Materials & Specifications

Bricks

SBEC1822 & SBEQ1822 – MATERIALS & SPECIFICATIONS

SEMESTER II 2011/2012

Muzani Mustapa

muzani@utm.my

Office: B11 - 420

Department of Quantity Surveying

Faculty of Built Environment

07-5537381

Presentation Overview

- Types and characteristics of brick
- Properties and behavioural of brick
- Manufacturing process of brick together with its quality control aspects.

Learning Objectives

By the end of today's lectures you should able to:

- Understand and appreciate the use of construction materials (brick)
- Describe what is construction material (brick) and application to construction projects
- Acquire relevant information from various sources

Introduction

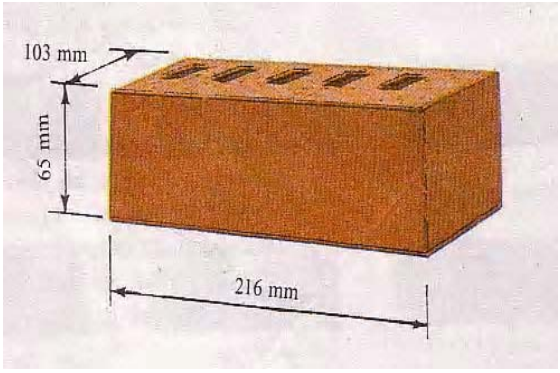
5

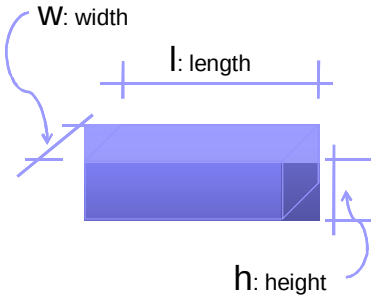
Typical used of bricks

- Structural uses such as foundations, walls and floors.
- Decorative/ornamental uses: May be cast to form molding and other decorative features; may be carved; may be used in a variety of colours, textures, bonds and joints.
- May be concealed by other finish materials such as plaster or paint, or may be exposed both on the interior and exterior.

6

SIZE OF BRICKS





General Brick Specification as per Malaysia Standard MS 7.6: 1972 / British Standard BS 3921: 1985

Specified Dimensions	Overall Measurement of 24 Bricks
Height: 65 + 1.875 mm	1560 + 45 mm
Width: 102.5 + 1.875 mm	2460 + 45 mm
Length: 215 + 3 mm	5160 + 75

Average weight

- Average weight for a common solid brick size 215mm x100mm x67mm is between 2.90 kg to 3.30 kg

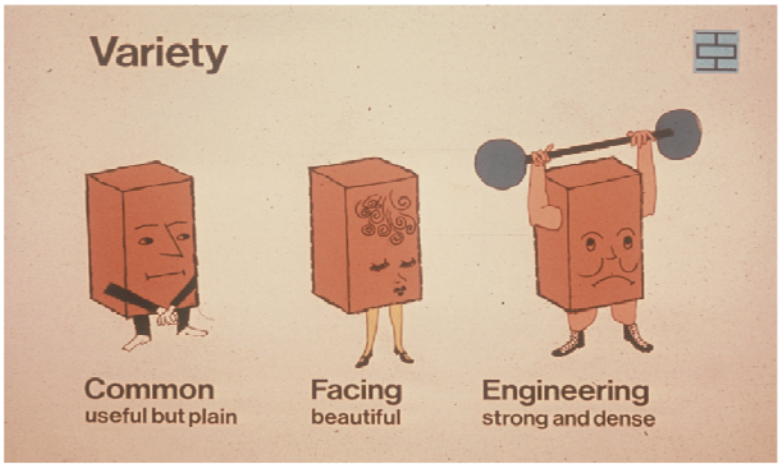
- Bricks usually is packed and transferred to site in pallete which contained about 360 - 400 pieces or brick. The quantity on each pallete varies depending on the size of the brick

Pallete of bricks

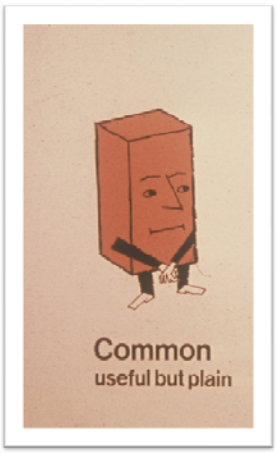
Description & Classification of Bricks

- Bricks may be described as common, facing (designed for good looks) or engineering.

