Commission Working Document on possible Ecodesign Reguirements for air-conditioning appliances and comfort fans

(1) Under Directive 2009/125/EC ecodesign requirements should be set by the Commission for energy-related products representing significant volumes of sales and trade, having significant environmental impact and presenting significant potential for improvement through design in terms of their environmental impact, without entailing excessive costs.

(2) Article 16(2), first indent, of Directive 2009/125/EC provides that in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15(2), and after consulting the Ecodesign Consultation Forum, the Commission shall, as appropriate, introduce implementing measures offering a high potential for cost-effective reduction of greenhouse gas emissions, such as HVAC (heating, ventilation and air-conditioning) systems.

(3) The Commission has carried out a preparatory study to analyse the technical, environmental and economic aspects of air-conditioning appliances and comfort fans typically used in households and small commercial establishments. The study has been developed together with stakeholders and interested parties from the EU and third countries, and the results have been made publicly available.

(4) The environmental aspect of the products covered, identified as significant for the purposes of this Regulation, is sound power level and energy consumption in form of indirect emissions in the use phase. The preparatory study also identified refrigerant leakage as a significant environmental aspect in form of direct greenhouse gas emissions, representing some 10-20% of the combined direct and indirect greenhouse gas emissions.

(5) Refrigerants are addressed under Regulation 842/2006/EC[1] in containing, preventing and thereby reducing emissions of fluorinated greenhouse gases covered by the Kyoto Protocol. Consequently, no specific requirements on refrigerants are set in this Regulation. However, in order to address the risk of direct green house gas emissions from air-conditioning appliances, the minimum efficiency requirements are lowered by 5% for appliances using a refrigerant with $1<GWP\leq150$ and by 15% for appliances using a refrigerant with GWP=1.

(6) Standby and off-mode functions can be responsible for an important part of the total power consumption of these appliances. For air-conditioning appliances, power consumption of these functions is part of the minimum energy performance requirements. Standby and off-mode requirements for single ducts, comfort fans and double ducts below 1kW input power are set on the basis of the Ecodesign requirements of Commission Regulation 1275/2008/EC[2].

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1 OJ L 161, 14.6.2006, p. 1.

2 OJ L 339, 18.12.2008, p. 45.

(7) The annual electricity consumption of products subject to this Regulation was estimated to have been X TWh in the EU in 2005. Unless specific measures are taken, annual electricity consumption is predicted to be X TWh in 2020. The preparatory study shows that the electricity consumption of products subject to this Regulation can be significantly reduced.

(8) The preparatory study shows that requirements regarding other ecodesign parameters referred to in Annex I, Part 1, of Directive 2009/125/EC are not necessary as electricity consumption and sound power level of air-conditioning appliances and comfort fans in the use phase are by far the most significant environmental aspects.

(9) Products subject to this Regulation should be made more energy efficient by applying existing non-proprietary cost-effective technologies that can reduce the combined costs of purchasing and operating these products.

(10) The ecodesign requirements should not affect functionality from the end-user's perspective and should not negatively affect health, safety or the environment. In particular, the benefits of reducing electricity consumption during the use phase should more than offset any possible additional environmental impact during the production phase.

(11) The ecodesign requirements should be introduced gradually in order to provide a sufficient timeframe for manufacturers to re-design products subject to this Regulation. The timing should be such as to avoid negative impacts on the functionalities of equipment on the market, and to take into account cost impacts for end-users and manufacturers, in particular small and medium-sized enterprises, while ensuring timely achievement of the objectives of this Regulation.

(12) Measurements of the relevant product parameters should be performed through reliable, accurate and reproducible measurement methods, which take into account the recognised state of the art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services[3].

(13) In accordance with Article 8 of Directive 2009/125/EC, this Regulation specifies the applicable conformity assessment procedures.

(14) In order to facilitate compliance checks, manufacturers should provide information in the technical documentation referred to in Annexes V and VI of Directive 2009/125/EC insofar as this information relates to the requirements laid down in this Regulation.

(15) In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to ensure the wide availability and easy accessibility of information on the life-cycle environmental performance of products subject to this Regulation.

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[3] OJ L 204, 21.7.1998, p. 37.

(16) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC,

Subject matter and scope

1. This Regulation establishes eco-design requirements for the placing on the market and putting into service of electric mains-operated air-conditioning appliances with a design load of ≤ 12 kW for cooling – or heating, if the product has no cooling function - and comfort fans with an electric fan power input ≤125W.

