**Pollution Prevention and Control Standard**

**Waste Incineration**

Standard No. **2020/01**

**Waste Management and Pollution Control Department**

**Ministry of Environment, Maldives**

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The Ministry of Environment has, upon due consultation with all concerned stakeholders elaborated this Standard of the *Solid Waste Management Regulation (2013/R-58)* for enforcement

**Table of Contents**

[**1**](#_gjdgxs) **Citation, Effectiveness and Extent 3**

[**2**](#_30j0zll) **Definitions and Interpretations 3**

[**3**](#_1fob9te) **Scope of the Standard 4**

[**4**](#_4d34og8) **Facilities Requiring Approval 5**

[**5**](#_3rdcrjn) **Alteration of a Waste Incineration Facility 5**

[**6**](#_lnxbz9) **Requirements for the Delivery, Acceptance and the Temporary Storage of Feed Stock Materials 6**

[**7**](#_z337ya) **Configuration of the Waste Storage and Feeding 6**

[**8**](#_1pxezwc) **Configuration, Construction and Operating Conditions of the Incineration and Heat Recovery Unit 8**

[**9**](#_2grqrue) **Air Emission Limits 9**

[**10**](#_1rvwp1q) **Dispersion of Flue Gases 11**

[**11**](#_4bvk7pj) **Noise Emission Limits 11**

[**12**](#_1664s55) **Treatment of Residues from Waste Incineration 12**

[**13**](#_34g0dwd) **Heat Recovery 12**

[**14**](#_43ky6rz) **Sampling Points 13**

[**15**](#_xvir7l) **Measurement Methods and Systems 13**

[**16**](#_1302m92) **Continuous Measurements 14**

[**17**](#_40ew0vw) **Compilation and Assessment of Continuous Emission Measurements 15**

[**18**](#_1tuee74) **Discontinuous Measurements 15**

[**19**](#_3s49zyc) **Reporting and Assessment of Discontinuous Measurements 16**

[**20**](#_279ka65) **Special Provisions for the Monitoring of Heavy Metal Emissions 16**

[**21**](#_36ei31r) **Malfunctions of a Waste Incineration Facility 17**

[**22**](#_45jfvxd) **Disclosure of Emission and Operational Statement 18**

[**23**](#_2koq656) **Exemptions 18**

[**24**](#_zu0gcz) **Further Requirements 18**

[**25**](#_3jtnz0s) **Norms and Standards 19**

[**26**](#_1yyy98l) **Interim Provisions 19**

**Part I – General Provisions**

# Citation, Effectiveness and Extent

## This Standard shall be cited as the Maldivian Pollution Prevention and Control Standard (Waste Incineration).

## This Standard comes into force on DD.MM. YYYY.

## The Standard extends to the entire territory of the Maldives.

# Definitions and Interpretations

## In this Standard, the following definitions and interpretations prevail:

1. ‘Air pollution control system’ means the system that abates the emissions to keep the emission standards as defined hereinafter.
2. ‘Commissioning period’ means that the installation and erection incl. the functionality tests of the facility are accomplished, so that the facility can be fuelled with waste materials as per Annex 1.
3. ‘Emissions’ are the air pollutants emerging from a facility given as milligram or nanogram per cubic metre.
4. ‘Emission standard’ refers to the maximum emission of each parameter related to the reference oxygen content that is regulated in this Standard.
5. ‘Flue gas’ is the exhaust gas after incineration carrying the emissions given as flow rate in cubic meters per hour at dry norm conditions (temperature of 273.15 Kelvin and 101.3 Kilopascal, after deduction of the water vapour content).
6. 'Hazardous Waste’ are all those waste types that are classified as hazardous according to the *Solid Waste Management Regulation* *(2013/R-58)* and as per Annex 1 of this Standard
7. ‘Operator’ is a legal or a natural person responsible for a regulation and standard compliant design, construction and operation of a facility.
8. ‘Reference oxygen content’ of this Standard is the oxygen content pursuant to clause ‎9.6.
9. ‘Thermal capacity’ is the heat unit related to the net calorific value that is supplied to a facility per unit of time expressed as Megawatt (MW).
10. ‘Waste’ means all materials pursuant to the *Solid Waste Management Regulation* that are defined in this regulation as wastes plus those materials listed in Annex 1 of this Standard.
11. ‘Waste co-incineration plant (or facility)’ means a facility incl. the delivery, storage, feeding, heat recovery, power generation, air pollution control, disposal of residues from the co-incineration, whose main purpose is the generation of energy or the production of materials and that regularly uses waste as per Annex 1 as substitute or complementary feedstock.
12. ‘Waste incineration plant (or facility)’ is a facility, irrespective of the number of trains, incl. the delivery, storage, feeding system for waste, supplies and air, furnace and, as the case may be, boiler and heat recovery and power generation, air pollution control, stack, disposal of residues from the incineration with the main purpose to reduce the volume and destroy the organic content of the waste.

# Scope of the Standard

## The content of this Standard applies to the permitting, the construction, the configuration and the operation of waste incineration facilities that have to be approved pursuant to the *Solid Waste Management Regulation (2013/R-58)* and any relevant applicable laws, regulations and standards in the Maldives, and that use solid and liquid wastes as amended in Annex 1 to this Standard unless precluded by other standards, regulations or by statutory decree of the Ministry of Environment or its subordinated Environmental Protection Agency.

## The Standard distinguishes between the following capacities of waste incineration facilities:

1. A throughput of more than 5 tonnes per hour or a thermal capacity of more than 10 MW that are allowed to incinerate waste as per Annex 1;
2. A throughput between 1 and 5 or less than 5 tonnes per hour or a thermal capacity between 2 MW and 10 or less than 10 MW that are allowed to incinerate waste as per Annex 1;
3. A throughput of less than 1 tonne per hour that can incinerate waste as per Annex 1.

## Unless explicitly stipulated, provisions of this Standard apply for all types of waste incineration plants.

## This Standard stipulates the requirements for

1. Mitigating the environmental and human health impact of waste incineration and waste co-incineration facilities that are due to the operations of such facilities, due to their emissions into air, water and soil;
2. Processing wastes within the facilities and that are generated during their operations;
3. Mitigating the risks of fire incidents;
4. The heat recovery from the incineration.

**Part II – Permitting and Approval Requirement**

# Facilities Requiring Approval

## All waste incineration facilities that are to be constructed and operated within the territory of the Maldives require the application of the construction and operation permit pursuant to the national and local laws, regulations and by-laws including meeting the requirements pursuant to the Law on EIA, regulation on waste management and related health and safety regulations and laws.

## Provided that a waste incineration facility, it's necessary (sub)units and all ancillaries are located within the same premises, the application encompasses all components that are relevant for

1. any additional environmental impacts or their mitigation or
2. development of any detrimental or substantial nuisances.

