ventilation system shall mainly be comprised of the electricity consumption of ventilators and control equipment thereof and to a lesser degree the electricity consumption of pumps and other auxiliary equipment. The efficiency of electricity use shall be assessed on the basis of the electrical effective output of the ventilation system utilising the reference air flow volume. Effective output shall be the ratio of the system's summary output and the air flow volume [(kW/(m^3/s)].

(2) In case of larger ventilation devices (air flow volume over 0.25 m^3/s), electricity consumption shall be calculated separately for each ventilator. Electricity consumption of a ventilator E_v (kWh/a) shall be calculated according to the following formula:

$$E_v = P_v \frac{\tau_d}{24} \frac{\tau_w}{7} t,$$

where P_v shall mean the electrical power of the ventilator (kW);
τ_d shall mean the number of operating hours of the device per 24-hour period utilising the reference air flow volume (h);
τ_w shall mean the number of operating days of the device per week utilising the reference air flow volume (d);
t shall mean the length of the calculation period (8,760 h).

(3) Electrical power of a ventilator P_v (W) shall be calculated according to the following formula:

$$P_v = \frac{\Delta p_v \dot{V}}{\eta_{ft}},$$

where Δp_v shall mean the ventilator's pressure increase (Pa);
$\dot{V}$ shall mean the ventilator's air flow volume (m^3/s);
η_{ft} shall mean the ventilator's summary efficiency factor, taking into account the efficiency factor of the ventilator, the efficiency factor of the belt transmission, the efficiency factor of the motor and the possible efficiency factor of rotating speed adjustment.

(4) Manufacturer's data or values provided for in Annex 14 to this Regulation shall be utilised for the ventilator's summary efficiency factor.

§ 27. Calculation of ventilator's pressure increase

(1) Ventilator's pressure increase Δp_v (Pa) shall be calculated according to the following formula:

$$\Delta p_v = \Delta p_m + \Delta p_t,$$

where Δp_m shall mean the pressure decrease of the ventilation device (Pa);
Δp_t shall mean the pressure decrease of the piping (Pa).

(2) The pressure decrease of a ventilation device Δp_m shall include the summary pressure decrease of the ventilation device's components and the pressure decrease at the connection point of the ventilator and the ventilation device. The average pressure decrease for the period of use, calculated by adding the initial pressure decrease to one third of the difference between the final pressure decrease and the initial pressure decrease, shall be utilised as a pressure decrease of filters.

(3) The pressure decrease of the piping Δp_t shall be calculated as the summary pressure decrease of the piping and the air distribution equipment, including the pressure decreases of the piping located both upstream and downstream from the ventilation device.

(4) If there is no pressure decrease data given in the construction design, then the pressure decreases shall be calculated utilising the data provided for in Annex 15 to this Regulation.

(5) Simplified calculation of systems with variable air flow volume shall assume that the pressure decrease of the piping is constant. Pressure decrease of a systems with variable air flow volume Δp_v (Pa) shall be calculated according to the following formula:

$$\Delta p_v = \Delta p_t + \Delta p_m x_p,$$

where Δp_t shall mean the pressure decrease of the piping and the air distribution equipment (Pa);
Δp_m shall mean the pressure decrease of the ventilation device (Pa);
x_p shall mean the pressure decrease factor of the system with variable air flow volume (x_p = 0.65).

§ 28. Auxiliary equipment of ventilation system

(1) Electrical power of the pump of a heat recovery device utilising intermediate heat carrier P_{hr} (kW) shall be calculated according to the following formula:

$$P_{hr} = \frac{\dot{V}_{sk}}{\eta_p}\left(\Delta p_r + \Delta p_p + \Delta p_v\right),$$

where $\dot{V}_{sk}$ shall mean the flow volume of intermediate heat carrier (m^3/s);
η_p shall mean the efficiency factor of the pump;
Δp_r shall mean the pressure decrease of the liquid component of the heat exchanger (kPa);
Δp_p shall mean the pressure decrease of the piping for liquid heat carrier (kPa);
Δp_v shall mean the pressure decrease of the adjustment valve (kPa).

(2) Estimated pressure decrease value of 0.2 kPa/m may be utilised as the pressure decrease of the piping of a heat recovery device utilising intermediate heat carrier. Pressure decreases of the liquid component of a heat recovery device shall be in the range of 60 kPa (small), 100 kPa (normal) and 150 kPa (large). 40% of the pressure decrease of the entire system (including the pressure decrease of the valve) may be utilised as the pressure decrease of a three-way valve (adjustment valve for the intermediate heat carrier). If the system is adjusted by changing the rotation speed of the pump, then the pressure decrease of the adjustment valve Δp_p shall equal 0 kPa.

(3) The value of 0.3 may be utilised as the pump's efficiency factor η_p.

§ 29. Electrical energy use of ventilation equipment in small houses and apartments

(1) Electrical energy use E_v (kWh/a) of small ventilation devices (hereinafter ventilation equipment) with air flow volume below 0.25 m^3/s shall be calculated according to the following formula:

$$E_v = P_{vs}\, t_{vsn}\, x_p,$$

where P_{vs} shall mean the electrical power of ventilation equipment utilising the reference air flow volume (kW);
t_{vsn} shall mean the annual operating time of the ventilation equipment utilising the reference air flow volume. The value of t_{vsn} shall generally be 8,760 h, with the exception of systems controlled according to necessity;
x_p shall mean the pressure decrease factor of the piping.

