



THE EUROPEAN UNION'S MEDIUM COMBUSTION PLANT DIRECTIVE - MONITORING AND COMPLIANCE REQUIREMENTS

The European Union's Medium Combustion Plant Directive (MCPD) entered into force in December 2015 and this must be transposed into national legislation within each of the Member States by 19 December 2017. The MCPD applies to existing individual Medium Combustion Plants (MCPs) in the net thermal input range 1 to <50 MWth and new aggregated plants above 1 MWth potentially aggregating to more than 50 MWth (provided that these do not qualify as a Large Combustion Plant under the Industrial Emissions Directive). Emission Limit Values are defined for NO_x, SO₂ and dust for both conventional combustion plants and gas turbines and engines, excluding start-up and shut-down periods. These limits will be applied to new MCPs from 20 December 2018 and to existing MCPs from 1 January 2025 (> 5 MWth) or from 1 January 2030 (1 to 5 MWth).

Periodic monitoring is required annually for MCPs > 20 MWth and three-yearly for smaller MCPs and all pollutants with specified Emission Limit Values and CO must be monitored. Optional exemptions are provided for MCPs that operate for no more than 500 hours per annum, district heating plants and isolated plants in remote locations and for those subject to interruption of their regular fuel supply. However, more stringent requirements can be imposed on MCPs within Air Quality exceedance zones.

There are significant implementation challenges associated with the assessment and demonstration of compliance and also the suitability and scheduling of manual periodic measurements following plant registration or permitting.

Scope of the Medium Combustion Plant Directive

The MCPD nominally applies to Medium Combustion Plants (MCPs) in the thermal input size range ≥ 1 to < 50 MWth. The thermal input is assumed to be based on the net calorific value of the fuel (the lower heating value) in line with other European legislation.

Most stationary combustion plants are in scope of the MCPD, including boilers, engines and turbines, except for Large Combustion Plants (regulated under Chapter III of the Industrial Emissions Directive (IED) and waste incineration plants (regulated under Chapter IV of the IED). Mobile generating units covered by the Non-Road Mobile Machinery Directive are also exempt from scope.

Emission Limit Values (ELVs) are defined for nitrogen oxides (NO_x), sulphur dioxide (SO₂) and dust for solid and liquid fuel fired MCPs (with the exception of gas oil). Only NO_x ELVs are specified for natural gas and gas oil fired MCPs.

A new plant is defined as an MCP that is put into operation on or after 20 December 2018 whilst an existing plant is an MCP operating before that date. ELV compliance is required from 20 December 2018 for a new plant and from 1 January 2025 for an existing plant (> 5 to < 50 MWth) or from 1 January 2030 (≥ 1 to ≤ 5 MWth).

Existing MCPs are regulated as individual units whilst new MCPs are regulated as aggregated units at stack level. As the IED excludes units smaller than 15 MWth when deciding on Large

Combustion Plant (LCP) status, a new MCP, which includes units smaller than 15 MWth, may therefore aggregate to more than 50 MWth without being classed as an LCP.

Any MCP located on an IED regulated site will fall within the scope of the IED general provisions, creating a regulatory overlap; however, it is clear that any MCPs in this category will be permitted under the IED with MCPD emission limit values also applying as a minimum requirement.

Registration or Permitting

MCPs must be either registered or permitted, as determined by each Member State, before first operation for a new MCP, or at least one year prior to the required ELV compliance date for existing MCPs.

Operators must provide the following information when registering or applying for a permit:

- Rated thermal input of the MCP
- Type of MCP: diesel engine; gas turbine; dual fuel engine; other engine or other medium combustion plant
- Type and share of fuels used by fuel category: solid biomass; other solid fuels; gas oil; other liquid fuels; natural gas; other gaseous fuels
- Date of the start of the operation
- Activity sector of the MCP or the facility in which it is applied (NACE code)
- Expected number of annual operating hours and average load in use
- Signed declaration that the MCP will not be operated > 500 hours per annum (if applicable)
- Name and registered office of the operator and the address where the plant is located.