Description & Classification of Bricks



Description & Classification of Bricks



Common bricks are accepted for use in general brick work with no special claim for attractive appearances. Walls built with common bricks require rendering or plastering.

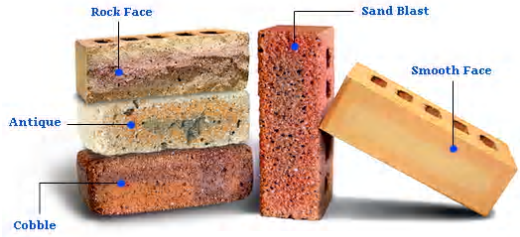
Common brick

Description & Classification of Bricks

Facing bricks

Quality burnt clay bricks, which give attractive appearance in their color and texture. It is used without rendering, plastering, or other surface treatments

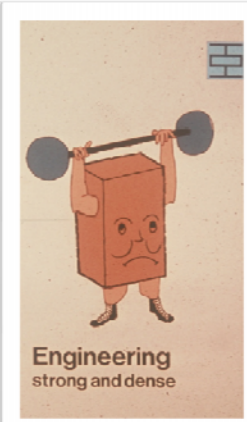
Facing brick



Facing brick

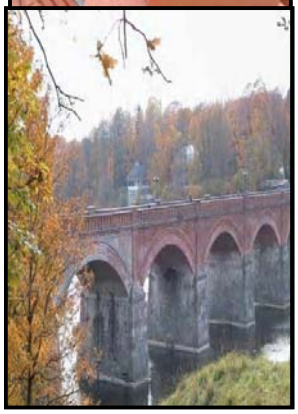
may be textured (by rolling, drag facing, sand facing or wire brushing) or coloured (e.g. by the addition of manganese dioxide to the clay).

Description & Classification of Bricks



Engineering bricks are bricks burnt at exceedingly high temperatures. They possess a dense and strong semi-vitreous body and conform to the defined limits for strength and water absorption.

Primarily used in civil engineering works that require high load bearing capacity, good damp-proof, and chemical resisting characteristics

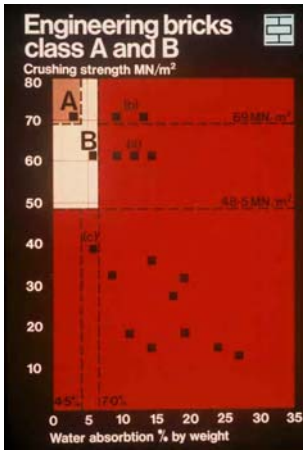


Engineering brick

Class A Engineering Bricks have a comprehensive strength greater than 70N/mm and water absorption less than 4.5%

Class B Engineering Bricks have a comprehensive strength greater than 50N/mm and water absorption of less than 7%

Class A & B Engineering Bricks



19

Load bearing brick

Load bearing bricks, which can be either common or facing bricks, conform to specified average compressive strength

What are bricks made of?

- Clay bricks and pavers are made up of a great variety of natural clay deposits which together with the firing characteristics of the manufacturing process govern the resulting properties of the brick or paver.

What are bricks made of?

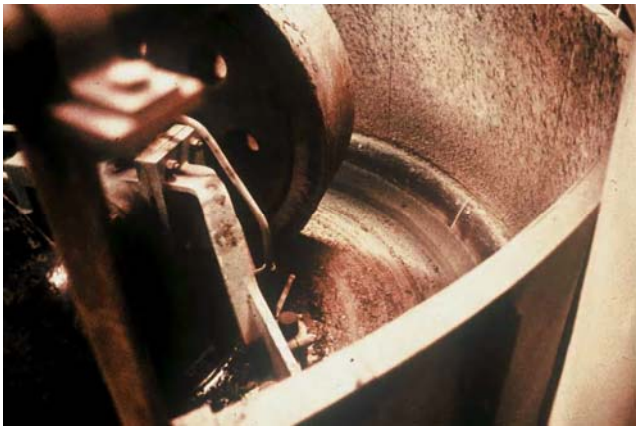
- The clay is crushed and mixed with water to form a elastic material which can be moulded (or shaping) into different shapes and sizes.
- Once fired to a very high temperature it reaches a hard and weather resistant form.

