Working Document

Draft COMMISSION REGULATION (EU) No …/…

of …

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for boilers

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of Ecodesign requirements for energy-related products[1] and in particular Article 15 (1) thereof,

After consulting the Ecodesign Consultation Forum,

Whereas:

(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 a significant environmental impact and presenting significant potential for improvement 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 for heating and water heating equipment.

(3) The Commission has carried out a preparatory study to analyse the technical, environmental and economic aspects of boilers. The study has been developed together with stakeholders and interested parties from the Union and third countries, and the results have been made publicly available.

(4) The environmental aspects of boilers, identified as significant for the purposes of this Regulation, are the energy consumption in the use phase, the emissions of nitrogen oxides, noise and greenhouse gas emissions from possible refrigerant leakage.

[1] OJ L 285, 31.10.2009, p. 10.

(5) Depending on the out outcome of further technical, economical and environmental analyses, ecodesign requirements for boilers specifically designed for using biofuels or solid fuels, including from biomass, should be set at a later stage, if appropriate.

(6) The annual energy consumption of products subject to this Regulation was estimated to have been … in the Union in 2005, corresponding to … CO_2 emissions. Unless specific measures are taken, annual energy consumption is estimated to be … in 2020. The annual emissions of nitrogen oxides were estimated to be … in the Union. Unless specific measures are taken, annual emissions are estimated to be … in 2020. The preparatory study shows that energy consumption and emissions of nitrogen oxides emissions of products subject to this Regulation can be significantly reduced.

(7) 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.

(8) The combined effect of ecodesign requirements set out in this Regulation and Commission delegated Regulation supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of boilers is expected to result in annual energy savings of … PJ, and a reduction of annual nitrogen oxides emissions of … by in 2020, compared to the situation if no measures are taken.

(9) The ecodesign requirements should not affect functionality from an end-user's perspective and should not negatively affect health, safety or the environment.

(10) The ecodesign requirements should be introduced gradually to provide a sufficient time-frame 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.

(11) Measurements and calculations of the relevant product parameters should be performed through reliable, accurate and reproducible measurement and calculation methods, which take into account the recognised state of the art measurement and calculation 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[2].

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

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

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

(14) 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 least-life cycle environmental performance of products subject to this Regulation.

(15) 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,

HAS ADOPTED THIS REGULATION:

Article 1
Subject matter and scope

(1) This Regulation establishes ecodesign requirements for the placing on the market of boilers with a rated input between, and including, 4 kW and 400 kW;

(2) This Regulation shall not apply to:

(a) equipment specifically designed for using biomass fuels;

(b) equipment using solid fuels;

(c) equipment within the scope of Directive 2010/../EU of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control)[3];

(d) equipment distributing heat provided by district heating;

(e) components and sub-assemblies of boilers;

(f) equipment generating heat only for the purpose of providing sanitary hot water;

(g) equipment for heating and distribution of gaseous heat transfer media such as vapour or air;

(h) cogeneration equipment with a maximum electrical capacity of 50 kW or above.

Article 2
Definitions

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

(1) "boiler" means a device which meets all of the following criteria:

– it provides heat to a water-based central heating system in order to reach and maintain the indoor temperature of an enclosed space such as a building, a dwelling, or a room, at a desired level;

– it uses a heat generator using the processes listed in point (3);

(2) "heat generator" means the part of a boiler that generates the heat using the following processes:

– combustion of gaseous or liquid fossil fuels;

– use of the Joule effect in electric resistance heating elements;

[3] OJ L …

– capture of ambient heat from air, water or ground source, and/or waste heat;

(3) "water-based central heating system" means a system using water as heat transfer medium to distribute centrally generated heat to heat emitters for space heating of buildings, or parts thereof;

(4) "rated input" means the maximum design energy input per unit time to the boiler in continuous operation, while complying with all applicable safety requirements, expressed in kW and, where applicable, based on the gross calorific value of the fuel;

(5) "gross calorific value" (GCV) means the heat released when a certain fuel is burned completely with oxygen at a constant pressure, and when the products of combustion are returned to ambient temperature, in kWh;

(6) "biomass fuel" means a gaseous, liquid or solid fuel produced from biomass;

(7) "biomass" means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and agriculture, as well as the biodegradable fraction of industrial and municipal waste;

(8) "fossil fuel" means a gaseous, liquid or solid fuel of fossil origin;

(9) "cogeneration" means the simultaneous generation in one process of heat and electricity.

For the purposes of the Annexes, additional definitions are set out in Annex I.

Article 3
Ecodesign requirements

1. The ecodesign requirements for boilers are set out in Annex I.

2. Each ecodesign requirement shall apply in accordance with the following timetable:

a) From [date to be inserted: one year after this Regulation has come into force] boilers shall correspond to ecodesign requirements as indicated in Annex I, Point 2(1) and Point 3.

b) From [date to be inserted: three years after this Regulation has come into force] boilers shall correspond to ecodesign requirements as indicated in Annex I, Point 2(2).

c) From [date to be inserted: five years after this Regulation has come into force] boilers shall correspond to ecodesign requirements as indicated in Annex I, Point 2(3).

3. Compliance with ecodesign requirements shall be measured and calculated in accordance with requirements set out in Annex II.

Article 4
Conformity assessment

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 for assessing conformity set out in Annex V to that Directive.

Article 5
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 verification procedure set out in Annex IV to this Regulation.

Article6
Benchmarks

The indicative benchmarks for the best-performing boilers available on the market at the time of entry into force of this Regulation are identified in Annex V.

Article 7
Revision

The Commission shall review this Regulation in the light of technological progress of boilers no later than five years after its entry into force and present the result of this review to the Ecodesign Consultation Forum.

Article 8
Repeal

Council Directive 1992/42/EEC is repealed from [date to be inserted: one year after entry into force of this regulation].

