

The Complete Book on Construction Materials

Author: NPCS Board of Consultants & Engineers

Format: Paperback

ISBN: 9788190439831

Code: NI190

Pages: 672

Price: Rs. 1,475.00 **US\$** 150.00

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Usually ships within **5** days

Construction industry is the largest consumer of material resources, of both the natural ones (like stone, sand, clay, lime) and the processed and synthetic ones. Each material which is used in the construction, in one form or the other is known as construction material (engineering material). No material, existing in the universe is useless; every material has its own field of application. Stone, bricks, timber, steel, lime, cement, metals etc. are some commonly used materials by civil engineers. Selection of building material, to be used in a particular construction, is done on the basis of strength, durability, appearance and permeability. The stone which is used in the construction works, in one form or another is always obtained from the rocks. The rocks may be classified in four ways; geological classification, physical classification, chemical classification and classification based on hardness of the stone. Various king of rocks come under these classification for example; igneous rocks, plutonic rocks, sedimentary rocks, silicious rocks, stratified rocks etc. brick is the most commonly used building material which is light, easily available, uniform in shape and size and relatively cheaper except in hilly areas. Bricks are easily moulded from plastic clays, also known as brick clays or brick earth. Bricks can be moulded by any of the three methods; soft mud process, stiff mud process and semi dry process. There are various kinds of bricks; specially shaped bricks, burnt clay bricks, heavy duty bricks, sand lime bricks, sewer bricks, refractory bricks, acid resistant bricks etc. lime is an important building material, it has been used since ancient times. Lime is used as a binding material in mortar and concretes, for plastering, for manufacturing glass, for preparing lime sand bricks, soil stabilization etc. Concrete is a construction material obtained by mixing a binder (such as cement, lime, mud etc.), aggregate (sand and gravel or shingle or crushed aggregate), and water in certain proportions. Based on the binding materials, the common concretes can be classified as; mud concrete, lime concrete, cement concrete and polymer concrete. World demand for cement and concrete additives is projected to increase 8.3 percent annually in next few years. This book basically deals with rock and stone, formation of rocks, classification of rocks, geological classification, metamorphism physical classification of rocks, chemical classification, classification based upon hardness of the stone composition of stone (rock forming minerals), igneous rock forming minerals, sedimentary rock forming minerals, texture of the rocks, types of fractures of rock, uses of stone, natural bed of stone, aluminium and magnesium alloys, mechanical properties of a partially cured resin, DMA characterization, chemical advancement of a partially cured resin, differential scanning calorimeter characterization, chemical mechanical relations, moisture content as a variable, wettability and water repellency of wood, fungal and termite resistance of wood etc.

The book provide wide coverage of building materials such as stone, bricks, lime, mortars, concrete, asbestos, gray iron, cast iron, steel castings, aluminium, wood, architectural paints and so many others with their applications in building construction. The book is resourceful for all professionals related to construction field, technocrats, students and libraries.

Contents

1. STONE

- Introduction
- Rock and Stone
- Formation of Rocks
- Classification of Rocks
- Geological classification
- Metamorphism
- Physical classification of rocks
- Chemical classification
- Classification based upon hardness of the stone
- Composition of Stone (Rock-forming Minerals)
- Igneous rock forming minerals
- Sedimentary Rock Forming Minerals
- Texture of the Rocks
- Types of Fractures of Rock
- Uses of Stone
- Natural bed of Stone
- Seasoning of Stones
- Characteristics or Qualities of Stones
- Characteristics of principle Building Stones
- Properties
- Decay or Deterioration of Stones
- Preservation of Stone
- Artificial Stone
- Important point to be Considered before Starting Quarrying
- Methods of quarrying Stone
- Various Operations of Blasting
- Precautions in Blasting
- Blasting materials
- Making of Primer Cartridge
- Storing of explosives
- Handling of misfires
- Dressing of Stone
- Machines Required for Quarrying Stone

2. BRICKS AND OTHER CLAY PRODUCTS

- Introduction
- Brick Earth and its Constituents
- Sources of Brick Earth
- Qualities of Brick Earth
- Chemical composition of Brick Earth
- Functions of the constituents of Brick Earth
- Harmful Ingredients
- Pebbles of Stones and Gravel
- Alkaline-Salts
- Limestone and Kankar
- Vegetation and Organic Matter
- Manufacture of Clay Bricks
- Selection of site
- Preparation of Clay
- Weathering Process
- Tempering process
- Moulding of bricks

Soft mud process
Procedure
Stiff Mud Process
Semi Dry Process
Drying of Bricks
Natural Drying
Artificial Drying
Burning of Bricks
Clamp
Intermittent Kilns
Continuous Kilns
Classification of Burnt Clay Bricks
Introduction
Properties of Burnt Clay Bricks
General Quality of Bricks
Dimensions and Tolerances
Water Absorption of Bricks
Efflorescence
Strength of Bricks
Testing of Bricks
Test for Compressive Strength
Test for Water Absorption
Test for efflorescence
Test for warpage
Special Bricks
Specially shaped Bricks
Burnt Clay Facing Bricks
Heavy Duty Bricks
Perforated building bricks
Sand lime Bricks
Sewer Bricks
Acid Resistant Bricks
Refractory Bricks
Manufacture
Acid bricks
Basic Bricks
Neutral Bricks
Building Tiles
Process for Manufacturing Roofing Tiles
Process for Manufacturing Flooring and Wall Tiles
Specifications for Building Tiles
Earthenwares
Glazed Earthenware Tiles
Terracotta
Stoneware