Emission Limits Values (ELVs)

Certain ELV compliance exemptions apply to all classes of MCP. Those located in the Canary Islands, French Overseas Departments, the Azores and Madeira are indefinitely and fully exempted from ELV compliance. Gas fired MCPs that suffer a fuel supply interruption may be exempted when firing alternative fuels

that would require secondary abatement to comply with the applicable ELVs (for ten days interruption unless the operator can demonstrate to the Competent Authority that a longer period is justified). MCPs that normally fire low sulphur fuel may similarly be exempted from their SO₂ ELVs for a maximum of six months if there is an interruption in the supply of low sulphur fuel due to a serious shortage.

In addition to these exemptions, there are a number of other optional exemptions that a Member State may or may not adopt. For existing plants, the main provision is an exemption from ELVs for plants operating ≤ 500 hours per annum, as a rolling average over five years, subject to meeting a dust ELV of 200 mg/m³ for plants firing solid fuels. This may optionally be extended to 1000 hours for heating plants during exceptionally cold weather events.

There are also time limited derogations for Isolated Systems (applicable to island communities), district heating systems and gas compressor stations within national transmission systems noting that, in some cases, less stringent ELVs are imposed.

For new plants, the main optional exemption is again available for plants operating < 500 hours per annum, as a rolling average over three years, subject to meeting a dust ELV of 100 mg/m³ for MCPs firing solid fuels. There is also an optional series of derogations, specifying less onerous NO_x ELVs, for engines operating between 500 and 1500 hours per annum dependent upon engine type and fuelling. This provision for new engines is surprising given that there is no equivalent provision for existing engines.

The most important ELV provisions are described below by technology type.

Gas turbine Emission Limit Values are given in Table 1 for new plants and in Table 2 for existing plants in mg/m³ at 15% O₂, dry, 273K, 101.3 kPa. NO_x ELVs are only applicable over 70% load and there are higher SO₂ ELVs specified for biogas and higher dust ELVs for small MCPs.

Table 1 Gas Turbine ELVs for NEW plants

| | Natural Gas | Other Gaseous | Gas Oil | Other Liquid |
|-----------------|-------------|---------------|---------|--------------|
| NO _x | 50 | 75 | 75 | 75 |
| SO ₂ | - | 15 | - | 120 |
| Dust | - | - | - | 10 |

The time-line for MCPD implementation is shown in the figure.

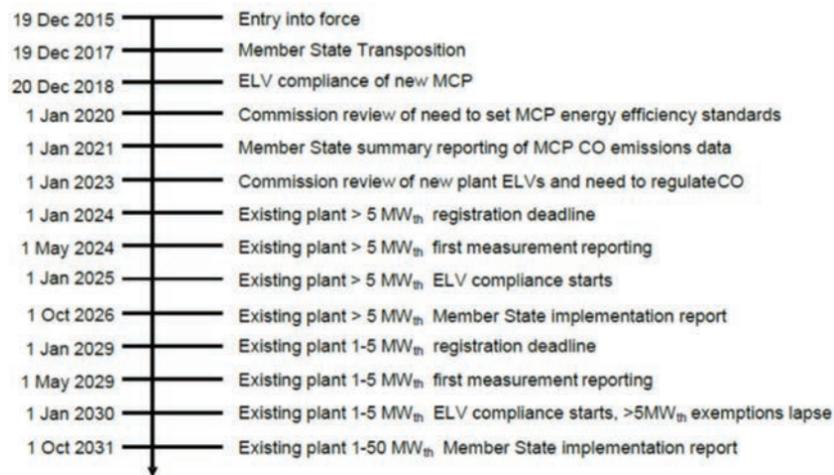


Table 2 Gas Turbine ELVs for EXISTING plants

| | Natural Gas | Other Gaseous | Gas Oil | Other Liquid |
|-----------------|-------------|---------------|---------|--------------|
| NO _x | 150 | 200 | 200 | 200 |
| SO ₂ | - | 15 | - | 120 |
| Dust | - | - | - | 10 |