## Only one application for the waste incineration facility, its necessary units and ancillaries has to be furnished and submitted provided these components are necessary for the safe operations of the entire facility.

## Article ‎4.3 does also apply if a landfill is constructed in the vicinity of the incineration facility.

## For alterations of a waste incineration facility, the provisions as defined in article ‎5 do apply.

# Alteration of a Waste Incineration Facility

## As substantial alterations, all those interventions are regarded that cause or may cause a significant additional environmental impact. All other alterations are regarded as minor.

## Whereas substantial alterations do request the operator to comply with the full environmental clearance and procedure to get the permit to implement the alterations, the operator has to notify Environmental Protection Agency (EPA) about minor alterations.

## The following modifications and alterations of a waste incineration facility are regarded as substantial and entail a new permitting procedure including a public stakeholder consultation:

1. Supplying hazardous waste to a waste incineration facility that was intended for the incineration of non-hazardous waste as per Annex 1 only;
2. Change of the technology to abate air emissions;
3. Increase in the throughput capacity of more than 20% of the permitted throughput;
4. Change of the location and height of the stack;
5. Changes in the handling of residues generated by the incineration itself or in the emission abatement; and
6. Modifications of the furnace and boiler geometry that have an impact on the combustion conditions as per article ‎8.5.

## Notwithstanding article ‎5.3, EPA may decide upon receiving the notification of the alteration whether an alteration is regarded as substantial.

**Part III – Requirements for the Construction, the Configuration and the Operations**

# Requirements for the Delivery, Acceptance and the Temporary Storage of Feed Stock Materials

## During the delivery and the acceptance of waste material or any feedstock material, the operator of a waste incineration plant must apply all reasonable measures to avoid or to mitigate any pollution of air, water and soil, other environmental impact due to noise and odour emissions, and perils or hazards to human health.

## The operator of a waste incineration plant must record the amount and type of wastes as per Annex 1 that were incinerated and must keep the records for not less than 5 years. Upon request of EPA, the operator shall provide these records.

## In the event that the operator intends to incinerate hazardous waste or any substance that is not explicitly precluded by this Standard, it is the operator’s responsibility to formally apply for the incineration permit at EPA and to provide evidence that the incineration of that waste does not affect the performance of the facility as defined in this Standard. EPA may at its sole discretion request the operator to engage third parties to validate the operator’s application at costs to be borne by the operator.

## Where the regulatory body has granted the permit pursuant to article ‎6.3, the operator has to document that the wastes do comply with this Standard by providing the following information and data prior to and whenever such waste is to be incinerated and, subject to the continuity of its incineration, at least every three months:

1. Source and origin of the wastes;
2. The physical and chemical composition of the wastes and any other useful information to judge the suitability for incinerating the wastes by taking representative samples from the materials to be incinerated. Samples have to be taken prior to unloading and a retain sample must be kept for a period of three months appropriately contained so that the nature of the samples is not affected.
3. Risk features of the substances (or wastes) that detail how to handle those and whether and to what extent they may be blended with other substances

## The operator must submit the records as per ‎6.4 within its environmental statement as per for article ‎22 for EPA’s perusal. EPA may limit the incineration of waste types as per article ‎6.3.

## Notwithstanding an exemption to be conceded by EPA, liquid wastes must be limited to the types of waste as defined in Annex 1.

# Configuration of the Waste Storage and Feeding

## Waste incineration plants must be designed, constructed and operated so that emissions of pollutants into the soil, into ground or surface waters or into the air are prevented. Contaminated surface run-off that is generated either after rain or that is due to any emergency or fire incident must be retained in sufficiently designed retention ponds. Prior to its discharge, such run-off waters have to be analysed and if required be treated.

## At sites that facilitate continuous operation by providing:

1. a bunker, the operator must keep the waste unloading area and the bunker under negative pressure using the exhaust air as combustion air. If no combustion air is needed the exhaust from the bunker area must be treated to avoid any odour emissions.
2. an open storage area, the storage area must be covered with a shed and be equipped with directed air extraction to minimise fugitive odour emission. The extracted air has to be used as combustion air.

## Any leachate that may be produced during storage must be collected and forwarded to the furnace or treated to meet the standards for discharge pursuant to the National Waste Water Quality Guidelines of Maldives.

## Liquid wastes as per article ‎6.6, must be kept in suitable separate tanks prior to incineration. Appropriate feeding and fuelling devices and fail-safe measures must be applied. Apertures at the point of transfer have to be equipped with an air extraction. Exhaust air from liquid storage tanks and extracted air from the apertures are to be used as combustion air. Liquid storage tanks must not be filled if the waste incineration facility is not operational.

## The operator must install appropriate fire detection systems and sufficiently sized firefighting devices. In any bunker, the fire detection and firefighting system have to facilitate an automated fire detection and an effective response to any fire incident. The fire detection and firefighting devices have to be designed and installed in line with the requirements of the local fire brigade.

## The operator of a waste incineration facility with an open storage area must install firefighting devices that facilitate an effective response to a fire incident in the bunker or the storage area.

## Firefighting water after a fire incident must be retained in sufficiently sized retention ponds. As such, the bunker of a waste incineration facility can be regarded. Facilities without bunkers must be equipped with separate retention ponds.

## Fire alarm, detection, fighting and suppression devices as well as the firefighting water retention ponds must be approved by the local fire brigade.

## If stored waste materials may, due to their compositions, entail the risk of explosions in the storage area the fire fighting measures and devices have to be installed after consultation with the permitting authorities and the local fire brigade.

## The operator of a waste incineration facility has to provide the facilities as per 3.2 a) and b) with automated and fail-safe instrumentation and devices to guarantee that

1. The incinerator can only be fed with waste materials as defined in article ‎3.1 if the minimum temperature according to article ‎8.5 has been reached.
2. Waste feeding into the incinerator can be continued only as long as the minimum temperature according to article ‎8.5 is maintained.
3. The supply of waste to the incinerator is halted if a failure of or within the air pollution control system may entail an exceedance of any of the continuously monitored emission parameters. In such events, the fire and explosion security and plant safety have to be maintained.

## The operator of a waste incineration facility has to provide the facilities as per article 3.2 c) with an automated and fail-safe instrumentation and device to guarantee that waste materials can be supplied only if the minimum temperature according to article 8.5 has been reached and is kept.

## The operator of a waste incineration facility must record any automated interventions as per article 7.10.

# Configuration, Construction and Operating Conditions of the Incineration and Heat Recovery Unit

## A waste incineration plant must be designed, constructed and operated so that all feedstock material is incinerated to the highest possible extent and that a bottom ash with an

1. organic carbon content of less than 3% (by dry weight) or a loss on ignition of smaller than 5% (by dry weight) is produced in waste incineration plants as per article ‎3.2 ‎a).
2. organic carbon content of less than 5% (by dry weight) or a loss on ignition of smaller than 8% (by dry weight) is produced in waste incineration plants as per article ‎3.2 ‎b)
3. organic carbon content of less than 8% (by dry weight) or a loss on ignition of smaller than 10% (by dry weight) is produced in waste incineration plants as per article ‎3.2 ‎c).

