



**SLOVENSKI STANDARD
SIST EN 1911-2:1999**

01-september-1999

9a [g]YbYdfYa] b\ j]fcj !'Fc bUa YrcXUXc`c Yj Ub'U<7`!'&"XY.'5 Vgcf dWYU
d`]bUgh\ `gdc]b`fd`]bg_Ua YrcXU

Stationary source emissions - Manual method of determination of HCl - Part 2: Gaseous compounds absorption

Emissionen aus stationären Quellen - Manuelle Methode zur Bestimmung von HCl - Teil 2: Absorption der gasförmigen Verbindungen

Emissions de sources fixes - Méthode manuelle de dosage du HCl - Partie 2: Absorption des composés gazeux

PREVIEW
(standards.iteh.ai)
SIST EN 1911-2:1999
<https://standards.iteh.ai/catalog/standards/sist/fce8d03-2a3d-4537-aa07-fbf6ae5469a1/sist-en-1911-2-1999>

Ta slovenski standard je istoveten z: EN 1911-2:1998

ICS:

13.040.40 Stationary source emissions

SIST EN 1911-2:1999 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1911-2:1999

<https://standards.iteh.ai/catalog/standards/sist/fce8d03-2a3d-4537-aa07-fb6ae5469a1/sist-en-1911-2-1999>

ICS 13.040.40

Descriptors: air pollution, air, quality, gas analysis, emission, gaseous effluents, determination, concentration, hydrochloric acid, absorption

English version

Stationary source emissions - Manual method of determination of HCl - Part 2: Gaseous compounds absorption

Emissions de sources fixes - Méthode manuelle de dosage du HCl - Partie 2: Absorption des composés gazeux

Emissionen aus stationären Quellen - Manuelle Methode zur Bestimmung von HCl - Teil 2: Absorption der gasförmigen Verbindungen

This European Standard was approved by CEN on 23 March 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1911-2:1998](https://standards.iteh.ai/catalog/standards/sist/f6e8d13-2a3d-4537-aa07-fb6ae5469a1/sist-en-1911-2-1998)

<https://standards.iteh.ai/catalog/standards/sist/f6e8d13-2a3d-4537-aa07-fb6ae5469a1/sist-en-1911-2-1998>



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents		Page
Foreword		3
1	Scope	4
2	Normative references	4
3	Principle	4
4	Absorption reagent	5
5	Equipment	5
6	Sampling procedure	7
7	Validation of sampling	9
8	Expression of sampled gas volume	10
Annex A (informative) Examples of suitable washing bottles		11
Annex B (informative) Bibliography		13

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1911-2:1999

<https://standards.iteh.ai/catalog/standards/sist/f6ce8d03-2a3d-4537-aa07-fb6ae5469a1/sist-en-1911-2-1999>



Foreword

This European Standard has been prepared by Technical Committee CEN/TC 264 "Air quality", the secretariat of which is held by DIN

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by month of October 1998, and conflicting national standards shall be withdrawn at the latest by month of October 1998.

The determination of gaseous hydrogen chloride emissions ¹⁾ from stationary sources by a manual method is divided in three parts described in the following standards :

- EN 1911-1 Stationary source emissions - Manual method of determination of HCl - Part 1 :
 Sampling of gases
- EN 1911-2 Stationary source emissions - Manual method of determination of HCl - Part 2 :
 Gaseous compounds absorption
- EN 1911-3 Stationary source emissions - Manual method of determination of HCl - Part 3 :
 Absorption solutions analysis and calculations

This standard is an integral part of a complete measurement procedure and the use of the two other parts is necessary for determination of hydrogen chloride.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 1911-2:1999

<https://standards.iteh.ai/catalog/standards/sist/f5ce8d03-2a3d-4537-aa07-fb6ae5469a1/sist-en-1911-2-1999>

¹⁾ In this standard no distinction is made between hydrogen chloride and hydrochloric acid.

1 Scope

This European standard specifies a method for the absorption of hydrogen chloride, in waste gases having been sampled and filtered according to EN 1911-1. The resulting absorption solutions is subsequently analyzed according to EN 1911-3.

The method described applies to ducted gaseous streams emitted by waste incinerators and more generally to waste gases in which HCl concentration may vary between $1 \text{ mg}\cdot\text{m}^{-3}$ and $5\,000 \text{ mg}\cdot\text{m}^{-3}$ under normal pressure and temperature conditions (see note).

NOTE : For the purposes of this standard, normal pressure and temperature conditions are 101,325 kPa and $0 \text{ }^{\circ}\text{C}$ (273,15 K).