Article 9
Entry into force

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

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission
Member of the Commission

ANNEX I
Ecodesign requirements for boilers

1. Definitions applicable for the purposes of Annexes

For the purposes of Annexes I and II the following definitions shall apply:

(1) "fossil fuel boiler" means a boiler that is equipped with heat generator(s) that generate(s) heat using the combustion of fossil fuels only;

(2) "heat pump" means a boiler that uses ambient and/or waste heat for heat generation, and possibly additional heat generator(s) using the Joule effect in electric resistance heating elements;

(3) "cogeneration boiler" means a cogeneration unit with a maximum electrical capacity below 50 kW;

(4) "seasonal space heating energy efficiency" (etas) means the ratio between the space heating demand pertaining to a designated heating season provided by a boiler, and the annual energy consumption required for its generation, expressed as percentage;

(5) "sound power level" means the A-weighted sound power level [dB(A)] indoors and/or outdoors measured;

(6) "off mode" is a condition when a boiler is connected to the mains power source and is not providing any function, including conditions providing only an indication of off mode condition, and conditions providing only functionalities intended to ensure electromagnetic compatibility pursuant to Directive 2004/108/EC of the European Parliament and of the Council[4];

(7) "off-mode power consumption" (Poff) means the power consumption of a boiler [kW] in off-mode;

(8) "temperature control" means equipment that interfaces with the end-user regarding the values and timing of desired indoor temperature and communicates/translates relevant data, such as registered actual indoor and/or outdoor temperature(s), to an interface of the boiler such as a central processing unit, thus contributing to the regulation of the indoor temperature(s)means equipment that regulates the heat output of a boiler;

(9) "auxiliary electricity correction" means the contribution to the to the seasonal space heating energy efficiency of a boiler due to consumption of electric auxiliary energy;

(10) "rated power" (Prated) means the heat output [kW] of a fossil fuel boiler at rated input, or the declared capacity of a heat pump for standard rating conditions under average climate conditions, as applicable;

Definitions related to fossil fuel boilers:

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

(11) “seasonal steady-state space heating energy efficiency” means a weighted average of the useful efficiency at rated input, and of the useful efficiency at 30% of the rated input;

(12) “useful efficiency” means the ratio of the useful output and the energy input, where the energy input is expressed in terms of the gross calorific value (GCV) of the fuel;

(13) “useful output” means the heat output transmitted to the heat carrier, expressed in kW and based on the GCV of the fuel;

(14) “emissions of nitrogen oxides” means the emissions of nitrogen oxides expressed in mg per kWh with respect to the GCV of the fuel;

(15) “ignition burner power consumption” (Pign) means the power consumption of a burner intended to ignite the main burner, expressed in terms of W with respect to the GCV of the fuel;

(16) “condensing boiler” means a fossil fuel boiler in which, under normal operating conditions and at certain operating water temperatures, the water vapour in the combustion products is partially condensed, in order to make use of the latent heat of this water vapour for heating purposes;

(17) “staged capacity fossil fuel boiler” means a fossil fuel boiler with a heat generator featuring two fuel-burning rates, i.e. a full rate and reduced rate;

(18) “fixed capacity fossil fuel boiler” means a fossil fuel boiler equipped with a heat generator that has one fixed fuel burning rate for space heating, including boilers appliances with alternative heating rates of which one particular rate is selected when putting a unit into service;

(19) “variable capacity fossil fuel boiler” means a fossil fuel boiler with two or more reduced water heating rates with a heat output distributed equidistant ±10% between zero and full rate, or a fossil fuel boiler with continuously adjustable reduced rate;

(20) “turndown ratio” means the ratio between the minimum and the maximum steady-state power output;

(21) “electric auxiliary energy” means the electric energy [kWh] required for designated operation of a unit, calculated from the electric power consumption at full load (elmax), 30% part load (elmin), stand-by mode (fossb) and default operating hours at each mode;

(22) “standby losses correction” means the contribution to the seasonal space heating energy efficiency due to standby heat losses;

(23) “standby heat losses” (Pstby) means the heat loss [kW] in operating modes without heat demand;

Definitions related to heat pumps:

(24) “standard rating conditions” means the operating conditions while establishing the rated capacity, sound power level, and rated coefficient of performance (COPrated) for heating, as set out in Annex II, Table 9;

(25) “outdoor temperature” (Tj) means the dry bulb outdoor air temperature [ºC] of which relative humidity can be indicated by a corresponding wet bulb temperature;

(26) “rated coefficient of performance” (COPrated) means the declared capacity [kW] divided by the rated power input [kW] when providing heating at standard rating conditions;

(27) “reference design conditions” means the combination of the reference design temperature, the maximum bivalent temperature and the maximum operation limit temperature, as set out in Annex II, Table 10;

(28) “reference design temperature” means the outdoor temperature [ºC] as described in Annex II, Table 10, at which the part load ratio shall be equal to 1, and which varies according the designated heating season;

(29) “full load” (Pdesignh) means the heating demand at the conditions pertaining to the reference design conditions;

(30) “part load ratio” (pl(Tj)) means the outdoor temperature minus 16ºC, divided by the reference design temperature minus 16ºC;

(31) “heating season” means a set of operating conditions describing per bin the combination of outdoor temperatures and the number of hours these temperatures occur per season the unit is declared fit for purpose;

(32) “bin” (with index j) means a combination of an outdoor temperature (Tj) and bin hours (hj), as set out in Annex II, Table 11;

(33) “bin hours” means the hours per season (hj) at which a outdoor temperature, rounded to an integer, occurs for each bin, as set out in Annex II, Table 11;

(34) “part load” means the heating load (Ph(Tj)) [kW] at a specific outdoor temperature Tj, calculated as the design load multiplied by the part load ratio;

