

The Complete Technology Book on Fibre Glass, Optical Glass and Reinforced Plastics

Author:- NIIR Board of Consultants & Engineers

Format: paperback

Code: NI177

Pages: 544

Price: Rs.1275US\$ 125

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Usually ships within 5 days

Although many natural materials were used in the past by man, answering his instinctive urges to prevent heat loss from or entry into his dwellings, no material in modern technology has satisfied the all around requirements as has fiber Glass. Fiber glass, optical glass and reinforced plastics have important applications and uses in the making of various products. Fiberglass is a lightweight, extremely strong, and robust material. Although strength properties are somewhat lower than carbon fiber and it is less stiff, the material is typically far less brittle, and the raw materials are much less expensive. Its bulk strength and weight properties are also very favorable when compared to metals, and it can be easily formed using molding processes. Fibre glass behaves as a thermal insulation because of its entrapment of small cells of air, and prevention of movement of the air in those cells. In acoustical applications, fibre glass presents to advancing sound waves a myriad of small anechoic chambers which reflect the sound inward from many diverse surfaces until it becomes blotted out. Optical glass is a high glass material that has been seen specifically formulated to possess certain desirable characteristics that effect the propagation of light. The two primary parameters that define the basic types of optical glass are its refractive index and its dispersion. Transportation on wheel is of special significance to the reinforced plastics industry on a number of counts. Suppliers of reinforced plastics parts are often called upon to furnish prototypes of products being considered for auto, truck and bus applications. Performance and quality demands on materials used in aerospace vehicles have given rise to many plastics developments and have kept profits in the plastics industry at a higher level than those in other major markets.

Some of the fundamentals of the book are fibres based on natural polymers:

fibres based on synthetic polymers, fibre glass blown wool or insulation products and their applications, fibre glass in wall construction for reduced sound transmission, ceramic fibre papers, ceramic fibre textiles, commercial polymerization processes, continuous filament fibre forming methods, marine applications, reinforced plastics for transportation on wheels, plastics in aircraft and aerospace, structural laminate bag molding process, reinforced molding compounds, filament winding, etc.

The present book contains processes and other valuable information for fiber glass, optical glass and reinforced plastics. This is very resourceful book for entrepreneurs, technocrats, institutions, researches etc.

1. INTRODUCTION

Product and its applications
Man Made Fibres : An overview
History of man made fibres-world view
Fibres Based on Natural Polymers:
Fibres based on Synthetic Polymers
History of man made fibres Indian scene

2. FIBRE GLASS BLOWN WOOL OR INSULATION PRODUCTS AND THEIR APPLICATIONS

Introduction-parameters and test methods
Chemical Composition
Fibre Diameter
Binders
Thickness and Density
Percent shot
Percent Recovery
Other properties
Building Insulation
Thermal insulation-Homes
Heat loss data and calculations
Thermal insulation-Metal Buildings
Blanket insulation
Rigid insulation board
Engineered systems for increased thermal performance
Insulation of Mobile Homes, Recreational Vehicles, and Packaged Housing
Acoustical insulation for buildings
Thermal-Acoustical Batting
Fibre Glass in Wall Construction for Reduced Sound Transmission
Thermal-Acoustical insulation or improvement of existing construction
Additional insulation for acoustical ceilings
Acoustical ceiling materials
Materials
Dimensions and suspending systems
Aesthetic appearance: Facings, configurations, contours
Light reflectance
Acoustical ratings
Thermal properties of ceiling components
Integrated systems
The open office
Industrial Noise Abatement
Pipe and air handling insulations
Pipe insulation
History and Evaluation
Manufacture
Properties and Performance
General properties
Specific properties
Applicable specifications
Insulation for Air-Handling Systems and Ducting
Introduction
External Duct insulation
Internal Duct insulation
Faced insulation for duct wrapping

