INTERNATIONAL STANDARD

ISO 11844-3

First edition
2006-05-15

Corrosion of metals and alloys — Classification of low corrosivity of indoor atmospheres —

Part 3: Measurement of environmental parameters affecting indoor corrosivity

Corrosion des métaux et alliages — Classification de la corrosivité faible des atmosphères d'intérieur —

Partie 3: Mesurage des paramètres environnementaux affectant la corrosivité des atmosphères d'intérieur

Reference number
ISO 11844-3:2006(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11844-3 was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

ISO 11844 consists of the following parts, under the general title *Corrosion of metals and alloys — Classification of low corrosivity of indoor atmospheres*:

— *Part 1: Determination and estimation of indoor corrosivity*

— *Part 2: Determination of corrosion attack in indoor atmospheres*

— *Part 3: Measurement of environmental parameters affecting indoor corrosivity*

Introduction

This part of ISO 11844 deals with environmental parameters for the characterisation of indoor atmospheres and methods of measurement.

The environmental parameters for the characterisation of indoor atmospheres include more airborne contaminants than are normally used for the characterisation of the outdoor environment.

Measurement of environmental parameters is a way of characterising the corrosivity of the indoor atmosphere and will always be required if it is necessary to consider measures for reducing the corrosivity.

Corrosion of metals and alloys — Classification of low corrosivity of indoor atmospheres —

Part 3: Measurement of environmental parameters affecting indoor corrosivity

1 Scope

This part of ISO 11844 describes methods for measuring the environmental parameters used to classify the corrosivity of indoor atmospheres on metals and alloys.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7708:1995, *Air quality — Particle size fraction definitions for health-related sampling*

ISO 9225:1992, *Corrosion of metals and alloys — Corrosivity of atmospheres — Measurement of pollution*

ISO 11844-1, *Corrosion of metals and alloys — Classification of low corrosivity of indoor atmospheres — Part 1: Determination and estimation of indoor corrosivity*

EN 12341:1998, *Air quality — Determination of the PM_{10} fraction of suspended particulate matter — Reference method and field test procedure to demonstrate reference equivalence of measurement methods*

3 Principle

Different combinations of parameters affect the corrosivity of indoor atmospheres. Knowledge about possible sources of environmental effects must be obtained before decisions regarding the type of measurements needed are taken. The characterisation of indoor atmospheric corrosivity using environmental parameters is more complicated than measuring the corrosivity with metal specimens. However, in many cases, measurement of environmental parameters can give a good indication of how to establish the corrosivity of an environment and will, in combination with the information given in ISO 11844-1, give a good indication of the corrosivity categories for the materials in the selected environment.

4 Environmental parameters

In indoor atmospheres, corrosion processes are characterised by a more complex group of parameters than in outdoor atmospheres. In general, two groups of parameters should be measured:

— humidity and temperature;

— airborne contaminants, such as gases and particles.

Fluctuation in the temperature and humidity, particularly at higher humidity levels, may cause condensation on cooler surfaces. The frequency and time of condensation is an important factor for indoor corrosion.

The corrosion effects from these groups of parameters are usually interdependent. A particular level of humidity is needed before corrosion begins, and this can vary for different contaminants. Combinations of contaminants might accelerate the corrosion processes.

5 Humidity and temperature parameters

5.1 Relative humidity

Use continuous measuring devices such as hygrographs, thermohygrographs or logging hygrometers.

The measuring period is preferably one year, to cover seasonal variations. If shorter measuring periods are needed, select a measuring period where large variations in the relative humidity are expected. The period shall be at least one month per season.

The data shall be reported as monthly values. The average, maximum and minimum values for each month shall be reported.

The calculation of time with relative humidity in given intervals represents useful information.

5.2 Temperature

Use continuous measuring devices such as thermohygrographs or logging thermometers.

The measuring period is preferably one year, to cover seasonal variations. If shorter measuring periods are needed, select a measuring period where large variations in the temperature are expected. The period shall be at least one month per season.

The data shall be reported as monthly values. The average, maximum and minimum values for each month shall be reported.

The calculation of time with temperature in given intervals represents useful information.

5.3 Temperature–humidity complex

Continuous measurements of temperature and humidity give data for the calculation of frequency and time with condensation.

6 Airborne gas contaminants

6.1 Principle

The gas concentration or deposition can be measured by several techniques:

— continuous gas-concentration measuring instruments;

— average gas concentration with an active sampler and air pump;

— average gas concentration with a passive sampler;

— average gas-deposition equipment.

The results from concentration measurements are typically given in $\mu g/m^3$ and for deposition measurements as $mg/m^2.d$. The results obtained from the two types of measurements can be difficult to compare.

6.2 Placing of measuring equipment

The corrosivity of the indoor atmosphere may vary dramatically from one point to another in a room. Cooler areas may have moisture condensation with a high corrosion effect. Corners often have higher contaminant concentrations and lower air circulation than the rest of the room. If the problem is located in a specific area, measurements shall be performed in that location. If the problem is more general, then measurements should be made in a central open area in the room.

6.2.1 Continuous gas-measuring instruments

The instrument shall be placed so it is protected from unauthorised people. Polyethylene or polytetrafluoroethene (PTFE) tubing can be used to collect the air sample from the selected area of the room. The length of the tubing should not exceed 2 m.

6.2.2 Active sampler

The active sampler shall be placed according to the same rules as the continuous gas-measuring instrument.

6.2.3 Passive sampler

The passive sampler shall be placed in a part of the room where there is free movement of air. The sampling device shall be placed with the open end facing downward.

6.2.4 Gas-deposition equipment

The equipment shall be placed in a part of the room where there is free movement of air. The equipment shall be sheltered from settling particles that can interfere with the analyses of the gases.

6.3 Measuring methods and duration

6.3.1 Continuous measurement

The measurements shall preferably be carried out for one year to record the seasonal variation of the gas pollutants. The data from continuous measuring instruments shall be reported as monthly average values, together with the maximum and minimum values of the month.

Standard instruments have detection limits in a range from 4×10^{-5} to 1×10^{-6} volume fractions. Specially designed instruments may have detection limits of one-tenth of these values.