Emission limit values: Comparative tables for cement industry, existing installations in the EU

The present document contains comparative tables of emission limit values for cement industry in the EU. The sector considered is installations for production of cement clinker in rotary kilns with a production capacity exceeding 50 tonnes per dayor in other furnaces with a production capacity exceeding 50 tonnes per day (Category 3.1 as defined in Annex I of the IPPC Directive). The tables concern existing installations.

There is a companion document concerning new or substantially changed installations.

See below for further explanations.

Contents

Explanatory notes 1
3.1 Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day 3

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 for cement, existing 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
HHAV	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.

3.1 Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day

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]	FIN	F[F1]	D[D1 D2]	EL	IRL[IRL6]
Particulates	*50 HHAV*		*50[DK2] 50[DK3] 50[DK4]*	*50-100 MAV*	*50 [1] MAV*	*50[2] DAV HHAV*	*100 / 150 [3]*	*120*
	(mg/m³)		None *(mg/m³)*	100[4] 50[5] *(mg/m³(n))*	*(ng/Nm³)*	*(mg/m³)*	*(mg/Nm³)*	*(mg/m³)*
					(mg/Nm³)			
CO	None		None	None	None	None	None	None
NOx	1000 HHAV		*1250[DK2] 2750-3000[DK3] 1250[DK4]*	1800 MAV	*1200 MAV*	800 DAV HHAV	[6, 3]	1800
	(mg/m³)		None (mg/Nm³)	(mg/m³(n))	1500 [7] MAV (mg/Nm³)	500[8] DAV HHAV (mg/m³)		(mg/m³)
SOx	200[9] HHAV		*10[DK2] 500[DK3] 500[DK4]*	400 DAV	*1200 MAV*	400 DAV HHAV	[10 , 3]	750
	(mg/m³)		None (mg/Nm³)	(mg/m³(n))	500[11] MAV (mg/Nm³)	(mg/m³)		(mg/m³)
metals and their compounds (Hg, Cd, Tl, As, Co, Ni, Se, Te, Sb, Pb, Cr, Cu, Mn, V, Sn, Zn)	0.2 [12] HHAV 1 [13] HHAV		None	[14] Hg 1.0; Cu 300 Ni 180; Zn 300; Cr 300; Cd 1.5; Pb 180; V 100	[15] [16]	HHAV 0.2[17] 1[18] 5[19]	[3]	None

[A1] Reference conditions: 10% O_2
[DK1] Reference conditions: 10% O_2, units refer to dry air
[F1] Reference conditions: 0° C, 101.3 kPa
[D1] Reference conditions: 10% O2
[D2] in case of combustion together with waste mixed-ELVs are valid
[IRL6] Reference conditions: 273 K, 101.3 kPa, dry gas, 3% O2 for liquid and gas fuels, 6 % O2 for solid fuels
[DK2] Semiwet process, Grey cement
[DK3] Wet process, Grey cement
[DK4] Wet process, White cement
[1] Clinker Cooler: 100 mg/Nm³, oven, grinder, drier, 50 mg/Nm³ **(FOE: No information about it)**
[2] Using standard fuel
[3] The limit or guide value for each relevant pollutant and carbon monoxide in the exhaust gas resulting from coincineration of hazardous waste must be calculated according to annex II of JMD 2487/455/99.
[4] Old kiln
[5] Old kiln; target value
[6] In cement works it is permitted to use fuels (standard fuels) with high sulphur content, provided the sulphur dioxide produced is absorbed in the product.
[7] The ELV's depend on the type of the installation
[8] new or substantially changed installations permitted after 12 May 1997
[9] Depending on the raw material exceeding up to 400 mg/m³; sometimes permitted
[10] In cement works it is permitted to use fuels (standard fuels) with high sulphur content, provided the sulphur dioxide produced is absorbed in the product.
[11] The ELVs are different if there is incineration of wastes (industrial or not)
[12] sum of Cd, Tl, Be; each 0.1 mg/m³ at most
[13] sum of As, Co, Ni, Pb
[14] the conditions for the metals are for the solvent

Air pollutant	A[A1]	B	DK[DK1]	FIN	F[F1]	D[D1 D2] HHAV	EL	IRL[IRL6]
	(mg/m^3)			(mg/kg)	(mg/Nm^3)	Cr 1[20] (mg/m^3)		
PCDD/PCDF	0.1[21] HAV YAV		None		*None*	0.1[22]	[3]	None
	(ng/m^3)				0.1 (ng/m^3)	(ngTE/m^3)		

FOR **DENMARK** IT SEEMS AS IF THE ELV FOR **NEW INSTALLATIONS** (FROM THE REPORTING TOOL) CORRESPONDE TO THE ELV FOR **EXISTING INSTALLATIONS** OF THE OLD AGGREGATED TABLE AND VICE VERSA.