2. This Regulation shall not apply to:

   a) appliances that use non-electric energy sources;

   b) air-conditioning appliances of which the condensor- and/or evaporator-side can not be supplied by air.

Definitions

In addition to the definitions set out in Article 2 of Directive 2009/125/EC, the following definitions shall apply:

(1) ‘Air-conditioning appliance’ means a device capable of cooling and/or heating indoor air and which is based on the vapour compression cycle driven by an electric compressor and which is either a 'room air-conditioner', a 'double duct' or a 'single duct'. This definition includes 'air-conditioning appliances' that provide additional functionalities such as dehumidification, air-purification, ventilation and/or supplemental air-heating by means of electric resistance heating. This definition also includes appliances that may use water (either condensate that is formed on the evaporator side or externally added water) for evaporation on the condensor, provided that the appliance is also able to function without the use of additional water, using air only;

(2) ‘Room air-conditioner’ means an air-conditioning appliance that is neither a double duct nor a single duct;

(3) ‘Double duct’ means an 'air-conditioning appliance' placed in the conditioned space near a wall, in which when cooling (heating) the condenser (evaporator) intake air is introduced from the outdoor environment by a small duct and the condenser (evaporator) discharge air is rejected to the outdoor environment by a second small duct;

(4) ‘Single duct’ means an ‘air-conditioning appliance’ for local cooling (heating) in which the condenser (evaporator) intake air is introduced from the space containing the unit and discharged outside this space;

(5) ‘Design load’ means the declared peak cooling and/or heating power demand in W that the air conditioning appliance can meet at the applicable extreme outdoor temperatures;

(6) ‘Comfort fan’ means an appliance designed for creating air movement around (part of) a human body for personal cooling comfort. This definition does not exclude comfort fans that can perform additional functionalities such as lighting.

(7) ‘Electric fan power input’ means the electric input power in W of a comfort fan measured at the declared maximum flow rate of the comfort fan.

Ecodesign requirements

The ecodesign requirements for air-conditioning appliances and comfort fans are set out in Annex I, points 2 and 3.

Conformity assessment

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.

2. For the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation file shall contain a copy of the calculation set out in Annex II to this Regulation.

Verification procedure for market surveillance purposes

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC for compliance with requirements set out in Annex I to this Regulation, the Member States authorities shall apply the verification procedure described in Annex III to this Regulation.

Benchmarks

The indicative benchmarks for best-performing air-conditioning appliances and comfort fans available on the market at the time of entry into force of this Regulation are set out in Annex IV.

Revision

The Commission shall review this Regulation in the light of technological progress no later than five years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the efficiency and sound power level requirements, the approach to promote the use of low-GWP refrigerants and the scope of the Regulation, in particular as to domestic ventilation, appliances above 12kW output power and appliances of which the condenser- and/or evaporator-side can be supplied by air.

Entry into force

1. This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

2. The ecodesign requirements set out in Annex I.2 shall apply from 1 January 2013 (1. tier) respectively 1 January 2015 (2. tier).

The ecodesign requirements set out in Annex I.3 shall apply from 1 January 2013.

ANNEX I
Ecodesign requirements

1 Definitions for the purposes of the Annex I

(1) 'Functionality' means the indication of whether the unit is intended for space cooling (suffix *c*), heating (suffix *h*) or both;

(2) 'Designated climate profile' means a weighted set of climate-specific operating conditions representative of a cooling season or a heating season (indicated by suffix A for 'average', W for 'warmer' and C for 'colder') for which the unit is declared fit for purpose;

(3) 'Climate-specific operating condition' or 'bin' (with index *j*) means a combination of a bin-specific outdoor temperature (*Tj*) in °C, a function-dependent indoor temperature (*Tin*) in °C and a bin-specific part load (*pc(Tj)* for cooling and *ph(Tj)* for heating) in kW;

(4) 'weighted set' in the context of a climate profile means that every operating condition ('bin') is given a relative weight, proportional to number of hours *hj* the rounded bin-specific outdoor temperature *Tj* occurs in a heating or cooling season;

(5) 'Outdoor temperature' (*T*) is the dry bulb outdoor air temperature at a given relative humidity with the latter indicated by the wet bulb temperature;

(6) 'Function-dependent indoor temperature' (*Tin*) is the dry bulb indoor air temperature at a given relative humidity - indicated by the wet bulb temperature - in cooling mode (*Tinc*) or - depending on the function - the dry bulb indoor air temperature in heating mode (*Tinh*), all in °C;

