

Guideline Bees A

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1 Introduction

The Guideline provides an explanation of the use of the [Besluit emissie-eisen stookinstallaties milieubeheer A](#) (Bees A) (Decree on emission limits for combustion plants, environmental management A) and the [Regeling meetmethoden emissie-eisen stookinstallaties milieubeheer A 2005](#) (Regeling meetmethoden A) (Regulation on measuring methods in respect of emission limits for combustion plants, environmental management 2005, Regulation on measuring methods A), in particular concerning the more complex aspects thereof. Instructive tables have been added and overviews included in appendices. Appendix 1 gives an overview of logistic units to which Bees A applies. Appendix 2 gives a flow diagram of the scope of Bees A. Appendix 3 specifies the prevalent emission standards.

Bees A contributes to the control of the phenomenon of acidification, which is primarily caused by emissions of NO_x, SO₂, ammonia and volatile hydrocarbons. Acidification causes damage to vegetation, reduction of bio-diversity and damage to materials and artworks and monuments. In addition, acidification has harmful effect on human health due to fine dust and ozone formation.

Bees A relates to the discharge (emission) of nitrogen oxides (NO_x), sulphur dioxide (SO₂) and particles (dust) resulting from combustion of fuels in combustion installations of specific logistic units. On the ground of the Wet inzake de luchtverontreiniging (Air Pollution Act, Wlv), Bees defines a combustion installation as: an installation used for energy generation by firing fuels.

The concept of fuel is interpreted in a very wide sense in Bees A. It concerns all solid, liquid and gaseous fuels not designated as waste. (The [Helpdesk Afvalbeheer \(Waste Management\) of SenterNovem](#) can answer the question whether a specific substance is a waste substance or not.) Solid substances are coal, but also, for instance, wood, peat and clean biomass. Liquid fuels are gas oil and heavy fuel oil, but also liquid fuels generated in the logistic unit, such as residual oil. Gaseous fuels can be natural gas and biogas, but also gasses generated in the logistic unit, such as chemical residual gasses. Bees A separately mentions refinery gas, blast-furnace gas, coke-furnace gas, oxygas and liquefied petroleum gas (LPG). Waste incineration plants do not fall under Bees A, but under the Besluit verbranden afvalstoffen (Waste Incineration Decree, Bva). Further information on Bva can be found in the Bva Manual of InfoMil.

This guideline explains the standards that apply to SO₂, NO_x and dust for combustion installations subject to Bees A. Falling under Bees A are combustion installations in large logistic units, such as power stations and large chemical companies.

On the ground of Bees A there is, in addition to the duty to observe the emission standard, also a duty to perform (have perform) a measurement. This applies in respect of each individual combustion installation: when, for example, several identical steam boilers are set up in a logistic unit, a measurement must be performed on each of these steam boilers. The measurement must show that the emission standard is complied with.

The standards of Bees A apply directly and therefore need not be included in the permit. These standards may be deviated from in several cases specified by Bees A. In those cases, the deviating standards concerned must be included in the permit. However, the preamble can point out the fact that Bees A applies.

Bees A makes a distinction between existing and new combustion installations. Existing combustion installations are exclusively those installations for which a permit has been issued before 29 May 1987. This is the date on which Bees A (originally Bees Wet inzake de luchtverontreiniging (Decree

on emission limits for combustion plants, Air Pollution Act) came into force. New combustion installations are all those installations that have been licensed after 29 May 1987. New installations are therefore for the most part also actually existing installations (such as, for instance, a combustion installation from 1992).

Because Bees A was amended in 2005 (Bulletin of Acts, Orders and Decrees 2005, 114, effective 7 April 2005) it was necessary to revise this guideline. The revision of Bees A relates to the implementation of the new Large Combustion Plants Directive (LCP Directive).

Furthermore, licensing authorities and users / owners of combustion installations face a new policy in respect of the abatement of NO_x emissions: the emissions trade. This guideline explains the relation between Bees A and emissions trade.

This guideline also explains the relation between Bees A and the Integrated Pollution Prevention and Control (IPPC) Directive.

At the moment of publication of this guideline, a start was made with the revision of Bees A and Bees B. This process is called "recalibration of Bees". The process aims, among other things, to reduce the costs for the government and industry, to make Bees more accessible and to improve the alignment with European legislation.

It is recommended to read this guideline in combination with the Manual Measurement of air emissions (InfoMil publication no. LB40).

This guideline is intended exclusively as an aid in the application of Bees A. No rights may be derived from the text.

2 Scope of Bees A (Articles 1 and 2)

2.1 Logistic units

Each combustion installation that is part of a logistic unit as meant in Article 1.b of Bees A falls under this decree. Appendix 1 gives an overview of these categories of logistic units. A determining factor for applying Bees A is therefore whether a combustion installation is in a logistic unit designated by Bees A.

2.2 Combustion installations

From the definition of combustion installation it follows that boilers, process furnaces, gas turbines, gas-turbine installations and piston motors must be designated as combustion installations. Any facilities for cleaning flue gas are part of the combustion installation and can therefore be designated as an independent combustion installation. The firing of fuel relates to the firing of fuel in the installation itself and not in the facilities for cleaning flue gas. Below is a description of combustion installations falling under Bees A and the exceptions from Bees A are considered.

A *process furnace* is a combustion installation primarily used for other purposes than heating water or steam, generating power or a combination thereof (Article 1, under z).

This definition is broad and also comprises thermal oil boilers where the thermal oil functions as an intermediary medium for heat transport. Process furnaces are used in the (hydrocarbon) process industry, in particular in the chemical industry and refineries. Process furnaces come in various designs and are used for a wide-range of processes. The most important fields of application of process furnaces are:

- low-temperature physical processes, such as the partial evaporation process in supply furnaces of refineries;
- high-temperature chemical reactors where it concerns the energy supply for an endothermic reaction, such as cracking furnaces.

A *boiler installation* is an installation primarily intended for transferring heat to water or steam.

A *gas turbine* is a prime mover consisting of a compressor, one or more combustion chambers and a turbine in which fuel is fired with the aid of air compressed by the compressor, after which the produced combustion gas expands in the turbine to a lower pressure and thereby supplies power to a rotating shaft.

A *gas turbine installation* is a combustion installation consisting of one or more gas turbines, in which a liquid or gaseous fuel is fired, with one or more accompanying boilers through which the combustion gasses of the gas turbine are passed in order to transfer heat to a medium that does not come into contact with those gasses; a fuel can or cannot be fired in the accompanying boilers; only if this occurs in such a way that before combustion no extra air or almost no extra air is necessary does it concern a gas turbine installation (Article 1, under n).

A *piston motor* is a combustion installation consisting of a unit in which a gas mixture produced by combustion sets a piston in motion for driving a piece of equipment (Article 1, under o).

Article 2, under a describes when a piston motor is subject to Bees A. Only pistons motors are subject to Bees A which:

- according to the permit are not of an experimental nature; and
- are fired on gas oil or gaseous fuels, with the exception of LPG, and:
- serve to:
 - drive an electrical generator in a combined heat-power installation;
 - drive a gas compressor in a heat pump; or
 - are used in a pump or compressor that is used continually for an installation that, according to the permit, is designed for an operating period of at least 5000 hours a year.

Excluded from Bees A are all piston motors that do not satisfy the aforementioned description and “existing” piston motors fired on fuel that contains less than 50% fuel gas. General standard setting is not deemed expedient in these cases. An example is a piston motor that is used for emergency power supply. Here it only concerns the delivery of electricity and the heat is not used usefully.

Biomass consists of products or waste substances of vegetable origin produced by agriculture or forestry which can be used as a fuel for utilising or recovering the generated heat, and also the following fuels: fibrous waste products from the production of paper pulp, vegetable waste products from the food industry, clean wood and cork.

Wood waste that is part of construction or demolition waste and CCA-impregnated wood fall under the scope of the Besluit verbranden afvalstoffen (Waste Incineration Decree).

Combustion installations that are excluded from Bees A are (Article 2, under b):

- combustion installations that fall under the scope of the Waste Incineration Decree (Bva);
- combustion installations for drying or treating objects or materials by direct contact with combustion gas, such as cement furnaces, brick furnaces, blast furnaces, installations for roasting ores, pelletising installations, etc. In these combustion installations, a mixture of combustion and process emissions occurs as a rule. To set standards exclusively on the combustion emissions is therefore not well possible. That is why they have been excluded;
- coke furnaces; here too a mixture occurs of combustion and process emissions;
- boiler installations, process furnaces, gas turbines and gas turbine installations for liquid or gaseous fuels with a thermal capacity of 0.9 MW or less, calculated on the lowest combustion value of the fuel. The limit of 0.9 WM thermal capacity applies per combustion installation. The addition of the capacities of installations below that limit is therefore not relevant. For combustion installations on solid fuels there is no lower limit for the thermal capacity;
- combustion installations that, according to the permit, are used for investigating, testing or demonstrating experimental combustion techniques or techniques for controlling the discharge of SO₂, NO_x or dust. For these experimental installations, uniform standard setting is not suitable;
- installations for gasification of coal or oil;
- boiler installations, process furnaces, gas turbines and gas turbine installations used on offshore platforms;

- technical facilities for cleaning flue gas by combustion that are not operated as autonomous installations. These installations can, however, be part of the combustion installation of which they are a part, but in themselves cannot be designated as individual combustion installations;
- existing boiler installations and process furnaces that, according to the permit applicable to them, are not intended for temporary operation of more than 500 hours per year;
- gas turbines and gas turbine-installations for which a permit has been issued before 27 November 2002 with less than 500 operating hours per year;
- gas turbines and gas turbine-installations for which a permit has been issued on or after 27 November 2002 with a thermal capacity of less than 50 MW with less than 500 operating hours per year. (Gas turbines and gas turbine installations with less than 500 operating hours per year are existing installations with a standby function. For these installation, measures would be relatively expensive and deliver little environmental gain. Because the LCP Directive does not make an exception for these installations, installations with a thermal capacity of 50 MW or more for which a permit has been issued on or after 27 November 2002 do fall under Bees A);
- gas turbines and gas turbine-installations with a shaft horsepower of maximally 1 MW.
- piston motors that fall under one of the exceptions referred to in the above definition of "piston motor".

Note: To determine the thermal capacity of a combustion installation, the capacity laid down in the permit is used as a basis, unless proof to the contrary is provided. The thermal capacity is the heat content of the maximum quantity of fuel (based on the lower heating value of the fuel) for which the burner is set.

In Appendix 2 it can be determined on the basis of a flow chart whether an installation falls under Bees A.

3 Date of permit issue (Articles 1, under m, 10a and 10b)

The date of permit issue also determines the question of what standard applies to the installation. Here it concerns the date on which (for the first time) the permit is issued for that part of the permit for the logistic unit that relates to the combustion installation. If a permit is issued again (e.g. a revision permit) while no changes have been made to the combustion installation, the date of the original permit remains the determining factor.

In Bees A, existing combustion installations are distinguished separately (Article 1, under m): "An existing combustion installation is a combustion installation for which a permit has been issued before 29 May 1987." This is the effective date of Bees A (the original Bees Wlv).

Where this guideline speaks of new installations it is done for the sake of ease and installations are meant that are not designated as existing installations. New installations are therefore installations for which a permit has been issued on or after 29 May 1987.

In the following cases another date applies than the date of permit issue:

Existing installations where the combustion installation has been replaced after 29 May 1987, the combination of burner and furnace has been replaced or changes have been made to the combination of burner and furnace that correspond to new construction.

These installations are regarded as new installations (Article 1, under m). If the combination of burner and furnace has been replaced to satisfy the standards of Bees A, the installation remains an existing installation. It is generally assumed that this exception only applies when the combination of burner and furnace has been replaced due to a new, stricter standard for the installation.

New installations where the combustion installation has been replaced, the combination of burner and furnace has been replaced or changes have been made to the combination of burner and furnace that correspond to new construction.

For these installations – only for the NO_x standards – the date applies on which the change was licensed or applied for, instead of the date of permit issue. An objection lodged against the permit or a suspension of the use of the permit does not change that in any way. If no application or change of the permit took place, the date applies on which the actual change was carried out (Article 10a, under a).

Installations with a thermal capacity of 50 MW or more that have been expanded on or after 27 November 2004 with 50 MW or more.

With regard to the expanded part, the date applies on which the change was licensed, instead of the date of permit issue for the combustion installation as a whole. If no permit was issued, the date applies on which the actual change was carried out (Article 10a, under b).

Installations with a thermal capacity of 50 MW or more that have been replaced on or after 27 November 2004 in a way that, in the opinion of the competent authority, can have significant negative effects on human beings or the environment.

Here it concerns a situation in which a "significant change" was made in the meaning of Article 2, par. 10, under b of the IPPC Directive (Directive 96/61 EC). In that case, the date applies on which the change was licensed, instead of the date of permit issue for the combustion installation as a whole. If no permit was issued, the date applies on which the actual change was carried out (Article 10a, under c).

Combustion installations for which a permit has been applied for before 27 November 2002 and that have been commissioned before 27 November 2003.

These are equated with combustion installations for which a permit was issued before 27 November 2002 (Article 10b). This therefore means that for this category of installations the same emission standards apply as for installations that were licensed just before that date.

4 Emission standards

4.1 Main lines (Articles 11 to 23a)

For new installations, Bees A in principle applies to all fuels (solid, liquid and gaseous) and to all three regulated components: SO₂, NO_x and dust. The rules with respect to emission standards are included in Chapter 2 of Bees A. Chapter 2 is structured as follows.