Combustion plants - other than gas turbines and engines - have Emission Limit Values as shown in Table 3 for new plants and Table 4 for existing plants in mg/m³ at 3% O₂, dry, for natural gas and liquid fuel firing and at 6% O₂, dry at 273K, 101.3 kPa for solid fuels. There are various SO₂ derogations for plants firing woody biomass, straw, biogas, coke oven gas, blast furnace gas and other solid fuels and also for Heavy Fuel Oil (HFO) firing on existing small MCPs until 2030, noting that secondary abatement would be required to meet the HFO ELVs. There are also various dust derogations for existing plants firing biomass, other liquid and other solid fuels.

Table 3 Boiler/Other Combustion Plant ELVs for NEW plants

| | Natural Gas | Other Gaseous | Gas Oil | Other Liquid | Solid Biomass | Other Solid |
|-----------------|-------------|---------------|---------|--------------|---------------|-------------|
| NO _x | 100 | 200 | 200 | 300 | 300 | 300 |
| SO ₂ | - | 35 | - | 350 | 200 | 400 |
| Dust | - | - | - | 20 | 20 | 20 |

Table 4 Boiler/Other Combustion Plant ELVs for EXISTING plants

| ≥ 1 MW _{th} to ≤ 5 MW _{th} | | | | | | |
|--|-------------|---------------|---------|--------------|---------------|-------------|
| | Natural Gas | Other Gaseous | Gas Oil | Other Liquid | Solid Biomass | Other Solid |
| NO _x | 250 | 250 | 200 | 650 | 650 | 650 |
| SO ₂ | - | 200 | - | 350 | 200 | 1100 |
| Dust | - | - | - | 50 | 50 | 50 |

| > 5 MW _{th} to < 50 MW _{th} | | | | | | |
|---|-------------|---------------|---------|--------------|---------------|-------------|
| | Natural Gas | Other Gaseous | Gas Oil | Other Liquid | Solid Biomass | Other Solid |
| NO _x | 200 | 250 | 200 | 650 | 650 | 650 |
| SO ₂ | - | 35 | - | 350 | 200 | 400 |
| Dust | - | - | - | 30 | 30 | 30 |

Engine Emission Limit Values are subject to complex derogations. In broad terms, the NO_x ELVs for new plants are 95 mg/m³ for natural gas firing and 190 mg/m³ for liquid fuel firing at 15% O₂, dry, 273K, 101.3 kPa. For existing plants, the NO_x ELV is 190 mg/m³ for all fuels. There are SO₂ ELVs for engines firing liquid fuels other than Gas Oil and gaseous fuels other than natural gas. Also, dust ELVs for engines firing liquid fuels other than Gas Oil.

In geographical zones that are not compliant with the EU's Ambient Air Quality Directive Member States must assess the need to apply stricter ELVs provided that these would contribute to a 'noticeable improvement in air quality'. The emission levels associated with best available and emerging technologies must be taken into account when assessing the need for stricter ELVs, following an information exchange with Member States, industry and non-governmental organisations (time-scales unspecified).

Monitoring Requirements

Periodic monitoring of the pollutants for which ELVs are defined is required every three years for MCPs ≥ 1 to ≤ 20 MW_{th} and every year for MCPs > 20 MW_{th}. Monitoring is always required for carbon monoxide (CO) even though this is not subject to an Emission Limit Value. Plants that operate for ≤ 500 hours per annum with an ELV exemption are not exempted from the monitoring requirements but the frequency at which monitoring is required, which is based on cumulative operating hours, is not entirely clear.

First monitoring is required within four months of the plant being permitted/registered, for existing plants, or prior to starting operation, for new plants. If

early registration is not allowed then all of the required monitoring for existing plants would be limited to a four month window and would need to be repeated in the same time frame either one or three years later. This is clearly unworkable, given the likely number of MCPs within Europe (hundreds of thousands). Early registration/permitting should therefore be encouraged.

