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**ECONOMIC COMMISSION FOR EUROPE**

EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE  
TRANSBOUNDARY AIR POLLUTION

Working Group on Strategies and Review

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Geneva, 31 August–4 September 2009

Item 4 of the provisional agenda

OPTIONS FOR REVISING THE GOTHENBURG PROTOCOL

**DRAFT TECHNICAL ANNEX ON DUST**

Note by the secretariat

*Summary*

At its forty-fourth session in April 2009, the Working Group on Strategies and Review welcomed the work carried out by the Expert Group on Techno-economic issues on updating the technical annexes IV, V, VI and VIII and the guidance documents and on elaborating new annexes on volatile organic compounds (VOC) in products and on particulate matter (dust). It requested the secretariat to submit them as official documents for negotiation at the forty-fifth session of the Working Group (ECE/EB.AIR/WG.5/96, para. 42 (d–e)). This note presents a draft technical annex on dust as suggested by the Expert Group on Techno-economic Issues.

## Annex [VII]

### LIMIT VALUES FOR EMISSIONS OF DUST FROM STATIONARY SOURCES

1. Section A applies to Parties other than Canada and the United States of America, section B applies to Canada and section C applies to the United States of America.

A. Parties other than Canada and the United States of America

2. For the purpose of section A limit value means the quantity of a solid substance contained in the waste gases from an installation that is not to be exceeded. Unless otherwise specified, it shall be calculated in terms of mass of pollutant per volume of the waste gases (expressed as mg/m<sup>3</sup>), assuming standard conditions for temperature and pressure for dry gas (volume at 273.15 K, 101.3 kPa). With regard to the oxygen content of exhaust gas, the values given in the tables below for each source category shall apply. Dilution for the purpose of lowering concentrations of pollutants in waste gases is not permitted. In the context of this protocol, dust and TSP have the same meaning. As can be seen from table 8 in the guidance document on general issues, abatement techniques for dust in general provide also a high removal efficiency for PM<sub>2.5</sub> and PM<sub>10</sub>. Start-up, shutdown and maintenance of equipment are excluded.

3. Emissions shall be monitored<sup>a</sup> in all cases. Compliance with limit values shall be verified. The methods of verification can include continuous or discontinuous measurements, type approval, or any other technically sound method. In case of continuous measurements, compliance with the emission standards is achieved if the validated [daily/monthly]<sup>b</sup> emission average does not exceed the limit values. In case of discontinuous measurements or other appropriate determination procedures, compliance with the emission standards is achieved if the mean value based on an appropriate number of measurements under representative conditions does not exceed the value of the emission standard. The inaccuracy of the continuous and discontinuous measurement methods may be taken into account for verification purposes.

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<sup>a</sup> Monitoring is to be understood as an overall activity, comprising measuring or calculating of emissions, mass balancing, etc. It can be carried out continuously or discontinuously.

<sup>b</sup> One option is to define the ELVs as daily averages, another option is to define the ELVs as monthly averages; shorter averaging periods can be considered as being more strict.

4. Sampling and analysis of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated measuring systems and the reference measurement methods to calibrate those systems shall be carried out in accordance with CEN standards. If CEN standards are not available, ISO standards, national or international standards, which will ensure the provision of data of an equivalent scientific quality, shall apply.

5. Special provisions for combustion plants with a rated thermal input exceeding 50 MWth and for combustion plants when combined to a common stack with a total rated input exceeding 50 MWth:

5.1 The competent authority may grant derogation from the obligation to comply with the emission limit values provided for in paragraph 7 in the following cases:

[a] for combustion plants using [only/mainly] gaseous fuel who have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility]

[b] for combustion plants not operated more than XXX operating hours, starting from DATE and ending no later than DATE]

5.2 Where a combustion plant is extended by at least 50MW, the emission limit value specified in paragraph 7 for new installations shall apply to the extensional part and to the plant affected by the change.

5.3 Parties shall ensure that provisions are made in the permits for procedures relating to malfunction or breakdown of the abatement equipment.

5.4 In the case of a multi-fuel firing combustion plant involving the simultaneous use of two or more fuels, the competent authority shall provide rules for setting the emission limit values.