BRICK MANUFACTURING

Clay Quarries

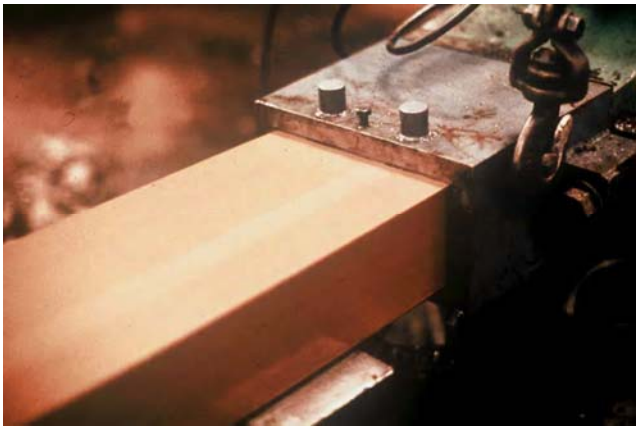
24

Clay Grinding



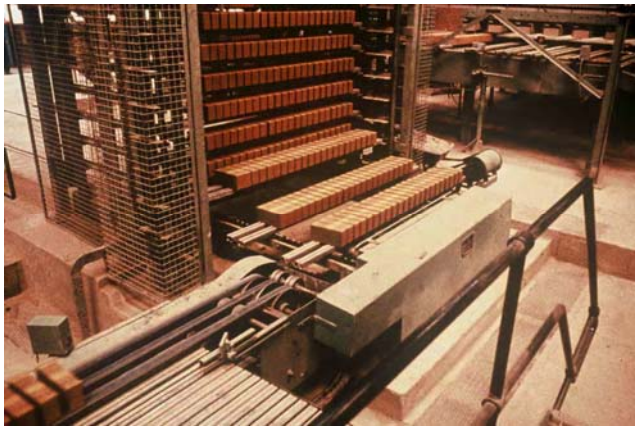
25

Extruding / shaping



26

Drying Racks



27

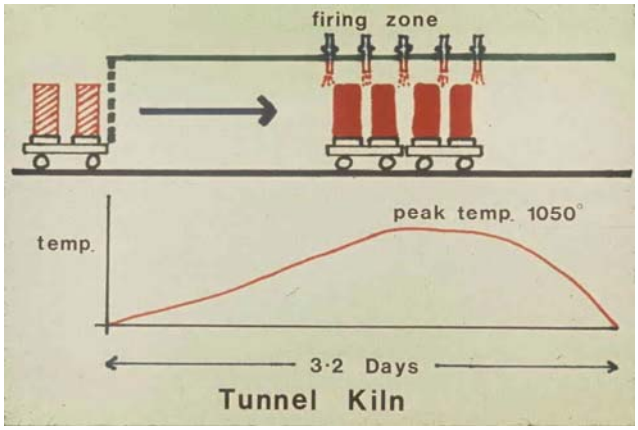
Drying Racks

28

Stacking Patterns for even firing

29

Tunnel Kiln temperatures



30

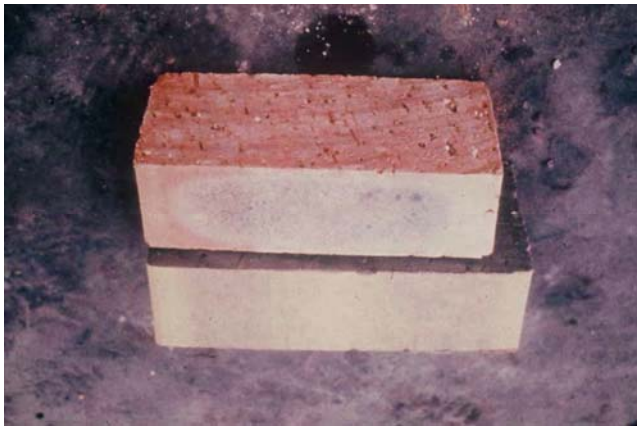
Gas Jet for firing process

31

Tunnel Kiln view

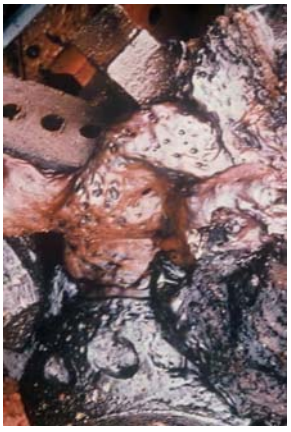
32

Fired Bricks



33

Over Fired Bricks…



34

Hoffman Kiln

35

Preparation of Bricks (cont'd)

- Clay bricks may also be made on an individual, hand-made basis, which allows "specials".

