

Spaulding

PRODUCTS for INDUSTRY

**THE
ANSWER
TO
INDUSTRY'S
PROBLEMS**

VULCANIZED FIBRE:

in sheets, rods, tubes and fabricated parts.

ARMITE:

Thin insulation (Fish Paper) in sheets, rolls, coils and fabricated parts.

SPAULDITE:

(Laminated Phenolic Plastic) in sheets, rods, tubes and fabricated parts.

SPAULDO:

Motor Insulation in sheets, rolls, coils, slot cells and other fabricated parts.

SPAULDING FIBRE BOARD:

in sheets and fabricated parts.

SPAULDING T BOARD:

A superior Transformer Board, in sheets and fabricated parts.

MATERIAL HANDLING EQUIPMENT:

Factory trucks, Boxes, Barrels, Trays, etc.

Our Factories and Branch Sales Offices are shown on inside front cover.

SPAULDING FIBRE COMPANY, Inc.

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**For the DESIGN ENGINEER or
the BUYER of MACHINE PARTS**

This book comprises two major divisions.

- 1. A detailed list of general physical properties and of specific uses for which Spaulding Products have proved their adaptability in industrial applications.*
- 2. Engineering Reference Data presented in a clear and comprehensive way.*

THE MATERIALS here described find advantageous uses in practically every field of present-day manufacture. Through their employment the user may provide:

Greater efficiency for his own products without extra cost, or; the same or a more efficient job at a lower cost.

SPAULDING SALES OFFICES

Welcome your inquiries

For product or price information or Engineering counsel, call or write our office nearest to you. No obligation.

BOSTON 16, MASS.

585 Boylston St.
Phone Commonwealth 6-2680

BRIDGEPORT 5, CONN.

2889 Fairfield Ave.
Phone 5-5202

CHICAGO 25, ILL.

4770 Lincoln Ave.
Phone Longbeach 1-7867

CHICAGO 38, ILL.

5604 West 63rd St.
Phone Reliance 5-1919

CLEVELAND 14, OHIO

2108 Payne Ave.
Phone Tower 1-2285

CLEVELAND 16, OHIO

19035 Detroit Rd.
Rocky River
Phone Edison 1-8200

DAYTON 2, OHIO

136 South Ludlow St.
Phone Adams 2286

DETROIT 1, MICH.

4612 Woodward Ave.
Phone Temple 2-1208

FORT WAYNE 6, IND.

2301 Fairfield Ave.
Phone Harrison 3228

LANSING 10, MICH.

2021 South Cedar St.
Phone 2-1601

LONG ISLAND, N. Y.

90-34 Jamaica Ave.
Woodhaven 21, L. I., N. Y.
Phone Virginia 9-5300

MILWAUKEE 8, WIS.

3329 West Vliet St.
Phone West 3-3810

NEW YORK 55, N. Y.

384 East 149th St.
Phone Cypress 2-1006

NEWARK 2, N. J.

965 Broad St.
Phone Mitchell 2-7870

PHILADELPHIA, PA.

702 Federal St.
Camden 3, N. J.
Phone Woodlawn 3-1640
Philadelphia, Pa.
Market 7-4764 or Market 7-1852

ST. LOUIS 5, MO.

34 North Brentwood Blvd.
Phone Delmar 4131

TONAWANDA, N. Y.

310 Wheeler St.
Phone Jackson 2000

LOS ANGELES 15, CALIF.

C. D. LaMoree,
1325 San Julian St.
Phone Richmond 6378

BERKELEY 10, CALIF.

C. D. LaMoree
2221 Fourth St.
Phone Berkeley 7-0601

TORONTO 18, ONT.

A. A. Andersen & Co.
28 Jackson Ave.
Phone Cedar 1-5353

LONDON

Spaulding's Ltd.
40 Gloucester Way
Clerkenwell, London, E. C. 1

PARIS

La Fibre Vulcanisee-
Spaulding
27 Rue Vincent Compoint

FACTORIES AT

TONAWANDA, N. Y.
NORTH ROCHESTER, NEW HAMPSHIRE
DOVER, NEW HAMPSHIRE
MILTON, NEW HAMPSHIRE
TOWNSEND HARBOR, MASS.

MECHANICAL, ELECTRICAL and CHEMICAL PROPERTIES OF SPAULDING PRODUCTS

In all the World, no greater range of usefulness to Industry

Abrasion Resistance
Acid Resistance
Alkali Resistance
Anti Rattling properties
Appearance
Arc Resistance
Chemical Resistance
Compressibility
Corrosion Resistance
Deionizing Properties
Dielectric Strength

Electrical Insulation
Forming Qualities
Gluing Surface
Heat Insulation
Impact Strength
Insolubility
Light Weight
Machinability
Mechanical Strength
Oil and Gas Resistance
Permanence

Punching Qualities
Quietness
Resilience
Scuffing & Splintering
Resistance
Slow burning properties
Stiffness
Structural Strength
Threading Qualities
Toughness
Wear Resistance

GENERAL APPLICATIONS

Advertising Novelties
Angles
Baffles
Barriers
Bearings
Bobbins
Bobbin Heads
Bushings
Cams & Cam Followers
Channels
Club Membership Tags
Clutch Discs
Coil Forms
Combs
Cutting Blocks
Delivery Cases
Escutcheon Pads
Extruded Bushings
Formed parts
Friction Discs
Gaskets
Gear Blanks
Gear Stock (Sheets)

Grommets
Guides and Guide Rolls
Handles
Identification Tags
Insulating Sleeves
Insulation
Jack Spacers
Key Tags
Knobs
Linings for Metal Cases
Mounting Plates
Name Plates
Material Handling Equip-
ment
Barrels
Boxes
Trays
Factory Trucks
Panels
Patterns
Pulleys
Pushbuttons
Railroad Bushings

Rods
Roll Coverings
Rollers
Rubbing Blocks
Screws
Shields
Shims
Snap Grommets
Spacers
Spool Heads
Spools
Stiffeners
Swaged Bushings (Upset
Washers)
Terminal Blocks
Thrust Washers
Toys
Tubing
Valve Discs
Washers
Waste Baskets
Wear Plates
Wire Cleats

FABRICATING SPAULDING PRODUCTS

Our Responsibility . . . Your Opportunity

OUR FABRICATING DEPARTMENTS are completely equipped with standard and special machines arranged for the most efficient production of parts made from our materials. They are staffed by specialists at their jobs and their knowledge and experience insures your receiving parts fabricated exactly to your blueprints and specifications.

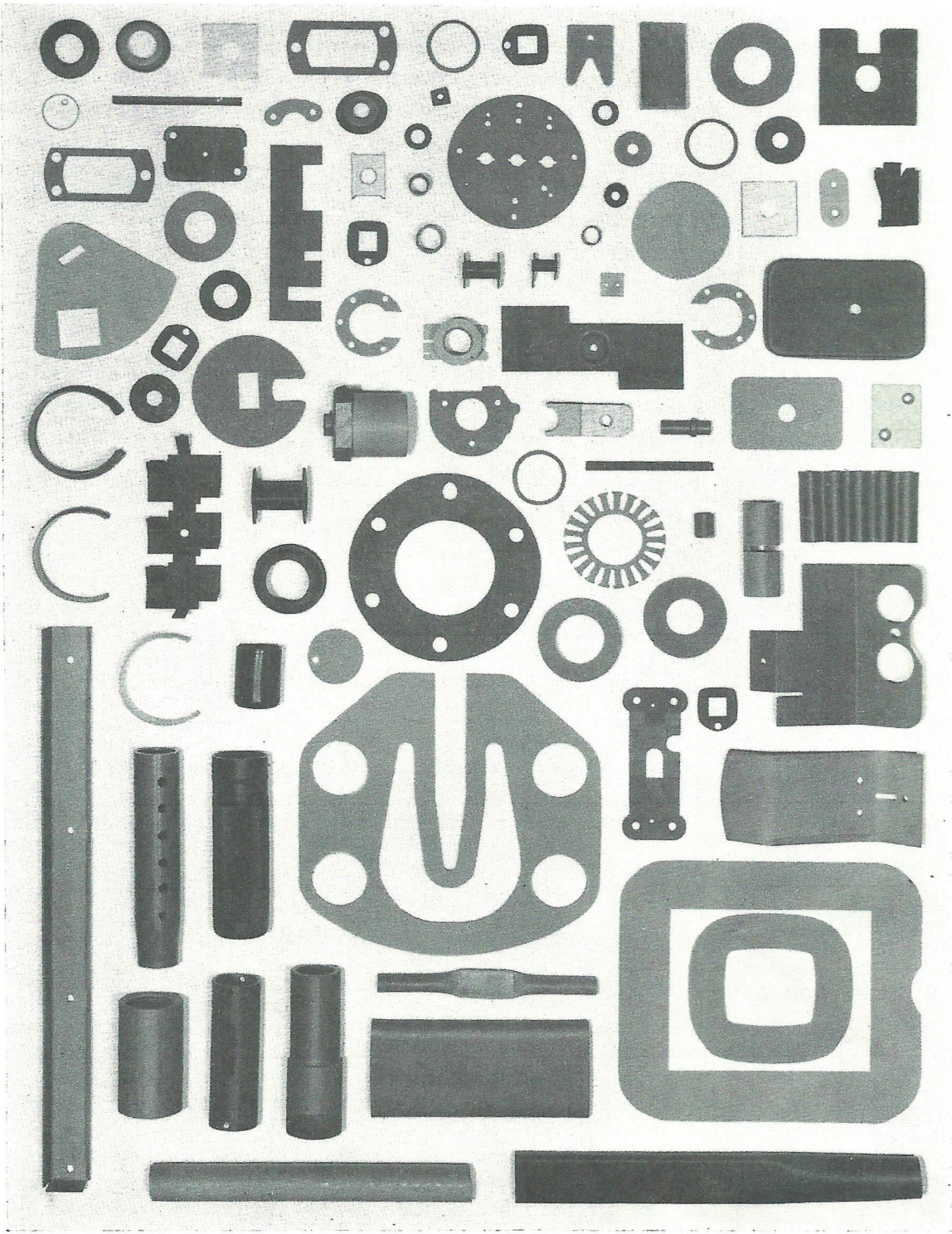
BY TAKING ADVANTAGE of our specialized facilities and experience, you avoid the necessity of maintaining stock inventories of the various grades, thicknesses, and forms of our materials needed in your products. You also avoid investments in special tools and equipment that are often necessary for maximum efficiency, and the problems of waste, scrap, and machining errors that require expensive salvage and inspection operations. Quite often we can suggest acceptable modifications of design or grade of material that will considerably reduce your costs.

ALL OPERATIONS involving the making and fabrication of Spaulding products are carried on in our own plant. All orders, whether for basic materials or intricate machined parts, are handled from start to completion without shift of supervision or divided responsibility. We do not depend on outside fabricators for workmanship nor on outside suppliers for quality of material.

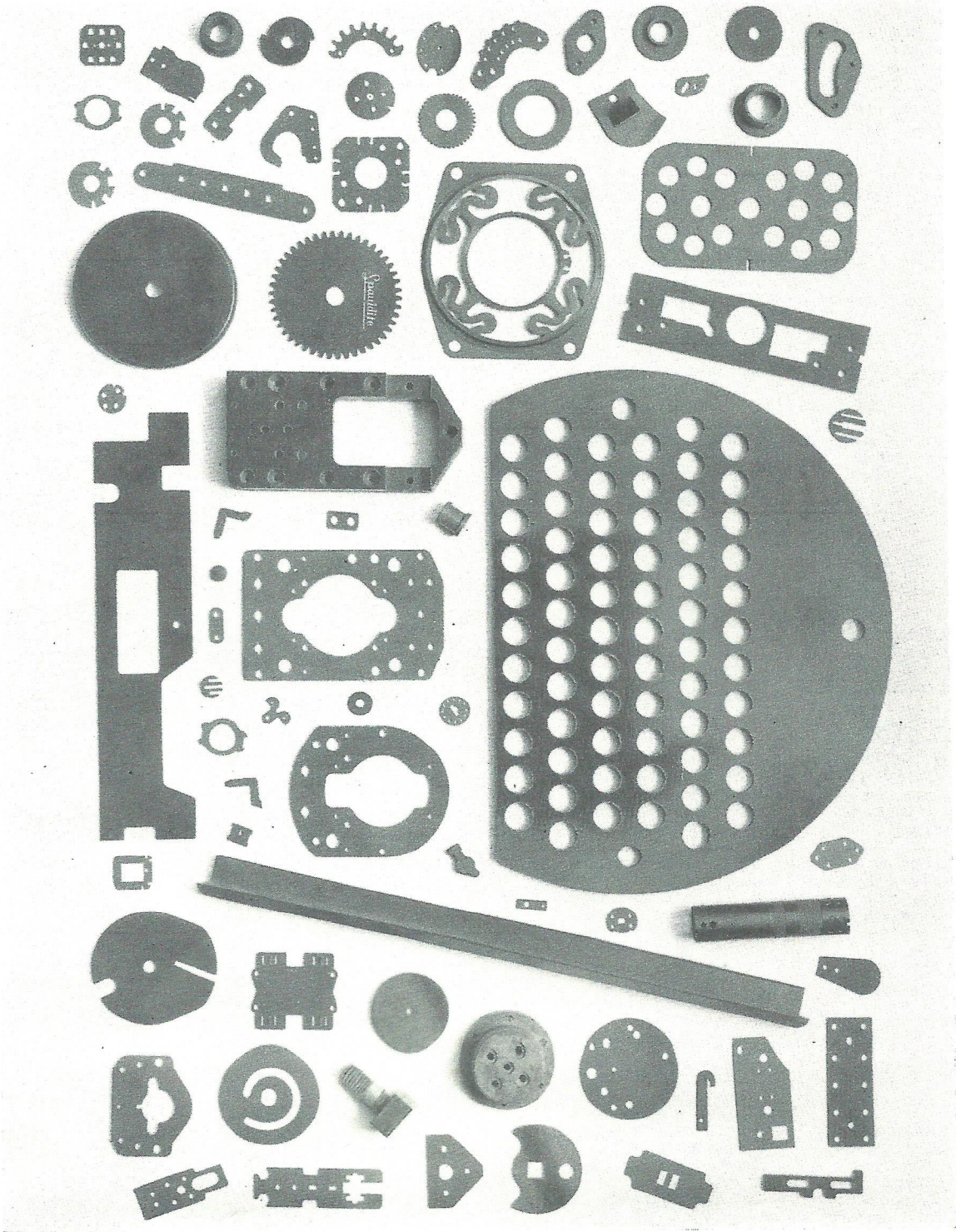
HINTS TO ENGINEERS AND DRAFTSMEN

1. Close tolerances are likely to cost more with these materials than with metals. Be certain that tolerances specified are necessary for interchangeability or functional performance and not mere guesses based on metal fabrication practice.
2. Each of the materials described in this data book and their various modifications or grades have clearly defined advantages in relation to certain properties, and clearly defined limitations in relation to other properties. Be certain you understand what limitations must be accepted to gain the desired advantages.
3. Some grades of these materials cost more than others. It is surprising how often the higher priced grades are specified where the lower priced grades would do the job. Don't pay for unnecessarily high electrical and mechanical qualities.
4. Avoid the following wherever possible for sheet stock too thick to punch:
 - a) Holes or counterbores other than circular. They can be machined but they cost more.
 - b) Irregularly shaped parts that cannot be sawed or profiled easily. Remember there are no forging or casting processes in connection with these materials. If a part is too thick to be punched from a sheet it must be machined from a block, a rod, or a tube.
5. For punched parts allow at least the thickness of the stock between holes and between holes and edge of piece. *This is not a "must", but where possible it is good practice.*
6. These are laminated materials. When possible avoid deep drilling and tapping of large holes parallel with laminations.
7. Get into the habit of using our branch engineers as consultants. It will save you time and money.