(35) “seasonal coefficient of performance” (SCOP) is the overall coefficient of performance of the unit, representative for the whole designated heating season, calculated as the reference annual heating demand divided by the reference annual energy consumption for heating; *[NB: the difference between annual energy consumption, given by the ratio of reference demand and etas, and reference annual energy consumption is that the first considers corrections such as controls, and the latter does not]*

(36) “reference annual heating demand” (QH) means the reference heating demand [kWh/a], 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 (Pdesignh) and the seasonal equivalent active mode hours for heating (HHE);

(37) “reference annual energy consumption” means the energy consumption required to meet the reference annual heating demand and which pertains to designated heating season, without taking into account corrections for temperature controls, designated position (outdoor or indoor), primary storage tank losses, and, for heat pumps using fossil fuels, the gas heat pump auxiliary electricity consumption;

(38) “equivalent active mode hours” (HHE) means the assumed annual number of hours [h/a] a unit must provide the design load for heating (Pdesignh) in order to satisfy the reference annual heating demand, as set out in Annex II, Table 12;

(39) “active mode coefficient of performance” (SCOPon) means the average coefficient of performance of the unit in active mode for the designated heating season, constructed from the part load, electric back up heating capacity (where required) and bin-specific coefficients of performance (COPbin(Tj) and weighted by the bin hours the bin condition occurs;

(40) “electric back-up heater capacity” (elbu(Tj)) is the heating capacity [kW] of a real or assumed electric back-up heater with COP of 1 that supplements the declared capacity for heating (Pdh(Tj)) in order to meet the part load for heating (Ph(Tj)) in case Pdh(Tj) is less than Ph(Tj), for the outdoor temperature (Tj);

(41) “bin-specific coefficient of performance” (COPbin(Tj)) means the coefficient of performance specific for every bin j with outdoor temperature Tj in a season, derived from the part load, declared capacity and declared coefficient of performance (COPd(Tj)) for specified bins (j) and calculated for other bins through inter/extrapolation, when necessary corrected by the degradation coefficient;

(42) “declared capacity” [kW] is the capacity of the vapour compression cycle of the unit for heating (Pdh(Tj)), pertaining to an outdoor temperature Tj, as declared by the manufacturer;

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

(44) “design load” means the declared heating load (Pdesignh) [kW] at the reference design temperature, where Pdesignh is equal to the part load at Tj equal to Tdesignh;

(45) “declared coefficient of performance” (COPd(Tj)) means the coefficient of performance at a limited number of specified bins (j) with outdoor temperature (Tj), as declared by the manufacturer;

(46) ”bivalent temperature” (Tbiv) means the outdoor temperature (Tj) [°C] declared by the manufacturer for heating at which the declared capacity equals the part load and below which the declared capacity must be supplemented with electric back up heater capacity in order to meet the part load for heating;

(47) “operation limit temperature” (Tol) means the outdoor temperature [°C] declared by the manufacturer for heating, below which the heat pump will not be able to deliver any heating capacity and the declared capacity is equal to zero;

(48) “cycling interval capacity” [kW] is the (time-weighted) average of the declared capacity over the cycling test interval for heating (Pcych);

(49) “cycling interval efficiency for heating” (COPcyc) is the average coefficient of performance over the cycling test interval (compressor switching on and off), calculated as the integrated heating capacity over the interval [kWh] divided by the integrated electric power input over that same interval [kWh];

(50) “degradation coefficient” is the measure of efficiency loss due to cycling (compressor switching on/off in active mode) established for heating (Cdh) or chosen as default value 0,25;

(51) “active mode” means the condition corresponding to the hours with a heating load of the building and activated heating function; this condition may involve on/off-cycling of the unit in order to reach or maintain a required indoor air temperature;

(52) “thermostat-off mode” means the condition corresponding to the hours with no heating load and activated heating function, that is the unit is not operational; this condition is related to outdoor temperatures and not to indoor loads; cycling on / off in active mode is not considered as thermostat off;

(53) “crankcase heater operation” means the condition in which the a heating device is activated to avoid the refrigerant migrating to the compressor in order to limit the refrigerant concentration in oil at compressor start;

(54) “thermostat-off mode power consumption” (PTO) means the power consumption of the unit [kW] while in thermostat-off mode;

(55) “Crankcase heater mode power consumption” (PCK) means the power consumption of the unit [kW] while in crankcase heater operation mode;

(56) “thermostat-off mode operating hours” (HTO) means the annual number of hours [h/a] the unit is considered to be in thermostat-off mode, the value of which depends on the designated season and function;

(57) “off-mode operating hours” (HOFF) means the annual number of hours [h/a] the unit is considered to be in off-mode, the value of which depends on the designated season and function;

(58) “crankcase heater mode operating hours” (HCK) means the annual number of hours [h/a] the unit is considered to be in crankcase heater operation mode, the value of which depends on the designated season and function;

(59) “rated power input for heating” (PCOP) means the electric power input [kW] of a unit when providing heating at standard rating conditions;

(60) “capacity ratio” means the ratio of the total stated heating capacity of all operating indoor units to the heating capacity of the outdoor unit at the rating conditions

(61) “low temperature heat pump” means an air-to-water heat pump that is specifically designed for low temperature application, and that cannot deliver heating water with

an outlet temperature of 52°C at inlet dry (wet) bulb temperature of -7°C (-8°C) under the reference design conditions for average climate specified in …;

(62) "low temperature application" means an application where the heat pump delivers its rated capacity at an indoor heat exchanger outlet temperature of 35°C;

(63) "medium temperature application" means an application where the heat pump delivers its rated capacity at an indoor heat exchanger outlet temperature of 55°C;

(64) "Global warming potential" (GWP) means the measure of how much 1 kg of the refrigerant applied in the vapour compression cycle of a heat pump is estimated to contribute to global warming, expressed in kg CO_2 equivalents over a 100 year time horizon;

