

CVL3211 : Civil Engineering Materials

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Brick masonry

This chapter will cover under given topics.

- ▶ Properties of brick clay and fly ash
- ▶ Manufacturing of brick
- ▶ Components of brick masonry
- ▶ Identification of good quality brick

Properties of brick clay and fly ash

- ▶ Brick are made from finely pulverized clayey soil or fly ash. Large grains or lumps will not fuse properly hence considered undesirable.
- ▶ Main constituents of brick clay are: Silica (50-60%), Alumina (20-30%), Iron Oxides (5-6%), MgO (less than 5%), Lime (less than 5%).
- ▶ All the constituents are not desirable though. Some ingredients like lime, alkalies, organic matter etc cause problems with brick.
- ▶ Fly ash bricks are manufactured by 45% fly ash and 55% cementing material (sand, stone dust, lime, gypsum).
- ▶ Fly ash bricks are lightweight, uniform, water/fire resistant and strong as compared to clay bricks.

Manufacturing of brick

Bricks are manufactured either in clamps or kiln. Both have their pros and cons as given below.

Factor	Clamp burning	Kiln burning
Capacity	20000-100000	25000
Fuel cost	Low i.e. grass, cow dung etc.	High i.e. coal, electricity etc.
Infrastructure	Low (temporary structures)	High (permanent kilns)
Quality	60% of batch is good	90% of batch is good
Fire regulation	Unregulated (no control system)	Regulated by fuel insertion and removal
Conduction Time	2-6 months for one clamp	Works 24×7 and 12 days for brick cooling

Components of brick masonry

- ▶ Standard size of brick is $19 \times 9 \times 9 \text{ cm}^3$. Frog is engraving on top face of brick required for cement joint connection in masonry and further engraving the brand name of manufacturer.
- ▶ Bricks used for masonry sometimes needed to be changed in shape *in-situ*. Even rounded angled brick are manufactured for curved walls e.g. bullnose and cownose bricks.
- ▶ For some joint applications, bricks are cut on-site e.g. king closer and queen closer.
- ▶ Generally, mortar used in brick masonry is cement mixed with sand in a 1:3 composition with water cement ratio of about 0.4-0.5.

Laboratory test of brick

Different tests are used to determine quality of brick:

- ▶ Absorption test: After 24 hours of immersion in water, the water absorptions should not be more than 20% for clay bricks.
- ▶ Compressive Strength test: Brick should not break before 10MPa in compressive testing.
- ▶ Efflorescence: After 24 hours of immersion in water, salt deposition on brick surface should not be more than 10% of total surface area.
- ▶ Soundness: Two brick when struck with each other should make a clear metallic ringing sound.
- ▶ Hardness: If fingernail scratch does not cause any impression on brick, its sufficiently hard.

All the above tests, if satisfied by a brick, define quality of a first class brick.