Commission Working Document on possible Ecodesign and Energy Labelling Requirements for domestic and commercial ovens, hobs, grills and domestic range hoods

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Explanatory Notes

This working document sets out ecodesign and energy labeling requirements. Pursuant to Directive 2009/125/EC, it establishes possible ecodesign requirements related to domestic and commercial kitchen appliances typically used in households and commercial establishments such as domestic and commercial ovens including ovens incorporated in cookers, hobs, grills and electric mains-operated domestic range hoods also when used for non-domestic purposes. The Lot 10, 22 and 23 preparatory studies showed that the energy in use phase is the only significant environmental aspect. Ecodesign parameters referred to in Annex I, Part 1 of Directive 2009/125/EC are not considered as significant. This working document also proposes possible energy labeling of domestic electric and gas ovens and domestic range hoods.

I.1. Form of the implementing measures

The intention is to give to the implementing measures the form of two directly applicable regulations.

I.2. Scope

This working document covers domestic and commercial hobs, grills, and electric mains-operated domestic range hoods also when used for non-domestic purposes, and domestic and commercial ovens including when incorporated in cookers. Ecodesign requirements are set for these products and energy labelling is proposed for domestic ovens and domestic range hoods.

I.3. Exclusions

Excluded from the working document are:

- appliances that use energy sources other than electric energy or gas;
- appliances that operate only with microwaves for heating food;
- free standing ovens with a product mass of 18 kilograms or less;
- ovens with a cavity volume of 750 litres or less (only from the scope of the draft ecodesign measure);
- domestic range hoods without motor.

I.4. Market structure of the products covered by this working document

Domestic and commercial cooking appliances are mainly produced in Europe. Domestic kitchen appliances are generally produced by medium to large size companies, whereas commercial kitchen appliances and commercial ovens are mainly produced by small to medium size companies. A part of the market is OEM. Several technical parts such as burners, igniters, heating elements etc. are purchased from specialized manufacturers. Most ovens, hobs and grills are electrically heated. The market share of electrical appliances is increasing, but the market share of gas appliances is still significant. About 16% of domestic ovens, 20% of commercial ovens, 36% of domestic hobs and 60% of commercial hobs are gas heated.

The impact analysis, which was done considering the worst possible scenario with a very slow migration of products to more efficient models, shows that due to the fairly large amount of units in stock and new units sold per year, the benefits for Europe in terms of energy saving and reduction of CO_2 will be very relevant with a decrease of energy consumption due to the introduction of the regulations and will save **13.3 TWh/year** by 2030 taking into account that the replacement cycle of the stock of some of the appliances is quite long.

I.5. International dimension

Most of the sales are made by European manufacturers and there are some Asian importers. Neither the preparatory study nor the stakeholders provided quantitative data on the origin of equipment. Eurostat shows significant imports of relatively low cost ovens, probably imported from low cost countries near Europe.

I.6. Impact on other EU legislation

No impact on other EU legislation has been identified.

I. Ecodesign requirements

The proposed ecodesign requirements are set out based on the recommendations of the preparatory studies, further discussions with the industry and further Commission calculations.

The preparatory studies propose to cover microwave ovens; however, the worst and the best performing ovens are very close to each other. Portable ovens having a mass of less than 18kg are not part of the scope of this working document because amendment 11 to EN standard 60335-2-6 (ovens and hobs) requires significant reduction of surface temperature of ovens which will result in energy efficient design of portable ovens.

The Lot 10 preparatory study showed that although large household range hoods with motor input power ≥280W already have to comply with Commission Regulation (EU) No 327/2011 (on ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW), this Regulation should be applied to all household range hoods since it addresses in particular the overall energy consumption of the household range hoods.

On top of the proposed eco-design requirements, the Commission recommends complementary measures to be taken by national, regional and local authorities: in their public procurement procedures, Member States would be encouraged to require for domestic and commercial ovens, hobs, grills and domestic range hoods the minimum energy efficiency values of the second phase of Annex I of the ecodesign working document already from the beginning of this measure.

1. Definitions

Domestic and commercial ovens, hobs, grills and domestic range hoods are considered as ErPs within the meaning of Article 2(1) of Directive 2009/125/EC.

For the purposes of this working document the following definitions shall apply:

'Domestic' means for household use;

'Commercial' means for use in commercial kitchens or other food processing facilities;

‘Oven’ means an appliance or part of an appliance which incorporates one or more cavities using gas and/or electric energy to operate;

‘Cavity’ means the enclosed compartment in which the temperature can be controlled for preparation of food;

‘Hob’ means an ‘electric hob’, ‘gas hob’ or a combination of both;

‘Cooking zone’ means part of a hob or area visible or marked on the surface of the hob where pans or pots are placed for cooking;

‘Electric hob’ means an appliance or part of an appliance which incorporates one or more cooking zones heated by electric energy, where a cooking zone is part of the hob or area marked on the surface of the hob where pans are placed for heating;

‘Gas hob’ means an appliance or part of an appliance which incorporates one or more cooking zones, heated by gas burners;

‘Grill’ means an appliance or part of an appliance in/on/under which food is cooked by radiant or contact heat;

‘Cooker’ means an appliance consisting of an oven and a hob using gas or electric energy;

‘Commercial oven’ means an oven intended for commercial use having a volume up to 750 litres per cavity;

‘Domestic range hood’ means a motor operated appliance intended to collect contaminated air from above a hob or includes a downdraft system intended for installation adjacent to domestic cooking ranges, hobs and similar cooking appliances, that draws vapour down into an internal exhaust duct. The blower of the domestic range hood may be internal or external, provided that is controlled by the domestic range hood. The air may be ducted away or discharged back into the room after filtration;

‘Domestic range hood without motor’ means an appliance intended to collect contaminated air from above a hob connected to a ventilation appliance not controlled by the range hood.

