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Ordinance on Air Pollution Control (OAPC)

of 16 December 1985 (Status as of 1 January 2023)

The Swiss Federal Council,

on the basis of Articles 12, 13, 16 and 39 of the Federal Act of 7 October 1983[1] on the Protection of the Environment (the Act),

ordains:

Chapter 1 General Provisions

Art. 1 Aim and scope

[1] This Ordinance is intended to protect human beings, animals and plants, their biological communities and habitats, and the soil against harmful effects or nuisances caused by air pollution.

[2] It regulates:

a. the preventive limiting of emissions from installations, as defined in Article 7 of the Act, which pollute the air;

a[bis].[2] open-air waste incineration;

b. requirements for thermal and motor fuels;

c. maximum permitted ambient air pollution levels (ambient limit values);

d. the procedure in the event of excessive ambient air pollution levels.

Art. 2 Definitions

[1] *Stationary installations* means:

a. buildings and other fixed structures;

b. terrain modifications;

c. equipment and machines;

AS **1986** 208

1 SR **814.01**

2 Inserted by No I of the O of 20 Nov. 1991, in force since 1 Feb. 1992 (AS **1992** 124).

d. ventilation systems which collect vehicle flue gases and discharge them as waste air into the environment.

2 *Vehicles* means motor vehicles, aircraft, ships and railways.

3 *Transport infrastructure* means roads, airfields, railway tracks and other installations where vehicle flue gases are released into the environment as waste air without being collected.

4 *New installations* also includes installations which are altered, extended or repaired if:

a. higher or different emissions are to be expected as a result; or

b. the costs incurred amount to more than half those of a new installation.

5 Ambient air pollution levels are *excessive* if one or more of the ambient limit values specified in Annex 7 is exceeded. If no such limit values are specified for a pollutant, ambient air pollution levels shall be considered excessive if:

a. they endanger human beings, animals, plants or their biological communities or habitats;

b. a survey establishes that they significantly affect the well-being of a substantial proportion of the population;

c. they damage buildings; or

d. they harm soil fertility, vegetation or waters.

6 *Placing on the market* means the transfer or disposal for the first time, whether or not for consideration, of equipment or machines for distribution or use in Switzerland. Equivalent to placing on the market is the commissioning, for the first time, of equipment or machines at one's own enterprise in cases where placing on the market has not previously occurred.[3]

Chapter 2 Emissions

Section 1 Limitation of Emissions from New Stationary Installations

Art. 3 Preventive limiting of emissions in accordance with Annexes 1–4

1 New stationary installations shall be equipped and operated in such a way that they comply with the emission limits specified in Annex 1.

2 Additional or different requirements apply in the case of the following installations:

a. installations listed in Annex 2: the requirements specified therein;

b. combustion installations: the requirements specified in Annex 3;

3 Amended by No I of the O of 18 June 2010, in force since 15 July 2010 (AS **2010** 2965).

c.[4] construction machines and particle filter systems as specified in Article 19*a*, and machines and equipment with internal combustion engines as specified in Article 20*b*: the requirements specified in Annex 4.

Art. 4 Preventive emission limits specified by the authorities

[1] Emissions for which no limit is specified in this Ordinance or for which a particular limit is declared not to apply, shall be limited preventively by the authorities as far as is technically and operationally feasible and economically acceptable.

[2] Emission limitation measures are technically and operationally feasible if they:

a. have been successfully tested at comparable installations in Switzerland or abroad; or

b. have been successfully applied in experiments and can be transferred to other installations from a technological perspective.

[3] The assessment of the economic acceptability of emission limitations shall be based on an average, economically sound enterprise in the relevant sector. If a particular sector contains widely differing classes of enterprises, the assessment shall be based on an average enterprise of the relevant class.

Art. 5 Stricter emission limits ordered by the authorities

[1] If an individual planned installation is expected to cause excessive ambient air pollution levels even though the preventive emission limitation requirements are met, the authorities shall order additional or stricter emission limitation requirements for the installation concerned.

[2] The emission limitation requirements are to be supplemented or tightened to such an extent that no excessive ambient air pollution levels are caused.

Art. 6 Capture and removal of emissions[5]

[1] Emissions shall be captured as fully and as close to the source as possible and shall be removed in such a way as to prevent excessive ambient air pollution levels.[6]

[2] They shall generally be discharged above roof level via stacks or waste air ducts.

[3] Annex 6 applies to stacks. If the required stack height H cannot be realised, or if the parameter H_0 is more than 100 m, the authorities shall as an alternative tighten the emission limitation requirements specified in Annexes 1–3.

4 Amended by No I of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632).
5 Amended by No I of the O of 20 Nov. 1991, in force since 1 Feb. 1992 (AS **1992** 124).
6 Amended by No I of the O of 20 Nov. 1991, in force since 1 Feb. 1992 (AS **1992** 124).

Section 2
Limitation of Emissions from Existing Stationary Installations

Art. 7 Preventive limiting of emissions

The provisions concerning the preventive limiting of emissions from new stationary installations (Articles 3, 4 and 6) also apply to existing stationary installations.

Art. 8 Mandatory retrofitting

1 The authorities shall ensure that existing stationary installations which do not meet the requirements of this Ordinance undergo retrofitting.

2 They shall issue the necessary rulings, specifying the time limit for retrofitting in accordance with Article 10. If necessary, they shall order operating restrictions or the shutdown of the installation for the duration of the retrofitting work.[7]

3 Retrofitting need not be carried out if the owner undertakes to shut down the installation within the time limit set for retrofitting.

Art. 9 Stricter emission limits

1 If it is established that an individual existing installation is causing excessive ambient air pollution levels even if the preventive emission limitation requirements are complied with, the authorities shall order additional or stricter emission limitation requirements for the installation concerned.

2 The emission limitation requirements are to be supplemented or tightened to such an extent that excessive ambient air pollution levels are no longer caused.

3 The additional or stricter emission limitation requirements are to be imposed by means of retrofitting rulings with time limits set in accordance with Article 10, paragraph 2. If necessary, the authorities shall order operating restrictions or the shutdown of the installation for the duration of the retrofitting work.

4 If excessive ambient air pollution levels are caused by more than one installation, the procedure specified in Articles 31–34 shall be followed.

Art. 10[8] Time limits for retrofitting

1 The standard time limit for retrofitting is five years.

2 Shorter time limits, but not less than 30 days, shall be set if:

a. retrofitting can be carried out without significant investments;

b. emissions are more than three times the value specified for the preventive limiting of emissions; or

7 Second sentence inserted by No I of the O of 20 Nov. 1991, in force since 1 Feb. 1992 (AS **1992** 124).

8 See also the Final Provisions of the Amendments of 23 June 2004 and 11 April 2018 at the end of this text.

c. ambient air pollution levels caused by the installation alone are excessive.

3 Longer time limits, up to a maximum of ten years, shall be set if:

a. emissions are less than one-and-a-half times the value applicable for the preventive limiting of emissions, or the provisions concerning flue gas losses are not complied with; and

b. neither letter a nor letter c of paragraph 2 is met.

4 The above is without prejudice to the ordering of shorter time limits for retrofitting in accordance with Article 32.

Art. 11 Relief

1 On request, the authorities shall grant relief to the owner of an installation if retrofitting in accordance with Articles 8 and 10 would be disproportionate, in particular not technically or operationally feasible, or economically unacceptable.

2 By way of relief, the authorities may in the first instance grant longer time limits. If the granting of longer time limits is not sufficient, the authorities shall specify less strict emission limits.

Section 3 Control of Stationary Installations

Art. 12 Emission declaration

1 Any person who operates or wishes to construct an installation which causes air pollution shall provide the authorities with information on:

a. the type and level of emissions;

b. the release location, release height and time course of emissions;

c. other release conditions required for the assessment of emissions.

2 The emission declaration may be based on measurements or on material balances of the substances used.

Art. 13 Emission measurements and inspections

1 The authorities shall monitor compliance with emission limitation requirements. They shall carry out their own emission measurements or inspections or shall have these carried out on their behalf.

2 If possible, the first measurement (acceptance measurement) or inspection must be carried out within three months, but no later than twelve months after the commissioning of the new or retrofitted installation. The foregoing is without prejudice to different provisions in Annex 3.[9]

9 Amended by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).

3 The measurement or inspection is generally to be repeated as follows, without prejudice to provisions to the contrary specified in Annexes 2, 3 and 4:

a. every four years for wood-fired boilers as specified in Annex 5 Number 31 paragraph 1 letter a, b or d Number 1 with a rated thermal input of up to 70 kW and for gas-fired installations with a rated thermal input of up to 1 MW;

b. every two years for other combustion installations

c.[10] every three years for other installations.[11]

4 In the case of installations which may produce significant levels of emissions, the authorities shall order continuous measurement and recording of emissions, or of another operating parameter which permits emission control.

Art. 13*a*[12] Proof of the knowledge of the recognised rules of metrology

1 Where an authority arranges for emission measurements and inspections in terms of Article 13 to be carried out by third parties, it must regularly check whether the third party concerned has sufficient knowledge of the recognised rules of metrology.

2 The authority may dispense with the regular check under paragraph 1 if the third party only carries out measurements and inspections for which simplified measurement procedures are provided.

Art. 14 Measurement procedures

1 The measurements must cover the operating conditions which are relevant for assessment purposes. If necessary, the authorities shall specify the type and extent of measurements required and the operating conditions to be covered.

2 Emission measurements shall be carried out according to the recognised rules of metrology. The Federal Office for the Environment (FOEN) shall issue recommendations on carrying out the measurements. The technical requirements for measurement systems and measurement stability are those specified in the Ordinance of 15 February 2006[13] on Measuring Instruments and the implementing provisions issued by the Federal Department of Justice and Police.[14]

3 The owner of the installation to be inspected shall set up and make accessible suitable measuring stations in accordance with instructions issued by the authorities.

4 The measured and calculated values, the measurement methods used and the operating conditions at the installation at the time the measurements were performed shall be recorded in a measurement report.

10 The correction of 16 April 2019 concerns the Italian text only (AS **2019** 1225).
11 Amended by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).
12 Inserted by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).
13 SR **941.210**
14 Amended by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).

Art. 15 Assessment of emissions

[1] The measured values shall be corrected to the reference values specified in Annex 1 Number 23.

[2] Unless otherwise specified in Annexes 1–4, the values calculated in accordance with paragraph 1 are to be expressed as hourly mean values for the assessment. In justified cases, the authorities may specify other suitable averaging periods.

[3] In the case of approval and control measurements, emission control requirements shall be regarded as having been complied with if none of the mean values determined in accordance with paragraph 2 exceeds the limit value.

[4] In the case of continuous measurements, emission limit values shall be regarded as having been complied with if, within a calendar year:

a. none of the daily mean values exceeds the emission limit value;

b. 97% of all the hourly mean values are no more than 1.2 times the limit value; and

c. none of the hourly mean values is more than twice the limit value.

[5] The authorities shall take account of the particular circumstances when assessing emissions during start-up and shut-down periods.

Art. 16 Bypass lines and malfunctions and lack of availability of chemicals for flue gas cleaning[15]

[1] A bypass line may only be used to protect flue gas cleaning systems with the approval of the authorities.

[2] If significant emissions could occur as a result of the use of bypass lines or during malfunctions, the authorities shall specify what measures are to be taken.

[3] The authorities may specify lower emission limits for fixed installations if it is proven that the chemicals required to operate the flue gas cleaning systems are not available. Lower emission limits are not permitted for highly toxic or carcinogenic substances.[16]

Section 4 Emissions from Vehicles and Transport Infrastructure

Art. 17 Preventive limiting of emissions from vehicles

In accordance with legislation on road transport, aviation, shipping and railways, preventive measures shall be taken to control emissions from vehicles as far as is technically and operationally feasible and economically acceptable.

15 Amended by No I of the O of 16 Dec. 2022, in force since 1 Jan. 2023 (AS **2022** 832).
16 Inserted by No I of the O of 16 Dec. 2022, in force since 1 Jan. 2023 (AS **2022** 832).

Art. 18 Preventive limiting of emissions from transport infrastructure

In the case of transport infrastructure, the authorities shall order such measures as are technically and operationally feasible and economically acceptable in order to control traffic-related emissions.

Art. 19 Measures to control excessive ambient air pollution levels from traffic

If vehicles or transport infrastructure have been shown or are expected to cause excessive ambient air pollution levels, the procedure specified in Articles 31–34 shall be followed.

Section 4*a*[17]
Requirements for Construction Machines and Particle Filter Systems

Art. 19*a* Requirements

[1] Machines and equipment for use on construction sites with internal combustion compression-ignition engines having a power output of more than 18 kW (construction machines) shall comply with the requirements specified in Annex 4 Number 3.

[2] ...[18]

[3] Construction machines are only to be operated with a particle filter system whose conformity with the requirements specified in Annex 4 Numbers 32 and 33 has been demonstrated.

[4] The authority may on request grant exemptions from the requirements set out in Annex 4 Number 3 for construction equipment used for test or demonstration purposes. The exemptions are granted for a maximum of 10 days.[19]

Art. 19*b* Proof of conformity

[1] Proof of conformity comprises:

a. a certificate issued by a conformity assessment body as specified in Article 18 of the Federal Act of 6 October 1995[20] on Technical Barriers to Trade (TBA) to the effect that the type of construction machine or particle filter system meets the requirements of Annex 4 Number 3 (certificate of conformity);

b. a declaration by the manufacturer or importer that the construction machines or particle filter systems to be placed on the market conform to the tested types (declaration of conformity), including the following details:

   1. name and address of the manufacturer or importer,

17 Inserted by No I of the O of 19 Sept. 2008, in force since 1 Jan. 2009 (AS **2008** 4639).
18 Repealed by No I of the O of 20 Oct. 2021, with effect from 1 Jan. 2022 (AS **2021** 632).
19 Inserted by No I of the O of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171).
20 SR **946.51**

2. designation of the type of construction machine, engine and particle reduction system,
3. year of manufacture and serial numbers of the construction machine, engine and particle filter system,
4. name and address of the conformity assessment body and number of the certificate of conformity,
5. name and function of the person signing the declaration of conformity for the manufacturer or importer,
6. the precise location of the markings on the construction machine; and

c. markings as specified in Annex 4 Number 33.

1bis For construction machines that meet the requirements of Annex II of Regulation (EU) No 2016/1628[21], proof of conformity comprises type approval by a member state of the European Union for the engine type or the engine family in accordance with Regulation (EU) No 2016/1628.[22]

2 The conformity assessment bodies shall send certificates of conformity, together with the relevant test reports, to the FOEN. The FOEN shall publish lists of compliant particle filter system and engine types.[23]

3 The manufacturer or importer shall retain the declaration of conformity for ten years after placing the construction machine or particle filter system on the market.

Section 5 ...

Art. 20[24]

Art. 20*a*[25]

21 Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, Amended by OJ L 252 of 16.09.2016, p. 53; supplemented by: Commission Delegated Regulation (EU) 2017/654 of 19 December 2016, OJ L 102 of 13.04.2017, p. 1; Commission Delegated Regulation (EU) 2017/655 of 19 December 2016, OJ L 102 of 13.04.2017, p. 334; Commission Implementing Regulation (EU) 2017/656 of 19 December 2016, OJ L 102 of 13.04.2017, p. 364.
22 Inserted by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).
23 Amended by No I of the O of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171).
24 Repealed by No I of the O of 20 Oct. 2021, with effect from 1 Jan. 2022 (AS **2021** 632).
25 Inserted by No I of the O of 23 June 2004 (AS **2004** 3561). Repealed by No I of the O of 20 Oct. 2021, with effect from 1 Jan. 2022 (AS **2021** 632).

Section 5*a*[26]
Requirements for Machines and Equipment with Internal Combustion Engines

Art. 20*b* Requirements

[1] Mobile machines and equipment with internal combustion engines that are not intended for use on the roads (machines and equipment with internal combustion engines) must satisfy the requirements specified in Annex 4 Number 4.

[2] New machines and equipment with internal combustion engines may only be placed on the market if the conformity of the engines with the requirements specified in Annex 4 Number 4 has been demonstrated (Art. 20*c*).

Art. 20*c* Proof of conformity

[1] Proof of conformity comprises:

a. type-approval granted by an EU Member State for an engine type or engine family in accordance with Regulation (EU) No 2016/1628[27]; and

b. engine markings as specified in Article 32 of Regulation (EU) No 2016/1628.

[2] Conformity may also be proven by means of a certificate issued by a conformity assessment body as specified in Article 18 TBA[28] to the effect that the type of machine or equipment with internal combustion engine meets the requirements of Annex 4 Number 4 (certificate of conformity). In this case, the engine must bear the trade mark or trade name of the manufacturer of the engine and the name of the conformity assessment body.

Section 5*b* ...

Art. 20*d* and **20*e***[29]

Section 6 Thermal Fuels

Art. 21 Requirements

Thermal fuels are subject to the requirements specified in Annex 5.

26 Inserted by No I of the O of 18 June 2010 (AS **2010** 2965). Amended by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).
27 See footnote to Art. 19*b* para. 1[bis].
28 SR **946.51**
29 Inserted by No I of the O of 11 April 2018 (AS **2018** 1687). Repealed by No I of the O of 20 Oct. 2021, with effect from 1 Jan. 2022 (AS **2021** 632).

Art. 22 Declaration

Any person who imports thermal fuels or offers them for sale on a commercial basis must declare the quality of the thermal fuel to the customer or consumer. On import, he must also declare the quality to the customs authorities.

Art. 23[30]

Section 7 Motor Fuels

Art. 24 Requirements

Motor fuels are subject to the requirements specified in Annex 5.

Art. 25 Declaration

Any person who imports motor fuels or offers them for sale on a commercial basis must declare the quality of the motor fuel to the customer or consumer. On import, he must also declare the quality to the customs authorities.

Art. 26 Installations for unleaded petrol

[1] Installations for unleaded petrol such as storage and transport tanks, tankers and petrol pumps must be clearly marked «unleaded».

