JECRC Foundation

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE
DEPARTMENT OF CIVIL ENGINEERING

Class – III Semester /II Year
Subject –Building Materials And Construction
Chapter – 2(FLY ASH)
Presented by – Teekam Singh (Assistant Professor)

VISION AND MISSION OF INSTITUTE

VISION

To become a renowned center of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities.

MISSION

Focus on evaluation of learning outcomes and motivate students to inculcate research Aptitude by project based learning. Identify, based on informed perception of Indian, Regional and global needs, areas of focus and provide platform to gain knowledge and solutions. Offer opportunities for interaction between academia and industry. Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

VISION AND MISSION OF DEPARTMENT

VISION

To become a role model in the field of Civil engineering for the sustainable development of the society.

MISSION

To provide outcome base education
To create a learning environment conducive for achieving academic excellence
To prepare civil engineers for the society with high ethical values.

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- INTRODUCTION
- CLASSIFICATION OF FLY ASH
- WHY TO USE FLYASH
- EFFECT OF HIGH VOLUME OF FLY ASH ON PROPERTIES OF FRESH CONCRETE
- FLYASH BRICKS

INTRODUCTION

- Fly ash is a finely divided byproduct resulting from the combination coal in plant
- It contains large amounts of silica, alumina and small amount of unburned carbon, which pollutes environment.
- It is grey in colour and alkaline in nature.
- The particle size ranges between 1-100 microns.
- The specific gravity of FA lies between 1.9 and 2.8 (generally 3.15 for Cement)

CLASSIFICATION OF FLY ASH

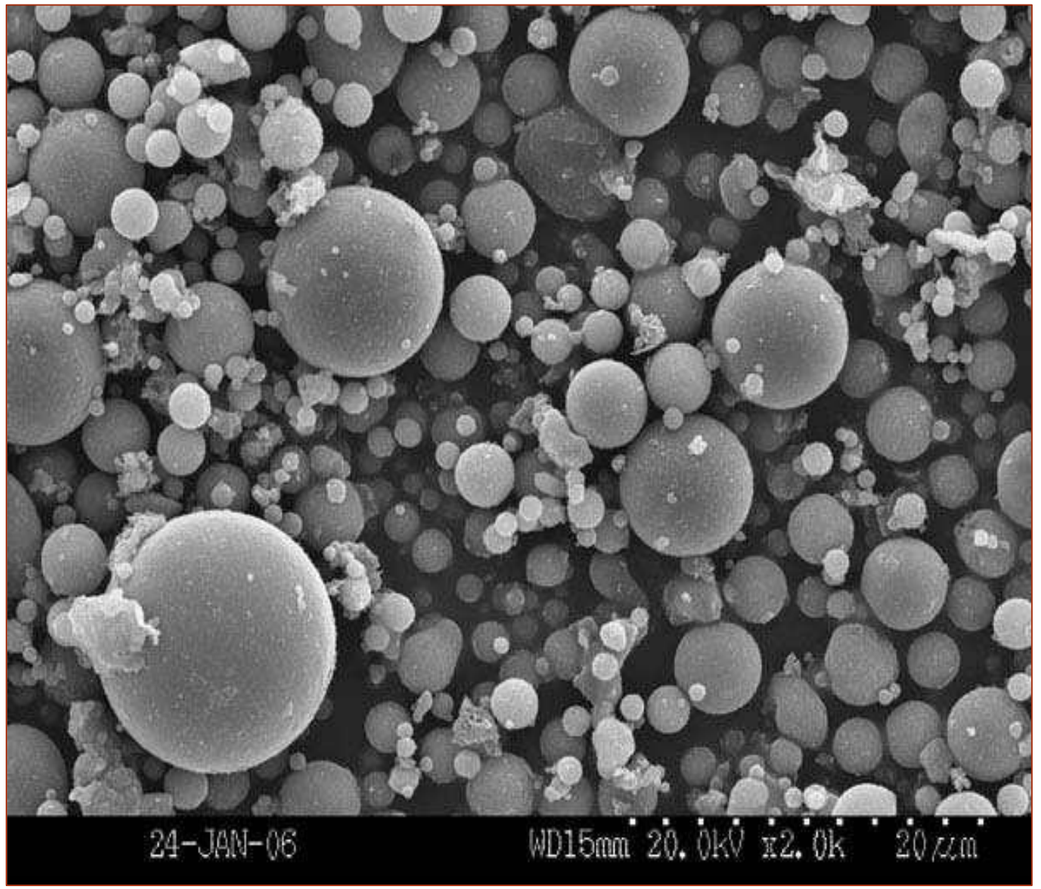
Two classes of fly ash are defined by ASTM C618:

- Class F fly ash
- Class C fly ash

This classification is based on the chemical composition of FA i.e. the sum of silica, alumina and iron oxide percentages in the FA, being :

- minimum of 70% for a Class F
- minimum 50% for a Class C

SOURCE: www.gradjevinarstvo.rs



SOURCE: www.caer.uky.edu/kyasheducation/flyash.shtml

WHY TO USE FLY ASH?