‘Equivalent domestic range hood’ means a model of domestic range hood placed on the market with the same technical and performance characteristics, energy consumption and airborne acoustical noise emissions as another model of domestic range hoods placed on the market under a different commercial code number by the same supplier.

Definitions for the purposes of the Annexes of the draft Regulations are provided in Annex I, Point 1 of the attached draft working documents on ecodesign and energy labelling.

2. Calculations for ecodesign requirements

The preparatory studies show that energy consumption in the use-phase completely dominates the life-cycle impact of domestic and commercial kitchen appliances. Accordingly, this working document proposes minimum energy efficiency requirements and benchmarks only in relation to energy consumption in the use phase.

In calculating the energy efficiency of gas appliances, the proposal takes into account two approaches.

A) Taking into account the electricity consumption of necessary ventilation of the room

Gas ovens burn gas which produce exhaust fumes flowing into the kitchen or house. To keep air quality at a good level, extra ventilation is needed.

The oven needs on average 1.56 kWh in one cycle, produced with 0.15 m^3 of gas. This produces 1.5 m^3 of exhaust gases containing 0.09 m^3 CO_2 per m3 = 0.135 m^3 CO_2. A person

produces between 0.015 m^3 (in rest) and 0.03 m^3 (active) CO_2/h. Per person the standard is 25 m^3 ventilation. To get rid of 0.15 m^3 CO_2, extra ventilation of 0.135/0.015 to 0.135/0.03 = 112.5 to 225 m^3 ventilation is needed.
Average temperature difference inside and outside of the oven: 13°C
Weight: 1.29 kg/m^3
Specific heat content of 1 kJ/kgK

The air contains:
112.5 m^3*1.29*13*1 = 1887 kJ
1887 kJ = 524 Wh of heat

i) An average fan has an SPI (value for efficiency) of 0.4 W/m^3. The fan uses 112.5*0.4 = 45 Wh electric energy = 112.5 Wh primary energy.
Total energy consumption = 0.524 + 0.1125 = 0.637 kWh

ii) An average consumer will put on the cooker hood for 20 minutes per baking cycle. A simple cooker hood has a capacity of 180 m^3/h and a power of 80W. So in 20 minutes 60 m^3 is removed with 27 Wh of electricity consumption = 67 Wh primary energy.

The 60 m^3 contains 60*1.29*13*1 = 1006 kJ = 280 Wh
Total energy required = 0.28 + 0.067 = 0.346 kWh

The conservative, low value is used (see point ii) above), since the behaviour of people is not really known. Several details would affect the extra energy consumption. Is the cooker hood switched on only if the oven can be smelled? Is the oven used during cooking when the hood is switched on anyway? What if the kitchen is not as warm as the rest of the house? The house has some ventilation in most cases and the air quality may be worse for a certain period. Which part must be attributed to the gas oven and which part to other activities?

B) Taking into account energy losses of gas appliances

Gas ovens produce on average higher losses in homes. The input energy is transformed to thermal energy. The net energy heats up the wet load (food) and evaporates water. The rest of the energy is heat stored in materials, and impact on the surroundings due to exhaust gas, radiation and thermal conduction. The net energy is identical for gas and electric ovens, therefore direct comparison of input energy at the system border is allowed. Gas ovens stress the home environment more than electric ovens:
- additional thermal losses,
- additional humidity,
- flue gas.

The additional environmental stress caused by gas ovens can generate additional need of energy for forced room ventilation, compensation of loss of room heat, and compensation of lost air-conditioned air. Therefore the elimination of the additional impacts of gas ovens to the home environment needs energy at the same level of the additional losses. The additional energy consumption is approximately 25% of the gas consumption, therefore a compensation factor of 1.25 for gas ovens is proposed. For electric ovens the losses for production and transport of electricity are covered by the primary energy conversion factor.

EEI_{gas} = EC*1,25/SEC*100

3. Ecodesign requirements (including information requirements)

This working document proposes minimum energy efficiency ecodesign requirements for domestic and commercial hobs, grills, and electric mains-operated domestic range hoods also when used for non-domestic purposes, and domestic and commercial ovens including when incorporated in cookers.

For domestic ovens and hobs a mandatory Energy Efficiency Index (EEI) 1 and 3 years after the entry into force of the regulation is proposed. Mandatory requirements on power management under the Standby Regulation will be applicable from 2013 (2^{nd} tier standby requirements).