[2] If an installation which previously contained leaded petrol is to be used for unleaded petrol, the owner of the installation must clean it thoroughly beforehand or take other measures to ensure that it does not contain excessive lead residues.

Section 8[31] Waste Incineration

Art. 26*a*[32] Incineration in installations

Waste may only be incinerated or thermally decomposed in installations specified in Annex 2 Number 7; an exception to this is the incineration of waste specified in Annex 2 Number 11.

Art. 26*b*[33] Incineration outside of installations

[1] Natural forest, field and garden waste may be incinerated outside installations if it is sufficiently dry to ensure minimal smoke formation.

30 Repealed by No I of the O of 4 July 2007, with effect from 1 Sept. 2007 (AS **2007** 3875).
31 Inserted by No I of the O of 20 Nov. 1991, in force since 1 Feb. 1992 (AS **1992** 124).
32 Amended by No I of the O of 4 July 2007, in force since 1 Sept. 2007 (AS **2007** 3875).
33 Inserted by No I of the O of 4 July 2007, in force since 1 Sept. 2007 (AS **2007** 3875).

2 The authorities may in individual cases approve the incineration of forest, field and garden waste which is not sufficiently dry if there is an overriding interest and it does not lead to excessive ambient air pollution levels.

3 They may restrict or prohibit the incineration of forest, field and garden waste outside of installations for particular areas or periods if excessive ambient air pollution levels are to be expected.

Chapter 3 Ambient Air Pollution Levels

Section 1 Determination and Assessment

Art. 27 Determination of ambient air pollution levels

1 The cantons shall monitor the air pollution situation and trends in their territory; in particular, they shall determine ambient air pollution levels.

2 To this end, they shall carry out surveys, measurements and dispersion modelling. The FOEN shall recommend suitable methods.

Art. 28 Ambient air pollution forecast

1 Before a stationary installation or transport infrastructure expected to be a significant source of emissions is constructed or retrofitted, the authorities may request the owner to provide an ambient air pollution forecast.

2 The forecast must indicate what type, extent and frequency of ambient air pollution levels are to be expected in what areas.

3 The forecast shall include details of the type and level of emissions, as well as the dispersion conditions and the calculation methods used.

Art. 29 Monitoring in relation to individual installations

The owner of an installation which is a significant source of emissions may be requested by the authorities to monitor ambient air pollution levels by carrying out measurements in the area concerned.

Art. 30 Assessment of ambient air pollution levels

The authorities shall assess whether the ambient air pollution levels measured are excessive (Article 2 paragraph 5).

Section 2
Measures to Control Excessive Ambient Air Pollution Levels

Art. 31[34] Preparation of an action plan

The authorities shall draw up an action plan in accordance with Article 44*a* of the Act if it has been established or is to be expected that, in spite of the preventive limiting of emissions, excessive ambient air pollution levels are caused by:

a. an item of transport infrastructure;

b. a number of stationary installations.

Art. 32[35] Content of the action plan

[1] The action plan shall indicate:

a. the sources of emissions which are responsible for causing excessive ambient air pollution levels;

b. the significance of individual sources of emissions for the total pollution load;

c. measures for reducing and eliminating excessive ambient air pollution levels;

d. the effects of the various measures;

e. the legal framework existing or yet to be established for the various measures;

f. time limits for the ordering and implementation of the measures;

g. the authorities responsible for enforcement of the measures.

[2] Measures under paragraph 1 letter c are:

a. for stationary installations: shorter time limits for retrofitting or additional or stricter emission limits;

b. for transport infrastructure: structural, operational, traffic management or traffic restriction measures.

Art. 33[36] Putting the action plan into effect

[1] The measures contained in the action plan are generally to be put into effect within five years.

[2] As a matter of priority, the authorities shall order measures for installations that account for more than 10 % of the total pollution load.

[3] The cantons shall regularly review the effectiveness of the measures and shall amend the action plans if necessary. They shall inform the public accordingly.

34 Amended by No I of the O of 15 Dec. 1997, in force since 1 March 1998 (AS **1998** 223).
35 Amended by No I of the O of 15 Dec. 1997, in force since 1 March 1998 (AS **1998** 223).
36 Amended by No I of the O of 15 Dec. 1997, in force since 1 March 1998 (AS **1998** 223).

Art. 34 Applications from the cantons

[1] If a cantonal action plan provides for measures which fall within the responsibility of the Confederation, the canton shall submit the plan to the Federal Council and make the relevant applications.

[2] If the action plan requires the cooperation of another canton, the authorities shall submit the plan to the canton in question and make the relevant applications. If necessary, the Federal Council shall coordinate the action plans of the cantons.

Chapter 4 Final Provisions

Section 1 Enforcement

Art. 35 Enforcement by the cantons

Subject to the provisions of Article 36, the cantons shall be responsible for enforcement of this Ordinance.

Art. 36 Enforcement by the Confederation

[1] The Confederation shall enforce the provisions concerning:

a.[37] market surveillance for construction machines and particle filter systems, and machines and equipment with internal combustion engines (Article 37);

b.[38] control of thermal and motor fuels on import and on placing on the market (Article 38).[39]

[2] When applying other federal acts or international agreements or resolutions relating to matters regulated by this Ordinance, federal authorities shall also enforce this Ordinance. Cooperation of the FOEN and the cantons is governed by Article 41 paragraphs 2 and 4 of the Act; these provisions are subject to legal requirements concerning secrecy.[40]

[3] The Federal Department of the Environment, Transport, Energy and Communications[41] may order implementing and supplementary provisions, particularly concerning:

a. methods of testing, measurement and calculation;

b. type-approval;

c. stacks.

37 Amended by No I of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632).
38 Amended by No I of the O of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171).
39 Amended by No I of the O of 18. June 2010, in force since 15 July 2010 (AS **2010** 2965).
40 Amended by No II 13 of the O of 2 Feb. 2000 to the Federal Act on the Coordination and Simplification of Decision-Making Procedures, in force since 1 March 2000 (AS **2000** 703).
41 The name of this administrative unit was changed by Art. 16 para. 3 of the Publications Ordinance of 17 Nov. 2004 (AS **2004** 4937).

4 The Confederation shall carry out surveys of the air pollution situation and trends in Switzerland as a whole (Article 39).[42]

Art. 37[43] Market surveillance for construction machines and their particle filter systems, and machines and equipment with internal combustion engines[44]

1 The FOEN shall monitor compliance with the regulations concerning placing construction machines, particle filter systems, and machines and equipment with internal combustion engines on the market. It shall monitor in particular:[45]

a. whether the information given in the declaration of conformity is correct; or

b.[46] whether the internal combustion engines of the machines and equipment which bear an approval mark conform to the type-approved engine or to the type-approved engine family.

2 It may entrust control tasks to public entities and private specialist organisations.

3 If the installations controlled do not meet the requirements, the FOEN shall order the necessary measures. In serious cases, it may prohibit further offering or marketing, or request the modification of installations already marketed.

Art. 38 Thermal and motor fuels

1 The customs authorities shall take samples of thermal and motor fuels which are imported or supplied by domestic refineries. They shall either submit the samples to a laboratory designated by the FOEN or analyse them themselves.[47]

2 The customs authorities or the laboratory shall report the results of the tests to the FOEN.[48]

3 The FOEN shall verify compliance with the regulations on placing thermal and motor fuels on the market by testing samples.[49]

4 If the FOEN establishes that an importer or dealer is repeatedly importing or placing on the market thermal or motor fuels which fail to meet the quality requirements in Annex 5, it shall inform the competent cantonal prosecution authorities and, if applicable, the customs authorities.[50]

Art. 39 Air pollution surveys

1 The surveys of the air pollution situation and trends in Switzerland as a whole shall be carried out by the FOEN.

42 Inserted by No I of the O of 18 June 2010, in force since 15 July 2010 (AS **2010** 2965).
43 Amended by No I of the O of 18 June 2010, in force since 15 July 2010 (AS **2010** 2965).
44 Amended by No I of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632).
45 Amended by No I of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632).
46 Amended by No I of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).
47 Amended by No I of the O of 23 June 2004, in force since 1 Jan. 2005 (AS **2004** 3561).
48 Amended by No I of the O of 23 June 2004, in force since 1 Jan. 2005 (AS **2004** 3561).
49 Amended by No I of the O of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171).
50 Inserted by No I of the O of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171).

2 The Swiss Federal Institute for Materials Testing and Research (EMPA) in Dübendorf shall operate the National Air Pollution Monitoring Network (NABEL) on behalf of the FOEN.

Art. 39*a*[51] Geoinformation

The FOEN shall specify the minimal geodata models and presentation models for official geodata in accordance with this Ordinance for which it is designated as the competent federal authority in Annex 1 of the Ordinance of 21 May 2008[52] on Geoinformation.

Section 2 Amendment and Repeal of Existing Legislation

Art. 40[53]

Art. 41 Repeal of existing legislation

The Ordinance of 10 December 1984[54] on Air Pollution Control Measures for Combustion Installations is repealed.

Section 3 Transitional Provisions

Art. 42

1 Installations which require a construction permit or planning permission shall be regarded as new installations if no binding decision has been taken regarding the construction permit or planning permission at the time this Ordinance enters into force.

2 Within two years after the commencement of this Ordinance, the authorities shall issue the retrofitting ruling in accordance with Articles 8 and 9, if possible for all cases, but at least for the most urgent cases where retrofitting is required.

3 In cases of existing excessive ambient air pollution levels, action plans shall be prepared in accordance with Article 31 within three years after the commencement of this Ordinance.

51 Inserted by Annex 2 No 8 of the O of 21 May 2008 on Geoinformation, in force since 1 July 2008 (AS **2008** 2809).
52 SR **510.620**
53 Repealed by No IV 30 of the O of 22 Aug. 2007 on the Formal Revision of Federal Legislation, with effect from 1 Jan. 2008 (AS **2007** 4477).
54 [AS **1984** 1516]

Section 3*a* ...

Art. 42*a*[55]

Section 4 Commencement

Art. 43

This Ordinance comes into force on 1 March 1986.

Transitional Provisions to the Amendment of 20 November 1991[56]

Transitional Provisions to the Amendment of 15 December 1997[57]

Transitional Provisions to the Amendment of 25 August 1999[58]

Transitional Provisions to the Amendment of 30 April 2003[59]

[1] Installations which require a construction permit or planning permission with regard to which no binding decision has been taken at the time this Amendment enters into force must comply with the requirements of the new legislation.

[2] Notwithstanding Article 10, the authority shall grant time limits of five to ten years for the retrofitting of installations that become subject to mandatory retrofitting after 1 July 2003, but which already comply with the preventive emission limits based on the existing provisions. This is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

Transitional Provisions to the Amendment of 23 June 2004[60]

[1] Notwithstanding Article 10, the authority shall grant time limits of six to ten years for the retrofitting of installations that become subject to mandatory retrofitting under

55 Inserted by No I of the O of 11 April 2018 (AS **2018** 1687). Repealed by No I of the O of 20 Oct. 2021, with effect from 1 Jan. 2022 (AS **2021** 632).
56 AS **1992** 124. Repealed by No IV 30 of the O of 22 Aug. 2007 on the Formal Revision of Federal Legislation, with effect from 1 Jan. 2008 (AS **2007** 4477).
57 AS **1998** 223. Repealed by No IV 30 of the O of 22 Aug. 2007 on the Formal Revision of Federal Legislation, with effect from 1 Jan. 2008 (AS **2007** 4477).
58 AS **1999** 2498. Repealed by No IV 30 of the O of 22 Aug. 2007 on the Formal Revision of Federal Legislation, with effect from 1 Jan. 2008 (AS **2007** 4477).
59 AS **2003** 1345
60 AS **2004** 3561

the Amendment of 23 June 2004, but which already comply with the preventive emission limits based on the existing provisions. This is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

2 ...[61]

3 Petrol and diesel oil which meet the existing requirements under Annex 5 of this Ordinance[62] may be placed on the market from licensed storage stocks, compulsory stocks and army stocks until 31 December 2008.

Transitional Provisions to the Amendment of 4 July 2007[63]

1 Notwithstanding Article 10, the authority shall grant time limits of five to ten years for the retrofitting of installations that become subject to mandatory retrofitting under the Amendment of 4 July 2007, but which already comply with the preventive emission limits based on the existing provisions. For wood-fired installations they shall grant a time limit of ten years for retrofitting; this is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

2 Combustion installations as specified in Article 20 paragraph 1 letter h may be placed on the market without a proof of conformity until 31 December 2007.

3 Wood-fired installations may be placed on the market without a proof of conformity until 31 December 2009 if they meet the requirements of Annex 4. In particular, these requirements are regarded as having been met in cases where wood-fired installations were awarded the Swiss Wood Energy Association (VHE) quality mark after 31 December 2003.

Transitional provisions relating to the Amendment of 19 September 2008[64]

1 The requirements specified in Annex 4 Number 3 apply to construction machines with a net power of 37 kW or more:

a. manufactured between 2000 and 2008: from 1 May 2010, if they are operated on Measure-level A construction sites as defined in the FOEN Guidelines of 1 September 2002 on Air Pollution Control at Construction Sites;

b. manufactured before 2000: from 1 May 2015.

2 The requirements specified in Annex 4 Number 3 apply to construction machines with a net power of 18 kW to 37 kW manufactured in 2010 or later.

3 For particle filter systems which are included in the FOEN/SUVA Filter List at the time this Amendment enters into force, the requirements specified in Annex 4 Number 32 are regarded as having been met.

61 Repealed by No IV of the O of 14 Oct. 2015, with effect from 16 Nov. 2015 (AS **2015** 4171).
62 AS **1999** 2498
63 AS **2007** 3875
64 AS **2008** 4639

4 «Extra light» heating oil which meets the existing requirements specified in Annex 5 may be placed on the market from licensed storage stocks, compulsory stocks and army stocks until 31 December 2011.

Transitional provisions relating to the Amendment of 18 June 2010[65]

Transitional provisions relating to the Amendment of 14 October 2015[66]

Notwithstanding Article 10, the authority shall grant time limits of six to ten years for the retrofitting of stationary internal combustion engines and gas turbines which become subject to mandatory retrofitting in accordance with the Amendment of 14 October 2015 but which already comply with the preventive emission limits based on the existing provisions. This is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

Transitional provisions relating to the Amendment of 11 April 2018[67]

1 Notwithstanding Article 10, the authority shall grant time limits of ten years for retrofitting installations that become subject to mandatory retrofitting under the Amendment of 11 April 2018 but which already comply with the preventive emission limits based on the existing provisions; this is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

2 «Euro extra-light» heating oil may be used in installations or operating units that have a rated thermal input of less than 5 MW for these thermal fuels until 31 May 2023.

3 The emission limit values for solids as specified in Annex 3 Numbers 511 paragraph 1 and 522 paragraph 1 for installations with a rated thermal input of up to 70 kW apply from 1 June 2019.

Transitional Provisions to the Amendment of 12 February 2020[68]

Notwithstanding Article 10, the authority shall grant time limits of six to eight years for retrofitting installations that become subject to mandatory retrofitting under the Amendment of 12 February 2020; this is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

65 AS **2010** 2965. Repealed by No IV of the O of 11 April 2018, with effect from 1 June 2018 (AS **2018** 1687).
66 AS **2015** 4171
67 AS **2018** 1687
68 AS **2020** 793

Transitional Provisions to the Amendment of 20 October 2021[69]

Notwithstanding Article 10, the authority shall grant time limits of ten years for retrofitting cement and lime kilns which become subject to mandatory retrofitting under the Amendment of 20 October 2021 but which already comply with the preventive emission limits based on the existing provisions; this is without prejudice to the provisions of Article 10 paragraph 2 letters a and c.

Transitional Provisions to the Amendment of 16 September 2022[70]

1 In the case of combustion installations that are equipped to operate on gas and heating oil and which are operated with «extra light» heating oil based on a recommendation from the Federal Department for Economic Affairs, Education and Research and the Federal Department of the Environment, Energy and Communications or on an order from the Federal Council, the following emission limit values apply in derogation from Annex 3 number 411:

– Carbon monoxide (CO) 170 mg/m^3

– Nitrogen oxides (NO_x), expressed as nitrogen dioxide 250 mg/m^3

2 In the case of installations in accordance with paragraph 1, the burner must be serviced by a specialist on changing to «extra light» heating oil or within no more than 30 days thereof. At the same time an emissions measurement must be taken and the measurement results submitted to the competent authority.

3 The emission limit values in accordance with paragraph 1 apply until 31 March 2023.

69 AS **2021** 632
70 AS **2022** 515

Annex 1[71]
(Art. 3 para. 1)

General preventive emission limits

1 Scope

1 The provisions of this Annex apply to the preventive limiting of emissions from stationary installations.

2 They are without prejudice to the additional or different provisions applicable for:

a. particular installations, as specified in Annex 2;

b. combustion installations, as specified in Annex 3;

c. type-approval of combustion installations, as specified in Annex 4.

2 Definitions

21 Flue gases

Flue gases means waste air, flue gases and other air pollutants discharged by installations.

22 Emissions

Emissions are expressed in the following terms:

a. Concentration:
Mass of emitted substance in relation to the volume of flue gas (e.g. in milligrams per cubic metre [mg/m^3]);

b. Mass flow:
Mass of emitted substance per unit time (e.g. in grams per hour [g/h]);

c. Emission factor:
Ratio of the mass of emitted substance to the mass of the products generated or processed (e.g. in kilograms per tonne [kg/t]);

d. Emission ratio:
Ratio of the mass of an air polluting substance emitted to the mass of that substance supplied to the installation in fuels and feedstock (in % (m/m);

71 Revised by No II of the Ordinances of 20 Nov. 1991 (AS **1992** 124), of 15 Dec. 1997 (AS **1998** 223), of 23 June 2004 (AS **2004** 3561), No II 10 of the O of 18 May 2005 on the Repeal and Amendment of Ordinances in connection with the Commencement of the Chemicals Act (AS **2005** 2695), No II of the O of 4 July 2007 (AS **2007** 3875), of 14 Oct. 2015, in force since 16 Nov. 2015 (AS **2015** 4171) and the correction of 30 Nov. 2021 (AS **2021** 789).

e. Smoke number:
The degree of filter blackening caused by flue gases. The grey scale used to determine the Bacharach smoke number ranges from 0 to 9 in unit steps.

