

Convention on Long-Range Transboundary Air Pollution

45<sup>th</sup> Working Group on Strategies and Review – 31 August 2009 to 4 September 2009

Technical Annex prepared by EGTEI

# **Suggested Technical Annex IV to the Gothenburg Protocol**

**Annex IV**

**LIMIT VALUES FOR EMISSIONS OF SULPHUR 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, except tables 3, 4 and 5, limit value means the quantity of a gaseous 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 the 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. 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.

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:

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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.

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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 SO<sub>2</sub> in respect of a combustion plant which to this end normally uses low-sulphur fuel, in cases where the operator is unable to comply with those limit values because of an interruption in the supply of low-sulphur fuel resulting from a serious shortage]

[b] for SO<sub>2</sub> in respect of a combustion plant firing indigenous solid fuel, which cannot comply with the emission limit values for SO<sub>2</sub> provided for in paragraph 7; instead at least following rates of desulphurisation have to be met:

Existing plants: 50 - 300 MW: 92 % [UNECE-GP: 90% for 50-100 MW; 92% for 100-300 MW]

New plants: 50 - 300 MW: 93 % [UNECE-GP: 40% for 50-150 MW; 40-90% (linear increase) for 150-500 MW]

Existing plants: > 300 MW: 96 % [UNECE-GP: 40-90% (linear increase) for 150-500 MW; 90% for >500 MW]

New plants: > 300 MW: 97 % [UNECE-GP: 95% for >300 MW]

[c] 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]

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

[e] for existing combustion plants using solid or liquid fuels not operated more than 1500 operating hours per year as a rolling average over a period of five years; instead following emission limit values apply:

for solid fuels: [option 1 = 800 mg/Nm<sup>3</sup>; option 2 = 800 mg/Nm<sup>3</sup>; option 3 = 2000 mg/Nm<sup>3</sup>]<sup>1</sup>

[UNECE-GP: 2000 mg/Nm<sup>3</sup> for 50-100 MW; 2000-400 mg/Nm<sup>3</sup> (linear decrease) for 100-500 MW; 400 mg/Nm<sup>3</sup> for >500 MW]

[EU-LCPD: 800 mg/Nm<sup>3</sup> for >400 MW if operated less than 2 000 hours (31 December 2015) resp. less than 1500 hours (from 1 January 2016);

for liquid fuels: [option 1 = 850 mg/Nm<sup>3</sup>; option 2 = 850 mg/Nm<sup>3</sup>; option 3 = 1700 mg/Nm<sup>3</sup>]<sup>1</sup>

[UNECE-GP: 1700 mg/Nm<sup>3</sup> for 50-300 MW; 1700-400 mg/Nm<sup>3</sup> (linear decrease) for 300-500 MW; 400 mg/Nm<sup>3</sup> for >500 MW]

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 part of 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 SO<sub>2</sub> limit value set in table 1 may be exempted from compliance with the individual SO<sub>2</sub> limit values provided in this annex. Following alternative bubble SO<sub>2</sub> 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 SO<sub>x</sub> emissions released from refineries using the bubble concept**

Plant type	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ]							
	Option 1/				Option 2/			Option 3/
Mineral oil refinery	200	Lower BAT AEL: ( <i>individual</i> processes) -refinery fuel gas: 5;  -Liquid fuels: 50  BREF: NO CONSENSUS ON BAT-AELs	Use of sulphur removal techniques for fuel gas And use of monitoring  Combination of: Hydrodesulphurization Use of FGD techniques (where feasible and cost-effective)	600	Upper BAT AEL: ( <i>individual</i> processes) -refinery fuel gas: 20;  -Liquid fuels: 850  BREF: NO CONSENSUS ON BAT-AELs	Same as Option 1	1000	EU-LCPD (licence after 2002): 600; (licence before 2002): 1000  UNECE-GP: 1000

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>:

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

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

Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>						
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques	Legislation
Solid fuels	50-100	New plants: 300 (coal, lignite) 250 (peat) 100 (biomass)	Coal, lignite: 200, 150 (FBC)  Peat: 200	Coal, lignite (Grate, PC, BFBC): Low sulphur fuel and FGD (sds, dsi)  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Peat (PC): Limestone injection Calcium hydroxide injection in dry form before the baghouse or ESP FGD(sds )  Peat (FBC): Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)	New plants: 400 (coal, lignite) 300 (peat) 150 (biomass)	Coal, lignite: 400  Peat: 300	Same as for option 1	New plants: 850 (coal, lignite) 850 (peat) 200 (biomass)  EU-IED (permit before 2014): coal, lignite: 400 peat: 300 biomass: 200  EU-IED (permit after 2014): coal, lignite: 400 peat: 300 biomass: 200  EU-LCPD (licence after 2002): 850; biomass 200  UNECE-GP: 850
		Existing plants: 300 (coal, lignite) 250 (peat) 100 (biomass)	Coal, lignite: 200, 150 (FBC)  Peat: 200	Coal, lignite (Grate, PC, BFBC): Low sulphur fuel and FGD (sds, dsi)  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Peat (PC): Limestone injection Calcium hydroxide injection in dry form before the baghouse or ESP FGD(sds )  Peat (FBC):Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)	Existing plants: 400 (coal, lignite) 300 (peat) 150 (biomass)	Coal, lignite: 400  Peat: 300	Same as for option 1	Existing plants: 2000 (coal, lignite) 2000 (peat) 2000 (biomass)  EU-IED (permit before 2014): coal, lignite: 400 peat: 300 biomass: 200  EU-LCPD (licence before 2002): 2000  EU-LCPD (licence after 2002): 850; biomass: 200  UNECE-GP: 2000

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>							
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>		
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation
	100-300	New plants: 150 (coal, lignite) 300 (peat) 100 (biomass)	Coal, lignite: 100  Peat: 200 (PC), 150 (FBC)	Coal, lignite (PC): Low sulphur fuel FGD (wet, sds) FGD (dsi, up to about 200 MWth) Seawater scrubbing Combined techniques for the reduction of NO <sub>x</sub> and SO <sub>2</sub>  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Coal, lignite (BFBC): Low sulphur fuel, FGD (wet, sds)  Peat (PC): Limestone injection Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)  Peat (FBC): Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)	New plants: 200 (coal, lignite) 300 (peat) 150 (biomass)	Coal, lignite: 200  Peat: 300 (PC), 250 (FBC)	Same as for option 1	New plants: 200 (coal, lignite) 300 (peat) 200 (biomass)	EU-IED (permit before 2014): coal, lignite: 250 peat: 300 biomass: 200  EU-IED (permit after 2014): coal, lignite: 200 peat: 300 peat (PC):250 biomass: 200  EU-LCPD (licence after 2002): 200  UNECE-GP: 850-200 (linear decrease)

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>					
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>
		Lower BAT AEL	Techniques	Upper BAT AEL	Techniques	Legislation	
	Existing plants: 150 (coal, lignite) 250 (peat) 100 (biomass)	Coal, lignite: 100  Peat: 200 (PC), 150 (FBC)	Coal, lignite (PC): Low sulphur fuel FGD (wet, sds) FGD (dsi, up to about 200 MWth) Seawater scrubbing Combined techniques for the reduction of NO <sub>x</sub> and SO <sub>2</sub>  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Coal, lignite (BFBC): Low sulphur fuel, FGD (wet, sds)  Peat (PC): Limestone injection Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)  Peat (FBC): Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds)	Existing plants: 250 (coal, lignite) 300 (peat) 150 (biomass)  Peat: 300	Coal, lignite: 250  Same as for option 1	Existing plants: 2000 (coal, lignite) 2000 (peat) 2000 (biomass)  EU-IED (permit before 2014): coal, lignite: 250 peat: 300 biomass: 200  EU-IED (permit after 2014): coal, lignite: 200 peat: 300 peat (PC):250 biomass: 200  EU-LCPD (licence before 2002; 100-500 MW): 2000-400 (linear decrease)  EU-LCPD (licence after 2002): 200  UNECE-GP (100-500): 2000-4000 (linear decrease)	

