



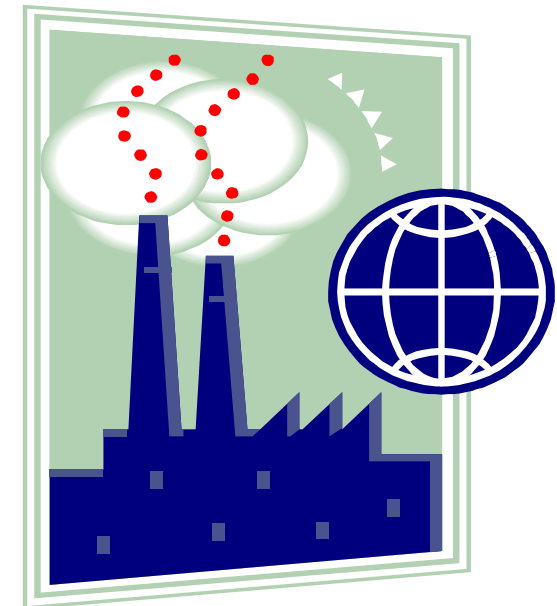
WASTE INCINERATION DIRECTIVE 2000/76/EC

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AIM OF THE DIRECTIVE

- † "to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks of human health, from the incineration and co-incineration of waste"



HOW THE AIM IS REACHED?

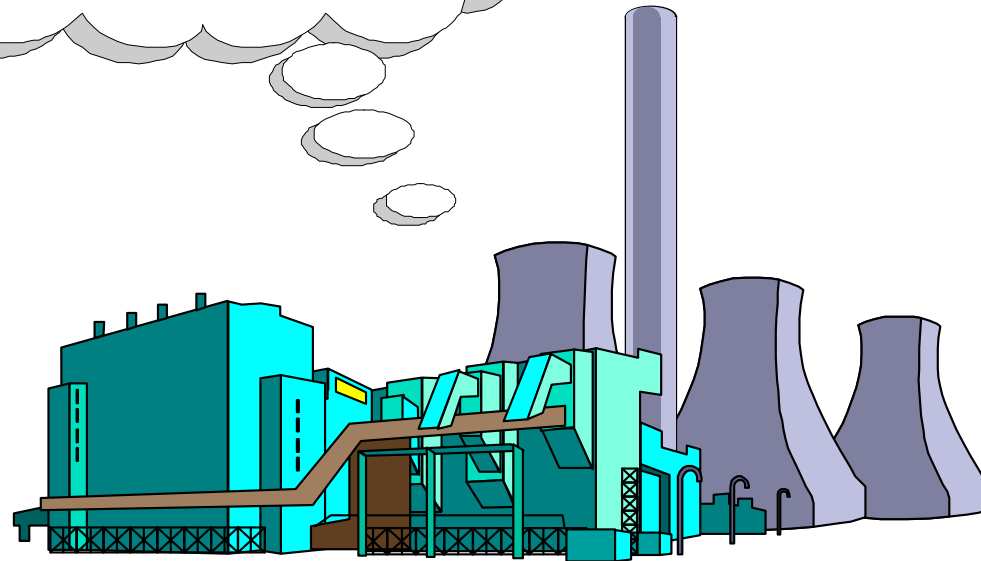
- ➔ STRINGENT OPERATIONAL CONDITIONS AND TECHNICAL REQUIREMENTS
- ➔ SETTING OF EMISSION LIMIT VALUES

OPERATING CONDITIONS...

- t TEMPERATURE AT LEAST 850 °C
- t IF HAZARDOUS WASTE CONTAINS MORE THAN 1 % OF HALOGENATED ORGANIC SUBSTANCES => TEMPERATURE 1 100 °C
- t RESIDENCE TIME AT LEAST 2 SECONDS

EMISSIONS

NO_x, SO₂, PAH, VOC,
dioxins, particulates....



REQUIREMENTS SET FOR EMISSION MEASUREMENTS IN WASTE INCINERATION DIRECTIVE

- demand for continuous emission monitoring
- prove the “quality” of the emission measurement results

=> results are reliable

=> criteria for the emission measurement uncertainty is set for the first time in directives

Waste incineration directive 2000/76/EC

- † Continuous measurement for:
 - NO_x
 - CO
 - total dust
 - TOC (total organic carbon)
 - HCl
 - HF
 - SO₂
- † Continuous measurement for: oxygen, p, T and water vapour content
- † At least two measurements per year of heavy metals and dioxins and furans

Waste incineration directive 2000/76/EC (Annex III)

- † Measurements shall be carried out representatively
- † *"Sampling and analysis of all pollutants including dioxins and furans as well as reference methods to calibrate automated measurement systems shall be carried out as given by CEN-standards. If CEN-standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply."*