23 Reference value for emission concentrations

1 The limit values expressed as concentrations and the oxygen contents given as reference values are based on the volume of flue gas under standard conditions (0 °C, 1013 mbar) after deduction of the moisture content (dry).

2 The limit values expressed as emission concentrations are based on the amount of flue gas which is no more heavily diluted than is technically and operationally unavoidable.

3 If oxygen content by volume is given as the reference value for an installation listed in Annexes 2–4, the measured emission concentrations are to be corrected to this reference value.

24 Rated thermal input

The rated thermal input is the maximum thermal energy that can be supplied to an installation per unit time. It is obtained by multiplying the fuel consumption of the installation by the lower calorific value of the fuel.

3 General provisions

31 Limitation of emissions

1 The following emission limitation requirements apply:

a. for dust: Number 4;

b. for inorganic substances, mainly in the form of dust: Number 5;

c. for inorganic substances in gaseous or vaporous form: Number 6;

d. for organic substances in gaseous, vaporous or particulate form: Number 7;

e. for carcinogens: Number 8.

2 Substances not listed in Numbers 5–8 shall be assigned to the substance classes which have comparable effects on the environment. Account shall be taken in particular of degradability and bio-accumulability, toxicity, the effects of decomposition processes and transformation products, and odour intensity.

32 Limitation of emissions dependent on installation size

1 If there is more than one emission source and if emission limitation requirements depend on the size of an installation (e.g. capacity or mass flow), the authorities shall

determine which emission sources shall collectively be considered to constitute a single installation.

2 Emission sources are generally to be considered as a single installation if they are situated in close proximity to each other and if their emissions:

a. essentially contain the same or similar pollutants; or

b. can be reduced using the same technology.

3 Parts of an installation which only serve as back-ups in the event of malfunctions are not taken into account when determining the size of the installation.

4 Emission limit values which depend on a certain mass flow shall only apply if:

a. this mass flow is reached or exceeded for more than five hours per week; or

b. double this mass flow is reached or exceeded for a shorter period.

4 Dust

41 Limit value for total dust

If the mass flow of dust is 0.20 kg/h or more, total dust emissions must not exceed 20 mg/m^3.

42 Limitation of exposure to components of dust

The requirements specified in Numbers 5, 7 and 8 apply for the limitation of exposure to individual components of dust.

43 Measures relating to treatment, storage, trans-shipment and transport

1 If significant dust emissions may occur in commercial or industrial facilities as a result of processes such as the conveyance, crushing, sorting or filling of dust-forming materials, the dust-containing flue gases must be captured and fed into a dust removal system.

2 When dust-forming materials are stored or trans-shipped in the open, measures must be taken to prevent significant dust emissions.

3 When dust-forming materials are transported, transport equipment must be used which prevents significant dust emissions.

4 If traffic on factory roads may cause significant dust emissions, the roads must be kept free of dust.

5 Inorganic substances, mainly in the form of dust

51 Limit values

[1] The emission concentration of the substances listed in Number 52 must not exceed the following values:

a. Class 1 substances
   at a mass flow of 1 g/h or more 0.2 mg/m[3]

b. Class 2 substances
   at a mass flow of 5 g/h or more 1 mg/m[3]

c. Class 3 substances
   at a mass flow of 25 g/h or more 5 mg/m[3]

[2] The limit values apply to the total mass of an emitted substance, including gaseous and vaporous components in the flue gas.

[3] If the flue gas contains several substances belonging to the same class, the limit value applies to the sum of these substances.

52 Table of inorganic substances, mainly in the form of dust

Substance		Expressed as	Class
Antimony[1]	and its compounds	Sb	3
Arsenic[1]	and its compounds, except arsine	As	2
Chromium[1]	and its compounds	Cr	3
Cobalt[1]	and its compounds	Co	2
Copper	and its compounds	Cu	3
Cyanides[2]		CN	3
Fluorides[2]	in dust form	F	3
Lead	and its compounds	Pb	3
Manganese	and its compounds	Mn	3
Mercury	and its compounds	Hg	1
Nickel[1]	and its compounds	Ni	2
Palladium	and its compounds	Pd	3
Platinum	and its compounds	Pt	3
Rhodium	and its compounds	Rh	3
Silica dust	in fine crystalline form	SiO_2	3
Selenium	and its compounds	Se	2
Tellurium	and its compounds	Te	2
Thallium	and its compounds	Tl	1
Tin	and its compounds	Sn	3
Vanadium	and its compounds	V	3

1 If not listed as a carcinogenic compound under Number 8.
2 If readily soluble.

6 Inorganic substances in gaseous or vaporous form

61 Limit values

The emission concentration of any of the substances listed in Number 62 must not exceed the following values:

a. For a Class 1 substance
   at a mass flow of 10 g/h or more 1 mg/m^3
b. For a Class 2 substance
   at a mass flow of 50 g/h or more 5 mg/m^3
c. For a Class 3 substance
   at a mass flow of 300 g/h or more 30 mg/m^3
d. For a Class 4 substance
   at a mass flow of 2500 g/h or more 250 mg/m^3

62 Table of inorganic substances in gaseous or vaporous form

Substance	Class
Ammonia and ammonium compounds, expressed as ammonia	3
Arsine	1
Bromine and its gaseous or vaporous compounds, expressed as hydrogen bromide	2
Chlorine	2
Chlorine compounds, vaporous or gaseous inorganic chlorine compounds except cyanogen chloride and phosgene, expressed as hydrogen chloride	3
Cyanogen chloride	1
Fluorine and its vaporous or gaseous compounds, expressed as hydrogen fluoride	2
Hydrogen cyanide	2
Hydrogen phosphide	1
Hydrogen sulphide	2
Nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide	4
Phosgene	1
Sulphur oxides (sulphur dioxide and sulphur trioxide), expressed as sulphur dioxide	4

7 Organic substances in gaseous, vaporous or particulate form

71 Limit values

1 The emission concentration of the substances listed in Number 72 must not exceed the following values:

a.	Class 1 substances	
	at a mass flow of 0.1 kg/h or more	20 mg/m^3
b.	Class 2 substances	
	at a mass flow of 2.0 kg/h or more	100 mg/m^3
c.	Class 3 substances	
	at a mass flow of 3.0 kg/h or more	150 mg/m^3

2 Notwithstanding paragraph 1, the provisions on dust limitation specified in Number 41 apply to Class 2 and Class 3 organic substances in particulate form.

3 If the flue gas contains several substances belonging to the same class, the limit value applies to the sum of these substances.

4 If the flue gas contains substances of different classes, the sum of the substances at a total mass flow of 3.0 kg/h or more must not exceed the limit value of 150 mg/m^3, in addition to the requirements specified in paragraphs 1 and 2.

5 Emissions of substances for which there is good cause to believe that they are carcinogenic[72] and which are not listed as Class 1 substances in the Table under Number 72 must be controlled in accordance with paragraph 1 letter a.

6 Emissions of substances which are classified as ozone depleting substances in Annex 1.4 of the Ordinance of 18 May 2005[73] on Chemical Risk Reduction, but which are not listed as Class 1 substances in the Table under Number 72, must be controlled in accordance with paragraph 1 letter a. This is without prejudice to the provisions of Number 8.

72 Table of organic substances in gaseous, vaporous or particulate form

Substance	Molecular formula	Class
Acetaldehyde	C_2H_4O	1
Acetic acid	$C_2H_4O_2$[4]	2
Acetic acid butyl ester (see Butyl acetate)		
Acetic acid ethyl ester (see Ethyl acetate)		

72 Substances for which there is good cause to believe that they are carcinogenic means in particular those substances contained in Section III of the «List of MAK and BAT Values» (Maximum Concentrations and Biological Tolerance Values at the Workplace) issued by the German Research Foundation (DFG). Available from: VCH Verlags-AG, Postfach, CH-4020 Basel.

73 SR **814.81**

Substance	Molecular formula	Class
Acetic acid methyl ester (see Methyl acetate)		
Acetic acid vinyl ester (see Vinyl acetate)		
Acetic ester (see Ethyl acetate)		
Acetone	C_3H_6O	3
Acrolein (see 2-Propenal)		
Acrylic acid	$C_3H_4O_2$	1
Acrylic acid ethyl ester (see Ethyl acrylate)		
Acrylic acid methyl ester (see Methyl acrylate)		
Alkanes, except methane		3
Alkenes, except 1,3-butadiene and ethene		3
Alkyl alcohols		3
Alkyl lead compounds		1
Aniline	C_6H_7N	1
Benzoic acid methyl ester (see Methyl benzoate)		
Biphenyl	$C_{12}H_{10}$	1
Bis(2-ethylhexyl)phthalate (see Di(2-ethylhexyl)phthalate)		
Bromomethane	CH_3Br	1
2-Butanone	C_4H_8O	3
2-Butoxyethanol	$C_6H_{14}O_2$	2
Butyl acetate	$C_6H_{12}O_2$	3
Butyl glycol (see 2-Butoxyethanol)		
Butyraldehyde	C_4H_8O	2
Carbon disulphide	CS_2	2
Carbon tetrachloride (see Tetrachloromethane)		
CFCs, chlorofluorocarbons, fully halogenated, with up to 3 C atoms		1
Chloroacetaldehyde	C_2H_3ClO	1
Chlorobenzene	C_6H_5Cl	2
Chloroacetic acid	$C_2H_3ClO_2$	1
Chloroethane	C_2H_5Cl	1
Chloromethane	CH_3Cl	1
Chloroform (see Trichloromethane)		
2-Chloroprene (see 2-Chloro-1,3-butadiene)		

Substance	Molecular formula	Class
2-Chloropropane	C_3H_7Cl	2
Cresols	C_7H_8O	1
Cumene (see Isopropylbenzene)		
Cyclohexanone	$C_6H_{10}O$	1
Diacetone alcohol (see 4-Hydroxy-4-methyl-2-pentanone)		
Dibutyl ether	$C_8H_{18}O$	3
1,2-Dichlorobenzene	$C_6H_4Cl_2$	1
1,1-Dichloroethane	$C_2H_4Cl_2$	2
1,1-Dichloroethene	$C_2H_2Cl_2$	1
1,2-Dichloroethene	$C_2H_2Cl_2$	3
Dichloromethane	CH_2Cl_2	1
Dichlorophenols	$C_6H_4Cl_2O$	1
Diethanolamine (see 2,2'-Iminodiethanol)		
Diethylamine	$C_4H_{11}N$	1
Diethyl ether	$C_4H_{10}O$	3
Di(2-ethylhexyl)phthalate	$C_{24}H_{38}O_4$	2
Diisopropyl ether	$C_6H_{14}O$	3
Diisobutyl ketone (see 2,6-Dimethyl-4-heptanone)		
Dimethylamine	C_2H_7N	1
Dimethyl ether	C_2H_6O	3
N,N-Dimethylformamide	C_3H_7NO	2
2,6-Dimethyl-4-heptanone	$C_9H_{18}O$	2
Dioctyl phthalate (see Di(2-ethylhexyl)phthalate)		
1,4-Dioxane	$C_4H_8O_2$	1
Diphenyl (see Biphenyl)		
Ethanol (see Alkyl alcohols)		
Ethene	C_2H_4	1
Ether (see Diethyl ether)		
2-Ethoxyethanol	$C_4H_{10}O_2$	2
Ethyl acetate	$C_4H_8O_2$	3
Ethyl acrylate	$C_5H_8O_2$	1
Ethylamine	C_2H_7N	1
Ethylbenzene	C_8H_{10}	2

Substance	Molecular formula	Class
Ethyl chloride (see Chloroethane)		
Ethylene glycol	$C_2H_6O_2$	3
Ethylene glycol monobutyl ether (see 2-Butoxyethanol)		
Ethylene glycol monoethyl ether (see 2-Ethoxyethanol)		
Ethylene glycol monomethyl ether (see 2-Methoxyethanol)		
Ethyl glycol (see 2-Ethoxyethanol)		
Ethyl methyl ketone (see 2-Butanone)		
Formaldehyde	CH_2O	1
Formic acid	CH_2O_2	1
Formic acid dimethyl amide (see N,N-Dimethylformamide)		
Formic acid methyl ester (see Methyl formate)		
2-Furaldehyde	$C_5H_4O_2$	1
Furfural (see 2-Furaldehyde)		
Furfuryl alcohol	$C_5H_6O_2$	2
Glycol (see Ethylene glycol)		
Halons, bromofluorocarbons, fully halogenated, with up to 3 C atoms		1
HBFCs, hydrobromofluorocarbons, partially halogenated, with up to 3 C atoms		1
HCFCs, hydrochlorofluorocarbons, partially halogenated, with up to 3 C atoms		1
4-Hydroxy-4-methyl-2-pentanone	$C_6H_{12}O_2$	3
2,2'-Iminodiethanol	$C_4H_{11}NO_2$	2
Isopropenylbenzene	C_9H_{10}	2
Isopropylbenzene	C_9H_{12}	2
Maleic anhydride	$C_4H_2O_3$	1
Mercaptans (see Thiols)		
Methacrylic acid methyl ester (see Methyl methacrylate)		
Methanol (see Alkyl alcohols)		
2-Methoxyethanol	$C_3H_8O_2$	2
Methyl acetate	$C_3H_6O_2$	2
Methyl acrylate	$C_4H_6O_2$	1
Methylamine	CH_5N	1
Methyl benzoate	$C_8H_8O_2$	3

Substance	Molecular formula	Class
Methyl chloride (see Chloromethane)		
Methyl chloroform (see 1,1,1,-Trichloroethane)		
Methylcyclohexanone	$C_7H_{12}O$	2
Methylene chloride (see Dichloromethane)		
Methyl ethyl ketone (see 2-Butanone)		
Methyl formate	$C_2H_4O_2$	2
Methyl glycol (see 2-Methoxyethanol)		
Methyl isobutyl ketone (see 4-Methyl-2-pentanone)		
Methyl methacrylate	$C_5H_8O_2$	2
4-Methyl-2-pentanone	$C_6H_{12}O$	3
4-Methyl-m-phenylene diisocyanate	$C_9H_6N_2O_2$	1
N-Methyl pyrrolidone	C_5H_9NO	3
Naphthalene	$C_{10}H_8$	1
Nitrobenzene	$C_6H_5NO_2$	1
Nitrocresols	$C_7H_7NO_3$	1
Nitrophenols	$C_6H_5NO_3$	1
Nitrotoluenes, except 2-nitrotoluene	$C_7H_7NO_2$	1
Olefin hydrocarbons (see Alkenes)		3
Paraffin hydrocarbons (see Alkanes)		3
Perchloroethylene (see Tetrachloroethylene)		
Phenol	C_6H_6O	1
Phthalic acid dioctyl ester (see Di(2-ethylhexyl)phthalate)		
Pinenes	$C_{10}H_{16}$	3
2-Propenal	C_3H_4O	1
Propionaldehyde	C_3H_6O	2
Propionic acid	$C_3H_6O_2$	2
Pyridine	C_5H_5N	1
Styrene	C_8H_8	2
1,1,2,2-Tetrachloroethane	$C_2H_2Cl_4$	1
Tetrachloroethylene	C_2Cl_4	1
Tetrachloromethane	CCl_4	1
Tetrahydrofuran	C_4H_8O	2
Thiols		1

Substance	Molecular formula	Class
Thioether		1
Toluene	C_7H_8	2
Toluene diisocyanate (see 4-Methyl-m-phenylene diisocyanate)		
Tolylene-2,4-diisocyanate (see 4-Methyl-m-phenylene diisocyanate)		
1,1,1-Trichloroethane	$C_2H_3Cl_3$	1
1,1,2-Trichloroethane	$C_2H_3Cl_3$	1
Trichloromethane	$CHCl_3$	1
Trichlorophenols	$C_6H_3OCl_3$	1
Triethylamine	$C_6H_{15}N$	1
Trimethylbenzenes	C_9H_{12}	2
Vinyl acetate	$C_4H_6O_2$	1
Wood dust, respirable (except beech and oak wood dust)		1
Xylenols, except 2,4-xylenol	$C_8H_{10}O$	1
2,4-Xylenol	$C_8H_{10}O$	2
Xylenes	C_8H_{10}	2

8 Carcinogens

81 Definition

Carcinogens means those substances that are designated as carcinogenic (C) in the list of limit values for exposure at the workplace[74] published by the Swiss Accident Insurance Fund (SUVA).

82 Limitation of emissions

[1] Irrespective of the risk of carcinogen exposure, emissions of carcinogens shall be limited as far as is technically and operationally feasible and economically acceptable.

74 List of limit values for exposure at the workplace, available from: Schweizerische Unfallversicherungsanstalt SUVA, Postfach, 6002 Luzern.

2 Emissions of the carcinogens listed in Number 83 shall be limited at least to such an extent that emission concentrations do not exceed the following values:

a. Class 1 substances
   at a mass flow of 0.5 g/h or more 0.1 mg/m³
b. Class 2 substances
   at a mass flow of 5 g/h or more 1 mg/m³
c. Class 3 substances
   at a mass flow of 25 g/h or more 5 mg/m³

3 If the flue gas contains several substances belonging to the same class, the limitation requirements specified in paragraph 2 apply to the sum of these substances.

