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Austenitic stainless steels — Determination of resistance to intergranular corrosion — Part II : Corrosion test in a sulphuric acid/copper sulphate medium in the presence of copper turnings (Monypenny Strauss test)

Aciers inoxydables austénitiques — Détermination de la résistance à la corrosion intergranulaire — Partie II : Essai de corrosion en milieu acide sulfurique/sulfate de cuivre en présence de copeaux de cuivre (Essai dit de Monypenny Strauss)

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

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It has been approved by the Member Bodies of the following countries :

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Austenitic stainless steels — Determination of resistance to intergranular corrosion — Part II : Corrosion test in a sulphuric acid/copper sulphate medium in the presence of copper turnings (Monypenny Strauss test)

1 SCOPE

This International Standard specifies a method for the determination of the resistance to intergranular corrosion of austenitic stainless steels in a sulphuric acid/copper sulphate medium in the presence of copper turnings (Monypenny Strauss test). It also specifies the purposes which may be assigned to the test.

2 FIELD OF APPLICATION

The method is applicable only to austenitic stainless steels supplied in the form of cast, rolled or forged products and tubes and intended to be used in a mildly oxidizing acid medium (for example, sulphuric acid, phosphoric acid).

NOTE — It is important to note that the result of the corrosion test is only strictly valid for the corrosive medium used in the test. It constitutes a basis for estimating the resistance to intergranular corrosion but may not be used to check resistance to other forms of corrosion (general corrosion, by pitting, stress corrosion, etc.). It is necessary for the user to adapt the specified corrosion test to the use which will be made of the metal. This test should, in no case, be considered as an absolute criterion of the quality of the metal.

3 GENERAL

3.1 The term "intergranular corrosion test" denotes the corrosion test carried out by means of the preferential attacking of the grain boundaries.

Austenitic stainless steels may be subject to such an attack when they are kept at a temperature between about 500 and 800 °C. This heat cycle, which may provoke sensitization to intergranular corrosion, may occur during hot-forming (forging, rolling), as the result of incorrect solution treatment or during a welding operation.

NOTE — In the field of application of this test, the intergranular corrosion may be connected with the presence along the grain boundaries of chromium-depleted regions due, in general, to precipitation of chromium carbides.

3.2 The interpretation of the results shall form the subject of an agreement between the interested parties.

4 PURPOSE OF THE TEST

This intergranular corrosion test may have either of the purposes given in 4.1 and 4.2. If the order specifies this corrosion test, the purpose of the test shall be stated at the time of ordering.

4.1 Verification of the intrinsic resistance of the metal to intergranular corrosion

This verification applies only to steels defined in ISO 683/XIII[1], specified specially for resistance to intergranular corrosion (low carbon steels : $C \leqslant 0{,}03\ \%$, and stabilized steels).[2] The metal is inspected after having undergone a heat treatment for sensitization. (See clause 5.)

4.2 Inspection of the efficiency of the solution treatment

This inspection is only carried out on thin products for which the cooling speed may be made sufficiently rapid. It is only of interest for the steels which are not defined in 4.1. The metal is inspected in the state in which it is delivered to the user, without heat treatment for sensitization.

5 HEAT TREATMENT FOR SENSITIZATION

In order to verify the intrinsic resistance to intergranular corrosion (see 4.1), it is necessary to carry out a heat treatment for sensitization for stabilized steels and steels with a very low carbon content. This sensitization treatment is usually obtained by maintaining the test piece for 30 min at a temperature of 700 ± 10 °C followed by rapid cooling (in water).

Other sensitization treatments, for example for the preparation of welded test pieces, may be provided for by agreement between the interested parties.

1) ISO 683/XIII, *Heat-treated steels, alloy steels and free-cutting steels — Part 13 : Wrought stainless steels.*

2) By agreement between the interested parties, this test can equally be applied to steels having a maximum carbon content of 0,07 %.