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1911-1:1998	Stationary source emissions - Manual method of determination of HCl - Part 1 : Sampling of gases
EN 1911-3	Stationary source emissions - Manual method of determination of HCl - Part 3 : Absorption solutions analysis and calculations
EN ISO 3696:1995	Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)

3 Principle

3.1 The gas stream is sampled and pretreated according to EN 1911-1.

3.2 HCl and gaseous inorganic chlorides are dissolved by bubbling through chloride-free water. The sampling system is designed to minimise condensation. However, where condensation does or may occur, this part of the equipment is rinsed and added to the absorption solutions.

3.3 The chloride concentration of the resulting solutions is expressed as HCl concentration in the sampled gas, and the chloride content is then determined according to EN 1911-3.

NOTE : In some circumstances other gaseous chlorides may be present in the gas sample (e.g. ammonium chloride). The procedure to be followed in these cases and with other possible interferents is described in EN 1911-3.

4 Absorption reagent

Chloride-free water of at least grade 2 purity, according to EN ISO 3696:1995 standard shall be used (conductivity less than $100 \mu\text{S}\cdot\text{m}^{-1}$).

5 Equipment

5.1 The equipment is a part of the whole sampling equipment described in EN 1911-1. An example of arrangement is shown on figure 1.

The materials used in 5.2 to 5.5, including seals and flexible connections in contact with the gas to be analysed shall be resistant to corrosion and to temperature. They shall not adsorb or react with the substances present in the gases.

5.2 A line connecting the heated separator (see EN 1911-1) to the washing bottle made of borosilicate glass or polytetrafluoroethylene (PTFE). Parts of the line which will not be rinsed shall be heated to avoid condensation. This line should be as short as possible, in order to minimize the gas residence time (see 5.1.1 and 5.2.1 of EN 1911-1:1998).

5.3 Washing bottle(s) made of borosilicate glass, with a capacity of approximately 250 cm^3 .

Condensate recovery is facilitated when the washing bottle is fitted with a vertical inlet tube. The washing bottle geometry and the quantity of water contained shall enable HCl absorbance efficiency of not less than 95 % to be attained, at the sampling volume flow rate and in the range of concentration examined.

The absorption efficiency shall be checked from time to time, and when using new washing bottles, by sampling at the selected volume flow rate with two washing bottles in succession with particular care to thoroughly rinse of the secondary washing bottle before a sample is taken. The measurement, after rinsing the tubes, has to prove that the quantity of HCl absorbed in the second washing bottle, is less than 5 % of the quantity absorbed in the first washing bottle.

This check should be performed for HCl concentration higher than $1 \text{ mg}\cdot\text{m}^{-3}$, in order to obtain a measurable amount of HCl in the secondary washing bottle.

NOTE : Sintered glass tips or plates are often used in order to achieve fine bubbling of gas into the absorption reagent. Annex A describes two types of suitable washing bottle.

5.4 A unit for suction and measuring the volume flow rate of the gas sampled, comprising :

<https://standards.iteh.ai/catalog/standards/sist/fce8d03-2a3d-4537-aa07->

5.4.1 A leak-tight pump with adjustable volume flow rate (using, e.g. a by-pass), enabling the required suction volume flow rate to be maintained under the measurement conditions. In choosing the pump, allowance has to be made for the substantial underpressure that can exist downstream of the filter used in the separator (see note and EN 1911-1).

NOTE : As an example, with a washing bottle as described in annex A, the sampling volume flow rate is of the order of $2 \text{ l}\cdot\text{min}^{-1}$ to $3 \text{ l}\cdot\text{min}^{-1}$. The underpressure measured downstream from the filter is of the order of 10 kPa to 40 kPa .