## Where the nature of feed stock materials require pre-treatment (crushing, shredding, mixing or the like) to meet the objectives as per article ‎8.1, the operator must provide for such pretreatment meeting the noise emission standards according to article ‎11. Dust or odour emissions must be prevented by applying a negative pressure or a directed extraction to the pre-treatment area and using the extracted air as combustion air.

## Article ‎8.2 does not apply for infectious waste as per Annex 1 (waste code 07) that must be incinerated directly without any manual intervention, pre-treatment or mixing/blending.

## Deposits of fly ash on heat exchanger surfaces that are exposed to the dust laden flue gas must be limited to the highest possible extent by both an appropriate design and through periodic cleaning.

## The incineration unit of the plant must be designed, constructed and operated so that for the incineration of all waste as per article ‎3.1 the following conditions are met:

1. The combustion temperature after the last injection of combustion air must be at least 850 degrees Celsius.
2. Under the most unfavourable conditions, the flue gas must be kept at the temperature as per provision a) of this article for at least 2 seconds.

## The combustion temperature as per ‎8.5 ‎a) has to be measured at suitable locations close to the inner surface within the post combustion zone.

## Every incinerator line of a waste incineration facility must be equipped with a sufficient number of auxiliary burners to always secure the minimum combustion pursuant to article ‎8.5.

## During the commissioning period of the incineration facility, the operator must provide evidence that the minimum combustion temperature and the retention time as per article ‎8.5 are kept. Subject to the decisions of EPA, the operator may furnish the proof by an independent certificate.

## For existing waste incineration facilities, the proof of meeting the combustion conditions according to article ‎8.5 can be provided either by a measurement or by an independent validation of the combustion conditions. EPA may concede an exemption from the provisions as per article ‎8.5.

## During start-up procedures or if the combustion temperature falls below the minimum required temperature, auxiliary burners must be activated automatically to raise the combustion temperature to reach or maintain the minimum required temperature.

## During shut-down operations, the auxiliary burners must be operated until the grate or the combustion chamber is free of waste. Emissions while operating the auxiliary burners must conform to the values defined in article ‎9.

## The auxiliary fuel used in a waste incineration plant having a capacity of more than 1 tonne per hour must have a sulphur content of not more than 0.5% (by weight). Auxiliary burners must be of a low NOx type.

## In the event that the operator changed the combustion chamber significantly, the proof of keeping the minimum combustion temperature and retention time has to be provided prior to resuming operations.

# Air Emission Limits

## The operator of a waste incineration facility must ensure by installing appropriate mitigation measures that air emission limits as defined in this article ‎9 for each incineration line are fulfilled any time.

## The operator of a waste incineration facility must install and operate continuous emission monitoring systems pursuant to article ‎15 and ‎16 to monitor and record the emission values as per article ‎9.3, 9.4 and 9.5.

## Waste incineration facilities pursuant to 9.2 a) must be designed, constructed and operated so that

1. None of the following daily averaged emission limits is exceeded:
2. Total dust 5 mg/m3
3. Organic substances, as total carbon 10 mg/m3
4. Gaseous inorganic chlorine compounds, as hydrogen chloride 10 mg/m3
5. Gaseous inorganic fluorine compounds, as hydrogen fluoride 1 mg/m3
6. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 50 mg/m3
7. Nitrogen oxide and nitrogen dioxide, as nitrogen dioxide 150 mg/m3
8. Mercury and its compounds, as mercury 0.03 mg/m3
9. Ammonia 10 mg/m3
10. Carbon monoxide 50 mg/m3
11. None of the following half hourly averaged emission limits is exceeded:
12. Total dust 20 mg/m3
13. Organic substances, as total carbon 20 mg/m3
14. Gaseous inorganic chlorine compounds, as hydrogen chloride 60 mg/m3
15. Gaseous inorganic fluorine compounds, as hydrogen fluoride 4 mg/m3
16. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 200 mg/m3
17. Nitrogen oxide and nitrogen dioxide, as nitrogen dioxide 400 mg/m3
18. Mercury and its compounds, as mercury 0.05 mg/m3
19. Ammonia 15 mg/m3
20. Carbon monoxide 100 mg/m3
21. None of the averaged values that have been obtained over the sampling periods exceed the following emission limits:
    1. Cadmium and thallium and their compounds, in total  
       as Cd and Th 0.05 mg/m3
    2. Antimony, arsenic, lead, chromium, cobalt, copper, manganese in total  
       nickel, vanadium, tin and their compounds 0.5 mg/m3  
       as Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn
    3. Arsenic and its compounds (except arsine), as As in total  
       Benzo(a)pyrene 0.05 mg/m3  
       Cadmium and its compounds, as Cd   
       Water soluble cobalt compounds, as Co  
       Chromium(VI) compounds (except barium and lead chromate)  
       as Cr

or

Arsenic and its compounds, as As in total  
Benzo(a)pyrene 0.05 mg/m3  
Cadmium and its compounds, as Cd  
Cobalt and its compounds, as Co  
Chromium and its compounds, as Cr

* 1. Dioxins and furans as per WHO TEF 2005 in total 0.1 ng/m3

## Waste incineration facilities pursuant to 9.2 b) must be designed, constructed and operated so that

1. None of the following daily averaged emission limits is exceeded:
2. Total dust 10 mg/m3
3. Gaseous inorganic chlorine compounds, as hydrogen chloride 10 mg/m3
4. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 50 mg/m3
5. Carbon monoxide 50 mg/m3
6. None of the following half hourly averaged emission limits is exceeded:
7. Total dust 20 mg/m3
8. Gaseous inorganic chlorine compounds, as hydrogen chloride 60 mg/m3
9. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 200 mg/m3
10. Nitrogen oxide and nitrogen dioxide, as nitrogen dioxide 400 mg/m3
11. Carbon monoxide 100 mg/m3
12. None of the averaged values that have been obtained over the sampling periods exceed the following emission limits:
    1. Cadmium and thallium and their compounds, in total  
       as Cd and Th 0.05 mg/m3
    2. Mercury and its compounds, as Hg in total 0.05 mg/m3
    3. Antimony, arsenic, lead, chromium, cobalt, copper, manganese in total  
       nickel, vanadium, tin and their compounds 0.5 mg/m3  
       as Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, Sn
    4. Dioxins and furans as per Annex 2 in total 0.1 ng/m3

## Waste incineration facilities pursuant to 9.2 c) must be designed, constructed and operated so that

1. None of the daily averaged values of the following emission limits is exceeded:
2. Carbon monoxide 50 mg/m3
3. Gaseous inorganic chlorine compounds, as hydrogen chloride 20 mg/m3
4. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 100 mg/m3
5. None of the following half hourly averaged emission limits is exceeded
6. Carbon monoxide 100 mg/m3
7. Gaseous inorganic chlorine compounds, as hydrogen chloride 100 mg/m3
8. Sulphur dioxide and sulphur trioxide, as sulphur dioxide 400 mg/m3

## Dust emissions from a bottom ash treatment plant must not be greater than 5 mg/m3 and must be measured once a year or whenever EPA requests the measurement.