SOME INDUSTRIAL USES OF SPAULDING FIBRE



REPRESENTATIVE SPAULDITE APPLICATIONS



APPLICATIONS

ABRASIVE INDUSTRY

Discs
Bushings
Fibre backers
Post Formed Spauldite Backers
Abrasive Wheel Sizing Bushings

Abrasive Wheel Core Bushings
Abrasive Armité
Snagging wheel liners
Face plate washers
Cut-off wheel bushings

AIRPLANE INDUSTRY

Door Latches
Floor boards
Antenna Housings (Loop)
Leading edge sections
Control column bearing blocks
Antenna posts and insulators
Radio connector terminal blocks
Landing gear bearings and seals
Electric propeller parts
Tail wheel bearings
Sound proof stiffeners
Post formed structural members

Fairleads
Fuse blocks
Control cable rubbing blocks
Rudder cable rubbing blocks
Elevator hinge bearing blocks
Antenna leadout insulators & tubes
Slip rings
Bushings
Bullet proof gas tank plates
Wing fillet strips
Guide pulleys

ARTIFICIAL LIMBS

Forming Fibre for limbs
Bushings

Ankle bearings

AUTOMOBILE

Light switch insulators
Starter Motor & Generator insulation
Voltage regulator insulation
Windshield wiper gears
Window latch slider parts
Primary terminal bushings
Panel insulators
Condenser washers
Breaker base supports
Friction washers
Switch pins
Dynamo couplings
Formed bracket insulators
End laminations
Insulation bushings
Gaskets
Coil insulation
Gear shift Anti-rattle part
Window anti-friction washers
Panel instrument backs
Stud insulator-ammeter to dash
Fuel pump valve discs
Horn insulation
Shock absorber packing
Body bolt sound insulators
Trouble light insulation
Radiator cap washers
Ignition bushings
Ignition rubbing blocks
Spotlight switch breaker block
Gas gauge tank unit resistor strips

Condenser can tops, rubber surfaced
Terminal insulators
Bumper Blocks
Carburetor gaskets
Water pump thrust washers
Transmission thrust washers
Dimmer switch parts
Differential thrust washers
Windshield breakover strips
Center pillar foundation strips (XL)
Speedometer drive gear blanks
Oil pump gear blanks
Brake shims
Light cable bushings
Gas tank cap washers
Hood latch bushings
Tacking strips
Trunk light socket insulation
Timer chain rubbing blocks
Seat spring anti-squeak insulators
Cable grommets
Generator cut-out panels
Trim strips
Cushion retainers
Glove box hinge spacers
Air intake gaskets
Arm rest supports
Ignition Point Insulation

Radiator Spacers
Trim Parts
Mirror Back Spacers

Registration Plates
Spring Liners

AUTOMOBILE ACCESSORIES

Speedometer parts
Hydraulic gauges
Gaskets
Clock insulation
Tail & stop light insulation
Dimmer switch ratchet tubes
Spotlight insulation
Fuse case insulators
Lamp wire bushings
Fuse socket bushings
Lamp socket bushings
Contact insulation

Contact rivet insulators
Direction indicator terminal boards
Jack spacers
Horn insulators
Head light insulators
Stoplight switch washers
Switch buttons
Terminal boards
Harness insulators
Aerial insulation
Overhead garage door rollers
Mirror back spacers

BALL & ROLLER BEARING ACCESSORIES

Dust covers
Dust seals

Retainer rings

BOTTLING & CANNING MACHINERY

Bumpers
Bottle Spacers
Test bottle jackets
Gear blanks
Spiders

Knockout fingers
Surface covering
Tubes for testing seal
Tubular cap magazine

BLANKETS — ELECTRIC

Electric blanket insulation

Thermostat insulation

BOWLING ALLEY EQUIPMENT

Kickbacks
Pin spots
Ball runner guides
Pin inserts and ferrules
Foul lines
Bowling rack guides

Bed plates
Pin deck strips
Step-through channels
Step-through face plates
Dowels
Alley target spots

BRUSH MANUFACTURE

Paint brush spacer strips & ferrules
Wall paper brush backs

Rotary brush reinforcement

BUFFING WHEELS

Fibre & Fibre board discs & spacers

BUILDING INDUSTRY

Door kick plates
Storm window slide bolts
Acoustical tile splines
Push plates for swinging doors

Tracks for sliding doors
Shoes for sliding doors
Rollers for sliding doors
Kitchen drawer rollers

CAMERAS AND PROJECTORS

Control knobs
Lens tubing insulation
Cams
Backing plates
Flash gun handles & insulation
Insulating washers on flashlight attachments
Flash holder cases
Shims
Pickup arm panels

Plate holder slides
Grommets
Shutter bushings
Projector amplifier covers
Projector lamp socket bases
Brush holders
Brush holder plates
Gear blanks
Shutter switch insulation

CLASSIFIED BY INDUSTRIES

CIRCUIT BREAKERS

Oil circuit breaker grids
Breaker blocks
Snuff arc shields
Marker discs
Grids
Lightning arrestors

Contact box insulators
Contact tube
Spools
Disconnect shields
Spauldite angles for cabinets

LOCKS, ELECTRIC

Backs
Cams
Contact insulators

Spools
Alarm control panels

CLOTHING MANUFACTURE

Pattern fibre
Swatch backs
Foundations for uniform caps
Trucks

Fibre sun helmet brackets & strips
Collar stiffeners
Cap fronts

COMPRESSORS, AIR

Baffle plates
Oil slinger rings

Piston washers
Drive gear blanks

CONDENSERS & CAPACITORS

Mounting plates
Washers (Rubber Sur-
faced Spauldite)

Can bottom washers
Can tops

CONTROLS, ELECTRIC

Contact spring spacers
Panels
Barriers
Reset buttons
Starter buttons
Contact spring separators
Terminal plates
Switch covers
Switch slides
Insulator bushings
Battery covers
Grids
Thermostat insulation

Contact yokes
Dust barrier insulators
Inside cover shield insula-
tion (XL Board)
Cross arms
Locking pins for adjust-
ment screws
Cover liners
Jack spacers
Timer switch cams
Timer switch terminal
boards

DAIRY EQUIPMENT

Pump vanes
Odorless washers

Gaskets
Pulsator valves

DIESEL LOCOMOTIVES

Wear plate
Brush holder tubes
Brush holder bearings
Panels
Terminal Boards
Conduit bushings

Slot wedges
Control insulation
Baffle plates
Cable connector covers
Cable clamps
Frame insulation

ELECTRICAL EQUIPMENT — MISC.

Insulation for staples
Spools for coils
Jack spacers
Post formed covers
Wire markers
Post formed fan blades
Post formed switch panel covers
Resistor strips
Panels
Terminal boards

Wall plug insulators
Cam followers
Toggle levers
Tank liners
Switch insulation
Battery contact pads
Fuse pullers
Electrical Device Insula-
tion
Terminal Block Lead
Barrier Insulation

ELECTRO-PLATING

Racks
Tubes
Paddles
Tank liner strips

Plating barrel parts & panels (Chemical re-
sistant)
Formed Spools

ELEVATOR EQUIPMENT

Slides
Door track
Gibbs

Control equipment parts
Motor insulation

FANS — ELECTRIC

Post formed fan blades
Brush holders
Brush plates
Motor insulation

End thrust washers
End spacer washers
Ceiling Fixture heat
insulation

FARM EQUIPMENT

Plunger blocks for hay & cotton baler
Wear plates
Baler pulleys
Disc harrow bearing dust seal washers
Corn picker flight auger (Post formed)

Tractor magneto ignition insulation
Tractor battery ignition insulation
Guide bars
Lubricated bearing strips
Tractor bearing bushings
Bearings

FLASHLIGHTS

Cases
Reflector insulation rings
Switch insulation
Case insulator rings

Socket bases
Battery tops
Top Panel Backing
Formed Insulating Caps

FOOD MIXERS — ELECTRIC

Brush holders
Brush plates
Food mixer wiper blades

Gear blanks
Fan & speed control parts

FURNITURE

Theater Seat Grease
Retainer Washers
Spacers in Theater Seats
Chair Seats

Casters
Desk Corners
Edge protectors

FUSES

Fuse pullers
Fibre fuse tubes
Beveled straps
Fibre bridges

Combination fuse tubes for high voltage
Fibre Tubes for fuse cases

HAT MANUFACTURE

Pounce blocks
Stripper blocks

Picker rolls

HOUSEHOLD APPLIANCES — MISC.

Thermostat cases & insu-
lation
Escutcheon pads
Toaster feet and supports
Motor insulation (See
Motors)
Terminal plates
Cut-out insulation
Insulator spools
Drainboard runners
Switch insulation
Switch and relay bases
Split grommets

Ice cream cabinet filler strips
Display Boards
Vacuum Cleaner Parts
Holder
Electric razor rubbing blocks
Electric razor insulation
Cover buttons
Eccentric insulation
Grommets
Rheostat boards
Contact guides

CONTINUED ON NEXT PAGE

APPLICATIONS

Jack Spacers
Cams
Winding strips
Reset rods for controls

LIGHTING EQUIPMENT — LAMPS (FLUORESCENT)

Lamp socket back plates
Starter socket base plates
Starter base
Ballast insulation
Transformer insulation
Formed Armite parts

MACHINERY

Gear blanks
Cams and cam followers
Friction clutch & pulley discs
Brake discs
Sheaves
Brush insulators
Switch hubs
Conveyor rollers
Can cylinders
Hydraulic equipment followers
Blocks for woodworking machinery

MAGNETOS

Rubbing blocks
Push rods
Oil slinger rings

MARINE INDUSTRY

Tail Shaft bearings
Centrifugal pump shaft sleeves
Magneto insulation

MATERIALS HANDLING EQUIPMENT

Barrels
Roving Cans
Delivery Boxes
Trays

METERS, ELECTRIC

Bases
Insulating plates
Formed insulation coils
Bushings
Spacers
Terminal strips

MOTORS (ELECTRIC) AND GENERATORS

Top sticks
Switch plates
Strain relief bushings
Armature thrust washers
Brush blocks
Commutator bushings
Commutator V Rings
Oil slinger rings & oil seals
Brush holder tubes
Phase insulation
End play washers
Centrifugal switch carriers
Rocker arm insulation

Dishwasher conveyor blocks & pins
Vaporizer tubes

Grommets
Split grommets
Threaded bushings
Reflector channel insulation

Spacers
Baffle plates
Motor insulation
Floor sander brush blocks
Idler rollers for printing presses
Lubricating rings
Oil slinger rings & seals
Fibre for lock nuts
Rotor blades for pneumatic tools
Clutch discs for outboard motors

Couplings
Coil insulation
Ignition bushings

Sail rigging pulleys
Valve discs
Waterproof light cases & parts

Trucks
XL Board pallets for painted parts

Coil bobbins
Anchor insulation
Shipping cases
Pole piece plates
Meter Coil insulation
Core insulation

Shaft insulators
Wire pounding blocks
Brush holder plates
Coil spacers
Core insulation (Spauldo)
Slot sticks
Motor cases
Brush holders
Slot insulation
Lead insulators
End laminations
Formed slot wedges
Hermetic motor packing spacers (XL Board)
Tie rod insulation

Band bushings
Switch arm pads
Brush holder caps
Coil supports
Cooling fans (Post formed)
Slot Pegs
Motor Bobbins
Motor Packing Coils
Lead Weld Insulating Envelopes
Coated Spauldo for Duplexing
Formed Core Coils
Packing Spacers
Coil Insulation
Rotary Brush Reinforcements
Formed Cupped Washers
Bearing oil throw washers
Interpole insulation washers
Commutator insulation segments
Condenser separators & seal covers
Field coil insulation

NOVELTIES AND SPECIALTIES

Combs
Key tags
Shoe horns
Hunting knife handles
Club membership tags
Fibre spoons and forks
Tokens
Salt spouts
Paint can bale hand protectors
Waxed paper cutting blades

OFFICE MACHINERY & EQUIPMENT

Motor insulation (See Motors)
Jack spacers
Relays
Terminal boards
Clutch friction discs
Book covers and backs
Angles for book covers
Fly leaves for loose leaf covers
Desk corners
Edge protectors
Jack Insulators

OPTICAL EQUIPMENT

Liner reinforcement for cases

Lens cushion washers
Lens grinding blocks

PACKAGING

Strapping
Shell Nose Packing Rings
Radio Shipping Spacer
Spacers for Finished Gears
Pallet Sheets for painted parts
Metal Switch box separators

Brush holder bushings
Armature hood washers
Insulator Rings
Stator Insulation
Snap grommets
Hair pin pegs (HDX Board)
Formed pegs
Mounting plates
Winding bonnets
Formed and molded wedges
Switch rings
Switch bases
Windshields
Rotor wedges
Gear shift lever bushings
Cuffed Spauldo
Shading pole insulators
Motor winding identification tags
Hood for commutator insulation
Field pole insulators
Wire lead supports
Cuffed Spauldo grommet

Bag fasteners
Spoon fibre (White)
Spacers for mounting 35 mm. slides (XL Board)
Garment bag reinforcement washers (XL Board)
Frames for Photo negative
Printed Forms requiring toughness
Display Boards
Ends for Musical Mutes

Spool heads
Motor insulation
Terminal plates
Casters
File index separators
Formed washers for envelope closure
Channels
End bushings
Cupped washers for filing boxes
Gear blanks

Thermometer packing
Discs
Shipping Covers & Protectors
Corrugated Box Handle
Stiffener
Shell Ring Grommets

CLASSIFIED BY INDUSTRIES

PAPER & FABRIC MANUFACTURE
(COATED)

Festoon stick ends
Festoon sticks

Serrated strips for cutting
waxed paper

PETROLEUM INDUSTRY

Pipe line flange insulators
Valve seats
Piston rings
Gas meter fitting
Valve discs
Insulating nipples
Baffle plates

Geological survey instru-
ment insulation
Blasting shell tubes
Packing rings
Couplings
Salt water disposal line
couplings

PIN BALL MACHINES

Terminal boards
Jack spacers
Coil ends

Mounting plates
Ratchets

PLANT EQUIPMENT

Die plates
Driving block
Drift pins
Gaskets
Fibre pins for belt lacing
Bearings

Gear blanks
Spacers for shipping
boxes
Bench covering
Friction clutch & pulley
discs

PLUMBING SUPPLIES

Adapter insulators
Bibb Washers
Gaskets, sink, drain, etc.
Water Heater pipe nipples

Water Heater insulation
spacers
Water faucet inserts

POWER STATIONS

Cable joints
Dead end insulation
Insulation channels
Bus bar insulation

Condenser packing
Condenser tube protec-
tion plugs

POWER TOOLS

Post formed floor sander
backing discs
Air baffles
Wire clamps
Motor insulation

Gear blanks
Band saw blade guides
Band saw blade plates
Rotor blades & vanes

PRINTING INDUSTRY

Cutting sticks and blocks
Spauldite rolls
Gear blanks (Special gear
stock)
Roller truck tires

Star wheels
Material support boards
Spauldo for printed forms
requiring toughness

PUMP MANUFACTURE

Wear plates
Rust plates
Rotor blades
Push rods
Seal washers

Packing rings
Reduction gear blanks
Piston rings
Valve discs

RADIO AND TELEVISION

Coil spools & forms
Boxes and trays
F. M. & Television
antenna insulation
Loop antenna mountings
Dial pulleys
Aerial insulation
Variable condenser
insulation
Volume control parts
Dust covers
Jack spacer screw
insulators
Radio case backs
Rubber surfaced washers
Thin wall tubing
Fibre adjusting tools
Switch blocks
Resistor strips
Terminal strips
Speaker spiders
Switching device mount-
ings
Fixed condenser
insulation
Extruded jack spacers
Terminal boards
Condenser can tops
Magnetic wave yoke split
washers
Focus coil insulation
Radio pulleys
Transformer bases
Slotted tubes
Standoff insulators
Rotor shafts
Condenser mounting bases

Volume control parts
Aerial loop supports
Spark plate insulators
Coil support plates
Cover strips
Trimmer plates
Stator insulation
Cams
Tuning knob thrust
washers
Panels
Grommets
Coil forms
High voltage transformer
coil forms
High voltage plates and
strips
Terminal plates
Tuner shafts
Lead through insulators
Antenna lead-in spacers
Antenna lead-in terminals
Switch parts
Transformer insulation
Magnetic wave yoke
spacers
Copper surfaced Spauldite
for printed circuits
Antenna arm insulators
Filament holders
Picture tube support
blocks
Antenna wire reel
Television light shields
Speaker gaskets
Radio shipping spacers

RAILROAD EQUIPMENT & SUPPLIES

Switch rod & gauge plate
insulation
Thin insulation (Armite)
Armature sticks
Shields and barriers
Terminal boards
Dust guards and plugs
Tapered bushings and
washers for rail cars

Tags, Signal wire code
Lateral thrust washers
Commissary Dept. boxes
Train control relay ship-
ping cases
Impregnated washers for
Oil Tank Cars
Fuse blocks
Connector Insulator

RAILROAD TRACK INSULATION
(CONTINUOUS & ARMORED)

Washer plates
Head piece insulation
Base piece insulation
End posts

Bushings
Switch rod & gauge plate
insulation

RAILROADS — ELECTRIC

Control guide blocks
Control cable rollers
Electric control insulation

Switch shields
Track insulation
Coilheads

RANGES - ELECTRIC

Drawer rollers
Snap switches
Terminal blocks
Switch parts
Terminal blocks & covers

Hardware mounting shims
Switch back covers
Switch cams
Push button switch slides

APPLICATIONS

RECORD PLAYERS

Tone arm insulators
Cam roller on tone arm sweep control

Gear blanks for tone arm lift

REFRIGERATORS

Drawer guides
Terminal bushings
Terminal insulating plates
Terminal seal washers
Throat spacers
Shims
Corner tie strips
Mullion tie strips
Baffle boards
Slot insulation (Chemically pure)
Door hinge spacers
Insulating plates
Tie-in blocks
Spacer tubes
Switch insulation
Relay bases
Switch lock device parts

Baffles for Compressors
Condensing coils
Inner box handles
Door latch shields
Escutcheon pads
Gaskets
Door guides
Door runners
Covering for ice cream boxes
Wear strips
Lead insulation
Brush holders
Unit mounting cushions
Compressor thrust washers
Liner supports
Shroud for condensing unit fan

RELAYS

Contact spring spacers
Contact spring lifters
Screw insulators
Bases
Solenoid spools
Jack spacers (punched, extruded or swaged)

Insulating lifter studs
Lifter actuators
Base insulation
Terminal plates
Signal relay shipping cases

RUBBER INDUSTRY

Rubber gasket stiffeners
Wringer roll thrust washers
Gas tank baffles
Gas tank supports
Gas tank check valves
Cutting boards

Rubber heel reinforcement
Rubber coated gaskets
Stiffener tubes
Tire turn-up tools
Cutting blocks

SEWING MACHINES

Gear blanks
Bushings
Grommets

Panels
Rheostat insulating blocks

SHOE INDUSTRY

Counters
Last tops
Heel seats
Arch supporters
Toe plate strips
Shoe fibre
Rubber Heel Inserts

Shoe tucks
Die pads
Shoe heel cams
Last top tubular inserts
Cutting blocks
Shoe horns

SPORTING GOODS

Billiard cue tips
Guards
Megaphones
Helmets
Fishing reel washers
Fishing reel gears
Bag stiffeners
Golf bag bottoms
Driver club faces
Golf club face inserts
Pool table pockets

Archery bow facings
Athletic Suit Reinforcement
Crowns
Hip Pads
Shoulder Harness
Thigh Guards
Shoulder Pads
Shin Guards
Miscellaneous protective pieces

STARTERS AND CONTROLLERS

Terminal bars
Armature slot insulation
Armature end lamination
Starter switch rod insulators