(7) 'Bin-specific part load' (*p*) means the cooling power demand (*pc(Tj)*) or the heating power demand (*ph(Tj)*) in kW in bin *j* calculated as a fraction of the climate-specific design load *Pdesign* at outdoor temperature *Tdesign* and the function-dependent indoor temperature *Tin*, whereby the value of the fraction depends on the bin-specific outdoor temperature *Tj* linearly weighted against a reference temperature value of 16 °C (*p*=0) and the aforementioned value of *Tdesign* (*p=Pdesign*);

(8) 'Fit for purpose' as regards a designated climate profile means that the unit is not only declared as such but also can meet the minimum performance requirements, i.e. the maximum value of the bivalent temperature *Tbiv* and the operation limit temperature *Tol* for the climate profile, at the design load *Pdesign*;

(9) 'Design load' (*Pdesign*) means the declared peak cooling (*Pdesignc*) and/or declared peak heating power (*Pdesignh*) demand in kW at *Tdesign* outdoor temperature, whereby in heating mode the declaration of the climate-specific *Pdesignh* values is subject to maximum requirements for the bivalent temperature *Tbiv* and the outdoor temperature operating limit *Tol*, both in °C, and in cooling mode *Pdesignc* must be equal to the declared capacity *Pdc* of the unit at *Tdesignc*;

(10) '*Tdesign''* means the outdoor temperature at extreme conditions pertaining to a climate profile;

(11) ‘Bivalent temperature’ (*Tbiv*) is the lowest outdoor temperature point at which the unit is declared to have a monovalent capacity able to meet 100% of the load without additional backup;

(12) ‘Operation limit temperature’ (*Tol*) in °C is the lowest outdoor temperature at which the unit in heating mode can still deliver heating capacity, as declared by the manufacturer;

(13) ‘Declared capacity’ (*Pd*) is the declared cooling (*Pdc*) or heating (*Pdh*) power output in kW of the refrigerant cycle of the unit at specific operating conditions;

(14) ‘Energy Efficiency Ratio’ (*EER*) is the cooling power output in kW divided by the electric power input of a unit at specific operating conditions;

(15) ‘P_{EER}’ means the electric power input in kW of a unit when providing cooling at design load (*Pdesignc*);

(16) ‘Coefficient of Performance’ (*COP*) is the heating power output of the refrigeration cycle in kW divided by the electric power input in kW of a unit at specific operating conditions;

(17) ‘P_{COP}’ means the electric power input in kW of a unit when providing heating at design load (*Pdesignh*);

(18) 'Seasonal Energy Efficiency Ratio’ (*SEER*) is the cooling season energy efficiency performance, expressed as the ratio between the reference *seasonal cooling demand* in kWh/a and the seasonal electricity consumption for cooling in kWh/a;

(19) 'Seasonal cooling demand' (Q_C) means the product of *Pdesignc* and the seasonal numbers of hours H_{CE} the unit has the compressor running to supply cooling in kWh/a;

(20) 'Seasonal electricity consumption for cooling' (Q_{CE}) means the seasonal cooling demand divided by the weighted average energy efficiency ratio plus the electricity consumption of the unit in the auxiliary modes during the cooling season;

(21) 'Seasonal Coefficient of Performance' (*SCOP*) is the heating season efficiency performance, expressed as the ratio between the reference seasonal heating energy demand in kWh/a and the seasonal electricity consumption for heating, which may vary according the climate profile chosen in kWh/a;

(22) ‘Seasonal heating demand’ (Q_H) means the product of *Pdesignh* and the seasonal numbers of hours H_{HE} the unit has the compressor running to supply heating in kWh/a;

(23) ‘Seasonal electricity consumption for heating’ cooling ($Q_{CE\ for\ A,\ W\ and/or\ C}$) means the seasonal heating demand divided by the weighted average Coefficient of Performance plus the electricity consumption of the unit in the auxiliary modes during the heating season;

(24) ‘Degradation coefficient’ (*Cd*) is the measure of efficiency loss due to cycling (compressor switching on/off in active mode);

(25) ‘Capacity control’ indicates whether the unit is able to change the rotational speed of the motor of the compressor in a minimum of three or more steps (variable speed), two steps (‘staged capacity’) or not at all (‘fixed capacity’);

(26) ‘Auxiliary electric power consumption’ is the power consumption of the unit in kW in stand-by mode (P_{SB}), thermostat-off mode (P_{TO}), off-mode (P_{OFF}) and crankcase heater operation (P_{CK});

(27) 'Off mode' is a condition in which the equipment 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[4];

(28) 'Nn-mode' is the assumed number of hours the unit has the compressor running (depending on the functionality of the product) and which is necessary to calculate the seasonal cooling demand and/or the seasonal heating demand;

