Commission communication in the framework of the implementation of Commission Regulation (EU) No 813/2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters and of Commission Delegated Regulation (EU) No 811/2013 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to the energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device

(2014/C 207/02)

1. Publication of titles and references of transitional methods of measurement and calculation (*) for the implementation of Regulation (EU) No 813/2013, and in particular Annexes III and IV thereof, and for the implementation of Regulation (EU) No 811/2013, and in particular Annexes VII and VIII thereof.

2. Parameters *in italics* are determined in Regulation (EU) No 813/2013 and in Regulation (EU) No 811/2013.

3. References

Parameter	Organisation	Reference/Title	Notes
Boiler space heaters and boiler combination heaters using gaseous fuel			
η, P, design types, P_{stby}, P_{ign}	CEN	EN 15502-1:2012 Gas-fired heating boilers - Part 1: General requirements and tests;	EN 15502-1:2012 is set to replace EN 297, EN 483, EN 677, EN 656, EN 13836, EN 15420.
Useful heat output at rated heat output P_4 and useful efficiency at rated heat output η_4 at 80/60 °C	CEN	§ 3.1.6 Nominal output (definition, symbol P_n); § 3.1.5.7 Useful efficiency (definition, symbol η_u); § 9.2.2 (test);	All efficiency values are expressed in gross calorific value *GCV*.
Design types, definitions	CEN	§ 3.1.10. Design types of boilers with definitions of 'combination-boiler'; 'low temperature boiler' and 'condensing boiler'. § 8.15. Formation of condensate (requirements and test);	

(*) It is intended that these transitional methods will ultimately be replaced by harmonised standard(s). When available, reference(s) to the harmonised standard(s) will be published in the *Official Journal of the European Union* in accordance with Articles 9 and 10 of Directive 2009/125/EC.

Parameter	Organisation	Reference/Title	Notes
Useful heat output at 30 % of rated heat output P_1 and useful efficiency at 30 % of rated heat output η_1 at partial heat input and low temperature regime	CEN	§ 3.1.5.7. Useful efficiency (definition, symbol η_u); § 9.3.2. Useful efficiency at part load, Tests;	1) tests are carried out at 30 % of nominal heat input, not at minimum steady state heat input; 2) test return temperatures are 30 °C (condensing boiler), 37 °C (low temperature boiler) or 50 °C (standard boiler). According to prEN 15502-1:2013, — η_4 is the useful efficiency at nominal heat input or for range rated boilers at the arithmetic mean of the maximum and minimum useful heat input. — η_1 is the useful efficiency at 30 % of the nominal heat input or for range rated boilers at 30 % of the arithmetic mean of the maximum and minimum useful heat input.
Standby heat loss P_{stby}	CEN	§ 9.3.2.3.1.3 Standby losses (test);	
Ignition burner power consumption P_{ign}	CEN	§ 9.3.2 Table 6 and 7: Q3 = permanent ignition burner.	Applies to ignition burners operating at main burner-off mode.
Emission of nitrogen oxides NO_X	CEN	EN 15502-1:2012. § 8.13. NO_X (classification, test- and calculation methods)	NO_X emission values are expressed in gross calorific value *GCV*.

Boiler space heaters and boiler combination heaters using liquid fuel

General test conditions		EN 304:1992; A1:1998; A2:2003; Heating boilers - Test code for heating boilers for atomizing oil burners; Section 5 ('Tests').	
Standby heat loss P_{stby}	CEN	EN 304 as above; § 5.7 Determination of standby loss.	P_{stby} =q × (P4/η4), with 'q' defined in EN 304. The test described in EN304 shall be done with Δ30K

Parameter	Organisation	Reference/Title	Notes
Seasonal space heating energy efficiency in active mode η_{son} with test results for useful output P	CEN	For condensing boilers: EN 15034:2006. Heating boilers - Condensing heating boilers for fuel oil; § 5.6 Useful efficiency.	EN 15034:2006 refers to condensing oil boilers.
		For standard and low temperature boilers: EN 304:1992; A1:1998; A2:2003; Heating boilers - Test code for heating boilers for atomizing oil burners; Section 5 ('Tests').	For boilers with forced draught burner similar sections apply in EN 303-1, EN 303-2 and EN 303-4. For atmospheric, not fan-assisted burners EN 1:1998 applies. Test conditions (power and temperature settings) for η_1 and η_4 are the same as for gas-fired boilers described above.
Emission of nitrogen oxides NO_X	CEN	EN 267:2009+A1:2011 Automatic forced draught burners for liquid fuels; § 4.8.5. Emission limit values for NO_X and CO; § 5. Testing. ANNEX B. Emission measurements and corrections.	NO_X emission values are expressed in *GCV*. A reference nitrogen content in the fuel of 140mg/kg shall be applied. Where another nitrogen content is measured, with the exemption of Kerosene oil only, the following correction equation shall apply: $$NO_{X(EN267)}\left[\frac{mg}{kWH}\right] = NO_{Xref}\left[\frac{mg}{kWH}\right] - (N_{meas} - N_{ref}) \times 0,2$$ $NO_{X(EN\ 267)}$ is the value of NO_X corrected to the reference conditions of nitrogen of the fuel oil chosen at 140 mg/kg; NO_{Xref} is the measured value of NO_X according to B.2; N_{meas} is the value of the nitrogen content of the fuel oil measured in mg/kg; N_{ref} = 140 mg/kg. For rating that the requirements of the standard are fulfilled the value of $NO_{X(EN\ 267)}$ shall apply.