## All emission values are to be understood as referenced to a dry flue or exhaust gas with an oxygen content of 11 vol% at normal conditions (273.15 degrees Kelvin and 101.3 kPa).

# Dispersion of Flue Gases

## The operator must arrange for an unrestricted dispersion of the flue gases of the waste incineration facility into the ambient air and that no accumulation of pollutants in the surroundings of the facility is to be concerned. The surroundings of the incineration plant encompass an area of not less than 20 times the stack height.

## For waste incineration plants as defined in article ‎3.2 ‎a), an air dispersion modelling must be performed.

## EPA may, subject to the outcome of the air dispersion modelling, request the operator to establish a baseline and carry out continuous monitoring of pollutants that are to be concerned.

## The stack height has to be determined by a suitably qualified party taking account of the shape and elevation of the building of the waste incineration facility and the buildings’ pattern and height and the topography of the surroundings, surrounding environment and the climatic conditions.

# Noise Emission Limits

## The operator has to provide all noise emitting components of the plant with noise attenuating hoods or suppression measures whose sound pressure levels are greater than 85 dB(A) at a distance of 1 m.

## In any compartment of the plant that, due to its nature, does not allow to keep the sound pressure level as per ‎11.1, the operator must ensure that its operating personnel is protected from the noise emission by wearing appropriate noise protection equipment.

## At the site boundaries the operator must ensure that the following sound pressure levels are met:

## 70 dB(A) from 7 am to 10 pm

## 50 dB(A) from 10 pm to 7 am

## The operator must conduct noise emission measurements after commissioning of the facility operating at full capacity and upon reasonably justified complaints filed during operations.

# Treatment of Residues from Waste Incineration

## Residues that are generated during waste incineration processes, such as bottom ashes, fly ashes, boiler ashes and air pollution control residues have to be, as far as possible, minimised and, if technically feasible, recycled to the highest possible extent. Only residues that cannot be recycled have to be safely disposed of in a landfill that meets the criteria as defined in Annex 4.

## Fly and boiler ashes that are retained by the flue gas cleaning system or that accumulate in the boiler passes or that are produced during cleaning of heat exchanger surfaces and flue gas ducts, and air pollution control residues must be kept separated from the bottom ash.

## If required by EPA, the operator has to reduce the content of unburnt material and of soluble components of the residues to meet its obligations of article ‎12.1.

## The operator has to provide for all contaminated powdered residues enclosed conveying, storage and extraction systems so that no discrete or fugitive dust emissions can occur. All powdered residues that are extracted with dry extraction systems have to be stored and transported in closed compartments. Particularly during maintenance and overhaul of the conveying, storage and extraction systems dust must not be released or personnel be exposed to dust emissions.

## Applying appropriate analysis methods, the operator of a facility according to article ‎3.2 ‎a) has to monitor the content of heavy metals and the soluble salt fraction of the bottom ash and the grading of the bottom ash after processing.

# Heat Recovery

The heat that is released during incineration and that will not be extracted for external or internal use, must be either transformed into electrical energy if a gross electric power of more than 0.5 MW can be generated or be used for purposes such as sea water desalination or cooling energy, where economically viable.

**Part IV – Monitoring and Surveillance**

# Sampling Points

## Prior to the commissioning of the incineration facility pursuant to article ‎3.2, the operator has to install suitable sampling and measuring points to verify emissions, the combustion conditions and the relevant operating conditions.

## All sampling points have to be easily accessible and must allow an undisturbed and representative sampling and measurement.

## The distance to the heat generator, the air pollution control system or the last heat exchanger must be greater than twice the diameter of the exhaust pipe or duct prior to the stack.

# Measurement Methods and Systems

## The operator must take account of the fact that the measuring systems for continuous emission monitoring according to article ‎9 apply methods and technologies that fulfil the requirements as per Annex 3.

## Prior to commissioning of a facility

1. according to ‎3.2 ‎a), the operator undertakes to obtain the certification from an ISO/IEC accredited firm that the installation of the sampling points, the piping and routing, and the configuration of the continuous emission monitoring system incl. its compilation and recording devices are carried out according to relevant ISO norms.
2. according to ‎3.2 ‎b) and ‎c), the supplier or suppliers of the equipment must guarantee that the installation of the sampling points, its piping and routing, and the configuration of the continuous emission monitoring system incl. its compilation and recording devices are carried out according to relevant ISO norms.

## Continuous emission monitoring systems as per article ‎15.2 must be installed in a calibrated mode prior to the commencement of the commissioning.

## The operator must ensure that the sampling and the analyses of all pollutants and the quality assurance including self-calibration of the continuous emission monitoring system as well as the reference measurement for the calibration of the continuous emission monitoring system are carried out according to relevant ISO standards.

## The operator has to arrange for the calibration and functional testing of the continuous emission monitoring system and the devices to analyse the reference or operating parameters according to Article ‎16.1 that are needed for monitoring and control purposes.

## The functional testing of the continuous emission monitoring system and of the measurement devices must be conducted once per year using a reference measurement for an appropriate two-point test of the measurement range.

## The calibration of the continuous emission monitoring system and of the measurement devices must be carried out as soon as the incineration facility runs in a steady state mode, latest 6 months after commencement of the commercial operations. Thereafter the operator has to arrange for the calibration every three years.

## For the functional tests of the continuous emission monitoring system of the facilities as per Article ‎3.2 ‎a), the operator has to engage an ISO/IEC accredited firm.

## The operator of incineration facilities as per Article ‎3.2 ‎b) and ‎c) has to acquire the necessary technical skills to carry out the functional tests itself via a training by an ISO/IEC accredited firm.

## Calibration of a continuous emission monitoring system has to be carried out by an ISO/IEC accredited firm.

## The operator of a facility pursuant to Article ‎3.2 ‎a) has to provide for the calibration of the measurement devices for the control of the combustion conditions every three years via an ISO/IEC accredited firm.

## For facilities as per ‎3.2 ‎b) and ‎c), the operator has to ensure every three years via an inspection protocol from the supplier that the combustion conditions are met.

## Both the certificates of the training by an ISO/IEC accredited firm according to Article ‎15.9 and the ISO/IEC accredited firm carrying out the tests according to ‎15.8, ‎15.10 and ‎15.11 have to be approved by EPA.

## The reports on the evaluation and results of the calibration and the testing must be submitted to EPA within 8 weeks upon termination of the calibration or the testing.

