



BSI Standards Publication

**Corrosion of metals and alloys — Test method
for high-temperature corrosion testing of
metallic materials by thermogravimetry
under isothermal or cyclic conditions**

National foreword

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Corrosion of metals and alloys — Test method for high-temperature corrosion testing of metallic materials by thermogravimetry under isothermal or cyclic conditions

*Corrosion des métaux et alliages — Méthode d'essai de corrosion à
haute température des matériaux métalliques par thermogravimétrie
en conditions isothermes ou cycliques*



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Foreword

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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metal and alloys*.

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Introduction

Oxidation and corrosion tests at high temperature on metallic materials are often performed according to the isothermal or to the cyclic exposure methods specified in [ISO 21608](#)^[6] and [ISO 13573](#)^[5] respectively. These methods rely on measuring the mass change at the end of the exposure. An alternative approach is to employ a thermogravimetric method which enables a continuous monitoring and recording of mass as a function of time under isothermal or cyclic operation.

Under isothermal exposure the thermogravimetric analysis allows the measurement of mass gain due to oxidation or corrosion and of mass loss due to volatilization. The corresponding kinetics can be assessed thereby distinguishing between mass gain due to oxidation or mass loss due to volatilization. Moreover, it allows the detection of a mass change due to the loss of a part of the oxide scale during the high temperature dwell or during cooling. Re-oxidations subsequent to the formation of cracks in the oxide scale can also be detected.

Under thermal cycling conditions the mass change of the sample can be measured as well. The corresponding kinetics can be assessed thereby distinguishing between mass gain due to oxidation and mass loss due to spalling. The occurrence of breakaway oxidation can be also precisely identified and the test is fully automated without the need to take the samples out of the corrosive atmosphere for mass measurements.

The main areas of application are the following:

- the test method describes the general conditions of analysis for materials such as pure metals and metallic alloys using thermogravimetric techniques;
- the thermogravimetric test can be used in the isothermal mode (mass variation versus time at a given temperature) or in the cyclic mode (mass variation versus time according to defined thermal cycles).