Electric boiler space heaters and electric boiler combination heaters

Seasonal space heating energy efficiency η_s of electric boiler space heaters and electric boiler combination heaters	European Commission	Point 4 of this Communication	Additional elements for measurements and calculations related to the seasonal space heating energy efficiency of boiler space heaters, boiler combination heaters and cogeneration space heaters.

Parameter	Organisation	Reference/Title	Notes
Cogeneration space heaters			
Useful heat output at rated heat output of cogeneration space heater with supplementary heater disabled $P_{CHP100+Sup0}$, useful heat output at rated heat output of cogeneration space heater with supplementary heater enabled $P_{CHP100+Sup100,}$ Useful efficiency at rated heat output of cogeneration space heater with supplementary heater disabled $\eta_{CHP100+Sup0}$, Useful efficiency at rated heat output of cogeneration space heater with supplementary heater enabled $\eta_{CHP100+Sup100,}$ Electrical efficiency at rated heat output of cogeneration space heater with supplementary heater disabled $\eta_{el,CHP100+Sup0}$, Electrical efficiency at rated heat output of cogeneration space heater with supplementary heater enabled $\eta_{el,CHP100+Sup100}$	CEN	FprEN 50465:2013 Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW. Heat outputs: 6.3 Heat input and heat and electrical output; 7.3.1 and 7.6.1; Efficiencies: 7.6.1 Efficiency (*Hi*) and 7.6.2.1. Efficiency – Seasonal space heating energy efficiency – conversion to gross calorific efficiency.	$P_{CHP100+Sup0}$ corresponds to $Q_{CHP\_100+Sup\_0} \times \eta_{th,CHP\_100+Sup\_0}$ in FprEN 50465:2013 $P_{CHP100+Sup100}$ corresponds to $Q_{CHP\_100+Sup\_100} \times \eta_{th,CHP\_100+Sup\_100}$ in FprEN 50465:2013 $\eta_{CHP100+Sup0}$ corresponds to $\eta_{Hs,th,CHP\_100+Sup\_0}$ in FprEN 50465:2013 $\eta_{CHP100+Sup100}$ corresponds to $\eta_{Hs,th,CHP\_100+Sup\_100}$ in FprEN 50465:2013 $\eta_{el,CHP100+Sup0}$ corresponds to $\eta_{Hs,el,CHP\_100+Sup\_0}$ in FprEN 50465:2013 $\eta_{el,CHP100+Sup100}$ corresponds to $\eta_{Hs,el,CHP\_100+Sup\_100}$ in FprEN 50465:2013 FprEN 50465 is the reference only for the calculation of $P_{CHP100+Sup0}$, $P_{CHP100+Sup100}$, $\eta_{CHP100+Sup0}$, $\eta_{CHP100+Sup100}$, $\eta_{el,CHP100+Sup0}$, $\eta_{el,CHP100+Sup100}$. For the calculation of η_s and η_{son} of cogeneration space heaters the methodology described in this Communication shall be used.
P_{stby}, P_{ign}	CEN	FprEN 50465:2013 Gas appliances – Combined Heat and Power appliance of nominal heat input inferior or equal to 70 kW.	
Standby heat loss P_{stby}	CEN	§ 7.6.4 Stand-by losses P_{stby} ;	

Parameter	Organisation	Reference/Title	Notes
Ignition burner power consumption P_{ign}	CEN	§ 7.6.5 Permanent ignition burner heat input Q_{pilot}	P_{ign} corresponds to Q_{pilot} in FprEN 50465:2013
Emission of nitrogen oxides NO_X	CEN	FprEN 50465:2013 § 7.8.2 NO_X (Other pollutants)	NO_X emission values shall be measured in mg/kWh fuel input and expressed in gross calorific value GCV. The electrical energy generated during the test, shall not be considered in the calculation of NO_X emission.