3. LIME

General
Properties of Lime
Uses of Lime
Source of Lime
Some Important Terms and their Definitions
Varieties of lime

Classification of Lime
Uses of fat lime
Classification of Lime According to I.S. 712-1984
Indian Standard Specification for Lime
Manufacturing process
Description of Each Stage of Operation
Field Control Test for Assessing Quality of Lime
Manufacture of Fat Lime
Advantages of continuous kiln
Manufacture of Natural Hydraulic Lime
Manufacture of Artificial Hydraulic Lime
Storage of Lime
Field Slaking of Lime and Preparation of Putty
Objective of Slaking
Slaking Process
Determining the Slaking Nature of Lime
Slaking Procedure for Quick Slaking Lime
Initial Preparation
Methods of Slaking Lime
General Precautions in Slaking
Slaking Procedure for Medium and Slow-slaking Limes
Running
Maturing
Making Coarse Stuff and Putty from Hydrated Lime or Powder
Coarse Stuff
Putty
Storage after slaking
Testing of Lime
Classification of binding materials
Precautions to be taken in handling lime
Properties of Lime

4. MORTARS

Definitions
Sand
Classification Based on Fineness
Bulking of Sand
Desirable Properties of Sand
Function of Sand in Mortars
Fineness Modulus of Sand
Tests for Sand
Selection of Sand for Use
Substitutes for Sand
Types of Mortars
Special Mortars
Properties of Good Mortar
Test for Mortars
Precautions in using Mortar

5. CONCRETE

Introduction
Lime Concrete
Preparation of lime Concrete

Laying of Lime Concrete
Properties of Lime Concrete
Use and Precautions
Water
Coarse Aggregate
Grading of Aggregate
Proportioning of Fine Aggregate to Coarse Aggregate
Maximum Size of the Aggregate
Measurement of Cement Concrete Ingredients
Significance of Bulking of Sand
Water Cement Ratio (W/C Ratio)
Proportioning of Concrete Mixes
Cube strength of Concrete
Properties of Cement Concrete
Slump Test
Factors Affecting Proportions of Concrete
Strength of Concrete
Mixing of Concrete
Transporting the Concrete
Placing of Concrete
Consolidation or Compaction of Concrete
Finishing
Curing of Concrete
Removal of Form Work
Joints in Concrete
Some other Types of Cement Concretes
Form Work

6. ASBESTOS

Introduction
Commercial Focus
Asbestos Sheets and Boards
Asbestos Cement Pipes

7. ASPHALT, BITUMEN AND TAR

Introduction
Terminology
Asphalt/Bitumen
Other Allied Terms
Bituminous Materials
Bitumen Felt/Tar Felt
Specifications and use
Other Bituminous Materials
Tests for Bitumen
Tar

8. GRAY IRON

The Metastable Iron-Iron Carbide System
Solidification of an Fe-C-Si Alloy
Chemical Composition Effects
Carbon
Silicon
Silicon Content and Graphitization

- Sulfur and Manganese
- Phosphorus
- Gray-iron Specifications
- Heat-treatment of Gray Iron
- Machinability
- Wear Resistance
- Strength
- Stress Relief
- Alloying Elements
- Effect on Microstructure
- Chromium
- Molybdenum, Molybdenum-Nickel
- Nickel
- Silicon
- Copper
- Aluminum and Titanium
- Effect on Properties

9. CAST IRON

- Definitions
- Chemical Composition
- Composition and Graphitization
- Solidification Process
- Microstructure
- Graphite
- Cementite
- Ferrite
- Pearlite
- Steadite
- Austenite
- Properties of Cast Irons
- White Irons
- Chilled Iron

10. STEEL CASTINGS

- Introduction
- Molding Processes And Sands
- Green-sand Molding
- Refractoriness
- High permeability and Low Moisture Content
- Organic and Other Additions
- Green-sand-molding Casing Defects
- Dry-sand Molds and Skin-dried Molds
- Other Types of Molds
- Molding Methods
- Cores
- Hot-tear Formation
- Metal penetration
- Burn-on
- Ceroxides
- Core and Mold Washes

11. ALUMINIUM AND MAGNESIUM ALLOYS

ALuminum Alloying Principles
Copper
Heat-treatment of Cu-Al Alloys
Silicon
Magnesium
Magnesium and silicon

12. DUCTILE IRON

Solidification Of Ductile Iron
Development of Graphite Spheroids
Role of Magnesium
Control of the Common Elements
Carbon
Silicon
Sulfur
Phosphorus
Other Elements
Melting Practices
Acid Cupola Melting
Desulfurization
Basic Cupola Melting
Induction-furnace Melting
Magnesium Treatment
Inoculation
Engineering Properties