Fabricated Fibre Glass duct
Appliance and equipment insulations
Introduction
Appliance insulation
Forms available
Product properties
Miscellaneous
Equipment insulation
Standard roll-type insulation
Dual-Density insulation
Mechanically Bonded Mats
Thermal insulating Wool
Mineral Fibre Board insulation
Double Mesh-Faced Insulation
Metal-Jacketed Equipment insulation
Miscellaneous
Insulation for various transportation modes
Automotive market
Automotive insulation-Topliners
Automotive insulation-Handliners
Automotive insulation-Molded engine housing
Insulation for Vans
Automotive insulation-Miscellaneous components
Summary
Marine Products
Navy Hullboard
Marine Equipment insulation
Felted Mineral
Unbonded Mats or Batting
Flotation wool
Aircraft and aerospace insulation's
Introduction
Aircraft Frame insulation
Reusable surface insulation for orbiting space vehicles
High temperature insulation : Refractory Fibres
Introduction
Bulk Fibres
Felts, Blankets, Boards
Ceramic Fibre papers
Ceramic Fibre Textiles
Vacuum Forming Social Shapes
Mixes
Tamping Mixes
Composite insulation for space firings and launchings.
Reinforcement of Zirconia and Like foams.
Filtration
Introduction
Condition of Air requiring filtration
Properties of Glass Fibre as an Air Filter Medium
Understanding Air-filtration Technology
Size of inner diameter
Length
Wall thickness

Densities and interleaving
Binder content
Grooving
Fibre diameter
Advantages of Fibre glass in filtration of liquids
Testing liquid filtration media
Degree or fineness required
Amount of material to be removed and at what rate
Overall cost
Applications and performance
Paints, varnishes and solvents
Photography processing
Underground water flooding
EDM (Electrical Discharge Machining)
Filtration of Hydraulic oil
Filtration of swimming pool water
Absolute liquid filtration
Filtration of Jet Fuel and the Like
Fibre Glass Mat and Web products
Introduction
Glass Fibre paper
Shingles and roofing mats
Shingles
Built up Roofing
Industrial Bonded mats
Pipeline Protection
Roadbed protection
Drain-Tile protection
Backing for floor tile carpeting and wall covering
Battery retainer mats
Separator sheets for small batteries
Laminated battery separator mats for larger batteries
Verd and surfacing mats

3 MANUFACTURING PROCESSES

General
Factors responsible for polymerization
Co-polymer composition
Neutral commoners
Ionic comonomers
Molecular weight
Catalyst preparation
Process parameters
Polymerization process
General
Bulk Polymerization
Aqueous dispersion/suspension
Emulsion polymerization
Solution Polymerization
Commercial polymerization processes
Processing and spinning
General
Solution dope preparations

Spinning processes
Wet spinning
Dry spinning
Commercial spinning process
Comparison of drywet spinning routes
Special spinning processes
Special Fibres
Porous fibres
Dyning of acrylic fibres
Pollution control in acroylic fibre plant
Raw materials
Acrylonitrile
Methyl Acorylate and Vinyl Acetate
Methyl acrylate
Vinyl acetate
Ionic co-monomers
Solvents
Dimethyl formatted
Dimethyl acetamide
Nitric acid
Major capital equipment
Suspension polymerization parts
Solution Polymerization parts
Dry spinning parts

4 CONTINUOUS FILAMENT FIBRE FORMING METHODS

Introduction
Marble melt process
Direct-melt process
The stricke and processes
Fibreproduction from ceramic crucibles
Metal coated glass Fibres
Staple Fibre or sliver
Production of Fibre optic elements
Extrusion fusion method

5 PRODUCT APPLICATION

Optical glass
Definition
Types of optical glass
Internal quality grades
Optical Fibre
Types of Optical Fibre
Application Profile
Optical glass
Optical Fibre

6. GLOBAL TECHNOLOGY TRENDS

Glass fabrication
Melting
Continuous process
Other emerging fabrication methods
Sol-gel method

Vapour deposition method
New Material compositions
Environmental friendly materials
IR materials
UV Transmission materials
Super flints
Artificial Crystal materials
Ophthalmic materials
Component production
Machining
Gradient index materials
Optical fibres
Material status
Optical fibre fabrication
Fused quartz and synthetic fused silica tubes/rods
Preform fabrication
Fibre drawing and coating processes
Furnace designs
Fibre diameter measurement and control
Fibre coatings
High speed drawing and coating
Fibre opto electronic devices and coupling
Technology status India
Optical glass
Ophthalmic glasses
BOGL
Other Glasses at R & D states
Emerging technology trends

7 TECHNOLOGY EVALUATION

Optical fibre
Application viability
Manufacturing Viability
Preform Fabrication
Fibre drawing
Furnance Designs

8 MARINE APPLICATIONS

Introduction
Marine structural laminates
Resin systems
Reinforcements
Production processes
Laminated Materials
Response to marine environment
Effect of extended water exposure on static properties
Effect of water under pressure
Recovery of properties of Drying
Effect of water on Long terms loading properties
Weathering effects
Biological attack- fouling
Design of marine structures
Applications