Boiler space heaters, boiler combination heaters and cogeneration space heaters

Auxiliary electricity consumption at full load *elmax*, at part load *elmin* and in standby mode P_{SB}	CEN	EN 15456:2008: Heating boilers - Electrical power consumption for heat. EN 15502:2012 for gas boilers. FprEN 50465:2013 For cogeneration space heaters § 7.6.3 Electric auxiliary energy consumption for ErP	Measurement without circulator (pump). *elmax* corresponds to P_{elmax} in FprEN 50465:2013 *elmin* corresponds to P_{elmin} in FprEN 50465:2013 In the determination of *elmax*, *elmin* and P_{SB}, the electric auxiliary energy consumed by the primary heat generator shall be included.
Sound power level L_{WA}	CEN	For sound power level, indoor measured: EN 15036 - 1: Heating boilers - Test regulations for airborne noise emissions from heat generators - Part 1: Airborne noise emissions from heat generators.	For the acoustics, EN 15036 - 1 is referring to ISO 3743-1 Acoustics - Determination of sound power levels of noise sources - Engineering methods for small, movable sources in reverberant fields - Part 1: Comparison method for hard-walled test rooms, as well as to other allowable methods, each with their own accuracies.
Seasonal space heating energy efficiency η_s of boiler space heaters, boiler combination heaters and cogeneration space heaters	European Commission	Point 4 of this Communication.	Additional elements for measurements and calculations related to the seasonal space heating energy efficiency of boiler space heaters, boiler combination heaters and cogeneration space heaters.

Parameter	Organisation	Reference/Title	Notes
Heat pump space heaters and heat pump combination heaters			
Testing methods, vapour compression electrically driven heat pumps	CEN	EN 14825:2013 Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance; Section 8: Test methods for testing capacities, EERbin(Tj) and COPbin(Tj) values during active mode at part load conditions Section 9: Test methods for electric power consumption during thermostat off mode, standby mode and crankcase heater mode	
Testing methods, vapor compression liquid or gaseous fuel engine driven heat pumps	CEN	EN 14825:2013 Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance; Section 8: Test methods for testing capacities EERbin(Tj) and COPbin(Tj) values during active mode at part load conditions; Section 9: Test methods for electric power consumption during thermostat off mode, standby mode and crankcase heater mode.	Until publication of a new European Standard. A working document is in progress within the CEN/TC299 WG3 experts group

Parameter	Organisation	Reference/Title	Notes
Testing methods, liquid or gaseous fuel sorption heat pumps	CEN	prEN 12309-4:2013 Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70kW – Test methods	
Vapor compression electrically or liquid or gaseous fuel engine driven heat pumps. Test conditions for air-to-water, brine-to-water and water-to-water units for medium temperature application for average, warmer and colder climate conditions for calculation of seasonal coefficient of performance *SCOP* for electrically driven heat pumps and seasonal primary energy ratio *SPER* for liquid or gaseous fuel engine driven heat pumps.	CEN	EN 14825:2013 Section 5.4.4, Tables 18,19 and 20 (air-to-water); Section 5.5.4, Tables 30,31 and 32 (brine-to-water, water-to-water); Where the outlet temperatures set out in column 'variable outlet' are to be applied for heat pumps that control the outlet (flow) water temperature according to the heat demand. For heat pumps that do not control the outlet (flow) water temperature according to the heat demand but have a fixed outlet temperature, outlet temperature should be set according to the 'fixed outlet'.	For liquid or gaseous fuel engine driven heat pumps EN 14825:2013 applies until publication of a new European Standard. Medium temperature corresponds to high temperature in EN 14825:2013. Tests are done according to EN 14825:2013, section 8: For fixed capacity units, tests are applied as indicated in EN 14825:2013, section 8.4. Either the outlet temperatures during the tests are the ones to obtain the average outlet temperatures corresponding to the declaration points in EN 14825:2013 OR this data should be obtained by linear interpolation / extrapolation from the test points in EN 14511-2:2013, complemented with test at other outlet temperatures when necessary. For variable capacity units, EN 14825:2013 section 8.5.2 are applied. Either the conditions during the tests are the same as for the declaration points specified in that standard OR tests can be performed at other outlet temperatures and part load conditions and the results linearly interpolated, extrapolated, to determine the data for the declaration points in EN 14825:2013. Apart from test conditions A to F, 'in case the TOL is below – 20 °C, an additional calculation point has to be taken from the capacity and COP at – 15 °C conditions' (cit. EN 14825:2013 § 7.4). For the purpose of this communication, this point will be called 'G'.

