SLOVENSKI STANDARD
SIST EN ISO 9400:1999

01-oktober-1999

Zlitine na osnovi niklja – Ugotavljanje odpornosti proti interkristalni koroziji (ISO 9400:1990)

Nickel-based alloys - Determination of resistance to intergranular corrosion (ISO 9400:1990)

Legierungen auf Nickelbasis - Bestimmung der Beständigkeit gegen interkristalline Korrosion (ISO 9400:1990)

Alliages a base de nickel - Détermination de la résistance à la corrosion intergranulaire (ISO 9400:1990)

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77.060	Korozija kovin	Corrosion of metals

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English version

Nickel-based alloys - Determination of resistance to intergranular corrosion (ISO 9400:1990)

Alliages à base de nickel - Détermination de la résistance à la corrosion intergranulaire (ISO 9400:1990)

Legierungen auf Nickelbasis - Bestimmung der Beständigkeit gegen interkristalline Korrosion (ISO 9400:1990)

This European Standard was approved by CEN on 1994-12-15. 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.

The European Standards exist 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.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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

Foreword

The text of the International Standard from ISO/TC 107 "Metallic and other inorganic coatings" of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 262 "Protection of metallic materials against corrosion".

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of an identical text or by endorsement, at the latest by May 1996, and conflicting national standards shall be withdrawn at the latest by May 1996.

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

Endorsement notice

The text of the International Standard ISO 9400:1990 has been approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 9400

First edition
1990-12-01

Nickel-based alloys — Determination of resistance to intergranular corrosion

Alliages à base de nickel — Détermination de la résistance à la corrosion intergranulaire

Reference number
ISO 9400:1990(E)

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.

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.

International Standard ISO 9400 was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

Annex A of this International Standard is for information only.

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Nickel-based alloys — Determination of resistance to intergranular corrosion

Section 1: General

1.1 Scope

This International Standard specifies four methods for determination of the susceptibility of nickel-based alloys to intergranular corrosion.

These methods are for laboratory testing of susceptibility only, and a direct correlation with intergranular corrosion in actual service may not occur unless the service medium is the same as the test medium.

The methods covered are as follows:

— **Method A:** iron(III) sulfate – sulfuric acid test (section 2);

— **Method B:** copper – copper-sulfate – 16 % sulfuric acid test (section 3);

— **Method C:** hydrochloric acid test (section 4);

— **Method D:** nitric acid test (section 5);

The appropriate method for use with a given alloy, the selection of sensitizing treatment, and the acceptance criteria to be used in any evaluation have to be agreed between the buyer and seller of the alloy. As a guide, the methods specified in this International Standard should be applicable to those nickel-based alloys used for corrosion service and listed in ISO 6207[1].

1.2 Definition

For the purposes of this International Standard, the following definition applies.

nickel-based alloy: An alloy which includes nickel as the predominant element.

NOTE 1 This definition is consistent with that given in ISO 6372-1[2].

1.3 Apparatus

The recommended apparatus is shown in figure 1. The cold-finger type of condenser with standard Erlenmeyer flasks should not be used except for method D.

The following items are required.

1.3.1 Four-bulb Allihn or Soxhlet condenser with 45/50 ground glass joint.

1.3.2 Erlenmeyer flask, capacity 1 dm^3, with 45/50 ground glass joint.

NOTE 2 The use of round flasks with a heating jacket is also acceptable.

1.3.3 Glass cradle or other equivalent means of specimen support, such as glass hooks or stirrups. The cradle should have three or four holes in it, to increase circulation of the test solution around the specimen (see figure 1).

1.3.4 Boiling chips to promote uniform boiling and to prevent bumping.

For method A, these boiling chips should be made of pure alundum.

1.3.5 Silicone grease for application to the ground glass joint of the condenser and flask.

A PTFE sleeve for the joint is also acceptable.

1.3.6 Heating device such as an electrically heated hot-plate, for continuous boiling of the test solution.

1.3.7 Analytical balance capable of weighing to at least the nearest 1 mg (if mass loss is to be determined).

1.3.8 Stereoscopic microscope capable of magnification of 5× to 20×, with a good light source, for examination of the tested specimen (for method B).

