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ANNEXES 1 to 5

ANNEXES

to the

COMMISSION REGULATION

laying down ecodesign requirements for air-to-air air conditioners, air-to-air air heat pumps and comfort fans pursuant to implementing Directive 2009/125/EC of the European Parliament and of the Council

repealing Regulation (EU) No 206/2012 with regard to ecodesign requirements for air conditioners and comfort fans

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ANNEX I

Definitions

In addition to the definitions set out in Directive 2009/125/EC and the definitions set out in Article 1 of this Regulation, the following definitions shall apply:

General definitions

(1) 'seasonal space cooling energy efficiency' ($\eta_{s,c}$) means the ratio between the reference annual cooling demand pertaining to the cooling season covered by an air-to-air air conditioner, and the annual energy consumption for cooling, corrected by contributions accounting for the temperature control, expressed in percentage (%);

(2) 'season' means a set of ambient conditions, designated as either a cooling season or a heating season, describing per bin the combination of outdoor temperatures and bin hours pertaining to that season;

(3) 'bin' (j) means a combination of an outdoor temperature (T_j) and bin hours (h_j) as set out in Annex III, Table 13 for cooling and Table 14 for heating;

(4) 'bin hours' (h_j) means the hours per season the outdoor temperature occurs for each bin, as set out in Annex III, Table 13 for cooling and Table 14 for heating, expressed in hours (h);

(5) 'portable air-to-air air conditioner' means an air-to-air air conditioner designed to function while not fastened in a specific location and not incorporated in the building structure or building finishing;

(6) 'fixed air-to-air air conditioner' means and air-to-air air conditioner designed to be used while fastened in a specific location and possibly incorporated in the building structure or building finishing;

(7) 'double duct air conditioner' means an air-to-air air conditioner in which, during cooling, the condenser intake air is introduced from the outdoor environment to the unit by a duct and rejected to the outdoor environment by a second duct, and which is placed wholly inside the space to be conditioned, near a wall;

(8) 'single duct air conditioner' means an air-to-air air conditioner in which, during cooling, the condenser intake air is introduced from the space containing the unit and discharged outside this space;

(9) 'seasonal space heating energy efficiency' ($\eta_{s,h}$) means the ratio between the reference annual heating demand pertaining to the heating season covered by an air-to-air heat pump, and the annual energy consumption for heating, corrected by contributions accounting for the temperature control, expressed in percentage (%);

(10) 'reference annual heating demand' (Q_H) means the reference heating demand pertaining to a designated heating season, to be used as basis for calculation of SCOP and calculated as the product of the design load for heating ($P_{designh}$) and the equivalent active mode hours for heating (H_{HE}), expressed in kilowatt hour per annum (kWh/a);

(11) 'seasonal coefficient of performance' (SCOP) means the overall coefficient of performance of an air-to-air heat pump, representative of the heating season, calculated as the reference annual heating demand (Q_H) divided by the annual energy consumption for heating (Q_{HE});

(12) ‘annual energy consumption for heating’ (Q_{HE}) means the energy consumption required to meet the reference annual heating demand pertaining to a designated heating season, and is calculated as the reference annual heating demand divided by the active mode seasonal coefficient of performance ($SCOP_{on}$) and the electricity consumption of the unit for thermostat-off, standby, off and crankcase heater mode during the heating season, expressed in kilowatt hour (kWh);

(13) ‘active mode seasonal coefficient of performance’ ($SCOP_{on}$) means the average coefficient of performance of the unit in active mode for the designated heating season, constructed from the part load, supplementary capacity for heating (where required) and bin-specific coefficients of performance ($COP_{bin}(T_j)$ and weighted by the bin hours the bin condition occurs;

(14) ‘equivalent active mode hours for heating’ (H_{HE}) means the assumed annual number of hours the unit must provide the design load for heating ($P_{designh}$) to satisfy the reference annual heating demand, as set out in Annex III, Table 7, expressed in hours per annum (h/a);

(15) ‘thermostat-off mode’ means a mode corresponding to the hours with no cooling or heating load whereby the cooling or heating function of the unit is switched on but the unit is not operational. Cycling in active mode is not considered as thermostat-off mode;

(16) ‘standby mode’ means a condition where the unit is connected to the mains power source, depends on energy input from the mains power source to work as intended and provides only the following functions, which may persist for an indefinite time: reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or information or status display;

(17) ‘reactivation function’ means a function facilitating the activation of other modes, including active mode, by remote switch including remote control, internal sensor, timer to a condition providing additional functions, including the main function;

(18) ‘information or status display’ is a continuous function providing information or indicating the status of the equipment on a display, including clocks;

(19) ‘off mode’ is a condition in which the air-to-air air conditioner or comfort fan is connected to the mains power source and is not providing any function. Also considered as off mode are conditions providing only an indication of off mode condition, as well as conditions providing only functionalities intended to ensure electromagnetic compatibility pursuant to Directive 2004/108/EC of the European Parliament and of the Council[1];

(20) ‘crankcase heater mode’ means a condition where the unit has activated a heating device to avoid the refrigerant migrating to the compressor to limit the refrigerant concentration in oil at compressor start;

(21) ‘supplementary heater’ means a heater that generates heat in case the heat load is greater than the declared capacity of the heat pump, using the Joule effect in electric heating elements;

(22) ‘spare part’ means a separate part that can replace a part with the same or similar function in a product;

[1] Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (OJ L 390, 31.12.2004, p. 24).

(23) ‘professional repairer’ means an operator or undertaking which provides services of repair and professional maintenance of the product;

(24) ‘guarantee’ means any undertaking by the retailer or a manufacturer, importer or authorised representative to the consumer, to:

(a) reimburse the price paid; or

(b) replace, repair or handle the unit in any way if they do not meet the specifications set out in the guarantee statement or in the relevant advertising;

(25) ‘conversion coefficient’ (CC) means a coefficient reflecting the estimated 47,6 % average EU generation efficiency, as established in Annex IV of Directive 2012/27/EU of the European Parliament and of the Council[2]. The value of the conversion coefficient shall be CC = 2,1;

(26) ‘networked standby’ means a condition in which the equipment is able to resume a function by way of a remotely initiated trigger from a network connection;

(27) ‘network’ means a communication infrastructure with a topology of links, an architecture, including the physical components, organisational principles, communication procedures and formats (protocols);

(28) ‘standby mode power consumption’ (P_{SB}) means the power consumption of the unit while in standby mode, expressed in kilowatt (kW);

(29) ‘thermostat-off mode operating hours’ (H_{TO}) means the annual number of hours the unit is considered to be in thermostat-off mode, the value depends on the designated season and function, expressed in hours per annum (h/a);

(30) ‘thermostat-off mode power consumption’ (P_{TO}) means the power consumption of the unit while in thermostat- off mode, expressed in kilowatt (kW);

(31) ‘standby mode operating hours’ (H_{SB}) means the annual number of hours the unit is considered to be in standby mode, the value of which depends on the designated season and function, expressed in hours per annum (h/a);

(32) ‘degradation coefficient’ means a factor taking into account the efficiency loss due to cycling (compressor switching on/off in active mode) during cooling (Cdc) or heating (Cdh), equal to 0,25;

(33) ‘on-off unit’ means an air-to-air air conditioner or an air to air heat pump that has a fixed capacity control;

(34) ‘inverter unit’ means an air-to-air air conditioner or an air to air heat pump that has a staged or variable capacity control;

(35) ‘capacity control’ means the ability of the unit to change its capacity by changing the refrigerant’s volumetric flow rate. Units are to be indicated as ‘fixed capacity control’ if the unit cannot change its volumetric flow rate, 'staged capacity control' if the volumetric flow rate is changed or varied in series of not more than two steps, or 'variable capacity control' if the volumetric flow rate is changed or varied in series of three or more steps;

(36) ‘part load for heating’ ($P_h(T_j)$) means the heating load at a specific outdoor temperature, calculated as the design heating load multiplied by the part load ratio, expressed in kilowatt (kW);

[2] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC (OJ L 315, 14.11.2012, p. 1).