Section 1 Emission standards for new installations	
Article 11*	New combustion installations for solid fuels (SO ₂ , NO _x and dust)
Article 12*	New combustion installations for liquid fuels (SO ₂ , NO _x and dust)
Article 13*	New combustion installations for gaseous fuels (SO ₂ , NO _x and dust)
Section 2 Emission standards for existing installations	
Article 15*	Existing combustion installations for coals (SO ₂ , NO _x)
Article 16*	Existing combustion installations for liquid fuels (SO ₂ , NO _x)
Article 17*	Existing combustion installations for gaseous fuels (SO ₂ , NO _x and dust)
Section 3 Refineries	
Article 18	SO ₂ standards for refineries
Section 4 NO_x standards for gas turbines, gas turbine installations and piston motors	
Article 20	NO _x standards for gas turbines and gas turbine installations
Article 20a	NO _x standards for existing gas turbines and gas turbine installations
Article 21	NO _x standards for the combination of a gas turbine and another combustion installation that does not form a gas turbine installation
Article 22	NO _x standards for gas turbines in combination with other combustion installations at electricity production companies
Article 23	NO _x standards for new piston motors
Article 23a	NO _x standards for existing piston motors
Section 5 Application of factors	
Article 24	Application of factors on emission standards set in articles 11 to 17
Article 25	Band width in the application of factors as referred to in article 24

*) The provisions in Articles 11, 12, 13, 15, 16 and 17 with respect to SO₂ do not apply to refineries. The provisions in these articles with respect to NO_x do not apply to gas turbines, gas turbine installations and piston motors.

An overview of all Bees A emission standards is given in Appendix 3.

In all cases in which no emission standard applies on the ground of Bees A, the Besluit zwavelgehalte brandstoffen (Decree on the sulphur content of fuels) applies with regard the sulphur standards and the standards for NO_x and dust must be regulated in the permit. The standards that in these cases can be laid down in the permit can sometimes be derived from Bees A, sometimes from the Netherlands Emission Guideline (NeR) and in other cases will have to be developed. Chapter 10 deals with this in more detail.

The emission standards are based on controlling the discharge of SO₂, NO_x and dust in accordance with the best available techniques. In those cases where the best available techniques are not laid down unambiguously in standards, a band width is given for the standard. The competent authority can, in those cases, set a stricter standard in the interest of preventing or restricting air pollution within that band width. Chapter 7.5 will deal with this in more detail.

The term band width therefore means the leeway that is given to set stricter standards than those of Bees A with application of Article 8.44, fourth paragraph of the Wet milieubeheer (Environmental Management Act).

The emission standards are evaluated regularly to find out whether adjustments are necessary given the best available technique and the quality of the environment. The usual term of the standards is 5 years (mentioned upon implementation of Bees A).

The general rule is that emission standards are set on each individual combustion installation that falls under Bees A. Exceptions are:

- the SO₂ standard for refineries (see Table 4); for SO₂, standards apply for groups of installations in the refinery (Article 18).
- the addition rule (see Section 5.1).

For refineries, the NO_x and dust standards set in Sections 1 and 2 of Bees A apply in addition to the SO₂ standards of Article 18, For piston motors and gas turbine combustion installations, the SO₂ and dust standards apply, where applicable, for boilers and furnaces as referred to in Sections 1 and 2 of Bees A.

For the NO_x standard for gas turbines and gas turbine installations, a “yield factor” is nearly always applied. This factor amounts to 1/30 of the gas turbine or motor yield. This yield varies from approx. 30 to 38%, depending on the type and age. At a yield of 35%, the yield factor is 1.17 ($1/30 * 35 = 1.17$). A NO_x standard for a piston motor of, for instance, 140 g/GJ times the yield factor is in that case: $140 \text{ times } 1.17 = 164 \text{ g/GJ}$. Unless proof to the contrary is provided, the gas turbine yield or motor yield guaranteed by the manufacturer is used.

4.2 Application of factors (Articles 24 and 25)

In some cases, a factor can or must be applied to NO_x standards only for existing boilers and process furnaces (licensed before 29 May 1987).

When the factor can be applied, the decision concerning this is that of the competent authority. Below is an overview of the factors.

Table 7: Overview of factors

The table below gives an overall picture of the factors that can or must be applied. The tables of Appendix 3 with emission standards give exactly in what cases a factor can or must be applied (namely in a limited number of existing installations). Refer to the relevant articles of Bees A for the exact conditions.

factor	formula	applicable to	article
furnace temperature (factor can be applied)	$1 + (T-760) / 555$, where T = furnace temperature (°C)	<ul style="list-style-type: none"> process furnace gaseous fuel furnace temperature > 760°C 	24, par. 1
air preheating (factor can be applied)	$1 / (1.18 - 0.0018 (t_1+100))$, where t ₁ = temperature (°C) of supplied air	<ul style="list-style-type: none"> boiler or process furnace gaseous or liquid fuels 	24, par. 2
natural gas deviating from standard quality (factor can be applied)	S _a / 38, where S _a = lowest combustion value (MJ/kg) of used natural gas	<ul style="list-style-type: none"> boiler or process furnace natural gas of deviating quality 	24, par. 3
nitrogen content of liquid fuel (factor must be applied)	$1.76 - 1.41e^{-2,06n}$ e = base of natural logarithm n = nitrogen content (%)	<ul style="list-style-type: none"> boiler or process furnace liquid fuel with nitrogen content e > 0.3% generated in installation 	24, par. 4
composition of a gaseous fuel (factor must be applied)	(1 + mol fraction C3+) (1 + mol fraction H ₂) where C3+ stands for hydrocarbons with more than three carbon atoms	<ul style="list-style-type: none"> boiler or process furnace gaseous fuel generated in installation 	24, par. 5

The application of one (or sometimes more than one) factor leads to an increase of the base of the emission standard, naturally depending on the variable to be filled in. For example, in the case of air preheating to 200 °C, the factor is 1.56 and the NO_x emission standard becomes 150 times 1.56 = 234 mg/m³ for an existing boiler or process furnace fired on gaseous fuel. When a number of factors apply, the basis requirement is multiplied by each of these factors. However, for each emission standard an upper limit is indicated, which after application of the relevant factor(s) may not be exceeded. If a combustion installation has both a furnace temperature higher than 760 °C and air preheating, only the factor for air preheating is applied.

Several other examples are worked out below.

High furnace temperature in the case of an existing process furnace fired on gaseous fuels

Process furnaces can be distinguished in low-temperature and high-temperature furnaces. Normative here is the end temperature that must be reached by the medium to be heated. The combustion temperature has an influence on the quantity of nitrogen that is formed. The determining factor for the temperature is the temperature in the furnace where the radiation part passes into the convection part. This temperature must be measured while shielded from the flame. Only above a furnace temperature of 760 °C may this factor be applied. To illustrate this, here are several values of the factor.

furnace temperature (°C)	factor
800	1.07
850	1.16
900	1.25

Air preheating applied since a point in time before 15 October 1992 in the case of an existing boiler or process furnace fired on gaseous and/or liquid fuels

Here there is no lower limit for the temperature of the preheated air. Air preheating is applied to save energy. It concerns the final step in the withdrawal of heat from the combustion gasses. These are then already cooled from about 1800 °C to between 300 and 400 °C. In a heat exchanger, usually a rotating wheel, the flue gas is further cooled by means of heat exchanging with the air that is supplied to the burner(s). This causes the combustion air to heat up from ambient temperature to about 200 to 300 °C. As a result, about 10 to 25% extra heat is utilised. The higher combustion air temperature results in a higher combustion temperature and this causes more NO_x to be formed. To illustrate, here are several values of the factor.

air temperature (°C)	factor
100	1.22
150	1.37
200	1.56

Application since a point in time before 15 October 1992 of a natural gas deviating from standard quality in the case of an existing boiler or process furnace

At a higher combustion value, the combustion temperature is higher and this causes more NO_x to be formed. The factor for the natural gas quality is calculated as Sa/38. Sa is the lowest combustion value of the used fuel. The lowest combustion value for the standard quality natural gas is 38 MJ/kg. At a combustion value of the used natural gas of 42 MJ/kg, the factor is 1.11.

Application of liquid fuels generated in the installation with a nitrogen content greater than 0.3% in the case of an existing boiler or process furnace

As the nitrogen content of the fuel increases, more NO_x is formed. To illustrate this, here are several values of the factor:

nitrogen content (%)	factor
0.5	1.26
0.7	1.43
0.9	1.54

Application of gaseous fuels generated in the installation in the case of an existing boiler or process furnace

The factor depends on the volume percentages for the higher hydrocarbons (C₃+, from C₃H₈ (propane)) and hydrogen. At an average gas composition of 40% H₂, 35% CH₄, 10% C₂H₆ and 15% C₃+(C₃H₈ and higher) the factor to be applied is 1.61.

4.3 NO_x emissions trade

Bees A has no special provisions for installations that fall under the scope of the emissions trade.

The installations that participate in the emissions trade must also continue to comply with the standards of Bees A. Due to the obligation of the Wet milieubeheer (Environmental Management Act) to apply best available techniques, no exceptions can be created for these installations. The measuring regime of Bees A also continues to apply. The requirements of the monitoring method for the NO_x emissions trade are for continuous measurements aligned to the measuring requirements of Bees A. For periodic measurements there is an alignment with regard to the measuring frequency, but not with regard to the process conditions during the measurements. The latter is due to the fact that within the framework of the emissions trade a faithful picture of the actual annual emission must ultimately be reported, while within the Bees framework a check for exceedance of the emission limit value must take place.

4.4 Installations between 50 and 75 MW (Article 48a)

In certain rare cases, deviating emission standards apply for older installations between 50 and 75 MW. Here it concerns installations that fall under the scope of Bees A in 1991 for the following reasons.

The Inrichtingenbesluit (Decree on entities) Article 19, first paragraph, Wet inzake de luchtverontreiniging (Air Pollution Act) (Bulletin of Acts, Orders and Decrees 1972, 294), the precursor of the Inrichtingen- en vergunningenbesluit milieubeheer (Decree on entities and permits) contains a category for installations with a technical capacity of 75 MW or more. In August 1991, this category was changed to 50 MW or more (Bulletin of Acts, Orders and Decrees 1991, 354), causing several to fall within the scope of Bees A. Many installations with a capacity between 50 and 75 MW, however, already fell under a different category of the Inrichtingenbesluit Wet Luvo (Decree on entities, Air Pollution Act) so that nothing changed for these installations.

For successfully invoking Article 48a it is therefore necessary to demonstrate that the installation concerned did not fall under one of the categories of the Inrichtingenbesluit Wet Luvo before August 1991.

5 Special situations

5.1 Chimneys: placing and averaging

Several installations on one chimney (Article 6)

In a number of cases, several combustion installations are regarded as one combustion installation (Article 6). The thermal capacity of such a combustion installation is then the sum of the thermal capacity of the constituent parts.

Excluded from the addition rule are:

- a. Existing combustion installations for solid or gaseous fuels.
- b. Existing combustion installations for heavy fuel oil that were licensed before 2 January 1975.
- c. Existing combustion installations for heavy fuel oil, where the share of heavy fuel oil in the heat content of the added fuels is less than 50%.
- d. Gas turbines and gas turbine installations that were licensed before 27 November 2002.
- e. Gas turbines and gas turbine installations with a thermal capacity of less than 50 MW.
- f. Piston motors.

It is not so that, because of the addition rule, installations can fall under the scope of Bees A which cannot fall under it as a result of their capacity as an individual installation. For example, two gas-fired boiler installations of 0.7 MW with one chimney cannot be designated as one boiler installation of 1.4 MW. For, Bees A does not apply to boiler installations with a capacity of less than 0.9 MW (Art. 2.b.3°), which means that the addition rule of Article 6 does not apply to them.

The exclusion of existing installations is meant to prevent them falling, due to addition, under a heavier regime for SO₂ emissions. For existing combustion installations under 300 MW, Bees A does not include a standard for SO₂. For gas turbines and gas turbine installations with a thermal capacity of less than 50 MW, the LCP Directive does not allow addition. The same is true for gas turbines and gas turbine installations that were licensed before 27 November 2002.

Addition is always subject to the condition that the combustion installations must be situated in one installation and connected to one chimney or can be connected to one chimney if technically and economically feasible according to the permit.

The rule for mixed firing applies (see Article 6.2) if different fuels are fired in the different constituents of the “composite” combustion installation. In determining the discharge from a “composite” combustion installation, which is actually connected to one chimney, the measuring provisions also apply as if it were one combustion installation. If the constituents of a composite combustion installation are not connected actually to one chimney, a measurement must be taken on each separate installation to determine the concentration.

Several chimneys (Article 10)

When several combustion installations, which on the ground of the addition rule are regarded as one combustion installation, have more than one chimney, the emission standard applies for the average discharge via those chimneys.

The average is determined on the basis of the flue gas volume that is discharged by each of the chimneys (Art.10). The same is true for refineries, where one emission standard for SO₂ applies for all of the combustion installations comprising the logistic unit.

The determination of the flue gas flow rate is explained in the notes to the Regeling meetmethoden (Regulation on measuring methods). The flue gas flow rate can be calculated on the basis of the data on the fuel composition, the fuel flow rate and the quantity of combustion air (O₂ measurement) added to the installation.

5.2 Firing of more than one fuel

Successively firing different fuels (Article 12, par. 6 and 7 and Article 16, par. 5)

When different fuels are fired successively, the standards apply that are used on the ground of the fuel and the thermal capacity of the combustion installation.

There are a few exceptions however: if heavy fuel oil or gas oil is fired exclusively instead of natural gas, because:

- a. due to weather conditions or malfunctions no natural gas can be delivered;
- b. this is necessary for an existing combustion installation to replenish the stock of heavy fuel oil or gas oil that is kept for the conditions referred to under a or on the ground of the Wet voorraadvorming aardolieproducten (Stockpiling of Petroleum Products Act).

The exception applies to new installations with a thermal capacity of 50 MW or more only during the first 240 hours following the malfunction.