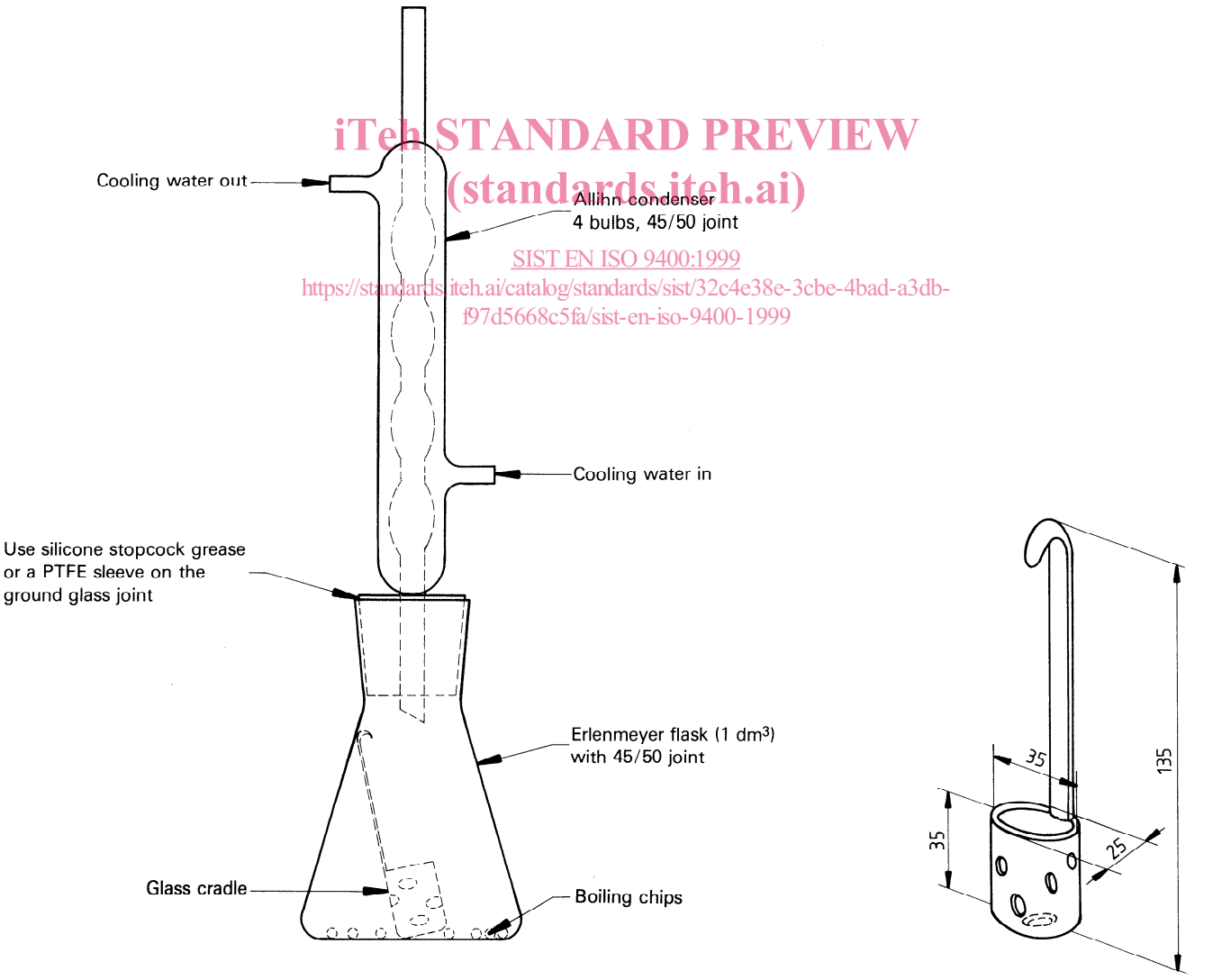
1.4 Preparation of test specimens

The following requirements for the preparation of test specimens are common to all four test methods. Additional requirements are given, where necessary, in the section describing the particular method.

A specimen having a total surface area of 20 cm^2 to 30 cm^2 is recommended. As-welded specimens should be cut so that no more than a 13 mm width of unaffected base metal is included on either side of the weld and heat-affected zone.

It is intended to test a specimen representing as nearly as possible the surface of the material used in service. Surface finishing should be performed only as required to remove foreign material and obtain a standard, uniform finish to represent the appropriate surface, while maintaining reasonable specimen size for convenience in testing. Normally, removal of more material than necessary will have little influence on the test results. However, in the special case of surface carburization (sometimes encountered, for instance, in tubing when carbonaceous lubricants are employed), it may only be possible to remove the carburized layer completely by heavy grinding or machining. Such treat-

Dimensions in millimetres



a) Assembled apparatus **b) Glass cradle**

Figure 1 — Recommended apparatus

ment of non-carburized test specimens is not permissible, except in tests undertaken to demonstrate specific surface effects. When samples are cut by shearing, the deformed metal shall be removed by grinding or machining prior to testing.

Prior to testing, the test specimens shall be degreased with a chlorine-free solvent and rinsed.

1.5 Sensitization of test specimens

1.5.1 Specimens to be given a thermal treatment prior to testing shall be clean of carbonaceous material prior to the thermal treatment. Otherwise, carburization may invalidate the test results. A light surface grinding or pickling followed by washing and rinsing in a non-chlorinated solvent should provide a clean surface. It is recommended that the effect of the pickling bath on the specimen be tested prior to the environmental exposure.

1.5.2 Specimens of alloys to be given a sensitization treatment prior to testing shall be placed in a furnace at the required temperature and for the required time, and shall then be water quenched. The use of a sensitization treatment shall be agreed upon between buyer and seller.

1.5.3 Specimens of alloys that are not given a sensitization treatment shall be tested in a condition simulating end-use conditions. Specimens from material that is intended to be welded or heat treated shall be welded or heat treated in nearly the same manner as the material will experience in fabrication or service. The specific treatment shall be agreed upon between buyer and seller.