

Emission limit values: Comparative tables for combustion plants, new or substantially changed installations in the EU

The present document contains comparative tables of emission limit values for combustion plants in the EU. The sector considered is Combustion installations with a rated thermal input exceeding 50 MW (category 1.1). The tables concern new or substantially changed installations.

There is a [companion document](#) concerning existing installations.

See below for further explanations.

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Explanatory notes

The IPPC Directive 96/61/EC prescribes that member countries must report certain information on industrial activities to the European Commission. The information to be reported includes representative data on emission limit values. The data are classified according to categories of industrial activities, cf. Annex 1 of the directive.

The information presented has been compiled from EU Member States through a questionnaire, as prescribed by the IPPC directive. The reports from the member states have been compiled in the report:

Analysis of Member States' first implementation reports on the IPPC Directive (EU-15) by LDK-ECO Environmental Consultants S.A. Athens, Greece. (June 2004). The report was prepared for the European Commission, Directorate General Environment, Directorate G: Sustainable Development and Integration, Unit G.2 Industry and Environment.

This report is available through

http://europa.eu.int/comm/environment/ippc/ippc_ms_implementation.htm

The information presented on the subsequent pages is extracted from that report, and concerns the sector Combustion installations, new or substantially changed installations.

Where "new" and "old" reports and limit values are referred to, it refers to the years 2003, respectively 2001.

The emission limit values in the tables are meant to be representative values of permits issued in the Member States. Ideally, they should represent the limit value for the median installation in a given category.

The abbreviations used in the subsequent tables have the following meaning:

No I.	No installations
C	Continuous measurement method including continuous sampling
P	Periodical measurement method
Calc	Calculation method using consumption of raw materials
HHA V	Half hourly average value
HAV	Hourly average value
DAV	Daily average value
MAV	Monthly average value
YAV	Yearly average value

Notes on remarks or text:

- Text in italics means that this text (remarks or ELV) was not comprised anywhere in the new reports of the Member States (MS). They are usually highlighted in yellow colour, but in some occasions in green colour as well (there is no difference concerning these colours)

- Yellow highlighted text means that this text (either remark or ELV) needs to be checked for small differences that are met between the two articles.
- Yellow highlighted remarks under the label “FOE”. These remarks were made by the person that has checked the aggregated tables, in order to provide additional information.
- Green highlighted text means that this text (either remark or ELV) was found in the new reports of the Member States (MS) and added to the tables.

Notes on Pollutant's Cells:

- Grey cells in general indicate that new or different ELV are found in the new reports (under Article 16(3)) comparing to the old aggregated tables (Article 16(1)). Therefore, in most cases, there are two cells per pollutant, the one comprising the old ELV (where the values are in italics) and another one that comprises the new ELV. However, in some cases, the old values are not in italics and placed in a white cell, indicating that the new ELV (in grey cell) are additional ELV and do not replace the old ELV.
- Grey rows in particular, indicate that the comprised pollutants were not included in the old aggregated tables and are considered in the present tables, under Article 16(3).

Notes on columns:

- The columns referring to UK's ELV are in a pale-green colour that indicates the submission of ELV by this MS, for the first time.

1.1.1 Combustion installations using solid fuels with a rated thermal input exceeding 50 MW

Typically, there are two rows for each pollutant, corresponding to "old" and "new" reports from Member States. See the *Explanatory Notes* on the first page for explanation of color coding etc.

