Glossary of Terms and Abbreviations

The following Glossary of Terms and Abbreviations is an accumulation of all the material in the HOL Office Library to make the most comprehensive listing of glossary terms and definitions available relating to the Roofing Industry.

Abatement

The removal of a material, specifically asbestos, from a building structure.

Abrasion Resistance

The ability of the membrane to resist being worn away by contact with a moving, abrasive surface, such as foot traffic, mechanical equipment, and wind-blown particles, which tend to progressively remove material from the membrane's surface.

Absorption

The process of one substance entering into the inner structure of another. Compare "**Adsorption**".

Accelerated Heat Aging

Exposure of sheet applied membranes to the deteriorating influence of air at a specified temperature for known periods of time, after which, various physical properties are determined. These may be compared with the same properties determined on original (unaged) specimens to give an indication of the relative performance.

Accelerated Weathering

Exposure of sheet applied membranes to the deteriorating influence of various environmental factors, including visible and ultraviolet light, heat and moisture under prescribed conditions which are magnified, thereby accelerating their effects. These conditions are generally more severe than those found naturally in order to cause deterioration in less time. Following exposure, various physical properties are determined and compared with the same properties determined on original (unweathered) specimens to give an indication of relative performance. The following methods of exposure are used:

"Standard for Performing Accelerated Outdoor Weathering Using Concentrated Natural Sunlight." Samples are exposed to approximately eight times the energy of the sun by use of mirrors in a device which tracks the sun. Excess heat is removed by blowers and water may be sprayed on the samples periodically. Records are kept of the total solar radiation and total ultraviolet radiation dose below 385 nm (or nanometers, which is the frequency wavelength).

"Standard Practice for Operating Xenon Arc-Type (Water-Cooled) Light Exposure Apparatus With and Without Water for Exposure of Plastics." Samples are exposed to properly filtered xenon arc lights which closely simulate the spectral distribution of sunlight at the surface of the earth. Temperature and humidity are controlled and water may be sprayed on the samples periodically. The number of hours of exposure is usually reported.

Accelerator

A substance used as an additive to reduce curing time. Compare "**Retarder**".

ACGIH

A professional organization, the American Conference of Governmental Industrial Hygienists.

ACM

Asbestos-Containing Material

Active

Capable of chemical or biological action. Compare "**Inert**".

Adhesion

The ability of a material to remain bonded to another material. The combined ultimate strength of the molecular forces and the mechanical interlocking achieved between the adhesive and the surfaces bonded. See "**Adhesive**"; Compare "**Cohesion**". For a comprehensive listing of related terms, see the section on **ADHESION AND ADHESIVES**.

Adhesive

A cementing substance that produces a steady and firm attachment between two surfaces. Before adhesives are applied, their compatibility with other roofing materials and components should be ensured through consultation with the membrane supplier. Failure to do so could result in the degradation of these materials and in poor adhesion. See "**Adhesion**".

Admixture

A material (other than aggregate, cement, or water) added in small quantities to concrete or other adhesive products to produce some desired change in properties.

Adsorption

The adhesion of a thin film of liquid or gas to the surface of a solid substance. Compare "**Absorption**".

Aerosol

Liquid droplets or solid particles, including fibers, dispersed in air. They are fine enough to remain dispersed in air for a period of time.

Aggregate

Coarse material, such as gravel, broken stone or sand, with which cement and water are mixed to form concrete, surfacing or ballasting. Crushed stone is usually designated as coarse aggregate and sand as fine aggregate. Crushed stone, water-worn gravel, or slag is also used as a protective surface or as ballast to anchor loosely-laid or protected-membrane assemblies.

Air Barrier

A membrane or building element that provides resistance to air leakage.

Air Leakage

The movement of air through spaces between constituent parts of a roof system or other enclosure element as a result of air-pressure differences between one and the other side.

Air Space

A cavity or unfilled space between two constituent parts in a roof system or other enclosure element of a building to allow free movement of air. Also called "**Airway"**.

Air Supported Structure

A structure consisting of a pliable membrane which achieves and maintains its shape and support by internal air pressure.

Airway

See "**Air Space**".

Air Well

A space within the building, enclosed by walls, partially or totally open to the outside air at the roof and intended solely as a means of ventilation for bathrooms, kitchens, and like service rooms.

AISI

American Iron & Steel Institute.

Alfin Catalyst

A catalyst derived from reaction of an alkali alcoholate with an olefin halide; used to convert olefins (for example, ethylene, propylene, or butylenes) into polyolefin polymers.

Alignment Notch

A cutout projection or slit on the end or sides of shingles. Acts as a guide in application to secure proper exposure.

Aliphatic

Pertaining to open-chain hydrocarbon structures.

Alkalis

Salts of sodium, potassium, or any of the elements of group 1a in the Periodic Table of Elements. **Efflorescence** in masonry, harmful to coatings.

Alkyd Paint

A durable, nearly odorless paint, made from an alkyd resin (a reaction product from unsaturated acids and glycerol) used as the vehicle for pigment.

Alligatoring

A term describing the defect in an applied coating or mastic when it cracks into large segments or shrinks due to photo-oxidation. When the action is fine and incomplete, it is usually referred to as "checking"

Alloy

A mixture or blend of similar materials (Thermoplastic) melted and re-extruded into a new material from which the original materials cannot be separated.

Ambient Temperature

Temperatures of the surrounding air on all sides.

American Society for Testing & Materials (ASTM)

A consensus standards-setting organization, headquartered in Philadelphia, PA. It's membership is voluntary.

American Iron & Steel Institute (AISI)

Amorphous

A non-crystalline substance, glassy in character, having no molecular lattice structure.

Anchor Bolt

A steel bolt used to secure a structural member against uplift. It is usually deformed at one end to ensure a good grip in the concrete or masonry in which it is embedded.

Angle Iron

An L-shaped steel section frequently used to support masonry over a window or door opening.

Angular Placement

The setting of fasteners into the roof decking. In Angular Placement, fasteners are not inserted perpendicular into the roof decking, but are inserted at an angle into the decking which can have a negative effect on pullout force and backout torque.

Anemometer

An instrument used to measure and record wind speed and direction.

Anhydrous Lime

Quicklime.

Anisotropic

Showing different properties as to velocity of light transmission, conductivity of heat, compressibility, and so on, in different directions. Also known as **aeolotropic**. Compare "**Isotropic**", "**Orthotropic**".

Anti-Perforation Layer

A layer between the waterproofing and the heavy protection used to minimize the effect of mechanical loads (UEAtc definition - MDAT No. 27:1983)

Annulus Area

That area between the outside of a penetrating item and the interior wall of the material being penetrated.

APP

Atactic Polypropylene. **Atactic** means of the configuration for a polymer, having the opposite stearic configurations for the carbon atoms of the polymer chain occur in equal frequency and more or less at random. **Polypropylene** is a crystalline, thermoplastic resin made by the polymerization of propylene, C_3H_6; the product is hard and tough, resists moisture, oils, and solvents, and withstands temperatures up to 170°C.

Application

The act of putting on or building up the felts and flashings of a Built Up-Roofing, or all the elements of any roofing system.

Application (Cold)

The applying of felts in a Built Up-Roofing with cold bituminous cements or emulsions.

Application (Horizontal)

Mineral-surfaced roofing applied with the laps parallel to the eaves of a sloping roof.

Application (Hot)

The application of felts in Built Up-Roofing using heated bitumen.

Application (Phased)

The practice of laying one or more plies of a Built Up-Roofing at one time with the additional plies laid at

a later time.

Application (Shingle)

Felts applied in an overlapping manner similar to shingle application, with the amount of overlap arranged to give the number of plies desired.

Application (Two-and-Two)

A four-ply roofing laid in shingle fashion with the first two giving double coverage and the last two separate double coverage.

Application (Vertical)

Mineral-Surfaced felt applied with the laps at right angles to the eaves and parallel to the rake. Also called **up-and-over** when it continues over the ridge. Sometimes laid slightly on the bias to encourage drainage away from the laps.

Application Temperature

The temperature of the hot bitumen when applied on the roof which should be not more than 50°F less than the correct kettle temperature.

Application Temperature Limits

Maximum and Minimum temperatures between which it is usually safe to apply finishes, adhesives and sealants.

Approved Contractor

An individual, partnership or corporation generally qualified by technical training and experience to direct or perform properly the application or repair of roofing, waterproofing or sheet metal work, as required in the roofing industry.

Approved Labs

UL, ULS, Southwest Research, Omega Point and Factory Mutual. Only labs recognized by SBCCI.

ARI

Air-Conditioning and Refrigeration Institute.

Artificial Stone

A special concrete unit, sometimes artificially colored, intended to resemble natural stone, made by mixing chippings and dust of natural stone with Portland Cement and water. This mixture is placed in molds and cured before use.

Aromatic

Derived from, characterized by, the presence of benzene rings.

Aromatic Hydrocarbons

A hydrocarbon compound characterized by a molecular structure involving one or more of 6 carbon atom rings (Benzene rings). (See "**Hydrocarbon**")

Asbestos Cement

A fire-resisting weather-proof building material, made from Portland Cement and asbestos. It is manufactured in various forms such as plain sheets, corrugated sheets, shingles, pipes.

ASHRAE

American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., located in New York, NY

Asphalt

A brown to black hydrocarbon solids or semi-solids found in natural beds or obtained as a residue from petroleums that gradually liquify when heated. It occurs in natural deposits at a few places throughout the world, but the source of asphalt for roofing is the residuum of petroleum distillation. See "**Blown Asphalt**". **Asphalt Felt** is an asphalt saturated felt. **Asphalt Primer** is a solution of asphalt in petroleum solvent, used to prepare concrete roof decks for the application of hot asphalt. The primer lays dust and improves the adhesion of the molten asphalt to the roof deck. **Dead Flat Asphalt** is a roofing asphalt conforming to the requirements of ASTM Specification D-312, Type I. **Flat Asphalt** is a roofing asphalt conforming to the requirements of ASTM Specification D-312, Type II. **Steam Blown Asphalt** is an asphalt produced by blowing steam through molten asphalt to modify its viscosity. **Steep Asphalt** is a roofing asphalt conforming to the requirements of ASTM Specification D-312, Type III. **Super Steep Asphalt** is a roofing asphalt conforming to the requirements of ASTM Specification D-312, Type IV.

Asphaltene

A high molecular weight hydrocarbon fraction precipitated from asphalt by a designated paraffinic naphtha solvent at a specified temperature and solvent-asphalt ratio. The asphaltene fraction should be identified

by the temperature and solvent-asphalt ratio used.

ASTM

American Society for Testing & Materials. ASTM Provides a "management system" in which "voluntary consensus standards" may be developed. These standards (i.e., test methods, specifications, definitions, practices, and classifications) are written by persons having expertise in specific fields, who choose, voluntarily, to work within the ASTM system. ASTM's voluntary standards are used worldwide by engineers, scientists, industry, government, consumers, academia, and others concerned with the optimum utilization of products, systems, and services. Test methods, specifications, etc., developed by the American Society for Testing and Materials are usually referred to by the letters ASTM, followed by a numerical designation, (e.g., ASTM D-746).

Atactic

See "**Tacticity**". A polymer in which there is a random arrangement of pendent groups on each side of the carbon chain, as in "**Atactic Polypropylene (APP)**".

Atactic Polypropylene (APP)

A group of high molecular weight polymers formed by the polymerization of polypropylene. Both atactic (amorphous, non-crystalline) and isotactic (highly crystalline) polymers are formed during the polymerization. The atactic polymer is the primary modifier used in combination with bitumen, although a small quantity of the isotactic polymer may be used as well. See "**Polymerization**", "**Tacticity**". Compare "**Isotactic**".

Atrium

An open-roofed entrance court. Some have the appearance of being open, but utilize skylights to actually form a closed roofing system.

Attic or **Roof Space**

A roof space between the top floor ceiling and the roof and between a dwarf partition and sloping roo

Back Coating

Asphalt coating applied to the back side of shingles or roll roofing.

Backing Mineral

The material applied to the back side of shingles or roll roofing to prevent sticking in the bundles or rolls.

Backlining

The practice of applying chalk lines to a roof surface eliminating the necessity to lay the felts according to the manufacturer's laying lines or to walk on the newly finished membrane during application. Effective when laying fiber glass felts in BUR application since walking on the freshly laid roll should not be done and the lines can be seen from the "deck" side of the roll.

Back Nailing

See "**Nailing**".

Backout

The phenomenon where a screw-type fastener will loosen itself by turning counter-clockwise and "back itself out" due to pulling or vibration of any component of the roof system. The pulling out of a nail or staple from the roof deck due to stress forces or the drying of the wooden roof deck

Backout Torque

The force, measured in inch-pounds or in foot-pounds, required to start back-threading the fastener out of the roof decking until the fastener head does not make contact with the installation plate.

Back Venting, Re-venting or Secondary Venting

Connecting a plumbing fixture with a nearby main vent instead of venting directly out of the roof.

Bald Roof

See "**Smooth-Surfaced Roof**".

Ballast

An anchoring material, such as rounded river rock, gravel, or pre-cast concrete pavers, which is used to hold single-ply roofing membranes in place and to stabilize the roof system from wind uplift forces in a **loosely-laid** system. Usually applied at a rate of 10 pounds per square foot of roof area.

Balloon Framing

A method of wood-frame construction in which the studs extend in one piece from the foundation sill to the top plate supporting the roof.

Band Sticks

Boards used with wrapping bands on wood and shake shingles for safe packaging.

Bar

A unit of pressure equal to 10^5 pascals or 10^5 newtons per square meter, or 10^6 dynes per square centimeter. See "**Dynes**".

Barge Board

A board, often decorative, covering the verge (projecting portion) of a gable roof. Also called "**Verge Board**".

Barrel Tile

A clay tile of semi-circular shape used as a cover tile in a clay roll tile roofing system. See "**Clay Tile**, "**Cover Tile**", "**Roll Tile**". Compare "**Pan Tile**".

Barrel Vault Roof

See "**Roof, Barrel Vault**". Also called "**Tunnel Vault**".

Base Coat

The first coat of a liquid applied membrane or coating over polyurethane foam. Compare "**Buildup Coats**", "**Top Coat**".

Base Flashing

See "**Flashing; Base**".

Base Sheet

A saturated or factory coated felt placed as the first ply in a multi-ply Built Up-Roofing (BUR) membrane or roof system. Specifically, the underlaying sheets comprising the base or principal part of a roof. Also called "**Base Ply**".

Batt

A semi-rigid section of mineral wool anchored to paper which is fixed between framed members.

Batten

A strip of steel or aluminum used to mechanically fasten a single-ply membrane for the purpose of preventing wind uplift. Also called "**Strip Fastener**". A type of metal roofing seam; raised rib in a metal roof, or a separate part of formed portion in a metal roofing panel. A narrow strip of wood used to cover joints between boards or panels.

Batter

A receding upward slope. A term normally applied to a wall or structural member where the thickness diminishes towards the top.

Batter Board

A temporary framework used to assist in locating corners when laying out a foundation.

Beam

A horizontal structural member usually wood, steel or concrete used to support vertical loads.

Beam Pocket

A notch formed at the top of a foundation wall to receive and support the end of a beam.

