

Activity 4.1 Instrument standards

Defined and initiated standardization process for compliance monitoring methods as prima facie evidence

Roadmap for EU level standardization

The European Committee for Standardization, CEN, has established a roadmap for standardization which is similar to ISO (International Standardization Organization). In general a new work item for preparation of standard is proposed by members of CEN (National standardization bodies) to technical committee. The new work item for preparation a new EN-standard or technical specification (TS) can be started once it is supported at least five members of CEN. In figure 1 a scheme for developing a new CEN standard is described.



25/08/2017

Figure 1. Schematic plan for preparation of CEN standard

4



Co-financed by the European Union
Connecting Europe Facility

The New Work Item Proposal (NWIP) for Sniffing method for defining the Sulphur content in marine fuels will:

- Harmonize the measuring techniques
- Improve the quality of the measurement results
- Help the authorities (state port authorities) to use the data obtained for legal actions.
- Provide a direct method (in-situ) for Member State controlling the Sulphur content in marine fuels which is compliance with the standard method defined by the MARPOL agreement and directive 2012/33/EU and described by ISO standard (ISO 14596:2007).

There are already several networks for ship emission studies to define the Sulphur content around the SECA area (Baltic sea and North sea) in Belgium, Denmark, Finland, Germany and Sweden. Also a number of publication (see in Annex) has been published in the international journals to demonstrate the scientific and technical capability of the sniffing method as a compliance method with the standard method. The standard will then harmonize the measurement method and all issues contributing to the reliability of the measurement results can be solved during the preparation of the standard.

The road map for preparation of the standard for sniffing method was discussed at one of the partner meeting at Gothenburg. The outcome of the meeting was:

- Preparation the draft version for the standard
- Preparation a proposal for New Work Item to CEN (see in Annex)

The draft version for the standard is a challenging part of the proposal and should include the present status of sniffing method and content of the standard (see also in annex). However at this point the draft has not been made. CompMon partners (Sweden, Belgium, Finland, Germany, Denmark) can make the proposal (NWI).

List of instrument and their specifications, for the evaluation of their fitness for purpose in the Action

At the moment there are no requirements for the performance of the sniffing method at methods itself nor in case of instrumentation. For air quality measurements the requirements are defined by the Directives 2015/1480/EC and 2008/50/EC which can be used for SO₂ and NO_x measurements. In case of CO₂ there is no such requirements. In Europe the instruments have been tested by TYV for air quality measurements but also for emission measurements. Full test reports for various analyzers both for emission and air quality measurements are available (<http://www.qal1.de/de>). Especially the NO_x-measurements are needed when UV-fluorescence method is used for SO₂ measurements due to the cross interference of the NO and NO₂ in the method. The parallel NO_x measurements are vital important especially in ship emission measurements where concentration of NO and NO₂ are much higher than the concentration of SO₂ especially in case of low sulphur content fuels. A list of type tested reference methods for SO₂ and NO_x analyzers are presented in Annex 2.

In case of CO₂ the instruments of Non-dispersive IR-method (NDIR) can be used for the measurements. More reliable data can be obtained from Cavity Ring Down Spectroscopy (CRD)



Co-financed by the European Union

Connecting Europe Facility

analyzers manufactured by Picarro Inc (USA), Los Gatos Inc (USA), Tiger Optics Inc (USA), Gasera oy (Finland).



Co-financed by the European Union
Connecting Europe Facility

Annex: A draft proposal for New Work Item (to be completed)

NEW WORK ITEM PROPOSAL

Closing date for voting
20xx-mm-dd
Reference number
(to be given by the Secretariat)
.....
Date of circulation
20XX -MM-DD

CEN/TC 264

Secretariat
DIN

CENELEC/TC / SC (Sec)...

IMPORTANT NOTE: Incomplete proposals risk rejection or referral to originator.

The proposer has considered the guidance given in Annexes 1 and 2 during the preparation of the NWIP

Proposal (to be completed by the proposer)

Title of the proposed deliverable

(in the case of an amendment, revision or a new part of an existing document, show the reference number and current title)

English title: *Air quality – Performance evaluation of sniffing techniques to be used for defining the content of Sulphur in the marine fuels from the ship plumes in ambient air*

Scope of the proposed deliverable

Description of specific performance requirements of the analysis methods to be used for measurements of Sulphur dioxide and Carbon dioxide from the emission plumes of the ships in ambient air. The concentration of the measured compounds are used to define the content of Sulphur in the marine fuels as a compliance method with the present standardized method (ISO 14596:2007). The methods for analysis of the compounds can be obtained by low cost sensors, single analyzers specifically for SO₂ and CO₂ or integrated analyzer unit that is capable for measurements of both compounds simultaneously. Additional chemical compounds as oxides of nitrogen should also be considered.