For commercial ovens and hobs a mandatory Energy Efficiency Index (EEI) 1 and 6 years after the entry into force of the regulation is proposed.

For domestic range hoods a mandatory Energy Efficiency Index (EEI) 1, 2, 5 and 7 years after the entry into force of the regulation is proposed. Although domestic range hoods are excluded from the scope of the Standby Regulation as explained in the accompanying guidelines, mandatory requirements on power management are also proposed after 2 and 5 years after the entry into force of the regulation.

Additionally to the minimum energy efficiency requirements, this working document also proposes ecodesign requirements for domestic range hoods on the limitation of the exhaust air, as well as several steps for phasing out low efficient products in function of the values reached by Fluid Dynamic Efficiency (FDE) and a mandatory Energy Efficiency Index (EEI) 2, 5 and 7 years after the entry into force of the regulation.

Products falling under the definitions of paragraph "Definitions" above in this document shall meet the ecodesign requirements set out in Annex I of the draft ecodesign working document:

1) Domestic ovens including when incorporated in cookers shall meet the ecodesign requirements set out below and be classified according to the measurements and calculations set out in Point 3 (measurement method).

a) Minimum energy efficiency requirement

Table 1: Minimum energy efficiency performance requirements domestic ovens

	Electric	Gas fired
Parameter	$EEI_{dom\ oven}$	$EEI_{dom\ oven}$
1 year after entry into force	≤ 120	≤ 110
3 years after entry into force	≤ 110	≤ 92.5

b) Power consumption requirement

i) Power consumption in off mode:

Power consumption of domestic appliances in any off mode condition shall not exceed 0,50 W.

ii) Power consumption in standby mode(s):

The power consumption of domestic appliances in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 0.50 W.

The power consumption of domestic appliances in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 1.00 W.

iii) Availability of off mode and/or standby mode:

Domestic appliances shall, except where this is inappropriate for the intended use, provide off mode and/or standby mode, and/or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

iv) Power management:

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

standby mode, or

off mode, or

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

c) Product information requirement

Model identification	
Type of oven	
Number of cavities	X
Heat source per cavity	
Operation mode(s) per cavity	

	Symbol	Value	Unit
Volume per cavity	V	X	l
Mass of the appliance	M	X	kg
Electric energy consumption per cycle in conventional mode per cavity	Ee	X	kWh/cycle
Gas energy consumption per cycle in conventional mode per cavity	Eg	X	kWh/cycle
Electric energy consumption per cycle in fan forced mode per cavity	Ee	X	kWh/cycle
Gas energy consumption per cycle in fan forced mode per cavity	Eg	X	kWh/cycle

2) Domestic hobs shall meet the ecodesign requirements set out in below and be classified according to the measurements and calculations set out in Point 3 (measurement method).

a) Minimum energy efficiency requirement

Table 2: Minimum energy efficiency performance requirements domestic hobs

	Electric	Gas fired
Parameter	$EEI_{dom\ hob}$	$EEI_{dom\ hob}$
1 year after entry into force	< 60 %	< 52 %
3 years after entry into force	< 60 %	< 60 %

b) Power consumption requirement

i) Power consumption in off mode:

Power consumption of domestic appliances in any off mode condition shall not exceed 0,50 W.

ii) Power consumption in standby mode(s):

The power consumption of domestic appliances in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 0.50 W.

The power consumption of domestic appliances in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 1.00 W.

iii) Availability of off mode and/or standby mode:

Domestic appliances shall, except where this is inappropriate for the intended use, provide off mode and/or standby mode, and/or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

iv) Power management:

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

standby mode, or

off mode, or

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

c) Product information requirement

Model identification			
Type of hob			
Number of cooking zones	X		
Heat source per cooking zone			
	Symbol	**Value**	**Unit**

Power per cooking zone	P	X	kWh
Diameter of useful surface area per electric heated cooking zone	∅	X	cm
Energy efficiency index per cooking zone (for commercial hobs)	$EEI_{com\ hob}$		
Energy efficiency index per cooking zone (for domestic hobs)	EEIdom hob		

3) Commercial ovens shall meet the ecodesign requirements set out below and be classified according to the measurements and calculations set out in Point 3 (measurement method).

a) Minimum energy efficiency requirement

Table 3: Minimum energy efficiency performance requirements commercial electric ovens

Type	Combination electric oven	Fan-forced electric oven	Multiple deck electric oven
Parameter	$EEI_{com\ oven}$	$EEI_{com\ oven}$	$EEI_{com\ oven}$
1 year after entry into force	≤2	≤2	≤2
6 years after entry into force	≤1.6	≤1.6	≤1.6

b) Minimum energy efficiency requirement

Table 4: Minimum energy efficiency performance requirements commercial gas ovens

Type	Combination gas oven	Fan-forced gas oven	Multiple deck gas oven
Parameter	$EEI_{com\ oven}$	$EEI_{com\ oven}$	$EEI_{com\ oven}$
1 year after entry into force	≤1	≤1	≤1
6 years after entry into force	≤0.8	≤0.8	≤0.8