Bearing Plate

A plate provided to distribute the load imposed by a specific member or members. Normally, a steel plate set on concrete or masonry to support a structural member.

Bearing Wall

A wall that supports any vertical load in addition to its own weight.

Bellows

See "**Expansion Joint**".

Bend Test

In testing, a method for measuring ductility of certain materials. There are no standardized terms for reporting bend test results for broad classes of materials; rather, terms associated with bend tests apply to specific forms or types of materials. For example, materials specifications sometimes require that a specimen be bent to a specified inside diameter (ASTM A-360), steel products). Results of tests of fiberboard are reported by a description of the failure or photographs (ASTM D-1037).

Bending Strength

In testing, a term used to describe flexure properties of cast iron and wood products. Compare "**Flexural Strength**".

Bending Stress

A force causing a deflection in shape or position of any member of a structure.

Bentonite

A clay formed from volcanic ash decomposition and largely composed of montmorillonite and beidellite used as a waterproofing material that gels when exposed to water, used loose as a temporary repair, or in panels between corrugated cardboard. Can also be used as an emulsifying agent in asphalt emulsions, which results in a thixotropic mixture that can be brushed or sprayed at room temperature. Also known as **taylorite** or **Volclay**.

Berm

A horizontal edge cut between the foot and top of an embankment to stabilize the slope by intercepting sliding earth. **Berming** is a technique used in underground waterproofing to stabilize soil erosion and lower high water tables.

Billowing

Small wavyness of the membrane in the vicinity of the fasteners in mechanically-attached, single-ply roofing membrane application. While some billowing may be normal, an excessive amount would indicate that design enhancements may be advisable and membrane manufacturers should be consulted.

Bitumen

An asphalt, various mixtures of hydrocarbon material of natural or pyrogenous origin (as coal tar), or combinations of both, which may be liquid, semi-solid, or solid, is completely soluble in carbon disulfide and is derived from either coal or petroleum. Any number of inflammable organic mineral substances.

Blanket Insulation

Fiber glass insulation in roll form, used with a vapor retarder membrane laminated to the inside face.

Bleeding or **Bleed Through**

Surface exudation. A change in the surface condition of a product caused by the migration of a liquid or solid material to the surface.

Blemish

A surface imperfection, usually minor. See "**Blister**".

Blends

Mixtures of various colored granules found on the one face of mineral-surfaced roofing

Blind Nailing

See "**Nailing**".

Blind Rivet

A rivet applied from one side, incorporating a stem which pulls against material on the blind side and pops off when the rivet is fully formed.

Blind Valley

A flat valley, one that cannot be normally seen from the ground.

Blister

An enclosed raised spot or area containing gas or liquid that shows at the surface of prepared or Built Up-Roofing. Surface Blisters are small blisters from pin head size to usually less than 25 mm in diameter appearing in the surface coatings of roofing. They frequently occur in clusters and result from exposure to sunlight and weather. Also called weather blisters, pin blisters, blueberries, raspberries, strawberries, pimpling, and bitumen bubbling. There are several causes for blistering.

Block

The piece of bulk wood from which wood shakes are sawn or split.

Block Copolymer

A polymer whose molecules consist of two or more separate chain sequences of monomeric units. Each of these sequences has its own individual properties that are the same as the homopolymer prepared under similar circumstances.

Blocking

Continuous strips, usually of wood, secured to roof decks at the perimeter edges and around roof openings to provide securement for the roofing membrane and flashings, or for other building parts.

Blowing Agent

A gas or a substance capable of producing a gas, used in making foamed or cellular materials, such as Refrigerant-11 (CFC-11), a chlorinated fluorocarbon.

Blown Asphalt

The end product of converting petroleum residuum to asphalt for use in the manufacture of roofing products by the use of air. The residuum is heated and air is blown through this material so the oxygen in the air will oxidize and produce a solid asphaltic material from the liquid residuum. See "**Asphalt**".

Blueprint

A copy of an original architectural drawing. A blueprint may be brown and white, black and white, or a color other than blue, but early copies were blue and the name still applies. See "**Specification**", "**Working Drawings**".

Bond

(1) The adhesive and cohesive forces holding two materials in contact. (2) The adhesive strength that prevents delamination of two components. See "**Adhesion**", "**Cohesion**". (3) A commitment or guarantee for usually ten to twenty years as a formalized detailed written agreement between the owner and the roofing contractor relating to a roof's performance. (4) In masonry, the pattern in which bricks or blocks are laid to tie the individual units together so that the entire wall they comprise will tend to act as a complete unit.

Bond Strength

In testing, the stress (tensile load divided by area of bond) required to rupture a bond formed by an adhesive between two metal blocks. (ASTM D-952).

Bonded Roof

A written guarantee for 5, 10, or sometimes more years that a manufacturer will assume financial responsibility for needed repairs on a roof that has been applied to the manufacturer's specifications.

Bonding Agent

Essentially synonymous with "Adhesive".

Bond Lines

The alignment of the cut-outs on 3-tab or 2-tab shingles.

Boston Lap

A method of finishing the ridge of a shingle course, using overlapping vertical joints.

Bowstring Roof

See "**Roof; Bowstring Roof**".

Box Beam

A beam made of plywood on a lumber framework.

Box Gutter

A Wooden gutter usually lined with metal having upright sides, sometimes called "**Concealed Gutter**".

BR

See "**Butyl Rubber**".

Brace

In carpentry, an inclined piece of timber used in walls and in trussed partitions or in framed roofs to form a triangle and thereby stiffen the framing. When a brace is used by way of support to a rafter, it is called a strut.

Breaking Load

In testing, a load that causes fracture in a tension, compression, flexure or torsion test. In tension tests of textiles and yarns, breaking load is also called breaking strength.

Breaking Strength

In testing, the tensile load or force required to rupture textiles (e.g. fibers, yarn, reinforcements) or leather. It is similar to breaking load in a tension test. Ordinarily, breaking strength is reported as lb. or lb./in. of width for sheet specimens.

Breather Vent

See "**Vent; Breather Vent**".

Breeze-Way

A covered passage-way between a house and an auxiliary building.

Bridging

See "**Cross Bridging**".

British Thermal Unit (BTU)

The amount of heat required to raise the temperature of one pound (.45 kg) of pure water one degree Fahrenheit. 3,413 BTU = 1 Kilowatt-hour (Kwh). 100,000 BTU = 1 Therm.

Brittle Point or **Brittleness Temperature**

The highest temperature at which a rubber specimen fractures on sudden impact. The kind of rubber, state of vulcanization, the geometry of the specimen and apparatus, and the speed of impact all influence the brittle point.

Brooming

The pressing of felts in close contact with the layer of bitumen immediately following the application of bitumen and felt, by the use of a wide stable of deck-type broom or other suitable push bar as wide as the felt. Brooming assures smooth contact with the underlying adhesive and helps to remove voids between roofing plies.

BTU

See "**British Thermal Unit**".

BTUH

BTUs per hour

Buckle

A large elongated bulge or fold in a roofing membrane as a result of separation from the substrate accompanied by expansion or stretching. "**Buckling**" in asphalt shingles is caused by moisture absorption and drying cycles combined with seasonal expansion and contraction of untreated roof decks.

Buckled Ply

Wrinkling, folding, or buckling where one layer is not adhering smoothly to another.

Building Code

Any system of principles or rules set to control, design, and construct buildings or materials.

Buildup Coats

The second and subsequent coats of a liquid applied membrane used to build up the membrane to a specified mil thickness. Compare "**Base Coat**", "**Top Coat**".

Built-Up-Roof (BUR)

A continuous roof assembly, consisting of plies of asphalt saturated felts, coated felts, fabrics, or mats between which layers of bitumen are applied. A BUR is generally surfaced with mineral aggregate, bituminous materials, or a granular-surfaced roofing sheet, known as a 90 pound cap sheet.

Bulkhead

A structure above the roof of any part of a building enclosing a stairway, tank, elevator machinery or ventilating apparatus, or such part of a shaft as extends above the roof; a sloping door or doors affording entrance to a cellar from outside a building.

Bull

Name given to plastic cement in some areas.

Bull Paddle

The tool used to apply plastic cement, usually a narrow wood shingle.

BUR

See "**Built Up-Roof**".

Butadiene (CH_2=CH-CH=CH_2)

A gaseous hydrocarbon of the diolefin series, boiling at -4.41°C. It can be polymerized to a synthetic rubber, polybutadiene. Butadiene is the chief raw material for making many of the synthetic rubbers of today. Copolymerized with styrene, it yields SBR; with acrylonitrile, the various nitrile synthetic rubbers are obtained.

Butt

The bottom edge or portion of a shingle.

Butt Joint

Any joint made by fastening two members together without overlapping. Also called "**Butt Seam**".

Butt Nailing

See "**Nailing; Butt**".

Butt Seam

See "**Butt Joint**".

Butt Up

When reroofing, it is the alignment of the top edge of the new shingles with the butt edge of the old shingles.

Butterfly Valve

A gate valve that opens to circulate pumped bitumen in a kettle or tanker and closes to force bitumen to the roof.

Button

See **"Fastener; Button**".

Butyl

A rubber material produced by copolymerizing isobutylene with a small amount of isoprene. butyl is variously manufactured into sheet goods, blended with other rubbers materials, and is often used to make sealants and adhesives.

Butyl Rubber

An elastomer which has extremely low water vapor and gas permeability. Having the lowest permeability in comparison to other elastomers, it is especially recommended in situations which have relatively higher vapor drives, such as low temperature applications (coolers, freezers, and cryogenic storage) or water immersion (water storage and ponding water). When exposed to exterior weathering or in areas where mechanical damage may occur, butyl rubbers should be **top coat**ed with tougher or more weatherable coatings (see coating manufacturers for specific recommendations). While most Butyl Rubbers are two-component materials, some single-component versions are available.

Calendar

A precision machine normally composed of 4 to 5 counter-rotating internally heated or cooled steel cylinder rolls of large diameter rollers which are positioned in an I, L, or F shape. The thickness of the sheet is established by feeding the compound through increasingly narrower gaps in the rollers. The actual thickness of the membrane is determined by the width of the gap between the last roller pair on the calender. The membrane then passes over several cooling rollers and at the final stage is wound into rolls.

Calibrate

To determine the value by measurement or comparison with a reference standard, a correct scale reading or setting of a meter or any other measuring instrument, before operation of the device.

Camber

The amount of upward curve given to an arch, bar, beam or girder to prevent the member from becoming concave due to its own weight and/or the weight of the load it must carry.

Canopy

A roof-like covering over an opening in an exterior wall.

Cantilever

A self-supporting projection without external bracing in which a beam or series of beams is supported by a downward force behind a fulcrum.

Cant Strip

A continuous strip of material (triangular in cross-section) used as a transition between the roof deck and a vertical surface (such as a parapet wall); normally has a 45° sloping surface. The roofing membrane and flashings are eased through the change in direction from essentially horizontal to vertical along its 45° sloping surface.

Cap

A block or other covering, plain or molded, forming the top of a wall, pier, newel post or column. A wall coping or chimney cap.

Cap Flashing

See "**Flashing; Cap**".

Capillary Action

The action by which the surface of a liquid where it contacts a solid is elevated or depressed, because of the relative attraction of the molecules of the liquid for each other and for those of the solid. Occurs commonly in reinforcing fibers when cut edges of a reinforced membrane are left exposed without the application of a lap sealant feathered onto the joint edge and water enters the fibers. This can result in delamination of the membrane layers when exposed to freeze-thaw cycles. Also known as **Capillarity.**

Capping In

The application of the roofing felt to a roof deck. Also called "**Drying In**".

Cap Sheet

The top sheet or ply of Built Up-Roofing forming the finished surface of the roof. Any mineral-surfaced or other coated felt or sheet designed for that purpose.

Carbon Black

Finely divided carbon. It may be formed by any one of the following processes: (1) The incomplete combustion of natural gas in burners under moving channel irons called **channel carbon blacks**, (2) The incomplete combustion of natural gas ad petroleum in large, closed furnaces called **furnace carbon blacks**, and, (3) The decomposition of gases in large converters filled with hot refractory brick checkerwork called **thermal blacks**. These carbon blacks vary in particle size and some of them may be furnace treated.

Carbon Black Masterbatch

A mixture of rubber and carbon black. It can be prepared by milling carbon black into rubber, but may also be prepared by dispersing carbon black and adding it to rubber late, then coagulating, washing, and drying the mixture.

CAS#

A Chemical Abstract Service number is the unique code assigned to a material to enable identificatio

Cast Sheeting

A manufacturing process in which a liquid is poured into a mold, cured, and removed from the mold. Cast films are also made by depositing the material, either by solution or in a hot melt form, against a highly polished supporting surface.

Catch Basin

A chamber in a drainage system designed to intercept solids and prevent their entrance into the system.

Cathode

The electrode in electrolysis at which positive ions are discharged, negative ions are formed, or other reducing actions occur.

Cathodic Protection

Protecting a metal from electrochemical corrosion by using it as the cathode of a voltaic cell with a sacrificial anode. Also known as **electrolytic protection**.

Cationic Surface Active Agent (Cationic Surfactant)

An oil-soluble cation, includes salts of long-chain aliphatic amines, esters of triethanolamine, and long-chain quaternary ammonium, sulfonium, or phosphonium salts; used as an emulsifier in acid solution. See "**Surfactant**".

Caulk

To fill or seal a joint with sealant. The material, generally of higher viscosity than sealant used to fill a joint.

C.D. or **CD**

See "**Cross Direction**".

Cellular Material

A generic term for materials containing many cells (either open, closed or both) dispersed throughout the mass.

Cellulose

A carbohydrate ($(C_6H_{10}O_5)_x$), which is the chief component of the cell walls of plants. Strictly, it is a polysaccharide consisting of glucose anhydride units bonded together through the 1- and 4-carbon atoms with [beta] glucosidal linkages. Cotton is the cellulose product most used in **rubber**.

Cement

A gray powdered substance produced from a burned mixture of chiefly clay and limestone used in making concrete. A substance used to make objects adhere to each other. In the roofing industry, it is loosely applied to mean caulking and mastic. A trowelable, plastic mixture of bitumen and asbestos or other reinforcing fibers, and a solvent. **Cement Grout** is a mortar of cement mixed with water and sand to the consistency of thick cream used for bedding bearing plates, setting anchor bolts and filling and smoothing foundation cracks. **Cement Mortar** is a mortar in which the cementitious material is primarily Portland Cement. **Rubber Cement** is an adhesive that is a dispersion or solution, or both, of raw or compounded

rubber in a suitable liquid.

Center to Center

See "**On Center**".

Centipoise (cp)

One one-hundredth ($^1/_{100}$) of a poise, which is a value for **viscosity**. The viscosity of water at 20°C (68°F) is approximately 1 cp.

Centistoke (cs)

Unit of kinematic **viscosity** (antonym of fluidity) equal to one one-hundredth ($^1/_{100}$) of a stoke (s), or 1 mm^2/s. Water has a viscosity of roughly 1 cst, light cooking oil is roughly 100 cst.

Ceramic Granules

Roofing granules in which color is fused to rock under extreme heat to provide a long lasting finish.

Ceramic Tiles

Vitreous clay tile used for a surface finish.

Chain Mop

A series of small-link chains attached to the bottom of a felt layer so that they will drag along the roof deck like a mop and help spread bitumen in a uniform layer.