# Continuous Measurements

## Considering the requirements as per Annex 3 and article ‎9.1, the operator of a waste incineration facility undertakes to continuously monitor, record, process and compile for each waste incineration line:

1. The parameters as defined in article ‎9.3, ‎9.4 and 9.5;
2. The oxygen content in the flue gas;
3. The temperature as per ‎8.5 ‎a);
4. All necessary parameters that are necessary to evaluate the safe operations of the incineration facility, particularly the flue gas temperature, flue gas volume rate, the water vapour content and the pressure of the flue gas that have to be measured at appropriate locations to obtain a consistent set of data. Jointly with these data, the waste throughput and the residue generated, and as the case may be, the net steam generation have to be recorded as well.

## In line with article ‎16.1, the operator has to install suitable measurement, data processing and conversion, and compiling devices prior to the commissioning of the waste incineration facility.

## Subject to the request of EPA, the operator of the waste incineration plant has to install continuous emission monitoring systems for all parameters as defined in article ‎9.3 ‎c) and ‎9.4 ‎c) if continuous measurement techniques are available for these parameters.

# Compilation and Assessment of Continuous Emission Measurements

## All measured pollutants and parameters according to article ‎16.1 and, if needed, according to article ‎16.3 must be related to the reference oxygen concentration as defined article ‎9.6 by applying the formula as per article ‎17.2 and have to be aggregated to half-hourly averaged values. For all parameters that are abated by the air pollution control system, the conversion to the reference oxygen concentration is limited to those measuring intervals revealing a higher oxygen content than the reference oxygen content. The half-hourly averaged values have to be aggregated to daily averaged values for the actual daily operational hours including shutdown and start-up procedures.

## Measured values have to be related to the reference oxygen concentration according to the following formula:

wherein

Er = concentration of a parameter at reference oxygen content as per article ‎9.6;

Em = measured concentration of a parameter as per article ‎16.1;

Om = reference oxygen concentration as per article ‎9.6; and

Om = measured oxygen concentration as per article ‎16.1.

## The operator must furnish an annual report on the outcomes of the continuous emission measurements and submit this report by 31st March of the subsequent year unless the measurement results are transmitted online to EPA. All recordings of the measurement devices and the processed data that are the basis of the annual reports have to be archived for five years after the reporting period.

## The report as per article ‎17.3 must include

1. The duration and frequency of non-compliance with the requirements as per article ‎8.5;
2. The recordings of the automated interventions as per ‎7.11;
3. The data as per article ‎16.1.

## The emission limits are regarded as met if

1. None of the daily averaged values as per article ‎9.3 ‎a), ‎9.4 ‎a) or ‎9.5‎a) that have been validated pursuant to Annex 3 are exceeded.
2. None of the half-hourly averaged values as per article ‎9.3 ‎b), ‎9.4 ‎b) or ‎9.5 ‎b) that have been validated pursuant to Annex 3 are exceeded.

# Discontinuous Measurements

## Prior to the commencement of the commercial operations or after a substantial alteration of a waste incineration facility as per article ‎3.2 ‎a) and ‎b), the operator has to provide evidence via an ISO/IEC accredited firm that the combustion conditions as defined in article ‎8.5 are met and will be met any time.

## Prior to the commencement of the commercial operations or after a substantial alteration of a waste incineration facility as per article ‎3.2 ‎a) and ‎b), the operator has to provide evidence via an ISO/IEC accredited firm that emission limits as defined in article ‎9.3 ‎c) and ‎9.4 ‎c) are met.

## Measurement as per article ‎18.2 must be carried out every second month over a period of 3 days during the first 12 months after commencement of the commercial operations. Subsequent measurements after the first 12 months’ operations have to be conducted in a 12 months’ interval.

## During each measurement cycle, the facility has to be operated at maximum continuous rating.

## Measurements as per article ‎18.3 must be carried out by an ISO/IEC accredited firm once every 12 months.

## The sampling periods for the measurement as per article ‎18.3 must be as follows:

1. 30 minutes at least, not exceeding 2 hours for pollutants listed in ‎9.3 ‎c) ‎i to ‎iii (except Benzo(a)pyrene) and ‎9.4 ‎c) ‎i to ‎iii;
2. 6 hours at least, not exceeding 8 hours for Benzo(a)pyrene as per ‎9.3 ‎iii and the pollutants listed in ‎9.3 ‎c) ‎iv and ‎9.4 ‎c) ‎iv.

## The detection limit of the analytical method applied for measuring dioxins and furans as listed in Annex 2 must not be greater than 0.005 ng/m3.

# Reporting and Assessment of Discontinuous Measurements

## The operator has to submit a report on the results of the discontinuous measurements as per article ‎18 latest 8 weeks after terminating the measurement that must provide details on the following subjects:

1. Planning and conducting the measurements;
2. Results of each discontinuous measurement;
3. The applied analytical measurement method incl. ISO references and
4. The operating conditions that are relevant to assess the measurement results as per article ‎16.1 ‎b) to ‎d).

## Emission limits are deemed kept if none of the discontinuous emission measurements revealed an exceedance of the emission limits pursuant to article ‎9.3 ‎c) and ‎9.4 ‎c).

# Special Provisions for the Monitoring of Heavy Metal Emissions

## If, either due to the type of waste or due to discontinuous measurement, emission values of heavy metals are to be concerned that exceed more than 70% of the limits of the pollutants as per article ‎9.3 ‎c) ‎i and ‎ii and ‎9.4 ‎c) ‎i to ‎iii the operator has to conduct monthly emission measurement.

## The operator has to continue monitoring the heavy metals as per article ‎20.1 until the operator can furnish the proof that the APC system can abate the heavy metal emission below 70% of the emission limit.

# Malfunctions of a Waste Incineration Facility

## In the event that measurements of the operating conditions as per article ‎8.5 or the emission measurements as per article ‎16 and ‎18 or any other measurement prove that the requirements towards the environmentally compliant or safe operations of the waste incineration facility cannot be fulfilled, the operator has to inform EPA immediately. Without delay, the operator must take appropriate measures to align the operations of the waste incineration facility with the requirement of this Standard. The provisions as per article ‎7.10 do prevail during such incidents.

## Notwithstanding the provisions as per Waste Management Regulation (2013/R-58), EPA is entitled to either

1. Instruct the operator to abide by its obligations pursuant to this Standard or to
2. Enforce the shut-down of the facility for rectification.

## If malfunctions of a waste incineration line do occur that can be rectified within less than 4 hours, EPA may concede the operator to keep that incineration line operational. Such exceptional permits are limited to 60 hrs per calendar year for the entire waste incineration facility. The half hourly emission values of the following pollutants have to be kept:

1. CO concentration must be always lower than 500 mg/m3; and
2. The concentration of total dust must be always lower than 100 mg/m3.

