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# Brazing — Imperfections in brazed joints

*Brasage fort — Défauts dans les assemblages réalisés par brasage fort*

Reference number
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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.

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 document 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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18279:2003), which has been technically revised.

The main changes are as follows:

— An additional quality level for brazed joint imperfections has been added in Annex B in order to reflect the technical progress that has been achieved over the past decade as well as the need for increased requirements regarding reliability of brazed joints for critical applications. Quality levels have been revaluated.

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 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.


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# Introduction

Brazed joints usually contain imperfections of various types, some of which are detrimental in almost every case while others can be detrimental or harmless, depending entirely on the service requirements of the joint in question. Therefore, it is often necessary to classify the imperfections in a brazed joint and then try to assess the significance of their effects on the behaviour of the joint in service. The classification is relatively easy and Table 1 describes the imperfections that most commonly occur. The assessment of significance is not easy (see also Annex A).

For welded joints, there has been extensive work carried out for many years on the significance of imperfections in service; however, such work has not been carried out on brazed joints. Moreover, the work on welded joints is only rarely relevant to brazed joints, mainly because of differences in geometry and stressing. Therefore, this document cannot give definitive quality levels for brazed joints. These can only be produced as experience is gained from industrial applications. However, Annex B gives some suggestions for quality levels for general applications, which can be of help where detailed information is not available. The use of quality levels can only be successful if the imperfections that are relevant to the application of the brazed joint are determined.

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# Brazing — Imperfections in brazed joints

## 1 Scope

This document details a classification of imperfections that can occur in brazing joints. In addition, guidance is provided on quality levels and suggested limits for imperfections are detailed.

For requirements not covered by this document, reference can be made to other sources, such as statutory regulations, codes of practice and technical delivery conditions.

No information is given on how imperfections are to be assessed in individual cases because this depends on the requirements for the particular brazed joint. These imperfections are not always detectable by the use of non-destructive testing alone.

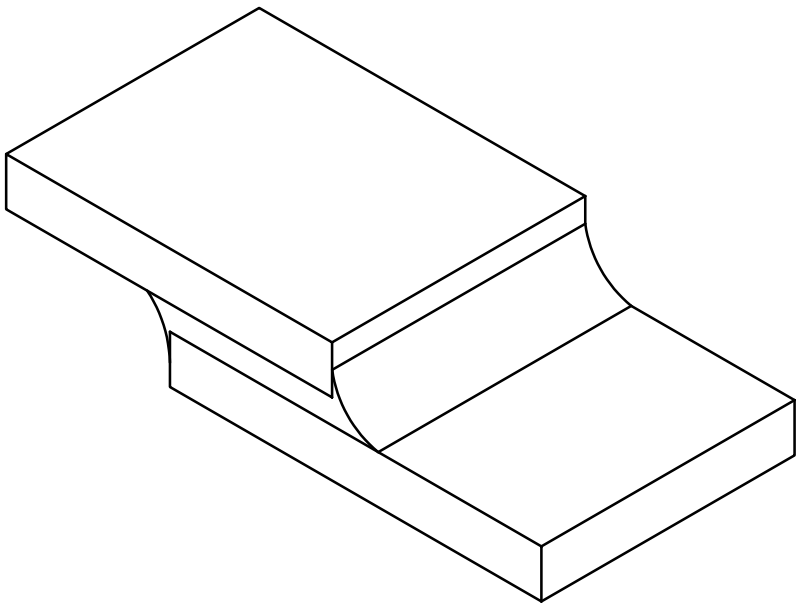
This document covers only imperfections that can occur in connection with brazing without the effect of any additional service loads. Only the type, shape and position of such imperfections are covered; no indication is given of the conditions of occurrence or causes.

For requirements for brazed joints which are relevant and essential to the particular function of the component, reference can be made to the relevant documentation, for example manufacturing documents or procedure sheets.

It is important that these requirements be precisely prescribed and that conformity with them be verifiable. Conformity can be established by testing either the brazed assembly itself or a test piece produced under comparable conditions.

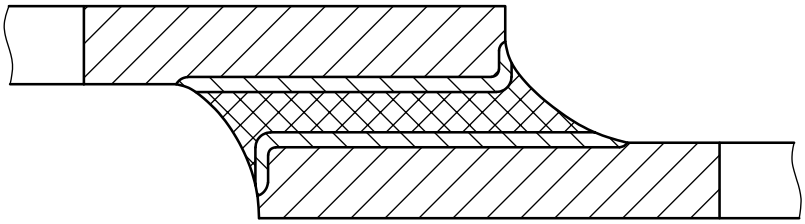
This document does not specify requirements for acceptance levels for imperfections, since these will differ very markedly depending on the application, but it does suggest some quality levels which can be of value in the absence of more detailed information.

For the purposes of this document, the areas of a brazed assembly are designated as shown schematically in Figure 1.



**a) Simple brazed assembly**

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**b) Section through assembly in a)**

**Key**

| | |
|---|---|
| | parent material |
| | parent material affected by brazing [heat-affected zone (HAZ)] |
| | diffusion-transition zone |
| | braze metal |

NOTE Extent of HAZ will vary with materials and brazing process.

**Figure 1 — Schematic of brazed assembly**

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

**3.1**
**imperfection**
irregularity in the brazed joint or deviation from the intended relative positions of the parts joined by brazing and from the intended shape of the brazed component, where such deviations are dependent on the brazing

EXAMPLE For an example of an imperfection, see Figure 2.


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