(2) Ventilation equipment manufacturer's figure for reference air flow volume, measured pursuant to the standard EVS-EN 13141-7 shall be utilised as the electrical power of the ventilation equipment P_{vs}.

(3) Piping's pressure decrease factor x_p shall be determined on the basis of data provided for in Annex 16 to this Regulation.

Section 3
Cooling system

§ 30. General Provisions

(1) Energy use of a cooling system shall be comprised of energy required for producing cooling energy and electrical energy of auxiliary equipment required for distribution and delivery of energy.

(2) The annual energy use required for producing cooling energy shall be calculated on the basis of the net energy demand for cooling of rooms.

§ 31. Calculation of electrical energy use of cooling system with a compressor device

(1) Electrical energy demand for the cooling period E^{Q}_{tc}(kWh/a) of a cooling system with a compressor device (without electrical energy for auxiliary equipment) shall be calculated according to the following formula:

$$E^{Q}_{tc} = \frac{(1+\beta_{sc})}{\varepsilon_E} Q_{nca},$$

where Q_{nca} shall mean the net energy demand for the cooling period for cooling the rooms served by the system (kWh/a);
β_{sc} shall mean the loss factor of the system, taking into account the condensate losses and heat losses;

ε_E shall mean the cooling factor of the cooling energy production process for the cooling period.

(2) Equipment manufacturer's values or the values provided for in Annex 17 to this Regulation shall be utilised for determining the cooling factor for the cooling period ε_E.

(3) Equipment manufacturer's values or the values provided for in Annex 18 to this Regulation shall be utilised for determining the loss factor of the system β_{sc}.

§ 32. Calculation of electrical energy use of cooling system with free cooling

If the cooling energy utilised in the building is produced by free cooling and with a compressor cooler, the electrical energy demand of the system for the cooling period shall be calculated according to the following formula:

$$E_{tc}^{Q} = \alpha_1 \frac{(1+\beta_{sc})}{\varepsilon_{E1}} Q_{nca} + \alpha_2 \frac{(1+\beta_{sc})}{\varepsilon_{E2}} Q_{nca},$$

where α_1 shall mean the estimated share of the annual cooling energy produced in the production process No. 1;
α_2 shall mean the estimated share of the annual cooling energy produced in the production process No. 2 ($\alpha_1 + \alpha_2 = 1.0$);
ε_{E1} shall mean the cooling factor of the production process No. 1 for the cooling period;
ε_{E2} shall mean the cooling factor of the production process No. 2 for the cooling period;
Q_{nca} shall mean the net energy demand for the cooling period for cooling the rooms served by the system (kWh/a);
β_{sc} shall mean the loss factor of the system, taking into account the condensate losses and heat losses.

§ 33. Calculation of electrical energy use of cooling system's auxiliary equipment

(1) Electrical energy use of the auxiliary equipment consuming electrical energy (for example the cooling system's pumps, ventilators and other auxiliary equipment) depends on the type of the system and shall be calculated according to the following formula:

$E_{ac} = \beta_{ac} Q_{nca}$,

where β_{ac} shall mean the electricity consumption factor of the system's auxiliary equipment for the cooling period;
Q_{nca} shall mean the net energy demand for the cooling period for cooling the rooms served by the system (kWh/a).

(2) Equipment manufacturer's values or the values provided for in Annex 18 to this Regulation shall be utilised as the electricity consumption factor.

Section 4
Other utility systems

§ 34. Calculation of other utility systems and energy supply systems

(1) Electrical energy use of the electrical system (incl. lighting) shall be calculated on the basis of the heat release from equipment and from lighting, pursuant to section 11.

(2) The energy use of utility systems and electricity consumers not listed in this Regulation (e.g. elevators, door opening drives, exterior lighting, various de-icing cables, outdoor power outlets) shall not be accounted in energy calculations.

(3) If energy calculation is not performed for a separate building part which is subject to requirements provided for catering facilities (for example if a restaurant kitchen is included in the calculation of the entire building), the energy calculation shall not account for the electricity consumption of kitchen equipment.

(4) Energy use of energy supply systems not listed in this Regulation (e.g. solar collectors and solar batteries, wind turbines, generators, cogenerating stations, fuel cells) shall be included in the calculations of the utility systems utilising the energy produced by these energy supply systems, thus these utility systems utilise less supplied energy (e.g. heat energy produced by solar collectors may be utilised for covering the energy demand for both heating of rooms and heating of domestic water).

Chapter 8
REQUIREMENTS FOR PERFORMING ENERGY CALCULATIONS AND FOR PRESENTING RESULTS

§ 35. Energy calculation as part of construction process

(1) Energy calculation shall be performed for the purpose of inspecting conformity to minimum requirements for energy performance and/or for the purpose of preparing an energy label. Results of an energy calculation performed pursuant to Chapters 3–7 of this Regulation may be used for both these purposes.