(65) "gas heat pump auxiliary electric power consumption" (hpaux) means the electric power consumption [kW] in active mode of heat pumps using gaseous fuels;

Definitions related to sanitary water heating in combination boilers:

(66) "combination boiler" means a boiler that is designed to provide also hot sanitary water to desired temperature levels, quantities, flow rates and intervals;

(67) "water heating energy efficiency" means the ratio between the useful energy for sanitary water heating provided by a combination boiler, and the energy required for its generation;

(68) "load profile" means a certain sequence of water draw-offs, as specified in Annex II, Table 13;

(69) "water draw-off" means a certain combination of useful water flow rate, useful water temperature, useful water energy content and peak temperature, as specified in Annex II, Table 13;

(70) "useful water flow rate" (f) means the flow rate in litres per minute for which hot water is contributing to the reference heat, as specified in Annex II, Table 13;

(71) "useful water temperature" (Tm) means the water temperature for which hot water is contributing to the reference heat, as specified in Annex II, Table 13;

(72) "useful energy content" (Qtap) means the energy content of water provided at temperature equal to, or above, the useful temperature, and at flow rates equal to, or above, the useful water flow rate, as specified in Annex II, Table 13;

(73) "energy content of hot water" means the product of the specific heat capacity of water, the average temperature difference between the cold water input and hot water output, and the total mass of the hot water delivered;

(74) "peak temperature" (Tp) means the minimum water temperature in degrees Celsius to be achieved during water draw-off, as specified in Annex II, Table 13;

(75) "reference energy" (Qref) means the sum of the energy content of water draw-offs in a specific load profile, as specified in Annex II, Table 13;

(76) "maximum load profile" means the load profile with the largest reference energy Qref defined in Table 13 of Annex II which a water heater is capable to provide, while fulfilling the minimum temperature and flow rate conditions of that load profile;

(77) "water heating electricity consumption" (Qelec) means the consumption of electricity during 24 consecutive hours under a particular load profile, expressed in kWh;

(78) "water heating fuel consumption" (Qfuel) means the consumption of liquid or gaseous fossil fuels during 24 consecutive hours under a particular load profile in terms of GCV.

2. Ecodesign requirements

(1) Ecodesign requirements applicable from [date to be inserted: one year after this Regulation has come into force]

(a) Seasonal space heating energy efficiency

The requirements for the seasonal space heating energy efficiency are set out in Table 1.

Table 1:

Fossil fuel boilers with 4,00 kW ≤ rated input ≤ 70 kW, and cogeneration boilers
The seasonal space heating energy efficiency shall not fall below 67,0%
Fossil fuel boilers with 70,00 kW < rated input ≤ 400,00 kW
The useful efficiencies at 100% and at 30% of the rated input shall not fall below 85,0%.
Heat pumps with the exception of low temperature heat pumps
Heat pumps with GWP above 150: The seasonal space heating energy efficiency shall not fall below 67,0%
Heat pumps with GWP not exceeding 150: The seasonal space heating energy efficiency shall not fall below 57,0%
Low temperature heat pumps
Heat pumps with GWP above 150: The seasonal space heating energy efficiency shall not fall below 92,0
Heat pumps with GWP not exceeding 150: the seasonal space heating energy efficiency shall not fall below 78,0

(b) Water heating energy efficiency of combination boilers

The water heating energy efficiency of combination boilers shall not fall below the values set out in Table 2.

Table 2: *[NB: to be adapted to final water heating regulation]*

Load profile	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
Energy efficiency	29%	32%	32%	39%	46%	50%	60%	64%	64%

(c) Sound power level of heat pumps

The sound power level of heat pumps shall not exceed the values set out in table 3.

Table 3:

Rated capacity ≤ 6 kW		6 kW < Rated capacity	
Indoor sound power level in dB(A)	Outdoor sound power level in dB(A)	Indoor sound power level in dB(A)	Outdoor sound power level in dB(A)
60	65	65	70

(2) Ecodesign requirements applicable from [date to be inserted: three years after this Regulation has come into force]

(a) Seasonal space heating energy efficiency

The requirements for the seasonal space heating energy efficiency and useful efficiencies are set out in Table 4.

Table 4:

Fossil fuel boilers with 4,00 kW ≤ rated input ≤ 15,00 kW
The seasonal space heating energy efficiency shall not fall below 75,0%
Fossil fuel boilers with 15,00 kW < rated input ≤ 70,00 kW, and cogeneration boilers
The seasonal space heating energy efficiency shall not fall below 86,0%
Fossil fuel boilers with 70,00 kW < rated input ≤ 400,00 kW
The useful efficiency at 100% of the rated input shall not fall below 88,0%, and the useful efficiency at 30% of the rated input shall not fall below 96,0%.
Heat pumps with the exception of low temperature heat pumps
Heat pumps with GWP above 150: The seasonal space heating energy efficiency shall not fall below 86,0
Heat pumps with GWP not exceeding 150: The seasonal space heating energy efficiency shall not fall below 73,0
Low temperature heat pumps
Heat pumps with GWP above 150: The seasonal space heating energy efficiency shall not fall below 111,0
Heat pumps with GWP not exceeding 150: The seasonal space heating energy efficiency shall not fall below 94,0

(b) Water heating energy efficiency of combination boilers

The requirements for the water heating energy efficiency of combination boilers are set out in Table 5.

Table 5: *[NB: possibly to be adapted to final water heating regulation]*

Load profile	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
Energy efficiency	32%	35%	35%	45%	56%	62%	72%	80%	86%

(3) Ecodesign requirements applicable from [date to be inserted: five years after this Regulation has come into force]

The following requirements for emissions of nitrogen oxides apply:

(i) fossil fuel boilers using gaseous fossil fuels: emissions of nitrogen oxides shall not exceed 70 mg/kWh;

(ii) fossil fuel boilers using liquid fossil fuels: emissions of nitrogen oxides shall not exceed 120 mg/kWh;

(iii) cogeneration boilers using gaseous fossil fuels: emissions of nitrogen oxides shall not exceed 120 mg/kWh;

(iv) cogeneration boilers using liquid fossil fuels: emissions of nitrogen oxides shall not exceed 200 mg/kWh.

