

Annex V

LIMIT VALUES FOR EMISSIONS OF NITROGEN OXIDES 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 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 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. Limit values generally address NO together with NO<sub>2</sub>, commonly named NO<sub>x</sub>, expressed as NO<sub>2</sub>. Start-up, shutdown and maintenance of equipment are excluded.

3. Emissions shall be monitored 1/ 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.

4. Sampling and analysis of pollutants, as well as reference measurement methods to calibrate any measurement system, shall be carried out in accordance with the standards laid down by the European Committee for Standardization (CEN) or by the International Organization for Standardization (ISO). While awaiting the development of CEN or ISO standards, national standards shall apply.

5. Measurements of emissions should be carried out continuously when emissions of NO<sub>x</sub> exceed 75 kg/h.

6. In the case of continuous measurements, except for existing combustion plant covered in table 1, compliance with the emission standards is achieved if the calculated daily mean values do not exceed the limit value and if no hourly value exceeds the limit value by 100%.

7. In the case of continuous measurements for existing combustion plant covered in table 1, compliance with the emission standards is achieved if (a) none of the monthly mean values exceeds the emission limit values; and (b) 95% of all the 48-hour mean values do not exceed 110% of the emission limit values.

8. In the case of discontinuous measurements, as a minimum requirement, 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.

9. Boilers and process heaters with a rated thermal input exceeding 50 MW<sub>th</sub>:

Table 1. Limit values for NO<sub>x</sub> emissions released from boilers a/

	Limit value (mg/Nm <sup>3</sup> ) <sup>b/</sup>
Solid fuels, new installations:	
- Boilers 50 - 100 MW <sub>th</sub>	400
- Boilers 100 - 300 MW <sub>th</sub>	300
- Boilers >300 MW <sub>th</sub>	200
Solid fuels, existing installations:	
- Solid in general	650
- Solid with less than 10% volatile compounds	1300
Liquid fuels, new installations:	
- Boilers 50 - 100 MW <sub>th</sub>	400
- Boilers 100 - 300 MW <sub>th</sub>	300
- Boilers >300 MW <sub>th</sub>	200
Liquid fuels, existing installations	450
Gaseous fuels, new installations:	
Fuel: natural gas	
- Boilers 50 - 300 MW <sub>th</sub>	150
- Boilers > 300 MW <sub>th</sub>	100
Fuel: all other gases	200
Gaseous fuels, existing installations	350

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

- Plant in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials, e.g. reheating furnaces, furnaces for heat treatment;
- Post-combustion plant, i.e. any technical apparatus designed to purify the waste gases by combustion that is not operated as an independent combustion plant;
- 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;
- 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 boilers running less than 500 hours a year. The O<sub>2</sub> reference content is 6% for solid fuels and 3% for others.

10. Onshore combustion turbines with a rated thermal input exceeding 50MW<sub>th</sub>: the NO<sub>x</sub> limit values expressed in mg/Nm<sup>3</sup> (with an O<sub>2</sub> content of 15%) are to be applied to a single turbine. The limit values in table 2 apply only above 70% load.

Table 2. Limit values for NO<sub>x</sub> emissions released from onshore combustion turbines

> 50 MW <sub>th</sub> (Thermal input at ISO conditions)	Limit value (mg/Nm <sup>3</sup> )
New installations, natural gas <sup>a/</sup>	50 <sup>b/</sup>
New installations, liquid fuels <sup>c/</sup>	120
Existing installations, all fuels <sup>d/</sup>	
- Natural gas	150
- Liquid	200

a/ Natural gas is naturally occurring methane with not more than 20% (by volume) of inerts and other constituents.

b/ 75 mg/Nm<sup>3</sup> if:

- Combustion turbine used in a combined heat and power system; or
- Combustion turbine driving compressor for public gas grid supply. For combustion turbines not falling into either of the above categories, but having an efficiency greater than 35%, determined at ISO base load conditions, the limit value shall be 50\*n/35 where n is the combustion turbine efficiency expressed as a percentage (and determined at ISO base load conditions).

c/ This limit value applies only to combustion turbines firing light and medium distillates.

d/ The limit values do not apply to combustion turbines running less than 150 hours a year.

11. Cement production:

Table 3. Limit values for NO<sub>x</sub> emissions released from cement production a/

	Limit value (mg/Nm <sup>3</sup> )
New installations (10% O <sub>2</sub> )	
- Dry kilns	500
- Other kilns	800
Existing installations (10% O <sub>2</sub> )	1200

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.

12. Stationary engines:

Table 4. Limit values for NO<sub>x</sub> emissions released from new stationary engines

Capacity, technique, fuel specification	Limit value <sup>a/</sup> (mg/Nm <sup>3</sup> )
Spark ignition (= Otto) engines, 4-stroke, > 1 MW <sub>th</sub>	
- Lean-burn engines	250
- All other engines	500
Compression ignition (= Diesel) engines, > 5 MW <sub>th</sub>	
- Fuel: natural gas (jet ignition engines)	500
- Fuel: heavy fuel oil	600
- Fuel: diesel oil or gas oil	500

a/ These values do not apply to engines running less than 500 hours a year. The O<sub>2</sub> reference content is 5%.

13. Production and processing of metals:

Table 5. Limit values for NO<sub>x</sub> emissions released from primary iron and steel <sup>a/</sup> production

Capacity, technique, fuel specification	Limit value (mg/Nm <sup>3</sup> )
New and existing sinter plant	400

<sup>a/</sup> Production and processing of metals: metal ore roasting or sintering installations, installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting with a capacity exceeding 2.5 Mg/hour, installations for the processing of ferrous metals (hot rolling mills > 20 Mg/hour of crude steel).

14. Nitric acid production:

Table 6. Limit values for NO<sub>x</sub> emissions released from nitric acid production

Capacity, technique, fuel specification	Limit value (mg/Nm <sup>3</sup> )
– New installations	350
– Existing installations	450

B. Canada

15. Limit values for controlling emissions of nitrogen oxides (NO<sub>x</sub>) from new stationary sources in the following stationary source categories will be determined on the basis of available information on control technology and levels including limit values applied in other countries and the following documents:

- (a) Canadian Council of Ministers of the Environment (CCME). National Emission Guidelines for Stationary Combustion Turbines. December 1992. PN1072;
- (b) Canada Gazette, Part I. Department of the Environment. Thermal Power Generation Emissions - National Guidelines for New Stationary Sources. May 15, 1993. pp. 1633-1638; and
- (c) CME. National Emission Guidelines for Cement Kilns. March 1998. PN1284.

C. United States of America

16. Limit values for controlling emissions of NO<sub>x</sub> from new stationary sources in the following stationary source categories are specified in the following documents:

- (a) Coal-fired Utility Units - 40 Code of Federal Regulations (C.F.R.) Part 76;
- (b) Electric Utility Steam Generating Units - 40 C.F.R. Part 60, Subpart D, and Subpart Da;
- (c) Industrial-Commercial-Institutional Steam Generating Units - 40 C.F.R. Part 60, Subpart Db;
- (d) Nitric Acid Plants - 40 C.F.R. Part 60, Subpart G;
- (e) Stationary Gas Turbines - 40 C.F.R. Part 60, Subpart GG;
- (f) Municipal Waste Combustors - 40 C.F.R. Part 60, Subpart Ea, and Subpart Eb; and
- (g) Hospital/Medical/Infectious Waste Incinerators - 40 C.F.R. Part 60, Subpart Ec.

Note

<sup>1/</sup> Monitoring is to be understood as an overall activity, comprising measuring of emissions, mass balancing, etc. It can be carried out continuously or discontinuously.