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>							
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>		
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation
	>300	New plants: 100 (coal, lignite) (FBC: 150) 100 (peat) (FBC:100) 100 (biomass)	Coal, lignite: 20 PC, BFBC; 100 CFBC, PFBC;  Peat: 50	Coal, lignite (PC): Low sulphur fuel, FGD (wet), FGD (sds), Seawater scrubbing, Combined techniques, for the reduction of, NOx and SO2  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Coal, lignite (BFBC): Low sulphur fuel, FGD (wet)  Peat (PC): FGD(wet), FGD(sds), Seawater scrubbing, Combined techniques for the reduction of NOX and SO2  Peat (FBC): Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds) or FGD(wet)	New plants: 150 (coal, lignite) (FBC: 200) 150 (peat) (FBC: 200) 150 (biomass)	Coal, lignite: 150 PC, BFBC; 200 CFBC, PFBC;  Peat: 150 (PC), 200 (FBC)	Same as for option 1	New plants: 200 (coal, lignite) 200 (peat) 200 (biomass)	EU-IED (permit before 2014): coal, lignite: 200 peat: 200 biomass: 200  EU-IED (permit after 2014): coal, lignite: 150 coal, lignite (CFBC, PFBC): 200 peat: 150 peat (FBC): 200 peat (PC): 250 biomass: 150  EU-LCPD (licence after 2002): 200  UNECE-GP: 200



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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>						
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>	
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques	Legislation
		Existing plants: 100 (coal, lignite) (FBC: 150) 100 (peat) 100 (biomass)	Coal, lignite: 20 PC, BFBC; 100 CFBC, PFBC;  Peat: 50	Coal, lignite (PC): Low sulphur fuel, FGD (wet), FGD (sds), Seawater scrubbing, Combined techniques, for the reduction of, NO <sub>x</sub> and SO <sub>2</sub>  Coal, lignite (CFBC, PFBC): Low sulphur fuel, Limestone injection  Coal, lignite (BFBC): Low sulphur fuel, FGD (wet)  Peat (PC): FGD(wet), FGD(sds), Seawater scrubbing, Combined techniques for the reduction of NO <sub>x</sub> and SO <sub>2</sub>  Peat (FBC): Co-combustion of biomass and peat, Limestone injection, Calcium hydroxide injection in dry form before the baghouse or ESP, FGD(sds) or FGD(wet)	Existing plants: 200 (coal, lignite) 200 (peat) 150 (biomass)	Coal, lignite: 200  Peat: 200	Same as for option 1	Existing plants: 1200 (coal, lignite) 1200 (peat) 1200 (biomass)  EU-LCPD (licence before 2002; 100-500 MW): 2000-400 (linear decrease)  EU-LCPD (licence before 2002; >500MW): 400  EU-LCPD (licence after 2002): 200  UNECE-GP (>500): 400
Liquid fuels	50-100	New plants: 200	100	Low sulphur fuel oil, co-combustion of gas and oil, FGD (dsi) or, FGD (sds)	New plants: 350	350	Same as for option 1	New plants: 850  EU-LCPD (licence after 2002): 850  UNECE-GP: 850

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>					
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques
	Existing plants: 200	100	Low sulphur fuel oil, co-combustion of gas and oil, FGD (dsi) or, FGD (sds)	Existing plants: 350	350	Same as for option 1	Existing plants: 1700 EU-IED (permit before 2014): 350 EU-IED (permit after 2014): 350 EU-LCPD (licence before 2002): 1700 EU-LCPD (licence after 2002): 850 UNECE-GP (50-300): 1700
	100-300 New plants: 150	100	Low sulphur fuel oil, co-combustion of gas and oil, and FGD (dsi), or FGD (sds) or, FGD (wet) (depending on the, plant size), Seawater scrubbing, Combined techniques for the, reduction of NO <sub>x</sub> and SO <sub>2</sub>	New plants: 200	200	Same as for option 1	New plants: 400 EU-IED (permit before 2014): 250 EU-IED (permit after 2014): 200 EU-LCPD(licence after 2002): 400-200 (linear decrease) UNECE-GP: 850-200 (linear decrease)

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>					
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>		Option 3 <sup>1/</sup>
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques
	Existing plants: 150	100	Low sulphur fuel oil, co-combustion of gas and oil, and FGD (dsi), or FGD (sds) or, FGD (wet) (depending on the, plant size), Seawater scrubbing, Combined techniques for the, reduction of NOx and SO2	Existing plants: 250	250	Same as for option 1	Existing plants: 1700 EU-IED (permit before 2014): 250 EU-IED (permit after 2014): 200 EU-LCPD (licence before 2002): 1700 EU-LCPD (licence after 2002): 400-200 (linear decrease) UNECE-GP (50-300): 1700
	>300 New plants: 100	50	Low sulphur fuel oil, co-combustion of gas and oil, and FGD (wet), FGD (sds), Seawater scrubbing, Combined techniques for the, reduction of NOx and SO2	New plants: 150	150	Same as for option 1	New plants: 200 EU-IED (permit before 2014): 200 EU-IED (permit after 2014): 150 EU-LCPD (licence after 2002): 200 UNECE-GP: 200