3. Product information requirements

a) From [date to be inserted: one year after entry into force of this regulation], the following product information requirement apply:

i) the information set out in points (b) and (c), measured and calculated in accordance with Annex II, shall be visibly displayed in the technical documentation of the product, the booklet of instructions and free access websites of manufacturers, their authorised representatives, or importers;

ii) the rated output and the seasonal space heating energy efficiency shall be durably marked on the boiler.

b) Information requirements for fossil fuel boilers and for cogeneration boilers

(i) The information requirements for fossil fuel boilers and for cogeneration boilers are set out in table 6.

(ii) The manufacturer shall provide laboratories performing market surveillance checks, upon request, the necessary information on the setting of the unit as applied for the establishment of declared useful output, declared useful efficiency and, where applicable, electric efficiency, and provide contact information for obtaining such information.

Table 6:

Information to identify the model(s) to which the information relates to:							
Indication if boiler is a condensing/low-temperature/standard fossil fuel boiler							
Indication if boiler is cogeneration boiler: yes/no							
Indicate if boiler is a combination boiler: yes/no							
Note: the number of digits in boxes "value" indicates the required precision of reporting							
Item	**Symbol**	**Value**	**Unit**	**Item**	**symbol**	**value**	**unit**
Nominal input	Pmax	x,x	kW	**Seasonal efficiency**	etas	x,x	
Declared useful output				Declared useful efficiency			
At rated input and high temperature regime[2]	Pd4	x,x	kW	Heat input=rated input	Eta4	x,x	-
At 0,30 * rated input and low temperature regime[3]	Pd1	x,x	kW	Heat input=0,30*rated input	Eta1	x,x	-
Auxiliary electricity consumption				Capacity control: indicate one of three options by stating the turndown ratio td			
Elmin		x,x	kW	Fixed	td	x,xx	
Elmax		x,x	kW	Variable	td	x,xx	
Fossb		x,x	kW	Staged	td	x,xx	
Other items							
Standby heat power	$P_{standby}$	x,x	kW				
Pilot flame power	P_{ign}	x,x	kW				
Emissions of nitrogen oxides	NOx	x	mg/kWh				
Designated positioning	indoor/outdoor						
Additional information for cogeneration boilers [*NB: to be completed]*							
Declared electric efficiency							
At rated input and high temperature regime	Chp4	x,x					
Additional information for combination boilers [TBA in accordance with water heater regulation]							
Contact details for obtaining more information	Name and address of the manufacturer or of its authorised representative.						
2= High temperature regime means 60°C system-return temperature (at boiler inlet) and 80°C system-feed temperature (is at boiler outlet)							
3= Low temperature means for condensing boilers at 30°C, for low-temperature boilers at 37°C and for standard boilers at 50°C system-return temperature (at boiler inlet)							

c) Information requirements for heat pumps

(i) The information requirements for air-to-water heat pumps and for water/brine-to-water heat pumps are set out in tables 7 and 8, respectively.

(ii) The manufacturer shall provide laboratories performing market surveillance checks, upon request, the necessary information on the setting of the unit as applied for the establishment of declared capacities, SCOP values and service values and provide contact information for obtaining such information.

(iii) For heat pumps with capacity control marked 'staged', two values for the highest and lowest, noted 'hi/lo' divided by a slash (‘/’) will be declared in each box under “declared capacity”.

Table 7: Information requirements for air-to-water heat pumps***

Information to identify the model(s) to which the information relates to:							
Indication if the heat pump is a low temperature heat pump: yes/no							
Indicate if the heat pump is a combination heat pump: yes/no							
Parameters shall be declared for medium temperature application, except for low-temperature heat pumps. For low-temperature heat pumps, parameter shall be declared for low-temperature application.							
Note: the number of digits in boxes "value" indicates the required precision of reporting							
Item	**Symbol**	**value**	**Unit**	**Item**	**symbol**	**Value**	**unit**
Design load	Pdesignh	x,x	kW	**Seasonal efficiency**	etas	x,x	-
Declared capacity* for part load pertaining to outdoor temperature Tj				Declared Coefficient of performance for part load pertaining to outdoor temperature Tj			
Tj=-7ºC	Pdh	x,x	kW	Tj=-7ºC	COPd	x,x	-
Tj=2ºC	Pdh	x,x	kW	Tj=2ºC	COPd	x,x	-
Tj=7ºC	Pdh	x,x	kW	Tj=7ºC	COPd	x,x	-
Tj=12ºC	Pdh	x,x	kW	Tj=12ºC	COPd	x,x	-
Tj=bivalent temperature	Pdh	x,x	kW	Tj=bivalent temperature	COPd	x,x	-
Tj=operating limit	Pdh	x,x	kW	Tj=operating limit	COPd	x,x	-
Tj=-15 ºC (if TOL<-20 ºC)	Pdh	x,x	kW	Tj=-15ºC (if TOL<-20 ºC)	COPd	x,x	-
Bivalent temperature	Tbiv	x	ºC	Operating limit temperature	Tol	X	ºC
Cycling interval capacity	Pcych	x,x	kW	Cycling interval efficiency	COPcyc	x,x	-
Degradation co-efficient**	Cdc	x,x	-				
Electric power input in power modes other than 'active mode'							
off mode	P_{OFF}	x,x	kW				
thermostat-off mode	P_{TO}	x,x	kW				
crankcase heater mode	P_{CK}	x,x	kW				
Additional information of heat pumps using gaseous fuels							
Gas heat pump electric power	Hpaux	X,x	kW				
Capacity control (indicate one of three options)				Other items			
Fixed	Y/N			Sound power level (indoor/outdoor)	L_{WA}	x,x / x,x	dB(A)
Staged	Y/N			Global warming potential	GWP	x	kgCO2 eq.
Variable	Y/N			Rated air flow (indoor/outdoor)	-	x / x	M3/h
				Designated positioning	Indoor/outdoor		
Additional information for combination boilers [TBA in accordance with water heater regulation]							