With regards to test methods: 'Sampling and analysis ... shall be based on methods enabling reliable, representative and comparable results ... EN standards shall be presumed to satisfy this requirement ... the plant shall be operating under stable conditions at a representative even load ... start-up and shut-down periods shall be excluded'

There is therefore not an absolute requirement to use ISO 17025 accredited test laboratories or CEN standards (the Standard Reference Methods for NO_x, SO₂, CO and dust are defined by individual CEN standards). However, if these are employed they will automatically satisfy the MCPD monitoring requirements. In any case, the equipment specified for manual dust measurement, and some of the detailed test procedures within the relevant CEN standard, are not suitable for application on plants that are smaller than 20 MW_{th} and further guidance will be required.

In many Member States, boiler emissions are already measured during annual or six-monthly service visits using equipment that is certified to appropriate CEN standards that apply to boiler testing. Provided that the procedures, staff training and quality systems that underpin these measurements are robust and can satisfy the MCPD requirements, it may be possible to use such an approach, at least for plant ≤ 20 MW_{th}. This would also share the burden with regards to the scheduling of test work.

The MCPD does allow Competent Authorities to specify

continuous monitoring, as an alternative to periodic monitoring, although this would normally require calibration according to EN 14181 using Standard Reference Methods.

Operators with abatement equipment are expected to define how they will demonstrate that this equipment continues to operate effectively which could, for example, include continuous indicative dust monitoring.

Concluding Remarks

The Medium Combustion Plant Directive is intended to improve air quality and reduce the impacts of pollution on human health by controlling emissions to air from medium sized stationary combustion plant, much of which is located in urban areas, notwithstanding the fact that mobile sources (the transport sector) are responsible for the bulk of these impacts.

Whilst the MCPD defines Emission Limit Values for key pollutants, and periodic monitoring requirements, the method for assessing compliance is not clearly defined. This will be particularly challenging for aggregated MCPs with different types of combustion units, possibly operating at different times, that are exhausting through a common stack and also for units fitted with pollution abatement equipment since the operator is required to demonstrate that the abatement is continually effective.

Monitoring requirements are also not defined in detail, requiring national guidance on which equipment, methods and quality assurance systems will be needed in order to demonstrate compliance. In the case of dust measurement, the applicable CEN standard defines sampling equipment for Large Combustion Plant that is not suitable for Medium Combustion Plant.

The Member State may elect to either simply register or grant a permit for a Medium Combustion Plant. However, the first emissions monitoring must be conducted within four months of either registration or permitting. This presents enormous practical challenges in relation to the scheduling and resourcing of periodic monitoring and some means of spreading the monitoring burden, such as early registration for existing plants, needs to be found.

The frequency of monitoring is also unclear for plants operating for less than 500 hours per annum.

With regards to future developments, the European Commission will review the need to revise Emission Limit Values for new plants, and whether or not there is a need to regulate CO emissions, by 1 January 2023. Following that, the MCPD will be reviewed every ten years with a focus on new plant provisions.

The Source Testing Association

The Source Testing Association (STA) was established in 1995 the membership comprises representation from process operators, regulators, equipment suppliers and test laboratories. The STA is a non-profit making organisation. The STA is committed to the advancement of the science and practice of emission monitoring and to develop and maintain a high quality of service to customers.



Its aims and objectives are to:

- contribute to the development of industry standards, codes, safety procedures and operating principles;
- encourage the personal and professional development of practicing source testers and students;
- maintain a body of current sampling knowledge;
- assist in maintenance of a high level of ethical conduct;
- seek co-operative endeavours with other professional organisations, institutions and regulatory bodies, nationally and internationally, that are engaged in source emissions testing.

The Association's headquarters are based in Hitchin, Hertfordshire with meeting rooms, library and administration offices.

The Association's offers a package of benefits to its members which include:

- Technical advice relating to emission monitoring
- Conference and exhibition opportunities
- Seminars and training on a variety of related activities
- Representation on National, European and International standards organisations
- Training in relation to many aspects of emission monitoring
- Liaison with regulators, UK and International, many of whom are members.

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