6. Mineral oil refineries complying with the overall dust limit value set in table 1 may be exempted from compliance with the individual dust limit values provided in this annex. Following alternative bubble dust limit value may be used, referring to the sum of the emissions from all combustion plants and process installations expressed as an average concentration and at a reference oxygen content of [3%]:

**Table 1. Suggested options for limit values for dust emissions released from refineries using the bubble concept**

Emission source	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Mineral oil refinery	30	50	100

7. Combustion plants (boilers and process heaters) with a rated thermal input exceeding 50 MWth or combustion plants when combined to a common stack with a total rated input exceeding 50 MWth<sup>c</sup>:

**Table 2. Suggested options for limit values for dust emissions released from boilers [and process heaters]<sup>a/</sup>**

Fuel type	Thermal input [MWth]	Suggested ELV for dust [mg/Nm <sup>3</sup> ] <sup>b/</sup>		
		Option 1 <sup>/</sup>	Option 2 <sup>/</sup>	Option 3 <sup>/</sup>
Solid fuels	50-100	New plants: 10 (coal, lignite) 10 (biomass, peat)	New plants: 20 (coal, lignite) 20 (biomass, peat)	New plants: 50 (coal, lignite) 50 (biomass, peat)
		Existing plants: 15 (coal, lignite) 15 (biomass, peat)	Existing plants: 30 (coal, lignite) 30 (biomass, peat)	Existing plants: 50 (coal, lignite) 50 (biomass, peat)
	100-300	New plants: 10 (coal, lignite) 10 (biomass, peat)	New plants: 20 (coal, lignite) 20 (biomass, peat)	New plants: 30 (coal, lignite) 30 (biomass, peat)
		Existing plants: 15 (coal, lignite) 10 (biomass, peat)	Existing plants: 25 (coal, lignite) 20 (biomass, peat)	Existing plants: 50 (coal, lignite) 50 (biomass, peat)
>300	New plants: 10 (coal, lignite) 10 (biomass, peat)	New plants: 10 (coal, lignite) 20 (biomass, peat)	New plants: 30 (coal, lignite) 30 (biomass, peat)	
	Existing plants: 10 (coal, lignite) 10 (biomass, peat)	Existing plants: 20 (coal, lignite) 20 (biomass, peat)	Existing plants: 50 (coal, lignite) 50 (biomass, peat)	
Liquid fuels	50-100	New plants: 10	New plants: 20	New plants: 50
		Existing plants: 15	Existing plants: 30	Existing plants: 50
	100-300	New plants: 10	New plants: 20	New plants: 30
		Existing plants: 15	Existing plants: 25	Existing plants: 50
	>300	New plants: 5	New plants: 10	New plants: 30
		Existing plants: 10	Existing plants: 20	Existing plants: 50
Natural gas	>50	5	5	5
Combustion plants in refineries	>50	10	20	50

<sup>c</sup> Individual combustion plants below 15 MWth shall not be considered to calculate the total rated input.

a/ In particular, the limit values shall not apply to:

- Plant where the combustion process is an integrated part of a specific production, for example the coke oven used in the Iron and Steel industry and glass and ceramics production plants;
- Plant in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials;
- Post-combustion plants designed to purify the waste gases by combustion which are not operated as independent combustion plants;
- Facilities for the regeneration of catalytic cracking catalysts;
- Facilities for the conversion of hydrogen sulphide into sulphur;
- Reactors used in the chemical industry;
- Coke battery furnaces;
- Cowpers;
- [Recovery boilers for black liquor within installations for the production of pulp]
- Waste incinerators; and
- Plant powered by diesel, petrol or gas engines or by combustion turbines, irrespective of the fuel used.

b/ These values do not apply to combustion plants running less than 500 hours a year. The O<sub>2</sub> reference content is 6% for solid fuels and 3% for others

8. Mineral oil and gas refineries:

**Table 3. Suggested options for limit values for dust emissions released from mineral oil and gas refineries**

Emission source	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
FCC regenerators	20	40	200

Oxygen reference: dry basis, 3% for combustion, 15 % for gas turbines.

9. Cement production:

**Table 4. Suggested options for limit values for dust emissions released from cement production<sup>a/</sup>**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Cement installations	15	20	50

a/ Installations for the production of cement clinker in rotary kilns with a capacity >500 Mg/day or in other furnaces with a capacity >50 Mg/day. The oxygen reference content is 10 %.