Contact details for obtaining more information	Name and address of the manufacturer or of its authorised representative.	
*= For staged capacity units, two values divided by a slash (‘/’) will be declared in each box in the section “Declared capacity of the unit” and "declared COP" of the unit.		
**= If default Cd=0,25 is chosen then (results from) cycling tests are not required. Otherwise the cycling test value is required.		
*** For multisplit systems, data shall be provided for combinations at capacity ratio of 1.		

Table 8: Information requirements for brine/water-to-water heat pumps***

Information to identify the model(s) to which the information relates to:							
Indicate if the heat pump is a combination heat pump: yes/no Parameters shall be declared for medium temperature application Note: the number of digits in boxes "value" indicates the required precision of reporting							
Item	**Symbol**	**value**	**Unit**	**Item**	**symbol**	**Value**	**unit**
Design load	Pdesignh	x,x	kW	**Seasonal efficiency**	etas	x,x	-
Declared capacity* for average climate, indoor temperature 20°C				Declared Coefficient of performance at average climate, indoor temperature 20°C			
Part load ratio = 0,88	Pdh	x,x	kW	Part load ratio = 0,88	COPd	x,x	-
Part load ratio = 0,54	Pdh	x,x	kW	Part load ratio = 0,54	COPd	x,x	-
Part load ratio = 0,35	Pdh	x,x	kW	Part load ratio = 0,35	COPd	x,x	-
Part load ratio = 0,15	Pdh	x,x	kW	Part load ratio = 0,15	COPd	x,x	-
Cycling interval capacity	Pcych	x,x	kW	Cycling interval efficiency	COPcyc	x,x	-
Degradation co-efficient**	Cdc	x,x	-				
Electric power input in power modes other than 'active mode'							
off mode	P_{OFF}	x,x	kW				
standby mode	P_{SB}	x,x	kW				
thermostat-off mode	P_{TO}	x,x	kW				
crankcase heater mode	P_{CK}	x,x	kW				
Capacity control (indicate one of three options)				Other items			
fixed	Y/N			Sound power level (indoor/outdoor)	L_{WA}	x,x / x,x	dB(A)
staged	Y/N			Global warming potential	GWP	x	kgCO2 eq.
variable	Y/N			designated positioning	indoor/outdoor		
Additional information for combination boilers [TBA in accordance with water heater regulation]							
Contact details for obtaining more information	Name and address of the manufacturer or of its authorised representative.						
*= For staged capacity units, two values divided by a slash ('/') will be declared in each box in the section "Declared capacity of the unit" and "declared COP" of the unit.							
**= If default Cd=0,25 is chosen then (results from) cycling tests are not required. Otherwise the cycling test value is required.							
*** For multisplit systems, data shall be provided for combinations at capacity ration of 1.							

ANNEX II
Measurements and calculations

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published in the Official Journal of European Union, or other 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. They shall fulfil all of the following technical parameters.

2. For the purposes of the calculations set out in point 2 and 3, consumption of electricity shall be multiplied by a factor of 2,5 that reflects the average efficiency of generating electricity from primary energy sources.

3. Fossil fuel boilers and cogeneration boilers

(1) The seasonal space heating energy efficiency etas shall be calculated as the seasonal steady-state space heating energy efficiency, corrected by contributions accounting for turndown ratio, temperature control, auxiliary electricity consumption, standby heat loss, ignition flame energy consumption, and in addition for cogeneration boilers the seasonal electric efficiency.

(2) The annual energy consumption QH [MJ] shall be calculated the ratio of the reference heating demand and the seasonal space heating energy efficiency.

4. Heat pumps

(1) The active-mode coefficient of performance SCOPon shall be calculated on the basis of the part load, electric back-up heating capacity (where required), and bin-specific coefficient of performance (COPbin(Tj)) and weighted by the bin-hours the bin conditions occurs, using the following conditions:

- the European heating season for average climate conditions, as defined in Table 3;
- reference design conditions, as defined in Table 2;
- the effects of the degradation of the energy efficiency caused by on/off cycling (if applicable) depending on the type of control of the heating capacity;

(2) The reference annual heat demand shall be the full load Pdesignh multiplied by 1400.

(3) The reference annual heating energy consumption shall be calculated as the sum of

- the ratio of the reference annual heating demand and the active-mode coefficient of performance SCOPon, and
- the energy consumption for thermostat-off, off- and crankcase-heater-mode during the heating season, using time periods as defined in Table 12;

(4) The seasonal space heating energy efficiency etas shall be calculated as the sum of

– the seasonal coefficient of performance SCOP, divided by the primary energy factor except for heat pumps using gaseous fossil fuels, and

– a correction accounting for temperature controls, expressed as percentage, and

– for heat pumps using gaseous fossil fuels, a correction for the gas heat pump auxiliary electricity consumption, expressed as percentage.

(5) Where the information relating to a specific heat pump model, being a combination of indoor and outdoor unit(s), has been obtained by calculation on the basis of design, and/or extrapolation from other combinations, the documentation should include details of such calculations and/or extrapolations, and of tests undertaken to verify the accuracy of the calculations undertaken, including details of the mathematical model for calculating performance of such combinations, and of measurements taken to verify this model.