(37) ‘part load ratio’ ($pl(T_j)$) means the outdoor temperature minus 16 °C, divided by the reference design temperature minus 16 °C, for either cooling or heating;

(38) ‘reference design temperature’ means the outdoor temperature for cooling ($T_{designc}$) or heating ($T_{designh}$) as described in Annex III, Table 8, at which the part load ratio is equal to 1 and which varies according to the cooling or heating season, expressed in degrees Celsius (°C);

(39) ‘marketed’ is placed on the market specifically for the mentioned operating condition or application, as evidenced by the technical documentation, information on the packaging and any advertising or marketing materials;

(40) ‘crankcase heater mode operating hours’ (H_{CK}) means the annual number of hours the unit is considered to be in crankcase heater mode, the value of which depends on the designated season and function, expressed in hours per annum (h/a);

(41) ‘crankcase heater mode power consumption’ (P_{CK}) means the power consumption of the unit while in crankcase heater mode, expressed in kilowatt (kW);

(42) ‘off-mode operating hours’ (H_{OFF}) means the annual number of hours the unit is considered to be in off-mode, the value of which depends on the designated season and function, expressed in hours per annum (h/a);

(43) ‘off-mode power consumption’ (P_{OFF}) means the power consumption of the unit while in off-mode, expressed in kilowatt (kW);

Definitions related to fixed air-to-air air conditioners and fixed air-to-air heat pumps

(44) ‘seasonal energy efficiency ratio’ (SEER) is the overall energy efficiency ratio of the air-to-air air conditioner, representative of the cooling season, calculated as the reference annual cooling demand (Q_C) divided by the annual energy consumption for cooling (Q_{CE});

(45) ‘reference annual cooling demand’ (Q_C) means the reference cooling demand pertaining to a designated cooling season, to be used as basis for calculation of SEER and calculated as the product of the design load for cooling ($P_{designc}$) and the equivalent active mode hours for cooling (H_{CE}), expressed in kilowatt hours per annum (kWh/a);

(46) ‘design load’ (P_{design}) means the space cooling ($P_{designc}$) or the space heating ($P_{designh}$) load declared by the manufacturer at $T_{designc}$ and $T_{designh}$ conditions respectively, expressed in kilowatt hours (kW);

(47) ‘equivalent active mode hours for cooling’ (H_{CE}) means the assumed annual number of hours the unit must provide the design load for cooling ($P_{designc}$) to satisfy the reference annual cooling demand, as set out in Annex III, Table 7, expressed in hours per annum (h/a);

(48) ‘active mode’ means the mode corresponding to the hours with a cooling or heating load of the building and whereby the cooling or heating function of the unit is activated. This condition may involve on/off-cycling of the unit in order to reach or maintain a required indoor air temperature;

(49) ‘annual energy consumption for cooling’ (Q_{CE}) means the energy consumption required to meet the reference annual cooling demand and is calculated as the reference annual cooling demand divided by the active mode seasonal energy efficiency ratio ($SEER_{on}$) and the electricity consumption of the unit for the thermostat-off mode, standby, off and crankcase heater mode during the heating season, expressed in kilowatt (kWh);

(50) ‘active mode seasonal energy efficiency ratio’ ($SEER_{on}$) means the average energy efficiency ratio of the unit in active mode for the cooling function, constructed from part load for cooling and bin-specific energy efficiency ratio's ($EER_{bin}(T_j)$) and weighted by the bin hours the bin condition occurs;

(51) ‘part load for cooling’ ($P_c(T_j)$) means the cooling load at a specific outdoor temperature, calculated as the design cooling load multiplied by the part load ratio, expressed in kilowatt (kW);

(52) ‘bin-specific energy efficiency ratio’ ($EER_{bin}(T_j)$) means the energy efficiency ratio specific for every bin j with outdoor temperature T_j in a season, derived from the part load for cooling, the declared capacity and declared energy efficiency ratio ($EER_d(T_j)$) for specified bins (j) and calculated for other bins through inter/extrapolation, when necessary corrected by the degradation coefficient;

(53) ‘declared energy efficiency ratio’ ($EER_d(T_j)$) means the energy efficiency ratio at a limited number of specified bins (j) with outdoor temperature (T_j);

(54) ‘supplementary capacity for heating’ ($elbu(T_j)$) is the heat output of a real or assumed supplementary heater with COP of 1 that supplements the declared capacity for heating ($P_{dh}(T_j)$) in order to meet the part load for heating ($P_h(T_j)$) in case $P_{dh}(_{Tj})$ is less than $P_h(T_j)$ for the outdoor temperature (T_j), expressed in kilowatt (kW);

(55) ‘bin-specific coefficient of performance’ ($COP_{bin}(T_j)$) means the coefficient of performance specific for every bin j with outdoor temperature T_j in a season, derived from the part load, declared capacity and declared coefficient of performance ($COP_d(T_j)$) for specified bins (j) and calculated for other bins through inter/extrapolation, when necessary corrected by the degradation coefficient;

(56) ‘declared coefficient of performance’ ($COP_d(T_j)$) means the coefficient of performance at a limited number of specified bins (j) with outdoor temperature (T_j);

(57) ‘reference design conditions’ means the combination of requirements for the reference design temperature, the maximum bivalent temperature and the maximum operation limit temperature, as set out in Annex III, Table 8;

(58) ‘bivalent temperature’ (T_{biv}) means the outdoor temperature (T_j) declared by the manufacturer at which the declared heating capacity equals the part load for heating and below which the declared capacity must be supplemented with electric supplementary heater capacity in order to meet the part load for heating, expressed in degrees Celsius (°C);

(59) ‘operation limit temperature’ (T_{ol}) means the outdoor temperature declared by the manufacturer, below which the air-to-air heat pump will not be able to deliver any heating capacity and the declared capacity is equal to zero, expressed in degrees Celsius (°C);

(60) ‘capacity ratio’ (CR) means the part load ratio for heating ($P_h(T_j)$ divided by the declared heating capacity ($P_{dh}(T_j)$) or the part load for cooling ($P_c(T_j)$) divided by the declared cooling capacity ($P_{dc}(T_j)$);

Definitions related to portable air-to-air air conditioners and portable air-to-air heat pumps

(61) ‘maximum supplementary capacity for heating’ (elbu_max) means the maximum heating capacity of portable air-to-air heat pumps when the vapour compression

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cycle has been switched off. The maximum supplementary heater capacity (elbu_max) should be at least equal to elbu($T_{designh}$);

(62) 'supplementary capacity for heating' (elbu(T_j)) is the heat output of the real supplementary heater with COP_d equal to 1 that supplements the declared capacity for heating ($P_{dh}(T_j)$) in order to meet the part load for heating ($P_h(T_j)$) in case $P_{dh}(T_j)$ is less than $P_h(T_j)$ for the outdoor temperature (T_j), expressed in kilowatt (kW);