c) Product information requirement

Model identification	
Type of oven	

Operation modes of the oven **conventional mode** **fan-forced convection mode** **steam mode**			
Operation mode of the oven used for energy label declaration			
	Symbol	**Value**	**Unit**
Rated number of shelves		X	
Surface area per shelve	A	X	cm^2
Load per cycle	L	X	kg
Energy consumption for heating the oven	Eh	X	kWh/cycle
Time needed for heating the oven	t	X	Min
Electric energy consumption in idle mode	Ee_i	X	kWh
Gas energy consumption in idle mode	Eg_i	X	kWh
Electric energy consumption in conventional mode	Ee	X	kWh/cycle
Gas energy consumption in conventional mode	Eg	X	kWh/cycle
Electric energy consumption in fan forced mode	Ee	X	kWh/cycle
Gas energy consumption in fan forced mode	Eg	X	kWh/cycle
Energy consumption in steam mode	Ee	X	kWh/cycle
Gas energy consumption in steam mode	Eg	X	kWh/cycle
Water consumption in steam	V	X	l/cycle

mode			

4) Commercial hobs shall meet the ecodesign requirements set out below and be classified according to the measurements and calculations set out in Point 3 (measurement method).

a) Minimum energy efficiency requirement

Table 5: Minimum energy efficiency performance requirements commercial hobs

	Electric	Gas fired
Parameter	$EEI_{com\ hob}$	$EEI_{com\ hob}$
1 year after entry into force	≤ 60 %	≤ 52 %
6 years after entry into force	≤ 60 %	≤ 60 %

b) Product information requirement

Model identification			
Type of hob			
Number of cooking zones	X		
Heat source per cooking zone			
	Symbol	**Value**	**Unit**
Power per cooking zone	P	X	kWh
Diameter of useful surface area per electric heated cooking zone	Ø	X	cm
Energy efficiency index per cooking zone (for commercial hobs)	$EEI_{com\ hob}$		
Energy efficiency index per cooking zone (for domestic hobs)	EEIdom hob		

5) Domestic range hoods shall meet the ecodesign requirements set out below and be classified according to the measurements and calculations set out in Point 3 (measurement method).

a) Minimum energy efficiency requirement

Table 6: Minimum energy efficiency performance requirements domestic range hoods		
	Electric	
Parameter	$EEI_{dom\ hood}$	$FDEI_{dom\ hood}$
2 years after entry into force	≤ 120	≤ 4
5 years after entry into force	≤ 110	≤ 8
7 years after entry into force	≤ 100	≤ 8

(1) *Limitation of the exhaust air*

From [*date to be inserted: 12 months after the entry into force of the Regulation*]:

a) Domestic range hoods with a maximum air flow in any of the available setting higher than 650 m^3/h shall automatically revert to an air flow lower than or equal to 650 m^3/h in a time *t* as defined in the following formula:

$$V = \int_0^t \frac{Q_{max}}{60} \times d(t)$$

where

- V is the air volume and is equal to 100 m^3
- Q_{max} is the maximum air flow of the domestic range hood, including intensive/boost if present, in m^3/h and rounded to the first decimal place
- *t* is the time, in minutes and rounded to the integer
- *d(t)* is the total time till the air volume of 100m3 has been reached

The mere presence of a manual switch or setting decreasing the appliance air flow to a value lower than or equal to 650 m^3/h is not considered fulfilling this requirement.

b) For domestic range hoods with automatic functioning mode during the cooking period:

- the activation of the automatic functioning mode shall be possible only through a manual operation by the user, either on the hood or elsewhere
- the automatic functioning mode shall revert to manual control after no more than 10 minutes from the moment the automatic function switches off the motor

(2) From [*date to be inserted*: *2 years after the entry into force of the Regulation*]:

a) The Fluid Dynamic Efficiency Index shall be higher than 4.

b) The Energy Efficiency Index shall be lower than 120.

(3) From [*date to be inserted:* 5 *years after the entry into force of the Regulation*]:

a) The Fluid Dynamic Efficiency Index shall be higher than 8.

b) The Energy Efficiency Index shall be lower than 110.

(4) From [*date to be inserted:* 7 *years after the entry into force of the Regulation*]:

a) The Energy Efficiency Index shall be lower than 100.

The Fluid Dynamic Efficiency Index and the Energy Efficiency Index of domestic range hoods are calculated as described in Annex II of the draft Regulation.

b) Power consumption requirement

From [*date to be inserted: 2 years after the entry into force of the Regulation*]

i) Power consumption in 'off mode': the power consumption in any off-mode condition shall not exceed 1,00 W.

ii) Power consumption in 'standby mode(s)':

The power consumption in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 1,00 W.

The power consumption of equipment in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 2,00 W.

iii) Availability of 'off mode' and/or 'standby mode': domestic range hoods shall, except where this is inappropriate for the intended use (i.e. full automatic range hoods), provide 'off mode' and/or 'standby mode', and/or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

(2) From [*date to be inserted: 5 years after the entry into force of the Regulation*]:

i) Power consumption in 'off mode': the power consumption in any off mode condition shall not exceed 0,50 W.

ii) Power consumption in 'standby mode(s)': the power consumption in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 0,50 W.

