Terms of Reference for Research Project

(For CHD 35 - Air Quality Sectional Committee of BIS)

1 Title:

Study on the methods for determination of total fluorides from emissions from stationary sources.

2 Background:

The determination of total fluorides from emissions of stationary sources is a critical area of research with significant environmental and health implications. Fluoride emissions, stemming from diverse industrial activities such as metallurgical processes, chemical production, and combustion, have been identified as potential contributors to environmental pollution.

BIS has published IS 11255 (Part 5), Methods of measurement of emission from stationary sources Part 5 Total Fluoride which prescribes the prescribes a method for determination of total fluorides from emissions from stationary sources.

Fluorine is one of the more common elements and occurs in at least trace amounts in virtually all natural and manufactured materials The release of fluorides into the atmosphere can adversely impact air quality, soil, water, and ecosystems. Moreover, prolonged exposure to elevated fluoride levels may pose health risks, including dental and skeletal fluorosis. Governments and environmental agencies worldwide have established regulations to limit fluoride emissions, emphasizing the importance of accurate monitoring methods for regulatory compliance.

With the changing technological developments, there is a need to study the various methods used for the determination of total fluorides from emissions from stationary sources. Additionally, regulatory agencies may specify certain methods for compliance monitoring. With an increasing focus on human health as well as environmental concerns, a need was felt to commission a research project for undertaking an in-depth and incisive study to determine the suitability and effectiveness of various testing methods for measurement of sulphur dioxide emissions from stationary sources.

3 Objective:

To collect relevant data and information from both primary and secondary sources regarding the suitability and effectiveness of various testing methods for determination of total fluorides from emissions from stationary sources. The focus extends to understanding the analytical techniques employed (such as ion-selective electrodes or chromatography), alongside details on instrumentation specifications and calibration methods, guiding the development and optimization of a robust method aligned with practical considerations in environmental monitoring.

4 Scope:

4.1 Undertake comprehensive study and comparative analysis of the available literature on the various testing methods for determination of total fluorides from emissions from stationary sources, which will inter alia include any international standards, research papers published, study conducted by any industry or any other organization on the subject.

4.2 Collection of data regarding the testing facilities and various methods of test available in the country for methods for determination of total fluorides from emissions from stationary sources.

4.3 Identification of the methods specified for compliance monitoring by the regulatory agencies in various major countries, and studying the technical regulations/standards which are applicable in these countries.

4.4 Collection of data regarding manufacturers of the testing equipment which are used in the various testing methods for determination of total fluorides from emissions from stationary sources.

4.5 Visit to six laboratories (preferably four government and two in private sector) to study the various testing methods for determination of total fluorides from emissions from stationary sources, unless the testing laboratories data collected indicates otherwise.

4.6 During literature survey and visits to testing laboratories, information on the following parameters shall be collected:

(i) Method(s) of testing used
(ii) Procedure used for selection of the testing Method(s) used
(iii) Validation/verification of the testing method used, if carried out
(iv) Details of the participation of the laboratories in Inter-laboratory comparison(ILC) and/or Proficiency testing (PT)
(v) Level of automation in the testing methods
(vi) Details regarding the make and manufacturers of the testing equipments used
(vii) effectiveness of various testing methods followed
(viii) Sustainability practices followed, if any [energy consumption, renewable energy sources, sustainable practices, 3Rs (Reuse, Reduce and Recycle), waste management and disposal mechanisms, steps taken to reduce carbon footprints], future plans.

4.7 Preparation and submission of report on the all the parameters covered in the scope.

5. Research Methodology:

The following research methodologies shall be followed:

5.1 Study the literature in respect to the Scope and analyze it.
5.2 Collection of information through structured questionnaire and contacting the relevant testing laboratories in respect to the scope.

5.3 Collection of data regarding the testing infrastructure available in the country for various testing methods for determination of total fluorides from emissions from stationary sources.

5.4 Visits to laboratories for observing testing methods used and the testing facilities available.

5.5 Focussed discussion with the Quality Control team through a structured questionnaire/ format.

5.6 Comprehensive and concise reporting

6. Sampling Plan

6.1 Preferably six laboratories (preferably four government and two in private sector) to study the various testing methods for determination of total fluorides from emissions from stationary sources, unless the testing laboratories data collected indicates otherwise.

7. Deliverables:

7.1 Study report consisting of outcomes of the study covering all the aspects of the scope shall be submitted in both digital and paper form.

7.2 Along with the final report, the survey formats and responses, questionnaires, results of testing, report of visits, other relevant documents/ information shall be appended.

8. Delivery Milestones and Review Process

8.1 The duration of the project shall be four months.

8.2 An interim report indicating the review of the literature, desktop research and sampling plan shall be submitted in 30 days from award of the project.

8.3 Draft report shall be submitted by the end of three months from award of the project.

8.4 Final report shall be submitted within 4 months from the date of award of project.

9. Support from BIS:

BIS will provide access to available international standards required for the project as per the requirement identified by the proposer and on request.

10. Nodal Point

Ms. Preeti Prabha, Scientist C & Member Secretary, CHD 35 may be contacted for more clarification on the R&D project (chd35@bis.org.in)