

DEP SPECIFICATION

CONSTRUCTION DETAILS FOR REFRACTORY BRICK AND SHAPE CONSTRUCTION

DEP 64.24.32.31-Gen.

February 2012

DESIGN AND ENGINEERING PRACTICE



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The information set forth in these publications is provided to Shell companies for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual Operating Units to adapt the information set forth in DEPs to their own environment and requirements.

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1. INTRODUCTION

1.1 SCOPE

This new DEP specifies requirements and gives recommendations for typical construction details of refractory brick and shape linings. It is intended to be applied where standard lining configurations are to be used.

This DEP is intended to be used for construction details for equipment utilizing refractory brick and fired shapes and/or refractory pre-cast and fired shapes for internal linings.

This DEP does not cover non-refractory chemical-resistant bricks and tiles.

Requirements and recommendations for refractory unshaped materials are found in DEP 64.24.32.30-Gen., which should be read in conjunction with this DEP if bricks and unshaped refractory are required.

The contents of this DEP were in a former Appendix of DEP 44.24.90.31-Gen.

1.2 ASSOCIATED DEPS

This DEP may be used in conjunction with one or more of the following DEPs for refractory bricks and shapes.

DEP 44.24.90.31-Gen.	Refractory bricks and shapes
DEP 44.24.90.32-Gen.	Classification of refractory bricks and shapes
DEP 44.24.90.33-Gen.	Specification for sampling and testing of refractory bricks and shapes
DEP 44.24.90.34-Gen.	Classification specification and testing of ancillary materials for refractory brick construction
DEP 44.24.90.35-Gen.	Specification and quality control for precast or specialty cast refractory baffle wall tile (shapes)

1.3 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented. This is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.4 DEFINITIONS

1.4.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Refractory Contractor** is the party that carries out all or part of the construction design, engineering, material procurement and installation of refractory materials. The Refractory Contractor has overall responsibility for the quality control of the products and services including those of any sub-contractors or Suppliers related to the installation.

The **Manufacturer/Supplier** is the party that manufactures or supplies materials, equipment and services to perform the duties specified by the Refractory Contractor. The Manufacturer may undertake all or part of the duties of the Refractory Contractor.

NOTE: For the purposes of this DEP, the Manufacturer/Supplier is the party that manufactures the refractory products and/or ancillaries for supply to the Refractory Contractor, Principal or another Supplier, and has primary responsibility for material design properties, manufacturing quality control at the manufacturing site and specific procedures such as but not limited to those for product mixing, installation and start-up.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant, authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.4.2 Specific definitions

Term	Definition
Bullseye	Term used in this DEP to describe refractory brick detailing of intersecting circular nozzle lining or opening into lining of circular vessel
Special Brick Shapes	Are refractory brick of special design of either simple or intricate form, pressed fired and otherwise treated as regular refractory brick. Special brick shapes may be manufactured with or without the same general overall dimensions of standard bricks or may be modifications of rectangular tiles having the same overall dimensions.
Standard Brick Shapes	Refractory brick of square, rectangular or tapered shape design in accordance with standard dimensions prescribed by applicable Standards Organisation Practice.

1.5 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets (). Other documents referenced by this DEP are listed in (8).

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be sent to the Administrator at standards@shell.com, using the DEP Feedback Form. The DEP Feedback Form can be found on the main page of "DEPs on the Web", available through the Global Technical Standards web portal <http://www.shell.com/standards> and on the main page of the DEPs DVD-ROM.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 APPLICATION

Information in this DEP is intended to be applied as standard information with standard lining configurations and is subject to acceptance by both the Refractory Contractor and the Manufacturer/Supplier of refractory materials for application with project specific lining configurations.

In the event that the Refractory Contractor's or Manufacturer/Supplier's construction practises or engineering standards differ from this DEP, and based on individual lining design specifics, all details shall be clearly shown on construction design detail drawings and shall be subject to approval by the Principal.