(2) Results of an energy calculation indicating conformity of the building to the minimum requirements for energy performance shall be presented as part of the construction design documentation submitted for applying for a construction permit for a building under construction or undergoing major renovation. During construction, the owner shall be obliged to ensure that the construction design does not undergo such changes that bring about a non-conformity to the minimum requirements for energy performance. A new energy calculation shall be performed for inspecting the conformity to the minimum requirements if the construction design undergoes any changes that significantly influence the building’s energy performance.

(3) Energy label for a building under construction shall be prepared on the basis of final results of energy calculation.

(4) Energy calculation pursuant to the procedure provided for in this Regulation shall be performed in order to issue an energy label for a building undergoing major renovation.

§ 36. Requirements for calculation software

(1) The calculation software utilised for energy calculations shall have the following features:
1) dynamic calculation of the building’s thermal exchange;

2) climate processing module, allowing importing the Estonian reference year for energy calculations with its original level of precision and calculating the hourly values of solar radiation on surfaces and the shadow zones;
3) possibility to model heat recovery of a ventilation system and preferably possibility to model ventilation, heating and cooling systems at the level of their main components and functions (e.g. inspection of heat exchanger icing, accounting for condensate on a cooling battery);
4) use of actual room temperatures in calculations and preferably possibility to model control graphs (e.g. calculation of heat transmission in ventilation according to the changing room temperatures together with controlling the heat recovery and the incoming air temperature);
5) possibility to enter primary data for energy calculations pursuant to Chapters 3 and 4 of this Regulation;
6) the calculation software must be validated pursuant to the relevant standard.

(2) All calculation software programs conforming to the above stated requirements may be used for energy calculations.

(3) Energy calculations for residential buildings may also be performed by software utilising simplified calculations per months or per degree days.

§ 37. Requirements for presenting calculation results

(1) Energy calculation results shall be presented in format provided for in Annex 19 to this Regulation. Summary energy use shall be presented separately for all energy carriers utilised for energy supply of the building (electricity, district heating and/or various fuels) according to the calculation results for utility systems.

(2) Calculation results for utility systems shall be entered into the supplied energy column of the summary energy use table provided for in Annex 19 to this Regulation. Energy use of ventilation, cooling and electrical systems shall be comprised of electrical energy only, which shall be added to the electrical energy use of the heating system. The resulting sum shall be entered into the supplied electricity column of the table provided for in Annex 19 to this Regulation. The heat energy use of the heating system shall be presented in the supplied energy column according to the energy supply solution of the heating system as heat energy of district heating and/or fuels.

(3) Purchased fuel quantities shall be calculated pursuant to the procedure provided for in section 3.

(4) Weighting factors of energy carriers are provided for in section 3. The weighted energy use shall be calculated as supplied energy multiplied by a weighting factor.

(5) Energy performance ratio shall be calculated as the sum of weighted energy uses divided by the number of square metres of heated space.

(6) Primary data utilised in energy calculations shall be presented in the format provided for in Annex 20 to this Regulation.

(7) Results of summer-time temperature inspection for all calculated standard rooms shall be presented in the format provided for in Annex 21 to this Regulation. Temperature stability

graph shall not be compulsory to present in case of residential buildings. If summer-time temperature inspection calculation is not performed for a small house, the data proving the exemption from temperature inspection of standard rooms shall be presented in the format of the table provided for in Annex 22 to this Regulation.

(8) Upon presenting results, it is compulsory to fill in the shaded lines and columns in the forms provided for in Annexes 19–22 to this Regulation.

Chapter 8[1]
SIMPLIFIED METHOD OF PROVING CONFORMITY TO MINIMUM REQUIREMENTS FOR ENERGY PERFORMANCE

[RT I 2009, 45, 301 – entered into force 12.09.2009]

§ 37[1]. Proving conformity to minimum requirements for energy performance with a simplified method

In order to prove conformity to minimum requirements for energy performance, utilising a simplified method:
1) the specification of the construction design shall describe the accounting of the general requirements and principles provided for in sections 4–7 of this Regulation;
2) the building's envelope shall be designed or prescribed in the construction design in such a way as to ensure that the summary specific heat loss of the envelope per square metre of the heated space conforms to the requirements provided for in section 37[2] of this Regulation;
3) the building's utility systems shall be designed or prescribed in the construction design in such a way as to ensure that they conform to the requirements provided for in section 37[3] of this Regulation.

[RT I 2009, 45, 301 – entered into force 12.09.2009]

§ 37[2]. Requirements for summary specific heat loss

The summary specific heat loss of the building's envelope per square metre of heated space shall not exceed the following limit values:
1) 1.8 W/(m^2·K), if the main energy source of the building's heating system and hot domestic water system is a geothermal heat pump;
2) 1.6 W/(m^2·K), if the main energy source of the building's heating system and hot domestic water system is an air-water heat pump;
3) 1.2 W/(m^2·K), if the main energy source of the building's heating system and hot domestic water system is a boiler utilising wood pellets;
4) 1.2 W/(m^2·K), if the main energy source of the building's heating system and hot domestic water system is district heating;
5) 0.9 W/(m^2·K), if the main energy source of the building's heating system and hot domestic water system is a condensate boiler utilising oil and/or gas.