Air pollutant	A ^{A1}	B	DK ^{DK1} MAV	FIN ^{FIN1} FIN2	F	D ^{D1} D ^{D2}	EL	IRL ^{IRL1}
Particulates	No l.		No l.	No l.	No l.	50 ^{DAV} HHAV	No l.	30 ^{DAV} 60 ^{HAV}
	10 ^{HHAV} (mg/m ³)		50 (mg/m ³)	30 (mg/m ³)		(mg/m ³)		(mg/m ³)
PM₁₀	No l.		No l.	No l.	No l.	None	No l.	None
	None (mg/m ³)		None	None				
CO	No l.		No l.	No l.	No l.	250 ^{DAV} HHAV	No l.	200 ^{DAV} 400 ^{HAV}
	100 ^{HHAV} DAV (mg/m ³)		625 (mg/m ³)	250 (mg/m ³)		(mg/m ³)		(mg/m ³)
NOx	No l.		No l.	No l.	No l.	400 ¹ DAV HHAV 200 ² DAV HHAV	No l.	200 ^{DAV} 400 ^{HAV}
	100 ^{HHAV} DAV (mg/m ³)		400 (mg/m ³)	300 270 ³ (mg/m ³)		(mg/m ³)		(mg/m ³)
SOx	No l.		No l.	No l.	No l.	2000 ⁴ DAV HHAV 2000 and 60% ⁵ DAV HHAV 400 and 85% ⁶ DAV HHAV	No l.	None
	200 ^{HHAV} DAV (mg/m ³)		400 (mg/m ³)	200 (mg/m ³)		400 and 95% ⁷ DAV HHAV (mg/m ³ and ROD)		
Metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No l.		No l.	No l.	No l.	0.5 ⁸ HHAV	No l.	None
	None		None	None		(mg/m ³)		
PCDD/PCDF	No l.		No l.	No l.	No l.	None	No l.	None

A¹ Reference conditions: 3% O₂

DK¹ Reference conditions: 6% O₂

FIN¹ Reference conditions: 6% O₂

FIN² daily average and 95 % of annual hourly average under 200% of the limit (DAV, HAV)

D¹ Reference conditions: 5%, 6% or 7% O₂; O₂% depending on combustion technology

D² Where waste is co-incinerated mixed ELVs apply.

IRL¹ Reference conditions: 272K, 101.3 kPa, dry gas 6% O₂

¹ MW > 50 to 300

² MW > 300

³ low limit (when burning peat)

⁴ MW > 50 to 100

⁵ MW > 100 to 300

⁶ MW > 300

⁷ combustion of brown coal with a high sulfur content

⁸ As+Pb+Cd+Cr+Co+Ni

	None		None	1 ¹⁰				
				(ng/m ³)				
PCB	None		None	None	No l.	None	No l.	None
NH₃	10 ^{HHAV} (mg/m ³)		None	None	No l.	None	No l.	None

⁹ target value: 0.1 ng/m³; minimisation obligation; only relevant for combustion of wood and wood residues containing chlorinated compounds

¹⁰ once in 3 years

Air pollutant	I	L	NL ^{NL1}	P	E	S	UK
Particulates	No I.		No I.	No I.	100 ^{E1}	No I.	
			5-20 ^{HHAV} (mg/m ³)		(mg/Nm ³)		
PM ₁₀	No I.		None	No I.	None	No I.	
CO	No I.		None	No I.	None ^{E1} ppm	No I.	
NO _x	No I.		No I.	No I.	650 ^{E1}	No I.	
			100 ^{11, HHAV} 200 ^{12, HHAV} (mg/m ³)		(mg/Nm ³)		
SO _x	No I.		No I.	No I.	1000 ^{E1,13}	No I.	
			700 ^{12, DAV} 200 ^{13, DAV} (85 ^{14, DAV}) (mg/m ³)		(mg/Nm ³)		
metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No I.		No I.	No I.	None	No I.	
			1 ¹⁵ (mg/m ³)				
PCDD/PCDF	No I.		No I.	No I.	None	No I.	
			0.1 (ng/m ³)				
PCB	None		None	No I.	None	No I.	
NH ₃	None		None	No I.	None	No I.	