(63) 'seasonal energy efficiency ratio' (SEER) means the overall energy efficiency ratio of the portable air-to-air air conditioner, representative of the cooling season, calculated as the annual cooling energy supplied by the unit divided by the annual energy consumption for cooling;

(64) 'supplied annual cooling energy' (Q_C) means the cooling energy supplied by the unit during a designated cooling season, to be used as basis for calculation of SEER, expressed in kilowatt (kW);

(65) 'annual energy consumption for cooling' (Q_{CE}) means the energy consumption required to generate the supplied annual cooling energy and is calculated as the supplied annual cooling energy divided by the active mode seasonal energy efficiency ratio ($SEER_{on}$) and the electricity consumption of the unit for the thermostat-off mode and standby during the heating season, expressed in kilowatt hour (kWh);

(66) 'active mode seasonal energy efficiency ratio' ($SEER_{on}$) means the average energy efficiency ratio of the unit in active mode for the cooling function, constructed from the corrected part load for cooling and bin-specific energy efficiency ratio's ($EER_{bin}(T_j)$) and weighted by the bin hours the bin condition occurs;

(67) 'corrected part load for cooling' (P_{c_corr}) means the building load curve ($BL(T_j)$) at a specific outdoor temperature below the equilibrium temperature and the corrected capacity ($P_{dc_corr}(T_j)$) above the equilibrium temperature, expressed in kilowatt (kW);

(68) 'building load curve' ($BL(T_j)$) means the rated capacity multiplied with the outdoor temperature minus 23 °C divided by 35 °C minus 23 °C;

(69) 'equilibrium temperature' (T_{eq}) means the temperature at which the building load curve ($BL(T_j)$) and the corrected declared capacity ($P_{dc_corr}(T_j)$) intersect, expressed in degrees Celsius (°C);

(70) 'corrected declared capacity for cooling' ($P_{dc_corr}(T_j)$) means the capacity of the vapour compression cycle of the unit for cooling corrected for infiltration, expressed in kilowatt (kW);

(71) 'bin-specific energy efficiency ratio' ($EER_{bin}(T_j)$) means the energy efficiency ratio specific for every bin j with outdoor temperature T_j in a season, derived from the declared energy efficiency ratio ($EER_d(T_j)$) for specific bins (j), when necessary corrected for on/off cycling, and calculated for other bins through inter/extrapolation;

(72) 'declared energy efficiency ratio' ($EER_d(T_j)$) means the energy efficiency ratio at a limited number of specified bins (j) with outdoor temperature (T_j) calculated as the corrected declared capacity for cooling divided by the rated power input for cooling;

(73) 'capacity ratio' (CR) means the part load ratio for heating ($P_h(T_j)$ for double duct heat pumps divided by the declared heating capacity ($P_{dh}(T_j)$) and for single duct heat pumps divided by the corrected declared capacity for heating ($P_{dh_corr}(T_j)$) or the corrected capacity for cooling ($P_{dc_corr}(T_j)$) divided by the building load curve ($BL(T_j)$

below or equal to the equilibrium temperature (Teq) and 1 above the equilibrium temperature;

(74) 'corrected declared capacity for heating' ($P_{dh_corr}(Tj)$) means the capacity of the vapour compression cycle of a portable single duct heat pump corrected for infiltration, expressed in kilowatt (kW);

(75) 'design load for heating' ($P_{designh}$) means the load declared by the manufacturer at $T_{designc}$ and $T_{designh}$ conditions respectively, expressed in kilowatt hours (kW);

(76) 'bin-specific coefficient of performance' ($COP_{bin}(T_j)$) means the coefficient of performance specific for every bin j with outdoor temperature T_j in a season, derived from the declared coefficient of performance ($COP_d(T_j)$) for specific bins (j), when necessary corrected for on/off cycling, and calculated for other bins through inter/extrapolation;

(77) 'declared coefficient of performance' ($COP_d(T_j)$) means the energy efficiency ratio at a limited number of specified bins (j) with outdoor temperature (T_j) for portable double heat pumps calculated as the heating capacity divided by the rated power input for cooling; for portable single heat pumps calculated as the corrected declared capacity for heating divided by the rated power input for heating;

(78) 'reference design conditions' means the combination of requirements for the reference design temperature and the maximum switch temperature heat pump off $T_{hp,off}$, as set out in Annex III, Table 8;

(79) 'switch temperature heat pump off' ($T_{hp,off}$) means the temperature below which the vapour compression cycle is switched off and heat is only provided by the supplementary heater;

Definitions related to comfort fans

(80) 'service value' (SV) means the ratio of the maximum fan flow rate and the fan power input, expressed in cub meters per minute per watt (m^3/min)/W;

(a) 'rated fan flow rate' (F) means the air flow rate of the comfort fan at its maximum speed position, expressed in cubic meters per minute (m^3/min);

(81) 'fan power input' (P_F) means the power input of the comfort fan at its maximum speed position, expressed in watt (W);

(82) 'ceiling fan' means a propeller-bladed fan having two or more blades, and provided with a device for suspension from the ceiling of a room so that the blades rotate in a horizontal plane;

(83) 'fan diameter' means the diameter of the circle traced out by the extreme tips of the fan;

(84) 'fan sound power level' means the A-weighted sound power level of the comfort fan while providing the maximum fan flow rate, measured at the outlet side, expressed in A-weighted decibels (dB(A)).

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ANNEX II
Ecodesign requirements

1. Energy efficiency requirements:

(a) From 1 January 2022, the seasonal space cooling energy efficiency of air-to-air air conditioners shall not be below the values in Table 1:

Table 1
Minimum seasonal space cooling energy efficiency energy efficiency requirements for air-to-air air conditioners, expressed in %

	$\eta_{s,c}$[1] in %
Portable air-to-air air conditioners	107
Fixed double duct and single duct air conditioners, with a rated capacity < 6 kW	202
Fixed double duct and single duct air conditioners other than portable, with a rated capacity ≥ 6 kW	185
Other fixed air-to-air air conditioners, with a rated capacity < 6 kW	283
Other fixed air-to-air air conditioners, with a rated capacity ≥ 6 kW	259

(b) From 1 January 2022, the seasonal space heating energy efficiency of air-to-air heat pumps, shall not be below the values in Table 2:

Table 2
Minimum seasonal space heating energy efficiency energy efficiency requirements for fixed air-to-air heat pumps, expressed in %

	$\eta_{s,h}$[2] in %
Portable single duct heat pumps	46
Portable double duct heat pumps	48
Fixed double duct and single duct heat pumps, with a rated capacity < 6 kW	134
Fixed double duct and single duct heat pumps, with a rated capacity ≥ 6 kW	131
Other fixed air-to-air heat pumps, with a rated capacity < 6 kW	187
Other fixed air-to-air heat pumps, with a rated capacity ≥ 6 kW	183

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Note[2]: the minimum seasonal space heating energy efficiency applies to the seasonal space heating energy efficiency of the air-to-air heat pump for the European average climate, as set out in Table 14.