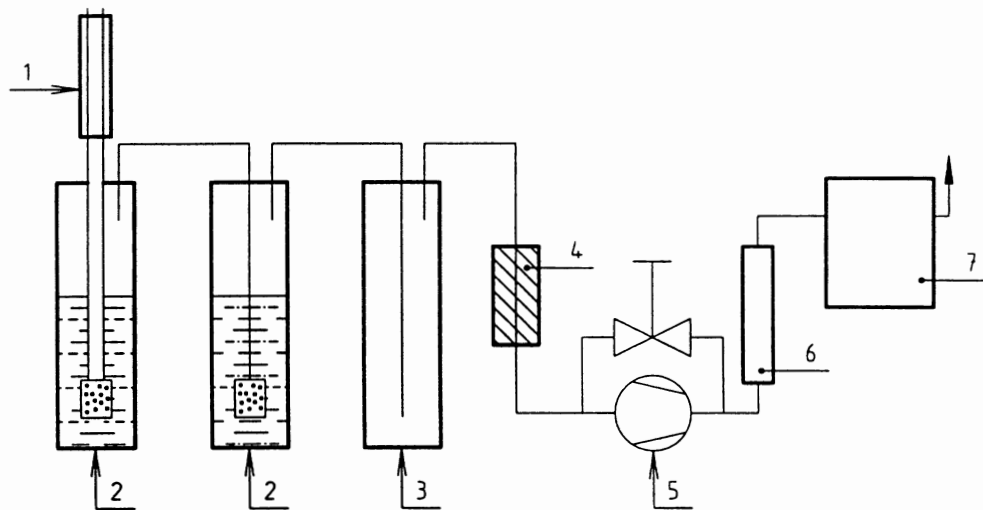
5.4.2 A flow meter for adjusting the volume flow rate during sampling (the volume flow rate value can be determined using the gas meter and a stop-watch).

5.4.3 A gas meter with means of measuring temperature and pressure. The gas meter can be either wet or dry type ; in the latter case, it has to have a drying device upstream (chemical desiccant or physical adsorbent) yielding a residual humidity of less than $10 \text{ g}\cdot\text{m}^{-3}$.

The maximum limits of measurement uncertainties shall be as follows :

- gas meter : 2 % ;
- temperature measurement : $2,5 \text{ }^\circ\text{C}$;
- pressure measurement : 1 kPa.

The total uncertainty of the measurement of the volume of the gas sampled is the combination of these individual values.



- | | | | | |
|---|-------------------------------------|---|---|---|
| 1 | connecting line (see 5.2) | 4 | cartridge with dessicant (optional) (see 5.5.4) | } suction unit and volume flow rate measurement |
| 2 | washing bottle(s) (see 5.3) | 5 | pump (see 5.4.1) | |
| 3 | guard bottle (optional) (see 5.5.3) | 6 | flow meter (see 5.4.2) | |
| | | 7 | gas meter (see 5.4.3) | |
| | | | | |

Figure 1 : Example of arrangement of equipment

5.5 Optional additional apparatus

5.5.1 A shut-off device for the connecting line (see 5.2) that allows isolation of the sampling line may be used. If such a device is used, it shall be capable of being rinsed completely after each sampling operation. Such a device shall not be used for measuring concentrations lower than $30 \text{ mg}\cdot\text{m}^{-3}$.

NOTE : It should be noted that this rinsing procedure is required because such a device forms a cold spot favouring the formation of condensation.

5.5.2 An additional bottle may be located just before the main washing bottle ; this arrangement prevents liquid being sucked back in the event of mishandling, but condensation will necessarily occur in it. If such a device is used, it shall be rinsed completely after each sampling operation, along with the tubes connecting it. In this case, the rinsing solution shall be incorporated with the solution contained in the main washing bottle. Such a device shall not be used for measuring concentrations lower than $30 \text{ mg}\cdot\text{m}^{-3}$.

5.5.3 Guard bottle, without sintered glass tip, that can be positioned after the secondary washing bottle (see figure 1) to collect any reagent carry over.

5.5.4 A cartridge filled with dessicant is normally located just before the unit for suction, in order to prevent any further moisture condensation.

6 Sampling procedure

6.1 General

Sampling shall be according to EN 1911-1 and as follows :

6.2 Preparation

6.2.1 Taking into account the expected concentration to be measured and the detection limit of available analytical method (see 9.1 of EN 1911-1:1998 and EN 1911-3), calculate the required sampled volume and sampling time. Calculate also, if relevant, the required sampling parameters (volume flow rate or sampling time) for each sampling point in the duct (see 6.1 of EN 1911-1:1998).

6.2.2 Prior to each serie of measurement, condition the whole sampling system as indicated in 7.2 of EN 1911-1:1998 for not less than 10 minutes, in order to bring it to the working conditions and ensure that it operates correctly. The washing bottle content used for the above conditioning shall not be analyzed.

6.2.3 Thoroughly wash the line (see 5.2) and the washing bottle(s) (see 5.3) to be used with the absorption reagent (see clause 4).

NOTE : As far as possible, use of the same pieces of equipment indiscriminately to measure low and high concentrations should be avoided (for example measurement upstream and downstream of a scrubber).

Sintered glass tips or plates may be heavily contaminated by chlorides, and are to be rinsed carefully.