(29) 'Standby mode' means a condition where the equipment 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;

(30) 'Thermostat-off mode’ means a condition where the unit is turned on, the compressor is not running and where the unit is waiting for a signal to start the compressor or proceed to another auxiliairy power mode;

(31) 'Crankcase heater operation' means a condition where the unit is not providing heating or cooling output and has activated a heating device to limit the concentration of refrigerant in oil at compressor start;

(32) '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;

(33) 'Information or status display' is a continuous function providing information or indicating the status of the equipment on a display, including clocks;

(34) 'Nominal air flow rates' means air flow rates in m^3/h, measured at the outlet of the indoor and/or outdoor units (whichever applies) of air-conditioning appliances, in operating conditions necessary to realise *Pdesign*;

(35) 'Global warming potential' means the global warming potential of the refrigerant applied in the unit, expressed in kg CO2 equivalents over a 100 year time horizon;

(36) 'Sound power level' means the A-weighted sound power level indoors and outdoors measured during nominal flow rate conditions;

[4] OJ L 390 of 31.12.2004, p. 24.

(37) 'Nominal fan flow rate' (*F*) in m³/min means the maximum air flow rate measured at the fan outlet;

(38) 'Nominal fan electric power consumption' (*P*) in W means the electricity consumption of the comfort fan operating at nominal flow rate;

(39) 'Service value' (*SV*) in (m³/min)/W means the ratio of the nominal fan flow rate and the nominal fan electric power consumption;

(40) 'Annual fan electricity consumption' (*Q*) in kWh/a means the reference annual electricity consumption of the comfort fan;

(41) ‘Tower fan’ means a comfort fan of which the air path through the impeller is in a direction essentially at right angles to the axis of rotation, both entering and leaving the impeller at its periphery (also known as ‘cross flow’ or ‘tangential’ fans);

(42) ‘Ceiling fan’ means a comfort fan designed to be suspended from a ceiling;

(43) ‘Other fan’ means a comfort fan not covered by the definition of ceiling fan or tower fan.

2. PRODUCT EFFICIENCY AND SOUND POWER LEVEL REQUIREMENTS

a) The minimum efficiency requirements for air-conditioning appliances using refrigerants with GWP>150 are set out in Table 1.

Table 1: Minimum energy efficiency performance requirements

Parameter	Room air-conditioners ≤12kW output power and double ducts >1kW input power		Double ducts ≤1kW input power		Single ducts ≤12kW output power	
	SEER	SCOP(A)	EER	COP	EER	COP
2 years after entry into force	**3,60**	**3,20**	**2,10**	**2,36**	**2,30**	**1,80**
4 years after entry into force	**4,30**	**3,50**	**2,45**	**2,60**	**2,60**	**2,04**

The minimum efficiency requirements for air-conditioning appliances using refrigerants with 1<GWP≤150 are set out in Table 2.

Table 1: Minimum energy efficiency performance requirements

Parameter	Room air-conditioners ≤12kW output power and double ducts >1kW input power		Double ducts ≤1kW input power		Single ducts ≤12kW output power	
	SEER	SCOP(A)	EER	COP	EER	COP
2 years after entry into force	**3,42**	**3,04**	**2,00**	**2,19**	**2,19**	**1,71**
4 years after entry into force	**4,09**	**3,33**	**2,33**	**2,47**	**2,47**	**1,95**

The minimum efficiency requirements for air-conditioning appliances and single ducts using refrigerants with GWP≤1 are set out in Table 3.

Table 1: Minimum energy efficiency performance requirements

Parameter	Room air-conditioners ≤12kW output power and double ducts >1kW input power	Double ducts ≤1kW input power	Single ducts ≤12kW output power

	SEER	SCOP(A)	EER	COP	EER	COP
2 years after entry into force	**3,06**	**2,72**	**1,79**	**1,99**	**1,99**	**1,53**
4 years after entry into force	**3,66**	**2,98**	**2,08**	**2,21**	**2,21**	**1,73**

The requirements for SCOP shall relate to the average climate profile to be calculated in accordance with Annex II.

b) The minimum efficiency requirements for comfort fans are set out in Table 4. The service value of comfort fans must be equal to or higher than the values in the table.