Starter field coil & insulation
Fuse tubing
Deion plates

STEEL MILL APPLICATIONS

Table tops and guides
Wear plates (Fibre or Spauldite)
Fibre Skids
Fibre Guides for square shears

Spauldite noiseless gears
Spauldite Spacer rings
Thrust plates
Up-coiler roll washers
Slippers
Pinch or feed rolls

SUGAR REFINING INDUSTRY

Sugar tips

Roll scrapers

SURGICAL APPLIANCES

Flashlight cases
Instrument handles
Diathermy arms
Suture reels

Artificial limbs
Adhesive tape core covers
Nozzle and terminal blocks
Stethoscope parts

SWITCHES & SWITCH GEAR

Snuff arc shields
Switch cross bars
Solenoid coil forms
Toggle switch handles
Circuit breaker separators
Yokes
Oil Circuit breaker grids
Bus bar insulators
Formed bus bar insulation
Contact actuators
Cams
Spiders
Ratchets
Ratchet panels
End pieces
Bearings
Terminal boards
Section insulation
Contact carriers
Screw & shaft insulators
Toggles
Spools
Jack spacers
Socket pull chain insulation

Base insulation
Base plates
Combination tubes
Fibre Board tank liners
Panels
Terminal block covers
Current regulator blocks
Barriers
Shields
Formed Fibre angles
Push button switch slides
Control panel wiring separators
Switch Covers
Cover Shield Insulation
Temperature Control Box Cover Liner
Thermostat Control cover
Control Insulator
Switch Box Liners
Switch Cushions
Punched Parts
Metal Case Liners

TELEPHONE EQUIPMENT

Push buttons
Dial governor gear
Wire guides & separators
Dust covers
Jack insulators
Fuse link casings
Exchange desk panels
Cord terminal plug handles

Communication jack plugs
Molded telephone mouthpieces
Shields
Cable sleeves
Bank insulators
Spool heads
Shellac cans (XL Board)

CLASSIFIED BY INDUSTRIES

TEST DEVICES

Voltage tester guides
Voltage tester housings
Spools
Prods

Fibre screw drivers
Fibre wrenches
Probe handles
Flashover guards

TEXTILE INDUSTRY

Shuttles
Binder pins
Roving cans
Swift braces
Treadle plugs
Twister tubes
Spooling caps
Nylon sizing tubes
Warp stop bars
Parallel plugs
Loom box linings
Lug strap holders
Cloth roll bearings
Weaving machine stops
Stick connector cushions
Hosiery boards
Separators
Uptwist spools
Bearings
Bobbin heads

Tote boxes
Lug straps
Knife filing guides
Bobbins
Creel Buttons
Cotton picker tops
Spool tubes
Take-up tubes
Pirn caps
Package dyeing tubes
Headless package tubes
Comber boards
Lap rolls
Bearing caps
Thread guides
Cloth roll tubes
Warp tie-on thread holders
Reinforcement rings for spinning buckets

TOY INDUSTRY

Doll leg joints
Brush holders
Bingo chips
Toy train insulation
Brush holder plates

Transformer insulation
Terminal boards
Parts for Toy Trains
Toy Game Gears
Toy Insulation

TRANSFORMERS & TRANSFORMER

PROTECTIVE DEVICES

Transformer Board
(Spaulding T. Board)
Gap spacers
Primary & Secondary
barriers
Cap change bases &
bushings
Resistor cases
Corrugated winding
separators
Duct formers
Tap changers
Coil wrapping
Lead insulation
Ratio switch covers
Lightning protectors
Foil bushings
Transformer insulation
Deion Gaps

Protective fuse tubes
Circuit breaker yokes
Terminal boards
Wire holders
Lightning arrester parts
Tap changer dials
Winding cores (Spaulding
T.)
Power transformer duct
sticks
Structural Pieces
Collars
Coil Insulation
Cores for Coils
Interlayer Insulation
High Voltage Barrier
Insulation
Tank Wall Liners

TRUNKS AND LUGGAGE

Fibre trunk covering
Formed parts for suit cases
Skate cases
Trunk angles

Stiffeners for flyers' bags
Laundry cases
Case fibre
Fibre for foot lockers

VACUUM CLEANERS

Crevice tools
Brush holder tubes
Belt remover tubes
Blower tools
Winding hoods

Extension tubes
Rollers
Dust bag collars
Accessory racks

VALVE MANUFACTURE

Valve discs
Valve seats
Valve seat inserts

Thermostat insulation
Coil forms

VENDING MACHINES

Jack insulators
Grommets
Terminal plates
Spool heads

Ratchets
Relays
Solenoids
Contact plates

WASHING MACHINES & IRONERS

Thrust washers
Timer switch parts
Clutch facings
Switch liners
Pump seal washers
Wringer roll thrust
washers

Clutch discs
Silencer spring buttons
Cams
Bushings
Switch cams
Noiseless gear blanks
Grommets

WELDING EQUIPMENT & SUPPLIES

Welders' helmets
Head band straps
Electrode holder handle
Electrode holder insula-
tion
Goggle bridges & lens
frames

Slot wedges
Slot cell insulation
Terminal boards
Anti-rattle Grommets
Chin straps

WIRING DEVICES

Anti-short bushings for
BX Cable
Conduit bushings
Terminal board covers
BX Cable bushings
Stud markers
Wire markers
Fuse tubing & washers for
Christmas tree sockets
Tack insulation
Insuliners
Receptacle backs

Connector insulation
Cord plug prong insulators
(XL Board)
Socket insulators
Couplings
Primary Distributor Wire
Insulators
Switch Box Liners
Low Voltage Insulators
Male Plug Insulators
Fluorescent Reflector
Wire Support

X RAY

Cassettes
Floor pads
Lead insulators

Panels
Push buttons
Terminal boards

HOW MOISTURE AFFECTS FIBRE

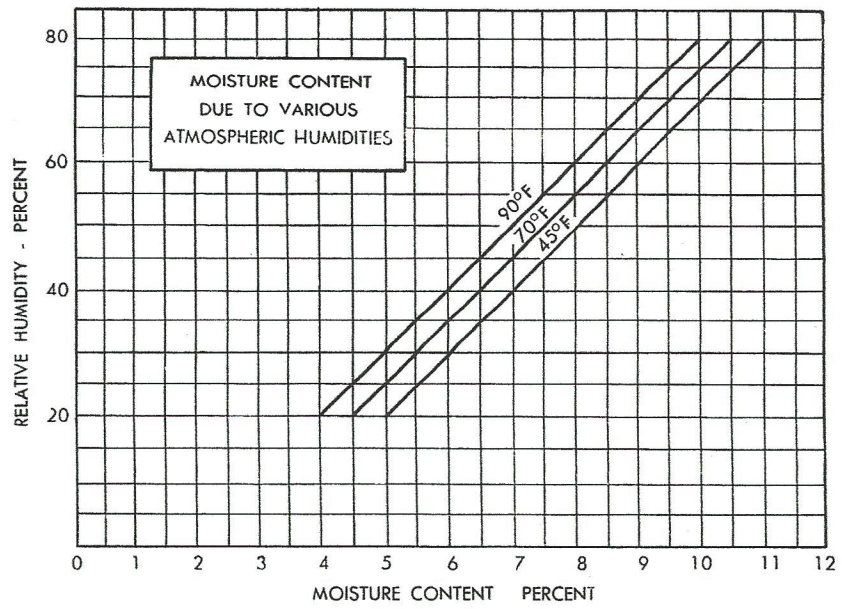
FIBRE CONTAINS normally approximately 7% moisture. It is on account of this moisture content that it possesses its unique properties of toughness, resilience, and punching and forming properties. When its moisture content is reduced greatly, it tends to warp, shrink and become hard and brittle. When its moisture content is increased greatly it tends to warp, expand and lose its stiffness and electrical insulating properties.

FIBRE ADJUSTS its moisture content to correspond with the atmospheric humidity to which it is exposed. The chart, Fig. 1 below shows for instance a change from app. 4½% to 10½% in moisture content due to a change in humidity environment from 20% to 80% Relative Humidity. These humidities correspond roughly to inside winter conditions and outside humid summer conditions.

STORAGE — This suggests that if normal properties are desired, Fibre should not be subjected in storage to either extreme, such as extremely dry or extremely damp conditions.

FIBRE CHANGES dimensions as the moisture content changes in accordance with certain definite relationships. It will be observed from the chart below, Fig. 2 that the thickness dimension changes the greatest percentage, the width dimension next and the length dimension the least. Roughly, the amount of change for each percent in moisture content is 1% in thickness, a quarter of 1% in width and one tenth of 1% in length.

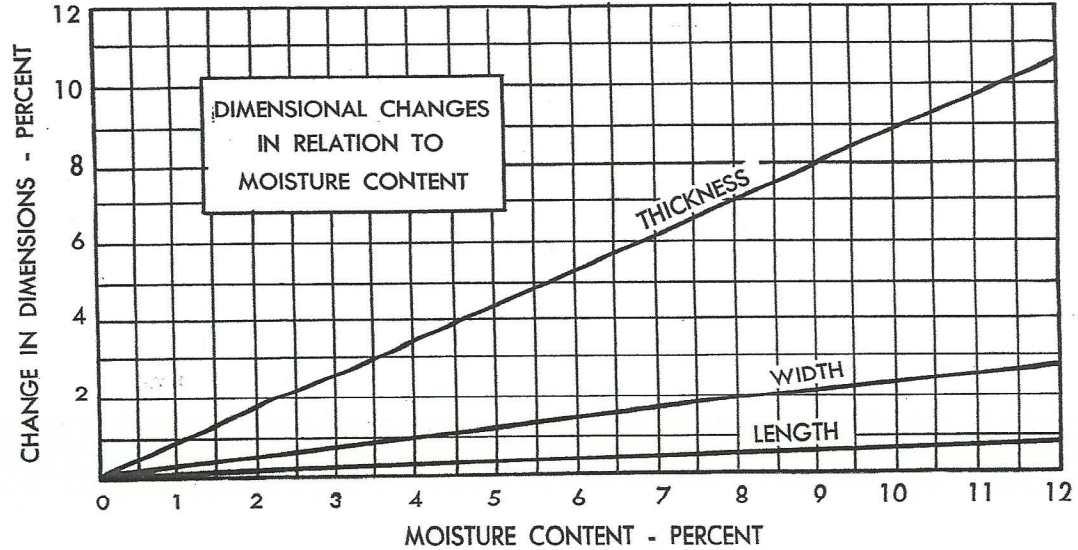
FIG. 1



HOW TO USE CHARTS, FIG. 1 & 2, FOR ESTIMATING DIMENSIONAL CHANGE IN FIBRE.

When the change in atmosphere humidity is known, the approximate change in moisture content to be expected in Fibre sheet can be obtained from the upper chart, Fig. 1. When the change in moisture content is known, the percentage change in dimensions in any direction may be read from the appropriate curve. For example: The change in width for a change in moisture content from 5% to 7% may be read from the width curve as 1.2% to 1.7%, a difference of .5%. In a width dimension of 1", .5% change represents .005" change.

FIG. 2



SPAULDING VULCANIZED FIBRE

Spaulding Vulcanized Fibre is made by combining layers of chemically gelled paper. The chemical compound used in gelling the paper is subsequently removed by leaching, and the resulting product after being dried and finished by calendering, is a dense material of partially regenerated cellulose in which the fibrous structure is retained in varying degrees, depending upon the grade of fibre.

SPAULDING FIBRE SHEET STANDARD GRADES

COMMERCIAL GRADE (Mechanical and Electrical) Specify Spaulding Fibre

A general purpose grade, used for mechanical and electrical purposes in a wide variety of applications and thicknesses. It should be specified unless there are definite special requirements which make it necessary to select one of the special grades.

COLORS: Red, Black and Grey — THICKNESSES: .010 to 2" Incl.

FURNISHED: in sheets; also in tubes and rods. In rolls and coils through .060" thickness.

SHEET SIZE: Up to and including 1/8" thick, 48 x 84": Over 1/8", 47 x 72".

BONE GRADE Specify Spaulding Supergrey Fibre

Characterized by high density resulting from more complete gelatinization of the cellulose. It possesses maximum hardness and stiffness and wear resistant qualities as well as excellent turning, threading and milling characteristics.

COLOR: Grey only. THICKNESSES: 1/32 to 3/4" Incl.

FURNISHED: in sheets and rods.

SHEET SIZE: Up to and including 1/8" thick, 43 x 84": Over 1/8", 42 x 68".

ELECTRICAL INSULATION GRADE (Fish Paper) Specify Spaulding Armité

This is a thin grade of vulcanized fibre made particularly for electrical insulation purposes.

It is characterized by high dielectric strength and toughness. It is also recommended for applications involving difficult forming or bending operations.

COLOR: Bluish Grey only. THICKNESSES: .004 to 1/8" Incl.

FURNISHED: in sheets. In rolls and coils through .060" thickness.

SPECIAL GRADES FOR SPECIFIC USES

GRADE	COLOR	THICKNESS	WIDTH	LENGTH	OUTSTANDING PROPERTIES	CHIEF OR ILLUSTRATIVE USES
Trunk	Special Colors	.020 to 1/8"	47-52"	84"	High mechanical strength and toughness. Good flexibility. Clean, smooth surface.	Cases. Trunk covering. Trunk angles.
White	White only	.010 to 1/4" Inclusive	47-52"	72-84"	Pleasing appearance. Clean, smooth, white surface. Low extractables.	Tags, Shims, Spoons and Forks, Artificial Limbs. Printed Novelties.
Flexible	Red Grey	1/64" to 1/2" Inclusive	53-57"	81-84"	Kept soft and pliable by glycerin treatment.	Gaskets, Packing and Washers.
White Last Top	White only	1/32" to 1/4"		72-80"	White color. Kept slightly soft by glycerin treatment to permit trimming and nailing readily.	Pressure pads on shoe lasts.
Forming	Red Black Grey	Up to 3/16"	47-52"	84"	Better forming properties.	See page 17.
Textile Bobbin	Red Black Grey	1/8 to 3/8" Inclusive	45-52"	72-84"	Smooth, clean surface. Good punching quality yet hard enough to finish with very smooth glossy edge and to withstand abuse in handling.	Heads for bobbins and spools in textile mills.
Shuttle	Red Grey	.100"	47-52"	84"	Same shade of color all the way through. Good gluing properties. Hard enough to finish smooth and glossy.	For covering shuttles used in weaving silk and similar textiles.
Shoe	Russet	.035"	47-52"	84"	Low density to permit skiving and nailing readily.	Heel seats in shoes.
Rubber Backing	Black Chocolate	.010"	47-52"	84"	Low density and porous to avoid blistering when rubber heel stock is molded on to it.	Rubber heel backing for use on ladies' shoes.
Pattern	Red Black Grey	1/32 to 3/32"	47-52"	84"	Minimum shrinkage and warp-age.	Patterns for cutting out cloth pieces.



SPAULDING FIBRE SHEET

PHYSICAL PROPERTIES

PROPERTY	NOMINAL THICKNESS INCHES	COMMERCIAL GRADE For General and Mechanical Use		BONE GRADE SPAULDING SUPER GREY Highest Density Maximum Hardness		ELECTRICAL INSULATION GRADE Spaulding Armite (Fish Paper)	
		Crosswise	Lengthwise	Crosswise	Lengthwise	Crosswise	Lengthwise
Tensile Strength P.S.I. Min.	Up to 1/8 Incl. Over 1/8 to 1/2 Incl. Over 1/2	6000 5500 5000	8000 7500 7000	6500 6000	8500 8000	6000	8000
Flexural Strength P.S.I. Min.	1/8 to 1/2 Incl. Over 1/2	12000 11000	14000 13000	13000	15000		
Compressive Strength Flatwise P.S.I. Min.	All Thicknesses	20000		30000			
Density G. per Cu CM. Min.	Under .010 .010 to 3/32 Incl. Over 3/32 to 5/8 Incl. Over 5/8 to 1 Incl. Over 1 to 1 1/4 Incl. Over 1 1/4	..... 1.15 1.20 1.10 1.05 1.01		..... 1.15 1.20 1.10 1.05 1.01		0.90 1.15 1.20	
Water Absorption Change in Wt. % Max.	1/32 to 1/8 Incl. Over 1/8 to 3/8 Incl. Over 3/8 to 1/2 Incl. Over 1/2 to 1 Incl. Over 1 to 2 Incl.	2 Hr. 55 24 Hr. 65	25 60	2 Hr. 50 24 Hr. 60	20 50	10 25	2 Hr. 55 24 Hr. 65
Dielectric Strength Volts per Mil. Min.	Up to 1/16 Incl. Over 1/16 to 1/8 Incl. Over 1/8 to 3/8 Incl. Over 3/8 to 1/2 Incl. Over 1/2	175 150 100 50	Total 25000 volts	175 150 100 50	Total 25000 volts		Thickness .004 to .005 incl. 200 .005 to .015 incl. 300 .015 to .040 incl. 250 .040 to 1/8 incl. 175
Bursting Strength P.S.I. Min.	.005 .007 .010 .015 .020						75 105 150 225 325
Tearing Strength Grams - Min.	.005 .007 .010 .015						Crosswise 100 Lengthwise 120 190 220 250 300 375 450

General All Grades: Rockwell Hardness Min. Bone Grade R-80 Com. & Elec. Grade R-50
 Ash Content Percent Max. Red 7 Grey 3 Black 3

Silica Content Percent Max. 0.3 Zinc Chloride Content Percent Max. 0.2
 Properties and Values Based on N.E.M.A. Standards and A.S.T.M. Spec. D-710

CUTTING TOLERANCE IN INCHES PLUS OR MINUS

Width In Inches	Rolls Slit	Shear-ed	Band Sawed	Smooth Sawed
3/16 and Under	.010	.015	.020	.006
Over 3/16 to 1/2 Incl.	.015	.020	.030	.008
Over 1/2 to 1 Incl.	.020	.030	.045	.010
Over 1 to 2 Incl.	.030	.040	.060	.012
Over 2	.040	.050	.075	.014

