
**Metallic and other inorganic
coatings — Measurement of Young's
modulus of thermal barrier coatings
by beam bending**

*Revêtements métalliques et autres revêtements inorganiques —
Mesurage du module de Young des revêtements barrières thermiques
par flexion de poutre*

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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 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 on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 107, *Metallic and other inorganic coatings*.

Introduction

Thermal barrier coatings are highly advanced material systems, generally applied to surfaces of hot-section components made of nickel or cobalt-based superalloys, such as combustors, blades, and vanes of power-generation gas turbines in thermal power plants and aero-engines operated at elevated temperatures.

The function of these coatings is to protect metallic components for extended periods at elevated temperatures by employing thermally insulating materials which can sustain an appreciable temperature difference between load bearing alloys and coating surfaces. These coatings permit the high-temperature operation by shielding these components, thereby extending their lives.

Although Young's modulus is an important property of thermal barrier coatings, the existing ISO standard only describes a method for measuring the Young's modulus of monolithic ceramics.

This International Standard specifies a method for measuring the Young's modulus of thermal barrier coatings that consist of multilayers formed on substrate by thermal spraying.

The measuring procedure of this International Standard is applicable for the measurement of the Young's modulus of various thermally sprayed coatings.

Metallic and other inorganic coatings — Measurement of Young's modulus of thermal barrier coatings by beam bending

1 Scope

This International Standard specifies a method for measuring the in-plane Young's modulus, at room temperature, of thermal barrier coatings formed on substrates by thermal spraying.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*

ISO 3611, *Geometrical product specifications (GPS) — Dimensional measuring equipment: Micrometers for external measurements — Design and metrological characteristics*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions, and surface texture parameters*

ISO 13385 (all parts), *Geometrical product specifications (GPS) — Dimensional measuring equipment*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 14188, *Metallic and other inorganic coatings — Test methods for measuring thermal cycle resistance and thermal shock resistance for thermal barrier coatings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14188 and the following apply.

3.1

thermal barrier coating

TBC

two-layer coating consisting of a metallic bond coat (BC) and a ceramic top coat (TC), in order to reduce heat transfer from outside of the top coat through the coating to the substrate

Note 1 to entry: See [Figure 1](#).