83 Table of carcinogens

Substance	Molecular formula	Class
Acrylonitrile	C_3H_3N	3
Antimony trioxide (in respirable form), expressed as Sb	Sb	2
Arsenic trioxide and arsenic pentoxide, arsenious acid and its salts, arsenic acid and its salts (in respirable form), expressed as As	As	2
Asbestos (chrysotile, crocidolite, amosite, anthophyllite, actinolite, tremolite) in the form of fine dust		1
Beech wood dust, respirable		3
Benzene	C_6H_6	3
Benzo[a]pyrene	$C_{20}H_{12}$	1
Beryllium and its compounds in respirable form, expressed as Be	Be	1
Bromomethane	C_2H_5Br	3
1,3-Butadiene	C_4H_6	3
Cadmium and its compounds cadmium chloride, cadmium oxide, cadmium sulphate, cadmium sulphide, and other bioavailable compounds (in respirable form), expressed as Cd	Cd	1
2-Chloro-1,3-butadiene	C_4H_5Cl	3
1-Chloro-2,3-epoxypropane	C_3H_5ClO	3
α-Chlorotoluene	C_7H_7Cl	3
α-Chlorotoluenes; mixtures of -chlorotoluene, α, α-dichlorotoluene, α, α, α-trichlorotoluene and benzyl chloride		3

Substance	Molecular formula	Class
Chromium(VI) compounds (in respirable form) as calcium chromate, chromium(III) chromate, strontium chromate and zinc chromate, expressed as Cr	Cr	2
Cobalt (in the form of respirable dusts or aerosols of cobalt metal and poorly soluble cobalt salts), expressed as Co	Co	2
Dibenzo(a,h)anthracene	$C_{22}H_{14}$	1
1,2-Dibromoethane	$C_2H_4Br_2$	3
1,4-Dichlorobenzene	$C_6H_4Cl_2$	3
3,3'-Dichlorobenzidine	$C_{12}H_{10}N_2Cl_2$	2
1,2-Dichloroethane	$C_2H_4Cl_2$	3
Diesel soot		3
Diethyl sulphate	$C_4H_{10}O_4S$	2
Dimethyl sulphate	$C_2H_6O_4S$	2
Epichlorohydrin (see 1-Chloro-2,3-epoxypropane)		
1,2-Epoxypropane	C_3H_6O	3
Ethylene imine	C_2H_5N	2
Ethylene oxide	C_2H_4O	3
Hydrazine	H_4N_2	3
2-Naphthylamine	$C_{10}H_9N$	1
Nickel (in the form of respirable dusts or aerosols of nickel metal, nickel sulphide and sulphide ores, nickel oxide and nickel carbonate, nickel tetracarbonyl), expressed as Ni	Ni	2
2-Nitrotoluene	$C_7H_7NO_2$	3
Oak wood dust, respirable		3
o-Toluidine	C_7H_9N	3
Trichlorethylene	C_2HCl_3	3
Vinyl chloride	C_2H_3Cl	3
N-Vinyl-2-pyrrolidone	C_6H_9NO	3

Annex 2[75]
(Art. 3 para. 2 let. a)

Additional or different emission limitation requirements for particular installations

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75 Revised by No II of the O of 20 Nov. 1991 (AS **1992** 124), of 15 Dec. 1997 (AS **1998** 223), Annex 2 No 5 of the O of 23 June 1999 on Plant Protection Products (AS **1999** 2045), No II of the O of 30 Apr. 2003 (AS **2003** 1345), Annex 3 No II 5 of the O of 22 June 2005 on Movements of Waste (AS **2005** 4199), No II of the O of July 2007 (AS **2007** 3875), of the O of 18 June 2010 (AS **2010** 2965), of 14 Oct. 2015 (AS **2015** 4171), Annex 6 No 7 of the Waste Ordinance of 4 Dec. 2015 (AS **2015** 5699), No I of the O of 3 March 2017 (AS **2017** 715), No II of the O of 11 April 2018 (AS **2018** 1687), No I of the O of 12 Feb. 2020 (AS **2020** 793; **2021** 682), No II of the O of 20 Oct. 2021 (AS **2021** 632) and No I of the O of 16 Nov. 2022, in force since 1 Jan. 2023 (AS **2022** 777). See also the transitional provision to the Amendment of 12.2.2020 above.

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1 Non-metallic mineral products

11 Cement and lime kilns

111 Fuels and waste

1 Number 81 does not apply to cement kilns.

2 Waste may only be used in cement kilns if it is suitable for this purpose in accordance with Article 24 of the Waste Ordinance of 4 December 2015[76] (ADWO).

111bis Reference value

Emission limit values are based on a flue gas oxygen content of 10% (% vol).

112 Nitrogen oxides and ammonia

1 Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide must not exceed 200 mg/m^3.

2 Emissions of ammonia must not exceed 30 mg/m^3.

113 Sulphur oxides

Emissions of sulphur oxides, expressed as sulphur dioxide, shall be limited as far as is technically and operationally feasible and economically acceptable, but at least to 400 mg/m^3.

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114 Gaseous organic substances

1 The emission limits in Annex 1 Number 7 do not apply.

2 Emissions of gaseous organic substances are expressed as total carbon.

3 The authority shall specify an installation-specific limit value for the total carbon taking the composition of the natural raw materials into account, subject to the following requirements:

a. the emissions of gaseous organic substances from the use of waste in accordance with Number 111 paragraph 2 may amount to 10 mg/m^3;

b. the limit value must not exceed a total of 50 mg/m^3.

4 The FOEN shall issue recommendations on suitable procedures to determine emissions of gaseous organic substances from natural raw materials.

115 Dust

Dust emissions must not exceed 20 mg/m^3.

116 Mercury and cadmium

Emissions of mercury and cadmium and compounds, expressed as metals, must not exceed 0.05 mg/m^3 in either case.

117 Lead and zinc

Emissions of lead and zinc and compounds, expressed as metals, must not exceed 1 mg/m^3 in total.

118 Dioxins and furans

Emissions of polychlorinated dibenzo-p-dioxins (dioxins) and dibenzofurans (furans) expressed as the sum of the toxicity equivalents in accordance with EN 1948-1[77] must not exceed 0.1 ng/m^3.

119 Monitoring

1 The flue gas content of the following must be continuously measured and recorded:

a. nitrogen oxides and ammonia;

b. sulphur oxides;

c. gaseous organic substances;

d. dust.

2 Any person who uses wastes containing organic compounds as a raw material in the production of cement must in addition to paragraph 1:

a. continuously measure and record the benzene content in the flue gas;

77 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

b. check each year in particular whether the emission limit values for benzo(a)pyrene and dibenzo(a,h)anthracene are being met.

12 Installations for firing ceramic products using clay

121 Reference value

Emission limit values are based on a flue gas oxygen content of 18 % (v/v).

122 Fluorine compounds

[1] The emission limitation requirements specified for fluorine compounds in Annex 1 Numbers 5 and 6 do not apply.

[2] Emissions of fluorine compounds, expressed as hydrogen fluoride, must not exceed 250 g/h.

123 Nitrogen oxides

Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, shall be limited as far as is technically and operationally feasible and economically acceptable but, at a mass flow of 2000 g/h or more, at least to 150 mg/m^3.

124 Organic substances

[1] The emission limitation requirements specified in Annex 1 Number 7 do not apply.

[2] Emissions of gaseous and vaporous organic substances shall be expressed as total carbon and must not exceed 100 mg/m^3.

125 Relation to Number 81

The provisions of Number 81 apply.

13 Installations for the production of glass

131 Scope

The provisions of this Number apply to installations that produce more than 2 tonnes of glass per year.

132 Reference value

Emission limit values are based on the following flue gas oxygen contents:

a. for flame-heated glass melting furnaces: 8 % (v/v)

b. for flame-heated pot furnaces: 13 % (v/v)

133 Nitrogen oxides

[1] The emission limitation requirement specified for nitrogen oxides in Annex 1 Number 6 does not apply.

[2] Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, shall be limited as far as is technically and operationally feasible

and economically acceptable, but at least so that they do not exceed the following limit values:

a. container glass: 2.5 kg per tonne of glass produced

b. other glass: 6.5 kg per tonne of glass produced

134 ...

135 Sulphur oxides

Emissions of sulphur oxides from the raw material, expressed as sulphur dioxide, must not exceed 500 mg/m^3.

136 Relation to Number 81

The provisions of Number 81 apply.

14 Asphalt mixing plants

141 Reference value

The emission limit values are based on a flue gas oxygen content of 17 per cent (% vol).

142 Structural and operational requirements

1 The flue gases from the mixer shall be captured and fed into a flue gas purification system.

2 The gas displacement procedure must be used to fill the bitumen storage tank.

143 Dust

Dust emissions must not exceed 20 mg/m^3.

144 Gaseous organic substances

1 The emission limits specified in Annex 1 Number 7 do not apply.

2 Emissions of gaseous organic substances are expressed as total carbon and must not exceed 80 mg/m^3.

145 Nitrogen oxides

Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, must not exceed 100 mg/m^3.

146 Carbon monoxide

Emissions of carbon monoxide must not exceed 500 mg/m^3.

147 Monitoring

1 The periodical measurement and inspection in accordance with Article 13 paragraph 3 must be repeated annually.

2 The temperatures in the mineral and asphalt granulate drums must be continuously measured and recorded.

2 Chemistry

21 Installations for the production of sulphuric acid

211 Scope

The provisions of this Number apply to installations for the production of sulphur dioxide, sulphur trioxide, sulphuric acid and oleum.

212 Sulphur dioxide

1 The emission limitation requirement specified for sulphur dioxide in Annex 1 Number 6 does not apply.

2 Emissions of sulphur dioxide must not exceed 2.6 kg per tonne of 100% sulphuric acid.

213 Sulphur trioxide

Emissions of sulphur trioxide must not exceed 60 mg/m^3 under constant gas conditions, and 120 mg/m^3 in all other cases.

22 Installations using the Claus process

221 Sulphur

The sulphur emission ratio must not exceed the following limit values:

For installations with a production capacity of	Limit value in % (m/m)
less than 20 t/day	3.0
20–50 t/day	2.0
more than 50 t/day	0.5

222 Hydrogen sulphide

1 The flue gases shall be subjected to afterburning.

2 Emissions of hydrogen sulphide must not exceed 10 mg/m^3.

23 Installations for the production of chlorine

231 Chlorine

1 Emissions of chlorine must not exceed 3 mg/m^3.

2 In the case of installations for the production of chlorine with complete liquefaction, emissions of chlorine must not exceed 6 mg/m^3.

232 Mercury

With alkali metal chloride electrolysis by the amalgam process, mercury emissions must not exceed an annual average of 1.5 g per tonne of installed chlorine capacity.

24 Installations for the production of 1,2-dichloroethane and vinyl chloride

1 The flue gas shall be subjected to flue gas purification.

2 The emission limitation requirement specified for 1,2-dichloroethane and vinyl chloride in Annex 1 apply irrespective of the mass flows specified therein.

25 ...

26 Production and packaging of plant protection products

1 Any person who produces or packages plant protection products must inform the cantonal environmental protection agency.

2 The authorities shall specify preventive emission limitation requirements for total dust in accordance with Article 4; Annex 1 Number 41 does not apply.

27 Installations for the production of carbon black

Particulate emissions must not exceed a total of 20 mg/m^3.

28 Installations for the production of carbon or electrographite by means of heating

281 Organic substances

1 Emissions of organic substances, expressed as total carbon, must not exceed the emission limitation requirements specified in Numbers 282–284.

2 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

282 Mixing and moulding

Emissions of organic substances in the flue gas of mixing and moulding installations where pitch, tar or other volatile binding agents or plasticisers are processed at a high temperature must not exceed 100 mg/m^3.

283 Incineration

1 Emissions of organic substances in the flue gas of single chamber furnaces, multi-chamber furnaces and tunnel furnaces must not exceed 50 mg/m^3.

2 Emissions of gaseous organic substances in the flue gas of ring furnaces for graphite electrodes, carbon electrodes and carbon bricks must not exceed 200 mg/m^3.

284 Impregnation

Emissions of organic substances in the flue gas of impregnation installations which use tar-based impregnation agents must not exceed 50 mg/m^3.

285 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

29 Installations for the production of nitric acid

291 Nitrogen oxides

Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, shall be limited as far as is technically and operationally feasible and economically acceptable, but at least to 190 mg/m^3.

3 Mineral oil industry

31 Refineries

311 Definition and scope

The provisions of this Number apply to installations for the distillation or refining of mineral oil and mineral oil products and to other installations for the production of hydrocarbons.

312 Refinery furnaces

312.1 Reference values

1 The emission limit values are based on a flue gas oxygen content of 3% v/v.

2 The emission limitation requirements for refinery furnaces are determined by the total rated thermal input of the refinery.

312.2 Sulphur oxides

Emissions of sulphur oxides, expressed as sulphur dioxide, must not exceed the following emission concentrations:

a. with a rated thermal input of up to 300 MW: 350 mg/m^3

b. with a rated thermal input of more than 300 MW: 100 mg/m^3

312.3 Nitrogen oxides

Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, must not exceed 300 mg/m^3.

313 Storage

1 Floating-roof tanks, fixed-roof tanks with internal floating cover, fixed-roof tanks connected to the refinery gas line or equivalent measures shall be provided for the storage of crude oils and refining products which have a vapour pressure of more than 13 mbar at a temperature of 20 °C. Floating-roof tanks shall be equipped with effective seals.

2 Fixed-roof tanks shall be equipped with forced ventilation, and the gases arising shall be fed to a gas collection or afterburning system if:

a. liquids are stored which, under storage conditions, may emit Class 1 substances as specified in Annex 1 Number 7 or substances specified in Annex 1 Number 8; and

b. the expected emissions exceed the mass flows specified in Annex 1.

314 Other emission sources

1 Any organic gases or vapours released shall be collected using a gas collection system. They shall be reused, fed to a gas purification or afterburning system, or burnt off. This provision applies in particular to:

a. pressure relief and blowdown systems;

b. process plants;

c. regeneration of catalysts;

d. inspection and cleaning activities;

e. start-up and shut-down processes; and

f. transfer of raw materials, intermediate products and finished products which have a vapour pressure of more than 13 mbar at a temperature of 20 °C.

2 Emergency and fire relief systems are not required to be connected to a gas collection system.

315 Hydrogen sulphide

1 Gases from desulphurisation installations and other sources shall be further processed if they simultaneously meet the following conditions:

a. volume content of hydrogen sulphide more than 0.4%

b. mass flow of hydrogen sulphide more than 2 t/day

2 Emissions of hydrogen sulphide in gases which are not further processed must not exceed 10 mg/m^3.

316 Process water and ballast water

1 Process water or excess ballast water must be degassed before it is discharged into an open system.

2 The flue gases produced shall be purified by scrubbing or combustion.

32 Large storage tank installations

321 Definition and scope

The provisions of this Number apply to large storage tank installations with a capacity of more than 500 m^3 per tank which are intended for the storage of products with a vapour pressure of more than 1 mbar at a temperature of 20 °C.

322 Storage

Fixed-roof tanks with internal floating cover, floating-roof tanks equipped with effective seals or other equivalent measures to reduce emissions shall be provided for storage.

33 Installations for trans-shipment of petrol

[1] The filling of road tankers, tank wagons or similar transport containers with automotive or aviation petrol must be carried out using bottom loading or other equivalent measures to reduce emissions.

[2] The emission limitation requirements specified in Annex 1 Numbers 7 and 8 do not apply to petrol stations.

[3] Petrol stations shall be equipped and operated in such a way that:

a. the organic gases and vapours displaced during delivery at the petrol station are collected and returned to the transport container (vapour recovery); the vapour recovery system and connected equipment shall not have any openings to the air during vapour recovery under normal operating conditions;

b. when vehicles with standardised fuel tank filler pipes[78] are filled, no more than 10 % of the organic substances contained in the displaced air shall be emitted; this requirement shall be deemed to be met if results to this effect are available from an official measurement agency and if the vapour recovery system is properly installed and operated.

[4] The provisions of paragraph 3 letter b do not apply when low-volume dispensing devices are used for filling.

4 Metals

41 Foundries

411 Amines

Emissions of amines arising during core making must not exceed 5 mg/m^3.

412 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

42 Cupolas

421 Dust

Total dust emissions must not exceed 20 mg/m^3.

422 Carbon monoxide

Emissions of carbon monoxide in flue gas must not exceed 1000 mg/m^3 for hot-blast furnaces with a recuperative heat exchanger.

423 Relation to Number 81

The provisions of Number 81 apply.

78 ISO 13331
This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

43 Aluminium smelters

431 Fluorine compounds

[1] The emission limitation requirements specified for fluorine compounds in Annex 1 Numbers 5 and 6 do not apply.

[2] Emissions of fluorine compounds, expressed as hydrogen fluoride, must not exceed a total of 700 g per tonne of aluminium produced.

[3] Emissions of gaseous fluorine compounds, expressed as hydrogen fluoride, must not exceed 250 g per tonne of aluminium produced.

432 Assessment of emissions

For comparison with the emission limit values, the measured emissions shall be averaged over an operating period of one month.

44 Installations for refining non-ferrous metals

441 Organic substances

[1] The emission limitation requirements specified in Annex 1 Number 7 do not apply.

[2] Emissions of organic substances, expressed as total carbon, must not exceed 50 mg/m^3.

442 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

45 Galvanising installations

451 Dust

Total dust emissions must not exceed 10 mg/m^3.

452 Additional provisions for hot-dip galvanising installations

[1] The emission limit values are based on an exhaust air volume of 3000 m^3 per square metre of zinc bath surface area per hour.

[2] At least 80 % of emissions from the zinc bath shall be captured by enclosures, hoods, lip extraction systems or similar measures.

[3] Emissions are only to be measured during dipping. Each dipping period begins with the first and ends with the last contact of the material to be galvanised with the galvanising bath.

46 Installations for the production of lead-acid batteries

461 Lead

[1] The flue gases from the installations shall be captured and fed into a dust removal system.

[2] Emissions of lead must not exceed 1 mg/m^3.

462 Sulphuric acid vapours

[1] Sulphuric acid vapours generated during plate formation shall be captured and fed into a flue gas purification system.

[2] Emissions of sulphuric acid, expressed as H_2SO_4, must not exceed 1 mg/m^3.