Table 4 **2 years after entry into force**	Fan diameter [cm]	service value [(m^3/min)/W]
Tower fans	All sizes	0.40
All comfort fans except tower and ceiling	0-20	0.54
	20-23	0.54
	23-25	0.64
	25-30	0.74
	30-35	0.81
	35-40	0.90
	40-45	1.00
	45-50	1.10
	50-60	1.13
	60+	1.30
Ceiling fans	0-60	0.54
	60-90	0.87
	90-120	1.15
	120-130	1.46
	130-140	1.45
	140-150	1.45
	150+	1.47

c) The off-mode and standby requirements for comfort fans, single ducts and double ducts below 1 kW input power, are set out below.

i) Power consumption in off mode:

Power consumption of equipment in any off mode condition shall not exceed 1,00 W as of 2 years, and 0,50 W as of 4 years after the entry into force of the Regulation

ii) Power consumption in standby mode(s):

The power consumption of equipment in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 1.00 W as of 2 years, and 0.50 W as of 4 years after the entry into force of the Regulation.

The power consumption of equipment in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 2.00 W as of 2 years, and 1.00 W as of 4 years after the entry into force of the Regulation

iii)Availability of off mode and/or standby mode

As of 2 years after entry into force of the Regulation, equipment shall, except where this is inappropriate for the intended use, provide off mode and/or standby mode, and/or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

iv) Power management

As of 4 years after entry into force of the Regulation, when equipment is not providing the main function, or when other energy-using product(s) are not dependent on its functions, equipment shall, unless inappropriate for the intended use, offer a power management function, or a similar function, that switches equipment after the shortest possible period of time appropriate for the intended use of the equipment, automatically into

– standby mode, or

– off mode, or

– another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source. The power management function shall be activated before delivery.

d) The maximum sound power level requirements for air-conditioning appliances are set out in Table 3.

Table 3: Sound power level

	Room air-conditioners				**Single ducts and double ducts**	
	Pdesignc/h ≤ 6 kW		**6 < Pdesignc/h ≤12 kW**		**Pdesignc ≤ 6 kW**	**6 < Pdesignc ≤ 12 kW**
	Indoor	**Outdoor**	**Indoor**	**Outdoor**	**Indoor**	**Outdoor**
dB(A)	60	65	65	70	65	70

e) The maximum sound power level requirements for comfort fans are set out in Table 4.

Table 4: maximum sound power levels for comfort fans

	Size of Fan	**Maximum sound power level**

2 years after entry into force	Fan diameter [cm]	dB(A)
Tower fans	All sizes	50
All comfort fans except tower and ceiling	0-20	59
	20-23	59
	23-25	60
	25-30	61
	30-35	63
	35-40	65
	40-45	67
	45-50	68
	50-60	70
	60+	73
Ceiling fans	0-60	62
	60-90	62
	90-120	65
	120-130	67
	130-140	70
	140-150	72
	150+	75

3. PRODUCT INFORMATION REQUIREMENTS

The information on air-conditioning appliances and comfort fans set out in points below shall be visibly displayed on:

(a) the technical documentation of the product;

(b) free access websites of manufacturers of air-conditioning appliances and comfort fans;

(1) The manufacturer of an air-conditioning appliance shall provide laboratories performing compliance checks the necessary information on the setting of the unit at declared capacities, SEER/EER and SCOP/COP values, upon request, and provide contact information for obtaining such information.

Specific information requirements for room air-conditioners

(3) In the technical fiche of the product the manufacturer shall supply the information as requested in Table 1, in as much as is relevant in view of the functionality, designated climate profiles and other conditions defined in Point 1 of this Annex. For staged capacity units, two values noted hi/lo divided by a slash (‘/’) will be declared in each box under “Declared capacity of the unit” (see ‘capacity control’ definition).

