CVL3211 : Civil Engineering Materials

Department of Civil Engineering

Abhipsa Kar
Pranjal Mandhaniya
Rashmisikha Behera

ITER, SoA University

November 13, 2016

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.
- Major constitutes of brick clay are: Silica (50-60%), Alumina (20-30%), Iron Oxides (5-6%), MgO (¡5%), Lime (¡5%).
- All the constitutes are not desirable though. Some ingridents like lime, alkalies, organic matter etc cause problems with brick.
- Fly ash bricks are manufectured 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 moths for one clamp	Works 24×7 and 12 days for brick cooling

Components of brick masonry

- Standard size of brick is $19 \times 9 \times 9$ 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 $10 MPa$ 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.