The power consumption of equipment in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display shall not exceed 1,00 W.

iii) Domestic range hoods shall, provide off mode and/or standby mode, and/or another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

iv) Power management: when domestic range hoods are not providing the main function, or when other energy-using product(s) are not dependent on its functions, equipment shall, unless inappropriate for the intended use, offer a power management function, or a similar function, that switches equipment after the shortest possible period of time appropriate for the intended use of the equipment, automatically into:

- standby mode, or
- off mode, or
- another condition which does not exceed the applicable power consumption requirements for off mode and/or standby mode when the equipment is connected to the mains power source.

The power management function shall be activated before delivery.

c) Product information requirement

The technical documentation of domestic range hoods shall include:

Model identification			
	Symbol	**Value**	**Unit**
Annual Energy Consumption	AEC	X	kWh
Increase factor	f	X	
Fluid Dynamic Efficiency	FDE	X	%
Standard Annual Energy Consumption	(SAEC)	X	kWh/year
Energy Efficiency Index	EEI		%
Measured air flow at best efficiency point	Q_{BEP}		m^3/h
Measured air pressure at best efficiency point	P_{BEP}		Pa

Maximum air flow	Q_{max}		m^3/h
Measured power at best efficiency point	W_{BEP}		W
Nominal power of the lighting system	W_L		W
Measured power consumption in standby mode	$P_{standby}$		W
Description of how the standby mode is selected or programmed			
Measured power consumption off mode	P_{off}		W
Description of how the off mode is selected or programmed			
Notes regarding operation of the equipment			

6) Domestic and commercial grills

a) Product information requirement

Model identification			
Type of grill			
Heat source			
	Symbol	**Value**	**Unit**
Power	P	X	kWh
Energy consumption during one hour of operation including heating	E	X	kWh
Used method for measuring and calculating the energy consumption			

3. Measurement method

Efficiency of domestic and commercial ovens, hobs, grills and domestic range hoods shall be tested in accordance with the methods described in Annex II. The selected test method shall be of "low uncertainty", and shall be stated in the documentation of the given appliance. A compensation factor for the ventilation necessary for gas appliances was introduced; this working document considers two approaches on how to calculate this compensation factor.

IEC 60350-2009	Electric cooking ranges, hobs, ovens and grills for household use - Methods for measuring performance.
EN 30-2-1	Domestic cooking appliances burning gas – Part 2-1: Rational use of energy – General
EN 30-2-2	Domestic cooking appliances burning gas – Part 2-2: Rational use of energy – Appliances having forced –convection ovens and/or grills
IEC 61591	Household range hoods and other cooking fume extractors – Methods for measuring performance
IEC 60704-2-13	Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-13: Particular requirements for range hoods
EN 15181	Measuring method of the energy consumption of gas fired ovens
EN 203-2-1	Gas heated catering equipment - Part 2-2: Specific requirements - Ovens
EN 203-2-2	Gas heated catering equipment - Part 2-2: Specific requirements - Open burners and wok burners
DIN 18873 - 1	Methods for measuring of the energy use from equipment for commercial kitchens - Part 1: Convection steamers
DIN 18873 - 4	Methods for measuring of the energy use from equipment for commercial kitchens - Part 4: Convection ovens
DIN 18873 - 7	Methods for measuring of the energy use from equipment for commercial kitchens - Part 7: Multiple deck ovens - draft
DIN 18873 - 9	Methods for measuring of the energy use from equipment for commercial kitchens - Part 9: Cooking zones - draft

A short explanation of the calculation of the efficiency of ovens is presented below:

a) Heating of an oven shall be done with a load of hydrated Hipor bricks with outside width x length x height dimensions of 114 x 230 x 64 mm, soaked with water.

The energy consumption of a domestic oven shall be measured for one cycle by heating a wet brick. The total consumption of gas and electric energy of the oven shall be taken into account as well as the compensation factor when using a gas oven.

Two alternative ways of estimating the compensation factor are presented:

i) The compensation factor is calculated to be the energy consumption of extra ventilation estimated to be a fixed number of 0.346 kWh primary energy per cycle of a gas oven, consisting of energy for operating the cooker hood and the heat removed with the exhaust gases.

For domestic ovens, the Energy Efficiency Index EEI shall be calculated according to these formulas:

SEC = 0,0158*V+1,274

EEI_{gas} = EC/SEC * 100

Whereas:

SEC = Specific Energy Consumption
V = the volume of the cavity
EEI_{gas} = Energy Efficiency Index
EC = the measured energy consumption, for gas ovens including the compensation factor
EC is expressed in kWh primary energy, whereby electric energy is converted to primary energy with a conversion factor of 2.5

ii) The compensation factor is calculated to be the extra energy consumption required to remove the exhaust gases and humidity and is estimated to be 25% of the gas energy consumption of the gas oven. A gas oven uses 29% more energy than an electric oven.