Parameter	Organisation	Reference/Title	Notes
Liquid or gaseous fuel sorption heat pumps Test conditions for air-to water, brine-to-water and water-to-water units for medium temperature application for average, warmer and colder climate conditions for calculation of seasonal primary energy ratio SPER	CEN	prEN 12309-3:2012 Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70kW – Part 3: Test conditions. Section 4.2 Tables 5 and 6.	Medium temperature corresponds to high temperature in prEN 12309-3:2012
Vapor compression electrically ord liquid or gaseous fuel engine driven heat pumps. Test conditions for air-to-water, brine-to-water and water-to-water units under low temperature application for average, warmer and colder climate conditions for calculation of seasonal coefficient of performance *SCOP* for electrically driven heat pumps and seasonal primary energy ratio *SPER* for liquid or gaseous fuel engine driven heat pumps.	CEN	EN 14825:2013; Section 5.4.2, Tables 11,12 and 13 (air-to-water); Section 5.5.2, Tables 24,25 and 26 (brine-to-water, water-to-water); Where the outlet temperatures set out in column 'variable outlet' are to be applied for heat pumps that control the outlet (flow) water temperature according to the heat demand. For heat pumps that do not control the outlet (flow) water temperature according to the heat demand but have a fixed outlet temperature, outlet temperature should be set according to the 'fixed outlet'.	Same notes as for average climate and medium temperature application, except 'Medium temperature corresponds to high temperature in EN 14825:2013'.
Liquid or gaseous fuel sorption heat pumps Test conditions for air-to water, brine-to-water and water-to-water units for low temperature application for average, warmer and colder climate conditions for calculation of seasonal primary energy ratio SPER	CEN	prEN 12309-3:2012 Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70kW – Part 3: Test conditions. Section 4.2 Tables 5 and 6.	

Parameter	Organisation	Reference/Title	Notes
Vapor compression electrically driven heat pump Calculation of seasonal coefficient of performance SCOP	CEN	EN 14825:2013 Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling – Testing and rating at part load conditions and calculation of seasonal performance; Section 7: Calculation methods for reference SCOP, reference $SCOP_{on}$ and reference $SCOP_{net}$.	
Vapor compression liquid or gaseous fuel engine driven heat pump. Calculation of seasonal primary energy ratio *SPER*	CEN	New European Standards under development	The SPER formulae will be established in analogy to the SCOP formulae for vapor compression electrically driven heat pumps: *COP*, $SCOP_{net}$, $SCOP_{on}$ and *SCOP* will be replaced by GUE_{GCV}, *PER*, $SPER_{net}$, $SPER_{on}$ and *SPER*.
Liquid or gaseous fuel sorption heat pumps Calculation of seasonal primary energy ratio *SPER*	CEN	prEN12309-6:2012 Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70kW – Part 6: Calculation of seasonal performances	*SPER* corresponds to $SPER_h$ in prEN12309-6:2012
Seasonal space heating energy efficiency η_s of heat pump space heaters and heat pump combination heaters	European Commission	Point 5 of this Communication	Additional elements for calculations related to the seasonal space heating energy efficiency of heat pump space heaters and heat pump combination heaters.

Parameter	Organisation	Reference/Title	Notes
Vapour compression liquid or gaseous fuel engine driven heat pumps, Emission of nitrogen oxides NO_X	CEN	New European Standard under development within the CEN/TC299 WG3 experts group	For variable capacity unit only, NO_X emissions shall be measured at standard rating conditions as defined in table 3 Annex III of Commission Regulation 813/2013, using 'Engine rpm equivalent ($Erpm_{equivalent}$)'. $Erpm_{equivalen}$ shall be calculated as follow: $Erpm_{equivalent} = X_1 \times F_{p1} + X_2 \times F_{p2} + X_3 \times F_{p3} + X_4 \times F_{p4}$ X_I = Engine rpm at 70 %, 60 %, 40 %, 20 % of the nominal heat input, respectively. X_1, X_2, X_3, X_4 = Engine rpm respectively at 70 %, 60 %, 40 %, 20 % of the nominal heat input. F_{pi} = weighting factors as defined in EN15502-1:2012, section 8.13.2.2 If X_i is less than the minimum Engine rpm (E_{min}) of the equipment, $X_I = X_{min}$
Liquid or gaseous fuel sorption heat pumps Emission of nitrogen oxides NO_X	CEN	New European Standard under development within the CEN/TC299 WG2 experts group prEN 12309-2:2013 Section 7.3.13 'NO_X Measurements'	NO_X emission values shall be measured in mg/kWh fuel input and expressed in gross calorific value GCV. No alternative methods to express NO_X in mg/kWh output shall be used.
Sound power level (L_{WA}) of heat pump space heaters and heat pump combination heaters	CEN	For sound power level indoor measured and outdoor measured: EN 12102:2013 Air conditioners, liquid chilling packages, heat pumps and dehumidifiers with electrically driven compressors for space heating and cooling - Measurement of airborne noise - Determination of the sound power	To be used also for liquid or gaseous fuel sorption heat pumps