For firing heavy fuel oil, there is, in this case, a requirement of 1700 mg/m³ for discharge of SO₂, regardless of the thermal capacity of the combustion installation. For the discharge of NO_x and dust as a result of firing heavy fuel oil in that type of circumstances, no requirement is included in Bees A. For that type of circumstances, the competent authority can, if necessary, set requirements in the permit prescriptions. The firing of heavy fuel oil or gas oil in the aforementioned cases must always be reported to the competent authority (Art. 12, par. 8 and Art. 16, par.7).

A problem can arise in installations where periodic measurements are performed. When different fuels are fired successively, the holder of the combustion installation may be tempted to burn the least contaminating fuel during the measurements. There is no cut-and-dried solution for that. It is so, however, that Article 30b, first paragraph of Bees A prescribes representative measurements. When a different fuel is normally fired than the fuel fired during the measurement, the measurement is not representative.

Mixed firing (Article 9)

Mixed firing is the simultaneous use of different fuels.

In the case of mixed firing for calculation of the permitted discharge of SO₂, NO_x and dust, the emission standard can be calculated using the following formula:

$$C_{\text{mixture}} = ((H_1 * Q_1) * C_1 + \dots + (H_m * Q_m) * C_m) / (H_1 * Q_1 + \dots + H_m * Q_m)$$

Where:

C_{mixture} = emission limit value for a contaminated substance in the flue gas if several fuels are fired simultaneously

C_m = emission limit value of the individual fuel

H_m = net caloric value of the individual fuel

Q_m = quantity of added individual fuel per time unit

For installations in which the part of the solid fuels and heavy fuel oil in the heat content of the added fuels is less than 30% of the total and less than 300 MW, the following emission values apply for calculating the SO₂ emission standard.

Date of permit issue	Thermal capacity	Fuel type	Emission value
Before 29-5-87	All	Solid fuels	700 mg/m ³
Before 29-5-87	All	Heavy fuel	1,700 mg/m ³
Between 29-5-87 and 26-11-02	≤ 400 MW	Solid fuels	700 mg/m ³
Between 29-5-87 and 26-11-02	≤ 400 MW	Heavy fuel	1.000 mg/m ³
On / after 27-11-02	50MW ≤ tv < 100MW	Heavy fuel	850 mg/m ³

If no emission standards for SO₂ are included in Bees A for one of the fuels to be fired simultaneously, the emission standard must be calculated as follows: It must be based on the maximum sulphur content permitted for the fuel concerned in accordance with the Besluit zwavelgehalte brandstoffen (Decree on the sulphur content of fuels) and the quantity of SO₂ must be calculated which would be produced when firing that fuel. This quantity of SO₂ can be used as the “virtual” emission standard in the mixing rule.

Article 9 does not apply to refineries with respect to SO₂, (for NO_x and dust it does apply however) (Article 18, first paragraph).

To illustrate the mixing rule, two examples have been worked out below.

The mixing rule is applied to determine the SO₂ emission standard for mixed firing of wood gasification gas and coal in two concrete cases:

1. A new installation with a thermal capacity of more than 300 MW. For that, the emission standard for SO₂ when firing coal is 400 mg/m³ (6% O₂).
2. A new installation with a thermal capacity of less than 300 MW. For that, no standard has been included in Bees A. The emission standard for SO₂ when firing coal needs to be calculated first.

Case 1

The formula of the mixing rule is applied with as parameters: $H_{\text{gas}}=17.5 \text{ MJ/m}^3$, $Q_{\text{gas}}=30,000 \text{ Nm}^3/\text{hour}$, $C_{\text{gas}}=35 \text{ mg/Nm}^3$ (Article 13.1.f), $H_{\text{coal}}=25 \text{ MJ/kg}$, $Q_{\text{coal}}=200,000 \text{ kg/hour}$, $C_{\text{coal}}=400 \text{ mg/Nm}^3$ (Article 11.1.a.1°). The result is an emission standard for SO₂ of (rounded-off) 365 mg/Nm³ (6% O₂).

Case 2

First the standard is calculated for pure firing of a fuel with 1.2% S-content. This standard is calculated at (rounded-off) 2,700 mg/Nm³ (6% SO₂). The formula for the mixing rule is applied with as parameters: $H_{\text{gas}}=17.5 \text{ MJ/m}^3$, $Q_{\text{gas}}=3,000 \text{ Nm}^3/\text{hour}$, $C_{\text{gas}}=35 \text{ mg/Nm}^3$ (Article 13.1.f), $H_{\text{coal}}=25 \text{ MJ/kg}$, $Q_{\text{coal}}=20,000 \text{ kg/hour}$, $C_{\text{coal}}=2,700 \text{ mg/Nm}^3$. The result is an emission standard for SO₂ of (rounded-off) 2,446 mg/Nm³ (6% O₂).

5.3 Malfunctions of the flue gas cleaning system

Installations < 50 MW (Article 7)

NO_x and dust: When as a result of a malfunction of the flue gas cleaning system of a combustion installation with a thermal capacity of less than 50 MW, the emission standards for NO_x or dust are not achieved, the installation may only be kept in operation if the competent authority has included in the permit a specific period during which this can be done.

SO₂:

1. Combustion installations for solid fuels or heavy fuel with a thermal capacity of less than 50 MW: In case of a malfunction in the flue gas cleaning system and if the emission standard for SO₂ is not achieved, the installation may be kept in operation for a maximum of 72 successive hours and a maximum of 240 hours per calendar year. If the emission standard for SO₂ is achieved, the installation may be kept in operation for an unlimited period, unless the competent authority has included in the permit a maximum duration for this sort of events.
2. Other combustion installations with a thermal capacity of less than 50 MW: If because of a malfunction in the flue gas system the emission standard for SO₂ is not achieved, the installation may only be kept in operation if the competent authority has included in the permit a specific period during which this can be done.

Installations \geq 50 MW (Article 7a)

For NO_x, SO₂ and dust the following applies:

Main rule: If a combustion installation with a thermal capacity of 50 MW or more is fitted with a flue gas system and the flue gas system fails, the combustion installation must be taken out of operation within 24 hours.

Exceptions to this rule. If the emission standard can be met by taking the installation partly out of operation, Bees A allows this. Furthermore, an installation with a low-polluting fuel may be kept in operation. The term "low-polluting fuel" refers to a fuel causing a substantially lower emission than the customary fuel (composition) of the combustion installation.

The installation may be kept in operation for a maximum of 120 hours per 12 months without the flue gas cleaning system functioning. The competent authority may extend these periods of 24 and 120 hours if the energy delivery comes at risk or when the combustion installation would be replaced for a limited amount of time by another combustion installation that would cause higher emissions.

Malfunctions of the flue gas cleaning system of installations with a thermal capacity of 50 MW or more must be reported to the competent authority within 48 hours.

Relation to Chapter 17 Wet milieubeheer (Environmental Management Act) (measures in special circumstances / unusual events)

This chapter of the Wet milieubeheer (Wm) is not intended for the type of environmental pollution that is regulated by Bees A (acidifying deposition on national or European scale). Chapter 17 Wm would play a role for Bees A-installations when, upon failure of the flue glass cleaning system, local environmental quality or health would come under acute risk.

Further

In the assessment of measures taken to control the discharge, the measuring results obtained during the failure periods in which the installation may still be in operation on the ground of Bees A are not taken into account (Articles 34, par. 3, 38, par. 5, 40, par. 2 and 43, par. 8). The measuring results obtained during start-up and shut-down of the installation are also not taken into account.

5.4 Combined heat and power (Article 10c)

For certain new combustion installations, the technical and economic feasibility of combined heat and power must be investigated. When it appears to be feasible, combined heat and power must be applied. It concerns the following installations:

- combustion installations with a thermal capacity of 50 MW or more for which a permit has been issued on or after 27 November 2002;
- combustion installations with a thermal capacity of 50 MW or more that have been expanded on or after 27 November 2002 with 50 MW or more.

5.5 Chimney height (Article 5a, par. 2)

Article 5a, paragraph 2 states that the chimney of a combustion installation must be high enough so as not to pose a risk for health, except where it concerns an existing combustion installation with a capacity of less than 50 MW. This prescription serves to prevent too high a concentration of air-polluting substances at ground level and too large a deposition of air pollution as a result of the emission from the logistic unit. Here it therefore concerns not only NO_x, SO₂ and dust, but also air polluting substances, such as fluorine and heavy metals. When the requirements pursuant to the Besluit luchtkwaliteit 2005 (Air Quality Decree 2005) have been met, the prescription of Article 5a, paragraph 2 has, at any rate, been met.

6 Measurements

All combustion installations falling under Bees A are subject to a measurement obligation to determine whether the emission standards set by Bees A have been met. Chapter 4 of Bees A includes the prescribed measuring regimes and the generally applicable (quality) requirements. Furthermore, a ministerial regulation, the "Regeling meetmethoden emissie-eisen stookinstallaties milieubeheer A 2005" (Regulation on measuring methods, emission-limits for combustion plants, environmental management A 2005) (hereinafter called the Regulation on measuring methods), has been drawn up where matters are further elaborated. For background information on the measurement of emissions refer to the manual Measurement of air emissions, which is published by InfoMil under number L40.

6.1 Measuring regime

Chapter 4 of Bees A gives the measuring regime. The other prescriptions concerning measurements can be found in the Regulation on measuring methods. Chapter 4 of Bees A is structured as follows:

Articles 30a, 30b and 30c	The quality standards set on measurement on the ground of Bees A.
Articles 31 up to and including 36	Measurement of SO ₂ emissions of installations not placed in refineries.
Article 37	Measurement of SO ₂ emissions of installations in refineries.
Articles 38 and 38a	Measurement of NO _x emissions of boilers and process furnaces.
Articles 39 up to and including 42	Measurement of NO _x emissions of gas turbines, gas turbine installations and CHP piston motors.
Article 43	Measurement of dust emissions.
Article 43a, 43b and 44	Registration, reporting and storage of measuring data.

The Articles concerned lay down, among other things, in which cases a continuous measurement and in which cases a non-continuous (periodic) measurement must be performed.

Continuous measurements

A continuous measurement obligation is prescribed for:

- SO₂, NO_x and dust emissions of combustion installations with a thermal capacity of at least 100 MW;
- NO_x emissions of gas turbines and gas turbine installations when, for controlling the NO_x emissions, the injection of steam, water or other inert material is applied;
- NO_x emissions of combined combustion installations in electricity production companies of which the thermal capacity of the gas turbine is smaller than 40% of the total thermal capacity and, for controlling NO_x emissions, the injection of steam, water or other inert material is applied.
(If, to the satisfaction of the competent authority, it can be demonstrated in another way that the emission standard will not be exceeded, continuous measurement is not obligatory. This applies, for example, to gas turbines for which it can be demonstrated that continuous steam injection is sufficient to avoid exceeding the emission).
- NO_x emissions of most combustion installations in which fuels are fired generated by the logistic unit itself (see Article 38, par 2).

An exception applies with respect to the continuous measurement obligation for:

- SO₂, NO_x and dust emissions of combustion installations with a thermal capacity between 100 and 300 MW that are not in operation for no more than 10,000 hours after 27 November 2002;
- SO₂ and dust emission of combustion installations that are fired on natural gas;
- SO₂ emissions of combustion installations without flue gas desulphurisation that are fired on oil whose sulphur content is known;
- SO₂ emissions of combustion installations without flue gas desulphurisation that are fired on biomass whose sulphur content does not lead to exceedance of the emission limit value;
- dust emissions of combustion installations fired on gaseous fuels that, given their origin, cannot lead to an exceedance of 10% of the emission standard.

Periodic measurements

For emissions of combustion installations on which no continuous measurement obligation applies, it must be demonstrated by means of periodic measurements that the emission standard is not exceeded. Periodic measurements must be performed within four weeks after an emission standard has come into effect and subsequently:

	NO _x	SO ₂	dust
• boiler installations and process furnaces ≥ 50 MW	every 6 months ¹	every 6 months ¹	every 6 months ¹
• boiler installations and process furnaces < 50 MW	none	none	none
• gas turbines and gas turbine installations ≥ 50 MW licensed on or after 27 November 2002	every 6 months ¹	every 6 months ¹	every 6 months ¹
• gas turbines and gas turbine installations ≥ 50 MW licensed before 27 November 2002	every 4 years	every 6 months ¹	every 6 months ¹
• gas turbines and gas turbine installations < 50 MW	every 4 years	none	none
• piston motors ≥ 50 MW	every 4 years	every 6 months ¹	every 6 months ¹
• piston motors < 50 MW	every 4 years	none	none

¹) If an installation is out of operation for more than six successive months per year, the half-yearly periodic measurements may be limited to once per year. This applies, for example, to installations in “campaign” firms such as sugar factories.

Exceptions to the above: periodic measurements need not be performed for:

- SO₂, NO_x and dust if no emission standard applies;
- SO₂, NO_x and dust if continuous measurement takes place;
- SO₂ for combustion installations without desulphurisation installation if fuels are exclusively fired that rule out exceedance of the emission standard;
- SO₂ for the combustion installations in refineries that are further specified in Article 37, paragraph 2 if the SO₂ emission of an installation is exclusively determined by the sulphur content of the used fuels and a register is kept thereof;
- NO_x if type approval burners are exclusively installed in an installation for heating water and steam with a thermal capacity less than 7.5 MW and no air preheating takes place and the steam pressure is not higher than 1 MPa;
- NO_x for natural gas-fired piston motors for which a type approval has been issued by a body designated by the Minister of Housing, Spatial Planning and the Environment and on which the maintenance is performed according to the operating instructions of the supplier (such a type approval has to date not been issued);
- dust if the installation is fired by natural gas or other gaseous fuel that, given its origin, cannot lead to an exceedance of 10% of the emission standard.