Chain Scission

The cleavage (loosening and rearrangement) of polymer chains, as a result of heating.

Chain Termination

The stopping of the growth of a polymer chain by combination of the end atom of the chain with a chemical species that does not undergo **polymerization**.

Chalk

A naturally occurring calcium carbonate known as calcite ($CaCO_3$) that powders easily, often used as an inexpensive **filler**.

Channel Mopping

See "**Mopping; Strip Mopping**".

Chalk Line or **Snap Line**

A long spool-wound cord encased in a container filled with chalk. Chalk-covered string is pulled from the case, pulled taut across a surface, lifted, and snapped directly downward so that it leaves a long straight chalk mark.

Charge Ratio

The proportions of **monomers** added in **emulsion polymerization** or other copolymerizations. For example, in the preparation of SBR rubber, the charge ratio is 72 parts of butadiene and 28 parts of styrene.

Checking

A term used to describe the early stages of **Alligatoring**.

Chemical Resistance

The inertness offered by products to chemical reactions.

Chicken Ladder

Hooks over the ridge by means of broad 2x4s nailed to the top, to provide safe footing on steep pitched roofs.

Chimney

A structure of brick, stone, concrete, metal or other non-inflammable material providing a housing for one or more flues which carry off products of combustion.

Chimney Flashing

See "**Flashing; Chimney**".

Chimney Flue

A passage housed in a chimney through which smoke and gases are carried from a fuel burning appliance, fireplace or incinerator to the exterior.

Chimney Lining

A material, usually tile, forming flues within the interior surface a chimney.

Chlorinated Polyethylene (CPE)

A thermoplastic composed of high molecular weight, low density polyethylene that has been chlorinated to a given level which makes it more fire resistant and more chemically stable by removing some of the hydrogen molecules and replacing them with chlorine.

Chlorinated Rubber

A white fibrous product obtained when chlorine is passed into a solution of crude rubber, containing approximately 68% chlorine. substitution as well as addition of chlorine takes place. the chlorinated rubber is soluble in benzene, chloroform, and acetone. Upon evaporation, the solutions leave a trough, transparent film that is very resistant to concentrated nitric, sulfuric, and chromic acids. It is used as a component of paints and of certain rubber-to-metal adhesives.

Chloroprene (2-chloro-1,3-butadiene)

A volatile, colorless liquid which boils at 59°C (138°F). Polymerization of chloroprene under suitable conditions produces polychloroprene.

Chlorosulfonated Polyethylene (CSPE)

A chlorosulfonated product obtained when polyethylene in solution is treated with chlorine and sulfur dioxide. Vulcanization depends on the formation of metallic sulfonate linkages between adjacent polymer chains. Reaction occurs between metal oxides or salts and the sulfonyl chloride groups to form the cross-links. It is not affected by ozone (O_3). In addition to chlorination, adding sulfur makes polyethylene more weather resistant. See "**Chlorinated Polyethylene**".

Chrysotile Asbestos

Chrysotile is a type of asbestos that is a form of the serpentine minerals. After the asbestos is mined and milled, it is in the form of soft, flexible, silky, long fibers.

Cladding

Basically, the process of covering one material with another and bonding them together. The bonding can be accomplished by several methods; the most common being the use of adhesives, or, with high pressure and/or temperature.

Clamp Ring

A ring bolted or clamped over flashing to secure the flashing to the drain head.

Clay

Any naturally occurring mineral substance consisting predominantly of hydro aluminum silicates. When finely divided and mixed with water, it yields a more or less plastic mass, which can be formed and molded and which will retain its shape on drying. Clays very greatly in composition, but in their purest forms, they approach the composition of kaolinite ($Al_2O_3 2SiO_2 2H_2O$). They are used as compounding ingredients in rubber, and some of them have mild reinforcing properties.

Clay Tile

Any of various roofing tiles made of clay paste followed by drying and heat treatment (in a kiln) at elevated temperature. They can be flat or semi-circular in shape. See "**Barrel Tile**", "**Cover Tile**", "**Pan Tile**" and "**Roll Tile**".

Cleavage

The principal property of slate which permits it to be split in one direction. See "**Grain**", "**Slate**".

Cleavage Strength

In testing, the tensile load (lb/in of width) required to cause separation of a 1-inch long metal-to-metal adhesive bond under the conditions set in ASTM D-1062.

Clerestory

An upward extension of enclosed day-lighted space created by carrying a setback, vertical, windowed wall up and through the roof slope.

Clinch Nailing

See "**Nailing; Clinch**".

Clipped Gable

A gable cut back at the peak in a hip roof form.

Closed Cell

A cell totally enclosed by its walls and hence not interconnecting with other cells, as in describing the cell structure of plastic foams.

Closed System

No positive flow of air, water lines, conduit terminating in a box or buss duct or a similar penetrating item where air flow is restricted. No definition yet established.

Closure Strip

A pre-formed shape used to fill the space between ribs on a metal panel.

Coalescing Agents

A material that promotes the uniting of particles to form larger particles, gaseous or liquid bodies.

Coal Tar Enamel

A class of coatings used to protect underground pipes from corrosion, and is sometimes applied in conjunction with foundation or underground waterproofing. These coatings are made by "coking" coal, refining the carbonized end product, and mixing it with plasticizers and fillers.

Coal Tar Pitch

A dark brown to black solid hydrocarbon obtained from the residuum of the distillation of coke-oven tar, specifically refined for roofing and used as the waterproofing agent of dead-level or low-slope Built Up-Roofs. It comes in a narrow range of softening points, from 129°F to 144°F. Also called "**Roofers Pitch**". See also "**Pitch**".

Coated Base Sheet (or Felt)

A roofing felt that is coated with asphalt, usually on both sides, then surfaced with an anti-stick materi

Coating Asphalt

The layer of asphalt applied to the surface of the roofing during manufacture into which roofing granules or some other form of surfacing material is embedded. This coating and surfacing provides the weather-resistant surface.

Coating

A thin layer of a substance used to cover other materials, to provide an aesthetic or protective function. See "**Paint**".

COC

Cleveland Open Cup. A method for determining the **flash point** of bitumen.

Code

The law relating to construction.

Code or Building Code

Legally binding regulations and restrictions of a given locality governing construction of buildings, methods and materials used in construction.

COE

Coefficient of Thermal Expansion.

Coefficient of Elasticity

See "**Modulus of Elasticity**".

Coefficient of [Linear] Thermal Expansion

The change in length of a material as a function of temperature. This is usually reported in unit of length accompanied by a unit change of length at a certain temperature (e.g., in/in/°F or mm/mm/°C).

Coefficient of Heat Transmission

A constant which represents the ability of a certain material to transmit heat.

Cohesion

The internal bonding strength of an any individual material. Compare "**Adhesion**".

Cohesive Strength

In testing, the theoretical stress that causes fracture in a tension test if material exhibits no plastic (stretching) deformation.

Cold Forming

The ability of a material to flow into a new shape with a minimum of cracking without the use of excessive heat applied to the material.

Cold Patch

The repair of a roof leak using prepared roofing saturated felt or fabric and plastic cement.

Cold Process

(1) Roofing comprised of layers of bituminous-coated felt adhered with cold-applied bituminous cement,

and surfaced with emulsion or cut-back. (2) Sometimes applied to any roofing system that uses bituminous materials applied cold.

Cold Weld

A problem in seaming thermoplastic single-ply membranes. A lap joint seam made incorrectly with a hot air welder that was improperly adjusted, resulting in poor molecular bonding and subsequent failure of the seam.

Cold Wrap

A corrosion proofing tape or wrapping applied to pipe without heating. Compare "**Hot Wrap**".

Collar Flashing

See "**Flashing; Collar**". Also called "**Sleeve**", or "**Vent Sleeve**".

Collar Brace

A horizontal piece of lumber used to provide intermediate support for opposite roof rafters, usually located in the middle third of the rafters. Also called "**Collar Beam**" or "**Collar Tie**".

Collector Box

A transition piece between a gutter and downspout to facilitate the flow of water.

Color Stability and Reflectivity

The ability of a membrane or a coating to retain its original color and reflectivity as it weathers. Color stability may be especially important for white or specifically pigmented materials which may have been deliberately selected for their high degree of reflectivity or for aesthetic reasons.

Combined Stresses

The action of more than one force developing stresses of different character on or in the same memb

Combustible and Incombustible Materials

Within the range of temperatures that may occur in a building either normally or under fire conditions, materials are classified as combustible or incombustible. The term incombustible is generally applied to support combustion at temperatures variously assumed at 1200°F to 1700°F. Refer to FM and UL rating for individual fire ratings and combustion characteristics.

Common Rafter

One of a series of rafters extending from the top of an exterior wall to the ridge of a roof.

Compact Roof

A roof system in which there is no air space between the deck, insulation, membrane and protective covering.

Composite

[MATER] A structural material composed of combinations of metal alloys or plastics, usually with the addition of strengthening agents. Heterogeneous insulating board laminates. See "**Sandwich Board**".

Composition Roofing

All types of asphalt rolled roofing and shingles. Also called "**Prepared Roofing**" or "**Prefabricated Membrane**".

Compression

Subjecting a material to a load which will tend to compress or push the material together. The opposite of tension. A displacement of particles in a substance caused by a mechanical wave that disturbs the particles; because displacement does not occur all at once, the substance may experience a slow change of properties such as in the compression cycle which changes limestone into marble.

Compression/Deflection Test

A non-destructive method for determining the relationship between compressive load and deflection under load for vulcanized rubber (ASTM D-575).

Compression Fatigue

The ability of rubber to sustain repeated fluctuating compressive loads (ASTM D-623).

Compression/Expansion Fastener

See "**Fastener; Compression/Expansion**".

Compression Set

The extent to which rubber is permanently deformed by a prolonged compressive load. (ASTM D-395).

Should not be confused with low temperature compression set.

Compression Test

A method for determining behavior of materials under crushing loads. Specimen is compressed, and deformation at various loads is recorded. Compressive stress and strain are calculated and plotted as a stress-strain diagram (curve) which is used to determine elastic limit, proportional limit, yield point, yield strength, and (for some materials) compressive strength. Standard compression tests are given in ASTM C-773 (high strength ceramics), ASTM E-9 (metals), ASTM E-209 (metals at elevated temperatures), and ASTM D-695 (plastics).

Compressive Strength

The ability of roofing materials and components to resist deformation or other damage caused by the weight or compression of either "live" or "dead loads." High compressive strength may be especially important in insulation boards. Compressive strength is calculated by dividing the maximum load by the original cross-sectional area of a specimen in a compression test. In testing, the measure of a material's deformation during compression is referred to as "**Compressive Deformation**".

Compressive Yield Strength

In testing, the stress that causes a material to exhibit a specified deformation. Usually determined from the stress-strain diagram (curve) obtained in a compression test. See also "**Yield Strength**".

Concealed Gutter

See "**Box Gutter**".

Concealed Nailing

See "**Nailing**".

Concrete

A mixture of Portland cement, water, sand, gravel, coarse aggregate and admixtures, poured in place and allowed to dry and cure. Maximum strength of concrete is attained after 28 days. **Aerated Concrete** is a light-weight concrete minute air filled voids which account for a large part of its volume. Its sound and heat transmission properties are lower than those of ordinary concrete. **Air-entrained Concrete** is concrete in which air in the form of minute bubbles have been occluded during the mixing period as a result of the use of an air-entraining agent as an admixture. **Cellular Concrete** is concrete in which bubbles of air are induced, by chemical means, in the process of manufacture, thereby producing a concrete of relatively low unit weight. **Light-Weight Concrete** is concrete with a filler, such as polystyrene, vermiculite, or other light-weight, organic or inorganic aerated material added. **Plain Concrete** is unreinforced concrete. **Reinforced Concrete** a concrete which include reinforcements such as metal bars, mesh, alkaline resistant fiberglass, or polypropylene chopped fibers to add to the internal streng

Condensation

Formation of water from vapor in the air upon contact with cold surfaces or reaching dew point temperature. **Concealed Condensation** is condensation that takes place within a roofing system and is not seen. **Interstitial Condensation** is condensation that occurs in the interstices between constituent parts of a roof system. (Also known as **Inter-ply Condensation**.) **Surface Condensation** is condensation that appears on the colder, exposed surfaces of a roofing system.

Condensation Reaction

A reaction in which two different molecules react to form a new compound, with an increase in the number of carbon to carbon-valence bonds. Often water, alcohol, or ammonia is a byproduct of this type of reaction.

Conditioning

The exposure of a material to the influence of a prescribed atmosphere for a stipulated period of time or, until stipulated relation is reached between material and atmosphere. **Environmental Conditioning** is the storage of a specimen under specified conditions such as temperature, humidity, etc., for a specified time prior to testing.

Conductivity

Specific conductance. The electric current transferred across unit area per unit potential gradient. The S1 unit is siemens/meter. The reciprocal of resistivity.

Conductor

See "**Down Spout**".

Confidence Value

A value obtained by determining the standard deviation value from a series of data points. One standard deviation from a number of values will determine the probability of this value being 68.27% probable. Two standard deviations will determine the value being 95.5% probable.

Conical-Style Flashing

See "**Flashing; Conical-Style**".

Conjugated Double Bonds

Double bonds in organic compounds that occur with single bonds in the chain of carbon atoms. This structure may occur in open chain and ring compounds. Butadiene (CH_2=CH—CH=CH_2) and isoprene (CH_2=C(CH_3)—CH=CH_2) are both examples of conjugated double bounds in open-chain structures.

Contact Cements

Adhesives which may be used to adhere or bond together various roofing components. The adhesive is applied to the last surfaces to be joined in a liquid state, and then allowed to dry before the surfaces are mated. The bond is formed immediately as the surfaces touch.

Because contact cements form a bond immediately upon mating the surfaces, great care must be taken to assure that the membrane is positioned properly. Any attempt to lift or reposition a misaligned and cemented membrane could result in damage to the membrane and/or in poor adhesion.

Control Flow or **Control Flow Drain(age)**

Relating to roof drainage. A type of drain or a system of drains that regulates the flow of water so that rain water can be drained away at a uniform rate no matter how heavy the rainfall.

Conveyor Belt

Belt for transporting articles or materials.

Coping

The cap or highest covering course of a wall, usually overhanging the wall and having a sloping top to shed water that is exposed to the weather. Usually made of metal, stone, or tile.

Copolymer

A polymerizate formed from two types of monomers.

Copolymerization

The polymerization of two different monomers, which is not a mixture of separate proportional polymers of the two homopolymers, but a complex molecule having properties different from the blend of individual homopolymers. For example, SBR is a copolymer of butadiene and styrene; nitrile rubbers are a copolymer of butadiene and acrylonitrile; and butyl rubber is a copolymer of isobutylene and isoprene.

Corner Bead

In gypsum board finish, a strip of metal or wood fixed to external corners to protect them from damag

Cornerite

Metal lath, cut into strips and bent to a right angle used in internal angles of plastered walls and ceilings as reinforcing.

Cornice

Projection at the top of a wall. Term applied to construction under the eaves where the roof and side walls meet. The top course, or courses of a wall when treated as a decorative projecting crowning membe

Corona

The glow discharge that takes place in a gas surrounding a conductor when the electric stress on the gas locally exceeds its breakdown strength. If the stress exceeds the breakdown strength of the gas over the whole gap between adjacent conductors, a flash-over or arc occurs. Corona causes formation of **ozone** (O_3).

