ANNEXES to COMMISSION IMPLEMENTING DECISION

OF XXX

on a standardisation request to the European Committee for Standardisation as regards methods for the measurements of PCDDs/PCDFs and dioxin-like PCBs, total gaseous mercury and formaldehyde in support of Directive 2010/75/EU of the European Parliament and of the Council

ANNEX I

List of new standards to be drafted as referred to in Article 1

Table 1: List of new European standards to be drafted and deadlines for their adoption

	Reference information	Deadline for the adoption[1] by the CEN
1.	European standard(s) on long-term sampling of PCDDs/PCDFs and dioxin-like PCBs	DD/MM/YYY [60 months after the notification of this Decision by the Commission to CEN]
2.	European standard(s) on long-term sampling of total gaseous mercury	DD/MM/YYY [60 months after the notification of this Decision by the Commission to CEN]
3.	European standard(s) on periodic measurements of formaldehyde	DD/MM/YYY [60 months after the notification of this Decision by the Commission to CEN]

[1] Adoption' refers to the relevant European standardisation organisation making an adopted standard available to its members or the public.

ANNEX II

Requirements for the standards referred to in Article 1

The European standards shall describe the technical solutions for long-term sampling the PCDDs/PCDFs and dioxin-like PCBs and total gaseous mercury and periodic measurement formaldehyde in support of Directive 2010/75/EU.

Standards shall reflect the generally acknowledged state of the art.

Standards shall specify requirements for each of the procedures as listed in the Table general requirements of this Annex. The methods developed in the standards shall contain at least the procedures as described in the Tables 1 to 3 of this Annex. Any additional procedure or requirement relevant to the standards shall be set in the context and in fulfilment of the objectives set out in Articles 4, 11(b) and 14 of Directive 2010/75/EU.

The European standards shall not define any limit or target values, minimum requirements for uncertainty of measurements or any other kind of data quality objectives.

GENERAL REQUIREMENTS

Procedure	**Requirements**
Sampling	Each of the procedure or protocols shall consist of the following elements i. Objectives ii. Equipment iii. Material iv. Siting v. Description of characteristics and criteria vi. Minimum performance requirements vii. Quality Assurance/Quality Control (QA&QC)
Calibration and analysis	
Maintenance	
Data evaluation and treatment	
Uncertainty calculation	
Data reporting	
Type testing and performance characteristics	

The standard methods shall take into account, as appropriate, existing standards at European and international level and on-going standardisation work on standard methods for measurement of these pollutant emissions

The methods should also consider the possibility to use equivalent (or improved) methods better reflecting state of the art methods at European and international level, provided that their application allows for equivalent results in terms of accuracy, adequacy, certainty and reliability.

1. MONITORING EMISSIONS OF PCDDS/PCDFS AND DIOXIN-LIKE PCBS

Procedure	Requirements
Sampling	The following points are to be considered when preparing the sampling program: • specific objectives and requirements within Annexes V and VI to Directive 2010/75/EU and relevant sectoral BAT conclusions, • general sampling devices, • components for the sampling train, • automatic controller, • devices for measuring the flue gas parameters, • sampling unit materials. The following performance characteristics shall be addressed for three sampling methods for long-term sampling of PCDDs, PCDFs and dioxin-like PCBs: (1)filter/condenser method; (2)dilution method; (3)cooled probe method: • existing standards EN 1948-2 , EN 1948-3 and EN 1948-4 describing the extraction, the clean-up, the identification and the quantification of PCDDs/PCDFs and the analyses of dioxin-like PCBs, respectively, may be used as references, whilst equivalent procedures may also be taken into count, • minimum requirements of a validation process between long-term sampling and standard reference method, • the quantification limit of the sample mass, • probes protection against contamination, • filter efficiency, • sampling duration (typically 4 weeks), • leak checks, • comparison between the data obtained with long-term sampling and standard reference sampling and standard reference methods during a specified time period (at least 40 h), • difference between the mean value of the multiple samples of the standard reference methods and the single long-term sample based on the corresponding I-TEQ/WHO-TEQ value, • filter temperature, • probe temperature. Quality Assurance/ Quality Control shall include: • quality assurance for the sampling unit, • guidance and recommendation for use, • information on monitoring of environmental parameters, • leak checks, • use of field blanks, • quality assurance for the sampling volume, • information on gas meter or other volume measuring devices, sampling flow, wet volume measurement, • quality assurance of isokinetic sampling, • information on the sampling flow rate.
Calibration and analysis	The following points are to be considered when preparing the calibration program:

	• the concentration of the sampling standard and the extraction standard, • the recovery of the sampling and extraction standards using isotope dilution, • analytical methods, • calibration range. Calibration standards should be traceable to international standards. The procedure shall describe: • sampling, • extraction of the sample, • clean up to separate the PCDDs/PCDFs/PCBs, • aliquotation.
Maintenance	The maintenance procedures shall guarantee the correct performance along the lifetime of instruments and equipment involved in sampling and analysis. The procedures shall determine the frequency and type of maintenance and calibration actions on instruments and equipment.
Data evaluation and treatment	The standard shall establish protocols or procedures to calculate and describe performance testing of a long term PCDD/PCDF/dioxin-like PCB sampling system (including extraction of the sample, partitioning of the sample extract, clean up, identification and quantification, data validation, calculation of results).
Uncertainty calculation	The uncertainty of the measurements shall be recommended as a function of the monitoring objective and measured concentration. Repeatability and reproducibility of measurements shall be taken into account by using inter-laboratory comparison where appropriate. The uncertainty budget shall consider all contributing factors from sampling to reporting (considering data coverage, averaging time periods). The uncertainty of the assessment methods should be evaluated in accordance with the principles of the CEN Guide to the Expression of Uncertainty in Measurement (ENV 13005-1999) or with the law on propagation of uncertainty as described in EN ISO 14956. Other national or international standards or principles may be used provided that their application allows for equivalent results in terms of accuracy, adequacy, certainty and reliability.
Data reporting	The standard shall indicate the necessary data reporting in accordance with defined parameters, objectives and sampling characteristics including the QA/QC requirements.
Type testing and performance characteristics	Recommended tests shall include effects of environmental variables as humidity, temperature or interferences for a representative concentration range. The effects should be checked under real emission matrices of waste gases from factories through field tests.

2. MONITORING EMISSIONS OF TOTAL GASEOUS MERCURY

Procedure	Requirements
Sampling	The following points are to be considered when preparing the sampling program: • specific objectives and requirements within Annexes V and VI to Directive 2010/75/EU and relevant sectoral BAT conclusions, • sorbent trap sampling period, • location of paired sorbent traps, • sorbents for the validation work are activated carbon (normally halogenated carbon), • sampling durations may be extended to improve detection limits, • three section traps enable Hg capture, Hg breakthrough and Hg recovery (from a section in the sorbent trap pre-spiked with Hg0). Quality Assurance/ Quality Control shall include: • guidance and recommendations for use, • leak checks of sample system, • sample flow rate control and calibration (including sample temperature and pressure), • Hg breakthrough, • paired trap agreement, • spike recovery, • use of Certified Reference Materials, • field blanks, • analyser calibration.
Calibration and analysis	The following points are to be considered when preparing the calibration program: • Capability of analytical system of quantitatively recovering and quantifying total Hg from sorbent traps, • Example recovery techniques, • Example analytical techniques, • Thermal decomposition approach, • reference materials traceable to international standards. Calibration standards should be traceable to international standards. The procedure shall describe: • analytical matrix interference test, • determination of minimum sample mass (limit of detection), • analytical bias test (elemental and oxidised Hg), • accuracy test using Certified Reference Material, • field recovery test, • sample handling and transport requirements.
Maintenance	The maintenance procedures shall guarantee the correct performance along the life time of instruments and equipment involved in sampling and analysis. It shall determine the frequency and type of maintenance and