6.2 Norms

It generally applies that measurements must be performed in accordance with CEN norms. CEN norms have immediate effect and must be applied within a year after their publication. Overviews of the CEN norms that apply for measurements on combustion installations are published periodically in the Netherlands Government Gazette. When CEN norms are lacking, the norms apply as mentioned in the Regulation on measuring methods. The norms are given in four tables in both the publication in the Government Gazette and the Regulation on measuring methods:

- Table A: continuous measurements
- Table B: periodic measurements and parallel measurements
- Table C: quality assurance
- Table D: fuel analyses

The tables of the latest publication in the Government Gazette and in the Regulation on measuring methods are integrated in the website of InfoMil.

In addition to the normalised measurement of the flue gas flow rate of a combustion installation, the flue gas flow rate may also be calculated. The calculation of the flow rate takes place on the basis of the measured oxygen content of the flue gasses, the fuel consumption and the fuel composition.

Measurement norms often set standards on the sampling of flue gasses. Usually, one measuring point in a flue gas channel is not sufficient to guarantee that the flue gas sample is representative. Companies are obliged to install for an installation the provisions for sampling and measurement in accordance with the measurement standards.

6.3 Continuous measurements

Continuous measurements of the SO₂, NO_x and dust concentration need not be performed with analysers (CEMS: Continuous Emission Monitoring System). Continuous calculation of the emission concentration on the basis of continuously-measured emission relevant parameters and the discharge characteristic determined for the installation is also permitted. Two requirements are set thereon. Firstly, the emission must be established unambiguously with the discharge characteristic. Secondly, the quality criteria and quality assurance applying for CEMS must be observed. The measuring method on the basis of a discharge characteristic is also designated as PEMS (Predictive Emission Monitoring System). PEMS is often used for measuring the NO_x emissions of gas turbines with steam injection. The emission is then calculated from the quantity of steam injection and the load of the installation on the basis of the discharge characteristic. Drawing up a PEMS for the dust emission often leads to problems in practice due to the unambiguousness requirement. This does not apply when the dust emission is caused exclusively by the composition of the fuel and not by soot-formation.

With respect to the availability of continuous measuring systems, 10 days may occur per year on which more than three hour-averages are invalid due to malfunction or maintenance of the measuring system. An hour average is invalid when no correct measuring signals have been registered for more than 20 minutes (one-third part of an hour).

Malfunctions of the continuous measuring equipment must be corrected as soon as possible. If a malfunction cannot be repaired within 24 hours, this must be reported to the competent authority. The operation of the flue gas cleaning system is not reduced during periods of malfunction of the continuous measuring equipment.

6.3.1 Quality assurance of continuous measurements

The quality assurance of continuous measuring systems must be carried out according to NEN-EN 14181. This norm describes four levels of quality assurance for CEMS: QAL1, QAL2, QAL3 and AST. Within the framework of the emissions trade, a number of aids have been developed for applying NEN-EN 14181. Furthermore, a practical approach to the four quality levels has been formulated for PEMS. These aids and the information can be found on the website of the Netherlands Emission Authority. Below is a short description of the quality assurance levels for CEMS.

(In the Dutch version of NEN-EN 14181 the concept of QAL is translated as KBN (kwaliteitsborgingniveau) and the concept of AST as JC (jaarlijkse controle)).

QAL1 procedure

With the aid of the QAL1 procedure, the accuracy of the measuring result is calculated on the basis of, amongst other things, the performance characteristics of the monitor and the data on the composition of the flue gas and this is then tested against the specified uncertainty requirement. The uncertainty requirement, expressed as 95% confidence interval of the individual observation, is 20% of the emission standard for the SO₂ and NO_x concentration. For the dust concentration this is 30% of the emission standard. The result of the test is unambiguous, regardless of the measuring principle, but it is not a guarantee of correct measurement.

QAL2 procedure

With the QAL2 procedure, the performance of the measuring equipment, after having been built in, are tested under operating conditions and the measuring system is calibrated with respect to the reference method. An accredited laboratory carries out an extended series of at least 15 parallel measurements in a period of 72 hours in order to record the calibration function. Every three years, or after a significant change in the operational management or changes to the measuring system, the QAL2 procedure is repeated. Examples of changes that lead to a renewed QAL2 procedure, because the performance of the measuring system is influenced by them, are:

- changes in the combustion process that systematically alter the flue gas composition;
- replacement of parts in the monitor system.

QAL3 procedure

During the year, the sensitivity and zero point setting of the measuring equipment must be checked and registered periodically. Each time it is checked that the drift of the measuring system still meets the specified criteria. In the case of non-extractive (in-situ) measurements, the instrument must have the possibility to do a simulation of the zero and sensitivity setting, so that the actual drift of the instrument can be established. The working method is described in the QAL3 procedure in NEN-EN 14181.

AST procedure

Annually, the validity of the calibration function, as this has been recorded during the QAL2 procedure, is checked by carrying out at least 5 parallel measurements in a period of 24 hours. The working method of this procedure, which is also called the verification test, corresponds to that of the QAL2 procedure. In addition to the test on the validity of the calibration function, functional tests must also be carried out on the measuring equipment, such as a leakage test and a linearity test.

Parallel measurements

Parallel measurements taking place within the framework of the QAL2 procedure or the AST procedure must be carried out by accredited laboratories. Laboratories can have themselves accredited by the Raad van Accreditatie (Council for Accreditation) or another body recognised by one or more EU member states. Parallel measurements are carried out in accordance with the Standard Reference Method and take at least a half hour. For the result of the parallel measurements it is assumed that the measuring values of the laboratory are the best estimate of the actual emission. That is why no correction is made for the measurement uncertainty of the laboratory in the calibration procedure and the verification test. Parallel measurements must be reported to the competent authority at least two weeks before they are taken. For installations that fall under the emissions trade, parallel measurements must be reported to the Netherlands Emission Authority (NEA). When a measurement is cancelled, this must be reported to the competent authority and, if necessary, to the NEA.

6.4 Periodic measurements

An important quality aspect of periodic measurements is the representativeness of the operational management during measurements. Depending on the type of combustion installation, different representative operating conditions are prescribed:

- Boiler or process furnace with a thermal capacity of at least 50 MW for which the permit has been issued after 28 May 1987: first periodic measurement at full load and follow-up measurements at more than 60% load.
- Boiler or process furnace with a thermal capacity of at least 50 MW for which the permit has been issued before 29 May 1987: all measurements at more than 60% load.
- Boiler or process furnace with a thermal capacity of less than 50 MW: at more than 60% load.
- Piston motor at full load.
- Gas turbine: at full load.
- Gas turbine installation with maximally 10% co-firing of boiler(s): at full load and maximum co-firing of the boiler(s).
- Gas turbine installation with maximally more than 10% co-firing of the boiler: at full load with 10% co-firing of the boiler or, if this is impossible, minimum co-firing of the boiler.
- Combustion installation provided with a flue gas desulphurisation system: dust concentration measurements at a desulphurisation percentage of at least 85%.

A periodic measurement consists of three sub-measurements of half an hour. When it is technically impossible to take the sub-measurements in half an hour, the measuring time may be extended to maximally two hours. This can, for example, occur when measuring low dust concentrations.

Periodic measurements must be performed by accredited laboratories. Laboratories can have been accredited by the Council for Accreditation or another body recognised by one or more EU member states. The sampling and analysis of periodic measurements must be carried out in accordance with the Standard Reference Method.

Periodic measurements must be reported to the competent authority at least two weeks before they are taken. For installations falling under the emissions trade, periodic measurements must also be reported to the Netherlands Emission Authority (NEA). When a measurement is cancelled, this must be reported to the competent authority and, if necessary, to the NEA.

6.5 Conversions and corrections of measuring values

Standard flue gas conditions

The NO_x, SO₂ and dust concentrations in flue gasses are dependent on the moisture and oxygen content of the flue gasses, as well as the reigning temperature and pressure. In order to be able to test against the emission standards in an unambiguous way, the measured concentrations must be converted to standard conditions. These standard conditions are:

Oxygen content:	6 vol% O ₂ (dry) when firing solid fuels 3 vol% O ₂ (dry) when firing other fuels
Moisture content:	0 vol% H ₂ O, i.e. dry flue gas
Temperature:	273 K
Pressure:	101.3 kPa

The formulas for these conversions are given in Section 4.3.4 of the manual "Measurement of air emissions" of InfoMil. This section also gives the formula for the conversion of measured emission concentrations of piston motors, gas turbines and gas turbine installations to the fuel input-related emission in g/GJ.

Combustion air conditions

The NO_x emissions of piston motors, gas turbines and gas-turbine installations are dependent on the combustion air conditions. That is why the measured emissions are first recalculated to ISO air conditions for testing: These are a temperature of 288 K, a pressure of 101.3 kPa and a relative moisture of 60%. The following empirical formula is used for that:

$$E = E_m \cdot \sqrt{(101.3/P_m)} \cdot (T_m/288)^{-1.53} \cdot e^{19(X_m - 0.0063)}$$

where:

E = nitrogen oxide discharge (g/GJ) converted to ISO air conditions

E_m = measured nitrogen oxide discharge (g/GJ)

P_m = measured atmospheric pressure at the inlet of the compressor (kPa)

T_m = temperature of the inlet air (Kelvin)

x_m = measured moisture content of the inlet air (in kg water per kg dry air)

The correction on the emission for the combustion air conditions is applied for gas turbines and gas turbine installations licensed after 27 November 2002.

In the case of a piston motor, if the temperature of the sucked-in air is lower than 288 K and the moisture of the sucked-in air is higher than 0.0063 water per kg air, the measured value may be made equal to the value corrected to ISO air conditions. In other cases, 95% of the measured value may be made equal to the value corrected to ISO air conditions.

Other correction methods for the combustion air conditions may also be used if it is demonstrated that the correction delivers a more accurate result.

From NO and NO₂ to NO_x

In addition to NO, flue gasses also contain NO₂. Because NO is converted to NO₂ under atmospheric conditions, it has been decided to express the NO concentration in flue gasses as NO₂. This means that for both NO and NO₂ a factor of 2.054 is used for the conversion of vppm to mg/m³.

When a continuous measurement of NO takes place exclusively at an installation, this is permitted if the measuring instrument concerned is calibrated (QAL2 procedure) with respect to an NO_x measurement.

6.6 Testing of measuring values against the emission standard

In testing the measuring values against the emission standard, the measurement uncertainty may be interpreted to the advantage of the permit holder. This means that the measurement uncertainty may be subtracted from the measuring values before testing. For the continuous measurement of the SO₂ and NO_x concentration, 20% of the emission standard may be deducted from the measuring values. For the dust concentration measurement, this is 30% of the emission standard. For the periodic measurements, the measurement uncertainty, as this has been demonstrated by an accredited laboratory, may be subtracted from the measuring value. The measurement uncertainty specified by a laboratory may not be greater than the mentioned measurement uncertainties for continuous measurements.

Continuous measurements

For continuous measurements, the periods of starting-up, stopping and malfunctions are disregarded for testing against the emission standard.

Depending on the age and type of installation and the emission, the decree has four regimes to test that the emission standard is being met. These are:

- I. the emission standard is met when no 24-hour average exceeds the emission standard;
- II. the emission standard is met when no calendar-month-average exceeds the emission standard and 97% of all 48-hour averages in a calendar month is not higher than 110% of the emission standard;
- III. the emission standard is met when no day average is higher than the emission standard and 95% of all hour averages in a calendar year are not higher than the 200% of the emission standard;

IV. the emission standard is met when no calendar-month average exceeds the emission standard and 95% of all 48-hour averages in a calendar year is not higher than 110% of the emission standard.

The table below indicates which testing regime applies in the different situations.

Installation type	Date of permit issue	Capacity < 50 MWth			Capacity ≥ 50 MWth		
		SO ₂	NO _x	part.	SO ₂	NO _x	part.
Boiler or process furnace	before 29-5-1987	II ¹	IV	II	II ¹	IV	II
	from 29-5-1987 tot 27-11-2002	II	IV	II	II	IV	II
	on or after 27-11-2002	II	IV	II	III	III	III
Piston motor	before 29-5-1987	II ¹	I	II	II ¹	I	II
	from 29-5-1987 tot 27-11-2002	II	I	II	II	I	II
	on or after 27-11-2002	II	I	II	III	I	III
Other installations	before 29-5-1987	II ¹	I	II	II ¹	I	II
	from 29-5-1987 tot 27-11-2002	II	I	II	II	I	II
	on or after 27-11-2002	II	I	II	III	I ²	III

¹⁾ In deviation thereof, regime I applies to refineries.

²⁾ In deviation thereof, regime III applies to gas turbine installations.

Periodic measurements

With respect to a periodic measurement, none of the three sub-measurements may exceed the emission standard. If the emission standard is exceeded, a company may as yet demonstrate that the emission standard is met by carrying out within one week a "further measurement series". A "further measurement series" consists of a series of nine sub-measurements.. With respect to a "further periodic measurement", the emission standard is met if:

- the average of the sub-measurements is lower than the emission standard; and
- maximally one sub-measurement exceeds the emission standard.

6.7 Reports and registrations

Continuous measurements

When a continuous measurement is performed on a combustion installation, it is registered which measuring method or discharge characteristic is applied and which operating conditions must be known to assess that the emission standard is being met. In addition, a continuous registration takes place of the measuring results of the continuous measurements and the relevant operating conditions.

The results of continuous measurements are worked out in such a way that the competent authority can assess that actions have been taken in accordance with the decree and measurement regulation. Simply delivering lists of measuring data without performing a translation of the data is usually not sufficient in that respect.

If a flue gas desulphurisation system is used for a combustion installation, the desulphurisation percentage is registered daily that has been calculated on the basis of the sulphur content of the fuel and the quantity of sulphur compounds discharged with the flue gas.