36

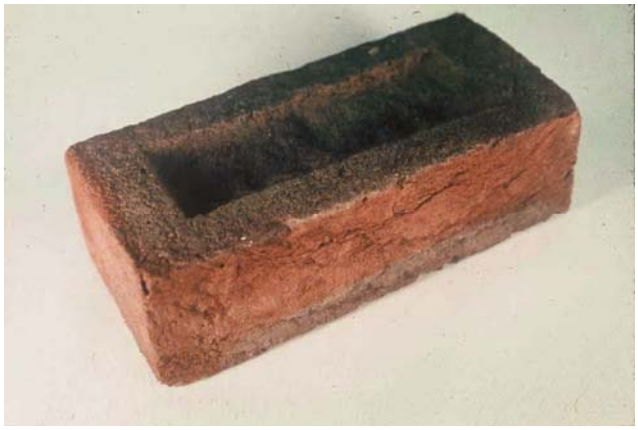
Hand Made Bricks

37

Hand Made Patterns

38

Hand Made Brick



39

Hand Made Brick Wall

40

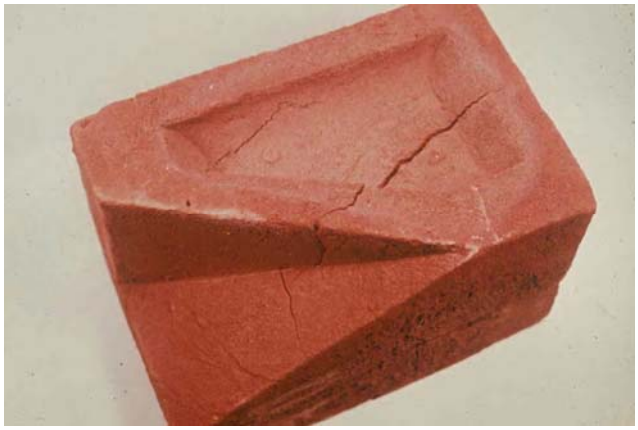
Specials

41

More Specials

42

Problems with Specials

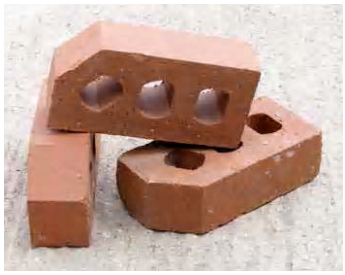


43

Shapes of Bricks

Plinth stretcher brick

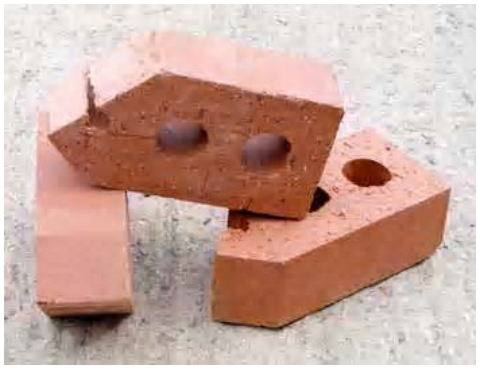
Plinth header brick



Single and double cant brick

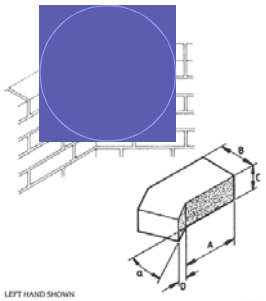
Single and double bull nose brick

Bull nose refers to a rounded corner on a brick. Bricks with two rounded corners are double bull nose.



Squint brick

L shaped brick



LEFT HAND SHOWN

DIMENSIONS					
TYPE No	A	B	C	D	a
AN.3.1	164[b]	102	65	51	30°
AN.3.2	164[b]	102	65	51	45°
AN.3.3	164[b]	102	65	51	60°
AN.3.4	159[a]	102	65	102	30°
AN.3.5	159[a]	102	65	102	45°
AN.3.6	159[a]	102	65	102	60°
AN.3.7	215[b]	102	65	102	30°
AN.3.8	215[b]	102	65	102	45°
AN.3.9	215[b]	102	65	102	60°

[a] Suitable for quarter bond without cutting.
[b] Suitable for half bond without cutting.