THICKNESS TOLERANCE IN INCHES

FULL SIZE SHEET	1/2 - 1/3 - 1/4 Sheets	
.004 - .040 Incl.	±10%	-8%
3/64	.004	8%
.050 to 1/16 Incl.	.005	.004
.065 to 3/32 Incl.	.007	.005
.100 to 1/8 Incl.	.009	.007
5/32 to 3/8 Incl.	.012	.010
1/16 to 5/8 Incl.	.015	.012
1 1/16 to 3/4 Incl.	.025	.018
1 3/16 to 7/8 Incl.	.025	.020
1 5/16 to 1 1/4 Incl.	.040	.030
1 3/8 to 2 Incl.	.060	.040



SPAULDING VULCANIZED FIBRE SHEETS, RODS AND TUBES

(BASED ON N.E.M.A. STANDARDS AND A.S.T.M. SPEC. D-710)

FIBRE TUBING

PROPERTY	WALL THICKNESS INCHES	VALUE
TENSILE STRENGTH P.S.I. MIN.	ALL THICKNESSES	6500
COMPRESSIVE STRENGTH AXIALLY P.S.I. MIN.	Up to 1/4 Incl. Over 1/8 to 5/16 Incl.	10000 9000
WATER ABSORPTION Chg. in WT. Percent Max.	1/32 to 1/8 Incl. Over 1/8 to 1/4 Incl. Over 1/4 to 5/16 Incl.	2 Hr. 24Hr
		50 75 20 50 10 25
DIELECTRIC STRENGTH Volts Per MIL MIN.	Up to 1/16 Incl.	175
	Over 1/16 to 1/8 Incl.	150
	Over 1/8 to 3/8 Incl.	100
	Over 3/8 to 1/2 Incl.	50
	Over 1/2	Total 25,000 Volts

FIBRE ROD

PROPERTY	DIAMETER INCHES	VALUE			
Tensile Strength P.S.I. Min.	Up to 1/8 Incl.	Bone	Commercial		
	Over 1/8 to 1/2 Incl.	8500	8000		
	Over 1/2	8000	7500		
Compressive Strength Axially P.S.I. Min.	All Diameters	.....	7000		
		8000	6000		
Flexural Strength P.S.I. Min.	1/8 to 1/2 Incl. Over 1/2 to 1 Incl.	15000	14000		
		.....	13000		
Water Absorption Chg. in Wt. Percent Max.	1/16 to 3/16 Incl. Over 3/16 to 1/2 Incl. Over 1/2 to 1 Incl. Over 1 to 2 Incl.	2 Hr. 24 Hr.	2 Hr. 24 Hr.	2 Hr. 24 Hr.	2 Hr. 24 Hr.
		35 75	40 80	20 60	10 30
		15 50	20 60	10 30	8 25
		.. ..	8 25		
				
Dielectric Strength Volts Per Mil. Min.	Up to 1/16 Incl. Over 1/16 to 1/8 Incl. Over 1/8 to 3/8 Incl. Over 3/8 to 1/2 Incl. Over 1/2	175	150		
		150	100		
		100	50		
		50	Total 25000 Volts		
		25,000			

FIBRE TUBING — AVAILABLE SIZES IN INCHES

I. D.	By Steps Of	MIN. Wall	MAX. Wall
1/8 to 1/32	1/64	1/32	1/8
1/4 to 3/8	1/64	1/32	1/4
13/32 to 3/4	1/32	1/32	1/4
13/16 to 1	1/32	1/32	9/32
1 to 1 3/8	1/16	1/16	9/32
1 3/8 to 1 1/2	1/16	1/16	5/16
1 1/2 to 4 1/4	1/16	1/8	5/16

TOLERANCES—FIBRE TUBE & ROD OUTSIDE DIAMETER OR INSIDE DIAMETER—PLUS OR MINUS IN INCHES

	FIBRE TUBE	FIBRE ROD
Up to 1/4 Incl.	.004	±.005
1/4 to 1" Incl.	.005	±.006
1 1/16 to 2 Incl.	.008	±.010
2 1/16 and Over	.010	±.010

SHEETS—RODS—TUBES MINIMUM DENSITY—ALL GRADES

NOMINAL THICKNESS Or DIA.—INCHES	GMS CU. CM
Under .010	0.90
.010 to 3/32 Incl.	1.15
Over 3/32 to 5/8 Incl.	1.20
Over 5/8 to 1 Incl.	1.10
Over 1 to 1 1/4 Incl.	1.05
Over 1 1/4	1.01

TOLERANCES—CUT TO LENGTH PCS.—PLUS OR MINUS

LENGTH INCHES	FIBRE TUBE		FIBRE ROD
	DIAMETER 0-3	DIAMETER 3-6	
0-3	.015	.024	.015
3-6	.020	.025	.020
6-12	.030	.035	.030
12-24	.035	.045	.035
24-48	.035	.045	.040
48-84	...	...	.062



SPAULDING ARMITE

A thin grade of Spaulding Vulcanized Fibre made particularly for electrical insulation purposes. Characterized by high dielectric strength and toughness. Also recommended for applications involving difficult forming or bending operations.

FURNISHED: In sheets 46" to 52" wide x 84" long.
In rolls 46" to 52" wide.
In strips cut to widths as ordered.
In coils 1/8" to 46" as ordered.

COLOR: Bluish Grey only.

THICKNESS: .004 to 1/8" inclusive.

PROPERTIES

Based on N.E.M.A. Standards & A.S.T.M. Specification D-710

Nominal Thickness Inches	Density Min. Grams per Cu. Cm.	Dielectric Strength Min., V per Mil.	Water Absorption Max., PerCent		Tensile Strength Min. P.S.I.		Bursting Strength Min., P.S.I.	Tearing Strength Min., Grams	
			2 Hrs.	24 Hrs.	Crosswise	Lengthwise		Crosswise	L'gthwise
.004	0.90	200	—	—	6000	8000	—	—	—
.005	0.90	200	—	—	6000	8000	75	120	100
.006	0.90	300	—	—	6000	8000	—	—	—
.007	0.90	300	—	—	6000	8000	105	220	190
.008	0.90	300	—	—	6000	8000	—	—	—
.010	1.15	300	—	—	6000	8000	150	300	250
.012	1.15	300	—	—	6000	8000	—	—	—
.015	1.15	300	—	—	6000	8000	225	450	375
.020	1.15	250	—	—	6000	8000	325	—	—
over .020 to 1/32	1.15	250	—	—	6000	8000	—	—	—
1/32 to .040 incl.	1.15	250	55	65	6000	8000	—	—	—
over .040 to 3/32 incl.	1.15	175	55	65	6000	8000	—	—	—
over 3/32 to 1/8 incl.	1.20	175	55	65	6000	8000	—	—	—

Note: Thickness tolerances are the same as for standard grades of Vulcanized Fibre.

TYPICAL USES OF SPAULDING ARMITE

Motor Slot Insulation
 Switch Control Insulation
 Transformer Insulation
 Radio Insulation
 Automotive Starter Slot Insulation
 Automotive Generator Slot Insulation

Switch Box Liners
 Duplex Cloth Stiffeners
 Coil Form Liners
 Electric Toy Insulation
 Novelties and Specialties
 Cupped Washers

SPAULDING FIBRE IS READILY FORMED

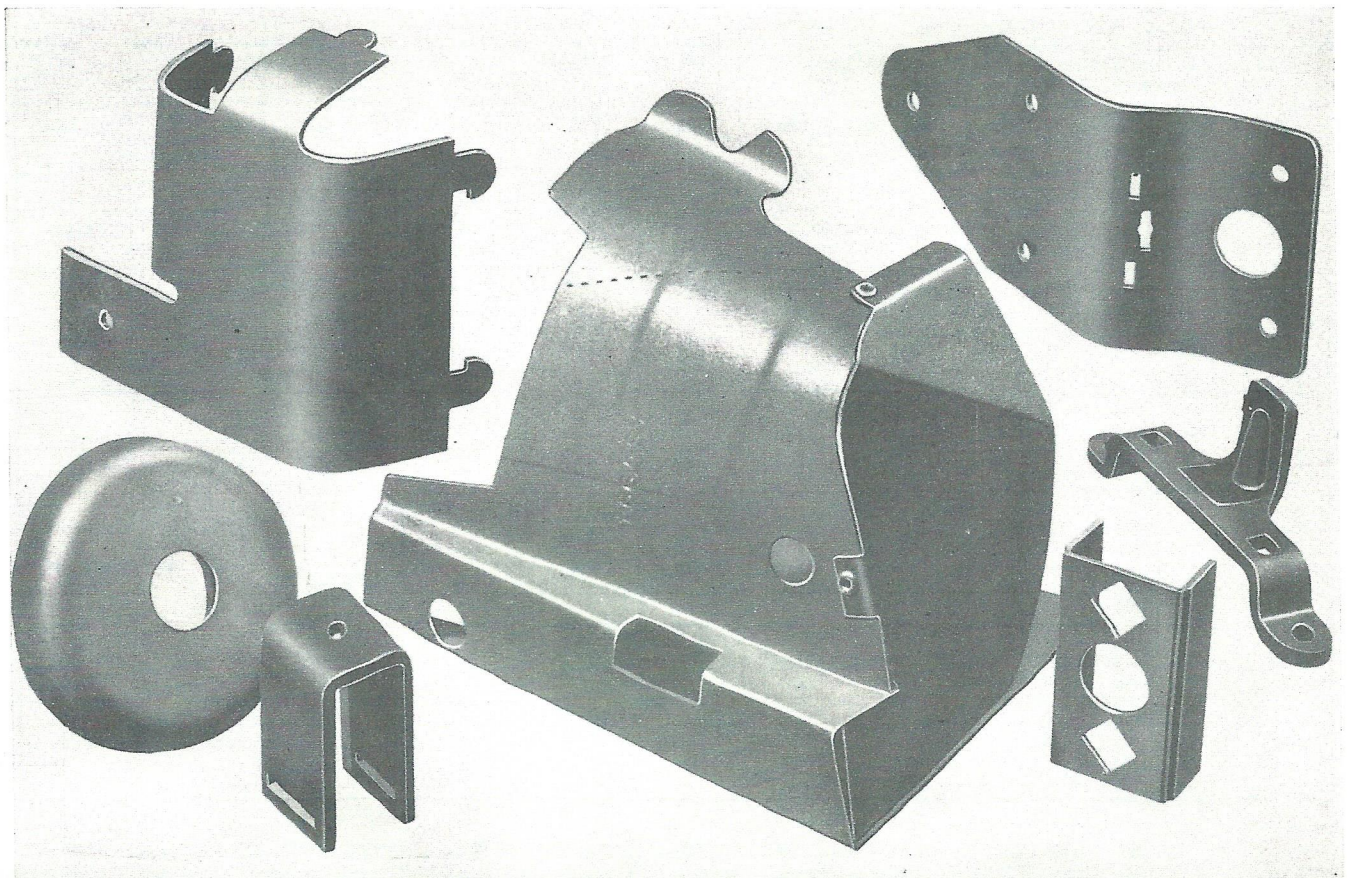
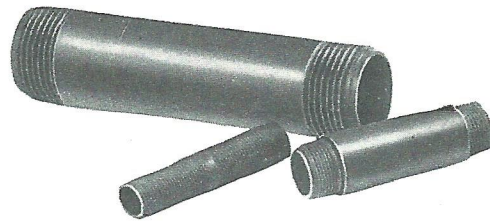
Spaulding Vulcanized Fibre is particularly adapted to forming operations, and can be readily shaped to meet the most precise and exacting requirements.

This versatility permits its use in an extremely wide range of industrial applications:

- (a) Where the requirements call for taking advantage of some distinctive physical characteristic of Vulcanized Fibre, and
- (b) Where the material to be employed must be adaptable to economical forming.

FORMED FIBRE PARTS ARE ECONOMICAL

Thin Fibre can be formed in punch press operations to effect surprising economies in the production of cupped washers, right angle pieces and the like. Fibre parts may be formed progressively.



SPAULDITE (LAMINATED PHENOLIC)

SPAULDITE is a laminated phenolic thermosetting plastic made by impregnating plies of base material, such as paper, fabric, asbestos, glass or synthetic fibers, with synthetic varnish and bonding them together under heat and pressure.

SPAULDITE

PROPERTIES OF

N. E. M. A. STANDARDS									
GRADE	DESCRIPTION	Military Specification		Federal Spec. HH-P-256		Flexural Strength Psi. Min. 1/16" Thick		Izod Impact Strgh. Edgewise, Min. Ft.Lbs. 1-in. Notch 1/2" - 2" Cond. E-48/50	
		Spec.	Type	Spec.	Type	(Length-Wise)	(Cross-Wise)	(Length-Wise)	(Cross-Wise)
X	Primarily for mechanical applications.			X	I	25,000	22,000	.55	.50
XX	For usual electrical applications.	MIL-P-3115	PBG	XX	I	15,000	14,000	.40	.35
XXX	For high humidity and minimum cold flow applications.	MIL-P-3115	PBE	XXX	I	13,500	11,800	.40	.35
XP	For usual punching applications.			P	I	13,000	11,000	.55	.50
XXP	Better electrically than Grade XX. Hot Punching.			XXP	I	14,000	12,000	.45	.40
XXXXP	Better electrically than Grade XXX. Hot Punching.	MIL-P-3115	PBE-P*	XXXXP	I	12,000	10,500	.35	.30
CE	Medium weight cotton fabric base for general applications requiring greater toughness than paper base grades.	MIL-P-15035	FBG**	CE	II	17,000	14,000	1.60	1.40
CG	Heavy weight cotton fabric base for heavy duty gears.	MIL-P-15035	FBM	C	II	17,000	16,000	2.10	1.90
LE-594	Fine weave cotton fabric base for better appearance and cleaner machining than CE.	MIL-P-15035	FBI	LE	II	15,000	14,000	1.35	1.10
LE	Better electrical quality and resistance to moisture than LE-594.	MIL-P-15035	FBE	LE	II	15,000	13,500	1.25	1.00
LG	Fine weave cotton fabric base for small gears.			L	II	15,000	14,000	1.35	1.10
A	Asbestos paper base; Heat Resistant Grade			A	IV	13,000	11,000	.60	.60
AA	Asbestos fabric base; Tougher than Grade A			AA	IV	16,000	14,000	3.60	3.00
N-1	Nylon fabric base. Excellent electrical properties and good impact strength.	MIL-P-15047	NPG		IV	10,000	9,500	1/8" and over 3.00	2.00
G-1	Glass cloth base. High impact strength, general purpose, heat resistant grade.				IV	22,000	18,000	5.00	4.00

TESTS ACCORDING TO A.S.T.M. METHODS IN "AS RECEIVED" CONDITION, EXCEPT AS NOTED.

* Grade XXX-618 is also approved. See Page 21

** Grade C-598 is also approved up through 3/8" thick. See Page 20.

NOTE: Cotton Fabric and Asbestos Grades are not recommended for primary insulation for electrical applications involving commercial power frequencies at voltages in excess of 600 volts.

**SHEET
STANDARD GRADES**

SPAULDITE is one of the most versatile of all plastics. Its unique combination of qualities, mechanical, electrical and chemical, render it the natural solution to innumerable problems involving durability, lightness in weight, strength, heat and moisture resistance and electrical insulation. For precise requirements, variation in the manufacturing processes may produce a grade exactly suitable to the user's needs. In other words, Spauldite may be "tailor made."

N. E. M. A. Authorized Engineering Information - Typical Values

Water Abs. Max. % 1/16" Thick Cond. E-1/105	Dielectric Strength Parallel To Lam. KV. Min. 1/32"-1"	Dielectric Constant Max. At 1 Meg. 1/32"-Max.	Dissipa- tion Factor Max. At 1 Meg. 1/32" Max.-	Tensile Strength PSI.		Compressive Strength PSI.		Rockwell Hardness (M)	Dielectric Strength Parallel to Lam. Volts Mil.	
				(Length- Wise)	(Cross- Wise)	(Flat- Wise)	(Edge- Wise)		(Short- Time)	(Step-by- Step)
6.00	...	...	...	20,000	16,000	36,000	19,000	110	700	500
2.00	40.0	5.50	.045	16,000	13,000	34,000	23,000	105	700	500
1.40	50.0	5.30	.038	15,000	12,000	32,000	25,500	110	650	450
3.60	40.0	...	...	12,000	9,000	25,000	.....	95	650	450
1.80	60.0	5.00	.040	11,000	8,500	25,000	.....	100	700	500
1.00	60.0	4.60	.030	12,400	9,500	25,000	.....	105	650	450
2.20	35.0	...	...	12,000	9,000	39,000	24,500	105	500	300
4.40	15.0	...	...	11,200	9,500	37,000	23,500	103	...	...
2.50	15.0	...	...	14,000	10,000	35,000	23,500	105	...	...
1.95	40.0	5.80	.055	13,500	9,500	37,000	25,000	105	500	300
2.50	15.0	...	...	14,000	10,000	35,000	23,500	105	...	...
1.50	5.0	...	...	10,000	8,000	40,000	17,000	111	225	135
3.00	...	...	...	12,000	10,000	38,000	21,000	103	...	...
.60	60.0	1/32"-1/8" 3.9 1/8"-1/4" 4.2	.038	8,500	8,000	...	.....	105	600	450
2.70	15.0	6.00	.035	12,500	9,500	50,000	.....	110	250	150

Sheet Sizes, all grades, app. 41" x 49" except CG and LG which are 39" x 39", and 41" x 41" respectively.
 Finish: Gloss (mirror), Semi-Gloss, (Satin), or Dull finish.
 Heat Conductivity Factor (K)—.0004 in B.T.U. per second, per inch thickness per square foot per °F.
 Coefficient of Thermal Expansion—.00003—change per unit length per °C.