Corrosion

The deterioration of metal by chemical or electrochemical reaction, caused by exposure to moisture, weathering, chemicals or other environmental pollutants.

Corrugation

Ribs in a formed metal panel, drawn or rolled into parallel ridges and furrows to provide additional strength.

Couped Roof

See "**Roof; Couped**".

Counterflashing

See "**Flashing**".

Countersink

To make a cavity for the reception of a metal plate or the head of a screw or bolt so that it shall not project beyond the face of the work.

Counter Truss or **Counter Brace**

See "**Truss; Counter**".

Couped Roof

See "**Roof; Couped**".

Course

A continuous layer of material applied in a given direction. Referred to in laying shingles and roll roofing, bricks and masonry.

Court

An open space, unoccupied from the ground or intermediate floor to the sky, contiguous with the building and on the same lot, intended primarily for the provision of light and air, but which may serve for entrance to the building. It shall be entirely enclosed by walls or enclosed on three sides having one side partially or totally open to a street, yard or abutting property. See "**Atrium**".

Cover Tile

The top roll tile in a clay tile roofing system which fits into the adjoining pan tiles on either side and drains into them. See "**Pan Tile**" and "**Roll Tile**".

Coverage

The surface area covered by a specific unit of roofing material after allowance is made for the required edge lap or overlap.

Coverage Patterns

The pattern of application for roofing materials, as related to the amount of cover or overlap.

Cowel

A cover, frequently louvered and either fixed or revolving, fitted to the top of a flue or vent to reduce down draft.

cp

See "**Centipoise**".

CPA

Co-Polymer Alloy

CPE

See "**Chlorinated Polyethylene**".

CPVC

"Chlorinated Polyvinyl Chloride". Used mainly for the manufacture of rigid plastic pipe.

Crack or **Cracking**

(1) A sharp break or fissure in the surface of rubber articles that develops on **exposure** to the atmosphere, light, heat, or repeated bending or stretching. (2) The treatment of raw rubber by passing it through moving corrugated rolls. (3) A break in a roofing membrane as a result of flexing, often at a **ridge** or wrinkle. **Atmospheric Cracking** is small fissures in the surface of an article resulting from exposure to atmospheric conditions. **Ozone Cracking** are the surface cracks, checks, or **crazing** caused by exposure to an atmosphere containing ozone.

Crazing

Surface deterioration by the formation of a pattern of fine hairline cracks.

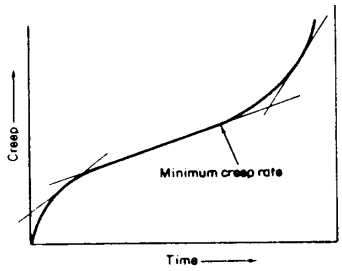
CRCA

Canadian Roofing Contractors Association

Creep, Drift, or Strain Relaxation

A deformation that occurs over a period of time when a material is subjected to constant stress at constant temperature. Constant temperature is maintained to eliminate effects of **thermal expansion** and measurements are taken from time load is zero to eliminate elastic effects. In metals, creep usually occurs only at elevated temperatures. Creep at room temperature is more common in plastic materials and is called **cold flow** or **deformation under load**. Data obtained in a creep test usually is presented as

a plot of creep vs time with stress and temperature constant. Slope of the curve is the **creep rate** (in *in/in/hr* or *% of elongation/hr*) and the end point of the curve is **time of rupture**. As indicated in the accompanying diagram, the creep of a material can be divided into three stages. **First stage** or **primary creep** starts at a rapid rate and slows with time. **Second stage** (secondary) creep has a relatively uniform rate. **Third stage** (tertiary) creep has an accelerating creep rate and terminates by failure of the material at time of rupture. See also "**Stress-Relaxation**". (1) A permanent deformation of the roof system caused by movement of the membrane. Creep occurs most often when the bitumen has been softened by warm rooftop temperatures. (2) The time-dependant strain that occurs after an application of a load which is thereafter maintained constant. (3) Sensitive index of rheological properties that depend on material, load, temperature and time. (4) The deformation in either vulcanized or unvulcanized rubber under stress, that occurs with lapse of time after the immediate deformation.



Creep Recovery

The rate of decrease in deformation that occurs when load is removed after prolonged application in a creep test.

Creep Rupture Strength

In testing, the stress required to cause fracture of a material in a creep test within a specified time. Compare "**Stress Rupture Strength**".

Creep Strength

In testing, the maximum stress required to cause a specified amount of creep in a material in a specified time. Also used to describe maximum stress that can be generated in a material at constant temperature under which creep rate decreases with time.

Creep Test

Standard creep testing procedures are detailed in ASTM E-139 (metal), ASTM D-2990 and D-2991 (plastics), and ASTM D-2294 (adhesives).

Creosote

An oily liquid with a phenolic smell produced during the heating of wood or coal tar collected in chimney flues. Commercially it is used in preserving wood in damp or wet places.

Cricket

A small false roof, or the elevation of a part of a roof surface, as a means of diverting water from behind a projection such as a chimney. Also used to direct water to drains in a horizontal roof valley formed by the intersection of two sloping roofs. Also called a "**Saddle**".

Cross Bridging

Small wood or metal members that are inserted in a diagonal position between adjacent floor or roof joists.

Cross Direction

The direction of a material being tested for strength being the opposite direction from the direction it was rolled on the spool. Abbreviated C.D. or CD. Compare "**Machine Direction**".

Cross Ventilating

The act of causing fresh air to circulate through open doors, windows, gratings, or vents at opposite sides of a room or space.

Crosslink

A chemical phenomenon by which polymers are cured or vulcanized. A crosslink is a chemical bond formed between the long chain molecules in the block polymer. This bond connects adjacent molecules and prevents their relative displacement (molecular slippage) then the material is stressed. See "**Cure**", "**Vulcanization**".

Crumb Rubber

(1) Milled vulcanized rubber that does not become soft and plastic. Also called "**Spring Rubber"**.

Crystallinity, Crystallization

Orientation of the disordered long-chain molecules of a high polymer into repeating patterns. **Polymer Crystallization** is the arrangement of previously disordered polymer segments of repeating patterns into geometric symmetry.

cc or c^3

See "**Cubic Centimeter**".

cs

See "**Centistoke**".

CSM

The designated nomenclature for "chlorosulfonated polyethylene" membrane by ASTM D-1418

CSPE

See "**Chlorosulfonated Polyethylene**".

CTP

See "**Coal Tar Pitch**".

Cubic Centimeter

A metric system unit of volume, abbreviated cc or c^3 and about the size of a small sugar cube, which is equivalent to one-thousandth of a liter (a metric unit of capacity. A liter (ℓ) is a little larger than a quar

Cupola

A structure, square to round in plan, rising above a main roof. While generally ornamental, a cupola also enables ventilation of an attic space in a framed roof.

Curb

A framed opening rising above the roof surface. A low wall of wood or masonry built above the level of the roof, surrounding a roof opening, such as is required for installation of fans and other equipment, and at the edges of movement joints in a roof deck.

Curb Roof

See "**Mansard**".

Cure

To change the properties of a plastic or resin by chemical reaction, which, for example, may be condensation, polymerization, or addition; usually accompanied by the action of either heat or catalyst or both, and with or without pressure. **High-Frequency Curing** is the vulcanization of a nonconductive rubber compound by means of heating it with a high frequency current of electricity.

Cure Time

The time required to effect curing.

Curing Agent

An additive in a coating or adhesive that results in increased chemical reaction between the components which initiate or increase the rate of the curing process.

Curing (of Concrete)

The maintenance of proper temperature and moisture conditions to promote the continued chemical reaction which takes place between the water and the cement.

Curled Felt

Membrane defect characterized by a continuous, open longitudinal seam with top felt rolled back from underlying felt.

Curtain Wall

See "**Non-Bearing Partition**".

Cutback

A volatile solvent-thinned bitumen used as a cold applied cement for flashing, or as a coating or primer. Filled cutbacks may contain mineral particles and inorganic fibers.

Cutback Products

Products made from petroleum distillation residue or coal tar pitch which have been blended (cut back) with distillate solvents.

Cutoff

A detail designed to prevent lateral water infiltration into the insulation where it terminates or the end of the day's work. A felt strip is hot-mopped or set in plastic cement to the stepped contour of the deck, the insulation edge, and the horizontal roof membrane surface.

Cutout

The portion of a strip shingle cut out to produce the tab to give the effect of individual shingles. Sometimes referred to as a slot or a notch.

d

The abbreviation for "penny" in designating nail size, e.g., 8d nails are 8-penny nails, 2½ in. long.

Dado

A rectangular groove cut across the grain of a wood blocking member, normally to provide edge canting at the periphery of a roof.

Dampproofing

The treatment of a building material or component surface with a bituminous or other coating to provide some measure of resistance to passage of moisture into or through the material or component. Dampproofing systems are not intended to prevent transport of water under pressure.

Dead Level

A roof deck with no intentional slope to the roof drains. Absolutely horizontal. Of zero slope. See "**Slope**".

Dead Loads

Non-moving rooftop loads, such as mechanical equipment, air conditioning units and the roof system itself. The total weight of the roofing system. Compare "**Live Load**".

Dead Soft Steel

[MET] 1. Steel very low in carbon. 2. Steel annealed until it is very soft.

Debye-Scherrer Diagram of Frozen Rubber

A ring pattern on an X-ray photograph of unstretched frozen or crystalline rubber. The angles of these refracted beams to the primary beam are equal to those found for stretched frozen, or stretched liquid, rubber. The frozen rubber interferences disappear when the rubber is warmed above 35°C (95°F).

Deck

The structural surface to which the roofing or waterproofing system (including insulation) is applied and which forms the load carrying base for the rest of the roofing system.

Deck Clips

A metal fastening device to hold multiple unit roof deck materials to the structural supporting members, a fastening device inserted in plywood decks to prevent uneven deflections between opposing plywood joints, or any one of a variety of devices to fasten insulation to a roof deck.

Deflection

The bending of a beam or any part of a structure naturally occurring or under an applied load.

Deformation

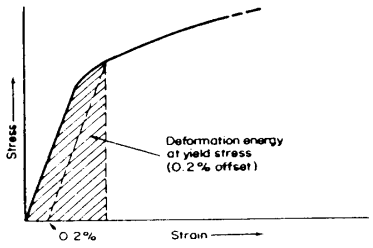
Alterations in forms which a structure undergoes when subjected to the action of weight or load.

Deformation Bar

Reinforcing bars made in irregular shapes to produce a better bond between the bars and the concre

Deformation Energy

In testing, the energy required to deform a material a specified amount. It is the area under the stress-strain diagram up to a specified strain.



80-22

Deglossing

Roughening surface for good adhesion of coatings.

Degradation

The deterioration of a substance caused by contact with its environment.

Degree of Polymerization (DP)

The number of base units per molecule, if the molecules are composed of regularly repeating units, or the number of monomeric units per molecule, if the molecules have been produced by polymerization from identical monomers.

Dehydration

The removal of water from a substance or thing.

Dehumidify

To reduce, by any process, the quantity of water vapor or moisture content in the atmosphere.

Delamination

The separation of the plies in a membrane system or separation of any laminated materials in composite form, usually attributed to lack of adhesion in plied goods.

Denier

In the textile industry, a unit expressing the mass of a fiber divided by its length, equal to 1 gram for 9000 meters of fiber. This unit of measurement is utilized in the manufacture of felts and fabrics for the reinforcements and scrims of various roofing membranes and roofing felts.

Density

Bulk Density is the mass in air of a unit volume of material including both permeable and impermeable voids normal to the material.

Depolymerization

The breaking of a more complex molecule into two or more simpler molecules chemically similar to, and having the same empirical composition as, the original. It is the reverse of **polymerization**.

Depth Adjuster

Feature found on some screw guns that allows the applicator to accurately drive mechanical fasteners at the proper depth for the specific application.

Destructive Evaluation

A method or process of testing the properties of a material that does not leave it intact or causes changes to its function or continued use. Compare "**Non-Destructive Evaluation**".

DEW Line

Distant Early Warning. A line of radar stations across the top of North America to give advance warning of an enemy attack by aircraft or missiles from the north.

Dew Point Temperature (Dp)

The temperature at which a specific atmosphere is saturated with water vapor (or 100% relative humidity). (Cooling below the dew point will cause release of water vapor in the form of condensation. In problem analysis for vapor barrier selection, it is the dew point temperature, not the relative humidity, that is pertinent. Dew Point Temperature is directly related to saturation water vapor pressure and may be obtained from tables.) Note: As the atmosphere is cooled, the amount of water vapor that it can hold decreases. If air is cooled sufficiently, the actual water vapor pressure becomes equal to the saturation water vapor pressure, and any further cooling beyond this point will normally result in the condensation of moisture.

DHW

Domestic Hot Water (Solar Heating)

Diagonal Ties

Braces or ties which help stiffen a roof truss. Braces attached to an angle to tie framing members together.

Die Cut

(1) To punch out with a sharp tool as in trimming flashing. (2) A cleft, ash, slit, or notch left from the punching out operation, or in extruded items, from foreign material in the extruding die.

Diffraction

In wave motion, it is the bending of a train of waves (light, sound, or heat) around an object encountered in its path. Long waves are bent to a much greater degree than short waves. Light waves, which are very short, may be diffracted by very small objects, or very close parallel lines (diffraction grating) with the production of a continuous spectrum. X-rays have such a short wavelength hat they can only be diffracted

by such minute objects as atoms, and this is the basis of the x-ray investigation of the structure of matter.

Diffusion

The migration or wandering of the particles or molecules of a body of fluid matter away from the main body through a medium or into another medium. Caused by the kinetic energy of molecules, diffusion is most marked in gases, less so in liquids, and practically non-existent in rigid solids. Solids dissolved in a liquid medium tend to diffuse at rates depending on the physical properties of the dissolved substance as well as of the solvent. Crystalloids diffuse readily and will pass through a confining membrane or septum, whereas colloids do so extremely slowly or not at all. **Diffusivity** is the relative tendency to diffuse. The **Diffusion of Water Through Rubber** is the absorption, and therefore the diffusion of water by rubber which is largely dependent on water-soluble or hygroscopic components embedded in a matrix of rubber hydrocarbon. However, they are not protected thereby from the action of water, because water is slightly soluble in the hydro-carbon, which therefore acts as a semi-permeable membrane. Proteins from the latex and absorptive fillers are the chief substances which help diffusion of water.

Digester

In reclaiming rubber, the double-jacketed **autoclave** used in the process of digestion.

Digestion

The process of reclaiming in which the ground scrap is heated in a double-jacketed autoclave with a solution of caustic soda or a metallic chloride.

Dimensional Change

The process in which a material undergoes expansion or contraction due to external effect, such as moisture or temperature variation.