Table 1. Information requirements for air-conditioning appliances

Description	**Symbol**	**Value**	**Unit**	**Symbol**	**Value**

Functionality		Cooling (suffix *c*)	Y/N		Heating (suffix *h*)	Y/N
Designated climate profiles apart from Average (suffix A)		Warmer (suffix *W*)	Y/N		Colder (suffix *C*)	Y/N
Design load		*Pdesign*	*Capacity*		*SEER/SCOP at Pdesign*	
in cooling mode		*Pdesignc*	0,0	kW	*SEER*	0,0
in heating mode		*Pdesignh*				
Average climate		*PdesignhA*	0,0	kW	*SCOPA*	0,0
Warmer climate (if designated)		*PdesignhW*	0,0	kW	*SCOPW*	0,0
Colder climate (if designated)		*PdesignhC*	0,0	kW	*SCOPC*	0,0
Declared capacity of the unit		*Pd*	*Capacity*		*EER/COP at Pd*	
in cooling mode		*Pdc*				
T=35, pl 1 (condition A)		*Pdc4*	0,0	kW	*EER4*	0,0
T=30, pl 0,74 (condition B)		*Pdc3*	0,0	kW	*EER3*	0,0
T=25, pl 0,47 (condition C)		*Pdc2*	0,0	kW	*EER2*	0,0
T=20, pl 0,21 (condition D)		*Pdc1*	0,0	kW	*EER1*	0,0
in heating mode						
Average climate						
T=-7, pl 0,88 (condition A)		*Pdh4A*	0,0	kW	*COP4A*	0,0
T=2, pl 0,54(condition B)		*Pdh3A*	0,0	kW	*COP3A*	0,0
T=7, pl 0,35 (condition C)		*Pdh2A*	0,0	kW	*COP2A*	0,0
T=12, pl 0,15 (condition D)		*Pdh1A*	0,0	kW	*COP1A*	0,0
T=Tbiv (condition F)		*Pdh5A*	0,0	kW	*COP5A*	0,0
T=Tol (condition E)		*Pdh6A*	0,0	kW	*COP6A*	0,0
Warmer climate						
T=2, pl 1 (condition B)		*Pdh3W*	0,0	kW	*COP3W*	0,0
T=7, pl 0,64 (condition C)		*Pdh2W*	0,0	kW	*COP2W*	0,0
T=12, pl 0,29 (condition D)		*Pdh1W*	0,0	kW	*COP1W*	0,0
T=Tbiv (condition F)		*Pdh5W*	0,0	kW	*COP5W*	0,0

Table 1 continued. Information requirements for air-conditioning appliances

Description	Symbol	Value	Unit	Symbol	Value	Unit
Declared capacity of the unit(c'td)	*Pd*	*Capacity*		*EER/COP at Pd*		
Colder climate						
T=-7, pl 0,61 (condition A)	*Pdh4C*	0,0	kW	*COP4C*	0,0	-
T=2, pl 0,37 (condition B)	*Pdh3C*	0,0	kW	*COP3C*	0,0	-
T=7, pl 0,24 (condition C)	*Pdh2C*	0,0	kW	*COP2C*	0,0	-
T=12, pl 0,11 (condition D)	*Pdh1C*	0,0	kW	*COP1C*	0,0	-
T=Tbiv (condition F)	*Pdh5C*	0,0	kW	*COP5C*	0,0	-
T=Tol (condition E)	*Pdh6C*	0,0	kW	*COP6C*	0,0	-
T=-15, pl 0,82 (condition G)	*Pdh7C*	0,0	kW	*COP7C*	0,0	-
Degradation co-efficient	*Cd*	0,0				
Cooling mode cycling (condition D)	*Pdcyc*	0,0		*EERcyc*	0,0	
Heating mode cycling (condition D)	*PhcycA*	0,0		*COPcycA*	0,0	

Bivalent point Tbiv for heating[5]					***Operation limit Tol***[6]		
Average climate	*TbivA*	0,0	°C		*TolA*	0,0	°C
Warmer climate	*TbivW*	0,0	°C		*TolW*	0,0	°C
Colder climate	*TbivC*	0,0	°C		*TolC*	0,0	°C
Capacity control		1. fixed, 2. staged OR 3.variable					
Contact details for obtaining information on		Contact information					
Auxiliary electric power consumption		***Cooling***			***Heating***		
off mode	P_{OFF}	0,0	kW		P_{OFF}	0,0	kW
standby mode (only for cooling)	P_{SB}	0,0	kW				
thermostat-off mode	P_{TO}	0,0	kW		P_{TO}	0,0	kW
crancase heater operation	P_{CK}	0,0	kW		P_{CK}	0,0	kW
Annual electricity consumption	Q_E						
in cooling mode	Q_{CE}	0,0	kWh/a				
in heating mode							
Average climate	Q_{HEA}	0,0	kWh/a				
Warmer climate (if designated)	Q_{HEW}	0,0	kWh/a				
Colder climate (if designated)	Q_{HEC}	0,0	kWh/a				
Global Warming Potential refrigerant		informative text					
Sound power level		0	dbA				
Nominal air flow		0	m³/h				

Information requirements for single ducts and double ducts < 1 kW input power:

(4) The manufacturer shall provide information as detailed in Table 2:

Table 2. Information requirements on single ducts

Description (where relevant)	**Symbol**	**Value**	**Unit**
Design load when cooling	*Pdesignc*	*[x,x]*	kW
Design load when heating	*Pdesignh*	*[x,x]*	kW
Nominal electric power consumption at design load when cooling	P_{EER}	*[x,x]*	kW
when heating	P_{COP}	*[x,x]*	kW
Energy Efficiency Ratio when cooling	*EER*	*[x,x]*	-
Coefficient of Performance when heating	*COP*	*[x,x]*	-
Stand-by power consumption	P_{SB}	*[x,x]*	W
Off-mode power consumption	P_{OFF}	*[x,x]*	W
Annual electricity consumption	*Q*	*[x,x]*	kWh/a
Sound power level	*Noise*	*[x]*	dB(A)

[5] The value of Tbiv shall be lower than or equal to the maximum Tbiv values indicated in Table 4 in order to declare a unit fit for a designated heating climate profile.