463 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

47 Heating furnaces and heat treatment furnaces

471 Scope

The provisions of this Number apply to heating furnaces and heat treatment furnaces with a rated thermal input of more than 100 kW which are fired with gaseous fuels as specified in Annex 5 Number 4 letters a–c.

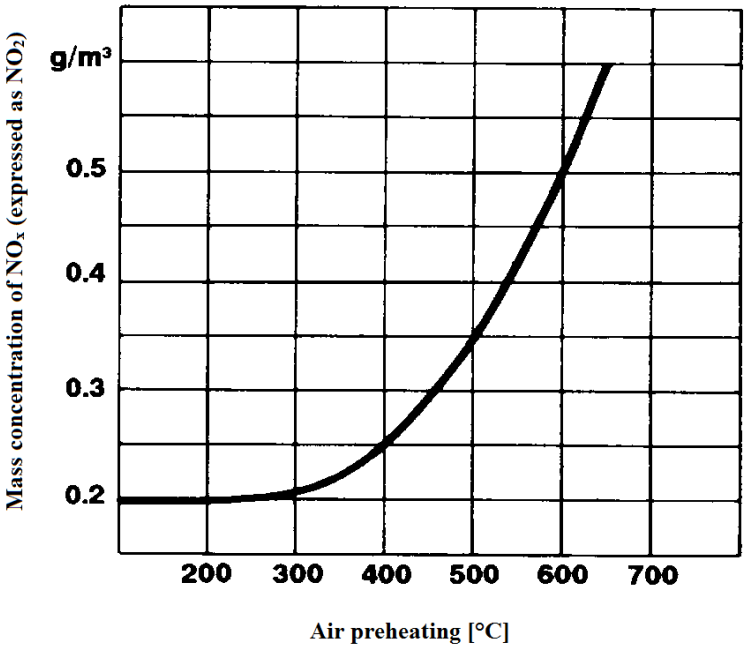
472 Reference value

The emission limit values are based on a flue gas oxygen content of 5 % (v/v).

473 Nitrogen oxides

Emissions of nitrogen oxides, expressed as nitrogen dioxide, must not exceed the limit values specified in the following diagram.

Diagram:



474 Measurements

Emissions shall be measured at not less than 80 % of the rated load and at the highest operating temperature in each case.

475 Relation to Number 81

The provisions of Number 81 apply.

48 Electric steel plants

481 Scope

The provisions of this number apply to installations for electric steel production, including continuous casting with a melting capacity of more than 2.5 tonnes of steel per hour.

482 Dust

Dust emissions must not exceed a total of 5 mg/m^3.

483 Dioxins and furans

The emissions of polychlorinated dibenzo-p-dioxins (dioxins) and dibenzofurans (furans) produced in electric arc furnaces expressed as the sum of the toxicity equivalents in accordance with EN 1948-1[79], must not exceed 0.1 ng/m^3.

5 Agriculture and foodstuffs

51 Stock rearing

511 Scope

The provisions of this Number apply to installations for traditional stock rearing and intensive stock rearing.

512 Minimum distance

When installations are constructed, the minimum distances from residential areas required in accordance with the recognised rules of stock rearing shall be observed. These include, in particular, the recommendations of the Swiss Federal Research Station for Farm Management and Agricultural Engineering.[80]

513 Ventilation systems

Ventilation systems must comply with the recognised rules of ventilation engineering. These include, in particular, the recommendations given in the Swiss Standard on Climatisation of Animal Houses.[81]

514 Ammonia

The authority shall specify the preventive emission limits in terms of Article 4; Annex 1 Number 62 does not apply. The FOEN shall issue recommendations.

52 Smoking installations

521 Scope

The provisions of this Number apply to installations for smoking meat, sausages and fish.

522 Smoke production

Number 81 does not apply.

523 Organic substances

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Emissions of organic substances shall be expressed as total carbon. They must not exceed the following limit values:

79 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

80 Available from: Forschungsanstalt Agroscope Reckenholz-Tänikon (ART), 8356 Ettenhausen.

81 Available from: Institute of Plant, Animal and Agroecosystem Sciences, Universitätstr.2, CH-8092 Zürich, Switzerland.

a. For hot smoking
   at a mass flow of 50 g/h or more 50 mg/m³
b. For cold smoking
   at a mass flow of 50 g/h to 300 g/h 120 mg/m³
c. For cold smoking
   at a mass flow of over 300 g/h 50 mg/m³

53 Installations for rendering and for dung drying

531 Definition and scope

The provisions of this Number apply to:

a. rendering installations.
b. installations where animal carcasses, parts of animal carcasses, and products of animal origin are collected and stored for use or disposal in rendering installations;
c. installations for melting animal fats;
d. installations for producing gelatine, haemoglobin and animal feed products;
e. installations for dung drying.

532 Structural and operational requirements

1 Processing installations and storage facilities where odours may develop shall be housed in closed rooms.

2 Strong-smelling flue gases shall be captured and fed into a flue gas purification system.

3 Raw and intermediate products shall be stored in sealed containers.

533 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

54 Installations for drying green fodder

541 Scope

The provisions of this Number apply to installations in which grass, maize plants and similar green fodder, marc, potatoes and sugar beet chips are dried.

542 Dust

Dust emissions shall be limited as far as is technically and operationally feasible and economically acceptable, but at least to 150 mg/m³.

543 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

55 Installations for storing and spreading liquid farmyard manure

551 Storage of liquid farmyard manure

Facilities for the storage of liquid manure and liquid fermentation products must be equipped with a permanently effective cover to limit ammonia and odour emissions. The FOEN and the Federal Office for Agriculture shall issue joint recommendations.

552 ...[82]

56 Installations for roasting coffee and cocoa

561 Organic substances

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Emissions of gaseous and vaporous organic substances shall be expressed as total carbon. In the case of installations with a roasting capacity of more than 100 kg of raw product per hour, they must not exceed the following limit values:

a. For installations with a roasting capacity of up to 750 kg/h: 150 mg/m^3

b. For installations with a roasting capacity of more than 750 kg/h: 50 mg/m^3

562 Relation to Number 81

The provisions of Number 81 also apply to installations in which materials are treated by direct contact with furnace flue gases.

6 Coating and printing

61 Installations for coating and printing with organic substances

611 Scope

1 The provisions of this Number apply to:

a. installations for coating and printing surfaces with organic substances such as paints, varnishes or plastics;

b. installations for impregnation.

2 They apply to the application and flash-off zones and also to the attached drying and stoving installations.

612 Dust

Total dust emissions must not exceed the following limit values:

a. For spray painting: 5 mg/m^3

b. For powder coating: 15 mg/m^3

82 Comes into force on 1 Jan. 2024 (AS **2021** 682, 789).

613 Solvent emissions

1 The emission limitation requirements specified in Annex 1 Number 71 do not apply to gaseous and vaporous organic emissions of Class 2 and Class 3 substances as specified in Annex 1 Number 72.

2 These emissions shall be expressed as total carbon and at a mass flow of 3 kg/h or more they must not exceed a total of 150 mg/m^3.

3 If paints are used which, in addition to water, exclusively contain up to 15% (m/m) ethanol as a solvent, emissions of ethanol must not exceed 300 mg/m^3 at a mass flow of 3 kg/h or more.

614 Flue gases from drying and stoving installations

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply to drying and stoving installations in which drying or stoving is carried out at temperatures of more than 120 °C.

2 Emissions of gaseous and vaporous organic substances shall be expressed as total carbon and at a mass flow of more than 250 g/h they must not exceed the following limit values:

a. For web offset printing installations: 20 mg/m^3

b. For all other installations: 50 mg/m^3

615 Relation to Number 81

The provisions of Number 81 also apply to installations in which products are treated by direct contact with furnace flue gases.

7 Waste

71 Installations for incineration of municipal and special waste

711 Scope and definitions

1 The provisions of this Number apply to installations in which municipal or special waste is incinerated or thermally decomposed. They are not applicable to installations for incinerating waste wood, paper and similar waste (Number 72) or sulphite waste liquor from pulp manufacture (Number 73), or to cement kilns (Number 11).

2 *Municipal waste* means waste from households and other waste of similar composition. It includes in particular:

a. garden waste;

b. market waste;

c. road sweepings;

d. office waste, packaging and food waste from the catering industry;

e. pre-treated municipal waste;

f. animal carcasses and meat waste;

g. sludge from municipal wastewater treatment plants;

h. waste gases as defined in Annex 5 Number 41 paragraph 2;

i. waste as defined in Annex 5 Number 31 paragraph 2 letter b.

3 *Special waste* means waste classified as special waste in the list issued in accordance with Article 2 of the Ordinance of 22 June 2005[83] on Movements of Waste (OMW).

712 Relation to Annex 1

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Where emission limitation requirements specified in Annex 1 apply, they apply irrespective of the mass flows specified therein.

713 Reference value and assessment of emissions

1 The emission limit values are based on the following flue gas oxygen contents:

a.	Plants for incinerating liquid waste:	3% (v/v)
b.	Plants for incinerating waste gases alone or together with liquid waste:	3% (v/v)
c.	Plants for incinerating solid waste alone or together with liquid waste or waste gases:	11% (v/v)

2 For the assessment of emissions, the values obtained shall be averaged over an operating period of several hours.

714 Emission limit values

1 Emissions must not exceed the following limit values:

a.	Dust:	10 mg/m^3
b.	Lead and zinc and their compounds, expressed as the metals, in total:	1 mg/m^3
c.	Mercury and cadmium and their compounds, expressed as metals, in each case:	0.1 mg/m^3
d.	Sulphur oxides, expressed as sulphur dioxide:	50 mg/m^3
e.	Nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, at a mass flow of 2.5 kg/h or more:	80 mg/m^3
f.	Gaseous inorganic chlorine compounds, expressed as hydrogen chloride:	20 mg/m^3
g.	Gaseous inorganic fluorine compounds, expressed as hydrogen fluoride:	2 mg/m^3
h.	Ammonia and ammonium compounds, expressed as ammonia:	5 mg/m^3
i.	Gaseous organic substances, expressed as total carbon:	20 mg/m^3

83 SR **814.610**

k.	Carbon monoxide:	50 mg/m^3
l.	Polychloriated dibenzo-p-dioxins (dioxins) and dibenzofurans (furans), expressed as the sum of the toxic equivalents in accordance with EN 1948-1[84]	0.1 ng/m^3

2 For installations with a nitrogen oxide content (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, of 1000 mg/m^3 or more in the raw gas, the authorities may specify a less strict emission limit value for ammonia and ammonium compounds, notwithstanding paragraph 1 letter h.

715 ...

716 Monitoring

1 The following shall be continuously measured and recorded:

a. the temperature of the flue gases around the burnout zone and in the stack;

b. the oxygen content of the flue gases after they leave the burnout zone;

c. the carbon monoxide content of the flue gases.

2 Operation of the flue gas purification system shall be continuously monitored by measurement of an emission parameter or an appropriate operating parameter such as flue gas temperature, drop in pressure, or water flow rate of the flue gas scrubber.

717 Storage

Strong-smelling waste and waste which emits dangerous vapours shall be stored in closed bunkers, rooms or tank installations. The waste air shall be extracted and purified.

718 Prohibition on waste incineration in small installations

1 Municipal and special waste must not be incinerated in installations with a rated thermal input of less than 350 kW.

2 This prohibition does not apply to special waste from hospitals which, due to its composition, cannot be disposed of as municipal waste.

719 Incineration of particularly hazardous waste

1 In cases where emissions may be especially hazardous to the environment, the installation owner shall determine the emissions to be expected by means of preliminary tests with small amounts of waste and shall inform the authorities of the results before the waste is incinerated.

2 Emissions are regarded as particularly hazardous to the environment if they are both highly toxic and persistent, such as polyhalogenated aromatic hydrocarbons.

84 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

72 Installations for incineration of waste wood, paper and similar waste

721 Scope

1 The provisions of this Number apply to installations in which waste made up of the following types of substances is incinerated or thermally decomposed alone or together with wood fuels as specified in Annex 5:

a. waste wood as specified in Annex 5 Number 31 paragraph 2 letter a provided it meets the requirements of Article 14*a* paragraph 2 ADWO;

b. paper and cardboard;

c. other waste which, when incinerated, gives off emissions similar to those produced by the waste listed under letters a and b.

2 If such waste is incinerated together with waste as specified in Number 711, the provisions of Number 71 apply.

3 The provisions of this Number do not apply to cement kilns (Number 11).

722 Reference value

The emission limit values are based on a flue gas oxygen content of 11% (v/v).

723 Dust

Dust emissions must not exceed the following limit values:

a. For installations with a rated thermal input of up to 10 MW: 20 mg/m^3

b. For installations with a rated thermal input of more than 10 MW: 10 mg/m^3

724 Lead and zinc

Combined emissions of lead and zinc must not exceed 5 mg/m^3.

725 Organic substances

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Emissions of gaseous organic substances, expressed as total carbon, must not exceed 50 mg/m^3.

726 Carbon monoxide and nitrogen oxides

1 Emissions of carbon monoxide must not exceed 250 mg/m^3.

1bis In the case of installations with a rated thermal input of over 10 MW, emissions of carbon monoxide must not exceed 150 mg/m^3.

2 In the case of installations with a rated thermal input of more than 10 MW, emissions of nitrogen oxides, expressed as nitrogen dioxide, must not exceed 150 mg/m^3.

727 Combustion control

The installation shall be operated with an automatic combustion control system.

728 Prohibition on waste incineration in small installations

Waste as specified in Number 721 must not be incinerated in installations with a rated thermal input of less than 350 kW.

73 Installations for incineration of sulphite waste liquor from pulp manufacture

731 Sulphur oxides

1 The emission limitation requirement specified for sulphur oxides in Annex 1 Number 6 does not apply.

2 Emissions of sulphur oxides, expressed as sulphur dioxide, must not exceed 4.0 kg per tonne of waste liquor incinerated.

732 Assessment of emissions

For comparison with the emission limit values, the measured emissions shall be averaged over an operating period of 24 hours.

74 Installations for incineration of biogenic waste and products of agriculture

741 Scope

1 The provisions of this Number apply to installations in which solid biogenic waste and products of agriculture are incinerated or thermally decomposed alone or together with wood fuels as specified in Annex 5. Farmyard manure and other strong-smelling waste and products must not be either incinerated or thermally decomposed in such installations.

2 If such waste and products are incinerated together with waste as specified in Number 711 or Number 721, the provisions of Number 71 or Number 72 apply.

3 If such waste and products are incinerated together with other fuels as specified in Annex 5, the composite limit value specified in Annex 3 Number 82 applies.

4 The provisions of this Number do not apply to cement kilns (Number 11).

742 Emission limit values

Emissions must not exceed the following limit values:

		Rated thermal input		
		up to 1 MW	over 1 MW up to 10 MW	over 10 MW
– Reference value: The limit values are based on a flue gas oxygen content of	% (v/v)	13	11	11
– Total solids:	mg/m^3	20	20	10
– Carbon monoxide (CO)	mg/m^3	500	250	150
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2)[1]	mg/m^3	250	250	150

1 At a mass flow of 2500 g/h or more

743 Prohibition on incineration in small installations

Solid biogenic waste and products of agriculture as specified in Number 741 must not be incinerated in installations with a rated thermal input of less than 70 kW.

8 Other installations

81 Installations in which products are treated by direct contact with furnace flue gases

[1] Only fuels as specified in Annex 5 shall be used.

[2] For emissions of sulphur oxides from the fuel, Annex 1 Number 6 does not apply. If coal or «medium» or «heavy» fuel oil is used, emissions of sulphur oxides, expressed as sulphur dioxide, shall be limited to such an extent that they are no higher than the unabated emissions arising from the use of a fuel quality with a sulphur content of 1.0 % (m/m).

[3] For emissions of sulphur oxides from the treated materials, Annex 1 Number 6 applies.

82 Stationary internal combustion engines

821 Reference value

The emission limit values are based on a flue gas oxygen content of 5% (v/v).

822 Thermal and motor fuels

Stationary internal combustion engines may only be operated with gaseous thermal and motor fuels as specified in Annex 5 Number 41 paragraph 1, or with liquid thermal and motor fuels as specified in Annex 5 Number 132, with the exception of «medium» or «heavy» fuel oil

823 Solids

[1] Particulate emissions must not exceed 10 mg/m^3.

[2] For the internal combustion engines of emergency generators, Number 827 paragraph 2 applies.

824 Nitrogen oxides and carbon monoxide

[1] Emissions from stationary internal combustion engines must not exceed the following limit values:

		Rated thermal input		
		Up to 100 kW	Over 100 kW	Over 1 MW
– Carbon monoxide (CO)	mg/m^3			
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1		650	300	300

		Rated thermal input		
		Up to 100 kW	Over 100 kW	Over 1 MW
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1 letters d and e, if these fuels make up at least 80 % of the fuels used for annual operation		1300	650	300
– when operating on liquid thermal or motor fuels		650	300	300
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2)	mg/m³			
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1		250	150	100
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 letters d and e, if these fuels make up at least 80 % of the fuels used for annual operation		400	250	100
– when operating on liquid thermal or motor fuels		400	250	250

2 When operating a stationary internal combustion engine with a denitrification system, the emissions of ammonia and ammonia compounds, expressed as ammonia, must not exceed 30 mg/m³.

825 Test beds

For test beds for internal combustion engines, the authorities shall specify preventive emission limitation requirements in accordance with Article 4; Annex 1 and Annex 2 Numbers 821–824 do not apply.

826 Measurement and control

1 Periodical measurement and control in accordance with Article 13 paragraph 3 must be repeated every two years.

2 For internal combustion engines of emergency generators, Number 827 paragraph 3 applies.

827 Emergency generators

1 For internal combustion engines of emergency generators that are operated for a maximum of 50 hours each year, the authority shall specify the preventive emission limits in accordance with Article 4; Annex 1 Number 6, Annex 2 Number 824 and Annex 6 do not apply.

2 Particulate emissions must not exceed 50 mg/m³.

3 Periodical measurement and control in accordance with Article 13 paragraph 3 must be repeated every six years.

83 Gas turbines

831 Reference value

The emission limit values are based on a flue gas oxygen content of 15% (v/v).