	calibration actions on instruments and equipment.
Data evaluation and treatment	The standard shall describe the analytical calculations and combine these with sampling data to provide emissions concentrations and calculate and describe the method detection limit (considering sampling volume, analysis, representing sampling time, averaging time period, data drift detection the data validation.
Uncertainty calculation	The uncertainty of the measurements shall be recommended as a function of the monitoring objective and mercury concentration. Repeatability and reproducibility of measurements shall be taken into account by using inter-laboratory comparison where appropriate. The uncertainty budget shall consider all contributing factors from sampling to reporting (considering data coverage, averaging time periods). The uncertainty of the assessment methods should be evaluated in accordance with the principles of the CEN Guide to the Expression of Uncertainty in Measurement (ENV 13005-1999), the methodology of ISO 5725:1994. Other national or international standards or principles may be used provided that their application allows for equivalent results in terms of accuracy, adequacy, certainty and reliability. A procedure is also required for an individual test laboratory to estimate the intra-laboratory uncertainty budget (repeatability). Both method validation and demonstration of equivalence of an alternative method are important.
Data reporting	The standard shall indicate the necessary data reporting in accordance with defined parameters, objectives and sampling characteristics including the QA/QC requirements.
Type testing and performance characteristics	Recommended tests shall include effects of environmental variables as humidity, temperature or interferences for a representative concentration range. The effects should be checked under real emission matrices of waste gases from factories through field tests.

3. MONITORING EMISSIONS OF MASS CONCENTRATION OF FORMALDEHYDE

Procedure	Requirements
Sampling	The following points are to be considered when preparing the sampling program: • specific objectives and requirements within Annexes V and VI to Directive 2010/75/EU and relevant sectoral BAT conclusions, • nature of the plant process, • homogeneity of the west gases at the sampling sections, • expected concentration to be measured, • required averaging period, • isokinetic sampling in some cases where waste gases are treated by a wet scrubber, • the same sampling shall be provided for all analytical methods. The following performance characteristics shall be addressed: • the sampling time and frequency, • volume of the absorption solution, • volume gas meter: uncertainty of sample volume, • uncertainty of temperature, • uncertainty of absolute pressure, • absorption efficiency, • leak in the sampling line, • value of the field blank. Quality Assurance/ Quality Control shall include: • guidance and recommendation for use, • flow controls, • monitoring of environmental parameters (pressure, temperature, wind velocity, % relative humidity), • recording of operational parameters, • use of blank samples, • interference of the different analytic methods shall be, individually considered.
Calibration and analysis	The following points are to be considered when preparing the calibration program: • the concentration of a standard formaldehyde solution, • analytical methods, • frequency for checking the calibration curve. Calibration standards should be traceable to international standards. The procedure shall describe: • detection limits, • calibration and analytical range, • calibration frequency, • blank levels, • memory effect, • sample storage.
Maintenance	The maintenance procedures shall guarantee the correct performance along the life time of instruments and equipment involved in sampling and analysis.

	It shall determine the frequency and type of maintenance and calibration actions on instruments and equipment.
Data evaluation and treatment	The standard shall describe the analytical calculations and combine these with sampling data to provide emissions concentrations and calculate and describe the method detection limit (considering sampling volume, analysis, representing sampling time, averaging time period, data drift detection the data validation).
Uncertainty calculation	The uncertainty of the measurements shall be recommended as a function of the monitoring objective and formaldehyde concentration. Repeatability and reproducibility of measurements shall be taken into account by using inter-laboratory comparison where appropriate. The uncertainty budget shall consider all contributing factors from sampling to reporting (considering data coverage, averaging time periods). The uncertainty of the assessment methods should be evaluated in accordance with the principles of the CEN Guide to the Expression of Uncertainty in Measurement (ENV 13005-1999), the methodology of ISO 5725:1994 and the guidance provided in the CEN report 'Air Quality — Approach to Uncertainty Estimation for Ambient Air Reference Measurement Methods' (CR 14377:2002E). Other national or international standards or principles may be used provided that their application allows for equivalent results in terms of accuracy, adequacy, certainty and reliability.
Data reporting	The standard shall indicate the necessary data reporting in accordance with defined parameters, objectives and sampling characteristics including the QA/QC requirements.
Type testing and performance characteristics	Recommended tests shall include effects of environmental variables as humidity, temperature or interferences for a representative concentration range. The effects should be checked under real emission matrices of waste gases from factories through field tests.