(c) From 1 January 2022, the service value of comfort fans shall not be below the values in Table 5:

Table 5
Minimum service value for comfort fans, expressed in m^3/min/W

	SV (m^3/min)/W
All comfort fans, except ceiling fans, with a fan diameter ≥ 20 and < 25 cm	0,5
All comfort fans, except ceiling fans, with a fan diameter ≥ 25 and < 30 cm	0,65
All comfort fans, except ceiling fans, with a fan diameter ≥ 30 and < 40 cm	0,75
All comfort fans, except ceiling fans, with a fan diameter ≥ 40 and < 50 cm	1,08
All comfort fans, except ceiling fans, with a fan diameter ≥ 50 and < 60 cm	1
All comfort fans, except ceiling fans, with a fan diameter ≥ 60 cm	1,1
Ceiling fans, with a fan diameter > 0 and < 60 cm	1,4
Ceiling fans, with a fan diameter > 60 and < 90 cm	2,6
Ceiling fans, with a fan diameter ≥ 90 and < 120 cm	3,1
Ceiling fans, with a fan diameter ≥ 120 and < 140 cm	4,0
Ceiling fans, with a fan diameter ≥ 140 and < 150 cm	4,1
Ceiling fans, with a fan diameter ≥ 150	4,3

2. Sound power requirements:

From 1 January 2022, the sound power of air-to-air air conditioners, air-to-air heat pumps and comfort fans shall not be above the values in Table 6:

Table 6
Minimum sound power requirements

	Sound power level in dB(A)	
	Indoor	Outdoor
Air-to-air air conditioners and air-to-air heat pumps other than single and double duct air conditioners and heat pumps, with a	60	65

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rated capacity < 6 kW		
Air-to-air air conditioners and air-to-air heat pumps other than single and double duct air conditioners and heat pumps, with a rated capacity ≥ 6 kW	65	70
Single and double duct air conditioners and heat pumps	65	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 20 and < 23 cm	59	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 23 and < 25 cm	60	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 25 and < 30 cm	61	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 30 and < 35 cm	63	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 35 and < 40 cm	65	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 40 and < 45 cm	67	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 45 and < 50 cm	68	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 50 and < 60 cm	70	-
All comfort fans, except ceiling fans, with a fan diameter ≥ 60 cm	73	-
Ceiling fans, with a fan diameter > 0 and < 90 cm	62	-
Ceiling fans, with a fan diameter ≥ 90 and < 120 cm	65	-
Ceiling fans, with a fan diameter ≥ 120 and < 130 cm	67	-
Ceiling fans, with a fan diameter ≥ 130 and < 140 cm	70	-
Ceiling fans, with a fan diameter ≥ 140 and < 150 cm	72	-
Ceiling fans, with a fan diameter ≥ 150	75	-

3. Functional requirements:

From 1 January 2022,

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(a) Portable air-to-air heat pumps shall incorporate a supplementary heater with a maximum supplementary heater capacity (elbu_max) of at least equal to elbu($T_{designh}$);

(b) Portable single duct heat pumps shall incorporate an outdoor temperature sensor that controls the heat pump and the supplementary heater as a function of the outdoor temperature.

4. Resource efficiency requirements:

From 1 January 2022, air-to-air air conditioners, air-to-air heat pumps and comfort fans shall meet the following requirements:

(a) Availability of spare parts

(1) Manufacturers, importers or authorised representatives of air-to-air air conditioners and air-to-air heat pumps shall make available to professional repairers at least the following spare parts:

– compressors;

– heat exchangers;

– printed circuit boards; and

– fan motors;

for a minimum if seven years after placing the last unit of the model on the market.

(2) Manufacturers, importers or authorised representatives of comfort fans shall make available to professional repairers at least the following spare parts:

– fan motors;

for a minimum if seven years after placing the last unit of the model on the market.

(3) The list of spare parts concerned by points (1) and (2) and the procedure for ordering them shall be publicly available on the free access website of the manufacturer, importer or authorised representative, at the latest two years after the placing on the market of the first unit of a model and until the end of the period of availability of these spare parts.

(b) Maximum delivery time of spare parts

During the period mentioned under point (a), the manufacturer, importer or authorised representatives shall ensure the delivery of the spare parts for air-to-air air conditioners, air-to-air heat pumps and comfort fans function within 15 working days after having received the order.

In the case of spare parts available concerned by point a(1) and a(2) the availability of the spare parts may be limited to professional repairers registered in accordance with point c(1) and (2).

(c) Access to repair and maintenance information

After a period of two years after the placing on the market of the first unit of a model or of an equivalent model, and until the end of the period mentioned under (a), the manufacturer, importer or authorised representative shall provide access to the

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appliance repair and maintenance information to professional repairers in the following conditions:

(1) the manufacturer's, importer's or authorised representative's website shall indicate the process for professional repairers to register for access to information; to accept such a request, manufacturers, importers or authorised representative may require the professional repairer to demonstrate that:

(i) the professional repairer has the technical competence to repair the relevant product and complies with the applicable regulations for repairers of electrical equipment in the Member States where it operates. Reference to an official registration system as professional repairer, where such system exists in the Member States concerned, shall be accepted as proof of compliance with this point;

(ii) the professional repairer is covered by insurance covering liabilities resulting from its activity regardless of whether this is required by the Member State.

(2) the manufacturers, importers or authorised representatives shall accept or refuse the registration within 5 working days from the date of the request;

(3) manufacturers, importers or authorised representatives may charge reasonable and proportionate fees for access to the repair and maintenance information or for receiving regular updates. A fee is reasonable if it does not discourage access by failing to take into account the extent to which the professional repairer uses the information.

Once registered, a professional repairer shall have access, within one working day after requesting it, to the requested repair and maintenance information. The information may be provided for an equivalent model or model of the same family, if relevant.

The available repair and maintenance information shall include:

– the unequivocal appliance identification;

– a disassembly map or exploded view;

– technical manual of instructions for repair;

– list of necessary repair and test equipment;

– component and diagnosis information (such as minimum and maximum theoretical values for measurements);

– wiring and connection diagrams;

– diagnostic fault and error codes (including manufacturer-specific codes, where applicable);

– instructions for installation of relevant software and firmware including reset software; and

– information on how to access data records of reported failure incidents stored on the product (where applicable).

(d) Requirements for dismantling for material recovery and recycling while avoiding pollution

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(1) Manufacturers, importers or authorised representatives shall ensure that products are designed in such a way that the materials and components referred to in Annex VII to Directive 2012/19/EU[3] can be removed with the use of commonly available tools.

(2) Manufacturers, importers and authorised representatives shall fulfil the obligations laid down in point 1 of Article 15 of Directive 2012/19/EU.

5. Information requirements:

From 1 January 2022, instruction manuals for installers and end-users, and free access websites of manufacturers, importers and authorised representatives shall include the following information:

(1) instructions for the correct installation and maintenance, including cleaning, of the air conditioner, heat pump or comfort fan;

(2) for appliances for which the space heating energy efficiency is not determined for cold climate 'this appliance is not intended to be used cold climates in Europe';

(3) for appliances for which the space heating energy efficiency is not determined for warm climate 'this appliance is not intended be used warm climates in Europe';

(4) access to professional repair (internet webpages, addresses, contact details);

(5) relevant information for ordering spare parts, directly from the manufacturer or through other channels;

(6) the minimum period during which spare parts, necessary for the repair of the appliance, are available;

(7) the minimum duration of the guarantee of the air-to-air air conditioner, air-to-air heat pump or comfort fans in years;

(8) instructions on how to find the model information in the product database, as set out in Regulation (EU) 2019/XXX *[OP- Please insert here the references of the energy labelling regulation for air-to-air air conditioner, air-to-air heat pump or comfort fans]* by means of a weblink that links the model information as stored in the product database or a link to the product database and information on how to find the model identifier on the product.