832 Fuels

Gas turbines may only be operated with gaseous thermal and motor fuels as specified in Annex 5 Number 41 paragraph 1, or with liquid thermal and motor fuels as specified in Annex 5, with the exception of «medium» or «heavy» fuel oil.

833 Smoke number

When operating on liquid thermal or motor fuels, soot emissions must not exceed the smoke number 2 (Annex 1 Number 22).

834 Carbon monoxide

Emissions of carbon monoxide must not exceed the following limit values:

		Rated thermal input	
		Up to 40 MW	Over 40 MW
– Carbon monoxide (CO)	mg/m^3		
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1 or liquid thermal or motor fuels		100	35
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1 letters d and e, if these fuels make up at least 80 % of the fuels used for annual operation		240	35

835 Sulphur oxides

Emissions of sulphur oxides, expressed as sulphur dioxide, must not exceed 120 mg/m^3 at a mass flow of 2.5 kg/h or more.

836 Nitrogen oxides and ammonia

[1] Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, must not exceed the following limit values:

		Rated thermal input	
		Up to 40 MW	Over 40 MW
– Nitrogen oxides (NO_x)	mg/m^3		
– when operating on gaseous thermal or motor fuels as specified in Annex 5 Number 41 paragraph 1		40	20
– when operating on liquid thermal or motor fuels		50	40

[2] When operating a gas turbine with a denitrification system, the emissions of ammonia and ammonia compounds, expressed as ammonia, must not exceed 10 mg/m^3.

837 Test beds and emergency generators

1 For test beds for gas turbines, the authorities shall specify preventive emission limitation requirements in accordance with Article 4; Annex 1 and Annex 2 Numbers 831–836 do not apply.

2 For gas turbines of emergency generators which are operated for no more than 50 hours per year, the authorities shall specify preventive emission limitation requirements in accordance with Article 4; Annex 1 and Annex 2 Numbers 833, 834 and 836 do not apply.

84 Installations for the production of wood particle board and wood fibre board

841 Scope

The provisions of this Number apply to installations in which wood particle board and wood fibre board are produced using a dry process.

842 Relation to Number 81

1 The provisions of Number 81 also apply in the case of installations in which products are treated by direct contact with furnace flue gases.

2 In derogation from paragraph 1, waste wood in accordance with Annex 5 Number 31 paragraph 2 letter a may be recycled if it is suitable for thermal recycling in accordance with Article 14*a* paragraph 2 der ADWO.

843 Reference value

Emission limit values are based on the following flue gas oxygen contents:

a.	in the case of directly heated wood chip dryers	18 per cent (% vol)
b.	in the case of directly heated wood chip dryers whose flue gases are treated together with the flue gases from the presses	18 per cent (% vol)

844 Dust

Dust emissions must not exceed the following limit values:

a.	in the case of wood chip and fibre dryers	10 mg/m^3
b.	in the case of presses	10 mg/m^3
c.	in the mechanical processing of wooden boards	5 mg/m^3

845 Organic substances

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Emissions of gaseous and vaporous organic substances expressed as total carbon may not exceed the following values:

a.	in the case of wood chip dryers	120 mg/m^3
b.	in the case of presses	70 mg/m^3

3 In the case of fibre dryers, emissions of gaseous and vaporous organic substances, expressed as total carbon, shall be limited as far as is technically and operationally feasible and economically acceptable, but at least to 100 mg/m^3.

846 Formaldehyde

Emissions of formaldehyde may not exceed 10 mg/m^3.

847 Nitrogen oxides

Emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide, may not exceed the following values:

a. in the case of directly heated wood chip dryers 150 mg/m^3

b. in the case of directly heated wood fibre dryers 50 mg/m^3

848 Monitoring

The flue gas content of the following shall be continuously measured and recorded:

a. gaseous organic substances;

b. nitrogen oxides.

85 Dry cleaning (clothes)

1 The provisions of this Number apply to dry cleaning installations which are operated using halogenated hydrocarbons.

2 The loading door of a dry cleaning machine shall be fitted with an interlock system so that it can only be opened when the concentration of gaseous and vaporous organic substances in the machine air falls below 2 g/m^3.

3 The concentration specified for the interlock system in paragraph 2 shall be continuously monitored inside the machine around the loading door.

4 The dry-cleaned items must have a maximum temperature of 35 °C before being removed from the machine.

5 If exhaust air is extracted from the machine, it must be purified by means of an activated carbon filter or by equivalent measures.

6 Indoor air must be exhausted so that the operating areas are always kept under negative pressure.

86 Crematoria

861 Organic substances

1 The emission limitation requirements specified in Annex 1 Number 7 do not apply.

2 Emissions of gaseous and vaporous organic substances, expressed as total carbon, must not exceed 20 mg/m^3.

862 Carbon monoxide

Emissions of carbon monoxide must not exceed 50 mg/m^3.

87 Surface treatment installations

1 The provisions of this Number apply to installations in which the surfaces of articles and products made of metal, glass, ceramics, plastics, rubber or other materials are treated with halogenated organic substances which at a pressure of 1013 mbar have a boiling point below 150 °C.

2 Surface treatment installations shall be equipped and operated as follows:

a. Articles and products must be treated in a chamber which is closed except for openings used for extraction of flue gases.

b. An interlock system shall be used to ensure that articles and products cannot be removed until the concentration of halogenated organic substances reaches 1 g/m^3 or less in the removal area.

c. Extracted flue gases must be cleaned in a separator. During this process, emissions of halogenated organic substances listed in Annex 1 Number 72 must not exceed a mass flow of 100 g/h and emissions of halogenated hydrocarbons listed in Annex 1 Number 83 must not exceed a mass flow of 25 g/h. The emission limitation requirements specified in Annex 1 Numbers 7 and 8 do not apply.

d. If halogenated organic substances are fed into or removed from the installation, emissions must be reduced by means of a vapour recovery system or equivalent measures.

3 If an installation is unable to meet the requirements specified in paragraph 2 letters a and b because of the bulky nature of the articles and products treated, emissions shall be reduced as far as is technically and operationally feasible and economically acceptable, by measures such as encapsulation, sealing, removal from exhaust air, airlocks or extraction.

88 Construction sites

1 Emissions from construction sites shall be limited as far as is technically and operationally feasible and economically acceptable, particularly by appropriate operating procedures. Account shall be taken of the type, size and location of the construction site and the duration of the construction work. The FOEN shall issue guidelines.

2 The emission limit values specified in Annex 1 do not apply to construction machines and construction sites.

Annex 3[85]
(Art. 3 para. 2 let. b)

Additional or different emission limitation requirements for combustion installations

1 Scope

[1] The provisions of this Annex apply to combustion installations which are used for the following purposes:

a. space heating;

b. production of process heat, including baking heat for commercial use;

c. production of warm or hot water;

d. production of steam.

[2] They do not apply to combustion installations in which products are treated by direct contact with furnace flue gases.

2 General provisions

21 Fuels

In combustion installations as specified in Number 1, only fuels as specified in Annex 5 shall be burned.

22 Control of combustion installations

Periodic measurements in accordance with Article 13 paragraph 3 are not required for the following combustion installations:

a. combustion installations which are operated for less than 100 hours in a calendar year;

b. combustion installations with a rated thermal input of less than 12 kW which are used solely to heat individual rooms;

c. and d. ...

e. coal-fired local space heaters;

f. solid-fuel-fired local space heaters, provided they operate solely on wood fuels as specified in Annex 5 Number 31 paragraph 1 letter a, b or d number 1.

85 Amended by No II of the O of 20 Nov. 1991 (AS **1992** 124). Revised by No II of the O of 15 Dec. 1997 (AS **1998** 223), of 23 June 2004 (AS **2004** 3561), of 4 July 2007 (AS **2007** 3875), of 22 Oct. 2008 (AS **2008** 5163), the O of 18 June 2010 (AS **2010** 2965), of 14 Oct. 2015 (AS **2015** 4171), No I of the O of 3 March 2017 (AS **2017** 715), No II of the O of 11 April 2018 (AS **2018** 1687), No I of the O of 12 Feb. 2020 (AS **2020** 793) and No II of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632). See also the transitional provision to the Amendment of 11 April 2018 above.

23 Measurement and assessment of emissions

[1] For each individual installation, emissions shall be measured under steady state conditions and in the load ranges which are relevant for assessment. In general, these are at least the highest and the lowest load point at which the installation is operated under standard operating conditions.

[2] For installations operated with soot blowing or similar cleaning processes, dust emissions shall be measured and assessed over a half-hour period. Measurement must include the cleaning phase.

3 Special provisions for combustion installations comprising several individual installations

[1] If several individual installations form a single operating unit, then limitation of emission for each individual installation is determined by the rated thermal input (Annex 1 Number 24) of the entire operating unit (total rated thermal input).

[2] The total rated thermal input is the sum of the rated thermal inputs of all the individual installations which make up the operating unit.

[3] Where two or more individual installations are operated in an operating unit in order to cover a variable heat or steam requirement in changing constellations, the rated thermal inputs of the individual installations shall normally form the basis for specifying the emission limits.

4 Oil-fired installations

41 Combustion installations for «extra light» heating oil

411 Emission limit values

[1] Emissions from combustion installations operating on «extra light» heating oil must not exceed the following limit values:

Combustion installations for «extra light» heating oil	
– Reference value: The limit values for gaseous pollutants are based on a flue gas oxygen content of	3% (v/v)
– Smoke number	1
– Carbon monoxide (CO)	80 mg/m^3
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide	
a. luminous radiant and tube radiant heaters	200 mg/m^3
b. installations with a heating medium temperature of up to 110 °C:	150 mg/m^3
c. other installations	120 mg/m^3
– Ammonia and ammonium compounds, expressed as ammonia[1]	30 mg/m^3

Note:

[1] This emission limitation requirement is only relevant for combustion installations fitted with a denitrification system.

2 Emissions of sulphur oxides are limited by the maximum sulphur content specified in Annex 5 Number 11. The emission limitation requirement specified for sulphur oxides in Annex 1 Number 6 does not apply.

3 In derogation from paragraph 1, in the case of installations with a rated thermal input of over 300 MW, emissions of nitrogen oxides, expressed as nitrogen dioxide, must not exceed 100 mg/m^3.

412 Additional provisions concerning nitrogen oxide emissions

1 The authorities may specify less stringent limit values for combustion installations with a heating medium temperature of more than 150 °C in cases where compliance with the limit value of 150 mg/m^3 specified for nitrogen oxides in Number 411 is not technically or operationally feasible, or is economically unacceptable. However, emissions of nitrogen oxides, expressed as nitrogen dioxide, must not exceed 250 mg/m^3.

2 and 3 ...

413 ...

414 Energy requirements

1 The flue gas losses from furnaces and boilers must not exceed the following limit values:

a.	for forced draught burners with single-stage operation and for vaporising-type burners	7 %
b.	for forced draught burners with two-stage operation:	
	1. during first-stage operation	6 %
	2. during second-stage operation	8 %

1bis The flue gas losses from boilers used to heat rooms or water commissioned from 1 January 2019 must not exceed 4 per cent.

2 The authorities may specify less stringent limit values for furnaces and boilers where the shut-off temperature of the safety temperature limiter exceeds 110 °C and where compliance with the requirements specified in paragraph 1 is not technically or operationally feasible, or is economically unacceptable.

415 Use of «Euro extra-light» heating oil

«Euro extra-light» heating oil may not be used in installations or operating units that have a rated thermal input of less than 5 MW for this thermal fuel.

42 Combustion installations for «medium» and «heavy» fuel oil

421 Emission limit values

1 Emissions from combustion installations operating on «medium» or «heavy» fuel oil must not exceed the following limit values:

		Rated thermal input			
		over 5 MW up to 50 MW	over 50 MW up to 100 MW	over 100 MW up to 300 MW	over 300 MW
«Medium» and «heavy» fuel oil					
– Reference value: The limit values are based on a flue gas oxygen content of	% vol	3	3	3	3
– Total solids: For heating oils with a sulphur content not exceeding 1 % by mass:	mg/m^3	80	10	10	10
For other heating oils	mg/m^3	50	10	10	10
– Carbon monoxide (CO)	mg/m^3	170	170	170	170
– Sulphur oxides (SO_x), expressed as sulphur dioxide (SO_2)	mg/m^3	1700	350	200	150
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2)	mg/m^3	150	150	150	100
– Ammonia and ammonia compounds, expressed as ammonia	mg/m^3	30	30	30	30

[2] The emission limit value of 1700 mg/m^3 for sulphur oxides shall be deemed to be met if heating oil with a sulphur content not exceeding 1 % by mass is used.

422 Use of «medium» and «heavy» fuel oil

«Medium» and «heavy» fuel oil must not be used in installations or operating units which have a rated thermal input of less than 5 MW for these fuels.

5 Installations fired by solid fuels

51 Coal-fired installations

511 Emission limit values

[1] Emissions from combustion installations which operate on coal, coal briquettes or coke must not exceed the following limit values:

		Rated thermal input					
		up to 70 kW	over 70 kW up to 500 kW	over 500 kW up to 1 MW	over 1 MW up to 10 MW	over 10 MW up to 100 MW	over 100 MW
Coal, coal briquettes, coke							
– Reference value: The limit values are based on a flue gas oxygen content of	% (v/v)	7	7	7	7	7	6
– Total solids:	mg/m^3	100	50	20	20	10	10
– Carbon monoxide (CO)	mg/m^3	2500	1000	1000	150	150	150

		Rated thermal input					
		up to 70 kW	over 70 kW up to 500 kW	over 500 kW up to 1 MW	over 1 MW up to 10 MW	over 10 MW up to 100 MW	over 100 MW
– Sulphur oxides (SO_x), expressed as sulphur dioxide (SO_2):							
– fluidised bed installations	mg/m^3	–	–	–	350	350	200
– other coal-fired installations	mg/m^3	–	–	–	1300	350	150
– other installations	mg/m^3	–	–	–	1000	350	150
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2)	mg/m^3	–	–	–	500	200	150
– Ammonia and ammonium compounds, expressed as ammonia[1]	mg/m^3	30	30	30	30	30	30

Notes:
– A dash in the table means that no limitations are specified either in Annex 3 or in Annex 1.
1 This emission limitation requirement is only relevant for combustion installations fitted with a denitrification system.

2 The authorities shall specify preventive emission limitation requirements for inorganic substances mainly in the form of dust and also for chlorine and fluorine compounds in accordance with Article 4; Annex 1 Number 5 and the emission limitation requirements specified for chlorine and fluorine compounds in Annex 1 Number 6 do not apply.

3 In derogation from paragraph 1, a carbon monoxide emission limit value of 4000 mg/m^3 applies to central heating and residential cookers.

512 Measurement and control

The requirements specified in Number 524 apply by analogy to installations in terms of Number 22 letter e and boilers with a rated thermal input of up to 70 kW that are operated with coal combustibles in accordance with Number 513.

513 Use of coal

In combustion installations with a rated thermal input of less than 1 MW, only coal, coal briquettes or coke with a sulphur content not exceeding 1% (m/m) may be used.

52 Wood-fired installations

521 Type of installation and fuel

1 In wood-fired installations, only wood fuels as specified in Annex 5 Number 31 paragraph 1 may be used which are suitable for combustion in these installations on account of the fuel type, quality and moisture.

2 In addition, only wood as specified in Annex 5 Number 31 paragraph 1 letters a, b or d number 1 may be used in hand-stoked combustion installations with a rated thermal input of up to 40 kW and in open fires.

[3] In automatic combustion installations with a rated thermal input of up to 40 kW, only wood fuels as specified in Annex 5 Number 31 paragraph 1 letters a, b or d number 1 may be used.

522 Emission limit values

[1] Emissions from combustion installations operating on wood fuels as specified in Annex 5 Number 31 paragraph 1 must not exceed the following limit values:

		Rated thermal input				
		up to 70 kW	over 70 kW up to 500 kW	over 500 kW up to 1 MW	over 1 MW up to 10 MW	over 10 MW
Wood fuels						
– Reference value: The limit values are based on a flue gas oxygen content of	% (v/v)	13	13	13	11	11
– For wood fuels as specified in Annex 5 No 31 para. 1 let. a, b or d Number 1						
– for central heating and residential cookers and commercially used baking ovens:						
– Total solids	mg/m^3	100	50	–	–	–
– Carbon monoxide (CO)	mg/m^3	4000	4000	–	–	–
– for hand-stoked local space heaters[1] and boilers:						
– Total solids:	mg/m^3	100	50[a]	20	20	10
– Carbon monoxide (CO):	mg/m^3	2500	500	–	–	–
– for automatically stoked hot water and steam boilers:						
– Total solids	mg/m^3	50	50	20	20	10
– Carbon monoxide (CO)	mg/m^3	1000	500	500	250	150
– for wood fuels as specified in Annex 5 Number 31 paragraph 1 letters c or d number 2						
– Total solids	mg/m^3	50	50	20	20	10
– Carbon monoxide (CO)	mg/m^3	1000	500	500	250	150
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2)	mg/m^3	c	c	c	c	150
– Gaseous organic substances, expressed as total carbon (C)	mg/m^3	–	–	–	–	50

		Rated thermal input				
		up to 70 kW	over 70 kW up to 500 kW	over 500 kW up to 1 MW	over 1 MW up to 10 MW	over 10 MW
– Ammonia and ammonium compounds, expressed as ammonia[3]	mg/m³	–	–	–	30	30

Notes:
– A dash in the table means that no limitations are specified either in Annex 3 or in Annex 1.
1 In the case of one off basic stoves as specified in SN EN 15544 (one off tiled/mortared stoves – dimensioning)[86] the emission limits for solids and CO apply up to 70 kW irrespective of their rated thermal input.
2 Does not apply to central heating cookers.
3 See the limit value specified for nitrogen oxides in Annex 1 Number 6.
4 This emission limitation requirement is only relevant for combustion installations fitted with a denitrification system.