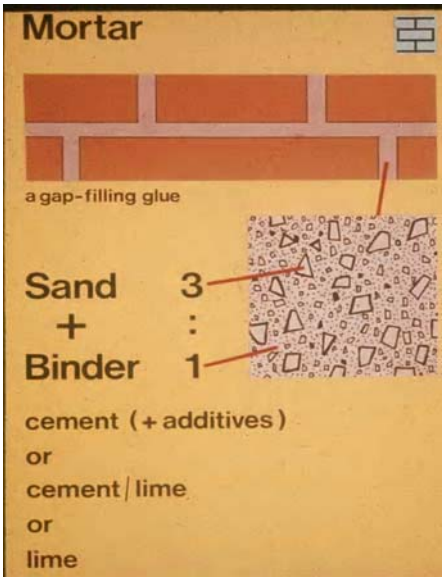
Dog leg brick

MORTAR

- Mortar is a “gap-filling glue” to enable bricks to be placed together – it distributes loads between separate walling components so that they act as unit.
- It is normally made from sand (“soft” sand, not concreting sand that has had the fines removed)

52

Mortar



53

Mortar Properties

- The following properties of a mortar are desirable:
  - It should have good plasticity.
  - It should be able to retain much of its water
  - Neither cement nor water should segregate or separate from the mix.
  - Once hardened, mortar should exhibit similar moisture and thermal movement characteristics to the bricks or blocks laid in it.
  - Once laid it should develop its strength quickly.

54

Mortar Properties

Increased cement gives:

- Quicker stiffness
- Higher strength
- Greater frost resistance
- Less risk of sulphate attack
- Less risk of rain through the mortar

55

Mortar Properties

Increased lime gives:

- More working time
- More workability
- Greater flexibility
- Less rain through the joints.

56

Mortar

Mortar	sand : cement	sand : lime : cement
general building (above ground)	5:1	5:1:1
general building (below ground)	3:1	6:1:1
Internal walls	8:1	9:2:1

57

Construction of brickwork

- Older buildings were built with whole brick walls.
- In the 1930s - cavity walls were introduced to aid damp penetration
- In the 1980s there was an energy crisis, and the cavity was filled with glass-fibre

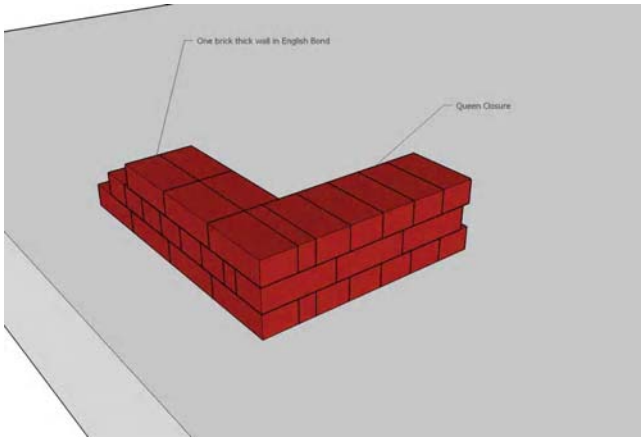
58

Construction of brickwork

- Brickwork is constructed by bedding bricks into mortar.
- 3 types of brick bond