Purpose and justification of the proposal

The aim of the proposal is to evaluate whether the sniffing method i.e. to measure the ratio of SO₂ to CO₂ concentration from the ship plume can be used to define the content of Sulphur in marine fuels fulfilling the prescribed requirements by the MARPOL agreement of Annex VI, and Directive 2012/33/EU.

The task aims to evaluate the applicability of sniffing method obtained by different platforms and instrumentations to be used for Sulphur content measurements of marine fuels. The common data quality objectives for the measurements need to be established for the sniffing method showing the comparability of the method with respect to reference method defined by the MARPOL agreement i.e. ISO standard (ISO 14596:2007). The data quality objectives (accuracy and uncertainty of the measurement result) for the sniffing method should be consistent with the requirements of the reference method where applicable.

Measurement platforms can be fixed measurement point e.g. ground station or moving platforms from the air or from the surface of the water. Measurements conducted in the air can be drones or aircrafts. The measurement instruments shall be type tested according to prescribed test procedures for the performance characteristics that are relevant to the sniffing method and is in line with the standard ISO 14596:2007. The instruments itself can be conventional analyzers, integrated analyzer system or low cost sensors fulfilling the requirements. The content of the standard shall include:

- *Data quality objectives (DQO) for the measurement results*
- *Measurements methods for SO₂ and CO₂. Additionally for NO and NO₂.*
- *Performance characteristics of the measurement instruments*
- *Methods to calculate the uncertainty of the measurement results*
- *Reporting of the results*

For any of these potential applications, it is essential that the performance characteristics of the instruments (model) is quantified, to enable the data to be meaningfully challenged and fit for purpose. This proposed NWI would seek to address this challenge.

Is the proposal actively or probably in support of European regulation / legislation or established public policy?

Yes

If Yes, indicate if the proposal is



Co-financed by the European Union

Connecting Europe Facility

- in relation to EC mandate(s): (which one(s))
- in relation to EC Directive(s)/Regulation(s): 2012/33/EC
- **in relation to other legislation or established public policy:** *Guide to the demonstration of equivalence of ambient air monitoring methods, Report by an EC Working Group on Guidance for the demonstration of equivalence*

Indication(s) of the preferred type or types of deliverable(s) to be produced under the proposal.

European Standard Harmonization Document* Technical Specification Technical Report

* also for ISO standard

Envisaged track

Enquiry and vote

Preparatory work (at a minimum an outline should be included with the proposal)

The proposer or the proposer's organization is prepared to undertake the preparatory work required Yes

If a draft is attached to this proposal,:

Please select from one of the following options (note that if no option is selected, the default will be the second option):

Draft document will be registered as a preliminary project in the committee's work programme (stage 00.60)

Draft document will be registered as a new project in the committee's work programme (stage 20.00)

Draft document can be submitted to UAP (FprEN – stage 50.20)

Known patented items

Yes No If "Yes", see CEN-CENELEC Guide 8 and provide full information in an annex

A statement from the proposer as to how the proposed work may relate to or impact on existing work, especially existing CEN, CENELEC, ISO and IEC deliverables. The proposer should explain how the work differs from any apparently similar work, or explain how duplication and conflict will be minimized.

The sniffing method is applicable for direct (on-line) measurements of Sulphur content in the marine fuels. Measurements can take place during the cruising of the ship at different platform i.e. fixed and/or moving platforms. The method that is described in the MARPOL agreement of Annex VI, and Directive 2012/33/EU (ISO 14596:2007) requires to take the sample from the marine fuel by state port authorities in the harbor, and conduct the analysis according to the ISO standard.

The work carried out at CEN TC 264 by WG12 and WG42 can be very helpful in defining of the performance criteria and uncertainty of the measurement results.

A listing of relevant existing documents at the international, regional and national levels.

GUIDE TO THE DEMONSTRATION OF EQUIVALENCE OF AMBIENT AIR MONITORING METHODS, Report by an EC Working Group on Guidance for the Demonstration of Equivalence.

An example of scientific publications on the sniffing method at international journals is presented in the list of references.