SPAULDITE SHEET GRADE SELECTION

Spauldite Is Available in the Following Base Materials and Grades:

PAPER BASE:

- General use — X, XX, XXX.
- Punching Grades — XP, XXP, XXXP.

FABRIC BASE:

- Electrical Grades — CE, LE, N-1.
- Mechanical Grades — CG, LG, NWF.
- Valve Grades — CV, LV.
- Caustic Resistant Grade — C477.

MINERAL BASE:

- Heat Resistant Grades — A, AA, AAA, G-1.

For Special Grades see page 21

It is important to select the right grade of Spauldite for each application. From a study of the table below, one of the standard grades will usually be found to have the necessary combination of properties. This combination may differ in each case depending upon the physical and electrical properties needed in use and upon the method of producing and assembling the part.

In the table, grades which stand in approximately the same relation in respect of a property are numbered the same. For instance in the first column XXX and XXXP are both indicated as having highest electrical quality by being designated number 1.

GRADE SELECTION CHART

	Electrical Quality	Moisture Absorption	Punching Quality	Clean-Machining	Surface Appearance	Plastic Deformation	Hardness	Mechanical Toughness	Riveting Quality	Heat Resistance
X	3	4	4	2	4	3	3	4	3	4
XX	2	2	6	1	1	2	2	5	3	4
XXX	1	1	7	2	1	1	1	6	4	4
XP	3	4	3	2	4	5	6	4	2	3
XXP	2	2	4	2	3	4	2	5	4	4
XXXP	1	1	5	2	2	4	1	6	4	4
CE	5	3	2	5	2	3	3	2	1	2
CG	6	5	5	6	5	3	4	1	1	2
LE	4	2	1	3	2	3	2	3	1	2
LG	5	3	2	4	4	3	3	2	1	2
A	8	2	8	7	5	2	5	7	5	1
AA	7	2	8	7	6	2	5	7	4	1
N-1	1	1	2	3	2	6	2	1	1	5
G-1	2	2	6	6	5	2	2	5	4	1

Permissible Variations in Thickness Based On N. E. M. A. Standards & A. S. T. M. Specification D-709

Nominal Thickness, Inches	App. Wt. in Lbs. Spauldite Sheets 41" x 49" SEE NOTE	Grades XP, XXP, XXXP	Grades X, XX, XXX	Grade CE A	Grades CG and C-598*	Grade LE	Grade LG	Grade AA	Grade G-1
		Plus or Minus	Plus or Minus	Plus or Minus	Plus or Minus	Plus or Minus	Plus or Minus	Plus or Minus	Plus or Minus
.010	1.0	.002	.002	—	—	.003	.003	—	—
.015	1.5	.0025	.0025	—	—	.0035	.0035	—	—
.020	2.0	.003	.003	—	—	.004	.004	—	—
.025	2.5	.0035	.0035	.0065	.0065	.0045	.0045	—	—
1/32	3.2	.0035	.0035	.0065	.0065	.005	.005	—	.008
3/64	4.8	.0045	.0045	.0075	.0075	.0055	.0055	—	.010
1/16	6.3	.005	.005	.0075	.0075	.006	.006	.018	.010
3/32	9.3	.007	.007	.009	.009	.007	.007	.018	.012
1/8	12.5	.008	.008	.010	.010	.008	.008	.020	.012
5/32	16.0	.009	.009	.011	.011	.009	.009	—	.015
3/16	19.0	.010	.010	.0125	.0125	.010	.010	.024	.019
7/32	22.0	.011	.011	.014	.014	.011	.011	—	.021
					Plus Only		Plus Only		
1/4	25.0	—	.012	.015	.030	.012	.024	.028	.022
5/16	31.0	—	.0145	.0175	.035	.0145	.029	.034	.026
3/8	38.0	—	.017	.020	.040	.017	.034	.038	.030
7/16	44.0	—	.019	.022	.044	.019	.038	.044	.033
1/2	50.0	—	.021	.024	.048	.021	.042	.048	.036
5/8	63.0	—	.024	.027	.053	.024	.048	.058	.040
3/4	75.0	—	.027	.029	.058	.027	.054	.068	.043
7/8	88.0	—	.030	.031	.062	.030	.060	.076	.046
1	100.0	—	.033	.033	.065	.033	.065	.086	.049
1 1/8	113.0	—	.035	.035	.069	.035	.069	—	.053
1 1/4	125.0	—	.037	.037	.073	.037	.073	.106	.055
1 3/8	138.0	—	.039	.039	.077	.039	.077	—	.058
1 1/2	150.0	—	.041	.041	.081	.041	.081	.124	.061
1 5/8	163.0	—	.043	.043	.085	.043	.085	—	.064
1 3/4	175.0	—	.045	.045	.089	.045	.089	.144	.067
1 7/8	188.0	—	.047	.047	.093	.047	.093	—	.070
2	200.0	—	.049	.049	.097	.049	.097	.160	.073

NOTE: Weight does not cover CG and LG which are smaller size sheets or AA and G-1 which have higher density.
 *Variations for Grade C-598 apply on Nominal Thickness of .025" Thru 3/8" only.

SPAULDITE SHEET SPECIAL GRADES

In each of these grades certain properties have been enhanced as required for specific uses usually resulting in a change in other properties considered unimportant for the particular application. If the standard grades fall short of meeting your special requirements, a Spaulding engineer will make a thorough study and recommend a suitable grade.

XPK20—TOUGH FLEXIBLE GRADE

Furnished:

In sheets .007 to $\frac{1}{8}$ " thick, and fabricated parts.
In walnut brown color with dull finish.

Special Properties:

The toughest, most flexible and most resilient paper base grade of Spauldite.
Extremely flexible—bends with the grain in $\frac{1}{32}$ " thickness to a $\frac{1}{2}$ " diameter arc.
Moisture absorption on $\frac{1}{16}$ " after 24 hrs. immersion—4 to 8%.
Can be punched cold with a smooth edge in thicknesses up to $\frac{1}{16}$ ".
Best heat resisting paper base grade.

Special Uses:

Economical for replacing costlier fabric base materials in riveting operations.
Can be readily forced over a fluted shaft, or can be stamped with letters without cracking.
Good for wire wound round edge resistor strips bent to a small diameter in assembling.

C477—ALKALI RESISTANT GRADE

Furnished:

In fabric base sheets, rods, tubes (L477) and fabricated parts.
In Natural color only.

Special Properties:

Resists severe attack in alkaline solutions in concentrations up to approximately 18% NaOH at temperatures up to 140°F.

Special Uses:

In plating solutions either alkaline or mineral acid.

MCE and MLE—ARC RESISTANT, ALKALINE RESISTANT, MELAMINE GRADE

Furnished:

MCE—In sheets $\frac{1}{32}$ " to 2" thick and fabricated parts.
MLE—In sheets .015" to 2" thick and fabricated parts.
In natural grey color only.

Special Properties:

Made with a different thermosetting varnish instead of the phenolic type.
Provides better resistance to arc tracking from an electrical arc than standard Spauldite grades.
Resists alkaline solutions but may be attacked by acids.
Has approximately the same level of moisture absorption and electrical properties as the corresponding phenolic standard grade, but lower impact strength.

Special Uses:

For use in electrical apparatus where arcing might char standard grades of Spauldite.
Serviceable in alkaline plating solutions.

NWF—NON WOVEN COTTON FABRIC MATERIAL

Furnished:

In sheets .015 to $\frac{5}{16}$ " thick and Fabricated parts.
In Natural Color Only.

Special Properties

High Impact Strength in both grain directions.
Machines with clean smooth edges.
Withstands steaming in textile operations without roughing.

Special Uses:

For Textile Bobbin Heads.
For Medium and Light Duty Gears.

CS-XXXP, CS-XXX-618—COPPER SURFACED SPAULDITE

Furnished:

In sheets $\frac{1}{32}$ " and up, and fabricated parts.
Copper .00068" thick and up. Can be supplied in one or both surfaces.

Special Properties:

Provides well Bonded, Heat Resistant combination of Copper Foil and High Quality Electrical Insulation.

Special Uses:

For making "Printed or Etched" Circuits Used in Radio, Television and Electronic Applications.

XXX-618—HIGH INSULATION RESISTANCE GRADE (APPROVED TO MIL-P-3115 TYPE PBE-P)

Furnished:

In sheets $\frac{3}{64}$ " to $\frac{1}{8}$ " thick and fabricated parts.
In Natural color only.

Special Properties:

Maintains high insulation resistance between electrical contacts after long exposure to high humidity conditions.

Special Uses:

For high frequency uses where low electrical losses are more important than impact strength, and riveting qualities.

FS-XX, FS-XP, FS-CE—FIBRE SURFACED SPAULDITE STOCK

Furnished:

In sheets and fabricated parts.
In Black or Natural, but with dark colored fibre surface.

Special Properties:

Provides exceptionally good resistance to arc tracking under an electric arc.
Provides surface arc deionizing effect associated with Vulcanized Fibre.
Provides moisture resistance and rigidity of Spauldite core. Accepted by Underwriters Laboratories for use as the sole support of current carrying parts.

Special Uses:

Recommended for use in electrical apparatus such as switches where the arc quenching and non-tracking surface qualities of Fibre are desired in combination with the moisture resistance and rigidity of Spauldite.
It may be punched or machined the same as similar standard grades of Spauldite.

LE-589—ROTOR VANE STOCK

Furnished:

In sheets $\frac{1}{16}$ " to $\frac{5}{16}$ ", and fabricated parts.
In Natural color, fabric base only.

Special Properties:

Combines good wearing qualities with minimum shrinkage, warpage and edge-chipping tendencies.

Special Uses:

For use as vanes in high speed pneumatic tools and in mechanically driven pumps and blowers.
Light weight and low friction when riding against the metal housing with limited lubrication.
Permanence in oil, water and hydrocarbons.

LE-540—SELF LUBRICATING FABRIC GRADE

Furnished:

In sheets and fabricated parts.
In Natural color, fabric base only.

Special Properties:

Low friction quiet operation when run against smooth metal surfaces, without lubrication.

Special Uses:

As a thrust washer and seal in automobile water pumps.

SPAULDITE FOR POST FORMING

IN STANDARD GRADES:

C-598 — Coarse weave cotton fabric base:
Natural, Black or Chocolate Brown.
Approved for Military Spec. MIL-P-15035, Type FBM through $\frac{3}{8}$ " thickness.

CO-632 — Odorless Cotton fabric base grade:
Natural only.

X-598 — Special paper base: Natural or Black.

SHEETS ARE APPROXIMATELY 38" x 49";
semi-gloss finish.

FURNISHED IN full size sheets, pieces and fully
fabricated post formed products.

POST FORMING DEFINED:

The term Post Forming is applied to cover the process of forming finished Spauldite stock into special shapes by reheating and molding to shape. Blanks of Post Forming Spauldite need only to be heated uniformly to a temperature of 370°F. and placed quickly in a mold. In closing, the mold forms it to the desired shape. When allowed to remain in the closed mold long enough to cool below the plastic state, its original properties are retained in the formed shape.

FORMABILITY:

The combination of a carefully selected base material with the right varnish produces a grade of Spauldite well adapted to withstand severe forming operations.

A SUGGESTION:

The post forming of laminated phenolic plastic material for industrial applications is a comparatively recent development. It is therefore, suggested that when a design is under consideration, you make use of the experience and knowledge of Spaulding field engineers. The use of their services involves no obligation on your part. These engineers are in contact with developments along this line in our mill, and they should be able to offer helpful suggestions.

POST FORMED SPAULDITE PARTS ARE RECOMMENDED WHERE:

- 1 High mechanical strength and light weight are essential.
- 2 Shock and impact may cause unsightly dents or deformations in thin metal.
- 3 Non Shattering strength and resilience are required.
- 4 Vibration causes assemblies to be noisy. Spauldite has noise-dampening characteristics and will not transmit vibrational noises.
- 5 Corrosion must be eliminated. Spauldite is non-corrosive.
- 6 Protection from adjacent heated parts is required. The coefficient of heat transmission for Spauldite is very low.
- 7 Electrical insulation is a factor. Post Formed Spauldite parts serve as both structural members and insulators.

PHYSICAL PROPERTIES BEFORE POST FORMING FOR GRADE C-598

N.E.M.A. Minimum Values Based Upon A.S.T.M. Methods

	Minimum Value
Tensile Strength, psi	7,500
Flexural Strength, psi	15,000
Compressive Strength, psi flatwise	30,000
Impact Strength	
ft/lb. per inch of notch (Izod edgewise test)	1.5
Density	1.35 ± 0.05

When designing parts for post forming it should be remembered that a minimum radius must be allowed inside the bends, depending upon the thickness of material as indicated in the table below which is based on N. E. M. A. values.

Sheet Thickness in Inches	Minimum Inside Bending Radius in Inches when formed to a 90° angle	Maximum Water Absorption after 24 hours immersion in water in Per Cent.
$\frac{1}{32}$	$\frac{1}{32}$	7.5
$\frac{1}{16}$	$\frac{3}{32}$	4.4
$\frac{3}{32}$	$\frac{3}{16}$	3.2
$\frac{1}{8}$	$\frac{5}{16}$	2.5
$\frac{3}{16}$	$\frac{9}{16}$	1.9
$\frac{1}{4}$	1	1.6
$\frac{3}{8}$	$2\frac{1}{4}$	1.4

SPAULDITE TUBES

FURNISHED:

In Rolled Tubes only — not Molded

In Random Lengths — Approximately 37"

In Cut-To-Length Pieces or Fabricated Parts

In Polished Finish or, on request, Varnished Finish

STANDARD GRADES

N.E.M.A. STANDARDS							N.E.M.A. AUTHORIZED ENG. INFORMATION		
Standard Spauldite Grades	Colors	Type Spec. MIL-P-79 Form Tr.	Description	Water Abs. % Max. 24 Hrs. 1" ID. x 1 1/8" OD.	Dielectric Strength Perpendicular to Laminations Volts per Mil. Min. 1" ID. x 1 1/8" OD.	Compressive Strength psi. Over 1/16" Wall and 1/4" ID.	Tensile Strength psi.	Dissipation Factor 10° Cycles	Dielectric Constant 10° Cycle
X	Natural (Dark Brown)	PBM	Paper Base for mechanical applications.	5.0	400 (only under dry conditions)	12,000	8,500	...	..
XX XX-5	Natural (Dark Brown) Black Natural (Light Tan)	PBG	Paper Base for usual electrical applications	3.0	400	13,000	8,000	0.040	5.0
C	Natural Black	FBM	Coarse-weave cotton fabric; Primarily for mechanical applications requiring greater toughness than XX.	5.0	...	12,000	6,000	...	..
LE	Natural Black	FBE	Fine-weave cotton fabric; Combines toughness with limited electrical qualities.	4.5	150	15,000	7,000	...	..

Tests according to A.S.T.M. Methods in "as received" condition.

SPECIAL GRADES

In the following Grades, specific properties have been improved for certain special uses, as indicated:

GRADE	COLOR	
XX-9	Natural (Dark Brown)	More resilient for interference fits as for brushholder tubes in electric motors.
XX-10	Natural (Light Color)	Harder and stiffer. Recommended for abrasive wheel and textile applications.
XXO	Black	Odorless for use where phenolic odor is objectionable as in refrigerators.
L-555	Natural	Cleanest machining; such as for ball bearing retainers.
C-477	Natural	Resistant to alkalies and acids for use in chemical and textile industries and in plating barrels.
L-477	Natural	Same as C-477, except finer-weave fabric.
MCE	Natural (Light Grey)	Resistant to alkalies (not acids) and to arc-tracking.
MLE	Natural (Light Grey)	Same as MCE, except finer-weave fabric.
A	Natural	Asbestos Paper Base; Heat Resistant (Max. 275°F.) but fragile.
XX	Natural	Has Fibre Tube liner to generate arc quenching gases in outdoor line fuses.
Combination XX	(Dark Brown)	
Combination WR-4	Brown	Same as above Grade, with smoother and more weather-resistant surface finish.

PERMISSIBLE VARIATIONS IN WALL THICKNESS PLUS OR MINUS INCHES

Nominal Wall Thickness, Inches	Grade X, XX	Grade LE		Grade C	Grade A
		3/16 to 1/2 inc. I.D.	over 1/2 I.D.		
.010 to under 1/64	.003	—	—	—	—
1/64 to under 1/32	.005	—	—	—	—
1/32 to under 1/16	.006	.010	.008	—	—
1/16 to under 1/8	.007	.011	.009	.015	.007
1/8 to under 1/4	.009	.013	.011	.020	.009
1/4 to 1/2, incl.	.011	.015	.013	.020	.011

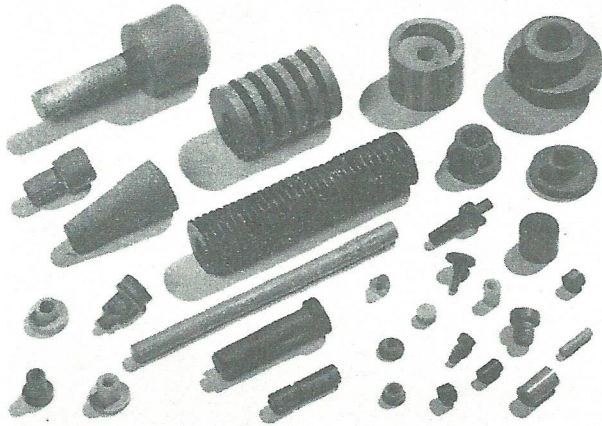
ALLOWABLE TOLERANCES PERMISSIBLE VARIATIONS IN DIAMETER PLUS OR MINUS, INCHES

Nominal Inside and Outside Diameters, Inches	Inside Diameter	Outside Diameter
1/8 to 2 3/32 Incl.	.003	.005
3/4 to 1 15/16 Incl.	.004	.005
2 to 4 Incl.	.008	.008
Over 4	.010	.025

PERMISSIBLE VARIATIONS IN LENGTHS OF CUT TUBES, PLUS OR MINUS, INCHES

Length, Inches	3/16 to 2 O.D.	Over 2 to 4 O.D.	Over 4 O.D.
3 and Under	.010	.010	.030
Over 3 to 6 Incl.	.010	.015	.030
Over 6 to 12 Incl.	.015	.020	.030
Over 12	.030	.030	.050

SPAULDITE RODS



FURNISHED:

In **MOLDED RODS** $\frac{3}{32}$ " to $\frac{5}{8}$ " Diameter, inc.—Approx. 39" long.