The registrations and workings out of the continuous measurements must be retained for three years.

Periodic measurements and parallel measurements

The measuring results of periodic measurements and parallel measurements, as well their conversion to standard conditions and/or ISO air conditions, must be documented in a measurement report. A measurement report should at least contain the following information:

- identification of the combustion installation;
- a description of the measuring points;
- all measured variables, such as the NO_x and O₂ concentration and, if relevant, the combustion air conditions;
- a specification of the applied measuring methods, such as measurement norms, measurement uncertainty, measuring equipment;
- the homogeneity of the flue gasses in the measuring surface and the applied sampling method;
- the date and time of the sub-measurements;
- the measured concentration and the converted data of each sub-measurement;
- the operating conditions of the combustion installation, such as load, fuel type and fuel consumption;
- the name and accreditation number of the measurement body.

A measurement report must be sent to the competent authority within three months after the measurements have been carried out.

When after carrying out a periodic measurement or parallel measurement it is decided to use the measuring results, this is reported to the competent authority with the reasons given. The measuring results are included in this report.

The results of periodic measurements must be retained during the useful life of the installation. The report of parallel measurements must be retained for three years.

Registration of sulphur content of the used fuels

In some cases, the sulphur content of the fuels is used to demonstrate that the emission standard for SO₂ is being met. In that case, the sulphur contents must be registered in such a way that the SO₂ concentration in the flue case can be calculated at any time. The registered sulphur content must be retained for at least three years.

Annual reports

For installation falling under the decree, the following information must be reported to the competent authority:

- installations where continuous measurements take place; the emitted mass quantity per day, as well as the annual emission of SO₂, NO_x and dust; these emissions are calculated on the basis of the measured concentrations and the measured or calculated waste gas flow rate;
- installations where periodic measurements take place; an estimate on the basis of the periodic measurements and fuel data of the annual emission of SO₂, NO_x and dust; for installations with a thermal capacity less than 50 MW, no estimate of the dust emission needs to be made;
- installations with a thermal capacity of at least 50 MW; a specified estimate, according to fuel type, of the heat content of the used fuels.

The annual reports must be sent to the competent authority before 1 April of the following year. The fuel data must also be sent to the inspector general of the Inspectorate General of the Ministry of Housing, Spatial Planning and the Environment.

If the aforesaid data are already being reported pursuant to the Besluit milieuverslaggeving (Decree relative to environment reporting), this need not be done again on the ground of Bees A. Reporting on the basis NO_x emissions trade does not relieve companies from the obligation to send in annual reports.

7 Relation with permit issue, the Decree on the sulphur content of fuels and the IPPC Directive

7.1 General

Bees A works directly, that is to say the obligations set by Bees A must be observed by the installation holder. It is therefore not necessary to include the requirements of Bees A in the permit prescriptions.

Bees A does not lead to changes in the permit issue procedure. It will, however, proceed simpler and faster, because a number of requirements have already been established in Bees A. This will be so in particular in cases where Gedeputeerde Staten (Provincial Executive) has no authority to deviate from the Bees requirements.

When Gedeputeerde Staten uses the band width given in Bees A or deviates from the authority of Bees A, this must, of course, be laid down in the permit prescriptions.

It also happens that the permit prescriptions indicate that a lower discharge level is achieved than when the relevant requirement(s) of Bees A are applied. When the permit is issued with account taken of the application, the lower discharge level applies. In that case it is irrelevant whether Bees A gives a band width or not.

The permit regime continues to apply for all subjects not regulated in Bees A. For example, Gedeputeerde Staten can establish, when prevention or abatement of air pollution requires this, prescriptions concerning the total discharge per time unit for the combustion installation or refuse or retract a permit. When in the case of firing a specific fuel, a requirement is set in Bees A only for SO₂, the competent authority is free to set requirements for NO_x, dust or other components. As long as a requirement is not in force, the ordinary permit regime also applies. When requirements are set, such as in the case of coal for SO₂, NO_x, and dust, the competent authority can regulate itself the emissions of other components (e.g. CO). Obviously, the ordinary permit regime also applies when a specific combustion installation does not fall under Bees.

When an emission standard on the ground of Bees A applies, the relation with the permit prescription is of importance. Gedeputeerde Staten then have a number of authorities on the ground of Bees A:

- For example, Gedeputeerde Staten determines that a number of combustion installations in a logistic unit must be considered a single combustion installation (see Article 6). This assessment must appear from the permit. If a number of combustion installations are designated as a single combustion installation, the limit of 300 MW may be exceeded and flue gas cleaning can therefore be obligatory depending on the circumstances.
- Gedeputeerde Staten can also determine a period in which an installation may be kept in operation when, due to a malfunction, the prevalent NO_x or dust standard cannot be met and, in the case of SO₂, the required desulphurisation percentage cannot be met but the emission standard can.
- It can also use the band width and the possibility to set further requirements.

7.2 Relation with the Decree on the sulphur content of fuels

In the Besluit zwavelgehalte brandstoffen (Decree on the sulphur content of fuels), the relation with Bees A is regulated. All installations on which Bees A sets standards with respect to SO₂ (SO₂ emission standards or standards on the sulphur content of the fuel), are excluded from the scope of Article 1 of the Besluit zwavelgehalte brandstoffen. For example, when coal or heavy fuel is fired in a combustion installation and an emission standard is set for SO₂, there is no restriction with respect to the sulphur content. Conversely, the decree applies if Bees A does not contain a standard with respect to SO₂ for a specific installation. This is also the case for the categories excluded from Bees A. The Besluit zwavelgehalte brandstoffen determines explicitly that the content of 1.2% S for other solid, liquid and gaseous fuels (Article 1, first paragraph, under c) may be deviated from and this to a level not lower than 0.3%.

The permitted sulphur contents pursuant to the Besluit zwavelgehalte brandstoffen are as follows:

gas oil	0.2%
heavy fuel (incl. heavy residues)	1.0%
other fuels (gas, liquid or solid)	1.2% ¹

¹⁾ Stricter requirements up to 3.0% S are possible. The other percentages may not be deviated from.

7.3 Relation with the IPPC Directive

Article 9.3 of the IPPC Directive prescribes that the best available techniques (BAT) must be used in installations that fall under the scope of the directive. Until a short time ago, the starting point was that the requirements of Bees A were at BAT level. The Council of State, however, was of the opinion in a specific case that the competent authority had to investigate whether the relevant requirement of Bees A was at BAT level given the age of Bees A (Council of State, 20 April 2005, no. 200405315/1).

It therefore seems that an additional test, beside the requirements of Bees A, is necessary – in any case for combustion installations placed in an IPPC logistic unit. If that test shows that the BAT level leads to a stricter requirement than the emission requirements of Bees, stricter emission requirements must be included in the permit.

7.4 Existing permit prescriptions (Articles 27, paragraph 1 and 47)

It is possible that an installation becomes subject to Bees A, for example because it exceeds the limits of the category classification specified in the Inrichtingen en vergunningenbesluit milieubeheer (Decree on entities and permits).

When, in such a case, Bees requirements apply for the first time on a combustion installation, any emission requirements with respect to SO₂, NO_x and dust laid down already in the permit prescriptions remain in force, in so far as they are stricter than the emission requirements of Bees A.

In assessing the question whether a requirement is stricter, account must also be taken of the measurement regime that may be prescribed in the permit. For, a requirement that has been formulated

as a month average is less strict than a requirement with the same numerical value as a 24-hour average.

The competent authority may determine the stricter permit prescription again for an installation when, with respect to the permit of that installation, a new decision must be taken (see Article 27, par. 1), for example when issuing a revision permit.

7.5 Deviation in specific cases (Articles 26 to 28)

Stricter requirements (Art. 27)

Article 27, paragraph 2 and 3 specifies in which cases the competent authority may set stricter requirements than the standard emission limit values of Bees A. The tables of Appendix 3 indicate when Article 27 allows stricter requirements.

Article 27, paragraph 1 gives a special regulation for cases where in the past a stricter requirement was included in the permit for a specific installation. For this see Section 7.4.

Pursuant to Article 27, fourth paragraph, stricter requirements may be set:

- a. when the (future) permit holder is willing and able to implement the more far-reaching provisions; or
- b. when according to Best Available Control Technology a stricter requirement can be met, while the combustion installation concerned was prescribed a less strict requirement on the ground of Article 28 than for another combustion installation in the logistic unit.

The reason why a permit holder would be willing to introduce more far-reaching provisions (part a) is as follows. This part of Article 27 is included in Bees A for cases where local air quality is at issue. The competent authority could in those cases consider refusing the permit for a logistic unit or even to retract it, because it would cause too much of an increase of the immissions in a region. Because the permit holder agrees to stricter emission limit values, too large an increase of immissions can be avoided in such cases.

Broader requirement (Article 28)

Specific technical circumstances at certain installations can make it impossible to limit the quantity of emissions to a sufficient extent. In those cases, Gedeputeerde Staten (Provincial Executive) can permit a higher emission limit value under certain conditions. Here it concerns the authority to make exceptions to the general rule (Art. 28) in certain special cases.

Article 28, paragraph 1 to 4 contains a special rule for certain existing installations. This entails that the prescriptions deviating from Bees A, which were included for a specific date in the permit (usually before 29-5-87), continue to apply. These deviating prescriptions had to be reported at the time the Minister of Housing, Spatial Planning and the Environment. At the Ministry nothing is, however, known about them. The question is therefore whether there are still installations in the Netherlands that can invoke this rule. That is why these exceptions have not been included in the tables of Appendix 3.

Article 28, paragraph 5 to 9 gives specific cases where the competent authority may include broader requirements in the permit. The tables of Appendix 3 indicate when this is so.

Article 28, paragraph 10 gives a general possibility for the competent authority to deviate and set more flexible requirements for NO_x if the permit holder demonstrates that a certain NO_x requirement of Bees A applying to his combustion installation is so stringent that it cannot be said that the emission

requirement is based on the best available techniques. When setting this more flexible requirement for an installation falling under the LCP Directive (Directive 2001/80/EC), the competent authority may not deviate from the requirements of this directive.

That authority to deviate is included with a view to cases in which it appeared that the general requirements in Bees A were too stringent in practice. Here it concerns a limited number of mostly large combustion installations for which the emission standards for nitrogen oxides cannot be achieved (are a fraction away from being achieved) due to the specific construction of the installation. There are also installations, in particular gas turbines, where the provisions necessary for meeting the requirements of Bees A lead to increased wear and lower yield.

The permit holder must demonstrate that the emission standard in Bees A for the combustion installation concerned is technically unfeasible or leads economically to unreasonable costs. Economic feasibility is determined objectively; the individual liquidity of the company concerned can therefore play no role. The permit holder must also indicate what emission standard can be achieved with the best techniques available for the installation. Because the competent authority in exercising the authority to deviate must take account of Article 8.11, third paragraph of the Wet milieubeheer (Environmental Management Act), which lays down the requirement for applying the best available techniques, it is ensured that no conflict can arise with the requirements of the IPPC Directive. If situations occur where the installation concerned has a more than marginal influence on local air quality, so that broadening the emission standard will have a negative effect on that air quality, the competent authority is obliged to maintain the existing emission standard.

In some cases, the regional inspector for environmental hygiene must be heard if broader requirements are included in the permit on the ground of Article 28.

The competent authority may always notify the Minister of Housing, Spatial Planning and the Environment of decisions taken on the ground of Article 28.

7.6 Further requirements in accordance with Article 29

On the ground of Article 29, Gedeputeerde Staten (Provincial Executive) can also set further requirements with respect to:

- the proper functioning of the combustion installation, such as instructions concerning the maintenance of the flue gas temperature with a view to sufficient plume rise;
- the height of the chimney to further detail the requirement set in Article 5a;
- demonstrating via the composition of the fuel that the requirement has been met;
- provisions of the Regeling meetmethoden (Regulation on measuring methods); here it exclusively concerns matters that have not been established unambiguously, such as the current measurement practice.

7.7 Emission ceiling and permit refusal

For air quality the method of discharge and the quantity of pollutants per time unit is of importance. Bees A only sets requirements on the concentration of SO₂, NO_x and dust in flue gas and does not regulate the quantity of pollutants per time unit. Bees A has therefore no influence on the authority of Gedeputeerde Staten (Provincial Executive) to regulate the latter when that is in the interest of local air quality.

In general the concentration requirement is sufficient guarantee for acceptable air quality. However, it cannot be ruled out that in the case of a substantial quantity of flue gas or as a result of other emissions or background concentrations, too much SO₂, NO_x or dust are discharged locally per time unit. In such cases, the competent authority may be compelled to set a maximum in the permit on the discharge per time unit (an emission ceiling) for a combustion installation or a specific logistic unit in its entirety at a level that is lower than – given the quantity of produced flue gas – would be in force with application of the concentration requirement.

In more extreme cases, the competent authority may be compelled to refuse a permit or to retract it for an existing installation. It is also possible to use Article 27, fourth paragraph, under a (prescribing stricter emission limit values than permitted by Bees A if the competent authority agrees to it). For this see Section 7.5.

7.8 Appeal, maintenance and sanctions

On the ground of Bees A, certain decisions may be taken by the competent authority (e.g. including deviating emission standards in the permit on the ground of Articles 27 and 28). These decisions are subject to appeal on the ground of Article 20.1 of the Wet milieubeheer (Environmental Management Act).

The competent authority is charged with supervising compliance with the provisions pursuant to the Environmental Management Act and therefore also with supervising compliance with Bees A in close relation with maintenance of the further permit prescriptions. In that connection, civil servants of the provincial government can and will supervise the performance of the measurements and the measurement reports. For the purpose of a random check, emission measurements may also be performed by or on behalf of the competent authority. The supervision by the regional inspectorates is no different than the supervision of the permits.