Dimensional Stability (Shrinkage)

This property needs to be divided into three types:
(1) **Hot Shrink** represents the memory of stresses applied to the membrane during the manufacturing process. These stresses are relieved when the membrane is heated to temperatures approaching those experienced during the formation of the sheet. The membrane will usually shrink in the machine direction and expand in width and/or thickness. (2) **Snapback** refers to stresses applied to the membrane during the windup operation. Since these stresses are usually applied at or near room temperature, elevated oven temperatures are not necessary for testing. The initial snapback is determined by removing a known length of material from the roll, measuring length instantly and then measuring length after 15 minutes of rest. Another snapback property that is measured is referred to as **100% recovery test**. Here, a known length of membrane is removed and length measured instantly. This time, the sample is allowed to rest 24 hours before remeasuring. (3) **Long-Term Shrink** is a change in dimensions of the membrane as a result of components of the compound being extracted from the sheet. This extraction or loss can occur through desorption or through volatility from exposure to extremely high temperatures.

Dimer

A chemically doubled monomer. Dipentene is the dimer of isoprene.

Dimple

A small surface depression.

Dip Coat

A thin film formed on a surface by immersing the article into a suitable coating solution or dispersion.

Dipper

A ladle for pouring bitumen.

Dirt

Foreign material, contained in the article.

Disc Fastener

See "**Fastener; Disc**".

Dishing

Localized indentations caused by heavy foot traffic where insulation is crushed. This can be prevented by using traffic boards or walkways in traffic-prone areas.

Dispersing Agents

Substances that promote the separation of small particles in a **emulsion** or suspension.

Dispersion

The act of causing particles of matter to separate and become uniformly scattered throughout a medium.

Any system of matter in which finely divided particles of one or more phases (components) are uniformly scattered throughout another phase or medium. A heterogeneous system (a uniform composition) in which a finely divided material is distributed in another material. The components or phases may be solid, liquid, or gaseous. (A wholly gaseous system is not considered a dispersion, but a simple mixture.) The degree of dispersion is the fineness of subdivision of dispersed particles. (Note: A dispersion is usually the distribution of a finely divided solid in a liquid or a solid: for example, pigments or fillers in coatings. A dispersion of a liquid in another liquid is an emulsion.)

Dissociation

Reversible decomposition due to the breaking up of a chemical compound under certain conditions into two or more components which recombine to form the original compound when the dissociating influence is removed. **Thermal Dissociation** is dissociation caused by heat.

Distributed Load

In building, a load spread over an entire surface or along the length of a beam.

Divorce Sheet

See "**Slip Sheet**".

DIY

"Do It Yourself." A term used to describe a self-help manual or procedure.

Dog Bone Sample

See "**Dumbbell**".

DOP

Di-Octyl Phthalate; Substance resembling oil that acts as a rubber or PVC plasticizer.

Dormer

A separate smaller roofed structure that projects from a sloping roof to provide more space below the roof and to accommodate a vertical window.

Double Bond

A double union of two atoms, such as occurs in the hydrocarbon ethylene (CH_2=CH_2) often called the "ethylene linkage." Carbon compounds containing double bonds are chemically unsaturated. Natural rubber contains one double bond for each five carbon atoms, whereas polybutadiene contains one double bond for each four carbon atoms. See also "**Conjugated Double Bonds**". **External double Bonds** are double bonds in the side vinyl groups and derivatives formed in polymerizations by 1,2-addition of the diene monomer, such as butadiene and isoprene.

Double Coursed

The application of two layers of shingles per each row, normally with wood or shake shingles on sidewall application.

Double Glazing

Two panes of glass in a door, window, skylight or roof window, with an air space between the panes. They may be sealed hermetically as a single unit or each pane may be installed separately in the sash.

Double Header

A structural member made by nailing or bolting two joists together for use where extra strength is required in the header, as at stair openings.

Double Pour

The application of the top covering of bitumen and ravel surfacing of a Built Up-Roofing in two separate operations. A quantity of gravel is spread over a first-pour coat of bitumen, loose gravel is removed, and additional gravel is spread into a second pour coat of bitumen.

Down Draft

A draft created in a chimney when air currents enter at the top and travel down. Sometimes caused by not carrying the chimney high enough above the ridge of the roof.

Down Pipe

(same as "Down Spout")

Down Spout

A pipe for conveying rain water from a roof gutter to a drain, or from a roof drain to a storm drain. Also

called a leader, conductor or down pipe.

Draft Stop

See "**Fire Stop**".

Drain

An outlet to allow water to flow from a roof surface into a drain pipe and away from the building through a drainage system. The **Drain Head** is the major component of a drain, set into a drainage pipe with a watertight seal. See "**Ponding**".

Draw Cock

A valve at the base of a **kettle** to draw off hot bitumen.

DRC

See "**Dry Rubber Content**".

Drip

A construction member, wood or metal, which projects to throw off rain water. A groove on the underside of a projecting part, such as a sill, serving the same purpose.

Drip Edge

The formed edge on metal flashing used at the eaves or other roof details to encourage water to drip away from vertical surfaces of the building detail or underlying construction.

Drip Mold

A projecting molding arranged to throw off rain water from the face of a wall.

Drippage

Bitumen that flows and drips through holes or over the edge of a roof deck.

Dry Bulb Temperature

The actual air temperature as measured by a dry bulb thermometer. Compare "**Wet Bulb Temperature**".

Dry Bulb Thermometer

An ordinary thermometer, especially one with an unmoistened bulb, not dependent upon atmospheric humidity. The moisture evaporating off a moistened bulb will cause an incorrect reading of the temperature. Compare "**Web Bulb Thermometer**".

Dry Film Thickness

The thickness, usually expressed in mils, of a liquid coating or membrane after all liquid and volatile components have evaporated, leaving a film that forms the intended coating or membrane.

Dry Ice

Solidified carbon dioxide (CO_2), with a sublimation point of -78.5°C (-109.3°F) weighing approximately 1500 kg/m^3 (94 to 95 lb/ft^3).

Dry Laid

Any roofing felt laid without bitumen or other adhesive.

Dry Mopping

Using a mop with bitumen below **EVT** (proper application temperature) or a mop with an insufficient quantity of bitumen. Also called "**Scrubbing**".

Dry Rot

A decay of timber due to the attack of certain fungi.

Dry Rubber Content

The mass of rubber coagulated by acid from one hundred parts mass of latex.

Dry Strength

In testing, the strength of an adhesive joint determined immediately after drying or after a period of conditioning in a specified atmosphere. (ASTM D-2475).

DSA

Double Sided Adhesive

Duck Boards

Slatted wood board panels for placement on a roof to provide a walkway or roof surfacing for light traffic.

Duct

In building construction, usually metal pipes, round or rectangular in shape, for distributing air in heating and ventilating systems.

Ductility

The property of the material to withstand deformation without rupture by stretching and without recovery of shape upon removal of the stretching force. The measure of asphalt flexibility or ability to be drawn out. Elongation and reduction of area are common measurements of ductility.

Dumbbell

A strip specimen shaped like a dumbbell, that is, constructed in the middle and flaring out at the ends, as distinguished from a circular or ring specimen. It is the most commonly used form of specimen in the physical testing of rubber.

Du Pont Abrader

A type of abrasion tester based on the loss in mass of a rubber vulcanizate in comparison with a standard under the same conditions.

Durometer

An instrument for measuring the hardness of rubber and plastics. **Durometer Hardness** is an arbitrary numerical value that indicates the resistance to indentation of the indentor point of the durometer. The value may be taken immediately or, after a very short specified time. See "**Shore Hardness**".

Dynamic Modulus of Elasticity

See "**Modulus of Elasticity**".

Dynamic Properties

Mechanical properties exhibited under repeated cyclic deformations.

Dyne

The unit of force in the centimeter-gram-second system of units, equal to the force which imparts an acceleration of 1 cm/sec^2 to a 1 gram mass.

Ears

The small protruding portion of shingles that slips or locks into a slot on lock shingles.

EASL

Elongation at a specified load.

Eave

The low edge of a sloping roof which projects beyond the face of the exterior wall.

Eave Soffit

Same as "**Soffit**".

Eave Trough

Same as "**Gutter**".

ECB

"**Ethylene-Copolymer-Bitumen**" and anthracite microdust roof membrane.

ECH

See "**Epichlorohydrine Polymers**".

Edge Venting

The practice of providing regularly spaced or continuous openings at a roof perimeter to relieve the pressure of water vapor entrapped in the insulation or dry out the roofing system. Edge Venting is usually combined with venting channels in the insulation and stack venting towards the center of the roof.

Efflorescence

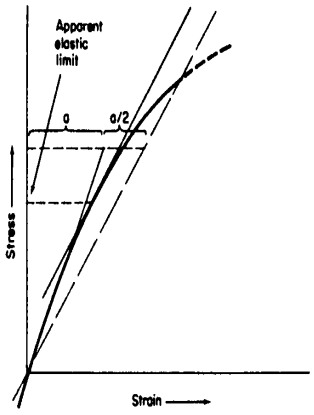
Formation of a white crystalline salts (calcium, magnesium, sodium, aluminum, sulphate, carbonate, etc.) deposits caused by leaching through rainwater or moisture transfer.

EIP

See "**Ethylene Interpolymer Alloy**".

Elastic Limit

In testing, the greatest stress that can be applied to a material without causing permanent deformation. For metals and other materials that have a significant straight line portion in their stress/strain diagram (see "**Deformation Energy**"), elastic limit is approximately equal to proportional limit. For materials that do not exhibit a significant proportional limit, (such as rubber), the elastic limit is an arbitrary approximation (the apparent elastic limit). In such materials, the **apparent elastic limit** is equal to the stress at which the rate of strain is 50% higher than at zero stress.



Elasticity

The property of matter by virtue of which it tends to return to its original size and shape after removal of the stress causing deformation such as stretching, compression, or torsion. It is the opposite of plasticity. It is often loosely employed to signify the "stretchiness" of rubber. As applied to rubber, it usually refers to the phenomenal distance to which vulcanized rubber can be stretched without losing its ability to return very nearly to its original shape; in this respect, rubber is the most elastic substance known.

Elastomer

Any of several natural or synthetic elastic substances that, at room temperature, are capable of recovering substantially in shape and size after removal of a deforming force, or, materials that resemble and display the qualities of rubber.

Elastomeric

Describing a material that has rubber-like properties. See "**Elastomer**". Compare "**Elastoplastic**", "**Plastomeric**", "**Viscoelastic**".

Elastoplastic

A substance that exhibits a greater or lesser resiliency and will return to (or almost return to) its original size and shape if deformed to some extent below its elastic limit, as opposed to a brittle substance. A trade description used to identify elastomeric and plastomeric types of single-ply roof membranes.

Electrolyte

Any substance which, when dissolved in water or other suitable solvent, forms a solution that conducts electricity, the conductivity being due to ionic **dissociation** of the dissolved substance. It is also a solution of a electrolyte.

Electrolytic Protection

See "**Cathodic Protection**".

Elevation View

A drawing showing a front view of vertical parts, such as a wall or roof.

Ell

An extension of a building, set at right angles to its length.

Elongation or **Percent of Elongation**

A lengthening or stretching ability to accommodate movement. The extension of a uniform section of a specimen expressed as a percent of the original length:

$$\frac{\text{(final length - original length)}}{\text{original length}} \times 100$$

Percent elongation cannot be used to predict behavior of materials subjected to sudden or repeated loading. **Ultimate Elongation** is the elongation percentage at the time of rupture.

Embedment

The pressing of felt, fabric, plies or panels into an adhesive.

Embrittlement

A rubber compound becoming brittle during low- or high-temperature exposure, or in the process of aging, or other physical or chemical changes.

Emulsifying Agent

A substance, added to two pure liquids that are not miscible (capable of being mixed) to form a stable emulsion. For example, a small amount of added soap will prevent an oil-water emulsion from separating. Other substances commonly used are gum arabic, albumin, agar, and gelatin. See also "**Protective Colloid**".

Emulsion

Bituminous Emulsion is an intimate mixture of fine globules of bitumen held in suspension in water by means of a chemical or clay emulsifying agent. A **Cationic Emulsion** is an emulsion in which the emulsifying system establishes a predominance of positive charges on the discontinuous phase. **Resin Emulsion** and **Polymer Emulsion** are microspheres held in suspension using **surfactants** (surface active agents, such as synthetic detergents).

Enamel

A hard vitreous material baked on the surface of metal, porcelain or brick, having a glossy surface. A form of paint that dries with a hard, glossy surface. An enamel paint may be either of the lacquer or varnish variety. See "**Paint**".

End Matched

Having tongued and grooved ends.

End Thrust

A pressure exerted in the direction of the ends of a structural member, such as a girder, beam, truss or rafter.

Endurance Test

A service or laboratory test, conducted to product failure, usually under normal use conditions.

Envelope

Continuous edge formed by folding an edge base felt over the plies above and securing it to the top felt. The envelope thus prevents bitumen seepage through the exposed edge joints of the laminated, built-up roofing membrane and also prevents lateral water infiltration into the insulation.

Environmental Conditioning

See "**Conditioning, Environmental;**".

Equalizing Layer

See "**Venting Layer**".

Equilibrium Moisture Content

The balanced moisture content attained by a material at any particular temperature and humidity conditions expressed as a percentage of moisture mass to material mass.

Equiviscous Temperature (EVT)

The optimum temperature for applying bitumen. At this temperature, the bitumen will be about as fluid as 20-weight oil. (Between 75 and 125 Centistokes.) When asphalt is mopped between felts, it yields approximately 23 lbs. per square (100 square feet, or 10 ft x 10 ft) when applied at the equiviscous temperature.

EPDM

See "**Ethylene Propylene Diene Monomer**".

Epichlorohydrine Polymers (ECH)

Epichlorohydrine elastomers are known for their low gas permeability and resistance to grease. Good aging, high resiliency and low-temperature flexibility are additional advantages for single-ply membranes made of this material.

EPS

Expanded Polystyrene

Ethylene Interpolymer Alloy (EIP)

Generic term for Elvaloy (a registered trademark of E.I. Du Pont de Nemours & Co.), a very dense molecular resin with exceptional fire resistance and chemical resistance properties.

Ethylene Propylene Diene Monomer (EPDM)

An elastomer based on ethylene, propylene and a small amount of non-conjugated diene to provide sites

for vulcanization, or stated more simply, a single-ply sheet composed of synthetic rubber, similar to butyl rubber. Thickness varies from 30 to 60 mils ($^{1}/_{32}$" to $^{1}/_{16}$") and depending on manufacturer, can be reinforced with fabric or fibers. The formulation of extenders and oils contributes to its performance. EPDM sheets cannot be **solvent** or heat welded. The sheet laps are joined together by contact splicing **cement**. Application can be **loosely laid** or **fully adhered.** EPDM features excellent heat, ozone and weathering resistance, and low temperature flexibility.

Ethylene-vinyl acetate (copolymers) - (EVAc)

Thermoplas0.04copolymer of ethylene with vinyl acetate; a versatile class of hot-melt adhesives whose properties can be modified over a wide range by varying the proportion of vinyl acetate comonomer, from 18-40 percent to alter flow properties.

Exhaust Shaft

A ventilating passage used to convey air away from rooms.

Exothermic

Indicating a loss of heat. Also called "**Exoergic**".

Expanded Metal

A metal network formed by stamping or cutting sheet-metal and stretching it to form open meshes. It is used as reinforcing in concrete construction and as lath for plas0ering and stucco.