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[15] Cd+Tl+Hg: 0.2 mg/Nm^3
As+Co+Ni+Se+Te: 1 mg/Nm^3
Sb+Cr+Cu+Sn+Mn+Pb+Va+Zn: 5 mg/Nm^3

[16] annually

[17] sum of Hg, Cd, Tl; using standard fuel; sum of vaporours, gaseous and particulate emissions

[18] sum of As, Co, Ni, Se, Te; using standard fuel; sum of vaporours, gaseous and particulate emissions

[19] sum of Sb, Pb, Cr, Cu, Mn, Pt, Pd, Rh, V, Sn; using standard fuel; sum of vaporous, gaseous and particulate emissions

[20] using standard fuel, Cr: limit value is depending on type of Cr compounds:
* carcinogenic Cr-VI-compounds as sum of carcinogenic As, Cr-VI, Co and Ni and their compounds, 3,3'-dichlorobenzidine, dimethyl sulfate, ethyleneimine (class II carcinogenic compounds) at a mass flow of 5 g/h or more; also valid for coinciding classes I and II; minimisation obligation
* Cr and its compounds as sum of Sb, Pb, Cr, Cu, Mn, Pt, Pd, Rh, V, Sn (class III particulate inorganic compounds)

[21] if waste is used as fuel

[22] target value; minimisation obligation;
When using standard fuels, real emissions are explicit less than the target value; if standard fuels are substituted by waste → see general remark

Air pollutant	I	L	NL[NL1] [NL2]	P	E	S	UK
Particulates	50[23] 150[24]		15 DAV	No data	30 E1 E2 25 13-185	50 MAV	50[26]
	(mg/m^3)		(mg/m^3)		50 E1 E2 27 (mg/Nm^3)	(mg/Nm^3)	
CO	None		None	No data	150-1300 (mg/Nm^3)	Missing	None
NOx	1800-3000[28] (mg/m^3)		1300 DAV (mg/m^3)	No data	1200 E1 E2 29 35-750 (mg/Nm^3)	0.5 MAV 85 (kg/ton) (%)	1540[30] (mg/m^3)
SOx	600[31] (mg/m^3)		225 10-DAV (mg/m^3)	No data	600 E2 32 (mg/Nm^3)	0.48 MAV 90 (kg/ton) (%)	2300[33] (mg/m^3)
metals and their compounds (Hg, Cd, Tl, As, Co, Ni, Se, Te, Sb, Pb, Cr, Cu, Mn, V, Sn, Zn)	5[34, 35] 0.2[36, 37] 1[38, 39]		*Hg 0.05; Tl 0.05; 1*[40]	No data	As 3; Cd 2; Cr 15; Cu 5; Hg 2; Ni 55; Pb 80; Zn 25	S1	Hg: 0.1[41]
	(mg/m^3)		1[42] (mg/m^3)		(mg/Nm^3)		(mg/m^3)
PCDD/PCDF	0.01[43] (mg/m^3)		0.1 (ng I-TEQ/m^3)	No data	None	S1	0.1[44] (ng/m^3)

[NL1] Reference conditions: 11% O_2
[NL2] Rotary kiln
[23] mass flow = 0.5 kg/h
[24] mass flow = 0.1 kg/h and < 0.5 kg/h
[E1] Reference conditions: normal conditions of pressure and temperature: (101.3 kPa, 273°K) 10% O_2 Normalised fuel gases
[E2] other ELVs can be authorized when waste valorization
[25] Cement Furnaces and coolers; other emission focus
[26] 30 minute sample
[E1] Reference conditions: normal conditions of pressure and temperature: (101.3 kPa, 273°K) 10% O_2 Normalised fuel gases
[E2] other ELVs can be authorized when waste valorization
[27] Cement Furnaces and coolers; other emission focus
[28] LV referred of wet effluents
[29] data from dry furnaces
[30] 24 hour sample
[31] LV referred of wet effluents
[32] data from dry furnaces; If it is not possible to get this value when raw sulphur materials are used, it must be noticed
[33] 24 hour sample
[34] Metals Cu, Pb, V, Rh, Pd, Pt, Mn, Sb, CN, Cr(III), Sn
[35] mass flow = 25 g/h
[36] Cd+Hg+Tl
[37] mass flow = 1 g/h
[38] As+Ni+Cr(VI)+Co
[39] mass flow = 5 g/h
[40] sum of As, Co, Ni, Se, Te, Sb, Pb, Cr, Cu, Mn, V, Sn
[S1] No ELVs exist but the emissions described in EIAs in the permits may not be exceeded. These values are reportidely below most/all ELVs in other EU countries.
[41] 30 minute sample
[42] As,Cd,Co,Cr,Cu,Hg,Mn,Ni,Pb,Sb,Se,Sn,Te,Tl,V,Zn
[43] mass flow = 0.02 g/h
[44] 6-8 hour sample