2 Emissions of sulphur oxides, expressed as sulphur dioxide and based on a flue gas oxygen content of 6 %, must not exceed the following values:

a. in the case of installations with a rated thermal input of 50 to 300 MW 200 mg/m³

b. in the case of installations with a rated thermal input of over 300 MW 150 mg/m³

3 In derogation from paragraph 1, emissions of nitrogen oxides, expressed as nitrogen dioxide and based on a flue gas oxygen content of 6 %, must not exceed the following values:

a. in the case of installations with a rated thermal input of 100 up to 300 MW 200 mg/m³

b. In the case of installations with a rated thermal input of over 300 MW 150 mg/m³

4 The authorities shall specify preventive emission limitation requirements for chlorine compounds and for organic substances in gaseous, vaporous or particulate form in accordance with Article 4; the emission limitation requirements specified for chlorine compounds in Annex 1 Number 6 and those specified for organic substances in Annex 1 Number 7 do not apply.

5 The foregoing is without prejudice to the special requirements for installations specified in Number 523.

523 Special requirements for boilers

Hand-stoked boilers with a rated heat output of up to 500 kW must be fitted with a heat accumulator with a volume of at least 12 litres per litre of the thermal fuel storage bin. The volume must not be less than 55 litres per kW of rated heat output.

86 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

2 Automatic boilers with a rated heat output of up to 500 kW must be fitted with a heat accumulator with a volume of at least 25 litres per kW of rated heat output. The foregoing does not apply to wood pellet boilers with a rated thermal input of up to 70 kW.

2bis In the case of boilers with a rated heat output of over 500 kW, the authority shall specify the accumulator volume. If these boilers are used to heat rooms or water, they must be fitted with a heat accumulator with a volume of at least 25 litres per kW of rated heat output.

3 In derogation from paragraphs 1, 2 and 2bis, the authority may specify a smaller accumulator volume if.

a. two or more individual installations as are operated as a single operating unit in order to cover a variable heat or steam requirement in changing situations;

b. this is appropriate for technical or operational reasons

524 Measurement and control

1 Series-produced local space heaters in accordance with Number 22 letter f are exempted from an acceptance measurement provided that it is confirmed by means of a declaration of conformity under Article 7 of the Energy Efficiency Ordinance of 1 November 2017[87] (EnEO) that the installation meets the requirements set out in Annex 1.19 EnEO.

2 Local space heaters in accordance with Number 22 letter f that are produced by craftsmen are exempted from an acceptance measurement if:

a. they have been constructed according to a recognised calculation procedure, in particular the tiled stove calculation program of the feusuisse association; or

b. they are equipped with a dust removal system that corresponds to the best available technology, in particular the requirements of the VDI 3670 technical standard[88] (waste gas cleaning – downstream dust control devices for small-sized solid fuel combustion systems).

3 Historic stoves that are worthy of protection up to volume of 0.4 m^3 and cookers produced by craftsmen are also exempted from the acceptance measurement if they were built according to the recognised rules of combustion technology or are equipped with a dust removal system in accordance with paragraph 2 letter b.

4 In the case of boilers with a rated thermal input of up to 70 kW that are operated with wood fuels as specified in Annex 5 Number 31 paragraph 1 letters a, b or d letter 1, solid emissions need not be measured in the regular control of combustion installations.

5 The FOEN shall recommend suitable measurement and assessment methods.

6 In the case of local space heaters that under Number 22 letter f do not require regular measurements, the authority shall in particular check combustion residues and the

87 SR **730.02**

88 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

condition of the installation. It shall on the first occasion provide information on how to use the installation properly and on how to use and store thermal fuels.

525 Requirements for dust removal systems

In the case of dust removal systems for installations with a rated thermal input of over 70 kW, uptime must normally amount to at least 90 per cent. Uptime is determined on the basis of the installation's service life.

6 Gas-fired installations

61 Emission limit values

Emissions from combustion installations operating on gaseous fuels must not exceed the following limit values:

Combustion installations for gaseous fuels	
– Reference value: The limit values are based on a flue gas oxygen content of	3% (v/v)
– Carbon monoxide (CO):	100 mg/m^3
– Nitrogen oxides (NO_x), expressed as nitrogen dioxide (NO_2): a. luminous radiant and tube radiant heaters b. installations with a heating medium temperature of over 110 °C c. Other installations	 200 mg/m^3 110 mg/m^3 80 mg/m^3
– Ammonia and ammonium compounds, expressed as ammonia[1]	30 mg/m^3

1 *Note:* This emission limitation requirement is only relevant for combustion installations fitted with a denitrification system.

2 In derogation from paragraph 1, emissions from installations of over 50 MW must not exceed the following values:

a. Dust
   1. when operated using gaseous fuels as specified in Annex 5 Number 41 paragraph 1 letters b–e: 10 mg/m^3
   2. when operated using gaseous fuels as specified in Annex 5 Number 41 paragraph 1 letter a: 5 mg/m^3

b. Sulphur oxides, expressed as sulphur dioxide
   1. when operated using gaseous fuels as specified in Annex 5 Number 41 paragraph 1 letters a and c–e: 35 mg/m^3
   2. when operated using gaseous fuels as specified in Annex 5 Number 41 paragraph 1 letter b: 5 mg/m^3

c. Nitrogen oxides (nitrogen monoxide and nitrogen dioxide), expressed as nitrogen dioxide: 100 mg/m^3

62 Additional provisions concerning nitrogen oxide emissions

1 The authorities may specify less stringent limit values for combustion installations with a heating medium temperature of more than 150 °C in cases where compliance with the limit value of 110 mg/m^3 specified for nitrogen oxides in Number 61 is not technically or operationally feasible, or is economically unacceptable. However,

emissions of nitrogen oxides, expressed as nitrogen dioxide, must not exceed 200 mg/m^3.

2 Notwithstanding the provisions of Number 61, the limit values for nitrogen oxides specified in Annex 3 Number 411 apply to gas-fired installations operating on gaseous fuels as specified in Annex 5 Number 41 letters b, d and e.

3 The emission limit values specified for nitrogen oxides in Annex 1 Number 6 and in Annex 3 Number 61 do not apply to gas-fired instantaneous water heaters and gas-fired storage water heaters; preventive emission control measures shall not be ordered in accordance with Article 4.

63 Energy requirements

1 The flue gas losses from furnaces and boilers must not exceed the following limit values:

a.	For forced draught burners with single-stage operation and for gas burners	7%
b.	For forced draught burners with two-stage operation:	
	1. during first-stage operation	6%
	2. during second-stage operation	8%

1bis Flue gas losses from boilers used to heat rooms or water that are commissioned from 1 January 2019 must not exceed 4 per cent.

2 The authorities may specify less stringent limit values for furnaces and boilers where the shut-off temperature of the safety temperature limiter exceeds 110 °C and where compliance with the requirements specified in paragraph 1 is not technically or operationally feasible, or is economically unacceptable.

7 Combustion installations for liquid fuels as specified in Annex 5 Number 13

1 The requirements specified in Number 41 apply to combustion installations which operate on liquid fuels as specified in Annex 5 Number 13.

2 Fuels as specified in Annex 5 Number 13 may only be used in installations with a rated thermal input of less than 350 kW if:

a. they meet the quality requirements of an official standard;

b. it is proven on the basis of an officially supervised measurement programme that the relevant requirements have been met for combustion in planned type of installation.

8 Multi- and mixed-fuel combustion installations

81 Multi-fuel combustion installations

If a single installation operates alternately on different kinds of fuel, the emission limitation requirements are determined by the fuel used in each case.

82 Mixed-fuel combustion installations

[1] If different kinds of fuel are burned at the same time in a single installation, the emission concentrations must not exceed the composite limit value.

[2] The composite limit value is calculated according to the following formula:

$$G_m = G_1 \times \frac{E_1}{E_{tot}} + G_2 \times \frac{E_2(21-B_1)}{E_{tot}(21-B_2)} + ... + G_n \times \frac{E_n(21-B_1)}{E_{tot}(21-B_n)}$$

where:

G_m	=	composite limit value based on the oxygen content B_1
$G_1, G_2 ... G_n$	=	emission limit value for the various fuels[89]
$E_1, E_2 ... E_n$	=	energy supplied per hour by the individual fuels
E_{tot}	=	$E_1 + E_2 + ... E_n$
$B_1, B_2 ... B_n$	=	reference value (oxygen content on which the emission limit value for the first, second and subsequent fuels is based)

[3] To calculate the relevant sulphur emission ratio, the method described in paragraph 2 shall be adopted *mutatis mutandis*.

89 *Note*: The following shall be taken as the emission limit values for sulphur dioxides:
a. for «extra light» heating oil:
G = 330 mg/m^3, based on a flue gas oxygen content of 3% (v/v);
b. for gas:
G = 38 mg/m^3, based on a flue gas oxygen content of 3% (v/v).

Annex 4[90]
(Art. 3 para. 2 let. c)

Requirements for construction machines and particle filter systems, and machines and equipment with internal combustion engines

1 Scope

The provisions of this Annex apply construction machines and particle filter systems as specified in Article 19*a* and machines and equipment with internal combustion engines as specified in Article 20*b*.

2 …

3 Air pollution control requirements for construction machines and particle filter systems

31 Requirements for construction machines

[1] Emissions from construction machines must comply with the relevant requirements corresponding to the year of manufacture for non-road mobile machinery in accordance with Directive 97/68/EC[91].

[2] In addition, exhaust emissions from construction machines must not exceed the particle count of 1×10^{12} 1/kWh for solid particles with a diameter greater than 23 nm, determined in accordance with the best available technology, specifically the UNECE Particle Measurement Programme[92] and the test cycles specified in Directive 97/68/EC.

[2bis] The requirements specified in paragraphs 1 and 2 are deemed to have been met if the construction machine meets the requirements of Annex II of Regulation (EU) No 2016/1628[93].

90 Amended by No II of the O of 23 June 2004 (AS **2004** 3561). Revised by No II of the O of 4 July 2007 (AS **2007** 3875), of 19 Sept. 2008 (AS **2008** 4639), of 22 Oct. 2008 (AS **2008** 5163), the O of 18 June 2010 (AS **2010** 2965), No I and II of the O of 14 Oct. 2015 (AS **2015** 4171), No III 1 of the O of 22 June 2016 (AS **2016** 2479), No II of the O of 11 April 2018 (AS **2018** 1687), No I of the O of 12 Feb. 2020 (AS **2020** 793) and No II of the O of 20 Oct. 2021, in force since 1 Jan. 2022 (AS **2021** 632). See also the transitional provisions to the Amendments of 4 July 2007 and 19 Sept. 2008 above.

91 OJ L 59 of 27.02.1998, p. 1; last amended by Directive 2012/46/EU, OJ L 353 of 06.12.2012, p. 80.

92 UNECE Regulation No 49 of 15 Apr. 1982 on uniform provisions concerning the measures to be taken against the emission of gaseous and particulate pollutants from compression ignition engines for use in vehicles and the emission of gaseous pollutants from positive ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles; last amended by the 04 series of amendments, addendum 8, in force since 22 Jan. 2015, Annex 4C, Particle Number Measurement Test Procedure. Available from: www.unece.org. This regulation May be viewed free of charge at the Federal Office for the Environment, Worblentalstr. 68, 3063 Ittigen.

93 See footnote to Art. 19*b* para. 1[bis].

3 The requirements specified in paragraph 2 are deemed to be complied with if the construction machine is operated with a particle filter system which meets the requirements specified in Number 32.

32 Requirements for particle filter systems

1 Particle filter systems for construction machines must:

a. filter 97 % of solid particles with a diameter of 20–300 nm when new and after 1000 hours of operation in a typical application (endurance test);

b. filter 90 % of solid particles during regeneration;

c. have an electronic on board control unit which records pressure losses that could compromise function and issues an alarm, and which switches off additive dosage in the event of filter damage;

d. have an opacity coefficient of less than 0.15 m^{-1} during free acceleration of the engine;

e. be designed in such a way that it is impossible for the filter element to be installed in the reverse direction;

f. be supplied with cleaning and maintenance instructions;

g. be operated without additives containing copper or catalytic coatings containing copper in the exhaust treatment system; and

h. limit the secondary emissions arising during operation as far as is technically and operationally feasible and economically acceptable.

2 The measurement methods and test procedures shall be based on the best available technology, specifically in accordance with SN 277206[94] or UNECE Regulation No 132[95].

33 Markings

1 The manufacturers or importers shall affix to each construction machine and particle filter system a readily visible, durable and clearly legible data plate/label including the following details:

a. name of the manufacturer or importer;

b. serial number;

c. type designation;

d. name of the conformity assessment body, if assessment is a requirement.

94 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

95 UNECE Regulation No 132 of 17 June 2014 on uniform provisions concerning the approval of Retrofit Emission Control devices (REC) for heavy duty vehicles, agricultural and forestry tractors and non-road mobile machinery equipped with compression ignition engines; revised by the 01 series of amendments, in force since 22 Jan. 2015 (Add.131 Rev.1). Available from: www. unece.org. This regulation May be viewed free of charge at the Federal Office for the Environment, Worblentalstr. 68, 3063 Ittigen.

2 The data plate/label of construction machines shall also include the following details:

a. year of manufacture of the construction machine;

b. engine output in kW;

c. type designation of the particle reduction system.

3 If a construction machine placed on the market is retrofitted with a particle filter system, the person installing this system shall affix to the construction machine a data plate/label including the details specified in paragraphs 1 and 2.

4 Construction machines with engines on the list of engine families in conformity with Article 19*b* paragraph 2 do not require a data plate/label on the particle filter system.

34 Exhaust emission maintenance and inspections

1 The holder or operator of a construction machine must carry out exhaust emission maintenance or have such maintenance carried out at least every 24 months. It must retain the results of the exhaust emission maintenance for at least two years and present it to the authorities on request.

2 Construction machines need not be inspected periodically in accordance with Article 13 paragraph 3. The authority shall carry out random checks of the results of exhaust emission maintenance. If there is any suspicion of excessive solid particle emissions, it may order further exhaust emission maintenance.

4 Air pollution control requirements for machines and equipment with internal combustion engines

41 Requirements for machines and equipment with internal combustion engines

1 The internal combustion engines of machines and equipment must meet the relevant requirements of Regulation (EU) No 2016/1628[96].

2 The emission limitation requirements specified in Annex 1 do not apply.

42 Exhaust emission maintenance and inspections

1 The holder or operator of a construction machine must carry out exhaust emission maintenance or have such maintenance carried out at least every 24 months. It must retain the results of the exhaust emission maintenance for at least two years and present it to the authorities on request. The FOEN shall issue recommendations.

2 Machines and equipment with internal combustion engines need not be inspected periodically in accordance with Article 13 paragraph 3. The authority shall carry out random checks of the results of exhaust emission maintenance. If there is any suspicion of excessive solid particle emissions, it may order further exhaust emission maintenance.

96 See footnote to Art. 19*b* para. 1[bis].

Annex 5[97]
(Art. 21 and 24)

Requirements for thermal and motor fuels

1 Heating oils and other liquid fuels

11 Definitions

1 «Extra light» heating oil comprises «Euro extra-light» heating oil and «eco extra-light» heating oil.

2 Untreated vegetable oils and vegetable oil methyl esters that meet the requirements of standard SN EN 14214 (Liquid petroleum products – fatty acid methyl esters (FAME) for use in diesel engines and heating applications – requirements and test methods)[98] are deemed to be equivalent to «eco extra-light» heating oil.

11bis Sulphur content of heating oils

The sulphur content of:

a. «Euro extra-light» heating oil must not exceed 0.1 per cent (*% m/m*);

b. «eco extra-light» heating oil must not exceed 0.005 per cent (*% m/m*);

c. «medium» and «heavy» fuel oil must not exceed 2.8 per cent (*% m/m*).

12 Additional requirements for heating oils

1 Additives containing halogen or heavy metal compounds (except iron compounds) must not be added to heating oils.

2 In addition, additives containing substances such as magnesium compounds which distort the results of smoke number measurement in the control of oil-fired installations must not be added to «extra light» heating oil.

3 Waste oils must not be added to heating oils.

13 Other liquid fuels

131 Definition

Other liquid fuels means liquid organic compounds which can be combusted like «extra light» heating oil and meet the requirements specified in Number 132.

132 Requirements

97 Revised by No II of the O of 20 Nov. 1991 (AS **1992** 124), No I of the O of 25 Aug. 1999 (AS **1999** 2498), No II of the O of 23 June 2004 (AS **2004** 3561), of 4 July 2007 (AS **2007** 3875), of 19 Sept. 2008 (AS **2008** 4639), of 18 June 2010 (AS **2010** 2965), of 14 Oct. 2015 (AS **2015** 4171), No I of the O of 3 March 2017 (AS **2017** 715), No II of the O of 11 April 2018 (AS **2018** 1687) and No I of the O of 12 Feb. 2020, in force since 1 April 2020 (AS **2020** 793). See also the Transitional Provisions of the Amendment of 19 Sept. 2008 above.

98 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

1 During combustion, other liquid fuels must not produce higher or other pollutant emissions than is the case with «extra light» heating oil.

2 The content of pollutants in the fuel must not exceed the following limit values:

Ash	50 mg/kg
Chlorine	50 mg/kg
Barium	5 mg/kg
Lead	5 mg/kg
Nickel	5 mg/kg
Vanadium	10 mg/kg
Zinc	5 mg/kg
Phosphorus	5 mg/kg
Polychlorinated aromatic hydrocarbons (e.g. PCBs)	1 mg/kg

3 In derogation from paragraph 2, for liquid biogenic fuels the following values apply for ash and phosphorus:

Ash	100 mg/kg
Phosphorus	20 mg/kg

133 Relation to Annex 2 Number 71

Other liquid organic compounds which do not meet the requirements specified in Number 132 shall be regarded as special waste.

2 Coal, coal briquettes and coke

The sulphur content of coal, coal briquettes and coke must not exceed 3.0 % (m/m).