Expansion Joint

A deliberate structural separation between two building elements that allows free movement between the elements without damage to the roofing or waterproofing sys0em's integrity. The joint is provided with a flexible watertight connecting detail.

Exposure or **Exposed Area**

The amount of any particular roofing unit exposed to the weather or not covered by an overlapping unit in a roofing sys0em that utilizes overlapping application. The dimension describing this is measured in the direction of the overlap and is normally the unit width minus a small amount to ensure complete coverage, divided by the number of plies. For a two-ply membrane from 3 ft wide roofing felt allowing 2 inches to ensure coverage, the exposure would be (300 - 20)/2 - 140 inches. For shingle type roofing, the allowance is called the head lap.

$$\frac{\text{(Unit Width - Overlap)}}{\text{Number of Plies}}$$

Extensometer

Laboratory apparatus used as tensile strength test accessory for measuring changes in linear dimensions. Used to determine the percent elongation at break. Frequently the apparatus is based on strain gage technology.

Extrusion

Process of extruding or forcing a material using heat and pressure through a die or orifice of specified shape. Plas0.04and aluminum materials may be extruded into various shapes by this process. Compare "**Calender**", "**Cast Sheeting**", "**Spread Coating**".

Eyebrow

A dormer, usually of small size, whose roof line over the upright face is an arch curve, turning into a reverse curve to meet the horizontal at either end and resembling an eyebrow.

Fabric

A woven cloth of organ.04or inorgan.04fibers,4filaments, threads4or yarns, which could be treated with bitumen and used for special flashing applications4or as a scrim4or reinforcement.

Facade

The whole exterior side of a building that can be seen at one view. The principal face or front.

Facing

The laminated surface on a material, usually referring to insulation, to allow a more universal compatibility with binders4and adhesives used in various roofing assemblies.

Fac0.0e

A rubbery product made from fatty oils either by heating them with sulfur or by reaction with sulfur chloride. It is sometimes called **vulcanized oils**. **White Fac0.0e**is a product made with sulfur chloride; **Brown Fac0.0e**is that made with sulfur. Although somewhat rubbery in appearance, they are quite unrelated

chemically to rubber and are used only as compounding ingredients with, not as substitutes for, rubbe

Factor of Safety

The ratio, allowed for in design between the breaking load on a member or structure and the safe permissible load on it.

Factory Edge

An uncut edge of a shingle.

Factory Mutual Engineering & Research Corporation (FM)

Organization located in Norwood, MA that classifies roof assemblies on their fire characteristics and wind uplift resistance for insurance companies in the United States.

Factory Seam

A splice made by the manufacturer during the assembling of narrow width material into larger sheets. Compare "**Field Seam**".

Fade-Ometer

An apparatus for accelerated light aging and light fastness testing of samples of vulcanized rubber and of plastics under the action of artificial light from an electric arc between carbons.

Fading

Loss of color strength due to the deteriorating effect of chemicals, moisture, heat, or light.

Fahrenheit

A temperature scale in which the freezing point of water is 32 degrees and the boiling point of water is 212 degrees. Abbreviated "◦**F**".

Failure

The end point of performance under a given condition. "Failure is a rupture of an adhesive bond resulting in complete separation of its adherence under the conditions of the test."

Fall

The vertical distance in inches (or millimeters) through which a roof incline falls in a unit horizontal distance of one foot (or meter). See "**Slope**". Also called "**Incline**", or "**Pitch**".

Fallback

A reduction of bitumen softening point related to contamination, incompatibility or over heating. Also referred to as "**Softening Point Drift**".

False Ceiling

A suspended ceiling formed to provide covered accommodation for wires, conduits, pipe ducts, etc.

Fascia or **Fascia Board**

The finishing member covering the edge or eaves of a flat or sloping overhanging roof. See "**Mansard**".

Fastener

In roofing, a device, usually metal or plastic, that fastens one or several roofing components to the roof deck, or fastens the deck itself to a supporting structure. Fasteners can be a screw, nail, staple, rod, anchor, toggle, or other design that is approved by **Factory Mutual** for fastening a product that has been selected or made by the material manufacturer. A **Button Fastener** is a flat, tin disc with center nail hole, used to fasten saturated felt to the roof deck. A **Compression/Expansion Fastener** is designed and manufactured on the principle of positive expansion in concrete or masonry substrate; requires a pre-drilled hole. **Disc Fasteners** are a wide variety of mechanical assemblies used to attach single ply membranes and/or insulation boards to a substrate or deck. Disc attachments generally consist of a square- or circular-shaped plate with a hole in the center, through which a screw or nail-like clip may be inserted. They are generally set in place with a drill-like device. **Friction Fasteners** are manufactured with a tapered shank and installed into the substrate with force. **Threaded Fastener** is a screw-type device which has treads on the shank below the head. Thread design is important for proper pullout and backout strength characteristics.

Fatigue

Permanent structural change that occurs in a material subjected to fluctuating stress and strain. In general, fatigue failure can occur with stress levels below the **elastic limit**.

Fatigue Life

The number of cycles of fluctuating stress and strain of a specified nature that a material will sustain before failure occurs. Fatigue life is a function of the magnitude of the fluctuating stress, geometry of the specimen and test conditions. An S-N diagram (below in **Fatigue Limit**) is a plot of the fatigue life at various levels of fluctuating stress.

Fatigue Limit

In testing, the maximum fluctuating stress a material can endure for an infinite number of cycles. Also called "**Endurance Limit**".

Fatigue Ratio

Ratio of fatigue strength or fatigue limit to tensile strength. For many materials, fatigue ratio may be used to estimate fatigue properties from data obtained in tension tests.

Fatigue Strength

The magnitude of fluctuating stress required to cause failure in a fatigue test specimen after a specified number of cycles of loading. Usually determined directly from the S-N diagram See "**Fatigue Limit**".

Fatigue Test

A method for determining the behavior of materials under fluctuating loads. A mean load and alternating load are applied to a specimen and the number of cycles required to produce failure (**fatigue life**) is recorded. Generally, the test is repeated with identical specimens and various fluctuating loads. Loads may be applied axially, in torsion, or in flexure and data is represented in an S-N diagram. See "**Fatigue Limit**". Most fatigue tests are conducted in flexure, rotating beam or vibratory machines. Fatigue is generally discussed in ASTM STP-91-A, ***Manual on Fatigue Testing***. ASTM D-671 details a standard procedure for fatigue testing of plastics in flexure.

Fatty Acid or **Fat Acid**

A term usually applied to members of the series of straight-chain or aliphatic monobasic acids, either saturated or unsaturated, the higher members of which occur as glyceryl esters in animal or vegetable fats and oils and are of great importance in rubber compounding. The most common example is stearic ac

Feather or **Feathering**

To reduce the edge of a material to a very small dimension, like a feather edge. The process whereby a bead of sealant or caulking is smoothed out in such a way to leave the sealant with a uniform crown or distribution along the length of a seam or overlap, as in a single ply lap joint.

Felt

A general term used to describe sheet roofing material consisting of a mat of organic or inorganic fibers untreated, or saturated, or saturated and coated with bitumen and supplied for use in roll form. Felts come in a variety of weights per square depending on requirements and climate conditions, such as Felt No. 15 is 15 pounds per square. **Asbestos Felt** is felt containing 75% to 85% of asbestos fiber. **Asphalt Felt** is felt for which the bituminous saturant or coating is asphalt. **Coated Felt is** asphalt saturated felt coated on one or both sides with filled asphalt. **Dry Felt** is organic fiber roofing felt before any treatment with bitumen. Used as an underlayment for Built Up-Roofing over wood board decks to prevent bitumen drippage or to provide a slip sheet. **Glass Felt** is glass fibers bonded into a sheet with resin and suitable for impregnation in the manufacture of bituminous waterproofing, roofing membranes, and shingles. **Mineral Fiber Felt** is a felt with rock wool as the principal component. **Mineral Surfaced Felt** is bitumen coated felt surfaced on one side with natural or synthetic colored granules. **Organic Felt** is felt made from organic fibers and in particular, wood fibers. **Perforated Felt** is bitumen saturated felt perforated with closely spaced small holes to allow for escape of air and moisture and bitumen to enter during application to form a well-bonded membrane. **Rag Felt** is a term sometimes used to describe organic fiber felt. A hangover from earlier days when a percentage of rag fiber was used. **Saturated Felt**

is a felt which has been impregnated with bitumen by passing it through vats of hot saturant. **Stripping Felt** is narrow widths of felt used to complete flashing details, particularly to cover the edges of metal flanges incorporated into Built Up-Roofing. **Tar Felt** is felt for which the saturant is coal tar pitch, more properly called **Coal Tar Pitch Felt.**

Felt Handler

A man on the roofing crew who puts the felt roll or sheet into position, and who with the felt runners, is responsible for unrolling felts and covering the roof deck or insulation with the correct number of plies.

Felt Layer

A piece of spreader-type, wheel-mounted, mobile mechanized roofing equipment for spreading bitumen and laying felt in a single continuous operation.

Felt Mill Ream

The mass in pounds of 480 ft^2 of dry, unsaturated felt, also called "**Point Weight**".

Felt Runner

A man on the roofing crew who is responsible for unrolling felts.

Ferrule

A round, hollow tube that serves as a bushing through which a spike can be passed and driven into a wall, used to fasten exterior drain fixings, gutters and downspouts.

Fiber Board

An insulating lath or wallboard of compressed wood fibers.

Fiber Exposure Monitoring

Determination of the concentration of airborne fiber found in the occupational environment using a sampling device consisting of a filter cassette and personal sampling pump. Analysis of the sample is done using optical microscopy and results are presented in f/cc (see "**Fibers Per Cubic Centimeter**") of air. NIOSH (see "**NIOSH**") has issued a standard method (No. 7400, ***Fiber in Air***) for this procedure.

Fiber Glass

A member of the MMVF (man-made vitreous fibers) (see "**Man-Made Mineral Fibers**") family created from molten masses of raw materials, selected to control the levels of impurities, under highly controlled conditions. Two categories of fiber glass are generally distinguished as Continuous Filament — large diameter fibers used for reinforcement applications, and Glass Wool — used for thermal and acoustical insulation and a wide variety of filtration applications.

Fiber Glass Insulation

See "**Glass Wool Insulation**".

Fibers Per Cubic Centimeter

Abbreviated f/cc, it is the number of fibers per cubic centimeter of air. See "**Cubic Centimeter**".

Fiber Saturation Point

That point reached in seasoning lumber when all the free water has been driven off, leaving water only in the cell walls. The point at which lumber begins to shrink (approximately 25 to 30% water content).

Field

The area covered by a roofing material.

Field Seam

A seam made by the roofing applicator in the field by several methods as opposed to that which is performed in the factory. See "**Seam**". Compare "**Factory Seam**".

Fill

Aggregate and cement mixtures placed on a roof deck in varying thickness to level out depressions and irregularities, or to form slopes to roof drains.

Filler

(1) Finely-divided mineral matter used as an extender and to improve the properties of asphalt coatings for shingle and Built Up-Roofing felts, and bituminous-plastic cement or mastic. Can be siliceous or other material, such as limestone. Also called a "**Stabilizer**". (2) A solid compounding material which may be added, usually in finely divided form, in relatively large proportions, to a polymer.

Film (Reflectant and Tinted)

Transparent plastic sheeting applied to windows and skylights for reflection of heat.

Fine Mineral Surfacing

Water-insoluble inorganic material, more than 50% of which passes the 500-µm (No. 35) sieve, used on the

surface of roofing.

Finger Wrinkling

Wrinkling of exposed felts in small, finger-sized ridges parallel to the longitudinal direction of the felt roll, caused by transverse moisture expansion of the felt.

Fire Barrier

A fire resistant wall, door or similar construction to prevent the spread of a fire in a building. See "**Fire Stop"**.

Fire Brands

Flaming pieces of material or burning embers.

Fire Resistance (**Rating**)

The property of a material or assembly to withstand fire or give protection from it. As applied to elements of buildings, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.

Fire Stop

A complete obstruction placed across a concealed air space in a wall, floor or roof to retard or prevent the spread of flame and hot gases.

Fire Wall

Any wall built for the purpose of restricting the spread of fire in a building. Such walls of solid masonry or concrete usually divide a building from the foundations to about 3 ft (a meter) above the roof.

Fishmouth

An opening formed by an edge wrinkle or adhesive failure in a felt or lap joint of a Built Up-Roofing or single ply membrane usually formed by wrinkling or discontinuities in the seaming operation.

Fissure

A split or crack in a cellular material.

F.I.T.

A classification of roof membranes to determine fitness for use as follows:

"F" = Fatigue Resistance;
"I" = Indentation or puncture, and;
"T" = Temperature stability.

The numbers that follow these classifications rate "fitness" from 1 (least appropriate) to 5 (most resistant or suitable). To date, the F.I.T. system has only been applied to "manufactured" sheets rather than built-up and fully-adhered or ballasted systems.

Fixtures

The nails and cement required for, and usually packed with roll roofing.

Flame Retardant

A substance mixed with rubber to retard its burning. For example, highly chlorinated hydrocarbon, antimony trioxide, or trixylenyl phosphate.

Flame Spread (**Rating**)

(1) The rate of flame movement across an exposed deck. (2) The measurement of how much a product contributes to the fire spread (determined under controlled and standardized test conditions). Refer to ASTM Designations E-84 or E-162.

Flame Stop V

For use with metal pipes, closed plastic systems, construction gaps, duct work, curtain walls and most other penetrations.

Flame Stop VP

Specifically for D.W.V. Vented plastic pipes.

Flammability

The characteristics of a material to burn or support combustion. Although some single-ply membranes possess a considerable degree of inherent fire resistance, all organic materials will burn under the right conditions of heat and oxygen supply. They should not, therefore, be exposed to direct flame or extreme heat. Therefore, architects, material specifiers, or roofing contractors specifying or installing a given membrane or other roofing material, should carefully consider its flammability, and any specific building

codes. See "**Factory Mutual**", "**Underwriters Laboratories**".

Flange

A projecting edge, rib or rim. The top and bottom of I-beams and channels are called flanges.