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>							
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>	
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation
		Existing plants: 100	50	Low sulphur fuel oil, co-combustion of gas and oil, and FGD (wet), FGD (sds), Seawater scrubbing, Combined techniques for the, reduction of NOx and SO2	Existing plants: 200	200	Same as for option 1	Existing plants: 1700	EU-IED (permit before 2014): 200 EU-IED (permit after 2014): 150 EU-LCPD (licence before 2002; 300-500MW): 1700-400 (linear decrease) EU-LCPD (licence before 2002; >500 MW): 400 EU-LCPD (licence after 2002): 200 UNECE-GP (300-500): 1700-400 (linear decrease); (>500): 400
Gaseous fuels in general	>50	New plants: 10		BREF: natural gas: well below 10 without any technical measures	New plants: 20		BREF: natural gas: well below 10 without any technical measures	New plants: 35	EU-IED: 35 EU-LCPD: 35 UNECE-GP: 35
		Existing plants: 10		BREF: natural gas: well below 10 without any technical measures	Existing plants: 30		BREF: natural gas: well below 10 without any technical measures	Existing plants: 35	EU-IED: 35 EU-LCPD: 35 UNECE-GP: 35
Liquefied gas	>50	New plants: 5			New plants: 5			New plants: 5	EU-IED: 5 UNECE-GP: 5
		Existing plants: 5			Existing plants: 5			Existing plants: 5	EU-IED: 5 EU-LCPD: 5 UNECE-GP: 5

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>							
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>	
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation
Low-calorific-value gases <sup>c/</sup>	>50	New plants: 200		refinery gas: limit the H <sub>2</sub> S content of the to 20 – 150 mg/Nm <sup>3</sup> leading to an emission of 5 – 20 mg of SO <sub>2</sub> /Nm <sup>3</sup>  [ISP-BREF: Coke oven firing: Use of desulphurized COG (desulphurisation by absorption systems or oxidative desulphurisation)]	New plants: 200			New plants: 400	EU-IED: Coke oven: 400  EU-LCPD (licence after 2002; coke-oven): 400  UNECE-GP: 400
		Existing plants: 200		refinery gas: limit the H <sub>2</sub> S content of the to 20 – 150 mg/Nm <sup>3</sup> leading to an emission of 5 – 20 mg of SO <sub>2</sub> /Nm <sup>3</sup>  [ISP-BREF: Coke oven firing: Use of desulphurized COG (desulphurisation by absorption systems or oxidative desulphurisation)]	Existing plants: 250			Existing plants: 800	EU-IED: Coke oven: 400  EU-LCPD (licence before 2002; refinery, coke-oven, blast furnace): 800  EU-LCPD (licence after 2002; coke-oven): 400  UNECE-GP: 800

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Fuel type	Thermal input [MWth]	Suggested ELV for SO <sub>x</sub> [mg/Nm <sup>3</sup> ] <sup>b/</sup>							
		Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>	
			Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation
Low calorific gases from blast furnace and BOF	>50	New plants: 200			New plants: 200			New plants: 200	EU-IED: Blast furnace: 200  EU-LCPD (licence after 2002; blast furnace): 200  UNECE-GP: Blast furnace: 200
		Existing plants: 200			Existing plants: 400			Existing plants: 800	EU-IED: Blast furnace: 200  EU-LCPD (licence before 2002; refinery, coke-oven, blast furnace): 800  EU-LCPD (licence after 2002; blast furnace): 200  UNECE-GP: Blast furnace: 800
FBC	fluidized bed combustion (circulating, pressurized, bubbling)								

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

- Plants 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;
- Plants 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;

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- [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.
- [Combustion plants running less than 500 hours a year].

b/ The O<sub>2</sub> reference content is 6% for solid fuels and 3% for others.

