# Refractory Installation Quality Control—Inspection and Testing Monolithic Refractory Linings and Materials

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Important Information Concerning Use of Asbestos or Alternative Materials

Asbestos is specified or referenced for certain components of the equipment described in some API standards. It has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. It has also been a universal sealing material, compatible with most refining fluid services.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite, Anthophyllite, and Actinolite, 29 Code of Federal Regulations Section 1910.1001; the U.S. Environmental Protection Agency, National Emission Standard for Asbestos, 40 Code of Federal Regulations Sections 61.140 through 61.156; and the U.S. Environmental Protection Agency (EPA) rule on labeling requirements and phased banning of asbestos products (Sections 763.160–179).

There are currently in use and under development several substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

SAFETY AND HEALTH INFORMATION WITH RESPECT TO PARTICULAR PRODUCTS OR MATERIALS CAN BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT PRODUCT OR MATERIAL, OR THE MATERIAL SAFETY DATASHEET.

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## Introduction

The purpose of this standard is to define the minimum requirements for the installation of monolithic refractory linings and to provide guidance for the establishment of quality control elements necessary to achieve the defined requirements.

# Refractory Installation Quality Control—Inspection and Testing Monolithic Refractory Linings and Materials

## 1 Scope

This standard provides installation quality control procedures for monolithic refractory linings and may be used to supplement owner specifications. Materials, equipment, and personnel are qualified by the methods described, and applied refractory quality is closely monitored, based on defined procedures and acceptance criteria. The responsibilities of all parties involved in the quality control process are also defined.

## 2 Normative References

The following documents are referred to in the text in such a way that some or all of 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 addenda) applies.

API Standard 560, *Fired Heaters for General Refinery Service*

ASTM C113, *Standard Test Method for Reheat Change of Refractory Brick*

ASTM C133, *Standard Test Methods for Cold Crushing Strength and Modulus of Rupture of Refractories*

ASTM C181, *Standard Test Method for Workability Index of Fireclay and High-Alumina Plastic Refractories*

ASTM C704/C704M, *Standard Test Method for Abrasion Resistance of Refractory Materials at Room Temperature*

ASTM C1054, *Standard Practice for Pressing and Drying Refractory Plastic and Ramming Mix Specimens*

SSPC SP 3, *Power Tool Cleaning SSPC SP 7/NACE No. 4, Brush-Off Blast Cleaning*

## 3 Terms and Definitions

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

NOTE See Annex A for a glossary of additional refractory terms that are not referenced in this standard.

**3.1**
**abrasion resistance**
The ability to withstand the effects of eroding particles for an extended period without significant loss of material or other damage.

EXAMPLE A vapor stream containing solid particles.

NOTE For refractory materials, abrasion resistance is measured in the form of eroded volume loss in accordance with ASTM C704/C704M.

**3.2**
**acceptance quality limit**
The acceptable limit of defect samples in a lot or batch, expressed as a percentage or ratio.

**3.3**
**applicator qualification testing**
Preinstallation simulation of production work that is visually inspected, sampled, and tested to verify that application equipment and personnel are capable of meeting specified quality standards.