AIR EMISSION LIMIT VALUES FOR INCINERATION PLANTS

† Daily average values (standardised to 11 % O₂):

<i>Total dust</i>	<i>10 mg/m³</i>
<i>Total organic carbon</i>	<i>10 mg/m³</i>
<i>Hydrogen chloride(HCl)</i>	<i>10 mg/m³</i>
<i>Hydrogen fluoride (HF)</i>	<i>1 mg/m³</i>
<i>Sulphur dioxide (SO₂)</i>	<i>50 mg/m³</i>
<i>Nitrogen dioxide (NO₂)</i> <i>- capacity > 6 tons, or new plant</i>	<i>200 mg/m³</i>
<i>Nitrogen dioxide (NO₂)</i> <i>- capacity < 6 tons, or existing plant</i>	<i>400 mg/m³</i>

Waste incineration directive 2000/76/EC (Annex III)

† *At the daily emission limit value level, the values of the 95 % confidence intervals of a single measured result shall not exceed the following percentages of the ELV:*

<i>Carbon monoxide (CO)</i>	<i>10 %</i>
<i>Sulphur dioxide (SO₂)</i>	<i>20 %</i>
<i>Nitrogen dioxide (NO₂)</i>	<i>20 %</i>
<i>Total dust</i>	<i>30 %</i>
<i>Total organic carbon</i>	<i>30 %</i>
<i>Hydrogen chloride (HCl)</i>	<i>40 %</i>
<i>Hydrogen fluoride (HF)</i>	<i>40 %</i>

=> this shall be proven with the procedures given in EN14181-standard (QAL2)

Waste incineration directive 2000/76/EC (Annex III)

For example, the maximum measurement uncertainty for dust measurement:

- daily emission limit value = 10 mg/m^3
- criteria for measurement uncertainty < 30 %

$$\Rightarrow 30 \% \times 10 \text{ mg/m}^3 < 3 \text{ mg/m}^3$$

The half-hourly average values and the 10-minute averages shall be determined from the measured values after having subtracted the value of the confidence interval specified in Annex III. The daily average values shall be determined from those validated average values.

RATIFIED CEN EMISSION MEASUREMENT STANDARDS (1)

Reference	Title
EN 1948-1	Dioxines and furans/Part 1: Sampling
EN1948-2	Dioxines and furans/Part 2: Extraction and clean up
EN1948-3	Dioxines and furans/Part 3: Identification and quantifaction
EN1911-1	Gaseous HCl/Part 1: Sampling and gas pretreatment
EN1911-2	Gaseous HCl/Part 2: Gaseous compund absorption
EN1911-3	Gaseous HCl/Part 3: Solution analysis and calculation

RATIFIED CEN EMISSION MEASUREMENT STANDARDS (2)

Reference	Title
EN 12619	Determination of the mass concentration of total gaseous organic carbon at low concentrations in flue gases- Continuous flame ionization detector method
EN 13526	Determination of the mass concentration of total gaseous organic carbon in flue gases from solvent using processes- Continuous flame ionization detector method
EN 13649	Determination of the mass concentration of individual gaseous organic compounds – Activated carbon and solvent desorption methods

RATIFIED CEN EMISSION MEASUREMENT STANDARDS (3)

Reference	Title
EN 13284 -1	Determination of low range mass concentration of dust- Part 1: Manual gravimetric method
EN 13284-2	Determination of low range mass concentration of dust- Part 2: Automated measuring system
EN 13211	Manual method of determination of the concentration of total mercury
EN 14385	Determination of the total emission of As, Cd, Cr, Co, Cu, Mn, Ni, Pb, Sb, Tl and V
EN 14181	Quality assurance of automated measuring systems
EN 14884	Determination of total mercury: Automated measuring systems

RATIFIED CEN EMISSION MEASUREMENT STANDARDS (4)

Reference	Title
EN 14789	Determination of volume concentration of oxygen-Reference method-Paramagnetism
EN 14790	Determination of water vapour in the ducts
EN 14791	Determination of mass concentration of sulphur dioxide-Reference method
EN 14792	Determination of mass concentration of nitrogen oxides-Reference method-Chemiluminescence
EN 15058	Reference method for the determination of carbon monoxide in emission by means of the non-dispersive infrared method

CEN EMISSION MEASUREMENT STANDARDS (*UNDER APPROVAL OR DEVELOPMENT*)

- † Fugitive emissions
- † Emission monitoring strategy
- † Certification scheme for automatic measuring systems
- † Manual and automatic measurement of velocity and volumetric flow in ducts