- being a pozzolanic, it can actually replace a part of Portland cement
- results in more durable concrete
- high ultimate strength
- improves workability
- improves cost economy of concrete
- reduction in heat of hydration
- decreases density of concrete
- more environment friendly concrete.

EFFECT OF HIGH VOLUME OF FLY ASH ON PROPERTIES OF FRESH CONCRETE

- 1. WORKABILITY
- 2. SETTING TIME, BLEEDING AND SEGREGATION
- 3. HEAT OF HYDRATION
- 4. DENSITY

WORKABILITY

- The inclusion of high volume of fly ash **increases the workability** as the content of FA is increased.

- The **increment in the slump height** is about 40% and 54% with the inclusion of 45% and 50% FA, respectively.
- generally higher substitution of Portland cement by fly ash **reduces the water requirement** for obtaining a given workability

SETTING TIME

- High volume of fly ash extends both the initial and final setting time of concrete
- The impact of fly ash on the setting behavior of concrete is dependent on:
- composition and quantity of fly ash used
- amount of cement
- water - to – cementitious material ratio
- concrete temperature

Bleeding and Segregation

The inclusion of high volume of fly ash in the mixture reduces the bleeding and segregation.

Reason:

The rate and amount of bleeding decreases due to the reduced water demand.

The reduction of bleeding and segregation may be related to the lubricating effect of the glassy spherical FA particles.

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HEAT OF HYDRATION

- Both the maximum rate of heat evolution and the cumulative heat evolution decrease with the inclusion of 45% FA during the first 72 hours.
- The inclusion of 45% FA results in 36% reduction in the cumulative heat evolution.
- In addition, the time of reaching the maximum rate of heat evolution delays.

DENSITY

- Inclusion of high volume of fly ash in the mixture decreases its density which leads to a reduction in the dead weight of the constructed element.
- Reason:
- This reduction in the density could be attributed to the lower specific gravity of FA (1.9 to 2.8) as compared to cement (3.15)

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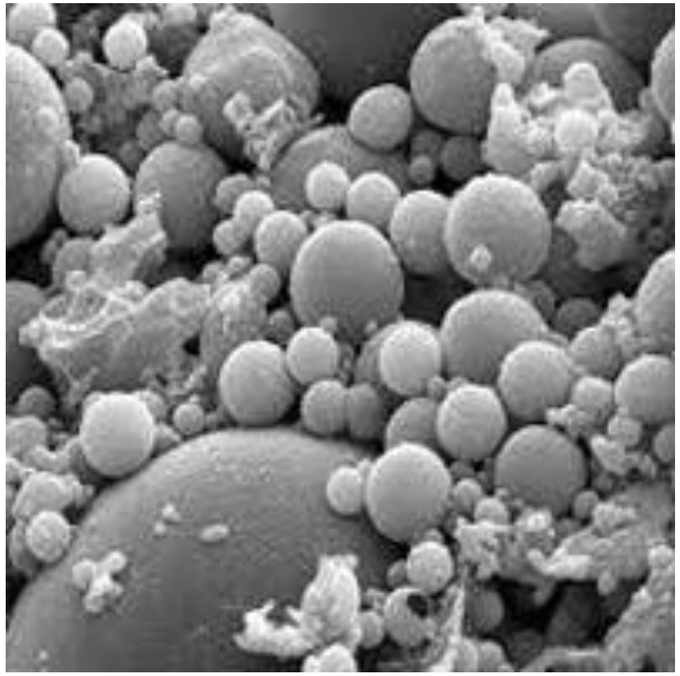
FLY ASH BRICKS



Flyash Bricks is a building material, specifically masonry units, containing fly ash and water, compressed at 28 MPa and cured for 24 hours in a 66 °C steam bath, then toughened with an air entrainment agent.

ADVANTAGES AND ITS NEEDS

1To provide and promote business and services that strengthens the brick manufacturing sector for the ultimate benefit of its customers and society.

2To be in the forefront of creating awareness about environment, & to be the largest player in the field of fly-ash brick production.

3Nearly 73% of India’s total installed power generation capacity is thermal, of which coal-based generation is 90% – the remaining comprising diesel, wind, gas, and steam. The 85 utility thermal power stations, besides the several captive power plants, use bituminous and sub-bituminous coal and produce large quantities of fly ash. High ash content (30%–50%) contributes to these large volumes of fly ash

MARKET DEMAND

1The country consumes about 180 billion tonnes bricks, exhausting approximately 340 billion tonnes of clay every year and about 5000 acres of top soil land is made unfertile for a long period.