## The provisions as per article ‎7.10 and ‎9.6 do prevail during such exceptional permits.

**Part V – Other Obligations**

# Disclosure of Emission and Operational Statement

## After successful commissioning of the waste incineration facility and thereafter every year, the operator of a waste incineration facility must at least disclose the following:

1. The status of the facility, its latest modifications and its operating conditions throughout the year, such as amount of waste incinerated, electricity generated, residues produced, and volume of wastewater discharged, operating hours, and the records as per ‎6.4 and ‎7.12.
2. The results of the emission measurements in comparison to the emission limits pursuant to article ‎18 and 9.
3. The assessment of the combustion conditions;
4. Statistics on the malfunctions of the waste incineration facility;
5. Evidence for the adequate operation of the CEMS throughout the year such as functionality test results, self-calibration protocols.

## Further details are subject to considerations of the EPA.

## The operator has to submit the statement by 31 May of the subsequent year.

# Exemptions

## Upon application by the operator and under due consideration of the subject of such application, EPA may exempt the operator from provisions of this Standard if the operator can evidence that provisions cannot be fulfilled or can be met only with unreasonable expenses and effort.

## Subject to the approval from EPA, the operator of a waste incineration facility may be exempted from article ‎7.2 ‎b) if the operator can provide evidence that there is no significant odour emissions.

## EPA has to publicly disclose all exemptions granted to an operator of a waste incineration facility together with all obligations resulting from the exemptions.

# Further Requirements

## Notwithstanding the provisions made within this Standard, EPA may, subject to the outcome of investigations and analyses of the environmental impacts, request the operator to implement further abatement, mitigation of environmental protection measures.

## EPA may bar an individual or a corporate entity from being responsible for the operations or operating a waste incineration facility if it can provide evidence that this individual or corporate entity does not satisfy the needs of a professional and safe operations entailing the risk of avoidable environmental impacts.

## **Part VI – Final Provisions**

# Norms and Standards

## All norms and standards to comply with this Standard have to be addressed by the operator in the permit application.

## The normative environment is given by the British Standard system.

# Interim Provisions

## This Standard applies to existing facilities as of DD.MM. YYYY.

## EPA may at its own discretion exempt operators to abide by this Standards or parts thereof.

## If existing plants, due design implications or constraints, cannot meet the combustion conditions as per article 8.5 b), the operator has to duly fulfil the obligations of article 8.5 after the refurbishment or a new-built of a furnace or a boiler system prior to the commencement of the commercial operation.

## In the event an existing plant will be extended so that the entirety of the systems forms a new plant, the new plant has to fulfil the obligations of the then valid version of this Standard.

**Annex 1 – Waste materials that can be incinerated in the waste incineration facilities as defined in ‎3.2.**

This Standard distinguishes between the following waste types:

01 – Wastes resulting from agriculture, horticulture, aquaculture, forestry or fishing, food and beverage processing

02 – Wastes from wood processing and furniture industry

03 – Waste from the shipbuilding industry

04 – Oil wastes (hydraulic, engine, transmission, lubricating oils) and wastes of liquid fuels

05 – Waste paints, coatings, sealants, adhesives, organic solvents, refrigerants and propellants

06 – Wastes from shaping and physical and mechanical surface treatment of metals and plastics

07 – Waste from human or animal health care

08 – Waste from end-of-life vehicle processing

09 – Waste from industrial cleaning and engineering activities

10 – Waste from construction and demolition activities

11 – Packaging waste

12 – Waste from processing and treatment of packaging waste or household and household like commercial waste (sorting, crushing, compacting)

13 – Waste from wastewater treatment plants

14 – Household waste or household like commercial and institutional waste incl. packaging waste (also collected separately)