^{NL1} Reference conditions: 6% O₂

^{E1} biomass facility

¹¹ rated thermal input 50-300 MW

¹² rated thermal input > 300 MW

¹³ SO_x as SO₂

¹⁴ % reduction efficiency, thermal input > 300 MW

¹⁵ As, Cd, Cr, Cu, Hg, Ni, Pb, Sn, Zn

1.1.2 Combustion installations using liquid fuels with a rated thermal input exceeding 50 MW

Air pollutant	A	B	DK ^{DK1}	FIN ^{FIN1}	F ^{F1}	D ^{D1 D2}	EL	IRL
Particulates	No I.		No I.	50 ^{FIN1}	15 ¹⁶ 20 ¹⁷ 100 ¹⁸	50 ^{DAV} HHA V	No I.	No I.
			50 (mg/m ³)	(mg/m ³ (n))	50 ¹⁹ (mg/m ³)	(mg/m ³)		
PM ₁₀	No I.		No I.	None	None	None	No I.	No I.
			None					
CO	No I.		No I.	None	85 ²⁰ HHA V 650 ²¹ HHA V	175 ^{DAV} HHA V	No I.	No I.
			500 (mg/m ³)		50 ²² HHA V (mg/m ³)	(mg/m ³)		
NO _x	No I.		No I.	None	120 ²³ HHA V 600 ²⁴ HHA V 1000 ²⁵ HHA V	300 ²⁶ DAV HHA V 150 ²⁷ DAV HHA V	No I.	No I.
			225 (mg/m ³)		400 ²⁸ HHA V (mg/m ³)	(mg/m ³)		
SO _x	No I.		No I.	None ²⁹	120 ³⁰ HHA V 550 ³¹ HHA V 3000 ³² HHA V 1500 ³³ HHA V	1700 ³⁴ DAV HHA V 1700 and 60% ³⁵ DAV HHA V 400 and 85% ³⁶ DAV HHA V	No I.	No I.
			400 (mg/m ³)		300 ³⁷ HHA V (mg/m ³)	(mg/m ³ , ROD ³⁸)		

^{DK1} Reference conditions: 3% O₂

^{F1} 5 % O₂ for combustion engines, 15% O₂ for combustion turbines, 273 K, 101.3 kPa

^{D1} Reference conditions: 3% O₂

^{D2} Where waste is co-incinerated mixed ELVs apply.

^{FIN1} Reference conditions: 3% O₂

¹⁶ For combustion turbines using domestic fuel

¹⁷ For combustion turbines using heavy fuel

¹⁸ for combustion motors

¹⁹ The values depend on the type of the installation and the combustion

²⁰ For combustion turbines

²¹ For combustion engines

²² The values depend on the type of the installation and the combustion

²³ For combustion turbines

²⁴ for combustion engines with power > 1000 MW

²⁵ for combustion engines with power < 1000 MW

²⁶ MWth > 50 to 300

²⁷ MWth > 300

²⁸ The values depend on the type of the installation and the combustion

²⁹ content of sulphur in heavy fuel oil < 1.00 % of weight (I can't find this in the Reporting Tool)

³⁰ for combustion turbines using domestic fuel

³¹ for combustion turbines using heavy fuel

³² for combustion engines using domestic fuel

³³ for combustion engines using heavy fuel

³⁴ MWth > 50 to 100

³⁵ MWth > 100 to 300

³⁶ MWth > 300; 400 mg/m³ and 85% ROD or use of light oil

³⁷ The values depend on the type of the installation and the combustion

³⁸ Rate of desulfurization

Air pollutant	A	B	DK ^{DK1}	FIN	F ^{F1}	D ^{D1 D2}	EL	IRL
metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No I.		No I.	None	20 ³⁹	2 ^{40 HHAV}	No I.	No I.
			None		12.5 ⁴¹			
					(mg/m ³)	(mg/m ³)		
PCDD/PCDF	No I.		No I.	None	None	None	No I.	No I.
			None					
NH ₃	No I.		1 (ppm)	None	20 ⁴² 30 ⁴³ (mg/m ³)	None	No I.	No I.