Parameter	Organisation	Reference/Title	Notes
Temperature controls			
Definition of temperature controls classes, contribution of temperature controls to seasonal space heating energy efficiency η_s of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device	European Commission	Point 6 of this Communication	Additional elements for calculations related to the contribution of temperature controls to the seasonal space heating energy efficiency of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device.
Combination heaters			
Water heating energy efficiency η_{wh} of combination water heaters, Q_{elec} and Q_{fuel}	European Commission	Commission Regulation No 814/2013, Annex IV §3.a Communication 2014/C 207/03 in the framework of the implementation of Commission Regulation No 814/2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks, and of the implementation of Commission Delegate Regulation (EU) No 812/2013 implementing Directive 2010/30/EU of the European Parliament and of the Council with regards to energy labelling of water heaters, hot water storage tanks and packages of water heater and solar device.	For the measurement and calculation of Q_{fuel} and Q_{elec} refer to Communication 2014/C 207/03 for the same water heater type and energy source(s)

4. Additional elements for measurements and calculations related to the seasonal space heating energy efficiency of boiler space heaters, boiler combination heaters and cogeneration space heaters

4.1. Test points

boiler space heaters and boiler combination heaters: the useful efficiency values η_4, η_1 and the useful heat output values P_4, P_1 are measured;

cogeneration space heaters:

— cogeneration space heaters not equipped with supplementary heaters: the useful efficiency value $\eta_{CHP100+Sup0}$, the useful heat output value $P_{CHP100+Sup0}$ and the electrical efficiency value $\eta_{el,CHP100+Sup0}$ is measured;

— cogeneration space heaters equipped with supplementary heaters: the useful efficiency values $\eta_{CHP100+Sup0}$, $\eta_{CHP100+Sup100}$, the useful heat output values $P_{CHP100+Sup0}$, $P_{CHP100+Sup100}$ and the electrical efficiency values $\eta_{el,CHP100+Sup0}$, $\eta_{el,CHP100+Sup100}$ are measured.

4.2. Calculation of the seasonal space heating energy efficiency

The seasonal space heating energy efficiency η_s is defined as

$$\eta_s = \eta_{son} - \sum F(i)$$

Where:

η_{son} is the seasonal space heating energy efficiency in active mode, calculated according to point 4.3 and expressed in %;

F(i) are corrections calculated according to point 4.4 and expressed in %.

4.3. Calculation of the seasonal space heating energy efficiency in active mode

The seasonal space heating energy efficiency in active mode η_{son} is calculated as follows:

(a) for fuel boiler space heaters and fuel boiler combination heaters:

$$\eta_{son} = 0{,}85 \times \eta_1 + 0{,}15 \times \eta_4$$

(b) for electric boiler space heaters and electric boiler combination heaters:

$$\eta_{son} = \eta_4$$

Where:

$\eta_4 = P_4 / (EC \times CC)$, with

EC = electricity consumption to produce useful heat output P_4

(c) for cogeneration space heaters not equipped with supplementary heaters:

$$\eta_{son} = \eta_{CHP100+Sup0}$$

(d) for cogeneration space heaters equipped with supplementary heaters:

$$\eta_{son} = 0{,}85 \times \eta_{CHP100+Sup0} + 0{,}15 \times \eta_{CHP100+Sup100}$$

4.4. Calculation of F(i)

(a) The correction F(1) accounts for a negative contribution to the seasonal space heating energy efficiency of heaters due to adjusted contributions of temperature controls to seasonal space heating energy efficiency of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device, as set out in point 6.2. For boiler space heaters, boiler combination heaters and cogeneration space heaters, the correction is F(1) = 3 %.

(b) The correction F(2) accounts for a negative contribution to the seasonal space heating energy efficiency by auxiliary electricity consumption, expressed in %, and is given as follows:

— for fuel boiler space heaters and fuel boiler combination heaters:

$$F(2) = 2{,}5 \times (0{,}15 \times elmax + 0{,}85 \times elmin + 1{,}3 \times P_{SB}) \; / \; (0{,}15 \times P_4 + 0{,}85 \times P_1)$$

— for electric boiler space heaters and electric boiler combination heaters:

$$F(2) = 1{,}3 \times P_{SB} \; / \; (P_4 \times CC)$$

— for cogeneration space heaters not equipped with supplementary heaters:

$$F(2) = 2{,}5 \times (elmax + 1{,}3 \times P_{SB}) \; / \; P_{CHP100+Sup0}$$

— for cogeneration space heaters equipped with supplementary heaters:

$$F(2) = 2{,}5 \times (0{,}15 \times elmax + 0{,}85 \times elmin + 1{,}3 \times P_{SB}) \; / \; (0{,}15 \times P_{CHP100+Sup100} + 0{,}85 \times P_{CHP100+Sup0})$$

OR a default value as set out in EN 15316-4-1 may be applied.

