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Investigation of brazeability with spreading and gap-filling test

Étude de l'aptitude au brasage au moyen d'un essai de mouillage et de capillarité

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 13, *Brazing materials and processes*.

This second edition cancels and replaces the first edition (ISO 5179:1983), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the spreading test has been added;

— the T-joint test has been added.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at https://www.iso.org/members.html.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

Introduction

When designing and making a brazed joint, quite apart from the physical properties of the brazing alloy and the mechanical properties which can be expected from the joint, it is important to know the brazeability as a function of the operating conditions adopted. The determination of wettability has already been the subject of numerous investigations and proposals regarding testing methods. In carrying out these investigations, the most frequently used methods are based on the spreading of a drop, or on the measurement of surface tension, but they in fact only take one element of the problem into account. It is important to know not only the way in which the liquid filler metal wets the surface of the parent material but also how this same liquid filler metal behaves in a given gap between the joint components when diffusion takes place.

In this document, brazeability is defined as a total degree of joinability. The joinability consists of both wettability and fluidity to permit distribution into a joint, i.e. ability to fill a joint gap, although total brazeability includes performance of the physical, and mechanical properties in services.

As the tests to be designated for brazeability, three methods are introduced in this document. The traditional varying gap test is described for the most real ability to fill the gap, but it requires a private sample preparation and special evaluation technique with X-ray device. The T-joint test is newly developed to investigate ability to fill the gap in an easier manner. It can be easily operated at industrial laboratories. Moreover, a simple spreading test is designated for practical convenience.

Investigation of brazeability with spreading and gap-filling test

1 Scope

This document specifies three test methods for investigating brazeability.

A spreading test shows testing method with measurement of the spread area of the filler metals.

A T-joint test describes a scheme to construct a T-shape design by the test pieces and a testing method.

A varying gap test describes a test piece and a testing method for assessing the influence of the various parameters which can influence brazing during manufacture as a function of clearances.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 857-2, *Welding and allied processes — Vocabulary — Part 2: Soldering and brazing processes and related terms*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 857-2 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Description of the test piece

4.1 Spreading test piece

The design of the spreading test piece is shown in Figure 1. By using this configuration, it is possible to investigate flow characteristics on the plate.

The test piece consists of a rectangular plate in the following dimensions:

— thickness, (2,0 ± 1,0) mm;

— width, (40 ± 10) mm;

— length, (40 ± 10) mm.

The filler metal (about 10 mm^3) is put on the centre of the plate.

If it requires fluxing at the temperature of the test, then the flux is also put on the plate.