The sanctions on non-compliance of the rules set by Bees A are no different than on non-compliance of the permit prescriptions. For example, a permit may be retracted in whole or in part pursuant to Article 18.12 Environmental Management Act. Administrative enforcement may be applied on the ground of Article 18.8 Environmental Management Act. A penalty may be imposed on the ground of Article 18.9 Environmental Management Act. The Wet economische delicten (Economic Offences Act, Wed) also applies to behaviours contrary to the prescriptions given in Bees A. When they are committed deliberately, they are criminal offences; in other cases, they are violations.

8 Amendments of Bees A in 2005

On 7 April 2005, the decision to amend Bees A became effective (Bulletin of Acts, Orders and Decrees 2005, 114). The amendments of Bees A ensue from the implementation of the LCP Directive.

The most important amendments of Bees A are:

- addition of several concepts to the list of definitions in Article 1, in particular the addition of the concept of biomass;
- tightening of some emission standards for the purpose of implementing the LCP Directive;
- addition of a possibility to set broader requirements in cases in which the requirements of Bees A are stricter than the BAT level that applies to a specific installation;
- Amendment / tightening of the measurement regime;
 - the limit above which continuous measurements must be taken has been changed from 300 MW to 100 MW;
 - the frequency of periodic measurements at installations with a capacity of 50 MW or more has been increased from once in three years to once in six months;
 - measurements and other determination methods must be performed in accordance with the latest CEN norms;
 - the continuous measurement of the parameters of the discharge characteristic of an installation is placed on par with direct continuous measurement;
 - the proper functioning of the measuring equipment must be inspected annually. The equipment must be calibrated once in three years;
 - if invalid measuring results are obtained for more than 10 days, the measuring system must be improved;
- a change of the regime that applies in case of malfunctions in the flue gas cleaning equipment;
- a change in the regulation for combustion installations that can be or are connected to a single chimney with respect to gas turbines and gas turbine installations for which a permit was after 27 November 2002;
- when a combustion installation is expanded, other requirements can apply for this combustion installation;
- compulsory use of combined heat-power at the newest installations if technically and economically feasible.

9 When Bees A does not set requirements

General

When Bees A does not apply, the competent authority is competent to set emission standards. Whether there are points of departure in Bees, NeR (Netherlands Emission Guideline) or elsewhere for setting a permit requirement is strongly dependent on the reasons on which the exclusion of certain categories is based. In some cases, the application of a requirement at the same level as laid down in Bees A for comparable installations will be a matter of course, such at the discretion of the competent authority in individual cases. The NeR is always relevant for certain categories of Bees excluded installations for which a regulation has been explicitly included in the NeR. Further, the system mentioned in the NeR can be used when there is no (indirect) link with the emissions of comparable installations that are subject to Bees.

Components not regulated in Bees A

Components not regulated in Bees A are, for example, CO, PAHs, HCl, HF, dioxins and heavy metals. The NeR can perhaps offer points of departure with respect to them, but it must be realised that the NeR has not been developed primarily for the emissions of combustion installations and that the discharge level of the components not regulated in Bees A can be linked to the components regulated in Bees A.

When Bees A does not set requirements for SO₂, NO_x or dust

In all cases in which no SO₂ emission standard pursuant to Bees A or another General Administrative Order on the ground of the Environmental Management Act, the Besluit zwavelgehalte brandstoffen (Decree on the sulphur content of fuels) applies. The requirements of this decree are mentioned in Section 7.2. For NO_x and dust, the other requirements of Bees A can possibly be a point of departure.

Categories of installations or fuels excluded from Bees A

- The NeR should in any case be consulted with respect to coke furnaces and combustion installations for drying or treating objects or materials by means of direct contact with combustion gas, such as cement furnaces, brick furnaces, glass furnaces, blast furnaces, grass and green fodder drying plants, installations for roasting ores, pelletising installations, etc.. All guidelines are included in the NeR for coke furnaces and blast furnaces. The NeR guidelines also include special regulations for NO_x emissions for brickworks and glass factories. For situations that are not (yet) included in the NeR, it is worth considering whether the emissions caused by combustion are influenced significantly by contact with objects or materials. If this is not the case, it is more obvious to use the requirements of Bees A, supposing that the nature of the production process and the technical possibilities for control linked to it do not pose an obstacle to compliance. If this is the case, the NeR can possibly offer points of departure.
- With respect to experimental installations (which according to the permit are used for investigating, testing or demonstrating experimental combustion techniques or techniques for controlling the discharge of SO₂, NO_x or dust) it would be incorrect to examine the requirements of Bees A or the NeR. These are not focused on experimental techniques or on gasification techniques. For these cases, individual requirements will therefore have to be set. For experimental installations and installations where gas obtained by gasification

of coal is fired, the emission standards for the individual combustion installation may possibly be derived from data on comparable installations.

- Installations for firing waste substances that do fall under the definition of biomass in accordance with Article 1, under dd of Bees A, are excluded from Bees A (Art. 2, under b, under 6°). The combustion of waste substances other than clean biomass falls under the Besluit verbranden afvalstoffen (Waste Incineration Decree).
- The BREFs (BAT reference documents), which present the BAT level, apply in many cases for IPPC installations.

Appendices

Appendix 1 Categories of logistic units falling under Bees A

A combustion installation falls (in so far as not generally excluded) under Bees A when it is placed in one of the following categories of logistic units mentioned in Annex 1 of the Inrichtingen- en vergunningenbesluit milieubeheer (Decree on entities and permits) (Gedeputeerde Staten (Provincial Executive) are the competent authority therefor.

1.3 under b

Logistic units for firing fuels with a thermal capacity of 50 MW or more.

2.6 under a

Logistic units for the storage and transshipment of hydrocarbons in gaseous state with a capacity for the storage of these substances or products of $100 \cdot 10^3 \text{ m}^3$ or more.

4.3

Logistic units for the manufacture of:

- a. one or more of the following substances or products with a capacity therefor of $5 \cdot 10^6 \text{ kg}$ per year or more:
 1. ammonia;
 2. acetic acid or acetic acid anhydride;
 3. benzene, toluene, xylene or naphthalene;
 4. chlorine;
 5. ethanol with a content of at least 94%;
 6. phenol or cresol;
 7. phosphorus or nitrogen-containing fertilisers.
 8. phosphoric acid;
 9. isocyanates;
 10. unsaturated organic compounds with a molecular mass of 110 or less;
 11. rayon of viscose;
 12. nitrous acid;
 13. synthetic organic polymers;
 14. titanium dioxide, vanadium pentoxide, zinc oxide, molybdenum oxide or lead oxide;

15. hydrochloric acid;
 16. sulphur, sulphuric acid, sulphurous acid or sulphur dioxide.
- b. one or more of the following substances or products with a capacity therefor of 10×10^3 :
1. amines;
 2. calcium carbide (carbid) or silicium carbide (carborundum);
 3. carbon black;
 4. carbonyl chloride (phosgene);
 5. phosphorus;
 6. carbon disulfide;
 7. organic sulphides (thioethers) or organic disulphides;
 8. thiols (mercaptanes);
- c. halogenated organic compounds with a capacity therefor of 1×10^6 kg per year or more;
- d. methanol with a capacity therefor of 100×10^6 kg per year or more;
- e. all the following substances or products with a total capacity therefor of 1×10^6 kg per year or more:
1. aromatic aldehydes;
 2. esters of aliphatic monocarbon acids;
 3. eugenol derivates;
 4. phenolic esters;
 5. ketones with a molecular mass greater than 150;
 6. oil of turpentine derivatives.

5.3

Logistic units for:

- a. the storage or transshipment of petroleum or hydrocarbons in liquid state with a capacity for these substance or products of 100×10^3 m³ or more;
- b. the refining, cracking or gasifying of petroleum or petroleum fractions with a capacity therefor of 1×10^9 kg per year or more.

6.2

Logistic units for the manufacture of:

- a. oils and fats obtained from animal or vegetable sources with a capacity therefor of 250×10^6 kg per year or more;
- b. fatty acids or alkanols obtained from animal or vegetable oils with a capacity therefore of 50×10^6 kg per year or more.

8.1 under e

Logistic units for the destruction of animals as referred to in Article 5 of the Destructiewet (Destruction Act).

8.2 under a

Logistic units for the manufacture of fat, glue, ash, coal, protein or gelatine from bones or skins with a capacity therefor of $5 \cdot 10^6$ kg per year or more.

9.3

Logistic units for:

g. the manufacture of sugar from sugar beets with a capacity therefor of $2.5 \cdot 10^6$ kg sugar beets per day or more;

j. the storage or transshipment of grains, flour sorts, seeds, dried legumes, maize or derivatives thereof with a processing capacity therefor of $0.5 \cdot 10^6$ kg per hour or more.

11.3

Logistic units for:

- a. the storage or transshipment of ores, minerals or derivatives of ores or minerals with a surface area for the storage thereof of 2000 m² or more;
- b. the grinding, roasting, pelletising or sintering of minerals or derivatives thereof with a capacity therefor of $1 \cdot 10^6$ kg per year or more;
- c. the manufacture of:

1° cement or cement clinker with a capacity therefor of $100 \cdot 10^6$ kg per year or more;

4° glass fibre, glazes, enamels, glass wool or stone wool with a capacity therefor of $5 \cdot 10^6$ kg per year or more;

6° cokes from coal with a capacity therefor of $100 \cdot 10^6$ kg per year or more;

f. the treating or processing of rock obtained from coal mines with a capacity therefor of $10 \cdot 10^6$ kg per year or more;

h. the extracting, breaking, grinding, sieving or drying of marl in so far as it concerns logistic units with a capacity of $100 \cdot 10^6$ kg per year or more;

k. the breaking, grinding, sieving or drying of:

2° sand-lime stone, lime with a capacity therefor of $100 \cdot 10^6$ kg per year or more if such a logistic unit is not a logistic unit for sand and gravel extraction for which a permit is required on the ground of Article 3 of the Ontgrondingenwet (Earth Removal Act).

12.2

Logistic units for:

- a. the manufacture of crude iron, crude steel or primary non-ferro metals with a capacity therefor of $1 \cdot 10^6$ kg per year or more;
- h. the melting or casting of metals or their alloys with a capacity therefor of $4 \cdot 10^6$ kg per year or more;
- i. for the melting of lead with a capacity therefor of $2.5 \cdot 10^6$ kg per year or more.

13.3 under c

Logistic units for cleaning tank ships.

24.2

Logistic units for the manufacture of coal electrodes in so far as it concerns logistic units with a capacity therefor of $50 \cdot 10^6$ kg per year or more.

28.4 under e

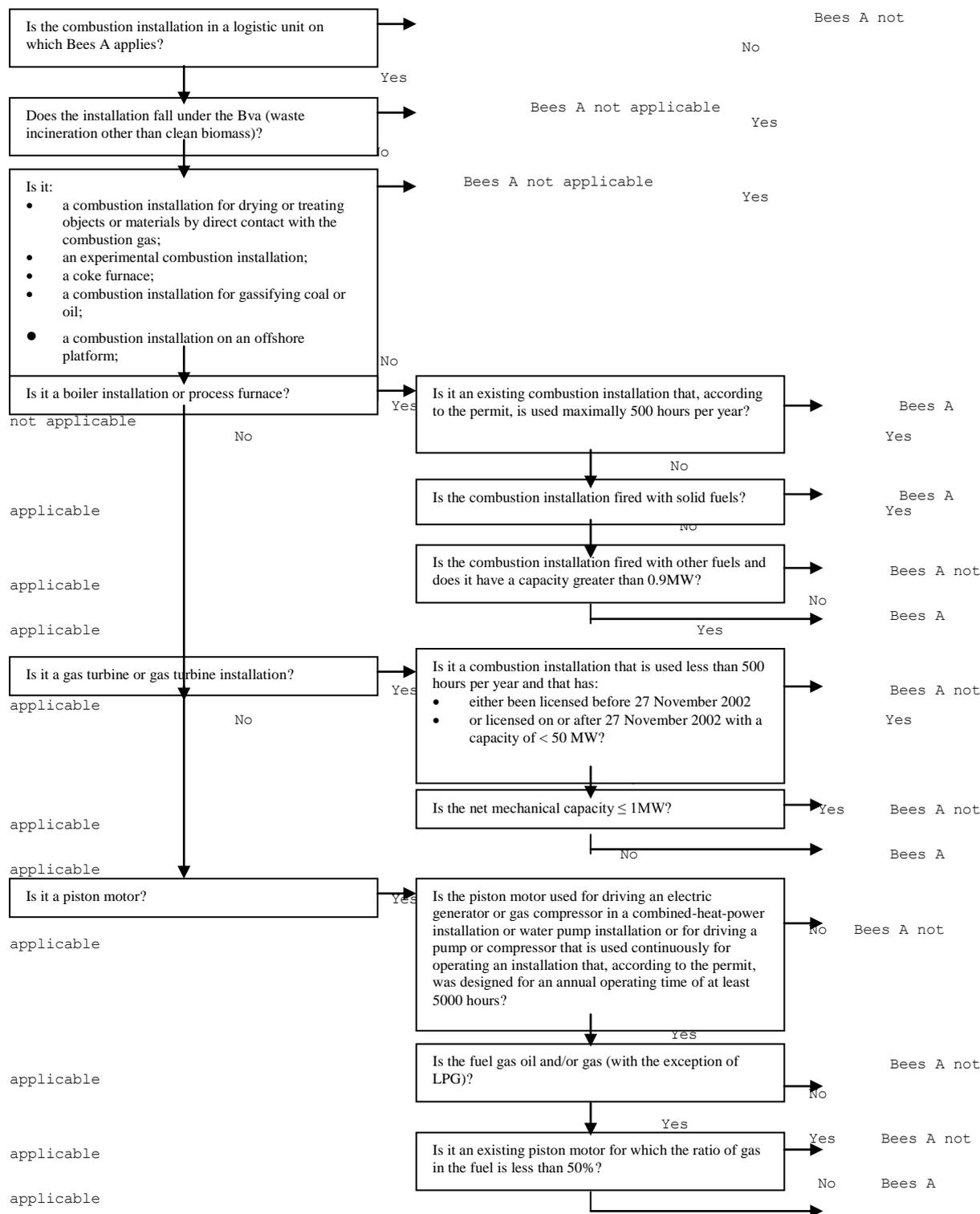
Logistic units for the incineration of:

- 1° household waste coming from outside the logistic unit;
- 2° industrial waste coming from outside the logic unit;
- 3° hazardous substances coming from outside the logistic unit;

in so far as it concerns logistic units with a capacity of $1.5 \cdot 10^3$ kg per hour or more (logistic units with a capacity of less than 1500 kg per hour therefore fall under Bees B). However, see below.

