Engineering Standard

SAES-N-130 11 April 2012

Installation Requirements - Refractory Bricks

Document Responsibility: Heat Transfer Equipment Standards Committee

Saudi Aramco DeskTop Standards

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Previous Issue: 30 January 2007 Next Planned Update: 11 April 2017

Revised paragraphs are indicated in the right margin

Primary contact: Mansour, Khalid Mohammad on 966-3-8809575

1 Scope

1.1 This standard covers the minimum mandatory requirements for the installation, testing, and inspection of refractory bricks that are used in process equipment.

1.2 For equipment and refractory system not covered by this Standard, the Saudi Aramco Engineer is to be contacted for guidance in determining the extent to which this Standard is applicable.

1.3 This entire standard may be attached to and be made a part of contracts for brick installation.

1.4 This standard covers the installation of new refractory bricks, and the repair of existing refractory bricks.

2 Conflicts and Deviations

2.1 Any conflicts between this standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Consulting Services Department of Saudi Aramco, Dhahran.

2.2 Direct all requests to deviate from this standard in writing to the Company or Buyer Representative, who shall follow internal company procedure SAEP-302 and forward such requests to the Manager, Consulting Services Department of Saudi Aramco, Dhahran.

3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references listed below, unless otherwise noted.

- Saudi Aramco References

Saudi Aramco Engineering Procedure

SAEP-302	*Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement*

Saudi Aramco Engineering Standard

SAES-N-100	*Refractory Systems*

Saudi Aramco Inspection Requirements

Form 175-328110 Inspection Requirements for Refractories

4 Definitions

Equipment Manufacturer: The company that is responsible for the fabrication of boilers, process heaters, pressure vessels, heat exchangers, and flare tips to which refractory is installed.

MSDS: Material Safety Data Sheets for refractory material, supplied by the Refractory Manufacturer.

Refractory Inspector: The person or company authorized by the Saudi Aramco Inspection Department to monitor refractory installations to the requirements of this standard.

Refractory Installer: The company responsible for the installation of refractory bricks.

Refractory Systems: A lining system that is designed to resist process conditions.

Saudi Aramco Engineer: The Heat Transfer Equipment Standards Committee Chairman.

5 Responsibilities

5.1 The Refractory Installer is responsible for installing refractory systems in accordance with the requirements of this standard and of the specific requirements of the Refractory Manufacturer and the Refractory Designer.

The Refractory Installer is also responsible for preparing a complete installation procedure in accordance with the requirements of Refractory Designer and this standard.

5.2 The Refractory Designer is responsible for preparing fully detailed engineering drawings of the refractory system. As a minimum, the drawings shall include anchorage design including spacing and orientation, refractory thicknesses, all materials, surface preparation, and welding details.

6 Installation

6.1 Expansion joints shall be installed in accordance with refractory design.

6.2 All brick lining shall be supported per the design drawings. All refractory supports shall be austenitic alloy material.

6.3 Brick lining shall be supported by metal support shelves welded to the casing and spaced a maximum of 8 meters vertically. Shelves shall be slotted to provide for differential thermal expansion. The shelf metal temperature shall be selected based on its calculated maximum surface temperature plus 10°C.

6.4 Mortar thickness between bricks shall not exceed 2 mm.

6.5 The use of steel shims is prohibited.

6.6 No bricks shall be cut and used below 50% of its original thickness or 50 mm whichever is greater. No two cut bricks shall be installed adjacent to each other.

6.7 Manual cutting or chipping of bricks is not allowed.

6.8 Key bricks position in adjacent rings shall be staggered.

7 Storage and Handling

7.1 Prior to placement, refractory bricks shall be protected from mechanical and water damage.

7.2 The Refractory Manufacturer's precautions, as specified on the MSDS sheets, must be strictly followed.

8 Inspection and Repairs

8.1 Inspection

All inspection shall be carried out in accordance with Saudi Aramco Inspection Requirements Form 175-328110 and the requirements of this standard.

Note: *Visual inspection of mortar condition thickness, expansion joints thickness bricks arrangements against design drawings needs to be added to the inspection form.*

8.2 Repairs

8.2.1 The method of repair shall be in accordance with the repair method statement approved by Saudi Aramco Engineer.

8.2.2 Any repair shall be monitored by refractory inspector.

8.3 Checklist for Refractory Brick Installation

The following is a checklist of activities that shall be used by the Refractory Installer for the installation of refractory bricks.

Revision Summary

11 April 2012	Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes. Conducted Value Engineering on 20 April 2011.

Checklist for Refractory Brick Installation

PRIOR TO INSTALLATION:

Materials

( ) Verify the types and quantities of materials supplied, data sheets and mixing instructions.

( ) Verify availability of MSDS sheets.

( ) Verify mortar shelf life.

Documents

( ) Verify approved detail drawings.

( ) Verify approved method statement.

Equipments

( ) Verify number and type are adequate.

( ) Back up equipments is available.

( ) Location relative to work.

( ) Cleanliness.

INSTALLATION:

( ) Verify all dimensions per detail drawings.

( ) Verify construction joints.

( ) Verify mortar joints.

( ) Verify plumbness and straightness per detail drawings.

( ) Verify the integrity of bricks (complete or sections) used.

( ) Verify the water quality per mortar manufacturer.