(c) The correction F(3) accounts for a negative contribution to the seasonal space heating energy efficiency by standby heat loss and is given as follows:

— for fuel boiler space heaters and fuel boiler combination heaters:

$$F(3) = 0{,}5 \times P_{stby} \; / \; P_4$$

— for electric boiler space heaters and electric boiler combination heaters:

$F(3) = 0,5 \times P_{stby} / (P_4 \times CC)$

— for cogeneration space heaters not equipped with supplementary heaters:

$F(3) = 0,5 \times P_{stby} / P_{CHP100+Sup0}$

— for cogeneration space heaters equipped with supplementary heaters:

$F(3) = 0,5 \times P_{stby} / P_{CHP100+Sup100}$

OR a default value as set out in EN 15316-4-1 may be applied.

(d) The correction F(4) accounts for a negative contribution to the seasonal space heating energy efficiency by ignition burner power consumption and is given as follows:

— for fuel boiler space heaters and fuel boiler combination heaters:

$F(4) = 1,3 \times P_{ign} / P_4$

— for cogeneration space heaters not equipped with supplementary heaters:

$F(4) = 1,3 \times P_{ign} / P_{CHP100+Sup0}$

— for cogeneration space heaters equipped with supplementary heaters:

$F(4) = 1,3 \times P_{ign} / P_{CHP100+Sup100}$

(e) For cogeneration space heaters, the correction F(5) accounts for a positive contribution to the seasonal space heating energy efficiency by the electrical efficiency and is given as follows:

— for cogeneration space heaters not equipped with supplementary heaters:

$F(5) = - 2,5 \times \eta_{el,CHP100+Sup0}$

— for cogeneration space heaters equipped with supplementary heaters:

$F(5) = - 2,5 \times (0,85 \times \eta_{el,CHP100+Sup0} + 0,15 \times \eta_{el,CHP100+Sup100})$

5. Additional elements for calculations related to the seasonal space heating energy efficiency of heat pump space heaters and heat pump combination heaters

5.1. Calculation of the seasonal space heating energy efficiency

The seasonal space heating energy efficiency η_s is defined as

(a) for heat pump space heaters and heat pump combination heaters using electricity:

$\eta_s = (100/CC) \times SCOP - \Sigma F(i)$

(b) for heat pump space heaters and heat pump combination heaters using fuels:

$\eta_s = SPER - \Sigma F(i)$

F(i) are corrections calculated according to point 5.2 and expressed in %. SCOP and SPER shall be calculated according to the tables in 5.3, and are expressed in %.

5.2. Calculation of F(i)

(a) The correction F(1) accounts for a negative contribution to the seasonal space heating energy efficiency of heaters due to adjusted contributions of temperature controls to seasonal space heating energy efficiency of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device, as set out in point 6.2. For heat pump space heaters and heat pump combination heaters, the correction is F(1) = 3 %.

(b) The correction F(2) accounts for a negative contribution to the seasonal space heating energy efficiency by electricity consumption of ground water pump(s) expressed in %. For water-/brine-to-water heat pump space heaters and heat pump combination heaters, the correction is F(2) = 5 %.

5.3 Hours for the calculation of SCOP or SPER

For the calculation of SCOP or SPER the following reference number of hours that the units work in active mode, thermostat off mode, standby mode, off more and crankcase heater mode shall be used:

Table 1

Number of hours used for heating only

	on mode	thermostat-off mode	standby mode	Off mode	crankcase heater mode
	H_{HE}	**H_{TO}**	**H_{SB}**	**H_{OFF}**	**H_{CK}**
Average climate (h/y)	2 066	178	0	3 672	3 850
Warmer climate (h/y)	1 336	754	0	4 416	5 170
Colder climate (h/y)	2 465	106	0	2 208	2 314

Table 2

Number of hours used for reversible heat pumps

	on mode	thermostat-off mode	standby mode	Off mode	crankcase heater mode
	H_{HE}	**H_{TO}**	**H_{SB}**	**H_{OFF}**	**H_{CK}**
Average climate (h/y)	2 066	178	0	0	178
Warmer climate (h/y)	1 336	754	0	0	754
Colder climate (h/y)	2 465	106	0	0	106

H_{HE}, **H_{TO}**, **H_{SB}**, **H_{CK}**, **H_{OFF}**= Number of hours the unit is considered to work in respectively, active mode, thermostat off mode, standby mode, crankcase heater mode and off mode.