NB: Installations that fall on the scope of the Besluit verbranden afvalstoffen (Waste Incineration Decree) are excluded.

Appendix 2 Flow chart of the scope of Bees A



Appendix 3 Overview of emission standards

Table A: Combustion installations fired with solid fuels

fuel	date of permit	thermal capacity	SO ₂ - requirement (mg/m ³)	article	explanation and/or requirement to be set
coal	*before 29-5-87	≥ 300 MW	400	15.1	Flue gas desulphurisation minimally 85% (art. 15.2).
All other installations licensed before 29-5-87: no SO ₂ requirements.					
solid	on/after 29-5-87 until 1-1-90	≥ 300 MW	400	11.1.a.1	Flue gas desulphurisation minimally 85% (art. 11.2).
	on/after 1-1-90	≥ 300 MW	200	11.1.a.2	Flue gas desulphurisation minimally 85% (art. 11.2).
	before 27-11-02	100 MW ≤ tc < 300 MW	700	11.1.b.1	For solid fuels other than coal a stricter SO ₂ requirement may be applied up to 250 mg/m ³ (art. 27.2.a.1°).
	on/after 27-11-02	100 MW ≤ tc < 300 MW	200	11.1.b.2	
	before 27-11-02	50 MW ≤ tc < 100 MW	700	11.1.c.1	For solid fuels other than coal a stricter SO ₂ requirement may be applied up to 250 mg/m ³ (art. 27.2.a.1°).
	on/after 27-11-02	50 MW ≤ tc < 100 MW	200	11.1.c.2	This requirement applies if the installation is fired with biomass.
			700	11.1.c.3	This requirement applies if the installation is fired with fuels other than biomass. For solid fuels other than coal a stricter SO ₂ requirement may be applied up to 250 mg/m ³ (art. 27.2.a.1°).
on/after 29-5-87	< 50 MW	700	11.1.d	For solid fuels other than coal a stricter SO ₂ requirement may be applied up to 250 mg/m ³ (art. 27.2.a.1°).	

fuel	date of permit	thermal capacity	NO _x - requirement (mg/m ³)	article	explanation and/or requirement to be set
coal	**before 29-5-87	> 20 MW	650	15.4	Article 15.3, which also applies to this category of installations, is a "dead" provision.
All other installations licensed before 29-5-87: no NO _x requirements.					
solid	on/after 29-5-87 until 1-1-89	≥ 500 MW	400	11.3.a.1	From January 2016, the requirement will be 200 mg/m ³ .
	In 1989	≥ 500 MW	300	11.3.a.2	From January 2016, the requirement will be 200 mg/m ³ .
	on/after 1-1-90	≥ 500 MW	200	11.3.a.3	
	on/after 29-5-87 until 1-1-89	300 MW ≤ tc < 500 MW	400	11.3.b.1	
	In 1989	300 MW ≤ tc < 500 MW	300	11.3.b.2	
	on/after 1-1-90	300 MW ≤ tc < 500 MW	200	11.3.b.3	
	on/after 29-5-87 until 1-8-88	< 300 MW	650	11.3.c.1	And if tc ≥ 50MW, the requirement will be 600 mg/m ³ on 1-1-08.
	on/after 1-8-88 up to and including 14-10-92	< 300 MW	500 (1)	11.3.c.2	
	15-10-92 up to and including 31-12-93	< 300 MW	200	11.3.c.3	
on/after 1-1-94	< 300 MW	100	11.3.c.4		
fuel	date of permit	thermal capacity	SO ₂ - requirement (mg/m ³)	article	explanation and/or requirement to be set
			Dust requirement (mg/m ³)		
solid	***Before 29-5-87	-	-	-	No dust requirement
	on/after 29-5-87 until 15-10-92	n/a	50	11.4.a	For solid fuels other than coal, a stricter dust requirement may be applied up to 5 mg/m ³ (art. 27.2.a.2°). For coal, a stricter requirement may be applied up to 20 mg/m ³ (art. 27.2.b).
	on/after 15-10-92	n/a	20	11.4.b	During malfunctions in the logistic unit for desulphurising flue gasses, the dust emission may amount to max. 50 mg/m ³ (art. 11.4.b). For solid fuels other than coal, a stricter dust requirement may be applied up to 5 mg/m ³ (art. 27.2.a.2°).

tc = thermal capacity

¹ In certain rare cases, a deviating requirement for installations with a tc between 50 and 75 MW applies on the ground of article 48a. For this refer to section 4.4.

Table B: Emission standards for combustion installations fired with liquid fuels

(The NO_x requirements of these tables do not apply for gas turbines, gas turbine installations and piston motors.)

installation type	fuel	permit date	thermal capacity	SO ₂ -requirement (mg/m ³)	article	explanation and/or requirement to be set
combustion installation	heavy fuel oil	before 29-5-87	≥ 300 MW	400	16.1	Flue gas desulphurisation minimally 85% (art. 16.2).
			< 300 MW	1700	16.6 (°)	If heavy fuel oil with a sulphur content of 1% or less is fired, the requirement is met (art. 33.3).
	liquid with the exception of gas oil	on/after 29-5-87 until 27-11-02	≥ 300 MW	200	12.1.a	In the case of heavy fuel oil, flue gas desulphurisation min. 85% (art. 12.2).
			100 MW ≤ tc < 300 MW	1700	12.1.b.1 °	If the sulphur content of the fuel is 1% or less, the requirement is met (art. 33.3).
			100 MW ≤ tc < 300 MW	400-200	12.1.b.2 °	400-200 mg/m ³ linearly decreasing between 100 and 300 MW.
			50 MW ≤ tc < 100 MW	1700	12.1.c.1 °	If heavy fuel oil with a sulphur content of 1% or less is fired, the requirement is met (art. 33.3).
			50 MW ≤ tc < 100 MW	850	12.1.c.2 °	
			< 50 MW	1700	12.1.d	If the sulphur content of the fuel is 1% or less, the requirement is met (art. 33.3).
All other cases: no SO ₂ requirements						

installation type	fuel	permit date	thermal capacity	NO _x -requirement (mg/m ³)	article	explanation and/or requirement to be set
combustion installation in electricity plant	Liquid fuels	before 29-5-87	all	700 ^(1,3)	16.3	When firing a liquid fuel generated in the logistic unit and with a nitrogen content > 0.3 %, a factor must be applied (art 24.4).
combustion installation, not in electricity plant	heavy fuel oil + liquid fuel with nitrogen content > 0.3% generated in logistic unit	before 29-5-87	all	400 ^(1,2)	16.4.a	When using heat pre-heating since before 15-10-92 a factor may be applied (art. 24.2.a). The requirement for heavy fuel oil may be a maximum of 450 mg/m ³ (art. 25.1.b) after correction with the factor. When firing a liquid fuel generated in the logistic unit and with a nitrogen content > 0.3 %, a factor must be applied (art 24.4). The requirement may amount to a maximum of 700 mg/m ³ (art. 25.1.a). The competent authority may set a less strict requirement than pursuant to article 16.4. in conjunction with article 24, but not less strict than 700 mg/m ³ (art. 28.9).
	other liquid fuels	before 29-5-87	all	200 ^(1,2)	16.4.b	When using heat pre-heating since before 15-10-92. a factor may be applied (art. 24.2.a). The requirement for heavy fuel oil may be a maximum of 225 mg/m ³ (art. 25.2). The competent authority may set a less strict requirement than pursuant to article 16.4. in conjunction with article 24, but not less strict than 700 mg/m ³ (art. 28.9).
process furnace	liquid	on/after 29-5-87 until 15-9-91	all	450 ⁽²⁾	12.3.a	If tc ≥500MW, the requirement will be 400 mg/m ³ after 1-1-08: If the burners were replaced on or after 15-10-92, a stricter NO _x requirement may be applied up to 400 mg/m ³ for heavy fuel oil (art. 27.3.a) or 200 mg/m ³ for other liquid fuels (art. 27.3.b).
		on/after 15-9-91 until 15-10-92	all	300 ⁽²⁾	12.3.b	If the burners were replaced on or after 15-10-92, a stricter NO _x requirement may be applied up to 200 mg/m ³ for liquid fuels other than heavy fuel oil (art. 27.3.b).
		on/after 15-10-92 until 1-5-98	all	200 ⁽²⁾	12.3.c	
		on/after 1-5-98	all	120	12.3.d	
combustion installation other than process furnace	liquid	on/after 29-5-87 until 1-8-88	all	450 ⁽²⁾	12.4.a	If tc ≥500MW, the requirement will be 400 mg/m ³ after 1-1-08. If the burners were replaced on or after 15-10-92, a stricter NO _x requirement may be applied up to 400 mg/m ³ for heavy fuel oil (art. 27.3.a) or 200 mg/m ³ for other liquid fuels (art. 27.3.b).
		on/after 1-8-88 until 15-10-92	all	300 ^(2,3)	12.4.b	If the burners were replaced on or after 15-10-92, a stricter NO _x requirement may be applied up to 200 mg/m ³ for liquid fuels other than heavy fuel oil (art. 27.3.b).
		on/after 15-10-92 until 1-5-98	all	150 ⁽²⁾	12.4.c	
		on/after 1-5-98	all	120	12.4.d	

installation type	fuel	permit date	thermal capacity	Dust requirement (mg/m ³)	article	explanation and/or requirement to be set
combustion installation	liquid fuel with ash content > 0.06%	on/after 29-5-87 until 27-11-02	50 MW ≤ tc < 500 MW	100	12.5.a	
	all liquid fuels	on/after 27-11-02	≥ 100 MW	30	12.5.b	
	Other cases licensed on/after 29-5-87 with a tc ≥ 50MW			50	12.5.c	
	For combustion installations licensed before 29-5-87 and for combustion installations with a tc < 50MW, no dust requirements apply.					

¹ The emission standard only applies for combustion installations that after 1-1-89 will still be in operation for more than 10,000 hours, converted to hours at a load of 100%.

² For installations with a thermal capacity < 2,5 MW (upper value) that are licensed before 1-5-98, this requirement does not apply, unless the burners were replaced on or after 1-5-98.

³ In certain rare cases a deviating requirement applies for installations with a tc between 50 and 75 MW on the ground of article 48a. For this refer to section 4.6.

tc = thermal capacity

Table C: Emission standards for combustion installations fired on gaseous fuels

(The NO_x requirements of these tables do not apply to gas turbines, gas turbine installations and piston motors.)

installation type	fuel	permit date	SO ₂ - requirement (mg/m ³)	article	Explanation and/or requirement to be set	
combustion installation	special refinery gas	before 29-5-87	800 (°)	17.2.a	Here it concerns refinery gas with a low specific heat content coming from the final phase of the conversion of refinery residues in petroleum coke.	
	other refinery gas	before 29-5-87	35 (°)	17.2.b		
	coke furnace gas	before 29-5-87	400 (°)	17.3.a.1°	When a desulphurisation installation is licensed on or after 15-10-92, a stricter requirement may be applied up to 200 mg/m ³ (art. 27.2.c).	
	blast furnace gas	before 29-5-87	150 (°)	17.3.a.2°	A stricter requirement may be applied up to 120 mg/m ³ (art. 27.2.d).	
	oxygen	before 29-5-87	35 (°)	17.3.a.3°		
	Other gasses fired in a combustion installation licensed before 29-5-87: no SO ₂ requirements					
	refinery gas	on/after 29-5-87	800	13.1.a.1°	This requirement only applies if refinery gas with low specific heat content coming from the final phase of conversion of refinery residues in petroleum coke is fired in an installation licensed before 27-11-02 or that has a tc < 50MW.	
			35	13.1.a.2°	Other cases than 13.1.a.1°	
	coke furnace gas	on/after 29-5-87	400	13.1.b	When the desulphurisation installation was licensed on or after 15-10-92, a stricter SO ₂ requirement may be applied up to 200 mg/m ³ (art. 27.2.c).	
	blast furnace gas	on/after 29-5-87	150	13.1.c	A stricter requirement may be applied up to 120 mg/m ³ (art. 27.2.d).	
	oxygen	on/after 29-5-87	35	13.1.d		
	LPG	on/after 29-5-87	5	13.1.e		
	other gaseous fuel	on/after 29-5-87	35	13.1.f	When natural gas is used, this requirement is met automatically (art. 43.4 in conjunction with art. 33.1). No SO ₂ -requirements apply for gas obtained from gasification of coal that is fired in a combustion installation licensed before 27 November 2002 or in a combustion installation with a tc < 50 MW.	