[RT I 2009, 45, 301 – entered into force 12.09.2009]

§ 37[3]. Requirements for utility systems

(1) Ventilation systems shall have heat recovery devices with the temperature ratio of at least 0.8.

(2) The maximum allowed effective output of a ventilator of the ventilation system shall be 2.0 W/(l/s).

[RT I 2009, 45, 301 – entered into force 12.09.2009]

Chapter 9
IMPLEMENTING PROVISIONS

§ 38. Implementation of Regulation

(1) This Regulation shall enter into force on 1 January 2008.

(2) Simplified procedure for proving conformity to the minimum requirements for energy performance may be utilised for construction designs of buildings with controlled indoor climate submitted for applying for a construction permit before 1 July 2009. In such cases the energy calculation provided for in Chapters 3–8 of this Regulation shall not be compulsory to perform. In case of simplified procedure, the designer shall describe in the specification of the construction design the accounting of the general requirements and principles provided for in sections 4–7 of this Regulation.

(3) The requirements provided for in this Regulation shall not be applied if the application for a construction permit has been submitted before 1 January 2008 but the construction permit is issued after the above stated date.

[1] Directive 2002/91/EC of the European Parliament and of the Council on the energy performance of buildings (OJ L 1, 4.01.2003, pp 65–71) and Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (OJ L 114, 27.04.2006, pp 64–85).

[RT I 2009, 45, 301 – entered into force 12.09.2009]

[2] RT = Riigi Teataja = *State Gazette*

Annex 1
to Regulation No. , 2007
"Minimum Requirements for Energy Performance"
of the Government of the Republic

Lower calorific values of fuels

Fuel	Lower calorific value	
	kWh/kg	kWh/volume unit
Shale oil	10.8	10.0 kWh/l
Light fuel oil	11.7	10.0 kWh/l
Diesel fuel	11.7	9.7 kWh/l
Heavy fuel oil	11.3	10.9 kWh/l
Natural gas		9.3 kWh/m^3
LP gas (propane + butane)	12.8	
Biogas[1]		6 kWh/m^3
Quartered wood (humidity content[2] 20%)	4.1	
Firewood, mixed species		1,300 kWh/m^3 (stacked m^3)
Firewood, birch		1,500 kWh/ m^3 (stacked m^3)
Minced wood		800 kWh/m^3 (bulk m^3)
Wood briquette (humidity content[2] 12%)	4.6	
Wood pellets (humidity content[2] 12%)	4.6	
Peat briquette (humidity content[2] 20%)	4.2	
Clump peat (humidity content[2] 40%)	3.4	
Milled peat (humidity content[2]	2.8	

50%)

Coal 7.0

[1] Approximate value; actual value depends on raw material

[2] humidity contented in percentage of mass

Annex 2

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

of the Government of the Republic

Room temperature settings for energy calculation

Building / room type	Heating setting[1] °C	Cooling setting[1] °C
Residential buildings	21	27
Public buildings, office and administrative buildings, commercial buildings and transportation buildings[2]	21	25
Staircases	17…20	27
Lobbies	20	25
Warehouses, storage rooms	20	
Stores	18	25
-cashier's desks and other workstations	21	25
Clinics (depending on room purpose)	21…23	25
Hospitals (depending on room purpose)	21...25	23…26
Industrial buildings, average intensity of work	17	23
Sports buildings	18	25
-wardrobes	22	
-shower rooms	24	
Pools	30	
-spectators		25

[1] Reference room temperature utilised in energy calculation; it may differ from the actual room temperature by the adjustment precision and in case of summer-time temperatures pursuant to section 4

[2] Except separately stated buildings and rooms

Annex 3

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Air flow volumes of ventilation for energy calculation of non-residential buildings

Room / use	**Reference floor area m^2 per person**	**Air flow volume of ventilation[a]**	
		Intake[b] $l/(s \cdot m^2)$	**Extraction $l/(s \cdot m^2)$**
Office and work rooms	12	2	
Meeting rooms	3	4	
Recreational rooms	5	3	
Hotel rooms	10	1.5	
Hallways and staircases		1	
Elevator shafts		8	
Smoking rooms			20
Classrooms	2	4	
Auditoriums	1	8	
Lobbies and walking hallways	2	4	
Lobbies	6	2	
Nursery schools (playrooms and bedrooms)	2	4	

Nursery schools (wardrobes)			5
Dining halls, restaurants and cafés	2	8	
Kitchens (warming up food)		10	10
Kitchens (preparing food)		15	15
Dishwashing rooms			12…20
Stores	6	3	
Exhibition rooms		3	
Libraries		3	
Halls (concert, theatre, cinema, school halls)		10 l/s per person	
Theatre stages		5	
Fitness rooms	3	5	
Gym halls	6	2	
Indoor sports halls and pools, athletes		2	
Indoor sports halls and pools, spectators		10 l/s per person	
Clinics		3…4	
Hospitals (excl. rooms with special requirements)		3…6	
Hospital rooms	10	2	
Operating theatres		15…20	
Laboratories		2…5	
Warehouses, archives			0.5

Copying and printing rooms		4
Toilet rooms		20 l/s per stall
Washing rooms		15 l/s per stall
Wardrobes	5 l/s per locker	
Sauna rooms with heater	6 l/s per person	
Cleaning items		4
Rooms for wastes		5…10