6. Additional elements for calculations related to the contribution of temperature controls to the seasonal space heating energy efficiency of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device

6.1. Definitions

In addition to the definitions set out in Commission Regulation (EU) No 813/2013, and Commission Delegated Regulation (EU) No 811/2013, the following definitions apply:

— 'modulating heater' means a heater with the capability of vary power output whilst maintaining continuous operation;

Definition of temperature controls classes

— Class I - On/off Room Thermostat: A room thermostat that controls the on/off operation of a heater. Performance parameters, including switching differential and room temperature control accuracy are determined by the thermostat's mechanical construction.

— Class II - Weather compensator control, for use with modulating heaters: A heater flow temperature control that varies the set point of the flow temperature of water leaving the heater dependant upon prevailing outside temperature and selected weather compensation curve. Control is achieved by modulating the output of the heater.

— Class III - Weather compensator control, for use with on/off output heaters: A heater flow temperature control that varies the set point of the flow temperature of water leaving the heater dependant upon prevailing outside temperature and selected weather compensation curve. Heater flow temperature is varied by controlling the on/off operation of the heater.

— Class IV - TPI room thermostat, for use with on/off output heaters: An electronic room thermostat that controls both thermostat cycle rate and in-cycle on/off ratio of the heater proportional to room temperature. TPI control strategy reduces mean water temperature, improves room temperature control accuracy and enhances system efficiency.

— Class V - Modulating room thermostat, for use with modulating heaters: An electronic room thermostat that varies the flow temperature of the water leaving the heater dependant upon measured room temperature deviation from room thermostat set point. Control is achieved by modulating the output of the heater.

— Class VI - Weather compensator and room sensor, for use with modulating heaters: A heater flow temperature control that varies the flow temperature of water leaving the heater dependant upon prevailing outside temperature and selected weather compensation curve. A room temperature sensor monitors room temperature and adjusts the compensation curve parallel displacement to improve room comfort. Control is achieved by modulating the output of the heater.

— Class VII - Weather compensator and room sensor, for use with on/off output heaters: A heater flow temperature control that varies the flow temperature of water leaving the heater dependant upon prevailing outside temperature and selected weather compensation curve. A room temperature sensor monitors room temperature and adjusts the compensation curve parallel displacement to improve room comfort. Heater flow temperature is varied by controlling the on/off operation of the heater.

— Class VIII - Multi-sensor room temperature control, for use with modulating heaters: An electronic control, equipped with 3 or more room sensors that varies the flow temperature of the water leaving the heater dependant upon the aggregated measured room temperature deviation from room sensor set points. Control is achieved by modulating the output of the heater.

6.2. Contribution of temperature controls to seasonal space heating energy efficiency of packages of space heater, temperature control and solar device or of packages of combination heater, temperature control and solar device

Class No.	I	II	III	IV	V	VI	VII	VIII
Value in %	1	2	1,5	2	3	4	3,5	5

7. Energy inputs

Definitions

— 'uncertainty of measurement (accuracy)' is the precision with which an instrument or a chain of instruments is capable to represent an actual value as established by a highly-calibrated measurement reference;

— 'permissible deviation (average over test period)' is the maximum difference, negatively or positively, allowed between a measured parameter, averaged over the test period, and a set value;

— 'permissible deviations of individual measured values from average values' is the maximum difference, negatively or positively, allowed between a measured parameter and the average value of that parameter over the test period;

(a) Electricity and fossil fuels

Measured parameter	Unit	Value	Permissible deviation (average over test period)	Uncertainty of measurement (accuracy)
Electricity				
Power	W			± 2 %
Energy	kWh			± 2 %
Voltage, test-period > 48 h	V	230 / 400	± 4 %	± 0,5 %
Voltage, test-period < 48h	V	230 / 400	± 4 %	± 0,5 %
Voltage, test-period < 1 h	V	230 / 400	± 4 %	± 0,5 %
Electric current	A			± 0,5 %
Frequency	Hz	50	± 1 %	
Gas				
Types	—	Test gases EN 437		
Net calorific value (NCV) and Gross calorific value (GCV)	MJ/m^3	Test gases EN 437		± 1 %
Temperature	K	288,15		± 0,5
Pressure	mbar	1 013,25		± 1 %
Density	dm^3/kg			± 0,5 %
Flow rate	m^3/s or l/min			± 1 %