Within these waste codes, the following categorisation prevails. Other wastes not listed herein must not be incinerated unless EPA has consented. In the overall input, a chlorine content of 1% (original substance) must not be exceeded. The incineration of hazardous wastes (marked by \*) are subject to EPA’s consent.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Waste Code** | **Waste Characterisation** | **To be incinerated in facility as per article ‎3.2** | | |
|  |  | **‎a)** | **‎b)** | **‎c)** |
| **01** | **Wastes resulting from agriculture, horticulture, aquaculture, forestry or fishing, food and beverage processing** | | | |
| 0101 | Animal-tissue waste | yes | yes | no |
| 0102 | Peelings and plant-tissue waste | yes | yes | yes |
| 0103 | Waste from the forestry (tree trimmings, leaves, branches, trunks) | yes | yes | yes |
| 0104\* | Wastes from the agriculture containing hazardous substances (no pesticides) | yes | no | no |
| 0105 | Other wastes from the agriculture not included in 0104 | yes | yes | no |
| 0106\* | Waste from the agriculture containing pesticides | no | no | no |
| 0107 | Waste from processing meat, fish and other food of animal origin | yes | yes | no |
| 0108 | Waste from dairy products industry | yes | yes | no |
| 0109 | Sludges from agriculture, horticulture, aquaculture, forestry or fishing, food processing | yes | yes | no |
| 0110 | Waste from the baking and confectionary industry | yes | yes | yes |
| 0111 | Waste from the beverage industry (peelings, sludges, concentrates) | yes | yes | yes |
| **02** | **Waste from the wood processing and furniture industry** | | | |
| 0201\* | Waste from the panel and furniture production containing hazardous substances | yes | no | no |
| 0202 | Waste from the panel and furniture production others than those included in 0201\* | yes | yes | yes |
| 0203\* | Cuttings, shavings, wood chips, saw dust containing hazardous substances | yes | no | no |
| 0204 | Cuttings, shavings, wood chips, saw dust other than those included in 0203\* | yes | yes | yes |
| 0205\* | Wood preservatives containing organochlorinated compounds | yes | no | no |
| 0206\* | Wood preservatives containing hazardous substances other than those covered by 0205\* | yes | no | no |
| 0207 | Wood preservatives other than those included in 0206\* | yes | yes | no |
| **03** | **Waste from the shipbuilding industry** | | | |
| 0301 | Fibre containing wastes from hull construction | yes | no | no |
| 0302\* | Wood waste and panels from hull construction containing paints and other hazardous substances | yes | no | no |
| 0303 | Wood waste and panels from hull construction other than those covered by 0302 | yes | yes | yes |
| 0304\* | Wastes adhesives and sealants containing organic solvents or other hazardous substances | yes | no | no |
| 0305 | Wastes adhesives and sealants other than those mentioned in 0304\* | yes | yes | no |
| **04** | **Oil waste (hydraulic, engine, transmission, lubricating oils) and wastes from liquid fuels** | | | |
| 0401\* | Chlorinated oil wastes (mineral based or synthetic or any other) | yes | no | no |
| 0403\* | Non-chlorinated mineral and synthetic oil wastes | yes | yes | no |
| 0404\* | Other oil waste not included in 0401\* and 0402\* | yes | no | no |
| 0405\* | Chlorinated insulating or heat transmission oils | yes | no | no |
| 0406\* | Non-chlorinated insulating or heat transmission oils | yes | yes | no |
| 0407\* | Other insulating or heat transmission oils | yes | no | no |
| 0408\* | Bilge oils (after oil water separation) | yes | yes | no |
| 0409\* | Oil/water separator content | yes | no | no |
| 0410\* | Wastes from liquid fuels (diesel, fuel oil, petrol and mixtures thereof) | yes | yes | no |
| 0411\* | Waste oil containing PCBs | no | no | no |
| **05** | **Waste paints, coatings, sealants, adhesives, organic solvents, refrigerants and propellants** | | | |
| 0501\* | Waste paints, coatings, varnish, sealants or adhesives and sludges thereof containing organic solvents and other hazardous substances | yes | no | no |
| 0502 | Waste paints, coatings, varnish, sealants or adhesives and sludges thereof other than those mentioned in 0501\* | yes | yes | no |
| 0503\* | Wastes from the removal of paints, coatings, varnish, sealants or adhesives and sludges thereof containing organic solvents and other hazardous substances | yes | no | no |
| 0504\* | Wastes from the removal of paints, coatings, varnish, sealants or adhesives and sludges thereof other than those mentioned in 0503\* | yes | yes | no |
| 0505\* | Waste printing inks and sludges thereof | yes | no | no |
| 0506\* | Dispersion oil | yes | no | no |
| 0507\* | Chlorofluorocarbon containing refrigerants | no | no | no |
| **06** | **Wastes from shaping and physical and mechanical surface treatment of metals and plastics** | | | |
| 0601 | Plastics filing, turnings, shavings | yes | yes | no |
| 0602\* | Mineral based machining oils and emulsions containing hazardous or halogenated substances | yes | no | no |
| 0603\* | Mineral based machining oils and emulsions free of hazardous or halogenated substances | yes | yes | no |
| 0604\* | Synthetic machining oils | yes | no | no |
| 0605\* | Biodegradable machining oil | yes | yes | no |
| 0605\* | Machining sludges containing hazardous substances | yes | no | no |
| 0606\* | Spent waxes and fats | yes | yes | no |
| 0607\* | Wastes from water and steam degreasing | yes | yes | no |
| **07** | **Waste from human or animal health care, diagnosis and treatment (except radioactive waste)** | | | |
| 0701\* | Waste whose collection and disposal is subject to special requirements to prevent infection (except 0704) | yes | no | no |
| 0702 | Waste whose collection and disposal is not subject to special requirements to prevent infection (e.g. dressings, plaster casts, linen, disposable clothing) | yes | yes | no |
| 0703 | Body parts and organs including blood bags and blood preserves | yes | no | no |
| 0704 | Sharps | yes | yes | no |
| 0705\* | Chemicals consisting of hazardous substances | yes | no | no |
| 0706 | Chemicals other than those included in 0705\* | yes | yes | no |
| 0707\* | Cytotoxic and cytostatic medicines | yes | no | no |
| 0708 | Medicines other than those included in 0707\* | yes | no | no |
| 0709 | Other wastes from human or animal medical care, diagnosis, treatment | yes | no | no |
| **08** | **Waste from end-of-life vehicle processing** | | | |
| 0801 | End-of-life tyres | yes | yes | no |
| 0802\* | Plastics containing hazardous substances (halogens, flame retardants) | yes | no | no |
| 0803 | Plastics other than those included in 0802\* | yes | yes | no |
| 0804\* | Extracted lubricants and oils (no refrigerants) | yes | no | no |
| 0805\* | Brake fluids | yes | no | no |
| **09** | **Waste from industrial cleaning and engineering activities** | | | |
| 0901\* | Sludges, emulsions, dusts and oil/grease separator contents containing hazardous substances | yes | no | no |
| 0902 | Sludges, emulsions, dusts, filter cakes and oil/grease separator contents other than those included in 0901’ | yes | yes | no |
| 0903\* | Solid wastes containing hazardous substances | yes | no | no |
| 0904\* | Washing liquids containing hazardous substances | yes | no | no |
| 0905 | Other washing liquids than those included in 0904\* | yes | yes | no |
| 0906\* | Wiping cloths, rags, absorbents contaminated with hazardous substances | yes | no | no |
| 0907 | Wiping cloths, rags, absorbents other than those included in 0907\* | yes | yes | no |
| 0907 | Other flammable wastes not specified in 09 | yes | no | no |
| **10** | **Waste from construction and demolition activities** | | | |
| 1001 | Wood | yes | yes | yes |
| 1002 | Plastics | yes | yes | no |
| 1003\* | Wood containing halogenated or hazardous preservatives (except 1001) | yes | no | no |
| 1004 | Plastic materials containing halogenated or other hazardous substances (except 1002) | yes | no | no |
| 1005 | Non-halogenated plastic insulation material | yes | yes | no |
| 1006\* | Halogenated plastic insulation material | yes | no | no |
| **11** | **Packaging waste** | | | |
| 1101 | Paper and cardboard packaging | yes | yes | yes |
| 1102 | Plastic packaging | yes | yes | no |
| 1103 | Wooden packaging | yes | yes | yes |
| 1104 | Textile packaging | yes | yes | yes |
| 1105\* | Packaging containing residues of or contaminated by hazardous substances | yes | no | no |
| **12** | **Waste from processing and treatment of packaging waste or household and household like commercial waste (sorting, crushing, compacting)** | | | |
| 1201 | Paper and cardboard | yes | yes | yes |
| 1202 | Plastics and rubber | yes | yes | no |
| 1203\* | Wood containing hazardous substances | yes | yes | no |
| 1204 | Other wooden material not included in 1203\* | yes | yes | yes |
| 1205 | Commingled sorting residues | yes | yes | no |
| **13** | **Waste from water and wastewater treatment plants** | | | |
| 1301 | Screenings | yes | yes | no |
| 1302 | Surplus sludge from biological wastewater treatment | yes | yes | no |
| 1303 | Grease and oil mixture (edible oil and fat) from oil/water separator | yes | yes | no |
| 1304 | Membranes from RO plants (crushed) | yes | no | no |
| 1305 | Saturated or spent ion exchange resins | yes | yes | no |
| **14** | **Household waste or household like commercial and institutional waste incl. packaging waste (also collected separately)** | | | |
| 1401 | Green and garden waste | yes | yes | yes |
| 1402 | Biowaste from restaurants, canteens and households incl. edible oil and fats | yes | yes | yes |
| 1403 | Clothes and textiles | yes | yes | no |
| 1404 | Plastics | yes | yes | no |
| 1405\* | Wooden materials containing hazardous substances | yes | yes | no |
| 1406 | Other wooden material not included in 1405\* | yes | yes | yes |
| 1407\* | Solvents, paints, inks, adhesives and resins containing hazardous substances | yes | no | no |
| 1408 | Solvents, paints, inks, adhesives and resins others than those included in 1304\* | yes | yes | no |
| 1409 | Commingled municipal waste | yes | yes | no |
| 1410 | Market waste | yes | yes | yes |
| 1411 | Street cleaning residues (less than 50% minerals) | yes | yes | no |
| 1412 | Bulky waste | yes | yes | no |
| 1413 | Municipal waste not otherwise specified | yes | yes | no |

**Annex 2 – Toxic equivalency factors to be used to determine the emission values as per article ‎9.3 ‎c) ‎iv and ‎9.4 ‎c) ‎iv**

The sum of the emissions of dioxins and furans as per article ‎9.3‎c) ‎iv and ‎9.4 ‎c) ‎iv have to be calculated by multiplying the measured emission values of the below listed polychlorinated di-benzo-dioxins, di-benzo-furans and biphenyls with the given toxic equivalency factors (TEF) that were evaluated by WHO in 2005.

