PIP RFTF1000
Ceramic Fiber Refractory Installation Qualification, Inspection, and Testing
PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

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This Practice is subject to revision at any time.

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Data Form

RFTF1000-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 ceramic fiber refractory.

1.2 Scope

This Practice covers the general requirements for inspection of ceramic fiber refractory linings. Inspection methods include documentation review, in-progress installation inspection, and final inspections 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 RFSF1000 – Ceramic Fiber Refractory Material Specification
- PIP RFSF2000 – Ceramic Fiber 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 C 71. 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 ceramic fiber refractory. This includes each individual ceramic fiber installer, who is pre-qualified/certified before allowed to install ceramic fiber lining.

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 ceramic fiber 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 Ceramic fiber 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 ceramic fiber refractory material manufacturer’s MSDS shall be provided for each installation site and complied with during the installation of the ceramic fiber refractory.

**4.1.3 Documentation**

Ceramic fiber refractory material manufacturer’s product data sheets and the approved installation procedure in accordance with PIP RFSF2000 shall be provided for each installation site and complied with during the installation of the ceramic fiber 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 Ceramic Fiber Refractory Lining Anchors

The qualification of ceramic fiber refractory anchor welders, selection of anchors, anchor installation, 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 the ceramic fiber refractory lining materials are in accordance with the contract documents and PIP RFSF1000. Items to be confirmed shall include material, style, geometry and/or dimensions of blankets, board, or modules and accessories.
4.3.2 Purchaser’s inspector shall confirm that ceramic fiber materials and accessories are not damaged, contaminated, or wet. See PIP RFSF2000 for water contamination evaluation criteria.

Comment: Damage and contamination are defined as degradations of the lining that the purchaser’s inspector determines to be detrimental to the serviceability of the ceramic fiber lining. Examples of damage include cuts, cracks, tears, compression, and missing materials. Examples of contamination include sea water, dirt, chemicals, and other foreign materials.

4.3.3 Purchaser’s inspector shall confirm that positive material identification (PMI) has been performed during installation on module hardware and 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, ceramic fiber refractory and accessories shall be in accordance with PIP RFSF2000.

4.5 Installer Prequalification Requirement

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 ceramic fiber shall not be permitted by that installer.

4.5.4 The installer’s inspector shall provide documentation of their ability to inspect ceramic fiber 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 ceramic fiber anchors 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 ceramic fiber materials, accessories, anchor system and layout, and lining design details including any 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 ceramic fiber 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 RFTF1000-F Inspection Hold Point and Sign-Off Schedule.

4.6.2.2 Work shall not progress until all parties listed on purchaser’s PIP RFTF1000-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 ceramic fiber 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 ceramic fiber 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. Ceramic fiber layout
   c. Backup materials
   d. Expansion joints
   e. Anchor attachment
   f. Lining construction

4.6.3.4 The installed ceramic fiber 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 ceramic fiber 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.
## Hold Point and Sign-Off Schedule

**Project No.:**

**Facility Name:**

**Location:**

**Supplier:**

**Report Date:**

### Hold Point Table

<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>
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<tr>
<td>7. In-Progress Visual Inspection</td>
<td>YES</td>
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</tr>
<tr>
<td>8. Final Lining Inspection</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

### Comments:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

**Installer's Inspector Signature:** (Printed)  
**Purchaser's Inspector Signature:** (Printed)