[6] The value of Tol shall be lower than or equal to maximum Tol values indicated in Table 4 in order to declare a unit fit for a designated heating climate profile.

Information requirements for comfort fans

(5) The manufacturer shall provide information as detailed in Table 3:

Table 3. Information requirements on comfort fans

Description	Symbol	Value	Unit
Nominal flow rate	*F*	*[x,x]*	m^3/min
Nominal electric power consumption	*P*	*[x,x]*	W
Service value	*SV*	*[x,x]*	$(m^3/min)/W$
Stand-by power consumption	P_{SB}	*[x,x]*	W
Off-mode power consumption	P_{OFF}	*[x,x]*	W
Annual electricity consumption	*Q*	*[x,x]*	kWh/a
Sound power level		*[x]*	dbA

ANNEX II
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 a reliable, accurate and reproducible method, which takes into account the generally recognised state of the art methods, and whose results are deemed to be of low uncertainty, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union. They shall fulfil all of the following technical parameters.

The cooling efficiency of room air-conditioners shall be determined as the representative seasonal cooling energy demand divided by the representative seasonal electric energy consumption. For single ducts the cooling efficiency shall be established at specific operating conditions.

The heating efficiency of air-conditioning appliances shall be determined as the representative seasonal heating energy demand divided by the representative seasonal electric energy consumption.

The determination of the seasonal energy consumption for cooling and/or heating of air-conditioning appliances shall take into account:

- European climate conditions, as defined in table 1 below;
- relevant boundary conditions of operation, as defined in table 2 below;
- electric energy inputs of all relevant modes of operation, as defined in table 3 below.

The comfort fan efficiency shall be determined on the basis of the nominal air flow rate of the unit divided by the nominal electric power input of the unit.

The determination of the comfort fan energy consumption shall take into account electric energy inputs of all relevant modes of operation.

Table 1. – bin number j, outdoor temperature Tj in °C and number of hours per bin hj corresponding to the reference heating seasons "warmer", "average", "colder"

COOLING SEASON			HEATING SEASONS		**Warmer (W)**	**Average (A)**	**Colder (C)**
j	**Tj**	**hj**	**j**	**T_j**	**hj W**	**hjA**	**hjC**
#	**°C**	**hrs**	**#**	**°C**	**hrs**	**hrs**	**hrs**
1	17	205	1 to 8	-30 to -23	0	0	0
2	18	227	9	-22	0	0	1

3	19	225	10	-21	0	0	6
4	20	225	11	-20	0	0	13
5	21	216	12	-19	0	0	17
6	22	215	13	-18	0	0	19
7	23	218	14	-17	0	0	26
8	24	197	15	-16	0	0	39
9	25	178	16	-15	0	0	41
10	26	158	17	-14	0	0	35
11	27	137	18	-13	0	0	52
12	28	109	19	-12	0	0	37
13	29	88	20	-11	0	0	41
14	30	63	21	-10	0	1	43
15	31	39	22	-9	0	25	54
16	32	31	23	-8	0	23	90
17	33	24	24	-7	0	24	125
18	34	17	25	-6	0	27	169
19	35	13	26	-5	0	68	195
20	36	9	27	-4	0	91	278
21	37	4	28	-3	0	89	306
22	38	3	29	-2	0	165	454
23	39	1	30	-1	0	173	385
24	40	0	31	0	0	240	490
			32	1	0	280	533
total		2602	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	3590	4910	6446

Table 2: Indoor and outdoor (Tdesign) air temperatures, bivalent point (Tbiv) and operating limit (Tol) temperatures per climate profile (all values are dry bulb temperatures with wet bulb temperatures indicated between brackets).

