

GP 19-03-03	Linings for Fired Heaters	July 2001
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Linings for Fired Heaters

GP 19-03-03

Scope

[I] This Global Practice (GP) covers material selection, installation, inspection, and testing of linings for fired heaters including combustion air and flue gas ducting and stacks.

[I] An asterisk (*) indicates that a decision by Purchaser is required or that additional information is furnished by Purchaser.

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1. Required References

[I] This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 18-12-01	Positive Material Identification
GP 20-01-01	Inspection of Equipment and Materials

1.2. API–American Petroleum Institute

API RP 936	Refractory Installation Quality Control Guidelines-Inspection and Testing Monolithic Refractory Linings and Materials
API STD 560	Fired Heaters for General Refinery Services

1.3. ASTM–American Society for Testing and Materials

ASTM C 109/C 109M	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM C 133	Standard Test Methods for Cold Crushing Strength and Modulus of Rupture of Refractories
ASTM C 155	Standard Classification of Insulating Firebrick
ASTM C 27	Standard Classification of Fireclay and High-Alumina Refractory Brick
ASTM C 860	Standard Practice for Determining the Consistency of Refractory Castable Using the Ball-in-Hand Test
ASTM C 862	Standard Practice for Preparing Refractory Concrete Specimens by Casting
ASTM C 865	Standard Practice for Firing Refractory Concrete Specimens

1.4. SSPC–Society for Protective Coatings

SSPC SP 7	Joint Surface Preparation Standard Brush-Off Blast Cleaning NACE No. 4: 2000 (Steel Structures Painting Manual, Ch 2–Surface Preparation Specs.)
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2. Additional Requirements

[I] Manufacturer requirements for castable or ceramic fiber shall be followed in addition to the requirements of this GP.

3. Documentation

- 1) [I] For all castables, the following information shall be submitted to Purchaser for review and approval:
 - a) Any changes from information supplied for bid review.
 - b) Applicable physical properties of refractory product to be installed, including:
 - i) Composition
 - ii) Cold crushing strength, permanent linear change, dry density
 - iii) Maximum continuous service temperature
 - iv) Thermal expansion from ambient temperature to specified use temperature
 - v) Thermal conductivity at specified use temperature
 - c) Installation procedures, including:
 - i) Packaging and storage
 - ii) Age of packed mixed castable on the specified date of shipment
 - iii) Surface preparation
 - iv) Installation equipment and techniques
 - v) Water ratio to be used
 - vi) Method of curing and dryout
 - d) Final design details, including:
 - i) Anchor types, materials, size and spacing
 - ii) Expansion joints
 - iii) Edging and joint details
 - e) [S] Material safety datasheets
- 2) [I] For all ceramic fiber insulation, the following information shall be supplied to Purchaser for review and approval:
 - a) Linear change at maximum and operating temperature
 - b) Thermal conductivity in installed condition at design temperature
 - c) Density
 - d) Installation and blanket joint and anchoring details
 - e) Installation procedures
 - f) * [S] Materials Safety Data Sheets (for purchase and use within the U.S.)—For other conditions of purchase and use, Vendor shall furnish safety precaution information for personnel protection during application.

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- g) Any changes from information supplied for bid review.
 - h) Anchor type, material, size, spacing, welding procedure, and testing methods.
 - i) Mill tests on all anchor material.
 - j) Final design details including expansion joints, corners, etc.
- 3) [I] For all brick, the following information shall be supplied to Purchaser for review:
- a) Composition of brick.
 - b) Compressive strength, both hot and cold.
 - c) Coefficient of linear change.
 - d) Design of expansion joints.
 - e) Description of mortar to be used.
 - f) Details of support shelves and tie-backs.
 - g) Any changes from information supplied for bid review.
- 4) [I] The final records to be submitted to the Owner's Engineer for castable linings are:
- a) Approved dryout schedule.
 - b) Quality control test reports.
 - c) Mill tests on all anchor material.
- 5) * [R] Shipping and handling procedures for all equipment with linings installed elsewhere than job site shall be submitted to Purchaser for review by the Owner's Engineer.

4. Materials

4.1. General

[S], [E] Asbestos or asbestos containing materials shall not be permitted.

4.2. All Castables

- 1) [R] Materials containing calcium silicate type binders (Portland cement) shall not be used at temperatures over 1000°F (540°C).
- 2) * [R] Proposals to use castables with sodium or potassium silicate binders shall be submitted to Purchaser for approval by the Owner's Engineer.
- 3) [R] Physical properties of castables shown in Table 1 are the minimum acceptable requirements for selection of refractory type, e.g., "Light Weight." The values to be met by the installed refractory, during testing, shall be manufacturer advertised values for the chosen refractory, within the range shown in Section 11.1, Item 1.

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