For domestic ovens, the Energy Efficiency Index EEI shall be calculated according to these formulas:

SEC = 0,0158*V+1,274

EEI_{gas} = EC*1,25/SEC*100

Whereas:

SEC = Specific Energy Consumption
V = the volume of the cavity
EEI_{gas} = Energy Efficiency Index
EC = the measured energy consumption, for gas ovens including the compensation factor
EC is expressed in kWh primary energy, whereby electric energy is converted to primary energy with a conversion factor of 2.5

The number of Hipor bricks per cavity of a commercial oven depends on the number of trays and the surface area per tray. The number of bricks loaded in the oven is calculated with the following formula:

$N = (^{(\text{tray width in cm} * \text{tray depth in cm})}/_{(60cm*40cm)}) * \text{number of trays}$

in which N is the number of bricks in units. Fractions are rounded up to the nearest integer.

b) Measuring the efficiency of a hob is done with a pot filled with water. The size of the pot and amount of water depends for electric hobs on the diameter of the useful surface of the cooking zone and for gas hobs on the rated power of the cooking zone.

The sizes of the pots and amount of water to measure the efficiency of domestic electric hobs are given in Table 1.

Table 1: sizes and water volume for measuring efficiency of domestic electric hobs			
Diameter useful surface area (mm)	Diameter pot (mm)	Height pot (mm)	Quantity of water (l)
≤ 145	145	140	1
> 145 ≤ 180	180	140	1.5
> 180 ≤ 220	220	140	2

The energy efficiency of commercial electric hobs shall be measured with a pot with measures according to Table 2.

Table 2: sizes and water volume for measuring efficiency of commercial electric hobs		
Diameter pot (mm)	Height pot (mm)	Quantity of water (g)
200	125	1852
220	125	2240
240	125	2267
260	125	3130
280	125	3630
300	125	4167
320	125	4741
340	125	5352

The measuring of the efficiency of domestic gas hobs shall be done with a stainless steel pot. The sizes of the pots and amount of water shall be fit to the size of the gas hobs according to the sizes in Table 3.

Table 3: sizes and water volume for measuring efficiency of domestic gas hobs		
Maximum power of the cooking zone (kW)	Internal diameter pot (mm)	Quantity of water (kg)
≤1.16 < 1.64	220	3.7
≤1.64 < 1.98	240	4.8

≤1.99 < 4.20	260	6.1

The measuring of the efficiency of commercial gas hobs shall be done with a stainless steel pot. The sizes of the pots and amount of water shall be fit to the size of the gas hobs according to the sizes in Table 4.

Table 4: sizes and water volume for measuring efficiency of commercial gas hobs

Maximum power of the cooking zone (kW)	Internal diameter pot (mm)	Quantity of water (kg)
1.79	220	3.7
2.13	240	4.9
2.50	260	6.1
2.91	280	7.8
3.33	300	9.4
3.80	320	11.8
4.28	340	13.6
5.35	380	18.7
6.53	420	24.9
7.84	460	32.4
9.26	500	41.2

c) The energy consumption of a commercial oven in each operation mode and in idle mode shall be determined according to commonly used measurement methods and the following calculation.

The total energy consumption of a commercial oven used in one heating cycle shall be divided by the total number of heated bricks in one cycle. The Energy Efficiency of the commercial oven and Energy Efficiency Index of the oven are determined according to the following formulas:

$EC_b = EC_t / 1.5 * n$

$EEI = EC/c$

Where

EC_t = Total energy consumption of the oven for heating a complete load

EC_b = Energy consumption of the oven for heating one brick

n = the number of heated bricks in one load

EEI = energy efficiency index

c = constant of 0.866 kWh, the average energy consumption of a domestic oven.

d) The energy consumption of a domestic or commercial grill shall be measured without load. The energy consumption will be measured during one hour of operation, including heating and shall be performed according to commonly used measurement methods and in commonly used circumstances. The grill shall be heated in working mode or with a setting leading to stationary temperature of or as near as possible to 200°C.

e) Calculation of the Fluid Dynamic Efficiency, Energy Efficiency Index and Annual Energy Consumption of domestic range hoods are set out below.

i) Calculation of the Fluid Dynamic Efficiency

The Fluid Dynamic Efficiency (*FDE*) at the best efficiency point is calculated by the following formula, and is rounded to the first decimal place:

$$FDE = \frac{Q_{BEP} \times P_{BEP}}{3600 \times W_{BEP}} \times 100 \qquad \text{(eq. 1)}$$

where

- Q_{BEP} is the air flow at best efficiency point, in m^3/h and rounded to the integer
- P_{BEP} is the static pressure at best efficiency point, in Pa and rounded to the integer
- W_{BEP} is the electric power consumption at the best efficiency point, in Watt and rounded to the first decimal place.

ii) Calculation of the Energy Efficiency Index

The Energy **Efficiency Index (*$EEI_{dom\ hood}$*)** is calculated as:

$EEI_{domhood} = \frac{AEC}{SAEC} \times 100$ and is rounded to the first decimal place (eq. 2)

where:

– *AEC* = annual energy consumption of the domestic range hood in kWh/year and rounded to the first decimal place

– *SAEC* = standard annual energy consumption of the domestic range hood in kWh/year and rounded to the first decimal place.

