TECHNICAL REPORT

ISO/TR 20580

First edition
2022-07

Preparation of metallographic specimens

Confection des éprouvettes métallographiques

Reference number
ISO/TR 20580:2022(E)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 7, *Methods of testing (other than mechanical tests and chemical analysis)*.

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Preparation of metallographic specimens

1 Scope

This document presents a list of common practices in preparation methods of metallographic specimens for optical and scanning electron microscopy, including preliminary preparation, grinding and polishing of specimens as well as microstructure revelation methods covering the optical method, etching methods (chemical, electrolytic, constant potential, ion sputtering and high temperature relieving) and the interface layer method [1][2].

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Preliminary preparation

4.1 Selection of metallographic specimens

4.1.1 General

Because the metallographic examination serves a specified purpose that differs from case to case, there is no one single way to select and prepare specimens. However, it is the accepted state of the art to select specimens that are representative of the material that is being studied. The location, type of section and number of the specimens to be studied are usually dictated by the manufacture method of metals, examination intent or purpose, related standards or agreement upon enquiry.

4.1.2 General studies or routine work

Specimens are generally chosen from locations most likely to reveal the maximum variations within the material under study [3]. For example, specimens could be taken from a casting in the zones wherein maximum segregation might be expected to occur as well as specimens from sections where segregation could be at a minimum [4]; in the examination of strip or wire, test specimens are often taken from each end of the coils [5]; heat or surface treated specimens are often taken so as to include all the heat or surface treated layers [6]; welding specimens often incorporate the welding seam, heat affected zone and base metal [7].

4.1.3 Study of failures

In nearly all situations, test specimens are taken as closely as possible to the fracture or to the initiation of the failure. Before taking the metallographic specimens, study of the fracture surface is completed, or at the very least, the fracture surface is documented [8]. In many cases, specimens are taken from a sound area for a comparison of structures and properties.

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