In **MACHINED RODS** Over $\frac{5}{8}$ " to 2" Diameter, inc.—Approx. 49" long.

In **Cut-To-Length Pieces** or **Fabricated Parts**

With **Permissible Variations** in Diameter of plus or minus .005"

STANDARD GRADES MOLDED

N.E.M.A. STANDARDS

	COLORS	MIL-P-79 TYPE	DESCRIPTION	Minimum Density Gms. per cc	Minimum Flexural Strength	Minimum Compressive Strength Axially	Water AnSORption $\frac{1}{4}$ " Dia. % in 24 Hrs.	† Tensile Strength psi.
XX	Natural Black	PBG	Paper Base for usual electrical and mechanical applications	1.30	15,000	20,000	1.5	10,000
XXX	Natural Black	PBE	Highest electrical quality and best dimensional stability	1.25	13,000	20,000	1.0	9,000
CE*	Natural Black	FBG	Medium weave cotton fabric base; primarily for mechanical applications requiring greater toughness than XX	1.26	13,000	20,000	1.7	8,000
LE	Natural Black	FBE	Fine weave cotton fabric base; combines toughness with limited electrical properties	1.26	12,000	20,000	1.4	10,000

Tests according to A. S. T. M. Methods in "as received" condition.

† N.E.M.A. Authorized Engineering Information.

SPECIAL GRADES MOLDED

In the following Grades, specific properties have been improved for special uses, such as indicated:

- XXF Natural Black Machines easier than Grade XX and is more resilient.
- XXO Black Odorless for use in electrical refrigerators.
- C-477* Natural Resistant to alkalis and acids, for use in many chemical, textile and plating barrel applications.
- L-477 Natural Same as C-477 except finer weave.
- MCE* Natural (Light Grey) Resistant to alkalis (not acids) and to arc-tracking.
- MLE Natural (Light Grey) Same as MCE except finer weave fabric.
- AA* Natural Asbestos Fabric Base—Heat resistant (275 °F) for mechanical applications.
- N-1 Natural Nylon Fabric Base—High Electrical quality combined with resilience.

*Minimum Diameter is $\frac{3}{16}$ ".

MACHINED RODS

Over $\frac{5}{8}$ " Diameter Spauldite Machined Rods are available turned or ground from strips cut from sheet stock of standard Grades. The laminations in this type are parallel chords of a circular section.

SPAULDING PRODUCTS APPLIED

The selection of a material for a given part is governed by many factors. To be solved by the same design may be problems of wear, weight, structural strength, resistance to heat, moisture, and chemical action; problems involving electrical insulation at high or low voltage, fabrication, finishing and assembly problems, and always the matter of cost.

Such combinations of factors impose severe limitations upon the designer who often must resort to expensive compromises to overcome them. In many electrical and mechanical industries and in hundreds of such applications, Spaulding Vulcanized Fibre or Spauldite Laminated Phenolic has enabled design and production engineers to improve the performance and output of their products.

A review of existing or proposed designs in relation to the properties of these industrial plastics often results in the replacement of a complicated component with a simple part made from Vulcanized Fibre or Spauldite which will perform two or more functions with better results and at lower cost.

SPAULDING VULCANIZED FIBRE *has the following properties:*

MECHANICAL

Excellent machinability at highest speeds and feeds.
 Good punching qualities. Good forming qualities.
 High structural strength per unit of weight.
 Light weight (half the weight of Aluminum).
 Resistance to wear and abrasion.
 Extreme toughness.
 Compressibility (as for gaskets).
 Dampens vibrations, making for quietness.
 Good appearance.

ELECTRICAL

Good dielectric strength.
 Excellent arc resistance.
 Deionizing properties.
 Low heat conductivity.

CHEMICAL

Permanence.
 Non-corroding.
 Insoluble.
 Unaffected by oils, greases, waxes, and solvents such as acetone, alcohols, benzol, turpentine, gasoline, lacquer, thinners and many others.

SPAULDITE *has the Following Properties*

MECHANICAL

High mechanical strength per unit of weight.
 Quietness in mechanical operation (as for gears).
 Light weight (half the weight of Aluminum).
 Resistance to wear.
 Dimensional stability.
 Excellent punching qualities.
 Excellent machinability.
 Permanent fine appearance.

ELECTRICAL

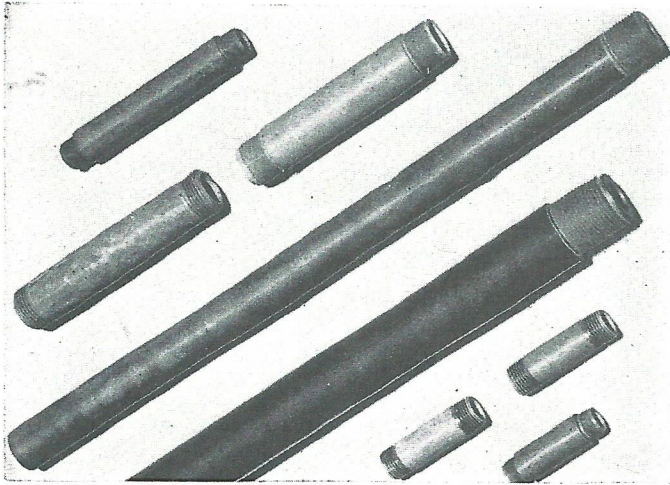
Low loss electrical insulation.
 Resistance to moisture.
 High dielectric strength.

CHEMICAL

Resistance to chemicals and chemical inertness for a wide range of solvents, acids and re-agents.

To suggest how others have made use of the combinations of properties summarized above, we are illustrating and describing in these pages, a few of the more common applications. In doing so emphasis has been placed upon the properties themselves, rather than upon the way they happen to be applied. Spaulding Vulcanized Fibre and Spauldite Laminated Phenolic must not be associated exclusively with any particular application or function, but always with the combinations of properties that fit them for such a wide range of usefulness.

SPAULDING VULCANIZED FIBRE APPLIED



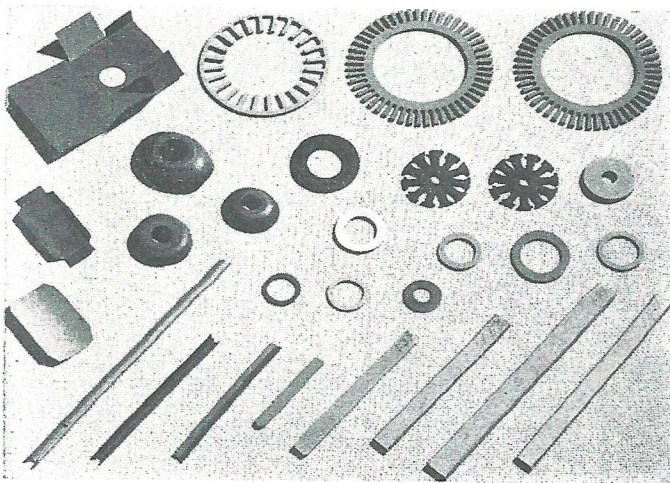
FUSES

ELECTRICAL INSULATING PROPERTIES

combined with

*Slow Burning, Arc Resisting, High Internal Bursting
Strength, Clean Threading*

Manufacturers of low voltage cartridge type fuses and high tension expulsion types take advantage of this combination of properties for the body of the fuse tubes illustrated.



ELECTRIC MOTORS

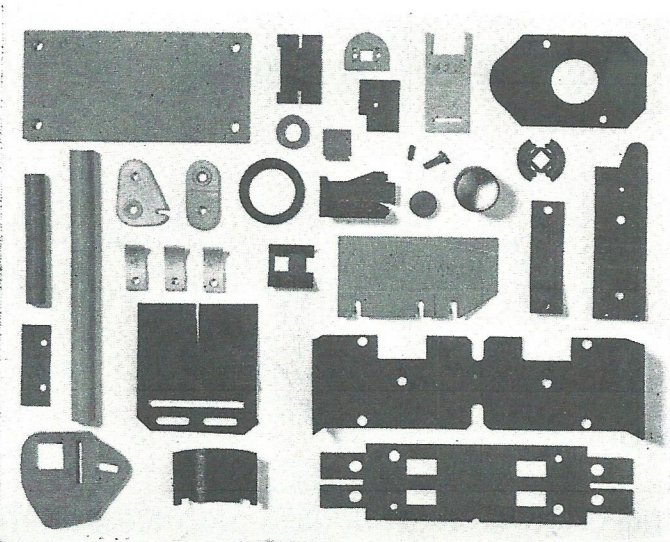
ELECTRICAL INSULATING PROPERTIES

combined with

*Structural Strength, Toughness, Ease of Forming,
Clean Punching, Light Weight.*

Electric motor manufacturers utilize these properties for:

End Laminations	Switch Insulation
Insulating Grommets	Slot Wedges
Shaft Insulation	Slot Cell Insulation
Coil Insulation	Condenser Insulation



SWITCHES AND SWITCH GEAR

ELECTRICAL INSULATING PROPERTIES

combined with

*Arc Resistance, Deionizing Properties, Structural Strength,
Toughness, Resistance to Wear and Abrasion, Good
Forming, and Clean Punching.*

In the manufacture of switches and switch gear, parts made from Spaulding Vulcanized Fibre are used as links, levers, cams, rollers, washers, strips, blocks, barriers, etc. All such components make use of all or part of the unique combination of properties listed.

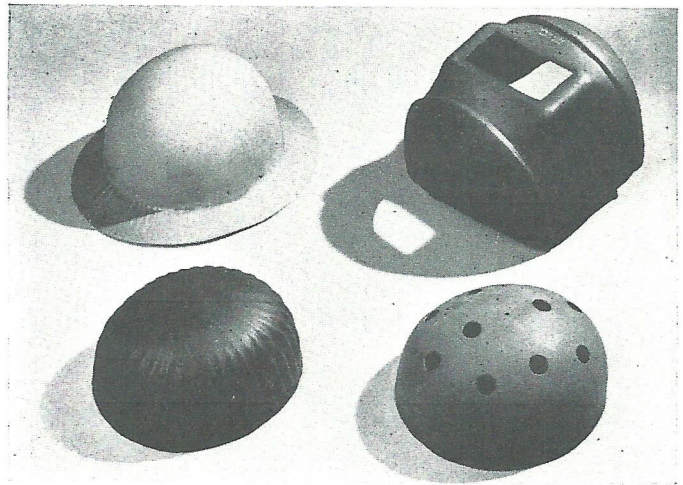
SPAULDING VULCANIZED FIBRE APPLIED

GOOD FORMING

combined with

*High Impact Strength, Toughness, Lightness,
Stiffness, Heat Insulation.*

Illustrated here are main parts from three types of protective headgear: a welding helmet, a construction worker's helmet and the crown from a football helmet. All three utilize the combination of properties given. Heat insulation is required for the welding helmet.



PROTECTIVE HEADGEAR

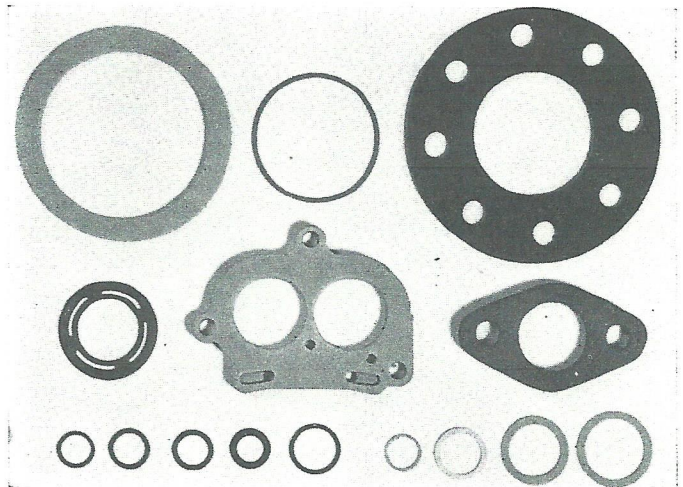
HIGH STRUCTURAL STRENGTH

combined with

*Toughness, Inertness (to oils, greases, waxes, solvents,
such as acetone, alcohols, gasoline, toluol, benzol,
turpentine, kerosene and many others).*

Clean Punching.

Gaskets of Spaulding Vulcanized Fibre are specially suited to high pressure systems. Its inherent strength and toughness permit the use of cross sections that would be impossible with material of less structural strength.



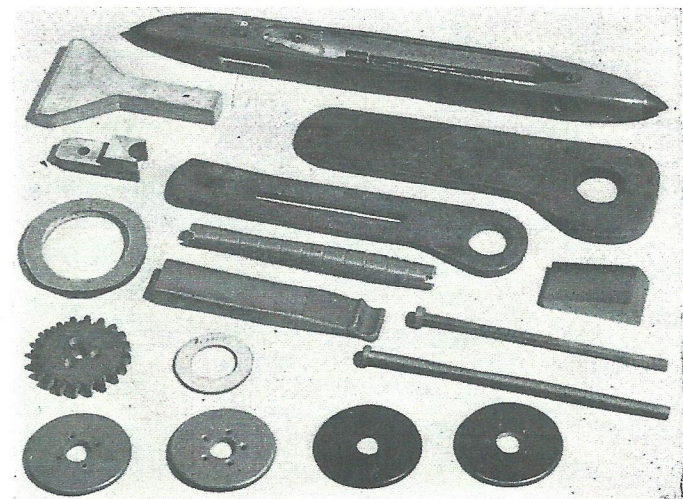
GASKETS

STRUCTURAL STRENGTH

combined with

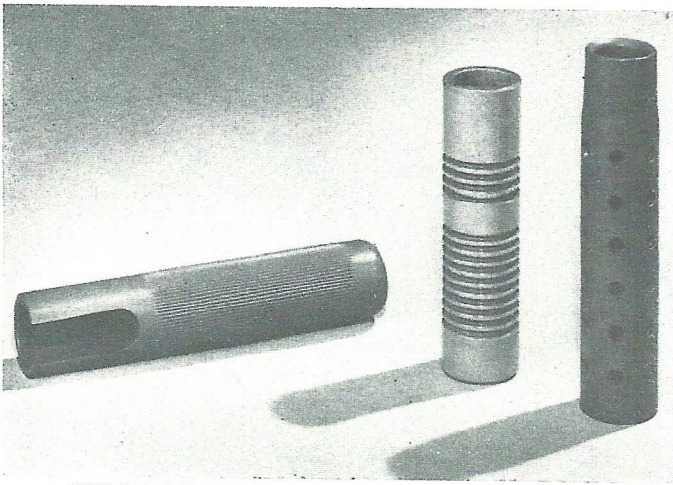
*Ease of Machining to Glass Smooth Surface, Non-Chipping
or Splintering, Toughness, Lightness, Non-Corroding,
Non-Staining.*

In the manufacture of textile machinery and textiles the unique combination of properties of Spaulding Vulcanized Fibre has been applied in a number of ways. A partial list of such applications include: Bobbin Heads, Shuttle Wearing Surfaces, Weaving Machine Stops, Loom Box Linings, Parallel Plugs, Lacing Combs, Picker Sticks, Swift Braces, Binder Pins, Treadle Plugs, Warp Stop Bars, Lug Strap Holders, Spindle Guards, Cloth Roll Bearings, Lug Strap Supports, Receptacles.



TEXTILE MACHINERY

SPAULDING VULCANIZED FIBRE APPLIED



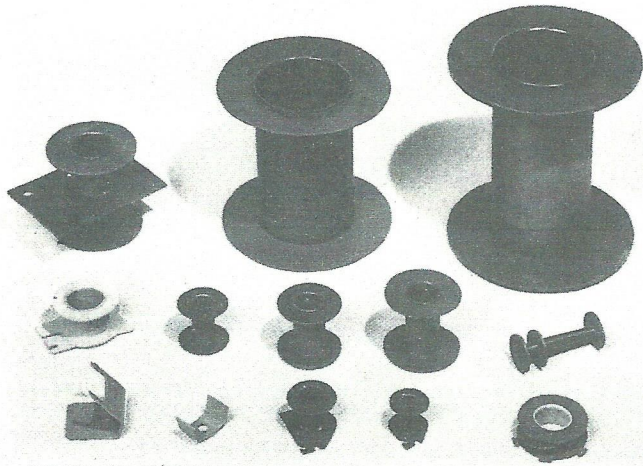
WELDING ELECTRODE HOLDERS

ELECTRICAL INSULATING PROPERTIES

combined with

*Structural Strength, Toughness, Low Heat Conductivity,
Good Forming, Punching and Machining.*

Illustrated are main parts from three designs of welding electrode holders. All take advantage of the combination of properties listed.



SPOOLS FOR ELECTRIC COILS

ELECTRICAL INSULATING PROPERTIES

combined with

Good Forming, Structural Strength, Toughness.

Spools made from Spaulding Vulcanized Fibre are used throughout the electrical industry as forms for coils. The spool body is made from Spaulding Vulcanized Fibre tube. Spool heads are punched from sheet, assembled to the body and simultaneously locked by swaging. The finished spool is light, rigid, and strong.