[a] Air flow volumes are intended for energy calculation; more detailed data must be used for design works

[b] Outdoor air flow volumes per room's floor area (or per separately stated unit)

Annex 4

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Air flow volumes of ventilation for energy calculation of residential buildings

Overall air replacement[1]	**Living rooms and bedrooms[1]**		**Extraction (informative)**	
l/(s·m^2)	l/(s·m^2)	Kitchen, l/s	Washing room, l/s	Toilet room, l/s
0,42	1,0	20	15	10

[1] Outdoor air flow volumes per square metre of the room's floor area

Annex 5

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Standard use of the building's standard rooms and the relevant free heat per square metre of space [a]

Building / room type	Time of day	Period of use		Usage rate, -	Lighting W/m²	Equipment W/m²	People [b] W/m²	Area on the basis of which the free heat is determined
		h/24h	d/7d					
Small houses	00:00-00:00	24	7	0.6	8[c]	2.4[d]	2	heated space of the building or room
Apartment buildings	00:00-00:00	24	7	0.6	8[c]	3[d]	3	heated space of the building or room
Office buildings	07:00-18:00	11	5	0.55	12	15	5	heated space of the building
Office rooms	07:00-18:00	11	5	0.55	15	18	6	net area of the room
Meeting rooms	08:00-17:00	9	5	0.6	18	60	25	net area of the room

School buildings (excl. dining halls and gym halls)	08:00-16:00	8	5	0.6	18	8	14	heated space of the building
Classrooms	08:00-16:00	8	5	0.5	18	12	35	net area of the room
Computer classes	08:00-16:00	8	5	0.6	18	75	35	net area of the room
Gym halls	08:00-22:00	14	5	0.5	18	0	5	heated space of the building
Nursery schools	07:00-19:00	12	5	0.4	18	12	35	heated space of the building or room
Commercial buildings	07:00-21:00	14	7	0.55	17	8	5	heated space of the building or room
Hotels	00:00-00:00	24	7	0.5	14	7	4	heated space of the building or room
Restaurants	12:00-22:00	10	7	0.4	20	20	26	heated space of the building or room
Sports buildings	08:00-22:00	14	7	0.6	20	0	5	heated space of the building or room
Health care buildings	00:00-00:00	24	7	0.8	9	3	10	heated space of the building or room

[a] The data presented here assumes that luminescence lamps or other types of lighting with similar efficiency are usually utilised in non-residential buildings. The heat releases from lighting (and electricity consumption) stated here include both the load of the luminescence lamp and the load of the starter, the latter being approximately 25% of the nominal load. Heat releases from people include only apparent heat. In order to take account of the latent heat, the values stated in Annex 5 to the Regulation shall be divided by the factor 0.6

[b] Not including latent heat

[c] The usage rate of residential buildings is 0.1

[d] In order to calculate the electricity consumption of residential buildings, the heat release shall be divided by the factor 0.7

Annex 6

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Detailed presence profiles and room usage profiles for energy calculation

Time of day	**Residential building lighting**	**Residential building equipment**	**Residential building people**	**Office building**	**Meeting room**	**Class-room**	**Nursery school playroom**	**Nursery school bedroom**
00:00-01:00	0	0.5	1	0	0	0	0	0
01:00-02:00	0	0.5	1	0	0	0	0	0
02:00-03:00	0	0.5	1	0	0	0	0	0
03:00-04:00	0	0.5	1	0	0	0	0	0
04:00-05:00	0	0.5	1	0	0	0	0	0
05:00-06:00	0	0.5	1	0	0	0	0	0
06:00-07:00	0.15	0.5	0.5	0	0	0	0	0
07:00-08:00	0.15	0.7	0.5	0.2	0	0	0.4	0.1
08:00-09:00	0.15	0.7	0.5	0.6	0.5	0.6	0.8	0.1
09:00-10:00	0.15	0.5	0.1	0.6	0.7	0.6	0.8	0.1
10:00-11:00	0.05	0.5	0.1	0.7	0.7	0.6	0.3	0.1
11:00-12:00	0.05	0.6	0.1	0.7	0.7	0.4	0.3	0.1
12:00-13:00	0.05	0.6	0.1	0.4	0	0.3	0.8	0.1
13:00-14:00	0.05	0.6	0.2	0.6	0.7	0.6	0.1	0.8
14:00-15:00	0.05	0.6	0.2	0.7	0.7	0.6	0.1	0.8

15:00-16:00	0.05	0.5	0.2	0.7	0.7	0.3	0.4	0.4
16:00-17:00	0.2	0.6	0.5	0.6	0.7	0	0.3	0.1
17:00-18:00	0.2	0.7	0.5	0.2	0	0	0.3	0.1
18:00-19:00	0.2	0.7	0.5	0	0	0	0.3	0.1
19:00-20:00	0.2	0.8	0.8	0	0	0	0	0
20:00-21:00	0.2	0.8	0.8	0	0	0	0	0
21:00-22:00	0.2	0.8	0.8	0	0	0	0	0
22:00-23:00	0.15	0.6	1	0	0	0	0	0
23:00-00:00	0.15	0.6	1	0	0	0	0	0

