
**Implants for surgery — Metallic
materials — Classification of
microstructures for alpha+beta titanium
alloy bars**

*Implants chirurgicaux — Matériaux métalliques — Classification des
microstructures des barres en alliages de titane alpha+bêta*



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Foreword

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Introduction

Some ISO Standards on alpha+beta titanium implant materials refer to a set of microstructural configurations provided in the ETTC2 brochure which was published first in 1979 by the Technical Committee of European Titanium Producers ^[1]. A reprint of ETTC2 containing some additions was made available in 1995.

In contrast to homogeneous material structures for which standards are available to determine the grain size of the microstructures (ISO 643, ASTM E112), no standards exist for the classification of the more complex alpha+beta titanium microstructures, although the alpha+beta alloys are the most frequently used technical titanium materials.

This International Standard follows the repeated request to make available the relevant set of microstructures of alpha+beta titanium alloy bars from the ETTC 2 publication as a standard document for easy access.

The ISO Technical Committee ISO/TC 150/SC 1 *Materials*, expresses its gratitude to the publishers of the ETTC 2 brochure for granting the reproduction of selected micrographs for the purpose of this International Standard.

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IMPORTANT — For the correct identification of microstructures, it is necessary to use reference micrographs of suitable quality and precise dimensions as contained in this International Standard. Owing to the fact that electronic copies of these reference micrographs are subject to change when viewed on screen or printed, it is recommended that only the micrographs contained in printed copies of this International Standard purchased from ISO or ISO members and their distributors be used for purposes of comparison.

1 Scope

This International Standard provides a catalogue of metallographic photomicrographs for the designation of microstructures of alpha+beta titanium alloys in the form of bars that are intended for the manufacture of surgical implants. This International Standard is applicable to bars of diameter no greater than 100 mm or the equivalent.

This catalogue of microstructures is intended to serve as an aid in the communication on general types of microstructures of alpha+beta titanium alloy bars. The designation of the microstructures is based on morphological appearance. Actual microstructures can also appear as a combination of the type of micrographs shown.

This International Standard does not contain specific microstructural requirements. The catalogue includes photomicrographs of desirable and undesirable microstructures that can develop during the processing of alpha+beta titanium alloys. The selection of acceptable microstructures is subject to agreement under the consideration of implant application and relevant material standards.

2 Normative references

The following referenced documents are indispensable for the application 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.

ASTM E407-99, *Standard Practice for Microetching Metals and Alloys*

3 Terms and definitions

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

3.1

alpha+beta titanium alloys

titanium alloys composed of alloying elements which propagate the stabilization of the titanium alpha/beta phase with hexagonal and body-centered crystal atomic structures, respectively

NOTE The constitution diagrams of these alloys present typically alpha+beta phase regions that are stable up to room temperature (see also 4.1).