5. Water heating energy efficiency of combination boilers *[NB: possibly to be adapted taking into account final version of water heater regulation]*

(1) The water heating energy efficiency of a combination boiler shall be calculated as the ratio between Qref, and the energy required for its generation, taking also into account effects of hot water distribution and waste heat recovery under the following conditions:

(a) measurements shall be carried out using the load profiles set out in Table 13;

(b) measurements shall be carried out using a 24-hour measurement cycle as follows:

– 00:00 hours to 06:59 hours: no water draw-off;

– from 7:00 hours: water draw-offs according to the declared load profile;

– from end of last water draw-off until 24:00 hours: no water draw-off;

(c) the load profile applied for conformity assessment and declarations shall be the maximum load profile.

(d) For combination heat pumps the following additional conditions apply:

(i) combination heat pumps that do not use ventilation exhaust air as heat source shall be tested under the conditions set out in Table 14.

(ii) combination heat pumps which use ventilation exhaust as heat source shall be tested under the conditions set out in Table 15. Where the supplier deems appropriate outdoor air may be used as additional heat source under the conditions set out in Table 14.

Table 9: Heat pumps standard rating conditions

Heat source	Outdoor heat exchanger	Indoor heat exchanger			
	Inlet dry bulb (wet bulb) temperature in °C	**Heat pumps, except low temperature heat pumps**		**Low temperature heat pumps**	
		Inlet temperature in °C	Outlet temperature in °C	Inlet temperature in °C	Outlet temperature in °C
Outside air	7(6)	47	55	30	35
Exhaust air (from ventilation)	20(12)				
	Inlet/outlet temperature in °C				
Water	10/7				
Brine	0/-3				

Table 10: Reference design conditions for heat pumps, temperatures in 'dry bulb' air temperature ('wet bulb' indicated in brackets) in °C

Indoor heat exchanger inlet/outlet temperature	Outdoor air temperature	Bivalent temperature	Operating limit temperature
Tin	Tdesignh	Tbiv	Tol
47/55	-10 (-11)	max. 2	max. -7

Table 11: Heating season bins (j=bin index, T_j= dry bulb outdoor temperature, h_j=hours per annum per bin)

j	T_j [°C]	h_j [h/annum]
1 to 8	-30 to -23	0
9	-22	0
10	-21	0
11	-20	0
12	-19	0
13	-18	0
14	-17	0
15	-16	0
16	-15	0
17	-14	0
18	-13	0
19	-12	0
20	-11	0
21	-10	1
22	-9	25
23	-8	23
24	-7	24
25	-6	27
26	-5	68
27	-4	91
28	-3	89
29	-2	165
30	-1	173
31	0	240
32	1	280
33	2	320
34	3	357
35	4	356
36	5	303
37	6	330
38	7	326
39	8	348
40	9	335
41	10	315
42	11	215
43	12	169
44	13	151
45	14	105
46	15	74
Total hours		4910

Table 12: Operational hours for heat pumps per functional mode to be used for calculation of electricity or gas consumption

Equivalent active mode hours	Thermostat-off mode	Off mode	Crankcase heater mode
1400	179	3672	3851

Table 13: Definition of water heating load profiles:

	XXS			XS			S			
	Qtap	f	Tm	Qtap	F	Tm	Qtap	f	Tm	Tp
H	kWh	l/mn	ºC	kWh	l/mn	ºC	kWh	l/mn	ºC	ºC
07.00	**0,105**	2	25				**0,105**	**3**	**25**	
07.05										
07.15										
07.26										
07.30	**0,105**	2	25	**0,525**	**4**	**35**	**0,105**	**3**	**25**	
07.45										
08.01										
08.05										
08.15										
08.25										
08.30	**0,105**	2	25				**0,105**	3	25	
08.45										
09.00										
09.30	**0,105**	2	25				**0,105**	3	25	
10.00										
10.30										
11.00										
11.30	**0,105**	2	25				**0,105**	3	25	
11.45	**0,105**	2	25				**0,105**	3	25	
12.00	**0,105**	2	25							
12.30	**0,105**	2	25							
12.45	**0,105**	2	25	**0,525**	4	35	**0,315**	4	10	55
14.30										
15.00										
15.30										
16.00										
16.30										
17.00										
18.00	**0,105**	2	25				**0,105**	3	25	
18.15	**0,105**	2	25				**0,105**	3	40	
18.30	**0,105**	2	25							
19.00	**0,105**	2	25							
19.30	**0,105**	2	25							
20.00	**0,105**	2	25							
20.30				**1,05**	4	35	**0,42**	4	10	55
20.45	**0,105**	2	25							
20.46										
21.00	**0,105**	2	25							
21.15	**0,105**	2	25							
21.30							**0,525**	5	45	
21.30	**0,105**	2	25							
21.45	**0,105**	2	25							
Qref	**2,1**			**2,1**			**2,1**			

	M				L				XL			
	Qtap	F	Tm	Tp	Qtap	f	Tm	Tp	Qtap	f	Tm	Tp
h	kWh	l/mn	ºC	ºC	kWh	l/mn	ºC	ºC	kWh	l/mn	ºC	ºC
07.00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
07.05	**1,4**	6	40		**1,4**	6	40					
07.15									**1,82**	6	40	
07.26									**0,105**	3	25	
07.30	**0,105**	3	25		**0,105**	3	25					
07.45					**0,105**	3	25		**4,42**	10	10	40
08.01	**0,105**	3	25						**0,105**	3	25	
08.05					**3,605**	10	10	40				
08.15	**0,105**	3	25						**0,105**	3	25	
08.25					**0,105**	3	25					
08.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
08.45	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
09.00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
09.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
10.00									**0,105**	3	25	
10.30	**0,105**	3	10	40	**0,105**	3	10	40	**0,105**	3	10	40
11.00									**0,105**	3	25	
11.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
11.45	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
12.00												
12.30												
12.45	**0,315**	4	10	55	**0,315**	4	10	55	**0,735**	4	10	55
14.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
15.00									**0,105**	3	25	
15.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
16.00									**0,105**	3	25	
16.30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
17.00									**0,105**	3	25	
18.00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
18.15	**0,105**	3	40		**0,105**	3	40		**0,105**	3	40	
18.30	**0,105**	3	40		**0,105**	3	40		**0,105**	3	40	
19.00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25	
19.30												
20.00												
20.30	**0,735**	4	10	55	**0,735**	4	10	55	**0,735**	4	10	55
20.45												
20.46									**4,42**	10	10	40
21.00					**3,605**	10	10	40				
21.15	**0,105**	3	25						**0,105**	3	25	
21.30	**1,4**	6	40		**0,105**	3	25		**4,42**	10	10	40
21.30												
21.45												
Qref	**5,845**				**11,655**				**19,07**			

