AS 1774.4.5:2026
ISO 20182:2024

Australian STANDARD®

STANDARDS Australia

Refractories and refractory materials — Physical test methods

Part 4.5: Refractory test-piece preparation — Gunning refractory panels by the pneumatic-nozzle mixing type guns (ISO 20182:2024, IDT)



AS 1774.4.5:2026

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- Australasian Institute of Mining & Metallurgy
- Australian Ceramic Society
- Australian Foundry Institute
- Australian Industry Group
- Bureau of Steel Manufacturers of Australia
- Cement Industry Federation
- Institute of Refractories Engineers
- Materials Australia
- Minerals Council of Australia
- University of New South Wales

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This page explains the meaning of the language and structure of this Standard.

Refer to Standards Australia's Standardisation Guide 006 for more details about drafting rules.

Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Standards Australia Committee MN-007, Refractories and Refractory Materials, to supersede AS 1774.4.5-2002, *Refractories and refractory materials — Physical test methods, Method 4.5: Preparation of test pieces — Gunning refractories.*

The objective of this document is to describe the procedure for the preparation of test panels from refractory materials by gunning through pneumatic nozzle mixing type guns at ambient temperatures. The test pieces are for the determination of properties on as-gunned products prepared under either "standard conditions" (as required for quality assurance or product development) or "site conditions". In the case of "site conditions", the purpose of the testing is to establish the properties pertaining to a given installation or a given set of installation conditions. In this case, the panel can be obtained during the on-site installation. Parameters such as ambient temperature, gunning elevation, air pressure and curing conditions (temperature, orientation of the panel) applicable during the preparation of the panel are as near as possible to the respective parameters pertaining to the site installation.

It is also possible to simulate certain "site conditions" by gunning panels off-site, for example, in a laboratory setting. This is acceptable under this document, by agreement between interested parties.

This document does not apply to plastic gunning mixes and to those mixes that contain aggregates that are susceptible to hydration.

This document does not apply to shotcrete type mixes, which are dealt with in AS 1774.4.6:2025.

This document is identical to, and has been reproduced from, ISO 20182:2024, *Refractory test-piece preparation — Gunning refractory panels by the pneumatic-nozzle mixing type guns.*

As this document has been reproduced from an international document, a comma is to be read as a full point when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms "normative" and "informative" are used in Standards to define the application of the appendices or annexes to which they apply. A "normative" appendix or annex is an integral part of a Standard, whereas an "informative" appendix or annex is only for information and guidance.

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 33, *Refractories,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 187, *Refractory products and materials,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 20182:2008), which has been technically revised.

The main changes are as follows:

— Scope has been broadened to include preparation of gunned panels under both controlled laboratory (“standard”) conditions and “site” conditions; this broadening of scope aligns with that adopted in ISO18886;

— in 6.5, details of two acceptable support plates have been amended;

— in Clause 4, provision has been made for the use of a gunning liquid other than water and examples of liquids other than water that might typically pertain, are given;

— Clause 8 has been revised;

— in Clause 9 test report item a), details of any stainless-steel wire fibre additions are to be reported;

— A.2 has been amended, specifying that it is the as-cured mass of the panel that is to be used as the basis for rebound calculations.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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WARNING This document can involve the use of hazardous materials, operations and equipment. It does not attempt to address the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices, and to determine the applicability of regulatory limitations prior to use.

1 Scope

This document describes the procedure for the preparation of test panels from refractory materials by gunning through pneumatic nozzle mixing type guns at ambient temperatures. The test pieces are for the determination of properties on as-gunned products prepared under either “standard conditions” (as required for quality assurance or product development) or “site conditions”. In the case of “site conditions”, the purpose of the testing is to establish the properties pertaining to a given installation or a given set of installation conditions. In this case, the panel can be obtained during the on-site installation. Parameters such as ambient temperature, gunning elevation, air pressure and curing conditions (temperature, orientation of the panel) applicable during the preparation of the panel are as near as possible to the respective parameters pertaining to the site installation.

It is also possible to simulate certain “site conditions” by gunning panels off-site, for example, in a laboratory setting. This is acceptable under this document, by agreement between interested parties.

This document does not apply to plastic gunning mixes and to those mixes that contain aggregates that are susceptible to hydration.

This document does not apply to shotcrete type mixes, which are dealt with in ISO 18886.

2 Normative references

The following documents are referred to in the text in such a way that some or all their content constitutes requirements 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.

ISO 836, *Terminology for refractories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 836 and the following apply.

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/

3.1
gun
assembly, essentially comprising a chamber into which the refractory is added, together with a mechanism that controls the flow of the material through the unit

Note 1 to entry: Depending on the type used, the gun may be open at the top, or a closed pressurized unit may be used.

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