Boat Construction
Fabrication processes
Fairings and Housings
Submarine fairwaters
Outer Hull structures
Shipboard structures
Tanks
Structure sonar Domes
Floats and Buoys
Protective Coatings
Current and future developments
Large surface slips
Naval construction
United Kingdom program
US program
Deep submergence vehicles
Properties of composite
Effects of operational conditions on properties
Design concept
Ring stiffened cylinder
Sandwich construction
Hollow glass materials
Other configurations
Current Research
Summation concluding remarks

9 REINFORCED PLASTICS FOR TRANSPORTATION ON WHEELS

Introduction
Production versus materials costs
FRP properties as related to transportation
What reinforced plastics to use-where and why
Low-or-No-Pressure
Matched Metal Die Molding
Contains strand mat
Performs
Sheet molding compound
Bulk molding compound (Premix)
Resins and reinforcements
The cross over or break even point
Improved, mechanized, automated equipment
Mechanization not enough
Improved equipment
Low cost high quality auto and truck finishes
Cases in point
Mach fender Hood assemblies
Falcon window frame moldings
Pressure-molded reinforced plastic reefer panels
GMC wheelhouse
International fan shrouds and grille frame

10 PLASTICS IN AIRCRAFT AND AEROSPACE

Introduction
Aircraft

Progress
Applications
Plastic-ceramic Armor
Structural and Nonstructural parts
The all-plastics airplane
Costs versus Fabrication
Changing Environment
Aerospace
Introduction
Applications
Fibres
Nonwoven structures
Whiskers
Matrix
Re-entry vehicle
Ionizing Radiation
Effects of Vacuum
Use of advanced composites in spacecraft
Material requirements
Outguessing studies for Lunar Module
Conclusions

11 HAND LAY-UP TECHNIQUES

A simple hand lay-up
A complex hand lay-up
Drape molding
Spray-up
Wet lay-up low compression molding
Moldless lay-ups
Direct lay-ups or one-shot techniques

12 MATCHED DIE MOLDING-FABRIC, MAT AND PREFORM

Introduction
Definitions
Scope
Molding considerations
Mat materials for molding
Continuous Fibre mats
Mold taper for matched molds
Chopped glass performs
Directed Fibre perform process
Wet slurry process
Preform screens
Preform binders
Molding with fabrics
Vacuum injection molding
Displacement of No pressure matched mold molding
Flexible plunger molding
Molding Presses
Nonmetallic mold materials
Matched metal die molding
Matched mold materials and mold design
The positive types of molds

Transfer molds
Open flash molds
The cut off mold
Complex or combination molds
Resins for pressure molding
Resins
Summary

13 STRUCTURAL LAMINATE BAG MOLDING PROCESS

Introduction
General description of processes
The bag molding team
Material and process Engineer
Tooling Engineer
Quality control Engineer
Production personnel
Bag molding materials and properties
Structural property determination and relation
Typical test data
Specification values
Design allowable values
Bag molding processing specification
Quality control procedures
Acceptance testing
Tool cure cycle determination
Secondary materials for Bag molding
Production Surveillance and Corrective Action
Production procedures
Bagging Area
Curing Area
Autoclave Curing
Detail curing operation
Autoclave cure
Oven Cure
Part removal and finishing
Final inspection
Designer
Materials and process engineer
Tooling
Quality control
Production

14 REINFORCED MOLDING COMPOUNDS

Definition
History
Premix
Sheet molding compound (SMC)
Properties
Applications
Materials
Resin
Reinforcements
Fillers

- Curing Agents and inhibitors
- Formulation
- Ingredients
- Premix
- Compounding
- Facility and equipment requirements
- Sheet Molding Compound
- Molding
- Mold Construction
- Release and Ejection of parts form the mold
- Molding presses
- Design

15 FILAMENT WINDING

- Introduction
- Basic material for windings
- Reinforcements
- Resin System
- The winding process
- Head counters
- Mandrels
- Behaviour of filament wound composites
- Netting analysis
- Filament winding machines
- Micromechanics and micromecahanics
- Test methods
- Composite Mechanical Properties
- Summary

16 Continuous production methods

17 Ablation

- Analysis
- History
- Applications
- Material characteristics
- Environmental effects
- Pyrolyzed and graphitized plastics
- Modified phenolic ablators

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

Sun, 25 May 2025 01:43:24 +0000