	XXL				3XL				4XL			
	Qtap	f	Tm	Tp	Qtap	f	Tm	Tp	Qtap	f	Tm	Tp
h	kWh	l/mn	ºC	ºC	kWh	l/mn	ºC	ºC	kWh	l/mn	ºC	ºC
07.00	**0,105**	3	25		**11,2**	48	40		**22,4**	96	40	
07.05												
07.15	**1,82**	6	40									
07.26	**0,105**	3	25									
07.30												
07.45	**6,24**	16	10	40								
08.01	**0,105**	3	25		**5,04**	24	25		**10,08**	48	25	
08.05												
08.15	**0,105**	3	25									
08.25												
08.30	**0,105**	3	25									
08.45	**0,105**	3	25									
09.00	**0,105**	3	25		**1,68**	24	25		**3,36**	48	25	
09.30	**0,105**	3	25									
10.00	**0,105**	3	25									
10.30	**0,105**	3	10	40	**0,84**	24	10	40	**1,68**	48	10	40
11.00	**0,105**	3	25									
11.30	**0,105**	3	25									
11.45	**0,105**	3	25		**1,68**	24	25		**3,36**	48	25	
12.00												
12.30												
12.45	**0,735**	4	10	55	**2,52**	32	10	55	**5,04**	64	10	55
14.30	**0,105**	3	25									
15.00	**0,105**	3	25									
15.30	**0,105**	3	25		**2,52**	24	25		**5,04**	48	25	
16.00	**0,105**	3	25									
16.30	**0,105**	3	25									
17.00	**0,105**	3	25									
18.00	**0,105**	3	25									
18.15	**0,105**	3	40									
18.30	**0,105**	3	40		**3,36**	24	25		**6,72**	48	25	
19.00	**0,105**	3	25									
19.30												
20.00												
20.30	**0,735**	4	10	55	**5,88**	32	10	55	**11,76**	64	10	55
20.45												
20.46	**6,24**	16	10	40								
21.00												
21.15	**0,105**	3	25									
21.30	**6,24**	16	10	40	**12,04**	48	40		**24,08**	96	40	
21.30												
21.45												
Qref	**24,53**				**46,76**				**93,52**			

Table 14: Ambient heat source temperatures for heat pumps and combination heat pumps (air source: dry bulb temperature) and humidity by heat transfer medium

Heat source	outdoor air	Brine	Water
Temperature	10,0°C	2,5°C	11,5°C
Humidity	5,5 g/m^3	not applicable	

Table 15: Maximum ventilation exhaust air available in m^3/h[5]

Load profile	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
Ventilation waste heat	109	136	128	159	190	870	1021	2943	8830

[5] at temperature of 20°C and humidity of 5,5 g H2O/m^3

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. The boiler model shall be considered to comply with the requirements set out in Annex I, as applicable, to this Regulation, if its seasonal space heating energy efficiency etas is not less than the target value minus 8%, established in accordance with Annex II.

   In addition, the boiler model shall be considered to comply with the requirements set out in this Regulation, as applicable, if its maximum sound power level does not exceed the target value by more than 2 dB(A).

   In addition, the combination boiler model shall be considered to comply with the requirements set out in Annex I, as applicable, to this Regulation, if its water heating energy efficiency etawh does not fall below the target value minus 8%, established in accordance with Annex II.

   In addition, the boiler model shall be considered to comply with the requirements set out in this Regulation, as applicable, if the emissions of nitrogen oxides do not exceed the target value by more than 10%.

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

4. The boiler model shall be considered to comply with the requirements set out in Annex I, as applicable, to this Regulation, if its seasonal space heating energy efficiency etas is not less than the target value minus 5%, established in accordance with Annex II.

   In addition, the boiler model shall be considered to comply with the requirements set out in this Regulation, as applicable, if its maximum sound power level does not exceed the target value by more than 1,5 dB(A).

   In addition, the combination boiler model shall be considered to comply with the requirements set out in Annex I, as applicable, to this Regulation, if its water heating energy efficiency etawh does not fall below the target value minus 5%, established in accordance with Annex II.

   In addition, the boiler model shall be considered to comply with the requirements set out in this Regulation, as applicable, if the emissions of nitrogen oxides do not exceed the target value by more than 6%.

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

In addition to the procedure set out in Annex II, Member State authorities shall use reliable, accurate and reproducible measurement and calculation procedures, which take into account the generally recognised state-of-the-art measurement methods, 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.

ANNEX IV
Indicative benchmarks for boilers

At the time of entry into force of the Regulation, the best available technology on the market for boiler in terms of their seasonal space heating energy efficiency and emissions of nitrogen oxides is identified as follows:

(1) seasonal space heating energy efficiency: 1,50;

(2) water heating energy efficiency:

Load profile	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
Energy efficiency	53	61	72	80	98	112	124	140	150

(3) emissions of nitrogen oxides:

(a) fossil fuel boilers, with the exception of cogeneration boilers: 35 mg/kWh GCV;

(b) cogeneration boilers: 70 mg/kWh GCV.