TRUNKS, LUGGAGE AND CASES

GOOD APPEARANCE

combined with

*Structural Strength, Toughness, Resistance to Abrasion
and Wear, Good Forming and Good Gluing Surfaces.*

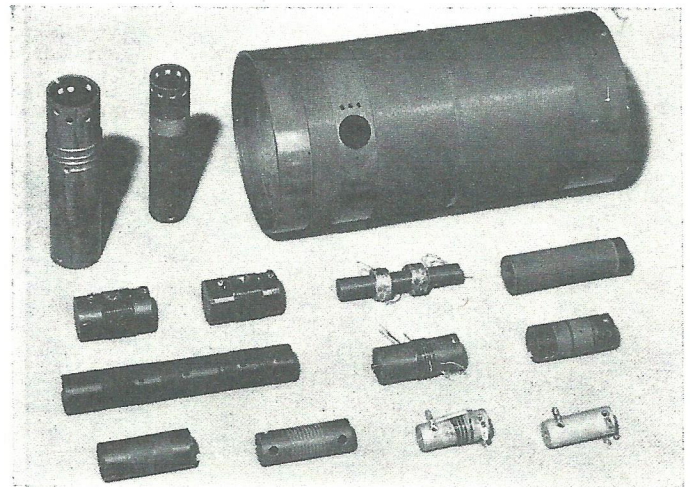
SPAULDITE APPLIED

LOW LOSS ELECTRICAL INSULATION

combined with

*Resistance to Moisture, Good Threading and
Punching Qualities.*

Spauldite radio coil form tubing was developed to furnish the specific properties necessary for best possible set reception and minimum power losses under wide variations of humidity.



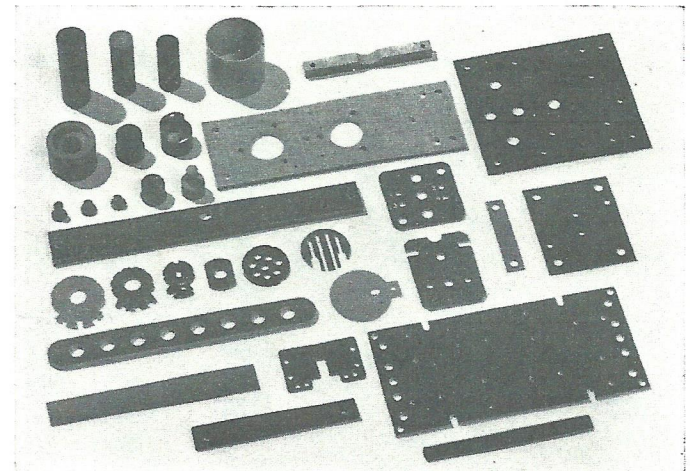
COIL FORMS

LOW LOSS ELECTRICAL INSULATION

combined with

*Resistance to Moisture, Dimensional Stability, Clean Punching
and Machining, Structural Strength*

In radio and other electronic devices the remarkable combination of properties of Spauldite is used in many ways. We have illustrated a few of the commonly used parts. All of them must have low loss insulating properties and high resistance to moisture. Some of them are required to withstand severe riveting or force-fit operations in assembly, a few are subjected to mechanical wear, others are bent to circles of small diameter in assembly.



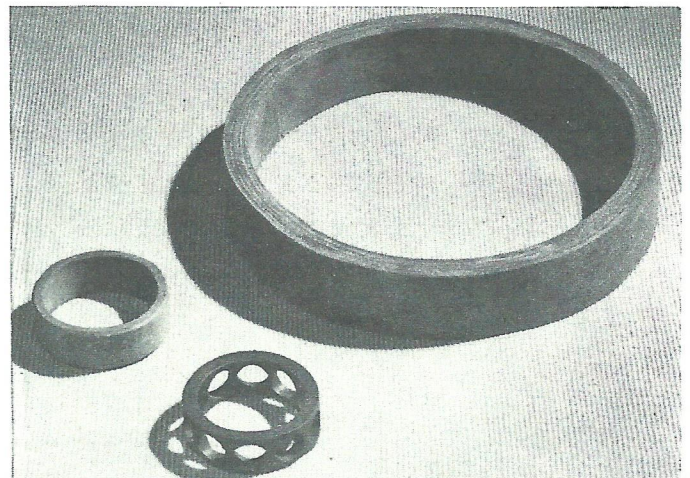
MISCELLANEOUS RADIO PARTS

LIGHTNESS

combined with

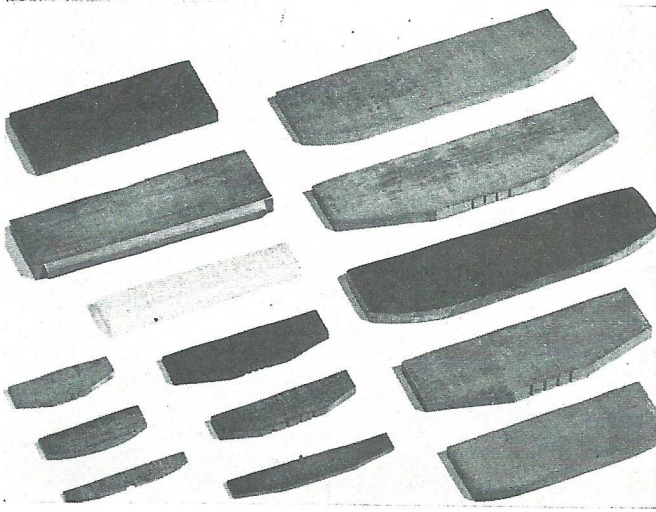
*Dimensional Stability, Extremely Clean Machining, Quietness
in Mechanical Operation, Resistance to Wear.*

Ball retainers for high speed ball bearings make excellent use of the above combination of properties of Spauldite. Some of these bearings revolve at speed in the neighborhood of 50,000 R.P.M. At these rotational speeds the property of extreme lightness is very important. Combined with lightness must be great resistance to wear and the property of machining very cleanly and to close tolerances together with the necessary dimensional stability to maintain these close tolerances under normal operating temperatures.

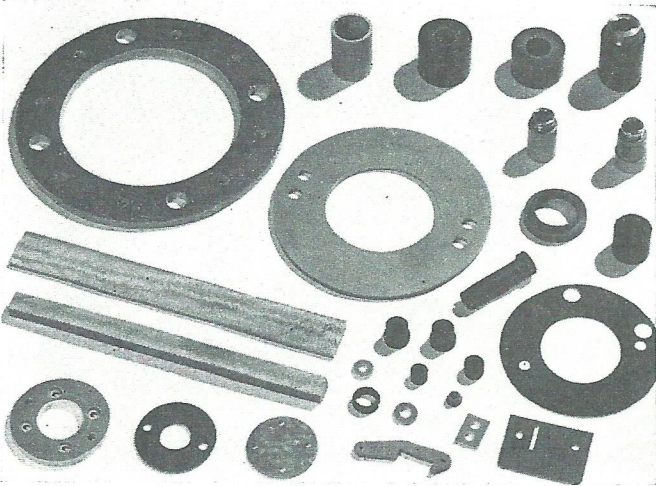


BALL BEARING RETAINERS

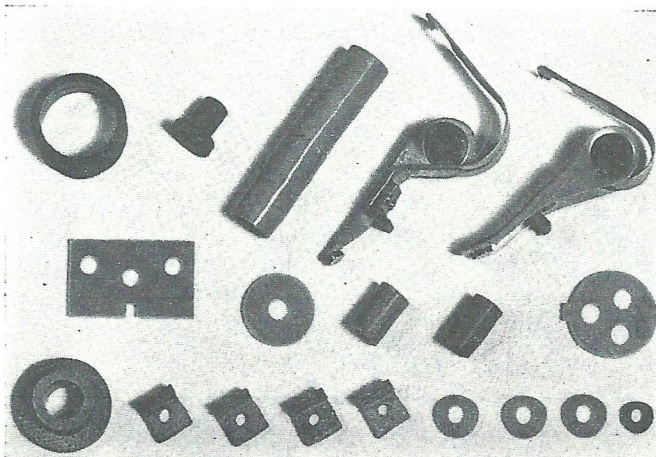
SPAULDITE APPLIED



ROTOR VANES



ELECTRIC MOTORS



AUTOMOTIVE ELECTRIC EQUIPMENT

EXTREME LIGHTNESS

combined with

Resistance to Wear, Dimensional Stability, Structural Strength, Clean Machining to Close Tolerances.

This unusual combination of properties has very successfully solved a number of exacting mechanical requirements in various applications. We have illustrated one of them here. Rotor vanes for pneumatic tools such as drills and grinders must be extremely light because of centrifugal force developed at speeds up to and including 20,000 R.P.M. They must be extremely wear-resisting to give satisfactory length of service as rubbing speeds up to 7,500 feet per minute against hardened steel cylinders. For maximum power output the vanes are assembled and must run with very small clearances. This demands a material that can be machined economically to close tolerances and dimensionally stable enough to maintain its dimensions under the extremes of temperatures and moisture conditions encountered in service. The Spaulding Fibre Company has developed several grades of Spauldite that have been outstandingly successful for this and similar applications.

ELECTRICAL INSULATING PROPERTIES

combined with

Resistance to Moisture, Dimensional Stability, Flexibility (to permit interference fits), Structural Strength, Clean Punching and Machining, Lightness.

This combination of properties is taken advantage of in centrifugal switches, brush holder bushings, brush holder plates, top sticks, and other applications in motors, magnetos, generators, etc.

ELECTRICAL INSULATING PROPERTIES

combined with

Resistance to Wear, Resistance to Moisture, Dimensional Stability, Structural Strength.

The remarkable wearing properties of Spauldite have solved many problems involving exacting mechanical requirements in combination with electrical insulation.

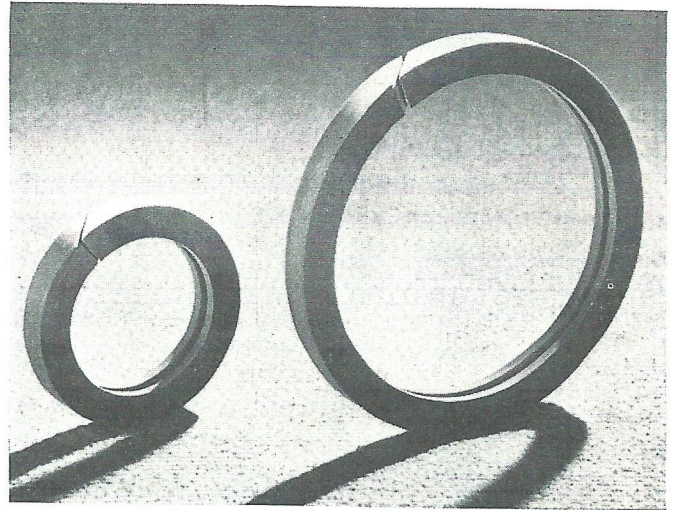
SPAULDITE APPLIED

CHEMICAL RESISTANCE

combined with

Resistance to Wear, Dimensional Stability, Structural Strength, Good Machinability.

This combination of properties is used by pump manufacturers for pumping equipment in connection with various chemicals. Piston rings and valves of Spauldite give excellent service.



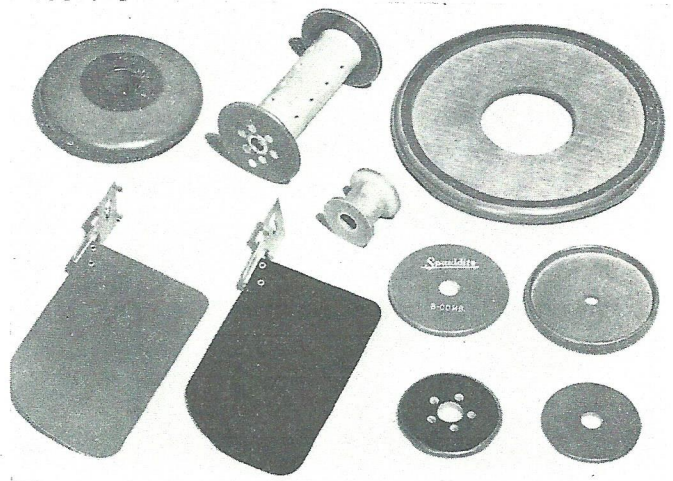
PISTON RINGS

STRUCTURAL STRENGTH

combined with

Ease of Machining to Glass-Smooth Surface, High Resistance to Moisture and Chemicals (at temperatures used in the textile industries;), Non-Chipping or Splintering, Lightness, Non-Corroding, Non-Staining.

This combination of properties is used for such applications in the textile industries as steaming bobbin heads where original smoothness of surface must be maintained after repeated cycles of steaming and washing. There is also a special chemical resisting grade of Spauldite that gives exceptional service under such exacting conditions as exist in the electro-chemical industries. Such uses include plating barrel parts and plating barrel panels.



TEXTILES

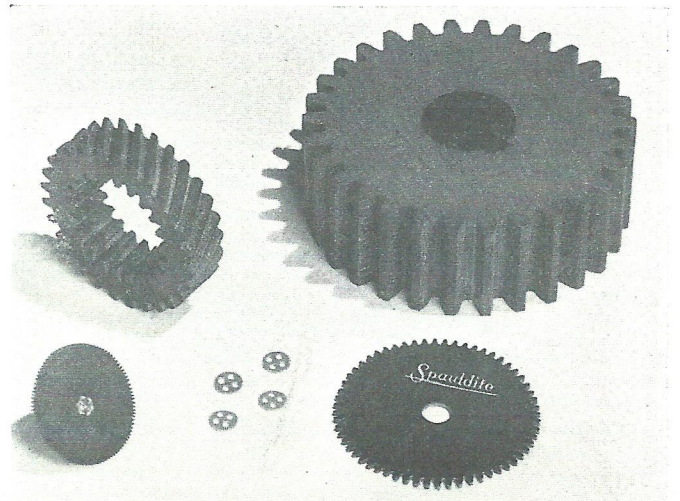
QUIETNESS IN MECHANICAL OPERATION

RESISTANCE TO WEAR

combined with

Structural Strength, Dimensional Stability, Lightness, Ease of Machining (may be hobbed, shaped, or milled with single or multiple tooth form cutter on standard machines).

Spauldite for gears is furnished in sheets or blanks of balanced construction to insure uniformity of strength of teeth. This balanced gear stock is furnished in a number of grades to cover gear requirements from fine pitch gears used in electric clocks and instruments to heavy gears in large industrial machinery.



GEARS

SPAULDING FIBRE BOARD

Furnished in sheets and Fabricated parts. Made from selected fibrous materials in various grades to meet specific industrial requirements. Made by the wet-process.

GENERAL PROPERTIES

Spaulding Fibre Board is tough, dense, strong and possesses exceptional mechanical and dielectric strength. It has good punching qualities and may be formed readily into a great variety of shapes.

GRADES

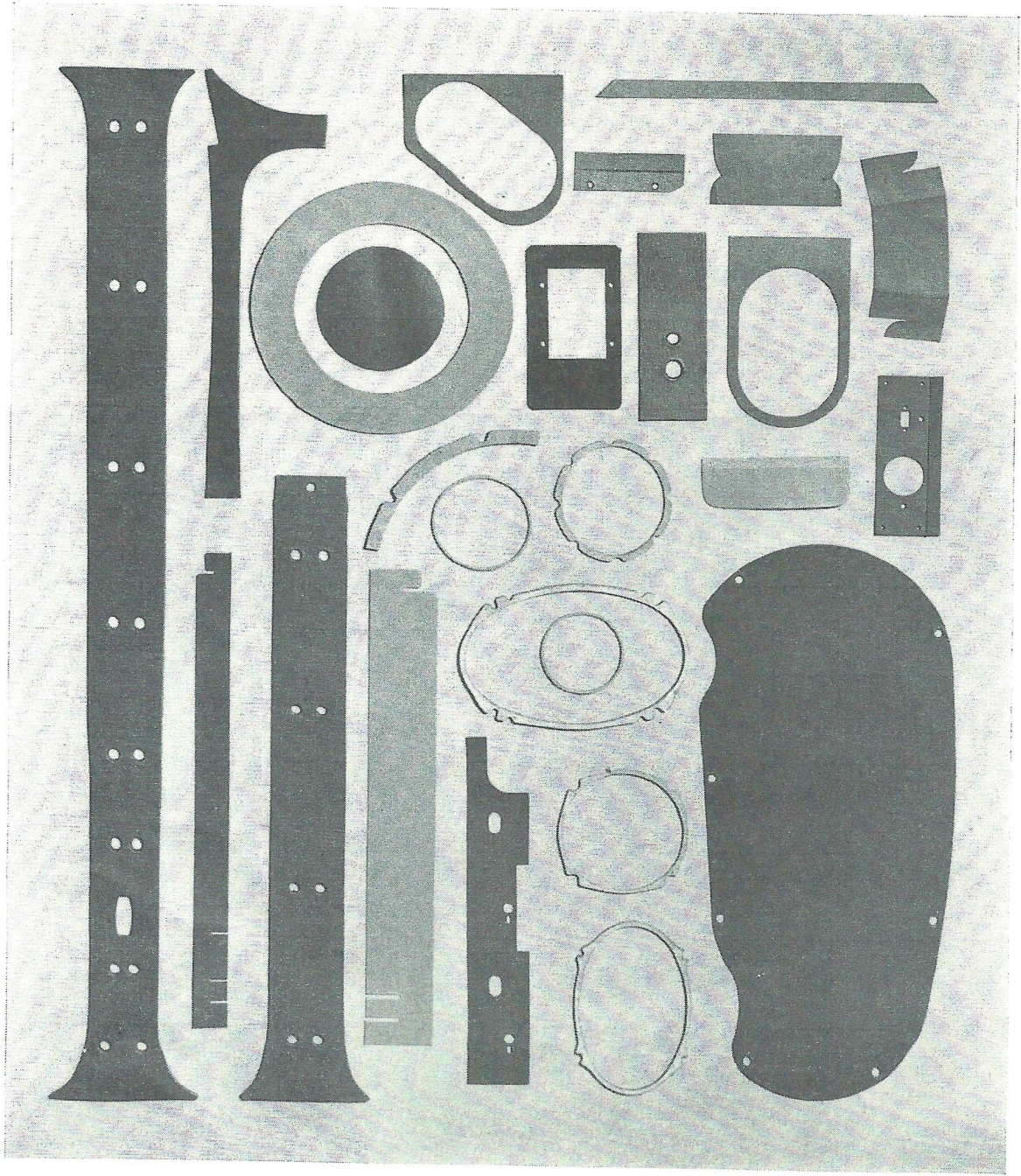
It is made for specific applications in various grades, the principal ones being:

- HDX:** Used largely for Shoe Reinforcements and for electrical applications. Excellent forming qualities.
- EL:** Especially developed for Motor End Laminations. Stiff, hard and dense.
- STAR:** Especially developed for Friction Rings and Pulleys.
- XL:** A general purpose material; well-finished; fairly dense and smooth. Used extensively for Cases and Receptacles. Also for fabricated parts for electrical and mechanical applications.
- LEATHER-BOARD: (or Heeling)** Made with a high percentage of scrap leather. Used chiefly for making heel bases for shoes. Also used as Dust Guards and Plugs for Railroad Car Journals. Also used for Gaskets and Friction Pulleys.

