

This is a preview of "ISO 18555:2016". [Click here to purchase the full version from the ANSI store.](#)

First edition  
2016-02-01

---

---

## **Metallic and other inorganic coatings — Determination of thermal conductivity of thermal barrier coatings**

*Revêtements métalliques et autres revêtements inorganiques —  
Détermination de la conductivité thermique des revêtements  
barrières thermiques*



Reference number  
ISO 18555:2016(E)

© ISO 2016

This is a preview of "ISO 18555:2016". [Click here to purchase the full version from the ANSI store.](#)



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

This is a preview of "ISO 18555:2016". [Click here to purchase the full version from the ANSI store.](#)

## Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>4</b>
<b>5 Apparatus for measuring thermal diffusivity</b> .....	<b>4</b>
<b>6 Specimen</b> .....	<b>5</b>
6.1 Shape and dimensions.....	5
6.2 Surface treatment.....	7
<b>7 Measuring procedure</b> .....	<b>7</b>
7.1 Specimen thickness.....	7
7.2 Thermal diffusivity.....	7
7.2.1 Measurement of temperature-rise curve.....	7
7.2.2 Calculation of thermal diffusivity of substrate.....	7
7.2.3 Calculation of thermal diffusivities of BC and TC.....	7
7.3 Specific heat capacity.....	10
7.4 Bulk density.....	10
<b>8 Thermal conductivities of BC and TC</b> .....	<b>11</b>
<b>9 Report</b> .....	<b>11</b>
9.1 Items to be reported.....	11
9.2 Additional items to be selected for the report.....	12
<b>Annex A (informative) Areal heat diffusion time method</b> .....	<b>13</b>
<b>Annex B (informative) Examples of theoretical temperature-rise curves</b> .....	<b>16</b>
<b>Bibliography</b> .....	<b>18</b>

## 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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

This is a preview of "ISO 18555:2016". [Click here to purchase the full version from the ANSI store.](#)

## Introduction

Thermal barrier coatings are highly advanced material systems. They are generally applied to surfaces of hot-section components made of nickel or cobalt-based superalloys, such as combustors, blades, 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 thermal conductivity is one of the most important properties of thermal barrier coatings, the existing International Standard (ISO 18755:2005) includes only the method for determining the thermal diffusivity of monolithic ceramics, regarding the heat conduction in thermal barrier coating.