Annex 7

to Regulation No. , 2007

“Minimum Requirements for Energy Performance”

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Detailed presence profiles for summer-time temperature inspection and cooling load calculation

Time of day	Office room	Meeting room	Class-room	Nursery school playroom	Nursery school bedroom
00:00-01:00	0	0	0	0	0
01:00-02:00	0	0	0	0	0
02:00-03:00	0	0	0	0	0
03:00-04:00	0	0	0	0	0
04:00-05:00	0	0	0	0	0
05:00-06:00	0	0	0	0	0
06:00-07:00	0	0	0	0	0
07:00-08:00	0	0	0	0.5	0.2
08:00-09:00	1	1	0.8	1	0.2
09:00-10:00	1	1	0.8	1	0.2

10:00-11:00	1	1	0.8	0.4	0.2
11:00-12:00	1	1	0.8	0.4	0.2
12:00-13:00	0	0	0.5	1	0.2
13:00-14:00	1	1	0.8	0.2	1
14:00-15:00	1	1	0.8	0.2	1
15:00-16:00	1	1	0.8	0.5	0.5
16:00-17:00	1	1	0	0.4	0.2
17:00-18:00	0	0	0	0.4	0.2
18:00-19:00	0	0	0	0.5	0.2
19:00-20:00	0	0	0	0	0
20:00-21:00	0	0	0	0	0
21:00-22:00	0	0	0	0	0
22:00-23:00	0	0	0	0	0
23:00-00:00	0	0	0	0	0

Annex 8

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Specific consumption of hot domestic water

Building type	**Specific consumption of hot domestic water**	
	l/person, d	l/(m^2·a)[1]
Small houses	45	
Apartment buildings	45	
Stores		65
Office buildings		100
Theatres and libraries		120
Educational buildings		180
Nursery schools		460
Health care facilities		520
Pools		1,800

[1]Per closed net space

Annex 9

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Base values for air leakage ratios of buildings per square metre of the envelope

Building type	**Base value for air leakage ratio $m^3/(h \cdot m^2)$**	
	New building	**Existing building**
Small houses	6	9
Other buildings	3	6

Annex 10

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

of the Government of the Republic

Additional conductance of geometric cold bridges the envelope

Envelope type	additional conductance Ψ_j W/(m K)
Exterior wall-exterior wall	
Wooden grid wall	0.06
Stone wall with thermal insulation	0.08
Massive stone wall, U < 0.5 W/(m^2 K)	0.07
Massive stone wall, U > 0.5 W/(m^2 K)	0.22
Roofing deck-exterior wall	
Wooden grid wall	0.07
Stone wall with thermal insulation and mineral wool thermal insulation in roofing deck	0.09
Stone wall with thermal insulation and ceramsite thermal insulation in roofing deck	0.13
Massive stone wall, U < 0.5 W/(m^2 K)	0.08
Massive stone wall, U > 0.5 W/(m^2 K)	0.30
Floor-exterior wall	
Slab on soil and wooden grid wall	0.12
Slab on soil and stone wall with thermal insulation	0.15
Slab on soil and massive stone wall, U < 0.5 W/(m^2 K)	0.11
Slab on soil and massive stone wall, U > 0.5 W/(m^2 K)	0.25
Floor with underside ventilation and wooden grid wall	0.11
Floor with underside ventilation and stone wall with thermal insulation	0.17
Floor with underside ventilation and massive stone wall, U < 0.5 W/(m^2 K)	0.12

Floor with underside ventilation and massive stone wall, U > 0.5 W/(m^2 K)	0.30
Wall fixture for a window	0.03

Annex 11

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

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Heat source efficiency factors

Heat source	Efficiency factor, -	
	Heating of rooms and heating of ventilation air	Heating of domestic water
District heating	1.0	1.0
Oil or gas boiler	0.85	0.85
Oil, condensate boiler	0.91	0.88
Gas, condensate boiler	0.95	0.92
Pellet boiler	0.85	0.85
Boiler utilising other solid fuels	0.75	0.75
Electric boiler	1.0	1.0
Stoves	0.6	0.6

Annex 12

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Efficiency factors of heat distribution and delivery and electricity consumption of the auxiliary equipment

Building type	**Heating method**	**Efficiency factor, -**	**Electricity consumption of circulation pump for water heating systems[1], W/m^2**
Small houses	Radiators	0.97	0.2
	Floor heating, slab on soil or floor with underside ventilation	0.85	0.5
	Floor heating in inserted ceiling	1.0	0.5
	Ceiling heating in roofing deck	0.90	0.5
	Ceiling heating in inserted ceiling	1.0	0.5
Other buildings	Radiators	0.97	0.1
	Floor heating, slab on soil or floor with underside ventilation	0.85	0.3
	Floor heating in inserted ceiling	1.0	0.3

[1] Electrical load according to average annual electricity consumption per m^2 of heated space, regarding electric radiators, electric cable heating and electric ceiling heating and regarding heat pump systems 0 W/m^2

Annex 13

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

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Average thermal factors of heat pumps for the heating period and average thermal factors of heating of domestic water[1]