The **Annual Energy Consumption (*AEC*)** of a domestic range hood is calculated, in kWh/year and recorded to the first decimal place, as:

- for the fully automatic range hoods:

$$AEC = \left[\frac{(W_{BEP} \times 60 \times f) + (W_L \times t_L)}{60 \times 1.000} + \frac{P_o \times (440 - 60 \times f)}{2 \times 60 \times 1.000} + \frac{P_s \times (440 - 60 \times f)}{2 \times 60 \times 1.000} \right] \times 365 \quad \text{(eq. 3)}$$

where

- W_{BEP} is the electric power consumption at the best efficiency point, in Watt and rounded to the first decimal place
- W_L is the nominal power consumption of the lighting system on the cooking surface, in Watt and rounded to the first decimal place
- t_L is the average lighting time per day, in minutes, t_L = 120
- t_H is the average running time per day for domestic range hoods, in minutes, t_H = 60
- *Po* is the power consumption in off-mode for domestic range hoods, in Watt and rounded to the second decimal place
- *Ps* is the power consumption in standby mode for domestic old range hoods, in Watt and rounded to the second decimal place
- f is the time increase factor, rounded to the first decimal place, as:

$$f = \frac{-3{,}6 \times FDE}{100} + 2 \qquad \text{(eq. 4)}$$

- for all other domestic range hoods:

$$AEC = \frac{\left[W_{BEP} \times \left(t_H \times f\right) + W_L \times t_L\right]}{60 \times 1000} \times 365 \qquad \text{(eq. 5)}$$

where

- W_{BEP} is the electric power consumption at the best efficiency point, in Watt and rounded to the first decimal place
- W_L is the nominal power consumption of the lighting system on the cooking surface (in Watt and rounded to the first decimal place)
- t_L is the average lighting time per day, in minutes, t_L = 120
- t_H is the average running time per day for domestic range hoods, in minutes, t_H = 60
- f is the time increase factor, rounded to the first decimal place.

The **Standard Annual Energy Consumption (*SAEC*)** of a domestic range hood shall be calculated, in kWh/year and rounded to the first decimal places, as:

$$SAEC = 0{,}55 \times \left(W_{BEP} + W_L\right) + 15{,}3 \qquad \text{(eq. 5)}$$

4. Conformity Assessment

A conformity assessment shall be carried out according to Article 8(2), and Annex IV (Internal design control) or Annex V (Management system for assessing conformity) of Directive 2009/125/EC.

5. Market surveillance

When performing the market surveillance checks referred to in Directive 2009/125/EC, Article 3(2), Member State authorities shall apply the verification procedure set out in Annex II of the ecodesign working document.

6. Benchmarks

The preparatory studies were unable to identify the best available technology for grills and domestic hobs covered by this working document because of unavailability of data. The best available technology on the market in terms of their energy performance for domestic electric ovens including when incorporated in cookers is 67.5, for domestic gas ovens is 75.0 (with room ventilation) or 72.7 (with energy losses of gas ovens), for commercial electric hobs is 90% and for commercial gas hobs is 60%.

The best technology available in domestic range hoods <280 W on the EU market in terms of fluid dynamic efficiency has a FDE of 22.

The best technology available in domestic range hoods >280 W on the EU market in terms of fluid dynamic efficiency has a FDE of 24,5.

The best technology available in domestic range hoods on the EU market in terms of:

- noise in normal use setting is 51dBA (normal use) @ 550 m3/h;
- noise in boost/intensive setting is 57 dBA (booster) @ 750 m3/h;
- grease filtration efficiency is 91%
- lighting efficiency is 29 (LED Lighting).

The best available technology on the market for domestic and commercial hobs, and ovens including when incorporated in cookers in terms of their energy performance is identified below:

Ovens	Domestic	Electric	EEI = 67.5
		Gas	EEI = 75.0 or 72.7 (depending on calculation)
	Commercial combi-steamer oven	Electric	
		Gas	
	Commercial fan-forced oven	Electric	
		Gas	
	Commercial multiple deck oven	Electric	

		Gas	
Hobs	Domestic	Electric	
		Gas	
	Commercial	Electric	Efficiency = 90%
		Gas	Efficiency = 60%
Range hoods		< 280 W	FDE = 22
		≥ 280 W	FDE = 24,5
		Noise	51dBA at 550 m^3/h
		Noise	57 dBA at maximal setting
		Grease	Filtration = 91%
		Lighting	Efficiency = 29%

7. Review

A review of the proposed requirements shall be presented to the Consultation Forum depending on technological progress and not later than seven years after its entry into force.

II. Energy labelling requirements

The analysis of the Lot 23 preparatory study of the current and best available products showed that although hobs and grills may have disparities in the relevant performance levels, early measurements based upon the draft test standard show little differentiation (15%) in the energy consumption of hobs and standards and measurement methods still have to be developed for grills.

The label for gas and electric appliances is a common label as one of the approaches suggested by the Lot 22 preparatory study. The label is calculated according to either (i) taking into account the electricity consumption of necessary ventilation and the heat loss of the removed air or (ii) taking into account energy losses of gas appliances such as additional thermal losses, additional humidity and flue gas.