[3] Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24.7.2012, p. 38)

ANNEX III
Measurements and calculations

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards, or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art methods and are in line with the provisions set out below. The reference numbers of these harmonised standards have been published for this purpose in the *Official Journal of the European Union*:

1. General conditions for testing for air-to-air air conditioners and air-to-air heat pumps:

(a) The seasonal space cooling energy efficiency for air-to-air air conditioners ($\eta_{s,c}$) shall be calculated as the seasonal energy efficiency ratio (SEER) divided by the conversion coefficient (CC), expressed in percent (%), minus F(1), which accounts for the temperature control and is equal to 3 %.

(b) The seasonal space heating energy efficiency for air-to-air heat pumps ($\eta_{s,h}$) shall be calculated as the seasonal coefficient of performance (SCOP) divided by the conversion coefficient (CC), expressed in percent (%), minus F(1), which accounts for the temperature control and is equal to 3 %.

(c) For air-to-air heat pumps equipped with an electric supplementary heater, the measurement and calculation of the declared heating capacity, the seasonal space heating energy efficiency, sound power level shall take account of the electric supplementary heater.

(d) The ecodesign requirements in Annex II apply to the values for the European cooling season, as set out in Table 13, and the European average heating season, as set out in Table 14.

(e) The standby mode power consumption P_{SB} of fixed air-to-air air conditioners and air-to-air heat pumps shall include the networked standby energy consumption of the unit.

2. Seasonal space cooling energy efficiency for fixed air-to-air air conditioners:

(a) For the purposes of measurement of air conditioners, the indoor temperature shall be set at 27 °C dry bulb and 19 °C wet bulb.

(b) The seasonal energy efficiency ratio (SEER) shall be calculated as the ratio of the reference annual cooling demand (Q_C) and the annual energy consumption for cooling (Q_{CE}).

(c) The reference annual cooling demand (Q_C) shall be the design load ($P_{design,c}$) multiplied by the equivalent active mode hours for cooling H_{CE} as set out in Table 7.

(d) The annual electricity consumption for cooling (Q_{CE}) shall be calculated as follows:

$$Q_{CE} = Q_C / SEER_{on} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF},$$

with

– $SEER_{on}$ the active mode seasonal energy efficiency ratio;

– H_{TO}, the thermostat-off mode operating hours, expressed in h, as set out in Table 7;

– P_{TO}, the thermostat-off mode power consumption, expressed in kW, as set out in Table 7;

– H_{SB}, the standby mode operating hours, expressed in h, as set out in Table 7;

– P_{SB}, the standby mode power consumption, expressed in kW, as set out in Table 7;

– H_{CK}, crankcase heater mode operating hours, expressed in h, as set out in Table 7;

– P_{CK}, crankcase heater mode power consumption, expressed in kW, as set out in Table 7;

– H_{OFF}, off-mode operating hours, expressed in h, as set out in Table 7;

– P_{OFF}, off mode power consumption, expressed in kW, as set out in Table 7;

(e) The active mode seasonal efficiency ratio ($SEER_{on}$) shall be calculated as follows:

$$SEER_{on} = \sum_{j=1}^{n} (h_j \times P_c(T_j)) / \sum_{j=1}^{n} h_j \times (P_c(T_j) / EER_{bin}(T_j);$$

with

– h_j, the bin hours, expressed in h;

– $P_c(T_j)$, the part load for cooling, expressed in kW;

– $EER_{bin}(T_j)$, the bin specific energy efficiency ratio;

taking into account the following:

(1) the reference design conditions, as set out in Table 8;

(2) the European cooling season, as set out in Table 13;

(3) the part load conditions for cooling, as set out in Table 11;

(4) the effects of degradation of the energy efficiency caused by on/off cycling, by calculating the $EER_{bin}(T_j)$ as follows:

$$EER_{bin}(T_j) = EER_d(T_j) \times (1 - Cdc \times (1 - CR(T_j));$$

with

– $EER_d(T_j)$, the declared energy efficiency ratio;

– Cdc, the degradation coefficient, equal to 0,25;

– $CR(T_j)$, the capacity ratio;

(5) for multi-split air-to-air air conditioners: the EER_{bin} at each bin temperature used for the calculation of the $SEER_{on}$ shall include the energy consumption of the outdoor units and indoor units.

3. Seasonal space cooling energy efficiency for portable air-to-air air conditioners:

(a) For the purposes of measurement of portable air-to-air air conditioners, the indoor temperature shall be set at 27 °C dry bulb and 19 °C wet bulb.

(b) The seasonal energy efficiency ratio (SEER) shall be calculated as the ratio of the supplied annual cooling energy (Q_C) and the annual energy consumption for cooling (Q_{CE}).

(c) The supplied annual cooling energy (Q_C) shall be calculated as follows:

$$Q_C = 10/24 \times \sum_{j=1}^{n} h_j \times P_{c_corr}(T_j);$$

(d) The corrected part load for cooling, with $P_{c_corr}(T_j)$, shall be calculated as follows:

– when the outdoor temperature (T_j) is lower or equal than the equilibrium temperature (Teq), $P_{c_corr}(T_j)$ is equal to the building load curve ($BL(T_j)$);

– when T_j is higher than Teq, $P_{c_corr}(T_j)$ is equal to the corrected capacity at the equilibrium temperature $P_{dc_corr}(Teq)$.

with

– T_{eq}, the equilibrium temperature, which is the intersection between the building load curve ($BL(T_j)$), equal to $P_{rated} \times (T_j - 23°C)/(35°C - 23°C)$, and the corrected capacity ($P_{dc_corr}(T_j)$).

(e) The corrected rated capacity ($P_{dc_corr}(T_j)$) shall be calculated as follows:

(1) For portable single duct air-to-air air conditioners:

(a) the corrected capacity $P_{dc_corr}(T_j)$ shall be equal to sum of the capacity $P_{dc}(T_j)$ and the infiltration impact $P_{INF}(T_j)$;

(b) $P_{dc}(T_j)$ for temperature T_j shall be calculated as follows:

$$P_{dc}(T_j) = P_{rated};$$

(c) $P_{INF}(T_j)$ shall be calculated as follows:

– if the outdoor temperature Tj < 27°C:

$$P_{INF}(T_j) = (27°C - T_j)/(27°C - 20°C) \times [AF \times (rho_{air_{27}} \times h_{27} - rho_{air_{20}} \times h_{20})];$$

– if the outdoor temperature Tj > 27°C:

$$P_{INF}(T_j) = (27°C - T_j)/(35°C - 27°C) \times INF;$$

with:

– AF the infiltration in air flow rate, expressed in m^3/s;

– INF the infiltration in kW, calculates as:

$$INF = [AF \times (rho_{air_{35}} \times h_{35} - rho_{air_{27}} \times h_{27})];$$

– $rho_{air_{20}}$ density of air at 20°C, equal to 1,20 kg/m^3;

– $rho_{air_{27}}$ density of air at 27°C, equal to 1.17 kg/m^3;

– $rho_{air_{35}}$ density of air at 35°C, equal to 1.15 kg/m^3;

– h_{20} the specific enthalpy of infiltration air at 20°C dry bulb and 15°C wet bulb temperature per kg dry air, equal to 42,2 kJ/kgda;

– h_{27} the specific enthalpy of infiltration air at 27°C dry bulb and 19°C wet bulb temperature per kg dry air, equal to 54,2 kJ/kgda;

– h_{35} the specific enthalpy of infiltration air at 35°C dry bulb and 24°C wet bulb temperature per kg dry air, equal to 72,5 kJ/kgda.