**Polychlorinated Dibenzodioxins (PCDF)** **WHO-TEF 2005**  
  
2,3,7,8 – Tetrachlorodibenzodioxin (TCDD) 1  
1,2,3,7,8 – Pentachlorodibenzodioxin (PeCDD) 1  
1,2,3,4,7,8 – Hexachlorodibenzodioxin (HxCDD) 0.1  
1,2,3,7,8,9 – Hexachlorodibenzodioxin (HxCDD) 0.1  
1,2,3,6,7,8 – Hexachlorodibenzodioxin (HxCDD 0.1  
1,2,3,4,6,7,8 – Heptachlorodibenzodioxin (HpCDD) 0.01  
Octachlorodibenzodioxin (OCDD) 0.003

**Polychlorinated Dibenzodioxins (PCDF)**  
2,3,7,8 – Tetrachlorodibenzofuran (TCDF) 0.1  
2,3,4,7,8 – Pentachlorodibenzofuran (PeCDF) 0.3  
1,2,3,7,8 – Pentachlorodibenzofuran (PeCDF) 0.03  
1,2,3,4,7,8 – Hexachlorodibenzofuran (HxCDF) 0.1  
1,2,3,7,8,9 – Hexachlorodibenzofuran (HxCDF) 0.1  
1,2,3,6,7,8 – Hexachlorodibenzofuran (HxCDF) 0.1  
2,3,4,6,7,8 – Hexachlorodibenzofuran (HxCDF) 0.1  
1,2,3,4,6,7,8 – Heptachlorodibenzofuran (HpCDF) 0.01  
1,2,3,4,7,8,9 – Heptachlorodibenzofuran (HpCDF) 0.01  
Octachlordibenzofuran (OCDF) 0.0003

**Polychlorinated Biphenyls**

**Non ortho PCB**  
PCB 77 0.0001  
PCB 81 0.0003  
PCB 126 0.1  
PCB 169 0.03  
  
**Mono ortho PCB**   
PCB 105 0.0003  
PCB 114 0.0003  
PCB 118 0.0003  
PCB 123 0.0003  
PCB 156 0.0003  
PCB 157 0.0003  
PCB 167 0.0003  
PCB 189 0.0003

**Annex 3 – Validating the continuous emission measurement results**

1. Each continuous emission monitoring system including all reference measurements, compilation and calculation devices must be operational over a 365-day interval so that in no case more than 10 daily averaged emission values or 5 half hourly averaged emission values per day have to be discarded. Compilation and calculation devices must achieve an availability of 99%.
2. Each continuous emission monitoring system must ensure that the value of the 95% confidence interval for each of the daily averaged emission limits does not exceed the following percentages of that emission limit:

## Carbon monoxide 10%

## Sulphur dioxide 20%

## Nitrogen dioxide 20%

## Total dust 30%

## Organic carbon 30%

## Hydrogen chloride 40%

## Hydrogen fluoride 40%

## Mercury 40%

1. All half-hourly and daily average values will be validated based on the measured half-hourly values after deduction of the value of the confidence interval that was determined during calibration.

**Annex 4 – Requirements towards the base and cover liner system of a landfill for the disposal of incineration residues**

The operator of a waste incineration facility has to dispose of the residues from the incineration that cannot be recycled in a landfill that complies with the following minimum requirements.

1. The base liner system must encompass:
2. An artificially completed/reinforced geological barrier (thickness not less than 0.5 m) that can offer an equivalent protection like a geological barrier having a hydraulic conductivity of less than 10-9 m/s and a thickness of 5 m.
3. An impermeable artificial liner for at least the compartment that is designated for the APC residues has to be provided.
4. A compartment, if any, for the residues from the bottom ash processing with an artificially completed geological barrier, having a not less than 0.5 m and a hydraulic conductivity of less than 10-9 m/s.
5. A mineral drainage system of at least 0.3 m thickness to prevent the accumulation of leachate has to be provided with an initial hydraulic conductivity of not less than 10-2 m/s.
6. Prior to the construction of the engineered barrier, the operator has to satisfy itself about the effectiveness of the barrier system by the installation of test pads whose effectiveness must be documented.
7. The operator has to provide EPA with a sequential filling plan and with the envisaged final shape of the landfill.
8. The operator has to furnish an annual filling plan that must provide sufficient information on the actual volume consumption versus the initially planned consumption.
9. For the leachate management,
10. The operator must take account of that leachate from different compartments for APC residues and residues from the bottom ash processing are collected and treated so that the leachate discharge standards are met any time, as defined in article ‎1 of this annex;
11. The operator must organise a system for the safe collection, transport and disposal of the concentrate of the leachate treatment plant;
12. Monitoring wells to detect any potentially escaping leachate must be installed in appropriate locations along the perimeter of a landfill;
13. Subject to further instruction by EPA, the samples of the monitoring wells have to analysed quarterly for the following parameters:
    1. pH
    2. Cadmium
    3. Chromium (hexavalent and total)
    4. Copper
    5. Lead
    6. Mercury
    7. Nickel
    8. Zinc
14. Once a landfill cell is filled, the operator must close that cell and provide the following safeguards:
15. A contour layer to smoothen the final shape of the landfill body;
16. A complementary dual cover system for the hazardous APC residues so that in the event one layer fails the other layer can withstand the ingress of water. In the event a mineral layer is applied, the layer has to provide a calculated percolation rate similar to a mineral layer of at least 0.5 m thickness having a permeability coefficient of not greater than 5x10-10 m/s at a constant water head of 0.3 m. If a geomembrane is used, its thickness must not be not less than 2.0 mm;
17. A leakage control system must be applied for the dual cover system;
18. A sufficiently dimensioned drainage layer (thickness > 0.3 m, permeability coefficient > 5x10-3 m/s);
19. A re-cultivation layer (thickness > 0.5 m) incl. a natural vegetation cover that meets the local conditions.
20. The leachate treatment plant must meet the discharge limits for the industrial wastewater as stated in the National Waste Water Quality Guidelines of Maldives.