Specifications for Spaulding Fibre Board, Leather Board, and Spaulding T

	HDX	EL	Star	XL	Spaulding T.	Leather Board
Approx. Size Sheet	35" x 42"	34" x 56"	35" x 42"	39" x 56"	90"x96"&120"	34"x42"
Thicknesses Furnished	1/32" - 1/8"	1/16" - 1/8"	1/8" - 1/4"	1/32" - 1/4"	1/32" - 1/4"	1/8"-5/16"
Color	Red	Red	Red	Red, Brown and Black	Natural Grey	Light Brown
Density	.95 to 1.20	.95 to 1.20	.95 to 1.20	.95 to 1.20	.95 to 1.20	.80
Mullen: per mil	7.0 to 10 lbs.	7.0 to 10 lbs.	7.0 to 10 lbs.	7.0 to 10 lbs.	7.0 to 10 lbs.	2 1/2 lbs.
Tensile — p.s.i. W.G. A. G.	5,000 to 7,000 2,000 to 3,000	5,000 to 7,000 2,000 to 3,000	5,000 to 7,000 2,000 to 3,000	5,000 to 7,000 2,000 to 3,000	6,000 - 8,500 2,500 - 3,500	500-800 200-300
% Water Absorption: 24 Hours	45 to 70	45 to 70	45 to 70	45 to 70	90 to 100	90 to 110
Dielectric Strength: V/M	100 to 250	100 to 250	100 to 250	100 to 250	150 to over 300	75 to 100

SPAULDING FIBRE BOARD PARTS



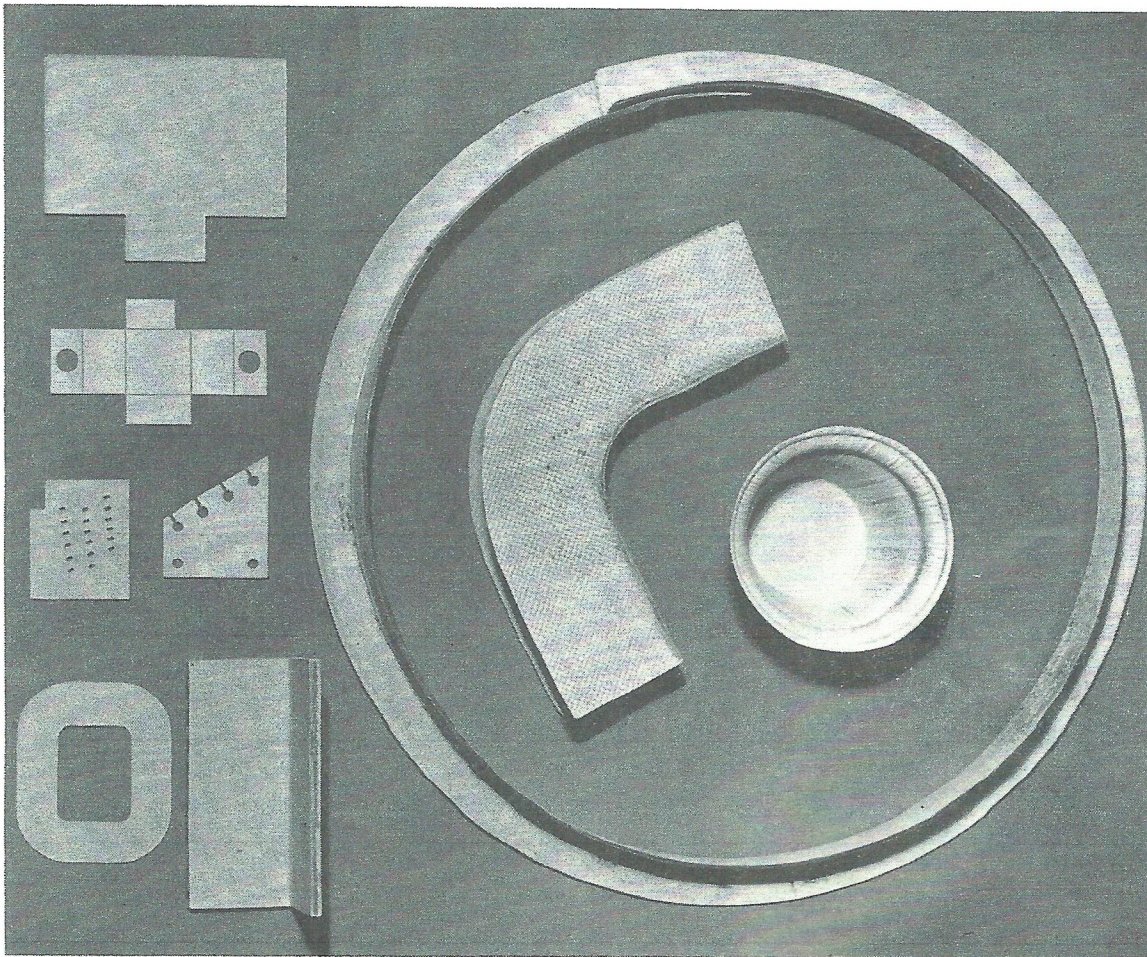
SPAULDING T.

Furnished in sheets and fabricated parts. Made from cotton and wood fibres by the wet process. (See page 32 for Physical and Electrical Properties.)

Is known also as Pressboard, Transformer Board and Fuller Board. A very high grade Fibre Board, grey in color, used chiefly by transformer manufacturers; produced to their exacting specifications. Serves as insulation in oil filled, power and distribution transformers. Electrically clean; low in ash; chemically neutral; has no added color and does not discolor transformer oil. Has high mechanical strength; can be formed into extreme shapes; bends readily without rupture and can be drawn.

It is widely used for many applications other than transformer use where Dielectric Strength, toughness and formability are required. A few parts are illustrated below.

For Physical Properties see page 32



SPAULDO

A SUPERIOR THIN INSULATION made from 100% rag stock on a wet machine, and glazed to a smooth finish. Its qualities of toughness, flexibility, and edge-tearing resistance, combined with high dielectric strength and ready absorption of insulating varnish have led to its predominant use as an IMPROVED motor slot cell insulation.

FURNISHED: In rolls from .007 to 1/32" thick, 37" to 40" wide, 14" to 16" diameter wound on a 3" paper core, weighing approximately 300 lbs.
 In sheets from .007 to 1/32" thick, 37" to 40" wide by 50" long, grain running 50" way.
 In coils or strips to width ordered.
 In cuffed coils or strips as ordered.
 In slot cells or other parts fabricated to B/P.

It was a great step forward in production line technique when insulation of the high quality of Spauldo became available in rolls, coils, and finally cuffed coils.

CHARACTERISTICS AND USES:

FLEXIBILITY: Bends readily without fracturing, in either direction of grain. *The extraordinary flexibility makes it possible to form over and lay flat a 1/8" wide cuff along the edges of coils or strips.*

EXTREME TOUGHNESS: Will stretch, before tearing, 5% to 7% w.g. or 14% to 18% a.g. *The unique combination of this extreme toughness with flexibility enables Spauldo punched pieces to be used successfully in many other difficult assemblies.*

NON-CORRODING: Will not corrode finest enamel wire.

EDGE TEARING RESISTANCE: Highly resistant to tearing force at edges of material. Will resist tearing at the ends of cells under conditions destructive to ordinary insulation. It is recommended that it be cut with the grain running around the cell form rather than lengthwise of the cell. *When pieces are cut off and folded up into motor slot cells the cuffed ends greatly increase the resistance to tearing.*

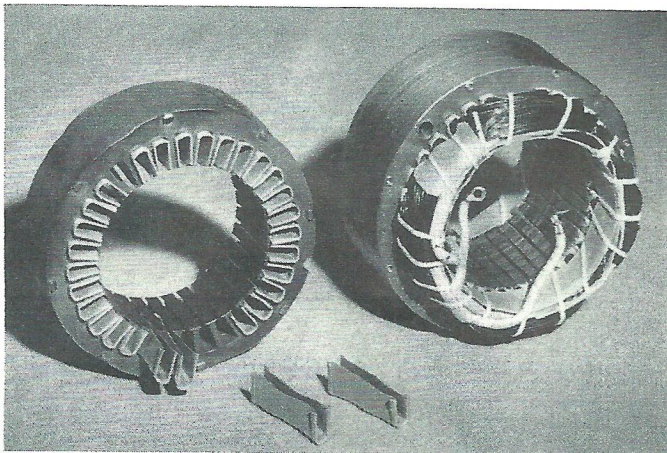
LOW EXTRACTABLES: Suitable for use in hermetically sealed motors for refrigerators.

NOTE: For best workability Spauldo should be stored under normal outside atmospheric humidity conditions in the neighborhood of 50% to 60% R. H.

PROPERTIES					
Showing recommended values for Specifications					
Nominal Thickness	Values	Elmendorf Tearing Strength		Dielectric Strength Volts Per Mil.	Mullen Strength
		M.D.	C.M.D.		
.007"	Specification, Min.	350	450	250	130
.010"	Specification, Min.	400	600	300	150
.015"	Specification, Min.	640	1100	300	200
.020"	Specification, Min.	1100	1600	300	300

SPAULDO ENGINEERING DATA

	M.D.	C.M.D.
Tensile Strength		
Lbs./Sq. In.	12,000	3,500
	to	to
	14,000	4,000
Elongation in Percent		
	5.0	14.0
	to	to
	7.0	18.0
Specific Gravity	1.30 to 1.40	
Thickness		
	Variation plus or minus 15%	



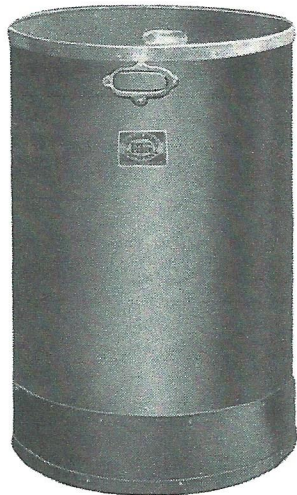
SPAULDO CUFFED SLOT CELLS

The flexibility and toughness of Spauldo permits turning over a cuff around the ends of the Spauldo cells.

The cuff increases the resistance to tearing under pressure of the winding and keeps the cell in position to insure insulating both ends effectively.

Cuffed Spauldo furnished in coils makes possible completely automatic insulating and winding of motors.

SPAULDING VULCANIZED FIBRE RECEPTACLES



CANS AND BARRELS

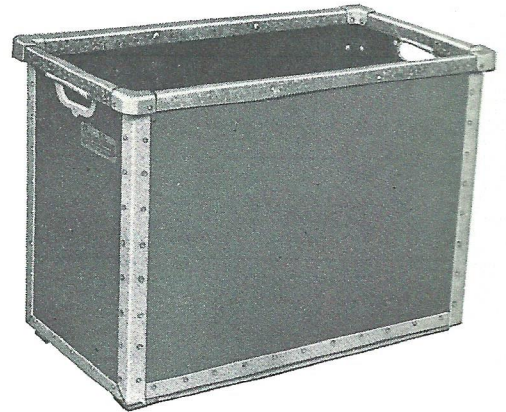
Standard Sizes:
 12 x 30 high 12 x 36 high
 14 x 30 " 14 x 36 "
 15 x 30 " 15 x 36 "
 16 x 30 " 18 x 30 "
 20 x 30 "

**A COMPLETE LINE OF
 STANDARD TYPE RECEPTACLES
 MADE IN ANY SIZE
 OR SHAPE.**

- Clean and Smooth
- No sharp edges
- No splinters
- Very Durable

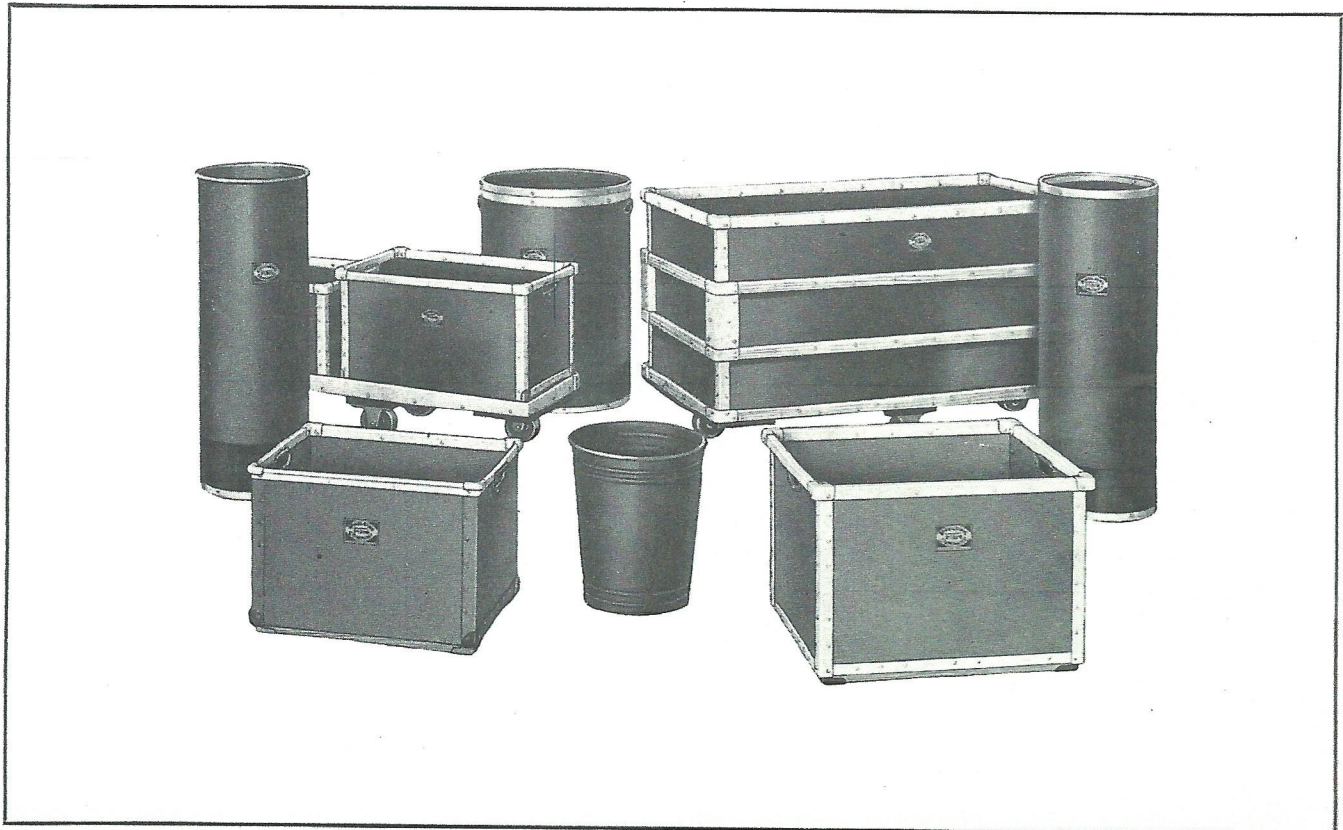
**ORDER STANDARD SIZES
 FOR PROMPT DELIVERY**

*Send for Special Receptacle
 Catalogue.*



STYLE B MILL BOX

Very Rugged
 Standard Sizes:
 18 x 12 x 12 deep I.D.
 24 x 16 x 12 " "
 30 x 16 x 16 " "
 36 x 20 x 24 " "



SPAULDING VULCANIZED FIBRE

COMBINES

ELECTRICAL INSULATION
PERMANENCE
MACHINEABILITY
ARC RESISTANCE
FORMING QUALITIES
PUNCHING QUALITIES
LOW HEAT CONDUCTIVITY

DEIONIZING PROPERTIES
RESISTANCE TO ABRASION
HIGH MECHANICAL STRENGTH
COMPRESSIBILITY
(as for Gaskets)
LIGHT WEIGHT
(half as much as Aluminum)

SPAULDITE IN ITS VARIOUS GRADES

MAY COMBINE

PERMANENT FINE APPEARANCE
MACHINEABILITY
PUNCHING QUALITIES
CHEMICAL INERTNESS
RESILIENCE
RESISTANCE TO MOISTURE
RESISTANCE TO CHEMICALS
LOW LOSS ELECTRICAL INSULATION

WEARING QUALITIES
(as for Bearings)
LIGHT WEIGHT
(half weight of Aluminum)
QUIETNESS IN MECHANICAL OPERATION
(as for Gears)
HIGH MECHANICAL STRENGTH PER UNIT OF WEIGHT
EASY POST FORMING

Spaulding