(2) For portable double duct air conditioners:

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(a) the corrected rated capacity $P_{dc_corr}(T_j)$ shall be equal to the capacity $P_{dc}(T_j)$;

(b) the declared capacity P_{dc} for temperature T_j shall be calculated as follows:

$$P_{dc}(T_j) = P_{rated} + (P_{dc}(35) – P_{rated})/ 8 \times (T_j – 27).$$

(f) The annual energy consumption for cooling (Q_{CE}) shall be calculated as follows:

$$Q_{CE} = Q_C/SEER_{on} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB}.$$

(g) The active mode seasonal efficiency ratio SEERon shall be calculated as follows:

$$SEER_{on} = \sum^{n}_{j=1} (h_j \times P_{c_corr}(T_j))/ \sum^{n}_{j=1} h_j \times (P_{c_corr}(T_j)/ EER_{bin}(T_j);$$

taking into account the following:

(1) the standard rating conditions, as set out in Table 10;

(2) the part load conditions, as set out in Table 12;

(3) the European cooling season, as set out in Table 13.

(4) the effects of degradation of the energy efficiency caused by on/off cycling, by calculating the $EER_{bin}(T_j)$ as follows:

(a) For on-off units:

$EER_{bin}(T_j) = EER_d(T_j) \times (1 - Cdc \times (1 - CR(T_j)))$;

with Cdc the degradation coefficient equal to 0,25.

(a) For inverter units:

– if $CR(Tj) \geq 0,33$:

$EER_{bin}(T_j) = EER_d(T_j) \times (1 + PL_c \times (1 - CR(T_j)))$;

– if $CR(Tj) < 0,33$:

$EER_{bin}(T_j) = EER_d(T_j) \times (1 + PL_c \times (1 – 0,33) \times (1 - 0,25 \times (1 – CR(T_j)/0,33))$;

with

– $EER_d(Tj)$

– for portable single duct air-to-air air conditioners:

– if the outdoor temperature $T_j \leq T_{eq}$:

$EER_d(T_j) = P_{dc_corr}(T_j) / P_{EER}$;

– if the outdoor temperature $Tj > T_{eq}$:

$EER_d(T_j) = P_{dc_corr}(T_{eq}) / P_{EER}$;

with P_{EER}, the rated power input for cooling;

– for portable double duct air conditioners:

$EER_d(T_j) = EER_{rated} + (EER_d(35°C) - EER_{rated}) / 8 \times (Tj – 27 °C)$;

with EER_{rated} the rated energy efficiency ratio and $EER_d(35°C)$ the EER at 35°C and a part load of 100 %.

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– $CR(T_j)$, the capacity ratio;

– PL_c, the part load coefficient, calculated as:

$PL_c = ((EER_d(27°C;33\%) – EER_{rated})/ EER_{rated} / (P_{rated} - P_{dc}(27°C;33\%) / P_{rated}$;

where $EER_d(27°C;33\%)$ and $P_{dc}(27°C;33\%)$ is the EER_d and the P_{dc} respectively at dry bulb temperature of 27°C and a part load of 33 %.

4. Seasonal space heating energy efficiency for fixed air-to-air heat pumps:

(a) For the purposes of measurement of heat pumps, the indoor temperature shall be set at 20°C.

(b) The seasonal coefficient of performance (SCOP) shall be calculated as the ratio of the reference annual heating demand (Q_H) and the reference electricity consumption for heating (Q_{HE}).

(c) The reference annual heating demand Q_H shall be the design load $P_{design,h}$ multiplied by the equivalent active mode hours for heating H_{HE} as set out in Table 7.

(d) The annual electricity consumption for heating (Q_{HE}) shall be calculated as follows:

$$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \times P_{TO} + H_{SE} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF},$$

with H_{TO}, H_{SE}, H_{CK} and H_{OFF} as set out in Table 7.

(e) The active mode seasonal efficiency ratio $SCOP_{on}$ shall be calculated as follows:

$$SCOP_{on} = \sum^{n}_{j=1} (h_j \times P_h(T_j))/ \sum^{n}_{j=1} h_j \times (P_h(T_j)/ COP_{bin}(T_j) + elbu(T_j),$$

taking into account the following:

(1) the reference design conditions, as set out in Table 8;

(2) the European average heating season, as set out in Table 14;

(3) if the unit is marketed for cold climates, the European colder heating season, as set out in Table 14;

(4) if the unit is marketed for warm climates, the European warmer heating season, as set out in Table 14;

(5) the part load conditions for heating, as set out in Table 11;

(6) the effects of degradation of the energy efficiency caused by on/off cycling, by calculating $COP_{bin}(T_j)$ as follows:

$$COP_{bin}(T_j) = COP_d(T_j) \times CR / (Cdh \times CR + (1 - Cdh));$$

(7) for multi-split air-to-air heat pumps, the $COP_{bin}(T_j)$ used for the calculation of the SCOPon shall include the energy consumption of the outdoor units and indoor units.

5. Seasonal space heating energy efficiency for portable air-to-air heat pumps:

(a) For the purposes of measurement of heat pumps, the indoor temperature shall be set at 20°C;.

(b) The seasonal coefficient of performance (SCOP) shall be calculated as the ratio of the reference annual heating demand (Q_H) and the reference electricity consumption for heating (Q_{HE}).

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(c) The reference annual heating demand (Q_H) shall be the design load ($P_{designh}$) multiplied by the equivalent active mode hours for heating H_{HE} as set out in Table 7. The design load cannot be higher than the sum of the declared capacity at $T_{designh}$, ($P_{dh}(T_{designh})$), and the maximum supplementary capacity for heating (elbu_max);

(d) The annual electricity consumption for heating (Q_{HE}) shall be calculated as follows:

$$Q_{HE} = Q_H / SCOP_{on} + H_{TO} \times P_{TO} + H_{SE} \times P_{SB} + H_{CK} \times P_{CK} + H_{OFF} \times P_{OFF},$$

with H_{TO}, H_{SE}, H_{CK} and H_{OFF} as set out in Table 7.

