PIP RFTB1000
Brick Refractory Installation Qualification, Inspection, and Testing
PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

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. Determinations concerning fitness for purpose and particular matters or application of the Practice to 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.

This Practice is subject to revision at any time.

© Process Industry Practices (PIP), Construction Industry Institute, The University of Texas at Austin, 3925 West Braker Lane (R4500), Austin, Texas 78759. PIP Member Companies and Subscribers may copy this Practice for their internal use. Changes or modifications of any kind are not permitted within any PIP Practice without the express written authorization of PIP. Authorized Users may attach addenda or overlays to clearly indicate modifications or exceptions to specific sections of PIP Practices. Authorized Users may provide their clients, suppliers and contractors with copies of the Practice solely for Authorized Users’ purposes. These purposes include but are not limited to the procurement process (e.g., as attachments to requests for quotation/purchase orders or requests for proposals/contracts) and preparation and issue of design engineering deliverables for use on a specific project by Authorized User’s client. PIP’s copyright notices must be clearly indicated and unequivocally incorporated in documents where an Authorized User desires to provide any third party with copies of the Practice.

PUBLISHING HISTORY
January 2013 Issued
March 2013 Editorial Revision

Not printed with State funds
Table of Contents

1. Introduction ....................................................................................................... 2
   1.1 Purpose ....................................................................................................................... 2
   1.2 Scope ......................................................................................................................... 2

2. References ........................................................................................................ 2
   2.1 Process Industry Practices .......................................................................................... 2
   2.2 Industry Codes and Standards .................................................................................... 2

3. Definitions ......................................................................................................... 2

4. Requirements .................................................................................................... 3
   4.1 General ....................................................................................................................... 3
   4.2 Brick Refractory Lining Anchors .................................................................................. 3
   4.3 Confirmation of Materials by Purchaser ........................................................................ 3
   4.4 Surface Preparation .................................................................................................... 4
   4.5 Installer Prequalification ............................................................................................ 4
   4.6 Installation Inspection and Testing ............................................................................... 4
   4.7 Lining Repairs .......................................................................................................... 5

Data Form
   RFTB1000-F – Inspection Hold Point and Sign-Off Schedule
1. Introduction

1.1 Purpose

This Practice provides requirements for quality control and quality assurance for the installation of refractory brick.

1.2 Scope

This Practice covers the general requirements for inspection of brick refractory linings. Inspection methods include documentation review, in-progress installation inspection, and final inspection of the completed lining.

2. References

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 RFSB1000 – Brick Refractory Material Specification (under development)
- PIP RFSB2000 – Brick Refractory Installation Specification
- PIP RFIA1000 – Refractory Anchor and Accessory Installation Details (under development)
- PIP RFSA1000 – Refractory Anchor and Accessories Specification (under development)
- PIP RFTA1000 – Refractory Anchor and Accessories Installation Qualification, Inspection, and Testing

2.2 Industry Codes and Standards

- American Society for Testing and Materials (ASTM)

3. Definitions

With the exception of the terms listed in this section, terms used in this Practice are defined in accordance with ASTM C71. If a definition as used in this Practice differs from the one listed in the referenced documents, the modified definition is included in the following listing:

installer: Party responsible for installing the brick refractory. This includes each individual brick layer, who is pre-qualified/certified before allowed to install brick.

installer’s inspector: Installer’s authorized representative, responsible for the quality control of all materials, installations, and workmanship provided by the installers, and any of the installer’s subcontractors or vendors

owner: Party who owns the facility wherein the refractory lined equipment will be used
purchaser: Party who awards the contract to the installer. The purchaser may be the owner or the owner’s authorized agent.

purchaser’s inspector: Purchaser’s authorized representative with authority to act in the interest of, and on behalf of, the purchaser in all quality assurance matters. The inspector shall be experienced in the evaluation of brick installation techniques and completed linings.

4. Requirements

4.1 General

4.1.1 Conflicts, Exceptions, Deviations, and Substitutions

4.1.1.1 All conflicts between the referenced documents and this Practice shall be submitted in writing to purchaser for clarification and resolution before proceeding.

4.1.1.2 All exceptions, deviations, and substitutions to the requirements specified herein and in referenced documents shall be approved by purchaser.

4.1.2 Regulations and Material Safety Data Sheets (MSDS)

4.1.2.1 Brick refractory materials shall be in accordance with all applicable federal, state, and local codes and regulations on storage, handling, safety, and environmental requirements.

4.1.2.2 The latest issue of the brick refractory material manufacturer’s MSDS shall be provided for each installation site and complied with during the installation of the brick refractory.

4.1.3 Documentation

Brick refractory material manufacturer’s product data sheets and the approved installation procedure in accordance with PIP RFSB2000 shall be provided for each installation site and complied with during the installation of the brick refractory.

4.1.4 Notification

Purchaser’s inspector shall be given adequate notice (e.g., time and location) before the start of all work and hold points, so that the inspector can witness the work.