13. MALLEABLE IRON

Melting
Batch-Melting Process
Engineering Properties
Pearlitic Malleable Irons
Other Malleable Irons

14. RESIN CHARACTERIZATION

Introduction
Scope
Mechanical Properties of a Partially Cured Resin – DMA Characterization
Chemical Advancement of a Partially Cured Resin – Differential Scanning Calorimeter Characterization
Chemical-Mechanical Relations
Moisture Content as a Variable
Flake Bonding
Measurement of Pressing Environments
Resin Penetration
Practical Application

15. THERMO-GRAVIMETRY OF WOOD REACTED WITH FLAME RETARDANTS

Introduction
Experimental Methods
Results and Discussion
Phosphorus And Nitrogen
Thermogravimetry
Flame Test
Conclusions

16. WETTABILITY AND WATER REPELLENCY OF WOOD

Introduction

Experimental

Wood materials

Automated surface tension analyzer

Computer program: wood wettability study

Graph

Contact angle from attractive force

Contact angle from work of adhesion

Surface free energy estimation

Interaction parameter calculation

Aging effect

Results and Discussion

Aging effect

Surface free energy estimates

Interaction parameter calculation

17. FLAME RETARDANT TREATMENT OF WOOD

Introduction

Materials and Methods

Preparation of specimens

Treatment of specimens

Leaching

Dimensional stability tests

Thermogravimetric analysis

Results and Discussion

Treatment of specimens

Leach resistance

Dimensional stability

Thermal degradation

Conclusions

18. FUNGAL AND TERMITE RESISTANCE OF WOOD

Introduction

Materials and Methods

Fungal evaluations

Termite evaluations

Reaction time and chemical analysis

Results and Discussion

Decay Resistance

Chemical Analysis

Conclusions

19. WEATHERING OF WOOD

Introduction

Early History

The Weathering Process

Weathering Factors

Property Changes

Weathering of Wood-Based Materials

Protection Against Weathering

Film-forming Materials
Penetrating Finishes
Summary

20. ARCHITECTURAL PAINTS

Introduction

Exterior Paints for Wood

Characteristics of Wood Siding

Binders for Exterior House Paints

Pigments for Colored Paints

Microorganisms in Paints and Coatings

Formulating Exterior Paints for Wood

Interior Paints for Plaster and Wallboard

Exterior Emulsion Paints for Masonry

Exterior Solution Type Paints for Masonry

Interior and Exterior Enamels

Enamels for Wood and Concrete Floors

21. BUILDING CONSTRUCTION ADHESIVES

Introduction

Advantage of Using Adhesives in Construction

Elastomeric Adhesives

Gap-Filling Phenol Resorcinol Adhesives

Polyurethane Adhesives

Resorcinol Resin Adhesives

Casein Adhesives

Polyvinyl Acetate Resin Emulsion

Phenolic Resin Adhesives

Melamine-Urea Resin Adhesives

Urea Resin Adhesives

Epoxy Resin Adhesives

Contact Cement

22. FLOORING

Domestic Flooring

Institutional Flooring

Industrial Flooring

Types Of Epoxy Flooring

Self-levelling Floors

Trowelled Floors

Epoxy Terrazzo

Future Developments In Epoxy Floors

23. MINING

Adhesion And Grouting

Remedial Uses

Concrete Crack Repair

Bonding Concrete to Concrete

Bonding Reinforcements

Epoxy Bonding in New Structures

Fire Resistance

Bulk Mechanical Properties

Creep

Miscellaneous Bonding Applications

24. GROUTS FOR LEVELLING: MISC. APPLICATIONS

Miscellaneous Applications

Soil consolidation

Tile grouts

Epoxy laminates for concrete moulds

Resin concrete

25. GLASS

Structure

Composition

Single-Phase Glasses

Properties

Manufacture and Processing

Economic Aspects

26. CEMENT

Clinker Chemistry

Hydration

Cement Paste Structure and Concrete Properties

Manufacture

Portland Cements

Special Purpose and Blended Cements

Nonportland Cements

Economic Aspects, Production, and Shipment

Specifications and Types

Uses

27. INSULATING MATERIALS

Introduction

Thermal Insulation

Terminology Related to Thermal Insulation

Requirements of Thermal Insulating Materials

Types of Insulating Materials

Air Spaces

Aerated Concrete

Gypsum

Expanded Blast Furnace Slag

Sprayed Asbestos

Vermiculite

Coconut Fibres

Cork Board

Rock Wool

Cellulose

Cellular Plastics

Fibre Glass

Sound Insulation

Terminology

Units of Sound

Velocity of Sound

Acoustics

Noise
Requirement of Sound Insulating Materials
Types of Acoustical Materials
Acoustic Pulp
Acoustical Plaster
Unifil Acoustical Plaster
Limpet Asbestos
Thermacoustic
Prefabricated Boards or Tiles
Glass Fibres
Composite Units

About NIIR

NIIR PROJECT CONSULTANCY SERVICES (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

NIIR PROJECT CONSULTANCY SERVICES , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** npcs.india@gmail.com **Website:** NIIR.org

Fri, 19 Apr 2024 19:56:42 +0530