2The government is seriously concerned over soil erosion for production of massive quantities of bricks, in the background of housing needs.

3The excellent engineering property and durability of fly ash brick enlarges its scope for application in building construction and development of infrastructure, construction of pavements, dams, tanks, under water works, canal lining and irrigation work etc.

4Enormous quantities of fly ash is available in and around thermal power stations in all the states.

5The demand of bricks could be met by establishing small units near thermal Power stations and to meet the local demand with less transportation costs.

RAW MATERIALS REQUIRED

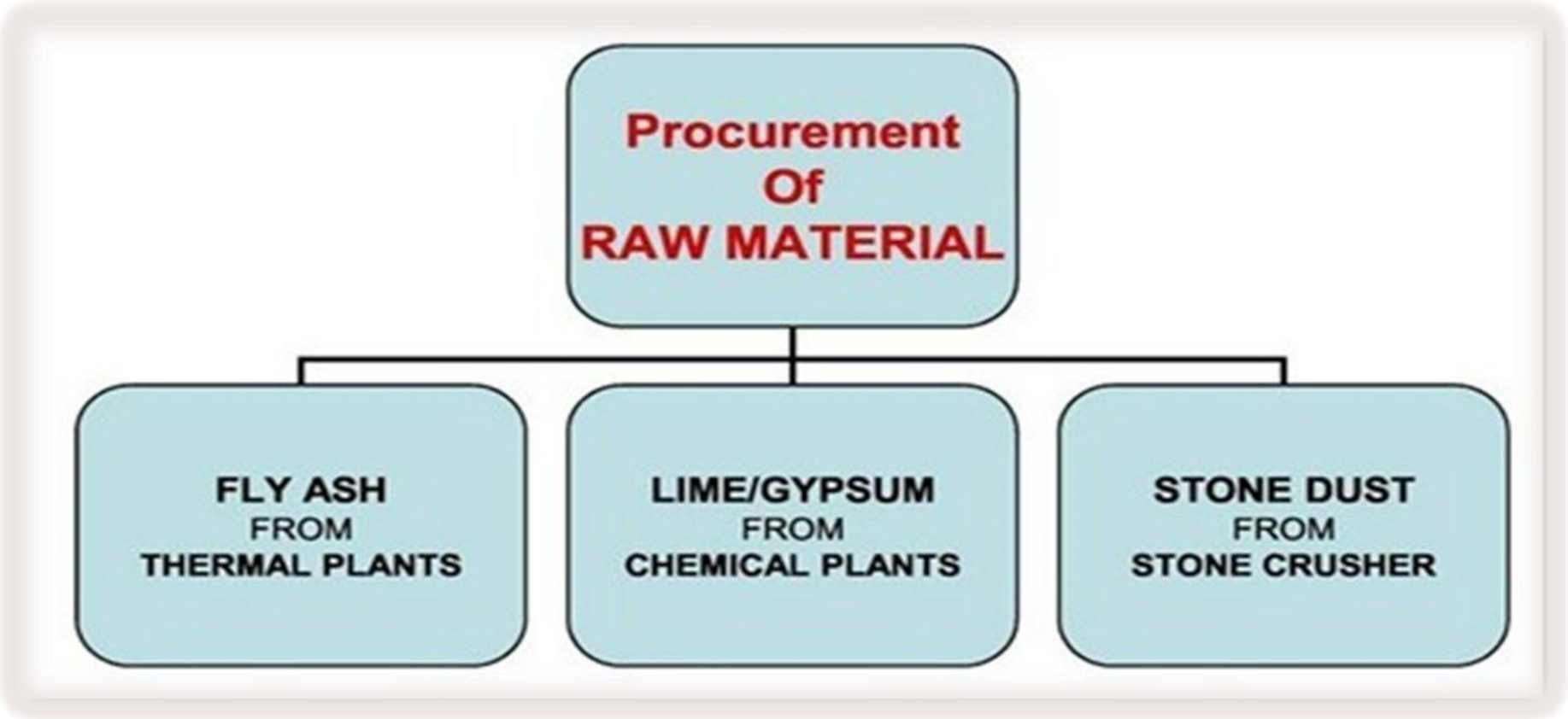
1] FLY ASH

2] GYPSUM LIME

3] LIME

4] SAND

Procurement Of Raw Material



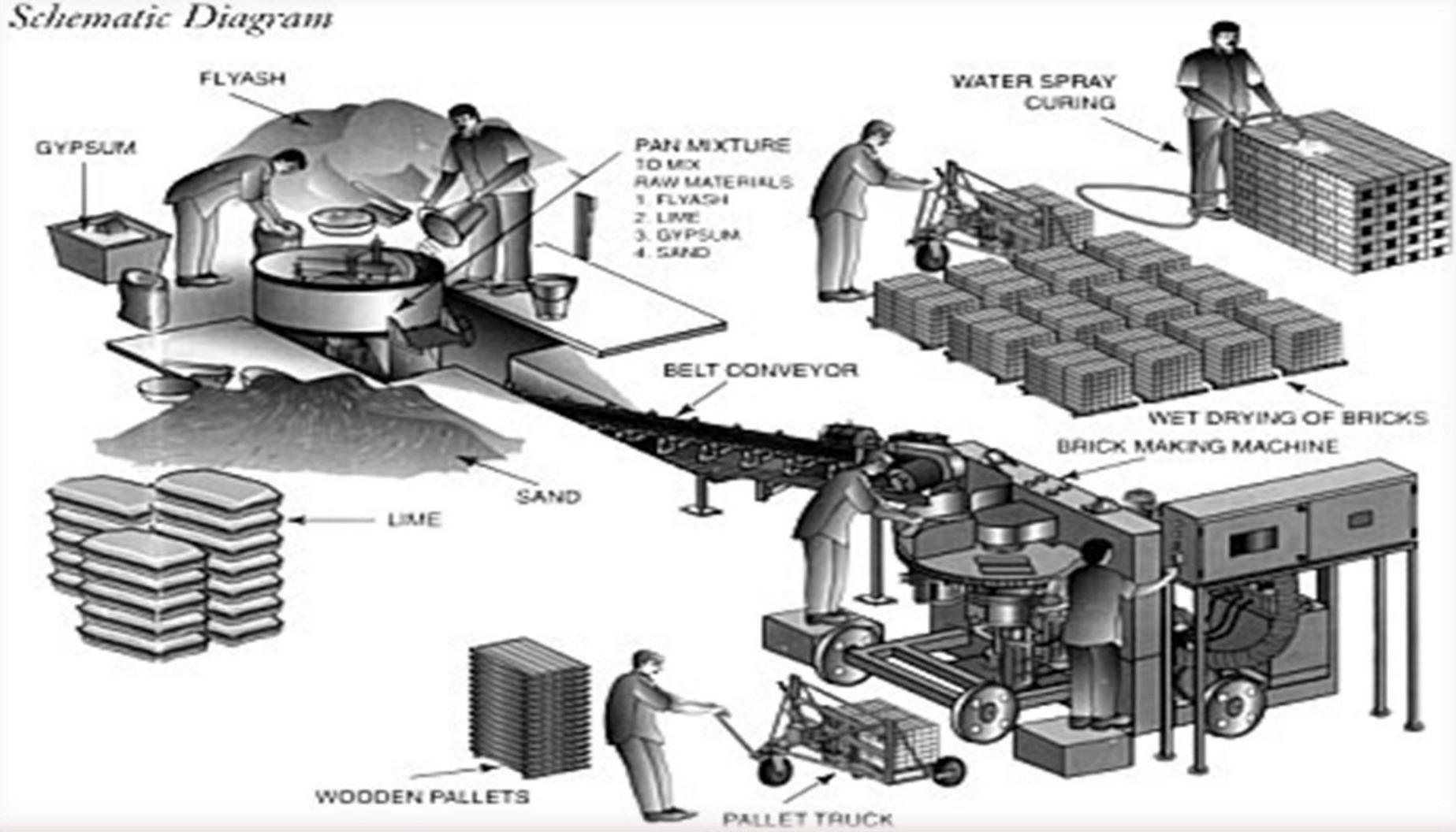
And Sand From Pits,Rivers,Seas etc.

PROPORTIONING OF RAW MATERIAL

- Fly ash: 55-60%
- Sand: 20-25%
- Sludge Lime: 15-20%
- Gypsum: 5%
- **1] NORMAL METHOD**

- Fly ash: 60-65%
- Sand: 18-27%
- Sludge Lime: 8-12%
- Gypsum: 5%
- **2] PROFITABLE METHOD**

Manufacturing Process



PRODUCT SPECIFICATIONS:-

Flyash brick size details:-

230 x 100 x 75

230 x 100 x 100

230 x 150 x 80 mm

230 x 150 x 100 mm

2] **Compressive strength**:- 75-150 kg/cm^2

3] **Water Absorption**:- 8-12%

4] **Efflorescence**:- Nil

5 Density:- 1700 kg/m^3

230 x 100 x 75 mm [weight about 4.75 – 5 kg approx]

6 Weight:-

230 x 150 x 75 mm [weight about 2.75 – 3 kg approx]

7 Load bearing capacity:- More than 25% as compare to clay bricks.

8 Composition:- Cement, Thermal station flyash, Crushed sand / stone dust and chemicals

9 9] **Drying shrinkage**:- Maximum average drying test shrinkage 0.035 – 0.04%

10] **Brick colour**:- Gray / Dark gray

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Thank you!

STAY HOME, STAY SAFE