4.2 Brick Refractory Lining Anchors

The qualification of anchor welders, selection of anchors, anchor installation, and anchor testing and inspection shall be in accordance with PIP RFIA1000, PIP RFSA1000, and PIP RFTA1000.

4.3 Confirmation of Materials by Purchaser

4.3.1 Purchaser’s inspector shall confirm that brick refractory lining materials are in accordance with the contract documents and PIP RFSB1000. Items to be confirmed shall include material, style, geometry and/or dimensions of brick and accessories.
4.3.2 Purchaser’s inspector shall confirm that bricks and accessory materials are not damaged in excess of the limitations of *PIP RFSB1000*.

4.3.3 Purchaser’s inspector shall confirm that positive material identification (PMI) has been performed during installation on loose metallic components. All items shall be in accordance with the contract documents and appropriately marked.

### 4.4 Surface Preparation

Surface preparation for the installation of coating, brick refractory and accessory materials shall be in accordance with *PIP RFSB2000*.

### 4.5 Installer Prequalification

4.5.1 Documentation shall be provided, from other recently completed installations, that confirms each installer’s ability to install the specific material type in a similar or same application as proposed for the subject installation. The documentation shall be provided to purchaser for review and determination of acceptance.

4.5.2 If the documentation specified in Section 4.5.1 cannot be provided, each installer shall be required to produce a mockup of the proposed installation. The mockup shall include all critical service areas as defined by purchaser’s inspector.

4.5.3 Unless Section 4.5.1 or 4.5.2 is satisfactorily completed, installation of brick shall not be permitted by that installer.

4.5.4 The installer’s inspector shall provide documentation of their ability to inspect brick linings. The documentation shall be provided to purchaser for review and determination of acceptance.

### 4.6 Installation Inspection and Testing

#### 4.6.1 General

4.6.1.1 Installation of anchors, supports, and tiebacks shall be in accordance with *PIP RFIA1000*. Inspection and testing shall be in accordance with *PIP RFTA1000*.

4.6.1.2 In-progress inspection of the refractory lining shall confirm that bricks, accessories, anchor system and layout, and lining design details including any required coatings are in accordance with the contract documents.

Comment: “In-progress” refers to continuous monitoring at regular intervals throughout the duration of the work.

4.6.1.3 Inspection of brick refractory lining installation shall be by visual inspection in accordance with Section 4.6.3.

#### 4.6.2 Hold Points

4.6.2.1 Inspection hold points shall be in accordance with purchaser’s *PIP RFTB1000-F* Inspection Hold Point and Sign-Off Schedule.

4.6.2.2 Work shall not progress until all parties listed on purchaser’s *PIP RFTB1000-F* have signed off at each hold point in the order as shown on the form.
4.6.3 Visual Inspection

4.6.3.1 Before brick refractory installation, welded anchors and accessories shall be 100% visually examined to confirm that all welding is in accordance with PIP RFIA1000.

4.6.3.2 The layout, size, and location of anchorage shall be in accordance with the detailed design drawings accepted by the purchaser.

4.6.3.3 By visual inspection of the in-progress brick refractory lining installation, the following shall be confirmed to be in accordance with the lining design drawings accepted by the purchaser:
   a. Lining thickness
   b. Brick layout
   c. Backup materials
   d. Expansion joints
   e. Mortar joint thickness
   f. Mortar consistency (e.g., trowelled joints vs. dipped joints)
   g. Anchor attachment to bricks
   h. Lining construction

4.6.3.4 The installed brick refractory lining shall be confirmed to be within design dimensional tolerances accepted by the purchaser.

4.6.3.5 During in-progress inspection of the brick refractory installation, any defects found shall be cause for work to cease. All inspection parties shall be notified of the defects and a report detailing type and extent of defects and the recommended repair procedure prepared. The detailed inspection report and recommended repair procedure shall be submitted to purchaser for resolution.

4.6.3.6 Defects noted in the lining during the final inspection shall be brought to the attention of the purchaser for resolution.

4.7 Lining Repairs

All lining repairs shall be subjected to the same inspection as the original lining.
## Brick Refractory Installation Qualification, Inspection, and Testing

### Project No. 
**Facility Name**
**Location**

### Project Document No.

### Hold Point Signoff Schedule

<table>
<thead>
<tr>
<th>Hold Point</th>
<th>Installer's Inspector</th>
<th>Purchaser's Inspector</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review Design Drawings and Procedures</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Installer Prequalification</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Confirm Materials</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. Surface Preparation</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5. Anchor System Installation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Coating</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7. Confirm Brick Dimensions and Sort by Critical Dimension As Necessary (See PIP RFSB2000)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>8. In-Progress Visual Inspection</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9. Final Lining Inspection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Comments:

---

### Signatures

**Installer's Inspector Signature:**

**Purchaser's Inspector Signature:**

(PRINTED)