(e) The active mode seasonal efficiency ratio $SCOP_{on}$ shall be calculated as follows:

$$SCOP_{on} = \sum^{n}_{j=1} (h_j \times P_h(T_j))/ \sum^{n}_{j=1} h_j \times (P_h(T_j)/ COP_{bin}(T_j) + elbu(T_j),$$

taking into account the following:

(1) the reference design conditions, as set out in Table 8;

(2) the European average heating season, as set out in Table 14;

(3) if the unit is marketed for cold climates, the European colder heating season, as set out in Table 14;

(4) if the unit is marketed for warm climates, the European warmer heating season, as set out in Table 14;

(5) the part load conditions for heating, as set out in Table 12;

(6) the effects of degradation of the energy efficiency caused by on/off cycling, by calculating $COP_{bin}(T_j)$ as follows:

$$COP_{bin}(T_j) = COP_d(T_j) \times (1 - Cdh \times (1 – CR(T_j)));$$

for $COP_{bin}(T_j)$, with $T_j > 12$ °C, the values are extrapolated from $COP_{bin}(7°C)$ and $COP_{bin}(12°C)$, or if $T_{hp,off} > 7°C$, from $COP_{bin}(T_{hp,off})$ and $COP_{bin}(12°C)$. For portable single duct heat pumps the $T_{hp,off}$ should always be lower than 10 °C;

for $P_{dh}(T_j)$, with $T_j > 12$ °C, the values are extrapolated from $P_{dh}(7°C)$ and $P_{dh}(12°C)$, or if $T_{hp,off} > 7°C$, from $P_{dh}(T_{hp,off})$ $T_{hp,off}$ and $P_{dh}(12°C)$; if $Tj < T_{hp,off}$, the declared heating capacity is equal to zero;

(7) for portable single duct heat pumps, the effects of infiltration are taken into account, by correcting the declared capacity ($P_{dh_corr}(T_j)$) shall be calculated as follows:

(a) the corrected capacity ($P_{dh_corr}(T_j)$) shall be equal to sum of the capacity $P_{dh}(T_j)$ and the infiltration impact $P_{INF}(T_j)$;

(b) $P_{dh}(T_j)$ for temperature T_j shall be calculated as follows:

(c) $P_{dh}(T_j) = P_{rated}$;

(d) $P_{INF}(T_j)$ shall be calculated as follows:

$$P_{INF}(T_j) = Cp \times AF(T_j) \times (rho_{air}(T_j) \times T_j - rho_{air_{20}} \times 20);$$

with:

– $AF(T_j)$, the infiltration in air flow rate, expressed in m^3/s;

– P_{INF}, the heat loss by infiltration, expressed in kW:

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– $rho_{air_{20}}$, density of air at 20°C, equal to 1,20 kg/m³;

– $rho_{air}(T_j)$ density of air at T_j;

– Cp the specific capacity of dry air, assumed constant, equal to 1,006 kJ/kg/K (1 atm).

6. Service value of comfort fans:

(a) The test shall be carried out at an ambient temperature of 20 °C;

(b) For the purpose of measurement of comfort fans, the voltage and the frequency the comfort fans are tested are the rated voltage and the rated frequency.

If the fan is specified for two or more distinct rated voltages, the tests shall be carried out at the most unfavourable voltage. When a rated voltage range is given, the test voltage shall be:

– the highest and the lowest values of the range when the voltage range is in excess of 10 % of the mean of the range;

– the mean of the upper and lower limits when the voltage range is 10 % or less of the mean of the range.

For a fan with a range of frequencies, the tests shall be made at the frequency which gives the most unfavourable results;

(c) The maximum flow rate is calculated by summing the maximum air flow rates at incrementing distances from the vertical axis of the fan.

The maximum flow rate at each distance is calculated by multiplying the air velocity measured at maximum speed at each distance by the surface area of the annulus, with radius in Table 15, over which is measured;

Air velocity measurements start at the initial position, as set out in Table 15. From that position, measurements shall be done in increments along a horizontal line, as set out in Table 15, until the air velocity fall below a certain value;

(d) For the measurement of the power input of the fan, the capacitors if any shall be retained in the circuit;

(e) The service value SV in (m³/min)/W for comfort fans shall be calculated as follows:

$$SV = F / P_F;$$

where

– F is the maximum flow rate in m³/min;

– P_F is the fan power input in W;

(f) For electric power in stand-by (P_{SB}) and thermostat off-mode (P_{OFF}) if applicable the same testing methods apply as for air-to-air air conditioners;

(g) The nominal electric power consumption is measured with the oscillating mechanism on. The flow rate is measured without the oscillations.

7. Sound power level of fixed air-to-air air conditioners and fixed air-to-air heat pumps:

While establishing the sound power level, the operating conditioners shall be the standard rating conditions set out in Table 9. The part load ratio in heating mode shall be the part load ratio of rating point C in Table 11.

8. Sound power level of portable air-to-air air conditioners and portable air-to-air heat pumps:

While establishing the sound power level, the operating conditioners shall be the standard rating conditions set out in Table 10. The capacity during the test shall be the rated capacity.

9. Sound power level of comfort fans:

While establishing the sound power level, the operating conditions shall be the maximum speed position of the comfort fan.

Table 7
Operational hours per functional mode for air-to-air air conditioners and air-to-air heat pumps

Season		Operational hours				
		On-mode	Thermostat Off mode	Standby mode	Off mode	Crankcase heater mode
		H_{CE} (cooling); H_{HE} (heating)	H_{TO}	H_{SB}	H_{OFF}	H_{CK}
Cooling only (to calculate SEER)	Average	350	221	2142	5088	2363
Cooling, if reversible (to calculate SEER)	Average	350	221	2142	0	2363
Heating only (to calculate SCOP)	Average	1 400	179	0	3 672	3672
	Colder	2 100	131	0	2 189	2184
	Warmer	1 400	755	0	4 345	4416
Heating, if reversible (to calculate SCOP)	Average	1400	179	0	0	3672
	Colder	2100	131	0	0	2184
	Warmer	1400	755	0	0	4416

Table 8
Reference design conditions

Function	Season	Reference design temperature dry bulb (wet bulb) (°C)	Bivalent temperature maximum	Operation limit temperature maximum	Switch temperature heat pump off minimum
		$T_{design,c}$ or $T_{design,h}$	T_{biv}	T_{ol}	$T_{hp,off}$
Cooling	Average	35 (24)	-	-	-
Heating	Average	- 10 (- 11)	+ 2	- 7	T_j at which $COP_{bin} < 1$ or 10 °C, whichever value is lower
	Warmer	2 (-1)	7	2	
	Colder	-22 (-23)	-7	-15	

Table 9
Standard rating conditions for fixed air-to-air air conditioners and fixed air-to-air heat pumps

		Outdoor side heat exchanger	Indoor side heat exchanger
		inlet dry bulb temperature (inlet wet bulb temperature) (ºC)	inlet dry bulb temperature (inlet wet bulb temperature) (ºC)
Cooling mode (for air conditioners)	Outside air / recycled air	35(24*)	27(19)
Heating mode (for heat pumps)	Outside air / recycled air	7(6)	20(15 max)

* the wet bulb temperature condition is not required when testing units which do not evaporate condensate

Table 10
Standard rating conditions for portable air-to-air air conditioners and portable air-to-air heat pumps

		Outdoor side heat exchanger	Indoor side heat exchanger
		inlet dry bulb temperature (inlet wet bulb temperature) (ºC)	inlet dry bulb temperature (inlet wet bulb temperature) (ºC)
Cooling mode (for double duct air conditioners)	Outside air / recycled air	35(24)	27(19)
Cooling mode (for double duct air conditioners)	Outside air / recycled air	27(19)	27(19)
Heating mode (for single duct heat pumps)	Outside air / recycled air	20(12)	20(12)
Heating mode (for double duct heat pumps)	Outside air / recycled air	7(6)	20(15 max)

Table 11
Part load conditions for fixed air-to-air air conditioners and fixed air-to-air heat pumps

Rating point	Outdoor temperature	Part load ratio	Outdoor side heat exchanger	Indoor side heat exchanger
Cooling				
	T_j (ºC)		Outdoor air dry bulb temperatures (ºC)	Indoor air dry bulb (wet bulb) temperatures (ºC)
A	35	100%	35	27 (19)
B	30	74%	30	27 (19)
C	25	47%	25	27 (19)