c/ e.g. gasification of refinery residues or coke oven gas

8. Gas oil:

**Table 3. Limit values for the sulphur content of gas oil<sup>a/</sup>**

	<b>Sulphur content (per cent by weight)</b>
<b>Gas oil</b>	<p>&lt; 0.1</p> <p>(based on Council Directive 1999/32/EC of 26 April 1999 relating to a reduction in the sulphur content of certain liquid fuels and amending Directive 93/12/EEC Limit value already set up in the existing Gothenburg Protocol)</p>

a/ "Gas oil" means any petroleum product within HS 2710, or any petroleum product which, by reason of its distillation limits, falls within the category of middle distillates intended for use as fuel and of which at least 85 per cent by volume, including distillation losses, distils at 350°C. Fuels used in on-road and non-road vehicles and agricultural tractors are excluded from this definition. Gas oil intended for marine use is included in the definition if it meets the description above or it has a viscosity or density falling within the ranges of viscosity or density defined for marine distillates in table I of ISO 8217 (1996).

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9. Mineral oil and gas refineries

Claus plant: for plant that produces more than 50 Mg of sulphur a day:

**Table 4. Suggested options for limit values for SOx emissions released from sulphur recovery units**

Plant type	Suggested efficiency for sulphur recovery <sup>a/</sup> %								
	Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>		
New plant	99.9	Lower BAT AEL 99.9 %	BAT: Staged SRU  General Technology performances: cf. BREF p.343	99.8	Upper BAT AEL 99.5 %	Same as for option 1	99.5	BAT: Staged SRU  General Technology performances: cf. BREF p.343	UNECE-GP: 99.5%
Existing plant	99.5	Same	Same	98.5	Same	Same	97	Same	UNECE-GP: 97%

a/ The sulphur recovery rate is the percentage of the imported H<sub>2</sub>S converted to elemental sulphur as a yearly average.



10. Titanium dioxide production:

**Table 5. Suggested options for limit values for SO<sub>x</sub> emissions released from titanium dioxide production.**

Plant type	Suggested ELV for SO <sub>x</sub> [kg/t of TiO <sub>2</sub> ]								
	Option 1 <sup>1/</sup>			Option 2 <sup>1/</sup>			Option 3 <sup>1/</sup>		
		Lower BAT AEL	Techniques		Upper BAT AEL	Techniques		Legislation	Techniques
Sulphate process, emission main sources	3	1	for digestion process: scrubbing system for calcining process: SO <sub>2</sub> recovery	6	6	Same as for option 1	10	UNECE-GP : 10	Same as for option 1
Chloride process, emission main sources	1.5	1.3	Off-gas scrubbing system	1.7	1.7	Same as for option 1	3	Based on a consensus of the EGTEI group	Same as for option 1

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

10. Limit values for controlling emissions of sulphur dioxide from new stationary sources in the following stationary source category will be determined on the basis of available information on control technology and levels including limit values applied in other countries and the following document: Canada Gazette, Part I. Department of the Environment. Thermal Power Generation Emissions - National Guidelines for New Stationary Sources. May 15, 1993. pp. 1633-1638.

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

11. Limit values for controlling emissions of sulphur dioxide from new stationary sources in the following stationary source categories are specified in the following documents:

- (a) Electric Utility Steam Generating Units - 40 Code of Federal Regulations (C.F.R.) Part 60, Subpart D, and Subpart Da;
- (b) Industrial-Commercial-Institutional Steam Generating Units - 40 C.F.R. Part 60, Subpart Db, and Subpart Dc;
- (c) Sulphuric Acid Plants - 40 C.F.R. Part 60, Subpart H;
- (d) Petroleum Refineries - 40 C.F.R. Part 60, Subpart J;
- (e) Primary Copper Smelters - 40 C.F.R. Part 60, Subpart P;
- (f) Primary Zinc Smelters - 40 C.F.R. Part 60, Subpart Q;
- (g) Primary Lead Smelters - 40 C.F.R. Part 60, Subpart R;
- (h) Stationary Gas Turbines - 40 C.F.R. Part 60, Subpart GG;
- (i) Onshore Natural Gas Processing - 40 C.F.R. Part 60, Subpart LLL;
- (j) Municipal Waste Combustors - 40 C.F.R. Part 60, Subpart Ea, and Subpart Eb; and
- (k) Hospital/Medical/Infectious Waste Incinerators - 40 C.F.R. Part 60, Subpart Ec.

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 at the WGSR. 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, then part B and C of the annex have not been modified yet.