



PROCESS  
INDUSTRY  
PRACTICES

TECHNICAL REVISION  
June 2021

**Refractory**

**PIP RFSM1000**  
**Monolithic Refractory Material Specification**

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In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determination concerning fitness for purpose and particular matters or application of the Practice to a particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

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## PIP RFSM1000 Monolithic Refractory Material Specification

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## 1. Scope

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This Practice describes the requirements for certification and prequalification of the refractory materials and accessories used to construct monolithic refractory linings in process equipment and piping. It provides a basis for: selection, purchase, and quality control of refractory materials and metal fiber reinforcement. Included are: the material property, testing, documentation, storage, and shipping requirements for industrial refractory lining materials and metal fiber reinforcement used to construct monolithic refractory linings. These materials can be installed by gunning, casting, pumping, or hand packing as specified.

## 2. References

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Applicable parts of the following Practices and industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles are used herein where appropriate.

### 2.1 Process Industry Practices (PIP)

- PIP RFSM2000 – *Monolithic Refractory Installation Specification*
- PIP VESPMI01 – *Positive Material Identification Specification*

### 2.2 Industry Codes and Standards

- American Petroleum Institute (API)
  - API Standard 936 – *Refractory Installation Quality Control – Inspection and Testing Monolithic Refractory Linings and Materials*
- ASTM International (ASTM)
  - ASTM A820/A820M – *Standard Specification for Steel Fibers for Fiber-Reinforced Concrete*
  - ASTM C24 – *Standard Test Method for Pyrometric Cone Equivalent (PCE) of Fireclay and High-Alumina Refractory Materials*
  - ASTM C71 – *Standard Terminology Relating to Refractories*
  - 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 C134 – *Standard Test Methods for Size, Dimensional Measurements, and Bulk Density of Refractory Brick and Insulating Firebrick*
  - ASTM C179 – *Standard Test Method for Drying and Firing Linear Change of Refractory Plastic and Ramming Mix Specimens*
  - ASTM C201 – *Standard Test Method for Thermal Conductivity of Refractories*
  - ASTM C417 – *Standard Test Method for Thermal Conductivity of Unfired Monolithic Refractories*
  - ASTM C704 – *Standard Test Method for Abrasion Resistance of Refractory Materials at Room Temperature*
  - ASTM C865 – *Standard Practice for Firing Refractory Concrete Specimens*
  - ASTM E1172 – *Standard Practice for Describing and Specifying a Wavelength-Dispersive X-Ray Spectrometer*