2. BRICK SIZES, SHAPES AND COMBINATIONS

2.1 APPLICABLE STANDARDS FOR BRICK SIZE

Unless otherwise specified, sizes for standard and special shaped bricks shall be in accordance with ASTM standard listed in Table 1. Table 2 lists an acceptable cross-reference for alternative methods. Where an individual project specification references the use of alternative methods, all conflicts between results of alternative methods shall be resolved prior to final approval and shipment of bricks and shapes. Those decisions shall be suitably documented in turnover or purchase documentation.

Special feature dimensions such as, but not limited to, tongue and groove configurations or machining to provide for anchoring and/or support, shall be in accordance with agreement between the Manufacturer/Supplier and the Principal after submission and approval of detailed standard part drawings.

Table 1 ASTM standards refractory brick dimensions

Standard	Title
C861	Standard Practice for Determining Metric Dimensions of Standard Series Refractory Brick and Shapes
C909	Standard Practise for Dimensions of a Modular Series of Refractory Brick and Shapes

Table 2 ASTM and alternative material standards

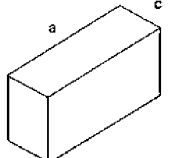
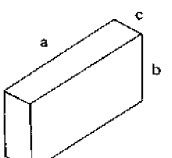
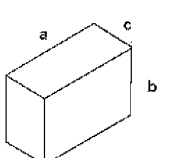
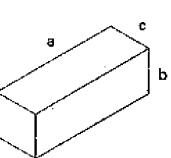
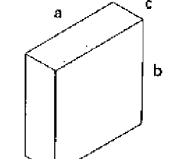
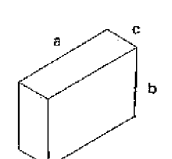
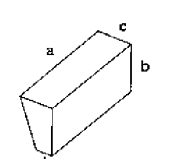
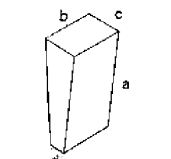
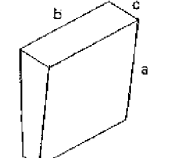
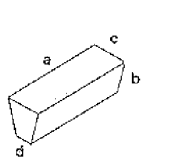
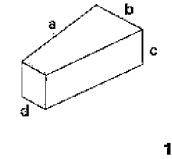
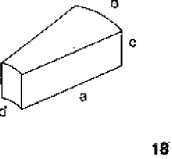
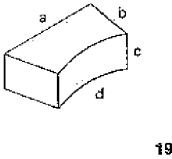
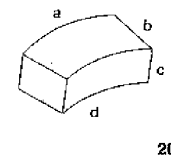
Properties	Alternative standard	ASTM standard
Dimensions of Standard shapes	ISO-5019-1, ISO 5019-2, ISO 5019-4 (double taper)	ASTM C909 (does not include double taper)

2.2 SHAPES

2.2.1 Standard brick shapes

A summary of standard brick shapes with their nomenclature is in Table 1.

Table 1 Standard brick shapes and nomenclature

No. NAME				
1 SQUARE 2 STRAIGHT 3 SPLIT 4 SCONE 5 CROPPED HEADER 6 THREE QUARTER BRICK 7 PUP 8 SOAP 9 CLOSER				
5 DOUBLE STANDARD 6 BROADBACK 7 SQUARE 8 SIDE ARCH 9 ARCH 10 END ARCH 11 WEDGE				
9 DOUBLE ARCH 10 SIDE ARCH PUP				
17 TAPERED HEADER 18 KEY 19 CROWN 20 CUPOLA 21 CIRCULAR HEADER 22 CIRCLE KEY 23 FLATBACK 24 CIRCULAR STRETCHER 25 CIRCLE BRICK				

NOTES: 1. a = length; b = width; c = height; d = taper
2. Double standard also known as large straight.

2.2.2 Special brick shapes

2.2.2.1 Tongue and groove brick shapes

For the purposes of this DEP, tongue and groove shapes are otherwise standard refractory brick shapes with the additional features of tongue and grooves.

Preferred tongue and groove configurations are located as shown in Figure 1a in cold face, third of the length of the shape. Tongue and groove configurations other than "as shown", require approval by the Principal.