Measured parameter	Unit	Value	Permissible deviation (average over test period)	Uncertainty of measurement (accuracy)
Oil				
Heating gas oil				
Composition, Carbon/ Hydrogen/ Sulfur	kg/kg	86/13,6/0,2 %		
N-fraction	mg/kg	140	± 70	
Net calorific value (NCV, Hi)	MJ/kg	42,689 (**)		
Gross calorific value (*GCV*, Hs)	MJ/kg	45,55		
Density ρ15 at 15 °C	kg/dm³	0,85		
Kerosene				
Composition, Carbon/ Hydrogen/ Sulfur	kg/kg	85/14,1/0,4 %		
Net calorific value (NCV, Hi)	MJ/kg	43,3 (**)		
Gross calorific value (*GCV*, Hs)	MJ/kg	46,2		
density ρ15 at 15 °C	kg/dm³	0,79		

Notes:
(**) Default value, if value is not determined calorimetrically. Alternatively, if volumetric mass and sulphur content are known (e.g. by basic analysis) the net heating value (Hi) may be determined with:
$Hi = 52{,}92 - (11{,}93 \times \rho 15) - (0{,}3 - S)$ in MJ/kg

(b) Solar energy for solar collector tests

Measured parameter	Unit	Value	Permissible deviation (average over test period)	Uncertainty of measurement (accuracy)
Test solar irradiance (global G, short wave)	W/m²	> 700 W/m²	± 50 W/m² (test)	± 10 W/m² (indoors)
Diffuse solar irradiance (fraction of total G)	%	< 30 %		
Thermal irradiance variation (indoors)	W/m²			± 10 W/m²
Fluid temperature at collector inlet/outlet	°C/ K	range 0-99 °C	± 0,1 K	± 0,1 K
Fluid temperature difference inlet/outlet				± 0,05 K
Incidence angle (to normal)	°	< 20°	± 2 % (<20°)	
Air speed parallel to collector	m/s	3 ± 1 m/s		0,5 m/s
Fluid flow rate (also for simulator)	kg/s	0,02 kg/s per m² collector aperture area	± 10 % between tests	
Pipe heat loss of loop in test	W/K	<0,2 W/K		

(c) Ambient heat energy

Measured parameter	Unit	Permissible deviation (average over test period)	Permissible deviations (individual tests)	Uncertainty of measurement (accuracy)
Brine or water heat source				
Water/brine inlet temperature	°C	± 0,2	± 0,5	± 0,1
Volume flow	m^3/s or l/min	± 2 %	± 5 %	± 2 %
Static pressure difference	Pa	—	± 10 %	± 5 Pa/ 5 %
Air heat source				
Outdoor air temperature (dry bulb) T_j	°C	± 0,3	± 1	± 0,2
Vent exhaust air temperature	°C	± 0,3	± 1	± 0,2
Indoor air temperature	°C	± 0,3	± 1	± 0,2
Volume flow	dm^3/s	± 5 %	± 10 %	± 5 %
Static pressure difference	Pa	—	± 10 %	± 5 Pa/ 5 %

(d) Test conditions and tolerances on outputs

Measured parameter	Unit	Value	Permissible deviation (average over test period)	Permissible deviations (individual tests)	Uncertainty of measurement (accuracy)
Ambient					
Ambient temperature indoors	°C or K	20 °C	± 1 K	± 2 K	± 1 K
Air speed heat pump (at water heater off)	m/s	< 1,5 m/s			
Air speed other	m/s	< 0,5 m/s			
Sanitary water					
Cold water temperature solar	°C or K	10 °C	± 1 K	± 2 K	± 0,2 K
Cold water temperature other	°C or K	10 °C	± 1 K	± 2 K	± 0,2 K

Measured parameter	Unit	Value	Permissible deviation (average over test period)	Permissible deviations (individual tests)	Uncertainty of measurement (accuracy)
Cold water pressure gas-fired water heaters	bar	2 bar		± 0,1 bar	
Cold water pressure other (except electric instantaneous water heaters)	bar	3 bar			± 5 %
Hot water temperature gas-fired water heaters	°C or K				± 0,5 K
Hot water temperature electric instantaneous	°C or K				± 1 K
Water temperature (in-/outlet) other	°C or K				± 0,5 K
Volume flow rate heat pump water heaters	dm^3/s		± 5 %	± 10 %	± 2 %
Volume flow rate Electric Instantaneous Water Heaters	dm^3/s				≥10 l/min: ± 1 % < 10 l/min: ± 0,1 l/min
Volume flow rate other water heaters	dm^3/s				± 1 %