installation type	fuel	permit date	NO _x requirement (mg/m ³)	article	Explanation and/or requirement to be set
combustion installation in electricity plant	gaseous fuels	before 29-5-87	500 ^(1,2,4)	17.1.a	
combustion installation, not in electricity plant	gaseous fuels	before 29-5-87	150 ^(1,2,4,9)	17.1.b.1°	For a process furnace with a furnace temperature of > 760°C, a factor may be applied (art. 24.1). For air pre-heating (used before 15-10-92), a factor may be applied (art. 24.2). If both these cases occur in a single combustion installation, only the factor for the furnace temperature may be applied (art. 24.6). The requirement after correction with a factor may not be more flexible than 350 mg/m ³ (art. 25.3). In case of non-standard natural gas (fired since before 15-10-92), a factor may be applied (art. 24.3). Correction is allowed up to 350 mg/m ³ (art. 25.3.b). When using gasses generated in the logistic unit, a factor must be applied (art. 24.5). Correction is allowed up to 500 mg/m ³ (art. 25.3.a).
			70 ^(1,2)	17.1.b.2°	This requirement applies for combustion installations with a tc ≤ 10MW in which the heat is transferred to water, steam or thermal oil when the burners were replaced on or after 1 May 1998. Otherwise 17.1.b.1° applies.
process furnace	gas generated in logistic unit	on/after 29-5-87 until 15-9-91	350 ^(3,5)	13.2.a	If 50 MW ≤ tc < 500 MW as from 1-1-08: 300 mg/m ³ . If tc > 500 MW as from 1-1-08: 200 mg/m ³ .
		on/after 15-9-91 until 1-5-98	200 ^(3,5,7)	13.2.b	
		on/after 1-5-98	110/140 ⁽¹⁰⁾	13.2.c.1°	110 mg/m ³ if no air pre-heating is used and the exit temperature is less than 600°C. In the other situations a NO _x requirement of 140 mg/m ³ applies (art. 13.2.c.2°).
	gas not from logistic unit	on/after 29-5-87 until 15-9-91	350 ^(3,5,6)	13.3.a	If 50 MW ≤ tc < 500 MW as from 1-1-08: 300 mg/m ³ If tc > 500MW as from 1-1-08: 200 mg/m ³ .
		on/after 15-9-91 until 15-10-92	200 ^(3,5,6,7)	13.3.b	
		on/after 15-10-92 until 1-5-98	150 ^(3,6,7)	13.3.c	
		on/after 1-5-98	80/110 ⁽¹¹⁾	13.3.d	If the exit temperature of the medium to which the heat is transferred is less than 600° C and no air pre-heating is used, a requirement of 80 mg/m ³ (13.3.d.1°) applies. Otherwise a requirement of 110 mg/m ³ applies (13.3.d.2°).

combustion installation other than process furnace	gaseous fuels	on/after 29-5-87 until 1- 8-88	350 ^(3,5,6)	13.4.a	If 50 MW ≤ tc < 500 MW as from 1-1-08: 300 mg/m ³ If tc > 500 MW as from 1-1-08: 200 mg/m ³ .
		on/after 1-8-88 until 15-10-92	200 ^(2,3,5,6,7)	13.4.b	
		on/after 15-10-92 until 1- 5-98	100/200 ^(3,6,7)	13.4.c	For gas generated in the logistic unit, a requirement of 200 mg/m ³ applies. For other gasses, a requirement of 100 mg/m ³ applies.
		on/after 1-5-98	70	13.4.d	

installation type	fuel	permit date	Dust requirement (mg/m ³)	article	Explanation and/or requirement to be set
combustion installation	coke furnace gas, blast furnace gas and oxygas, or mixtures thereof	before 29-5-87	20	17.3.b	The requirement also applies for mixtures with coke furnace gas and/or oxygas and/or natural gas.
	Combustion installations licensed before 29-5-87 with other gasses as fuel: no dust requirements				
	coke furnace gas	on/after 29-5-87	20	13.5.a	The requirement also applies for mixtures with blast furnace gas.
	blast furnace gas	on/after 29-5-87	10	13.5.b	Not mixed with blast furnace gas or oxygas.
	oxygas	on/after 29-5-87	20	13.5.a	This requirement applies for mixtures with blast furnace gas.
other gaseous fuel	on/after 29-5-87	5	13.5.c	When natural gas is used, this requirement is met automatically (art. 43.7).	

¹ This requirement only applies for combustion installations that will still be in operation after 1-1-89 for at least 10,000 hours, converted to hours at a load of 100%.

² In certain rare cases, a deviating requirement applies for installations with a tc between 50 and 75 MW on the ground of article 48a. For this refer to section 4.6.

³ For installations with a thermal capacity < 2,5 MW (upper value) that were licensed before 1-5-98 this requirement does not apply, unless the burners were replaced on or after 1-5-98.

⁴ For installations with a thermal capacity < 2,5 MW (upper value) that were licensed before 1-5-98 this requirement does not apply.

⁵ If for an installation with a tc > 10 MW the burners were replaced after 15-10-92, a stricter requirement may be applied up to 150 mg/m³ (art. 27.3.c).

⁶ If for an installation with a tc ≤ 10 MW the burners were replaced after 15-10-92, a stricter requirement may be applied up to 70 mg/m³ when the transfer of heat occurs by means of water, steam or thermal oil and 50 mg/m³ in the other cases.

⁷ When, using the best available technique, the combustion installation cannot be adjusted or rebuilt in such a way that the NO_x requirement is met, a less strict requirement may be applied up to 350 mg/m³ (art. 28.5 en 28.7). This requirement will be cancelled as per 1-1-08 if it (art. 28.12) is less strict than 300 mg/m³ (tc<500 MW) or less strict than 200 mg/m³ (tc≥500 MW).

⁸ In the case of combined use with natural gas, a value of 35 mg/m³ for natural gas is used for calculating the SO₂ requirement with the mixture rule of article 9 (art. 17.4).

⁹ The competent authority may set a less strict requirement than pursuant to art. 17.1.b. 1° in conjunction with art. 24, but not less strict than 500 mg/m³ (art. 28.9).

¹⁰ When air pre-heating is used for an installation as referred to art. 13.2.c.2° (requirement: 140 mg/m³) a less strict requirement may be set if, given the best available technique, that is inevitable, but not less strict than 160 mg/m³ if the exit temperature is less than 600°C and 200 mg/m³ at an exit temperature of ≥ 600°C (art. 28.5, 28.6 and 28.8).

¹¹ When air pre-heating is used for an installation as referred to in art. 13.3.d.2°, a less strict requirement may be set, but not less strict than 130 mg/m³ if the exit temperature is less than 600°C and 150 mg/m³ at an exit temperature of ≥ 600°C (art. 28.8.b).

Table D: SO₂ requirements for refineries

(For NO_x and dust, the requirements apply per combustion installation as presented above for liquid and gaseous fuels.)

Installation type	SO ₂ - requirement (mg/m ³)	Article	Supplement
The average of all combustion installations in the refinery licensed before 29-5-87	1700	18.2.a	From 1-1-08, a requirement of 1000 mg/m ³ applies.
The average of all combustion installations in the refinery licensed on/after 29-5-87, but before 27-11-02	1000	18.2.b	
The average of all combustion installations in the refinery licensed on/after 27-11-02 with a tc < 50 MW	1000	18.2.b	
The average of all combustion installations in the refinery licensed on/after 27-11-02 with a tc ≥ 50 MW	600	18.2.c	
As a supplement to the above: SO ₂ (all combustion installations)+(mass SO (from desulphurisation as SO ₂)/total volume flue gasses) ≤ 1000 mg/m ³ (art.18.3)			

Table E: NO_x requirements for gas turbines and gas-turbine installations

(For SO₂ and dust, the requirements apply per combustion installation as presented above for liquid and gaseous fuels. The following applies for NO_x emissions related to the heat content of the supplied fuel.)

Installation type	Fuel	Permit date	Thermal capacity	NO _x - requirement t (g/GJ)	article	Explanation and/or requirement to be set
gas turbine	all	before 29-5-87	all	200 ^(1,3)	20a.2.a	ISO + R-factor
		29-5-87 up to and including 30-4-98	all	200	20.1.a	ISO + R-factor Upon permit issue on or after 15-10-92, a stricter requirement may be applied up to 65 g/GJ times the R-factor, recalculated to ISO air conditions if this does not necessitate the injection of water, steam or other inert material (art. 27.2.e).
		1-5-98 up to and including 26-11-02	all	65	20.1.b	ISO A stricter requirement may be applied up to 45 g/GJ (art. 27.2.f).
		on/after 27-11-02	< 50 MW	65	20.1.b	ISO A stricter requirement may be applied up to 45 g/GJ (art. 27.2.f).
	natural gas	on/after 27-11-02	≥ 50 MW	45	20.1.c	
	other fuels	on/after 27-11-02	≥ 50 MW	65	20.1.d	A stricter requirement may be applied up to 45 g/GJ (art. 27.2.f).
gas turbine installation in electricity plant	all	before 29-5-87	all	135 ^(1,3)	20a.2.b	ISO + R-factor A stricter requirement may be applied up to 100 g/GJ recalculated to ISO air conditions times the yield factor (art. 27.2.g).
gas turbine installation not in electricity plant	all	before 29-5-87	all	65 ⁽²⁾	20a.5	ISO + R-factor
gas turbine installation	all	29-5-87 up to and including 26-11-02	all	65	20.1.e	ISO + R-factor
		on/after 27-11-02	< 50 MW	65	20.1.e	ISO + R-factor
	natural gas	on/after 27-11-02	≥ 50 MW	45	20.1.f	
	other fuels	on/after 27-11-02	≥ 50 MW	65	20.1.g	

- ISO: The requirement is recalculated to ISO air conditions.

- R-factor: The requirement is multiplied by 1/30 gas turbine yield. The yield factor must be minimally 1. If gaseous fuels other than natural gas of standard quality are fired, the yield factor is, in its turn, multiplied again by a factor equal to the ratio of the lowest combustion value of the used fuel, expressed in MJ/kg, up to a combustion value of 38 MJ/kg. This latter factor must amount to minimally 0.9 and maximally 1.1 (art. 20.1, 2 and 3, art. 20a.2, 3 and 4).

¹ This requirement only applies when the gas turbine will still be in operation for 25,000 hours after 31-12-89 (art. 20a.2).

² This requirement only applies when the installation will still be in operation for 25,000 hours after 31-12-93 (art. 20a.5).

³ In certain rare cases, a deviating requirement applies for installations with a tc between 50 and 75 MW on the ground of article 48a. For this refer to section 4.6.

Table F: NO_x requirements for combination of gas turbine and another combustion installation (not being a gas turbine installation)

(For SO₂ and dust, the requirements apply per combustion installation as presented above for liquid and gaseous fuels.)

Installation type	Article	Special regulation
A combination of a gas turbine and another combustion installation, without this installation forming a gas turbine installation in the meaning of article 1, under n, unless it is an installation in the meaning of article 22 (see below).	21	<ul style="list-style-type: none"> - For this combination, the emission requirements of the installation apply with which the gas turbine is combined. For determining the thermal capacity, the sum applies of the capacities of the gas turbine and the combustion installation with which the gas turbine is combined. - - If the combustion installation with which the gas turbine is combined is a combustion installation in the meaning of articles 13.3.b or 13.4.b, instead of the emission standard of 200 mg/m³ mentioned in those articles a value of 240 mg/m³ applies for combustion installations with a tc < 500 MW and a value of 240 mg/m³ for combustion installations with a tc ≥ 500 MW until 1 January 2008 (thereafter once more the ordinary requirement of 200 mg/m³).
A gas turbine that belongs to an electricity production plant and which is combined with another combustion installation in which more extra fuels are co-fired than a quantity that corresponds with one-and-a-half times the thermal capacity of the gas turbine.	22	For this combination, the emission requirement applies that is the average of the requirements that would apply separately for the gas turbine and for the other combustion installation, where the average is calculated according to the ratio of the heat content of the supplied fuels.

Table G: NO_x requirements for piston motors (For SO₂ and dust, the requirements apply per combustion installation as represented above for liquid and gaseous fuels.)

Fuel	Permit date	Mechanical capacity	NO _x requirement (g/GJ)	Article	Explanation and/or requirement to be set
≥ 50% gas	Before 29-5-87	> 50 kW	500	23a	Having heard the inspector, the competent authority may set a less strict requirement for gasses other than natural gas or for application in accordance with article 2.a, introduction and 2°, in so far as the best available technique cannot be adjusted or rebuilt in such a way that the requirement is met (art. 28.3)
Other piston motors licensed before 29-5-87: no NO _x requirements.					
≥ 50% gas	29-5-87 - 31-12-89	> 50 kW	800 ⁽¹⁾	23.1.a. 1°	Stricter requirement may be applied up to 270 g/GJ ⁽¹⁾ (art. 27.2.h)
	1-1-90 - 31-12-93	> 50 kW	270 ⁽¹⁾	23.1.a. 2°	Stricter requirement may be applied up to 100 g/GJ ⁽¹⁾ (art. 27.2.i)
	on/after 1-1-94	> 50 kW	140 ⁽¹⁾	23.1.a. 3°	Stricter requirement may be applied up to 100 g/GJ ⁽¹⁾ (art. 27.2.i)
	on/after 29-5-87	≤ 50 kW	800 ⁽¹⁾	23.1.b	Stricter requirement may be applied up to 270 g/GJ ⁽¹⁾ (art. 27.2.h)
< 50% gas	29-5-87 - 31-12-89	> 50 kW	1200 ⁽¹⁾	23.2.a	Stricter requirement may be applied up to 400 g/GJ ⁽¹⁾ (art. 27.2.j)
	on/after 29-5-87	≤ 50 kW	1200 ⁽¹⁾	23.2.a	Stricter requirement may be applied up to 400 g/GJ ⁽¹⁾ (art. 27.2.j)
	on/after 1-1-90	> 50 kW	400 ⁽¹⁾	23.2.b	Stricter requirement may be applied up to 150 g/GJ ⁽¹⁾ (art. 27.2.j)

¹ times 1/30 motor yield

The emission standards for all piston motors are based on discharge recalculated to ISO air conditions and related to the heat content of the supplied fuel.