funtionality	Appliance type		Evaporator side (indoor air temp.)	Condensor side (outdoor air temp. Tdesignc)		
cooling	single duct		35 (24) ºC	35 (24) ºC *		
	room air-conditioner and double duct		27 (19) ºC	35 (24) ºC		
		climate profile (suffix A/W/C)	Condensor side (indoor air temp.)	Evaporator side (outdoor air temp. TdesignhA/W/C)	Maximum bivalent point (TbivA/W/C)	Maximum operating limit (TolA/W/C)
heating	single duct	Average	20 (12) ºC	20 (12) ºC *	n.a.	n.a.
	double duct (≤ 1 kW input power)	Average	20 (15 max) ºC	7 (6) ºC	n.a.	n.a.
	room air-conditioner and double	Average	20 (15 max) ºC	-10 (-11) ºC	2 ºC	-7 ºC
		Warmer	20 (15 max) ºC	2 (-11) ºC	7 ºC	2 ºC

	duct (> 1 kW input power)	Colder	20 (15 max) ºC	-22 (-23) ºC	-7 ºC	-15 ºC
* = In case of single ducts the condensor/evaporator in cooling/heating mode is not supplied by outdoor air, but indoor air.						

Table 3. Time periods in hrs./ for cooling and heating seasons for each mode

COOLING

	Cooling Only (for SEER)					Cooling and heating (for SEER)				
	on mode (cooling)	thermostat off mode	crankcase heater mode	off mode	standby mode	on mode (cooling)	thermostat-off mode	crankcase heater mode	off mode	standby mode
	350	221	7760	5088	2142	350	221	2672	0	2142

HEATING

	Heating Only (for SCOP)				Cooling and Heating (for SCOP)			
Climate profile	on mode (heating)	thermostat off mode	crankcase heater mode	off mode	on mode (heating)	thermostat-off mode	crankcase heater mode	off mode
A	1400	179	3851	3672	1400	179	179	0
W	1400	755	2944	2189	1400	755	755	0
C	2100	131	4476	4345	2100	131	131	0

ANNEX III
Verification procedure for market surveillance purposes

When performing the market surveillance checks referred to in Article 3 (2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following verification procedure for the requirements set out in Annex I.

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

2. In case of air-conditioning appliances the model shall be considered to comply with the provisions set out in this Regulation, if its seasonal energy efficiency ratio SEER for cooling (or EER in the case of single ducts) is at least the target value ±8% and/or its coefficient of performance SCOP for heating is at least the target value ±8%, established in accordance with Annexes I to III.

   In case of comfort fans the model shall be considered to comply with the provisions set out in this Regulation, if its service value SV is at the most ±8%.

3. If the result referred to in point 2 is not achieved, the market surveillance authority shall randomly test three additional units.

4. In case of air-conditioning appliances the model shall be considered to comply with the provisions set out in this Regulation if the average SEER (or EER in case of single ducts) of the three units referred to in point 3 is at least the target value ±5% and/or the average SCOP of the three units referred to in point 3 is at least the target value ±5%, established in accordance with Annexes I to III.

   In case of comfort fans the model shall be considered to comply with the provisions set out in this Regulation, if the average service value SV of the three units is at the most ±5%.

5. If the results referred to in point 4 are not achieved, the model shall be considered not to comply with this Regulation.

For the purposes of checking conformity with the requirements of this Regulation, Member States shall apply the procedures referred to in Annex II, and reliable, accurate and reproducible calculation and measurement methods, which take into account the generally recognised state-of-the-art, including methods set in calculation methods and standards the references and reference numbers of which have been published for that purpose in the Official Journal of the European Union.

ANNEX IV
Benchmarks

At the time of entry into force of this Regulation, the best available technology on the market for air-conditioning appliances and comfort fans in terms of their energy performance was identified as follows:

Benchmarks for air-conditioning appliances:

Benchmarks for air-conditioning appliances					
Room air-conditioners ≤12kW output power and double ducts >1kW input power		Double ducts ≤1kW input power		Single ducts ≤12kW output power	
SEER	SCOP	EER	COP	EER	COP
7,0	**5,1**	**3,00**	**3,15**	**3.15**	**2,60**

Benchmarks for comfort fans

Fan type	**Fan diameter [cm]**	**Best product service value [(m^3/min)/W]**
Tower fans	**All**	0,60
All comfort fans except tower and ceiling	0-20	0,81
	20-23	0,81
	23-25	0,96
	25-30	1,11
	30-35	1,22
	35-40	1,35
	40-45	1,50
	45-50	1,65
	50-60	1,70
	60+	1,95
Ceiling fans	0-60	0,81
	60-90	1,31
	90-120	1,73
	120-130	2,19
	130-140	2,18
	140-150	2,18

	150+	2,21