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D	20	21%	20	27 (19)
Heating				
Rating point	T_j (ºC)	Part load ratio	Outdoor air dry bulb (wet bulb) temperatures (ºC)	Indoor air dry bulb temperature (ºC)
A	-7	88%	-7(-8)	20
B	+2	54%	+2(+1)	20
C	+7	35%	+7(+6)	20
D	+12	15%	+12(+11)	20
E	T_{ol}	depends on T_{ol}	$T_j = T_{ol}$	20
F	T_{biv}	depends on T_{biv}	$T_j = T_{biv}$	20

Table 12
Part load conditions for portable air-to-air air conditioners and portable air-to-air heat pumps

Rating point	Outdoor temperature	Part load ratio	Outdoor side heat exchanger	Indoor side heat exchanger
Cooling				
	T_j (ºC)		Outdoor air dry bulb temperatures (ºC)	Indoor air dry bulb (wet bulb) temperatures (ºC)
All	27	100%	27(19)	27 (19)
Double duct	35	100%	35(24)	27(19)
Inverter type	27	33%	27(19)	27 (19)
Heating				
Rating point	T_j (ºC)	Part load ratio (Average climate)	Outdoor air dry bulb (wet bulb) temperatures (ºC)	Indoor air dry bulb temperature (ºC)
A	-7	88%	-7(-8)	20
B	+2	54%	+2(+1)	20
C	+7	35%	+7(+6)	20
D	+12	15%	+12(+11)	20
E (only for cold climate)	-15	N.A.	-15	20
F	$T_{hp,off}$	depends on $T_{hp,off}$	$T_j = T_{hp,off}$	20

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Table 13
European cooling season for fixed air-to-air air conditioners

	Outdoor temperature	bin hours
j	T_j	h_j
#	°C	h/a
1	17	205
2	18	227
3	19	225
4	20	225
5	21	216
6	22	215
7	23	218
8	24	197
9	25	178
10	26	158
11	27	137
12	28	109
13	29	88
14	30	63
15	31	39
16	32	31
17	33	24
18	34	17
19	35	13
20	36	9
21	37	4
22	38	3
23	39	1
24	40	0

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Table 14
European heating seasons for heat pumps

bin_j	T_j (°C)	H_j (h/a)		
		Warmer	Average	Colder
1 to 8	-30 to -23	0	0	0
9	-22	0	0	1
10	-21	0	0	6
11	-20	0	0	13
12	-19	0	0	17
13	-18	0	0	19
14	-17	0	0	26
15	-16	0	0	39
16	-15	0	0	41
17	-14	0	0	35
18	-13	0	0	52
19	-12	0	0	37
20	-11	0	0	41
21	-10	0	1	43
22	-9	0	25	54
23	-8	0	23	90
24	-7	0	24	125
25	-6	0	27	169
26	-5	0	68	195
27	-4	0	91	278
28	-3	0	89	306
29	-2	0	165	454
30	-1	0	173	385
31	0	0	240	490
32	1	0	280	533
33	2	3	320	380
34	3	22	357	228
35	4	63	356	261
36	5	63	303	279
37	6	175	330	229
38	7	162	326	269
39	8	259	348	233
40	9	360	335	230
41	10	428	315	243
42	11	430	215	191
43	12	503	169	146
44	13	444	151	150
45	14	384	105	97
46	15	294	74	61
Total hours:		3 590	4 910	6 446

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Table 15
Air velocity reading for the maximum air flow determination

	Initial position (mm from the vertical axis)	Increment (mm)	Radius annulus	Air velocity limit (m/min)
Ceiling fans	20	40	40	24
Other fans	40	80	80	9

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ANNEX IV
Verification procedure for market surveillance purposes

The verification tolerances defined in this Annex relate only to the verification of the declared parameters by Member State authorities and shall not be used by the manufacturer, importer or authorised representative as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

Where a model has been designed to be able to detect it is being tested (e.g. by recognising the test conditions or test cycle), and to react specifically by automatically altering its performance during the test with the objective of reaching a more favourable level for any of the parameters specified in this Regulation or included in the technical documentation or included in any of the documentation provided, the model and all equivalent models shall be considered not compliant.

When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to point 2 of Article 3 of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

1. The Member State authorities shall verify one single unit of the model.

2. The model shall be considered to comply with the applicable requirements if:

(a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer, importer or authorised representative than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and

(b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer, importer or authorised representative does not contain values that are more favourable for the manufacturer, importer or authorised representative than the declared values; and

(c) when the Member States authorities check the unit of the model, they find that the manufacturer, importer or authorised representative has put in place a system that complies with the requirements in the second paragraph of Article 6; and

(d) when the Member States authorities check the unit of the model, it complies with the requirements in the third paragraph of Article 6, the functional requirements in point 3 of Annex II and on resource efficiency in point 4 of Annex II; and

(e) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 16.

3. If the results referred to in point 2(a), (b), (c) or (d) are not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.

4. If the result referred to in point 2(e) is not achieved the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more equivalent models.

5. The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 16.

6. If the result referred to in point 5 is not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.

7. The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3 or 6.

The Member State authorities shall use the measurement and calculation methods set out in Annex III.

The Member State authorities shall only apply the verification tolerances that are set out in Table 16 and shall use only the procedure described in points 1 to 7 for the requirements referred to in this Annex. For the parameters in Table 16, no other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 16
Verification tolerances

Parameter	Product	Verification tolerances
SEER	Fixed air-to-air air conditioners < 2 kW	The determined value[a] shall not be more than 8 % higher than the declared value.
	Fixed air-to-air air conditioners ≥ 2 kW and < 6 kW	The determined value[a] shall not be more than 6 % higher than the declared value.
	Fixed air-to-air air conditioners ≥ 6 kW	The determined value[a] shall not be more than 4 % higher than the declared value.
	Portable air-to-air air conditioners	The determined value[a] shall not be more than 6 % higher than the declared value.
SCOP	Fixed air-to-air air conditioners < 2 kW	The determined value[a] shall not be more than 8 % higher than the declared value.
	Fixed air-to-air air conditioners ≥ 2 kW and < 6 kW	The determined value[a] shall not be more than 7 % higher than the declared value.
	Fixed air-to-air air conditioners ≥ 6 kW	The determined value[a] shall not be more than 6 % higher than the declared value.
	Portable air-to-air air conditioners	TBC
$P_c(T_{eq})$	Portable air-to-air air conditioners	The determined value[a] shall not be more than 7 % higher than the declared value.

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T_{eq}	Portable air-to-air air conditioners	The determined value[a] shall not be more than 0,3 K higher than the declared value.
Maximum air flow	Comfort fans	The determined value shall not be more than 10 % higher than the declared value.

[a] in the case of three additional units tested as prescribed in point 4, the determined value means the arithmetical mean of the values determined for these three additional units.

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ANNEX V

Benchmarks

At the time of entry into force of this Regulation, the best available technology on the market for refrigerating appliances with a direct sales function in terms of their EEI was identified as outlined below.

Table 17
Benchmarks for air-to-air air conditioners and air-to-air heat pumps

	SEER	SCOP
Fixed air-to-air air conditioners and air-to-air heat pumps	11,3	6,3
Portable air-to-air air conditioners and air-to-air heat pumps	4,3	1,5

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