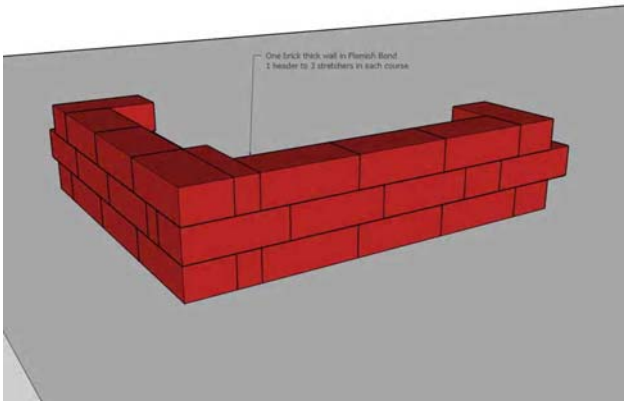
59

English Bond



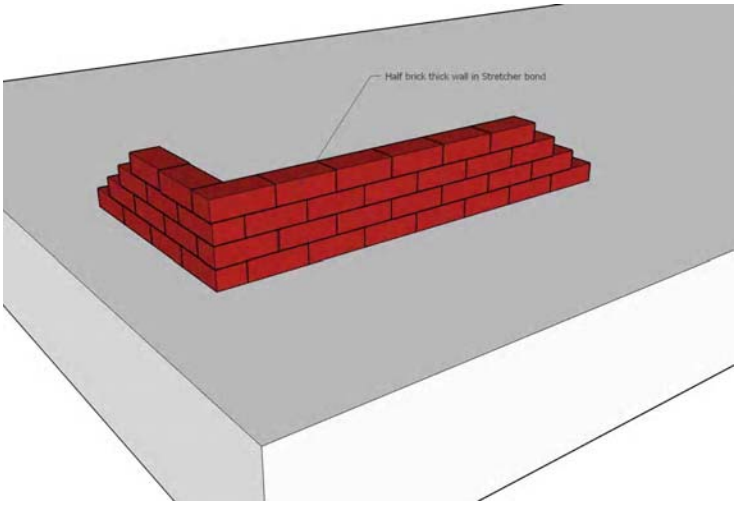
60

Flemish Bond



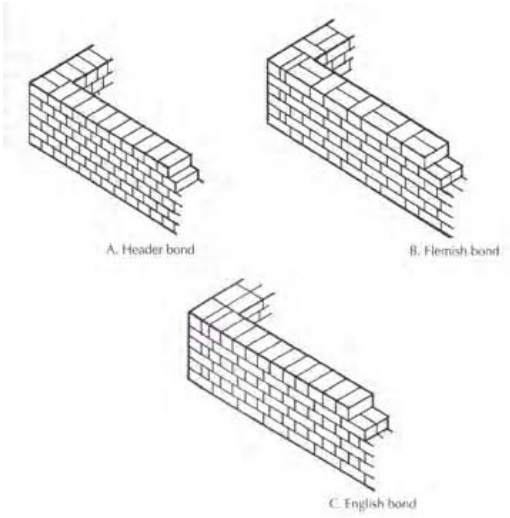
61

Stretcher Bond



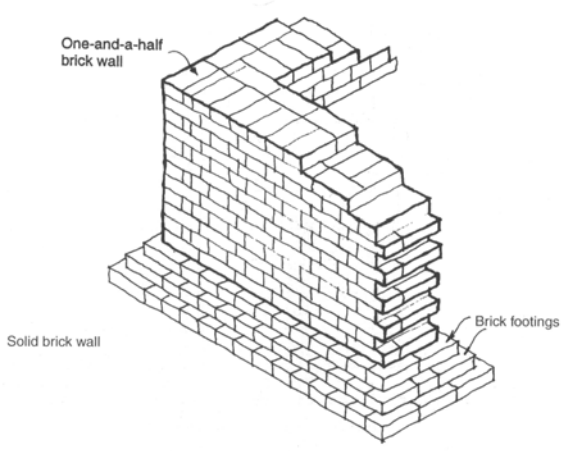
62

Whole Brick Wall



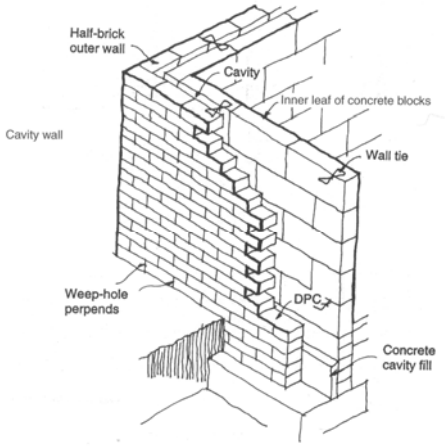
63

One and Half Brick Wall



64

One and Half Brick Wall

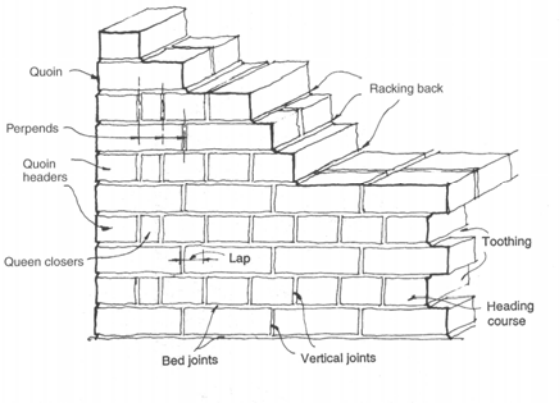


65

Cavity Wall Construction

66

Brick Works Construction



67

Desirable properties of brickwork

- It provides thermal insulation, sound insulation and resistance to fire.

68

STORAGE

Storage on site

- Bricks should be stored off the ground and covered

Thank you