## 10. Lime production:

**Table 5. Suggested options for limit values for dust emissions released from lime production**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Lime production	15	20	30

## 11. Production and processing of metals:

## Iron and steel production:

**Table 6. Suggested options for limit values for dust emissions released from primary iron and steel production**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/ b/</sup>
Sinter plant (>150 t/day)	15 <sup>a/</sup>	50 <sup>a/</sup>	50
Pelletization plant (>150 t/day)	5 <sup>a/</sup>	10 <sup>a/</sup>	25
Blast furnace: Hot stoves (>2.5 t/hour)	5 <sup>a/</sup>	10 <sup>a/</sup>	50
Basic oxygen steelmaking and casting (>2.5 t/hour)	10 <sup>a/</sup>	30 <sup>a/</sup>	50
Electric steelmaking and casting (>2.5 t/hour)	10 (existing) 5 (new)	15 (existing) 5 (new)	20

a/ As an exemption to paragraph 3, these ELVs should be considered as averaged over a substantial period of time

b/ Based on the heavy metal protocol based on a daily average

## Iron foundries:

**Table 7. Suggested options for limit values for dust emissions released from iron foundries**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Iron foundries (>20 t/day): - all furnaces (cupola, induction, rotary) - all mouldings (lost, permanent)	10	20	50
Hot and cold rolling	10	20	30

## Production and processing of non ferrous metals:

**Table 8. Suggested options for limit values for dust emissions released from non ferrous metals production and processing**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ] [daily]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
non ferrous metal processing <sup>a/</sup>			
- fabric filters, ceramic filters:	[3] 7	[5] 12	20 20
- electrostatic precipitators:	10	20	20
- scrubbers:			

a/ The choice of abatement technique depends on local conditions, cross-media effects, geographical location and technical characteristics of the plant. Socio-economics need also to be considered. The preferred technique for dust abatement is the use of a fabric filter or a ceramic filter. Electrostatic precipitators should be used for gases containing too much moist, for hot gases, or when the dust is too sticky. Scrubbers should be used as the temperature or the nature of the gases precludes the use of other techniques, or when gaseous elements or acids have to be removed simultaneously with dust.

12. Glass production:

**Table 9. Suggested options for limit values for dust emissions released from glass production**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
New installations	10	30	50
Existing installations	15	30	50

For combustion gases: dry, 8 % oxygen by volume (continuous melters), 13 % oxygen by volume (discontinuous melters).

13. Pulp production:

**Table 10. Suggested options for limit values for dust emissions released from pulp production**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Auxiliary boiler	25	40	40
Recovery boiler and lime kiln	40	50	80

## 14. Waste incineration:

**Table 11. Suggested options for limit values for dust emissions released from waste incineration**

	Suggested ELV for dust [mg/Nm <sup>3</sup> ]		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Municipal waste incineration plants (> 3 tonnes/hour)	3	5	10
Hazardous and medical waste incineration (> 1 tonne/hour)	3	5	10

Oxygen reference: dry basis, 11%.

## 15. Wood processing:

**Table 12: Suggested options for limit values for dust emissions from for wood processing industry**

	Suggested dust Limit value (mg/Nm <sup>3</sup> )		
	ELV1	ELV2	ELV3
Dryer	25	50	100
Panel production <sup>1</sup>	1	5	10
Other wood processing industry <sup>1</sup>	25	50	100

<sup>1</sup>emissions from dryers are not included

## 16. Titanium dioxide production:

**Table 13. Suggested options for limit values for dust emissions released from titanium dioxide production**

	Suggested ELV for dust		
	Option 1 <sup>1/</sup>	Option 2 <sup>1/</sup>	Option 3 <sup>1/</sup>
Sulphate process, emission main sources [mg/Nm <sup>3</sup> ]	12	20	50
Chloride process, emission main sources [kg/t of TiO <sub>2</sub> ]	0.15	0.2	50 [mg/Nm <sup>3</sup> ]



B. Canada<sup>2/</sup>

C. United States of America<sup>2/</sup>

Note

1/ The definitions of option 1, option 2 and option 3 are as follows. These options were designed to leave maximum flexibility for discussion by the Working Group on Strategies and Review.

Options for ELVs are as follows:

- Option 1: ELV1 is a demanding but technically feasible option with the objective of achieving a high level of reduction. The ELV1 is based on a value between the lower and upper BAT AEL, (where it is available),
- Option 2: ELV2, while technically demanding, pays greater attention to the costs of the measures for achieving reduction. The ELV2 is a value based on the upper BAT AEL (where it is available),
- Option 3: ELV 3 represents current [good] practices based on the legislation of a number of Parties to the Convention.

2/ Up to now, no information has been provided by North America, therefore part B and C of the annex have not been modified yet.

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