A simple and concise statement identifying and describing relevant affected stakeholder categories (including small and medium sized enterprises) in particular those who are immediately affected by the proposal and how they will each benefit from or be impacted by the proposed deliverable(s)

-Environment

Instrument manufacturers can demonstrate their performance of the instrument

Sensor manufacturers will be able to evaluate their sensors against the protocol, demonstrate compliance to recognised performance requirements and improve them as required.

State port control authorities can benefit for the in-situ technique and they can demonstrate their activities in controlling the use of allowed marine fuel in the ships under their territory.

-Support to European legislation/regulation

Directive 2012/33/EU.

Liaisons:

A listing of relevant external European or international organizations or internal parties (other CEN, CENELEC, IMO, ISO and/or IEC committees) to which a liaison should be



Co-financed by the European Union

Connecting Europe Facility

established (in case of ISO and IEC committees via Vienna and Dresden Agreements).

Joint/parallel work:

Possible joint/parallel work with:

CEN (please specify committee ID)
CENELEC (please specify committee ID)
ISO (please specify committee ID)
IEC (please specify committee ID)
Other (please specify)

Candidate for European – International cooperation?

Vienna Agreement (ISO-CEN Agreement):

Yes No ('Yes' meaning joint ISO-CEN development)

Dresden Agreement (IEC-CENELEC Agreement):

Yes No ('Yes' meaning that the NWI, if approved, is to be offered to IEC for taking up)

Name of the Proposer

CompMon partners

Proposed Project Leader

CompMon partner

Supplementary information relating to the proposal

This proposal relates to a new document;

This proposal relates to the adoption as an active project of an item currently registered as a Preliminary Work Item;

This proposal relates to the re-establishment of a cancelled project as an active project.

Members already known to support the proposal and willing to participate to the activities:... *[Note: The proposal cannot usually*

be approved without a minimum of 5 national Members]

Annex(es) are included with this proposal (give details)

Outline proposal and report EUR 26112

3

References

ISO 8754:2003: Petroleum products -- Determination of sulfur content -- Energy-dispersive X-ray fluorescence spectrometry

ISO 4259:2006: Petroleum products — Determination and application of precision data in relation to methods of test

ISO 14596:2007: Petroleum products -- Determination of sulfur content -- Wavelength-dispersive X-ray fluorescence spectrometry

Agrawal, H., Welch, W.A., Miller, J.W., and Cocker, D.R.: Emission measurements from a crude oil tanker at sea, *Environ.Sci.Technol.*, 42, 7098-7103, 2008.

Alföldy, B. et al.: Measurements of air pollution emission factors for marine transportation, *Atmos. Meas. Tech. Discuss.*, 5, 8925-8967, 2012.



Co-financed by the European Union

Connecting Europe Facility

Cooper, D. A., 2005: HCB, PCB, PCDD and PCDF emissions from ships, *Atmos. Environ.*, 39, 4901–4912.

Kattner, L., B. Mathieu-Üffing, J. P. Burrows, A. Richter, S. Schmolke, A. Seyler, and F. Wittrock. Monitoring compliance with sulfur content regulations of shipping fuel by in situ measurements of ship emissions. *Atmos. Chem. Phys.*, 15, 10087–10092, 2015.

L. Pirjola, A. Pajunoja, J. Walden, J.-P. Jalkanen, T. Rönkkö, A. Kousa, and T. Koskentalo. Mobile measurements of ship emissions in two harbour areas in Finland. *Atmos. Meas. Tech.*, 7, 149–161, 2014.



Annex 2. Type testing SO₂- and NO_x analyzers

SO₂ - Ambient Air

Manufacturer	Product	Components
Ecotech Pty Ltd	Serinus 50	SO ₂ ,
Environnement S. A	AF22M	SO ₂ ,
	AF22e	SO ₂ ,
HORIBA Europe GmbH	APSA 370	SO ₂ ,
Teledyne Advanced Pollution Instrumentation	M100E T100	SO ₂ ,
Thermo Fisher Scientific	Model 43i	SO ₂ ,

NO_x - Ambient Air

Manufacturer	Product	Components
Ecotech Pty Ltd	Serinus 40	NO _x ,
Environnement S. A	AC32e	NO, NO ₂ , NO _x ,
	AC32M	NO, NO ₂ , NO _x ,
HORIBA Europe GmbH	APNA 370	NO, NO ₂ , NO _x ,
Teledyne Advanced Pollution Instrumentation	M200E T200	NO _x ,
Thermo Fisher Scientific	Model 42i	NO, NO ₂ , NO _x ,