Heat pump type	Average thermal factor for the heating period[2], -	Thermal factors [-] at various outdoor temperatures, °C and at various partial loads, %			
		-15°C/100%	-7°C/100%	2°C/50%	7°C/50%
Geothermal heat pump, floor heating 40°C/33°C or 35°C/30°C	3.5		-		
Geothermal heat pump, radiator heating 50°C/35°C	3.0				
Geothermal heat pump, heating of domestic water	2.7				
Heat pump using extraction air[3]	4.0		-		
Air-air type heat pump using outdoor air[4]	-	2.0	2.4	3.0	4.0
Air-water type heat pump using outdoor air, floor heating[4]	-	1.7	2.1	2.7	3.5
Air-water type heat pump using outdoor air, heating of domestic water	2.3		-		

[1]Thermal factors include the electricity consumption of the compressor, the circulation pumps and the auxiliary equipment

[2]Average annual thermal factor for heating of domestic water

[3]The temperature difference of extraction air is 21-5=16°C and part of the output of the heat pump is used for heating of domestic water

[4]The output and the thermal factor of the heat pump are significantly dependent on the outdoor temperature

Annex 14

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

of the Government of the Republic

Ventilator's summary efficiency factor η_{ft}

Air flow volume $\dot{V}$ m^3/s	η_{ft}
< 0.25	0.20
0.25 - 0.5	0.35
0.5 – 1	0.40
1 – 5	0.45
> 5	0.50

Annex 15

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

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Pressure decrease of ventilation devices and piping parts for systems with air flow volume of ≥ 0.25 m³/s

Component	**Pressure decrease Pa**		
Air intake	**Small**	**Normal**	**Large**
Heating element	40	80	120
Cooling element	60	100	140
Heat recovery device	100	150	200
Humidifier	20	40	60
Coarse filter	30	60	100
Fine filter	70	100	200
Noise dampener	30	50	80
Connection between the ventilator and the piping	20	50	70
Piping:			
-constant air flow volume	100	200	300
-dynamic air flow volume	200	300	400
Air distributor	30	50	100
Extraction	**Small**	**Normal**	**Large**
Heat recovery device	100	150	200
Filter	50	100	150
Noise dampener	30	50	80

Connection between the ventilator and the piping	20	50	70
Piping:			
Constant air flow volume	100	200	300
Dynamic air flow volume	200	300	400
Air distributor	20	30	50

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to Regulation No. , 2007

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Pressure decrease factor of the piping x_p

Pressure decrease factor	**Pressure decrease factor of the piping**		
Pressure decrease of the air intake piping	**Small** **35 Pa**	**Normal** **50 Pa**	**Large** **100 Pa**
x_p	0.8	1.0	1.2

Annex 17

to Regulation No. , 2007

“Minimum Requirements for Energy Performance”

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Cooling factor of the cooling energy production process for the cooling period

Cooling energy production method	ε_E
Compressor / cooling device	3.5
Free cooling, liquid cooler	4-6

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to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

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Loss factor of the cooling system β_{sc} and electricity consumption factor of the auxiliary equipment β_{ac}

Cooling system	β_{sc}	β_{ac}
Water-based system, cooling beams	0.4	0.02
Water-based system, ventilator convectors	0.6	0.05
Systems with variable air flow volume (VAV)	0.6	0.1-0.3
SPLIT equipment[1] (local devices with separate cooler and condenser)	0	0

[1] System losses and auxiliary equipment have been taken into account in the cooling factor

Annex 19

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Presenting the results of energy calculation

Data about the building

Building type				New building
Address				Renovation
Construction year				Existing building
Heated area		m^2		
Closed net area		m^2		

Energy performance ratio		**kWh/m²** (kWh per square metre of heated space)

Data about energy consumption

Energy carrier	Purchased fuels		Consumed energy, kWh/a	Weighting factor	Weighted energy use, kWh/a	Weighted specific energy use, kWh/(m²·a)
	quantity/a	mass or volume unit				
Electricity	-	-		1,5		
District heating						
Fuel 1						
Fuel 2						

…						
Sum	-	-	[1]	-	[2]	

[1] Summary energy use of the building's utility systems (heat + electricity together) kWh/a

[2] Energy performance ratio is calculated by dividing this with the area of heated space

Energy use of the building's utility systems

Utility system	Electricity, kWh/a	Heat, kWh/a	Electricity, kWh/(m^2·a)	Heat, kWh/(m^2·a)
Heating system[3]				
Heating of rooms				
Heating of ventilation air				
Heating of domestic water				
Ventilation system[4]				
Cooling system				
Equipment and lighting				
Summary energy use of the building's utility systems				

[3] Heating of rooms, ventilation air and domestic water

[4] Heating of ventilation air is considered to be part of the heating system

Net energy demand

Net energy demand	kWh/a	kWh/(m^2·a)
Heating of rooms[5]		
Heating of ventilation air[6]		
Heating of domestic water		
Total heating energy		

Utilised free heat[7] Cooling		

[5] Includes warming of infiltration air and ventilation air in the room

[6] calculated together with heat recovery

[7] Together with utilised system losses

Energy from free heat

Energy from free heat	kWh/a	kWh/(m^2·a)
Solar radiation People Equipment Lighting		