Flashing

A building device used to prevent water from penetrating the exterior surface of a building element or material, or to intercept and lead water out of it. Flashing can be considered as a continuation of the roofing membrane to protect and weatherproof any element of the building or roof deck that departs from the roof deck level or incline. **Base Flashing** is the extension over a cant strip and up the vertical surface of the roofing membrane at the base of a vertical wall or item intersecting or penetrating the roof to direct the flow of water on the roof away from the juncture of the deck and the parapet wall. **Cap Flashing** is the sheet metal coping for the top of a higher wall, such as a parapet, or the cover over a detail, such as an expansion joint to prevent water seepage behind the base flashing. Cap Flashing overlaps the base flashing and usually refers to **counterflashing**. **Chimney Flashing** is any kind of metal or composition material placed around a chimney where it comes through the roof, to cover the joint and prevent water from entering. **Collar Flashing** A metal cap flashing around a vent pipe projecting above a roof deck. **Conical-Style Flashing** is a cone-shaped section that fits over prefabricated chimney sections that pass through a steeply pitched roof. The conical flashing fits under upper-level shingles and over lower-level shingles. The cone is adjustable to fit various degrees of pitch. The cone also directs rain away from the chimney and seals the roof opening. **Counter Flashing** is the material, usually sheet metal, protecting the top edge and covering or partially covering the base flashing to shed water over the top and to allow some differential movement without damage to the flashing. Also it acts as barrier protecting the vertical edge of a membrane against exposure. Sometimes also called a **Cap Flashing. Eaves Flashing** is the treatment of the edge of a roof with felt and metal flashing. The portion of the metal eaves flashing exposed on the elevation may be called a **Fascia Flashing. Gravel Stop** is a formed strip of metal at the edges of a gravel surfaced roof to prevent the gravel from rolling or washing off. Usually combined with the eaves flashing to add a crisp, finished appearance to the roof edge. **Jack Flashing** is lead, lead collar, or neoprene collars used for flashing pipe. **Pipe Flashing** is a boot or conical rubber used to flash cylindrical penetrations through the roofing membrane. Also called **Collar Flashing**, or **Sleeve Flashing**. **Saddle Flashing** is a water diverter used on the high side of a chimney, usually metal. **Step Flashing** are individual pieces of flashing material used to counterflash chimneys, dormers and such projections along steep-sloping roofs. The individual pieces are overlapped and stepped up the vertical surface. Also called **Shingle Flashing. Through-the-Wall** (or **Thruwall**) **Flashing** is flashing extending completely through a masonry wall to lead water that penetrates higher up out of the wall at the flashing.

Flashing Block

A specially designed masonry block having a slot or coping into which the top edge of the roof flashing can be inserted and anchored. Also called "**Raggle Block**".

Flashing Cement

Is a trowelable mixture of asphalt, volatile solvent and mineral fillers used as a cold coating in the application of flashing, for sealing around details and for cold patching.

Flash Point

The temperature at which the vapor from asphalt (or petroleum products) will ignite or flash in air but does not remain burning. Compare "**Self-Ignition Temperature**".

Flex Resistance

Ability of foam rubber to sustain repeated compressive loads without damage to cell structure. (ASTM D-1055).

Flexural Modulus of Elasticity

Alternate term for "**Modulus in Bending**".

Flexural Strength

A material's ability to withstand bending. In testing, Maximum fiber stress developed in a specimen just before it cracks or breaks in a flexure test. Flexural yield strength is reported instead of flexural strength for materials that do not crack in the flexure test. An alternate term is "**Modulus of Rupture**".

Flexure Test

Method for measuring behavior of materials subjected to simple beam loading. Specimen is supported on

two knife edges as a simple beam and load is applied at its mid-point. Maximum fiber stress and maximum strain are calculated for increments of load. Results are plotted on a stress-strain diagram, and maximum fiber stress at failure is flexural strength. Standard test procedures are given in ASTM D-790 (plastics), and ASTM D-797 (elastomers).

Flip Method

A procedure for handling nails for rapid application.

Float Finish

A type of finish on concrete or plaster.

Floating

The equal spreading of plaster or concrete by means of a board called a float.

Floating Roof

A new roof over insulation that has been applied to the existing gravel on an old roof.

Flood Coat

The top layer of bitumen in an aggregate-surfaced, built up roofing membrane. Correctly applied, it is poured, not mopped, to a weight of 60 lbs. per square for asphalt and 75 lbs. per square for cool tar pitch. Also called "**Pour Coat**".

Flow Stress

In testing, the stress required to cause **plastic deformation**.

Flue

See "**Chimney Flue**".

Flue Cap

A waterproofing hood placed at the top of a chimney, usually fastened to the flue tile.

Flue Lining

The material (usually tile pipe in 2-foot (approx 60 centimeters)) which lines the flue to protect the chimney walls from hot gases.

Flue Tile

The tile or fire clay extending through the top of a chimney.

Flutter Fatigue

The fatigue action a single ply membrane may experience in a high wind saturation, causing a complete stress reversal to occur rapidly; temperature may influence the flutter fatigue resistance of the membrane material.

Flux

Bituminous material used as a feed stock for further processing and as a material to soften other bituminous materials.

Flying In

Hand laying of felt accomplished by two workers pulling the felt out and setting it into the hot bitumen.

FM

See "**Factory Mutual**".

FMRC

Factory Mutual Research Consultants.

Foam Rubber

A cellular rubber. One method of manufacture is to whip latex to form a froth and the vulcanize it. It is usually of open-cell structure.

Foaming Agent

A substance that promotes the formation of finely divided gas bubbles suspended in a liquid.

Fracture Stress

In testing, the true stress generated in a material at fracture.

Fracture Test

A visual test wherein a specimen is fractured and examined for grain size, case depth, etc.

Fracture Toughness

Ability of a material to resist crack propagation when subjected to shock load as in an **impact test**.

Framing

The rough timber work of a house, including the flooring, roofing, partitioning, ceiling and beams.

Free Carbon in Tars

The hydrocarbon fraction that is precipitated from a tar by dilution with carbon disulfide (CS_2).

Free Radical

An active radical with a free valence. They can be formed from a catalyst, or by the action of heat or light on monomers. Peroxides and hydroperoxides are widely employed as catalysts because they readily form free radicals. A free radical may remove a hydrogen atom from a monomer or polymer and convert it into a free radical as follows: R + M (monomer) RM. Reaction of the new free radical with another molecule of monomer followed by another and another may proceed very rapidly, and this chain growth quickly forms a large polymer radical, which may be terminated by the final addition of a free radical.

Freezeback

Thawing ice refreezing at the eave, forcing water back into and usually under the shingle. Also called "**Ice Dam**". See "**Ice Dam**".

Freon

Trade name for compounds consisting of ethane or methane with some or all of the hydrogen substituted by fluorine, or by fluorine and chlorine. Used as refrigerants, in fire extinguishers, and as aerosol fluids for insecticides, polyurethane foam, etc., because of their low boiling point and chemical inertness, and for insulating atmospheres in electrical apparatus because of their high breakdown strengths. Principle ones are: Freon 11 trichlorofluoromethane (CCl_3F), Freon 12 dichlorodifluoromethane (CCl_2F_2), Freon 21 dichlorofluoromethane ($CHCl_2F$), Freon 114 dichlorotetrafluoroethane ($CClF_2$-$CClF_2$), Freon 142 (1-chloro-1 : 1-difluoroethane CH_2CClF_2)

Friction Fastener

See "**Fastener; Friction**".

FRT

Fire Retardant Treated. Usually referring to wood products that have been treated with a fire retardant. Compare "**Flame Retardant**".

Fully Adhered

A roofing assembly in which a single-ply membrane has been fully adhered to a substrate, usually with the aid of an appropriate contact or water-based adhesive or emulsion. Compare "**Loosely-Laid**", "**Mechanically Attached**".

Fume

Airborne solid particles formed during the heating of materials. Gases and vapors should not be referred to as fumes.

Fungus

Usually filamentous, spore-bearing microorganisms devoid of chlorophyll.

Furring

Strips of wood applied to a wall or other surface as nailing support for the finish material, or to give the wall an appearance of greater thickness.

Gable

Same as rake; also, the triangular end of an exterior wall from the level of the eaves to the ridge of a double-sloped roof.

Gable End

A gable end is the entire end wall of a building with a gable formed by the roof.

Gage, Gauge

An arbitrary unit of measurement thickness measurement. As an example, the following thicknesses in the United States have been agreed upon:

12 Gauge = 105 mil or 2.667 millimeters
14 Gauge = 75 mil or 1.905 "
16 Gauge = 60 mil or 1.524 "
18 Gauge = 48 mil or 1.219 "
20 Gauge = 36 mil or 0.914 "
22 Gauge = 30 mil or 0.762 "
24 Gauge = 25 mil or 0.635 "
26 Gauge = 20 mil or 0.508 "
28 Gauge = 18 mil or 0.457 millimeters

(where 1 mil equals 0.001 (or $^{1}/_{1000}$th) inch or 0.0254 millimeter)

A designation of metal diameter such as nails or wire and thickness such as sheet metal. The act of measuring the exposure of shingles with a tool. Also the device used on the hatchet with which to gauge.

Gage Length

The known distance between **bench marks**.

Galvanized

Zinc coating on steel for corrosion resistance.

Gambrel Roof

A type of roof which has its slope broken by an obtuse angle, so that the lower slope is steeper than the upper slope. A double-sloped roof having two inclines on each slope.

Gasoline

A refined petroleum naphtha which by its composition, is suitable for use as a carburant in internal combustion engines. Unleaded gasoline is used to clean the surface of EPDM membranes to remove talc and mica powder, and other processing aids and thereby achieve strong adhesive bonding of the laps and seams.

Gehman Torsional Apparatus

An apparatus for determining flexibility at low temperatures.

Gel Time

The period of time from the initial mixing of the reactants of a plastic or rubber composition to the time when gelation occurs as defined by a specified test.

Gel Permeation Chromatography (GPC)

Type of liquid-solid elution chromatography that separates solutions of poly-dispersed polymers into fractions by means of the sieving action of a swollen polymeric gel.

Gelling

Formation of a uniform solid coagulum from which the aqueous phase has not separated.

Gilsonite

A black lustrous type of hard asphalt, used as a mineral hydrocarbon for softening rubber. Also known called "**Uintiate**".

Glass Mat

A thin mat of glass fibers with or without a binder which serves as a membrane reinforcement.

Glass Transition Temperature - T_g

The temperature at which amorphous and crystalline regions of a polymer will show signs of change from a hard and relatively brittle one to a viscous or rubbery condition. Lowest temperature at which segmental motion of a polymer chain exists. Abbreviated **T_g**.

Glass Wool Insulation

An insulating material composed of glass fibers which are formed into lightweight blankets of uniform thickness. Also known as "**Fiber Glass Insulation**".

Glaze Coat

A thin coating of bitumen applied to the felts of unfinished roofing to give short time protection from weather when roofing operations are delayed. Also refers to the top layer or **top coat** of asphalt in a sooth-surfaced Built Up-Roofing system.

Goodrich Flexometer

An apparatus for measuring the heat built up in a cylindrical specimen subjected to rapid cyclic constant compression. Besides temperature rise, the static and dynamic compression, and final compression set can be measured.

Goodrich Plastometer

An apparatus used for measuring viscosity of rubber compounds at elevated temperatures.

Goodyear, Charles

Discoverer of vulcanization of natural rubber in Woburn, MA, in 1839. He was a Connecticut inventor who became interested in rubber by examining a life preserver in the store of the Roxbury India Rubber Co., in New York City, and worked hard for 5 years before he discovered vulcanization by heating rubberized fabric on a kitchen stove. The rubber mixture on the fabric contained sulfur and white lead.

Granules

Mineral particles of a graded size that are embedded in the coating asphalt of shingles and mineral surfaced roofing.

Grade (Lumber)

To separate lumber into different established classifications depending upon its suitability for different uses. A classification of lumber

Grade (Slope)

Also known as "**Slope**", "**Incline**", "**Pitch**".

Grain

Weight unit equal to $^1/_{7000}$ lb, used in measuring atmospheric moisture content. In **Slate**, a second direction of fracture which usually occurs at right angles to the **Cleavage**. See "**Slate**".

Gravel Stop

A flanged device, usually metal, in sheet or extruded form, designed to prevent loose aggregate from washing or being blown off the roof and to provide a finished edge detail for the build up roofing assembly. See also "**Flashing**".

Graveling In

The operation of spreading a gravel surfacing over the flood coat of bituminous Built Up-Roofing.

Gravimetric Exposure Monitoring

An industrial hygiene technique used to measure the amount of all airborne dust, not just fibers. The results are presented in milligrams per cubic meter (mg/m^3).

Green

Raw or unvulcanized stock. Green is generally not used to denote a defect.

Grout

A fluid cement-mortar mixture used to fill joints and cavities of masonry or concrete building construction. On roof decks, the joints between many types of pre-cast roof deck slabs are grouted.

Guarantee

Usually refers to the assurance given by the roofing subcontractor that the work performed by him is in accordance with specification and is without defects in labor and material.

Gusset

A piece used to give additional size or strength in a particular location.

Gutter

Drainage trough at the low edge of a sloping roof to convey water to a downspout. A **Hanging Gutter** is an eaves gutter held in place by wire or strapping.

Gypsum

Calcium sulfate ($CaSO_4 \cdot 2H_2O$). Commonly used for wall panels. Also called "**Drywall**".

Hanging Gutter

See "**Gutter; Hanging Gutter**".

Hardness

The resistance to indentation resulting from pressure, abrasion or impact. May be thought of as a function of the stress required to produce specified type of surface deformation. There is not absolute scale for hardness; therefore, to express hardness quantitatively, each type of test has its own scale of arbitrarily defined hardness. Compare "**Compression**", "**Compressive Strength**", "**Impact Resistance**".

Hazard Communication Standard

A regulation, established by the Occupational Safety and Health Administration (OSHA) and published in the Code of Federal Regulations (29 CFR 1910.1200), that includes requirements for employers to:

1. have available health and safety information for all materials used in their workplaces, and
2. train all workers in the safe methods for handling and working with these substances, plus other requirements.

H-Beam

A structural beam, not unlike an I-beam but with wider flanges.

Head Lap

See "**Lap; Head**".

Header

The beam into which the common joists are fitted when framing around a roof opening. The headers are placed so as to fit between two long beams, or trimmers, to support the joist ends. When used at openings

in the roof system, the header supports the joist or rafters and acts as a beam.

Heat Aging

Submitting a membrane to prolonged, elevated temperatures to determine if its physical properties are adversely affected. When specimens of vulcanized rubber are given accelerated aging in air and oxygen at different temperatures, and in some cases pressure. Generally, the deterioration is noted in the percent drop in **tensile strength** and **elongation**.

Heat Embrittlement

Phenomenon of hardening, especially of vulcanized SBR at elevated temperatures, characterized by a rise of **modulus** and decrease of **tensile strength** and **elongation**.

Heat Welding

See "**Thermal Welding**".

Heating Degree Day

A measure of the temperature difference from (or, departure of) the mean daily temperature from a given standard (usually 65°F to 70°F); one degree-day is recorded for each degree of temperature difference above (or below) the standard during a single day; used to estimate energy requirements for building heating and cooling. Wind speed, solar radiation, the extent to which the building is exposed to these elements, and the internal heat sources also affect the heat required. Thermal insulation manufacturers and ASHRAE provide listings of heating degree days for major U.S. cities. This information can also be obtained from local weather services.

Heel Joint

The joint of a slope roof structure connecting a beam or joist to a rafter above the ceiling and supporting wall near the eave, is trapezoidal in cross-section and the angle depends on the slope of the roof.

Helm Roof

See "**Roof; Helm**".

Hexagonal or **Hex**

A strip shingle having a butt or tab which is one half of a hexagon.

High Melt Point

Usually in reference to asphalt used on sloping roofs, which has a relatively higher melting temperature than other bitumen used on low slope roofs. Also called "**High Softening Point**".

Hip

The sloping line along the outer angle formed by the intersecting of two sloping sides of a roof whose eaves meet at a right angle. A **Hip Roof** is one that rises by inclined planes from all four sides of a building to form hips at the intersection of adjacent roof slops. A **Hip Rafter** is a rafter which forms the hip of a roof.

Hip Pad

A protective cover worn on the roofer's hip for protection and traction, usually made of rubber.

Hoist

A device used for hoisting (lifting and transferring) roofing materials from ground to roof.