³⁹ Includes the sum of the following metals: Sb+Cr+Co+Cu+Sn+Mn+Ni+Pb+V+Zn for emissions >= 25g/h

⁴⁰ As+Pb+Cd+Cr+Co+Ni; valid for fuels with more than 12 ppm Ni and liquid fuels without norm only

⁴¹ Includes the sum of the following metals: Sb+Cr+Co+Cu+Sn+Mn+Ni+Pb+V+Zn for emissions >= 25g/h

⁴² For combustion turbines

⁴³ For combustion engines

Air pollutant	I	L	NL ^{NL1}	P	E ^{E1}	S	UK
Particulates	No I.		No I.	No I.	20 ^{E2 E3}	No I.	50
			50-100 ^{44, HHAV} 0 ⁴⁵		(mg/Nm ³)		(mg/m ³)
PM ₁₀	No I.		None	No I.	None	No I.	None
CO	No I.		None	No I.	None	No I.	300 (mg/m ³)
NOx	No I.		No I.	No I.	120 ^{E2 E3}	No I.	750
			120 ^{HHAV}		(mg/Nm ³)		(mg/m ³)
SOx	No I.		No I.	No I.	111 ^{E2} 30 ^{E3}	No I.	None
			1700 ^{32, DAV} 200 ^{31, DAV} (85 ^{46, DAV})		(mg/Nm ³)		
Metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No I.		None	No I.	None	No I.	None
PCDD/PCDF	No I.		None	No I.	None	No I.	None
NH ₃	No I.		None	No I.	None	No I.	None

^{NL1} Reference conditions: 3% O₂

^{E1} Reference conditions: 15% O₂, dry gas

^{E2} operational situation: high quality air

^{E3} operational situation: quality of air with low level of pollution

⁴⁴ = 300 MW

⁴⁵ < 300 MW

⁴⁶ % reduction efficiency, thermal input = 300 MW

1.1.3 Combustion installations using gaseous fuels with a rated thermal input exceeding 50 MW

Air pollutant	A	B	DK	FIN	F ^{F2}	D ^{D1 D2}	EL	IRL ^{IRL2}
Particulates	No l.		No l.	40 ¹	10	5 ² HHAV 10 ³ HHAV 50 ⁴ HHAV	No l.	2
			5	40 ⁵	5 ⁶			
			(mg/m ³)	(mg/MJ)	(mg/m ³)	(mg/m ³)		(mg/m ³)
PM ₁₀	No l.		No l.	None	None	None	No l.	None
			None					
CO	No l.		No l.	None	85 ⁷ HHAV	100 ⁷ DAV HHAV	No l.	None
			500		100 ⁸ HHAV			
			(mg/m ³)		(mg/m ³)	(mg/m ³)		(mg/m ³)
NOx	No l.		No l.	50 ⁹ 150 ¹⁰	50 ¹¹ 250 ¹²	200 ¹³ HHAV 100 ¹⁴ DAV HHAV	No l.	50
			225	50 ¹⁵ 150 ¹⁶	350 ¹⁷ HHAV			
			(mg/m ³)	(mgNO ₂ /MJ)	(mg/m ³)	(mg/m ³)		(mg/m ³)
SOx	No l.		No l.	None	10 ¹⁸ 35 ¹⁹	35 ²⁰ HHAV 5 ²¹ HHAV 100 ²² HHAV 200- 800 ²³ HHAV	No l.	12
			35		35 ²⁴ HHAV			
			(mg/m ³)		(mg/m ³)	(mg/m ³)		(mg/m ³)
metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No l.		No l.	None	20 ²⁵	None	No l.	None

F² 273 K, 101.3 kPa, 5 % O₂ for combustion engines, 15% for combustion turbines

D¹ Reference conditions: 3% O₂

D² Where waste is co-incinerated mixed ELVs apply.

IRL² 272 K, 101.3 kPa, dry gas 15% O₂ – Gas turbine

¹ Per installation

² gaseous fuels in general

³ blast furnaces

⁴ industrial off-gases from steel-production

⁵ burning oil

⁶ The values depend on the type of the installation

⁷ gaseous fuels in general

⁸ The values depend on the type of the installation

⁹ only thermal input

¹⁰ oil input

¹¹ for combustion turbines

¹² for combustion engines with power > 100 MW, otherwise ELV 350 mg/m³

¹³ MWth > 50 to 300

¹⁴ MWth > 300

¹⁵ burning natural gas

¹⁶ burning oil

¹⁷ The values depend on the type of the installation and its power

¹⁸ for combustion turbines

¹⁹ for combustion engines

²⁰ gaseous fuels in general

²¹ liquid gas

²² coke-oven gas

²³ combustion gases used jointly at steel works and cooking plants

²⁴ The values depend on the type of the installation

²⁵ includes the following metals: Sb+Cr+Co+Cu+Sn+Mn+Ni+Pb+V+Zn for emissions >= 25g/h