Power of utility systems

Utility system	Electricity, kW	Heat, kW
Heating system Cooling system		

Annex 20

to Regulation No. 258

"Minimum Requirements for Energy Performance"

of the Government of the Republic from 20 December 2007

(wording from Regulation No.

of the Government of the Republic from August 2009)

Presenting the primary data for energy calculation

Primary data for energy calculation

Number of calculation zones		
Heating system type		
- heat source and fuel		
- heat distribution		
Ventilation system type		
Cooling system (present / none)		
Infiltration air replacement		l/s
Specific heat loss		W/(K·m^2)

Envelope	Area, m^2	U, W/(m^2·K)	U*A, W/K
1 (e.g. exterior wall)			
2 (e.g. roofing deck)			

3 (e.g. floor on soil) *...*			
Sum[1]/weighted average[2]	[1]	[2]	[1]

Cold bridges	Linear cold bridge, W/(K·m)	m	Point cold bridge, W/K	Sum, W/K
1 (geom. floor-exterior wall) *2 (geom. exterior wall-exterior wall)* *3 (geom. roof-exterior wall)* *4 (e.g. window frame-exterior wall)* *5 (e.g. stiffening elements)* *6 (e.g. masonry anchors)* *...*				
Sum, W/K	-	-		

Windows (incl. exterior doors)	Area, m^2	Glass part U, $W/(K \cdot m^2)$	Frame part U, $W/(K \cdot m^2)$	Summary U, $W/(K \cdot m^2)$	U*A, W/K	Solar factor g, -
1 (e.g. towards south) *2 (e.g. towards west)* *3 (e.g. towards east)* *4 (e.g. towards north)*						

…						
Sum[1]/weighted average[2]	1	2	2	2	1	2

Ventilation equipment	Pressure increase intake/extraction Pa/Pa	Ventilator's efficiency factor intake/extraction %/%	System's SFP kW/(m³/s)	Incoming air temperature °C	Heat recovery temperature ratio %	Exhaust air, minimum temperature[3] °C
1 (e.g. vent. device 1)	/	/				
2 (e.g. extraction ventilator 1)						
…						

[3] Preventing the icing of the heat recovery device

Heating system	System's		Auxiliary equipment's electricity consumption[5] kWh/a
	Efficiency factor %	Thermal factor[4] -	
1 (e.g. heating of rooms)			
2 (e.g. vent. equipment)			
3 (e.g. hot water)			
…			

[4] average thermal factor of the heat pump system during the heating period

[5] none, if presented within the thermal factor

Cooling system	Cooling factor of cold production, -	System's loss factor, -	Auxiliary equipment, electricity consumption factor, -
1 (e.g. central) *2 (e.g. SPLIT)* ...			

Hot water consumption	l/(d per person)	No. of persons	l/(dm^2)	m^2	total, m^3/a

Stoves, fireplaces and sauna heaters	Reference heat output[6]		Sauna heater consumption, kWh/a
	Stoves, W	Fireplaces, W	

[6] 24 h heating interval

Free heat	People, W/m^2	Equipment, W/m^2	Lighting, W/m^2	Usage level, %	Usage time	
					Days per week, d	Hours per day, H

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to Regulation No. , 2007

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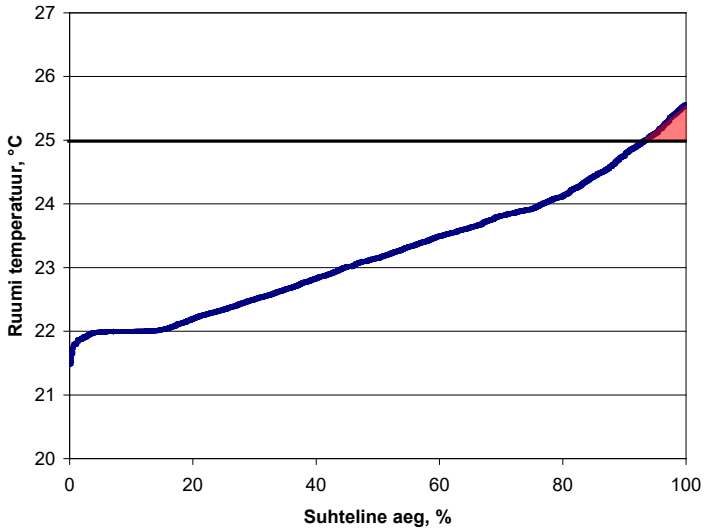
Presenting the results of summer-time temperature inspection

Summer-time temperature inspection	
Room	
Limit temperature	°C
Number of degree hours exceeding the limit temperature	°Ch

Time period (time of day)	People W/m^2	Equipment W/m^2	Lighting W/m^2
e.g. 8:00-15:00			
…			

Temperature stability graph 01.06-31.08



Annex 22

to Regulation No. , 2007

"Minimum Requirements for Energy Performance"

of the Government of the Republic

Data for standard rooms of small houses

Exemption from summer-time room temperature inspection in small houses	

Room		
Floor area		m^2
Area of exterior walls		m^2

Window	Glass part area m^2	Compass direction	Solar factor g, -
1			
2			
…			
Sum		-	-

Ratio between the area of glass part of window and the area of exterior walls	
Ratio between the area of opening windows and floor area	