3 Wood fuels

31 Definition

1 *Wood fuels* means:

a. untreated wood, in pieces, including attached bark, especially chopped firewood, wood briquettes, brushwood and cones, and unused sections of solid wood produced solely by mechanical processing;

b. untreated wood, not in pieces, especially wood pellets, chips, shavings, sawdust, sander dust and bark;

c. wood residues from the wood-processing industry an the woodworking trade, provided the wood is painted, coated, glued or treated in a similar way; the foregoing does not apply to wood that is pressure-impregnated or has halogenated organic compounds in the coating.

d. untreated waste wood in the form of:

1. fence posts, beanpoles and other items made of solid wood used in horticulture or agriculture,

2. disposable pallets made of solid wood.

2 Wood fuels do not include:

a. waste wood from demolition, conversion or renovation work, waste residues from construction sites, used wooden furniture and waste wood from packaging including pallets, with the exception of disposable pallets in accordance with paragraph 1 letter d number 2, or mixtures thereof with wood fuels as specified in paragraph 1;

b. any other wooden materials, such as:

1. waste wood or wood waste which has been pressure-impregnated with wood preservatives or treated with coatings containing halogenated organic compounds;

2. wood waste or waste wood intensively treated with wood preservatives such as pentachlorophenol;

3. such waste mixed with wood fuels as specified in paragraph 1 or with waste wood as specified in letter a.

32 Requirements for wood pellets and briquettes

Wood pellets and briquettes that are untreated wood in accordance with Number 31 paragraph 1 letters a and b may only be commercially imported or placed on the market if:

a. the wood pellets meet the requirements of Standard SN EN ISO 17225-2 (Solid Biofuels - Fuel Specifications and Classes - Part 2: classification of wood pellets)[99] for Class A1 or A2 or are of an equivalent quality;

b. the wood briquettes meet the requirements of Standard SN EN ISO 17225-3 (Solid Biofuels - Fuel Specifications and Classes - Part 3: classification of wood briquettes)[100] for Class A1 or A2 or are of an equivalent quality.

4 Gaseous fuels

41 Definition

1 *Gaseous fuels* means:

a. natural gas, petroleum gas or coal gas which is fed into a public gas distribution grid;

b. liquid gas consisting of propane and/or butane;

c. hydrogen;

99 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

100 This standard may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

d. gases similar to natural gas, petroleum gas or coal gas, such as biogas obtained from the gasification of wood fuels specified in Number 31 paragraph 1 letter a, b or d Number 1 or sewage treatment gases;

e. landfill gases, provided the total content of inorganic and organic chlorine and fluorine compounds, expressed as hydrogen chloride and hydrogen fluoride, does not exceed 50 mg/m^3.

2 All other gases shall be regarded as waste gases, which must meet the requirements specified in Annex 2 Number 71 during combustion. This also applies in particular to landfill gases which do not meet the requirements specified in paragraph 1 letter e.

42 Requirements

The sulphur content of gases as specified in Number 41 letters a and b must not exceed 190 mg/kg.

5 Petrols

1 Petrol may only be imported or placed on the market if it complies with the following requirements:

Property	Unit	Minimum value[a]	Maximum value[a]	Test method[b]
Petrol				
– Research octane number, *RON*		95.0[c]	–	EN ISO 5164
– Motor octane number, *MON*		85.0[c]	–	EN ISO 5163
– Vapour pressure (DVPE):				EN 13016-1
– Six summer months	kPa	–	60.0[d]	
– Distillation characteristics:				EN ISO 3405
– evaporated at 100 °C	% *(V/V)*	46.0	–	
– evaporated at 150 °C	% *(V/V)*	75.0	–	
– Determination of hydrocarbon types:				
– Olefins	% *(V/V)*	–	18.0	EN 15553, EN ISO 22854
– Aromatics	% *(V/V)*	–	35.0	EN 15553, EN ISO 22854
– Benzene	% *(V/V)*	–	1.00	EN 12177, EN 238, EN ISO 22854
– Oxygen content	% *(m/m)*	–	3.7	EN 1601, EN 13132, EN ISO 22854
– Oxygenates content:				EN 1601, EN 13132, EN ISO 22854
– Methanol	% *(V/V)*	–	3.0	
– Ethanol	% *(V/V)*	–	10.0	
– Isopropyl alcohol	% *(V/V)*	–	12.0	
– *tert*-Butyl alcohol	% *(V/V)*	–	15.0	
– Isobutyl alcohol	% *(V/V)*	–	15.0	
– Ethers (containing 5 or more carbon atoms)	% *(V/V)*	–	22.0	

Property	Unit	Minimum value[a]	Maximum value[a]	Test method[b]
– Other oxygenates[e]	% *(V/V)*	–	15.0	
– Sulphur content	mg/kg	–	10.0	EN ISO 20846, EN ISO 20884
– Lead content	mg/l	–	5.0	EN 237

Notes:

a The test results are to be assessed in accordance with EN ISO 4259 «Petroleum products – Determination and application of precision data in relation to methods of test».

b The following (joint) standards are applicable for testing:
– EN: standard issued by the European Committee for Standardization (CEN)
– ISO: standard issued by the International Organization for Standardization (ISO).
These standards may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

c For regular petrol, notwithstanding the values given in this Table, the RON must be at least 91 and the MON at least 81.

d Applies to petrols used between 1 May and 30 September.

e Other monoalcohols and ethers having a boiling point not greater than 210 °C

1bis If bioethanol is added to petrol, the following deviations from the maximum vapour pressure of 60.0 kPa specified in paragraph 1 are permissible during the six summer months, until 30 September 2025:

Bioethanol content	% *(V/V)*	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
Maximum permissible deviation[a]	kPa	3.7	6.0	7.2	7.8	8.0	8.0	7.9	7.9	7.8	7.8

Notes:

a Intermediate values are obtained by linear interpolation between the value immediately above and the value immediately below the bioethanol content.

2 Aviation petrol shall only be imported or placed on the market if the lead content does not exceed 0.56 g/L and the benzene content does not exceed 1 % (*V/V*). Aviation petrol placed on the market shall be dyed blue.

6 Diesel oil

Diesel oil shall only be imported or placed on the market if it complies with the following requirements:

Property	Unit	Minimum value[a]	Maximum value[a]	Test method[b]
Diesel oil				
– Cetane number		51.0[c]	–	EN ISO 5165, EN 15195, EN 16144, EN 16715
– Density at 15°C	kg/m^3	–	845.0	EN ISO 3675, EN ISO 12185
– Distillation characteristics: 95 % (*V/V*) recovered at	°C	–	360	EN ISO 3405, EN ISO 3924
– Polycyclic aromatic hydrocarbons	% (*m/m*)	–	8.0	EN 12916

Property	Unit	Minimum value[a]	Maximum value[a]	Test method[b]
– Sulphur content	mg/kg	–	10.0	EN ISO 20846, EN ISO 20884, EN ISO 13032

Notes:

[a] The test results are to be assessed in accordance with EN ISO 4259 «Petroleum products – Determination and application of precision data in relation to methods of test».

[b] The following (joint) standards apply to testing:
- EN: standard issued by the European Committee for Standardization (CEN)
- ISO: standard issued by the International Organization for Standardization (ISO) These standards may be viewed free of charge or obtained for a fee from the Swiss Association for Standardisation, Sulzerallee 70, 8404 Winterthur; www.snv.ch.

[c] For winter qualities, the cetane number, notwithstanding the value given in this Table, must at least satisfy the requirements of SN EN 590.

Annex 6[101]
(Art. 6 para. 3)

Minimum stack height

1 Scope

The provisions of this Annex apply to installations for which the quantity Q/S exceeds 5, where:

Q = mass flow of the emitted air pollutant in grams per hour;

S = value calculated in accordance with Number 9.

2 Calculation method

[1] The required physical stack height is calculated step by step in accordance with Numbers 3 to 6.

[2] If more than one air pollutant is emitted, the physical stack height is calculated on the basis of the pollutant for which the quantity Q/S has the highest value.

3 Parameter H_0

31 Determination of H_0 according to Diagram 1

[1] The parameter H_0 takes account of the short-term effects of the air pollutants emitted from a single installation. It is determined with the aid of Diagram 1.

[2] The quantities Q and F depend on the emission conditions at the installation. The full load values and the fuel/emission conditions most conducive to air pollution are used to calculate H_0.

[3] The quantity S is used to limit the maximum short-term ambient air pollution levels caused by the installation to a specific value (S value). The S values specified in Number 9 are used to calculate H_0.

32 Determination of H_0 in individual cases

[1] The parameter H_0 is determined in individual cases according to the recognised rules for calculating the stack height and the dispersion of flue gases if:

a. the Q/S or F values lie outside Diagram 1; or

b. the flue gas temperature is less than 55 °C.

[2] However, where flue gas temperatures are below 55 °C, the parameter H_0 must not be lower than the value which is obtained according to Diagram 1 for a temperature of 55 °C.

101 Revised by No II of the O of 15 Dec. 1997, in force since 1 March 1998 (AS **1998** 223).

4 Minimum height for flat, obstacle-free terrain

[1] The stack height for flat, obstacle-free terrain is:
$H_1 = f \times H_0$
The correction factor f takes account of long-term effects due to wind channelling.

[2] Values between 1.0 and 1.5 are used for f as follows:

f = 1.00 for sites with no prevailing wind direction;

f = 1.25 for sites with average conditions;

f = 1.50 for valleys with pronounced wind channelling.

[3] Intermediate values are also possible for f, depending on the site conditions.

5 Height increase for buildings and vegetation

Elevated objects (buildings and vegetation) in the vicinity of the stack are taken into account by means of a height increase I_1:

$I_1 = g \times I$

where:

I = Height of the highest significant obstacle area in the region affected by the installation. Values between 0 (no obstacles) and 30 m (e.g. forest) are used for I.

g = Correction factor, with values between 0 and 1 according to Diagram 2.

6 Physical stack height

The physical stack height H is calculated according to the following formula:

$H = H_1 + I_1$

7 More stringent requirements

In justified cases, the authorities will require taller stacks, for example, in the case of:

a. structures with particular shapes;

b sites with particularly poor meteorological dispersion conditions;

c. particular topographical conditions, such as narrow valleys, hillsides or depressions.

8 Symbols

H (m) = Physical stack height

H_0 (m) = Parameter for determination of H_1

H_1 (m) = Minimum stack height for flat, obstacle-free terrain
I (m) = Height of the highest significant obstacle area
I_1 (m) = Height increase for buildings and vegetation
f (–) = Correction factor for long-term effects due to wind channelling
g (–) = Correction factor for buildings and vegetation
Q (g/h) = Mass flow of the emitted air pollutant; emissions of nitrogen oxides (nitrogen monoxide and nitrogen dioxide) are expressed as nitrogen dioxide
R_n (m^3/h) = Volume flow of the flue gas under standard conditions (0 °C, 1013 mbar)
t (°C) = Flue gas temperature at the stack outlet
Δt (°C) = t–10 °C
F (m^4/s^3) = Lift flux; $F = 3.18 \times 10^{-6} \times R_n \times \Delta t$
S (µg/m^3) = S value (cf. Numbers 3 and 9)

9 S values

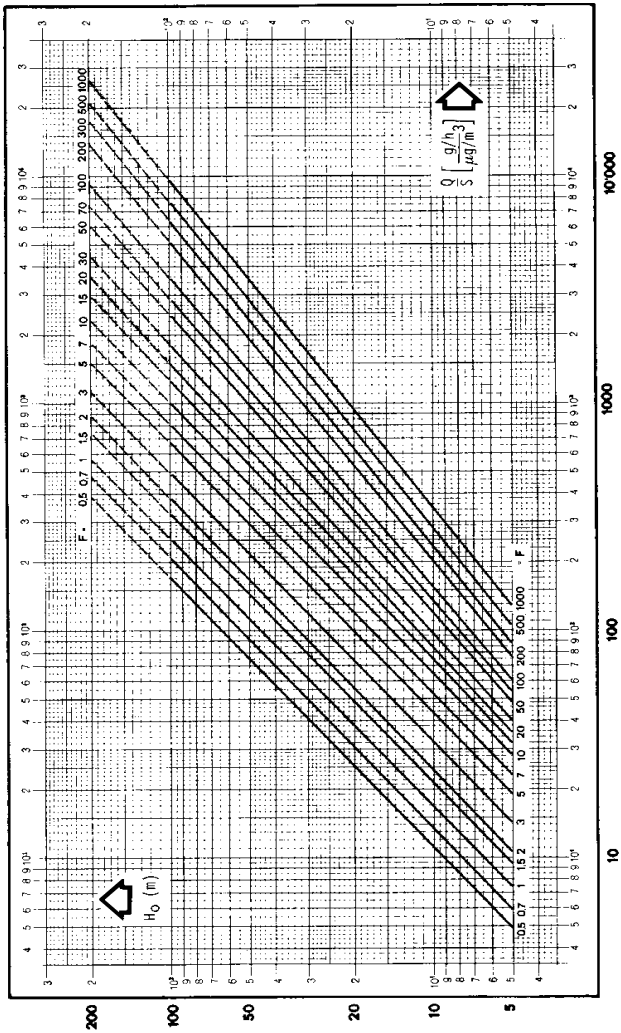
Pollutant	S (µg/m^3)
Suspended particulates (PM10)[1]	50
Hydrogen chloride, expressed as HCl	100
Chlorine	150
Hydrogen fluoride and inorganic gaseous fluorine compounds, expressed as HF	1
Carbon monoxide	8000
Sulphur oxides, expressed as sulphur dioxide	100
Hydrogen sulphide	5
Nitrogen oxides, expressed as nitrogen dioxide	100
Substances listed in Annex 1 Number 5:	
– Class 1	0.5
– Class 2	2
– Class 3	5
Substances listed in Annex 1 Number 7:	
– Class 1	50
– Class 2	200
– Class 3	1000
Substances listed in Annex 1 Number 8:	
– Class 1	0.1

Pollutant	S (µg/m³)
– Class 2	1
– Class 3	10

1 Fine particulate matter with an aerodynamic diameter of less than 10 µm.

Determination of the parameter H_0 for stacks

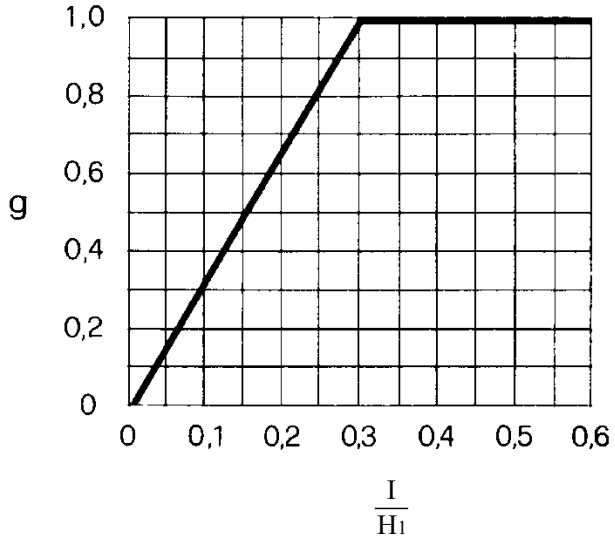
Diagram 1



$F = 3{,}18 \times 10^{-4} \times R_n \times \Delta t \qquad \Delta t = t - 10\,°C$

Determination of the correction factor for buildings and vegetation

Diagram 2



I = Height of the highest significant obstacle area (Number 5)

H_1 = Minimum stack height for flat, obstacle-free terrain (Number 4)

Annex 7[102]
(Art. 2 para. 5)

Ambient limit values for air pollutants

Pollutant	Ambient air limit value	Statistical definition
Sulphur dioxide (SO_2)	30 µg/m³	Annual average (arithmetic mean)
	100 µg/m³	95% of half-hour means for one year ≤ 100 µg/m³
	100 µg/m³	24-hour mean; must not be exceeded more than once per year
Nitrogen dioxide (NO_2)	30 µg/m³	Annual average (arithmetic mean)
	100 µg/m³	95% of half-hour means for one year ≤ 100 µg/m³
	80 µg/m³	24-hour mean; must not be exceeded more than once per year
Carbon monoxide (CO)	8 mg/m³	24-hour mean; must not be exceeded more than once per year
Ozone (O_3)	100 µg/m³	98% of half-hour means for one month ≤ 100 µg/m³
	120 µg/m³	1-hour mean; must not be exceeded more than once per year
Suspended particulates (PM10)[1]	20 µg/m[a]	Annual average (arithmetic mean)
	50 µg/m³	24-hour mean; must not be exceeded more than once per year
Suspended particulates[b] (PM2.5)[b]	10 µg/m³	Annual average (arithmetic mean)
Lead (Pb) in PM10	500 ng /m³	Annual average (arithmetic mean)

[102] Amended by No II of the O of 14 Oct. 2015(AS **2015** 4171). Revised by No II of the O of 11 April 2018, in force since 1 June 2018 (AS **2018** 1687).

Pollutant	Ambient air limit value	Statistical definition
Cadmium (Cd) in PM10	1.5 ng/m^3	Annual average (arithmetic mean)
Total dust deposition	200 mg/m^2 × day	Annual average (arithmetic mean)
Lead (Pb) in dust fallout	100 µg/m^2 × day	Annual average (arithmetic mean)
Cadmium (Cd) in dust fallout	2 µg/m^2 × day	Annual average (arithmetic mean)
Zinc (Zn) in dust fallout	400 µg/m^2 × day	Annual average (arithmetic mean)
Thallium (Tl) in dust fallout	2 µg/m^2 × day	Annual average (arithmetic mean)

Notes:
mg = milligram: 1 mg = 0.001 g
µg = microgram: 1 µg = 0.001 mg
ng = nanogram: 1 ng = 0.001 µg
d = day
The sign ≤ means «less than or equal to».

[a] Fine particulate matter with an aerodynamic diameter of less than 10 µm.

[b] Fine particulate matter with an aerodynamic diameter of less than 2.5 µm.

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