This working document also proposes an energy label for domestic range hoods also when used for non-domestic purposes. The energy used by household range hoods accounts for a significant part of total household energy demand in the European Union. In addition to the energy efficiency improvements already achieved, the scope for further reducing the energy consumption is substantial. Therefore a uniform design and content for the label, together with requirements as to the technical documentation and the product fiche and requirements as to the information to be provided for any form of distance selling, advertisements and technical promotional materials are proposed.

1. Definitions

For the purposes of this working document the following definitions shall apply:

'Domestic' means for household use;

'Commercial' means for use in commercial kitchens or other food processing facilities;

‘Oven’ means an appliance or part of an appliance which incorporates one or more cavities using gas and/or electric energy to operate;

‘Cavity’ means the enclosed compartment in which the temperature can be controlled for preparation of food;

‘Cooker’ means an appliance consisting of an oven and a hob using gas or electric energy;

‘Domestic range hood’ means a motor operated appliance intended to collect contaminated air from above a hob or includes a downdraft system intended for installation adjacent to domestic cooking ranges, hobs and similar cooking appliances, that draws vapour down into an internal exhaust duct. The blower of the domestic range hood may be internal or external, provided that is controlled by the domestic range hood. The air may be ducted away or discharged back into the room after filtration;

‘Domestic range hood without motor’ means an appliance intended to collect contaminated air from above a hob connected to a ventilation appliance not controlled by the range hood;

‘Equivalent domestic range hood’ means a model of domestic range hood placed on the market with the same technical and performance characteristics, energy consumption and airborne acoustical noise emissions as another model of domestic range hoods placed on the market under a different commercial code number by the same supplier;

‘Equivalent domestic range hood’ means a model of domestic range hood placed on the market with the same technical and performance characteristics, energy consumption and airborne acoustical noise emissions as another model of domestic range hoods placed on the market under a different commercial code number by the same supplier;

‘End-user’ means a consumer buying or expected to buy domestic range hood;

‘Point of sale’ means a location where domestic range hoods are displayed and/or offered for sale, hire or hire-purchase.

Definitions for the purposes of the Annexes of the draft Regulation are provided in Annex I, Point 1 of the attached draft working document on energy labelling.

2. Measurement standard

Efficiency of domestic gas and electric ovens and domestic range hoods shall be tested in accordance with the methods described in Annex II. The selected test method shall be of “low uncertainty”, and shall be stated in the documentation of the given appliance. A compensation factor for the ventilation necessary for gas appliances was introduced, at the moment two approaches are considered.

IEC 60350-2009	Electric cooking ranges, hobs, ovens and grills for household use - Methods for measuring performance.
EN 30-2-1	Domestic cooking appliances burning gas – Part 2-1: Rational use of energy – General
EN 30-2-2	Domestic cooking appliances burning gas – Part 2-2: Rational use of energy – Appliances having forced –convection ovens and/or grills
IEC 61591	Household range hoods and other cooking fume extractors – Methods for measuring performance
IEC 60704-2-13	Household and similar electrical appliances - Test code for the determination of airborne acoustical noise - Part 2-13: Particular requirements for range hoods
EN 15181	Measuring method of the energy consumption of gas fired ovens

All the tests and the tools necessary for calculating power consumption in standby and off mode condition are already defined in EN 50564:2011.

All the tests and the tools necessary for calculation of Fluid Dynamic Efficiency (FED) and Energy Efficiency Index (EEI) are already defined in EN 61591:1997+A:2006+A2:2011.

An updating of EN 61591 to add the definition of Best Efficiency Point introduced with this regulation is suggested.

Calculation of the Fluid Dynamic Efficiency (FDE), Energy Efficiency Index (EEI) and Annual Energy Consumption (AEC) is defined in Annex II of the draft ecodesign regulation.

Transitional measurement method for domestic range hobs

Publication of titles and references of transitory measurement methods[1] for the implementation of Regulation (EC) No xx/2012, including in particular Annex III of that Regulation.

Measured parameter	**Organisation**	**Reference**	**Title**
Electric power consumption at the BEP	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances
Light power consumption			Total nominal power consumption of lamps
Light luminance value	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances
Air flow	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances. (air flow is measured at a pressure of 15 Pa (in m^3/h).
Air flow at the BEP	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances
Static Pressure at the BEP	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances
Grease Efficiency	CENELEC	EN 61591:1997 + A1:2006 + A2: 2011	Domestic range hoods - Method for measuring performances
Sound power	CENELEC	EN 60704-2-13:2000 + A1:2006 + A2:2008	Household and similar electrical appliances – Test code for determination of airborne acoustical noise. Part 2 particular requirements for range hoods
Sound power	CENELEC	EN 60704-3:2006	Household and similar electrical appliances – Test code for determination of airborne acoustical noise.

[1] These transitory measurement methods are meant to be replaced by harmonised standard(s). When available, the reference(s) of 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.

			Part 3: Procedure for determining and verifying declared emission values
Standby Power consumption	CENELEC	EN50564:2011	Household and similar electrical appliances – Measurement of standby power