Air pollutant	A	B	DK	FIN	F ^{F2}	D ^{D1 D2}	EL	IRL ^{IRL2}
			None					
					(mg/m ³)			
PCDD/PCDF	No I.		No I.	None	None	None	No I.	None
			None					
PCB	No I.		None	None	None	None	No I.	None
NH ₃	No I.		None	None	20 (mg/m ³)	None	No I.	None

Air pollutant	I	L	NL ^{HHAV}	P	E ^{E1}	S	UK
Particulates	No l.		No l.	No l.	None	No l.	50 ²⁶
	50 ¹¹		5 ^{NL1, 27} 20 ^{NL1, 28} 10 ^{NL1, 29}				
	(mg/m ³)		(mg/m ³)				(mg/m ³)
PM ₁₀	No l.		None	No l.	None	No l.	None
	None						
CO	No l.		None	No l.	None	No l.	100 ^{UK1}
	30 ¹²						
	(mg/m ³)						(mg/m ³)
NO _x	No l.		No l.	No l.	75 ^{E2} 60 ^{E3}	No l.	125 ^{UK2}
	50 ¹²		70 ^{NL1, 30} 80-110 ^{NL1, 31} 110-140 ^{NL1, 32} 45-65 ^{NL2, 33} 100-140 ^{NL2, 34}				
	(mg/m ³)		(mg/m ^{3,35})		(mg/Nm ³)		(mg/m ³)
SO _x	No l.		No l.	No l.	11.6 ^{E2 E3}	No l.	None
	400 ¹¹		35-800 ^{NL1, 36} 200-400 ^{NL1, 37} 120-150 ^{NL1, 38} 35 ^{NL1, 39} 5 ^{NL1, 40}				
	(mg/m ³)		(mg/m ³)		(mg/Nm ³)		
Metals and their compounds (Cu, Pb, As, Ni, Cd, Zn, Cr, Hg, Sn)	No l.		None	No l.	None	No l.	None
	0.2 ^{41, 42, 11}						
	(mg/m ³)						
PCDD/PCDF	No l.		None	No l.	None	No l.	None

E¹ Reference conditions: 15% O₂, dry gas

²⁶ When firing on backup fuels (oil)

¹¹ Reference conditions: 3% O₂

NL¹ Reference conditions: standard, 3% O₂

²⁷ refinery gas, LPG, other gas (incl. natural gas)

²⁸ coke oven gas, oxygen steel furnace gas

²⁹ blast furnace gas

UK¹ Reference conditions: 3% O₂

¹² Reference conditions: 15% O₂

E² pre-operational situation: high quality air

E³ pre-operational situation: quality of air with low level of pollution

UK² Reference conditions: 3-15% O₂

³⁰ boiler

³¹ process furnace with other gas (incl. natural gas)

³² process furnace with process gas

NL² Reference conditions: 15% O₂, ISO

³³ gas turbine

³⁴ gas engine

³⁵ fourth and fifth line are in g/GJ

³⁶ refinery gas

³⁷ coke oven gas

³⁸ blast furnace gas

³⁹ oxygen steel furnace gas, other gas (incl. natural gas)

⁴⁰ LPG

⁴¹ Cd, Hg, Tl

⁴² mass flow = 1 g/h

Air pollutant	I	L	NL	P	E ^{Et}	S	UK
	0.01 ^{43, 11} (mg/m ³)						
PCB	0.5 ⁴⁴ (mg/m ³)		None	None	None	No I.	None
NH ₃	100 (mg/m ³)		None	None	None	No I.	None

⁴³ mass flow = 0.02 g/h

⁴⁴ mass flow = 0.5 g/h