HOL

A private roofing library and documentation center owned by the author located in Los Angeles, CA. The library's filing system divides the subject matter dealing with roofing into 20 main categories.

Holiday

The improper application of bitumen mopping or other fluid-applied coating where the application is discontinuous.

Homolog

A member in a series of related organic compounds, whose molecular size increases from member to member by one CH_2 group (for example, methane CH_4, ethane C_2H_6, propane C_3H_8, and butane C_4H_{10}). Such a series is known as a homologous series.

Homopolymer

A high polymer consisting of molecules containing a single type of monomeric units.

Honeycombing

Surface defect in concrete where voids are created by trapped air.

Hood

A sheet metal cover over equipment, stack vents or similar roof details.

Hooke's Law

A law used in materials testing stating that stress is directly proportional to strain. Hooke's law assumes perfectly elastic behavior. It does not take into account plastic or dynamic loss properties.

Hot Air Welding

See "**Thermal Welding**".

Hot Spot

Areas in a tile or slate roof where too much of one color is concentrated.

Hot Stuff or Hot

Roofer's term for hot bitumen.

Hot Wrap

A corrosion proofing wrapping using pipe wrapping felts embedded in hot coal tar enamel. See "**Ragging Method**". Compare "**Cold Wrap**"

HRA Institute

Heating, Refrigerating and Air Conditioning Institute of Canada

HVAC

Heating, Venting and Air Conditioning Unit

Hydrocarbon

Any of a large number of organic compounds which are based primarily on carbon and hydrogen atoms, such as ethylene, benzene, etc. Petroleum and petroleum products are mixtures of numerous hydrocarbons.

Hydrocarbon Resins

[ORG CHEM] Brittle or gummy materials prepared by the polymerization of several unsaturated constituents of coal tar, rosin, or petroleum. They are inexpensive and find uses in rubber and asphalt formulations, and in coating, caulking and polishing formulations.

Hydrolysis

Decomposition or alteration of a chemical substance by water.

Hydrostatic Pressure

(1) Pressure exerted against the underground portion of a building such as the basement walls or basement floor created by the presence of water in the soil. (2) An quantitative laboratory test for subjecting waterproofing membranes to determine water permeability.

Hygro Diode Membrane (HDM)

A moisture sensing vapor barrier consisting of a fabric of glass fibers or synthetic fibers on which a diffusion-tight plastic film is applied leaving displaced stripes. The membrane utilizes electronic resistors in parallel that sense the presence of moisture and automatically vents the roof under certain conditions. Best suited for hot, humid climates with a short heating and a long air-conditioning season.

Hygroscopic

Attracting and absorbing moisture from the air. See "**Absorption**", "**Adsorption**".

Hypalon®

See "**Chlorosulfonated Polyethylene**".

Hypalon® Coatings

Hypalon (a registered trademark of E.I. DuPont de Nemours & Co.) are elastomeric coatings based on chlorosulfonated polyethylene (CSPE) rubbers. They are fast-drying, single-package materials that have exceptional fire retardancy, chemical resistance, weathering properties, and moisture vapor transmission resistance. They may be used as the entire coating system or as a topcoat over other generic coatings and are often used in conjunction with neoprene in elastomeric roof coverings.

Hyperbolic Paraboloid Roof

See "**Roof; Hyperbolic Paraboloid**".

I-60; Factory Mutual

Factory Mutual wind uplift rating that indicates a roof assembly is able to withstand 60 pounds per square foot upward load, cause by winds of up to 88 miles per hour.

I-90; Factory Mutual

Factory Mutual wind uplift rating that indicates a roof assembly is able to withstand 90 pounds per square foot upward load, cause by winds of up to 110 miles per hour.

IARC

The International Agency for Research on Cancer. An agency of the World Health Organization (WHO). An IARC program of particular interest evaluates the carcinogenic risk of chemicals to humans.

I-Beam

A steel beam with a cross section resembling the letter "**I**".

ICBO

International Conference of Building Officials. Uniform Building Code (UBC)

Ice Dam

Ice formation at the eaves of snow covered sloping roofs that forms an obstruction to the drainage down the slope of snow melt water. The melting of ice and snow causes moisture infiltration under the shingles and through the roof deck if a waterproofing underlayment (such as plastic, galvanized steel or bituminous saturated felt) is not installed.

Impact Energy

The energy required to fracture a part subjected to shock loading as an impact test. Alternate terms are impact value, impact strength, impact resistance, and energy absorption.

Impact Resistance

Capability to withstand mechanical or physical abuse under severe service conditions. Resistance to blows, bumps, fracture and shocks pertinent to use. The impact resistance of the roofing assembly is a function of all of its components, not just the membrane itself.

Impact Strength

Measure of the toughness of a material, as the energy required to break a specimen with a single blow or hit, as in an impact test. Alternate terms are impact energy, impact value, impact resistance, and energy absorption.

Impact Test

A method for determining behavior of material subjected to shock loading in bending, tension (stretching), or torsion (twisting). The quantity usually measured is the energy absorbed in breaking the specimen in a single blow, as in the Charpy impact test, Izod impact test and tension impact test. See "**Izod Impact Test**". Impact tests also are performed by subjecting specimens to multiple blows of increasing intensity, as in the drop ball impact test and repeated blow impact test. Impact resilience and scleroscope hardness are determined in nondestructive impact tests.

Impervious

Resisting the passage of moisture or water.

Impregnated Wood

Wood preserved by forcing creosote or chemical solutions into the pores of the wood under pressure, or through a vacuum saturation treatment. See "**Creosote**".

Incline

The slope of a roof, expressed in the number of vertical units of rise per horizontal units of run. or in percent. See "**Slope**" or "**Pitch**".

Incompatibility

Materials not suitable for being used or mixed together or near each other, as in the case of asphalt and coal tar pitch.

Indentation

(1) The extent of deformation by the indentor point of any one of a number of standard hardness testing instruments. (2) A recess in any surface of a rubber article.

Inert

Lacking the properties necessary for chemical or biological action. Compare "**Active**".

Infiltration (air or moisture)

The penetration of air or moisture through cracks, voids and spaces in walls, roofs, and building components.

Infrared

Pertaining to the region of the electromagnetic spectrum, from approximately 0.78 to 300 m.

Injection Molding

Molding in which the rubber or plastic stock is heated and, while in the flowable state, is forced or injected into the mold cavity.

Inorganic

Being or composed of material other than hydrocarbons and their derivatives; not of plant or animal origin.

Instron

A brand name of laboratory instrument apparatus utilized in the stress-strain testing of materials.

Insulate

To cover a body, such as a conductor of electricity or of heat, with a non-conducting material designed to prevent loss of energy from the conductor to some other body or medium with which it may come in contact.

Insulation

More properly termed "Thermal Insulation", any of a variety of materials designed to retard the flow of heat and sound through a building enclosure. Insulating materials are generally installed just below or immediately above the roofing membrane, depending on the roofing system employed. Currently, rigid or semi-rigid boards or panels of plastic foams such as extruded or expanded polystyrene, urethane, polyisocyanurate, fiberboard, spun glass, mineral wool and various composite insulations are among the most popular and widely used insulating materials.

Insulation Set

When thermal insulation is compressed and does not spring back up to its original thickness.

Interior Drainage System

A drain system that allows water to be removed from the roof by sloping the roof inward towards drains that pass the water through pipes running through the interior of the building. Drains in this type of system should allow for deck deflection and be placed near support columns or interior supporting walls.

Interior Gutter

A gutter hidden behind an outside wall or located inside a building.

International System of Units

A rational and coherent system of units adopted by the General Conference of Weights and Measures for international use.

Intumescent

Capability to expand when subjected to heat.

Inverted Roofing Membrane Assembly

See "**Protected Membrane Roof**".

Iodine Number

The number of grams of iodine absorbed through reaction with 100g of a sample of fat or oil. It is a measure of the degree of unsaturation.

IPA

See "**Isopropanol**".

IRC

Independent Roofing Consultants.

IRMA

Inverted Roofing Membrane Assembly. See "**Protected Membrane Roof**".

ISO

International Organization for Standardization. A roofing practitioner's term for polyisocyanurate foam insulation.

Isolation Layer

See "**Slip Sheet**".

Isomeric Polymers

Polymers having essentially the same percentage composition but are different with regard to their molecular architecture.

Isopropanol (IPA)

Isopropyl alcohol. A water-miscible alcohol, used in surface preparation, such as for sealant application, where water with a detergent has been used to prepare surfaces or substrates and the resulting film and moisture must be removed.

Isotactic

See "**Tacticity**". An isotactic form of rubber is obtained by converting ordinary rubber into the hydrochloride and regenerating the rubber, having the same ultimate composition $((C_5H_8)_x)$, but being softer

and less elastic than rubber. Beta-iso-rubber is obtained from the hydrochloride of alpha-iso-rubber by the same process.

Isotactic Polymer

A polymeric molecular structure containing a sequence of regularly spaced asymmetric atoms arranged in like configuration in a polymer chain. In the head-to-tail polymerization of styrene, each repeating unit contains an asymmetric carbon and the substituents of this carbon may be arranged in two different configurations that are mirror images of each other. (This corresponds to the d-form and the l-form of optically active compounds). If the two forms are distributed at random along the chain, the polymer is atactic, but if all l-units or all d-units, the polymer is isotactic.

Isotropic

Having equal or identical properties in all directions. Compare "**Anisotropic**", "**Orthotropic**".

Izod Impact Test

A test using a vertical notched rubber or plastic specimen supported as a cantilever. The sample is broken by a pendulum blow delivered at a fixed distance from the edge of a clamped specimen. The test requires the notch in the sample to produce a standard degree of stress concentration.

Jack

A flanged metal sleeve used as part of the flashing around small items that penetrate a roof.

Jack Rafter

See "**Rafter; Jack Rafter**".

Jamb

The side post or lining of a doorway, window, roof window or other opening.

Joint

Any point where sheets of rigid insulation meet. **Broken Joints** or **Staggered Joints** is the application of rigid insulation in a pattern which ideally eliminates joints of extended length to create a strong substrate with maximum thermal resistance. For single-ply joint, see "**Seam**".

Joint Cement

A powder which is mixed with water and applied to the joints between sheets of gypsum wallboard. It is also available in paste form.

Joist

One of a number of the smaller, closely spaced parallel structural supports for a flat roof deck spanning between walls, roof beams or purlins, or to support a flat ceiling below a sloping roof. A **Joist Hanger** is a steel section shaped like a stirrup, bent so that it can be fastened to a beam to provide end support for joists, headers, etc.

Kaolin

A variety of clay containing a high percentage of kaolinite.

Karifalt

A proprietary mixture of aliphatic and aromatic elastomers, commonly styrene-butadiene-styrene, used to modify bitumen for manufacturing modified bitumen single-ply membranes, **BUR** cap sheets and other products such as adhesives and flexible pavement.

Kelvin

A unit of absolute temperature equal to $^{1}/_{273.16}$ of the absolute temperature of the triple point of water (comprising ice, liquid and vapor). Expressed as "°K" or "degrees Kelvin".

Kerosine Test

ASTM designation D-727. This test method covers the determination of the relative saturating capacity of felt papers for roofing (and flooring) and is the kerosine number of roofing and flooring felt computed from the maximum weight of a kerosine of known specific gravity retained by the felt after displacement of all the air from the interior voids. It is the milliliters of kerosine held per 100 g of felt and thus is a measure of the quantity of saturant that a given felt will absorb.

Kesternich Cabinet

A test apparatus developed in West Germany to determine corrosive resistance of Volkswagen mufflers which has been adapted for testing of many metal roofing components. This test method utilizes heat (40°C - 104°F), Sulfur Dioxide (SO_2) and distilled water to create an acidic environment. Several temperature

cycles are employed.

Ketones

Compounds containing the carbonyl group (4C4O) to which is attached two alkyl or aryl groups. Ketones, such as methyl ethyl ketone (MEK), are commonly used as solvents for resins and plastics.

Kettle

Equipment used for heating bitumen to the temperatures required for application. **Kettle Temperature** is the temperature to which bitumen is heated in the roofing kettle, often considerably higher than the point of application. The maximum recommended kettle temperature varies with the type of bitumen, but generally must never be greater than 400°F for coal tar pitch and 450°F for asphalt. Above these temperatures, the materials lose valuable oils by distillation, and only a thin film is formed in application which does not provide proper cementing action. The latest research indicates that the lower limit of EVT is 75° Centistoke and 150° Centistoke as the maximum. See "**Equiviscous Temperature**". **Kettle Thermometer** is a thermometer used for checking the temperature of heated bitumen in a double jacketed kettle. A **Patch Kettle** is a small (25 to 90 gallons) kettle, easily transportable, used for patch work. Compare "**Tanker**".

Kettleman

The member of a roofing crew responsible for the operation of the bitumen heating kettle and the bitumen pump if one is in use. He sometimes also doubles as a hoister of materials on smaller jobs.

Key

In waterproofing, a notch in a foundation footing designed to receive the upright wall structure and insure a watertight seal at the juncture.

k-Factor (or **k-value**)

See "**Thermal Conductivity**".

Kieselguhr (pronounced (kees-ill-goor)

Siliceous diatomaceous earth used as a filler in rubber compounds. Also called "**Infusorial Earth**".

King Post Truss

The upright member in the center of a simple truss, extending from the apex to the middle of the bottom chord. Compare "**Queen Post Truss**".

Knock-on-Union

A pipe fitting on a bitumen kettle with ear-like projections for hammering the union tight.

Koresin

A petroleum distillate fraction. It was prepared by the Germans during World War II by reacting p-tert-butyl-phenol with acetylene in the presence of a zinc naphthenate. It was used as a **tackifier** for Buna A. It is a good **tackifier** for **SBR**.

KSK

A German self-sealing waterproofing membrane used as a modified bitumen membrane for waterproofing foundation walls.

Laced

Woven or lapped back and forth.

Ladder Jack

Braces used to support scaffold planks between two ladders. Ladder jacks should always be used only on ladders capable of supporting all live loads with extreme caution, on solid, level ground. Planks used over ladder jacks should always be tied off with rope or heavy gauge wire or securely nailed.

Laitance

An accumulation of fine particles on fresh cement caused by the upward movement of water; it is an indication of too much water used at the time of mixing, resulting in poor surface adhesion for a waterproofing layer.

Laminated Wood

Layers of wood cemented, screwed or nailed together to form a unit.

Lamination

The process of joining thin layers of material together under heat and pressure (with an adhesive) into a

finished product. Scrim, fibers, or mats may be introduced between the two components being laminated to serve as reinforcement in the finished sheet. Compare "**Delamination**".

Langley

A unit of energy per unit area, commonly employed in radiation theory; equal to 1 gram-calorie per square centimeter (1 g-c/cm^2). This unit of measurement is used in accelerated weathering energy measurements of roofing materials.

Lap

The part of a roofing unit that covers the preceding course in any overlapping roofing application. Applied to shingles, Built Up-Roofing felts, and most other types of roofing. **Edge Lap**: The amount of overlap of the edge of a ply of roofing felt over the previous ply. Also called "**Side Lap**". **End Lap**: The amount of overlap at the start of a roll of felt over the end of the previously laid roll. **Head Lap**: In shingle or other overlapped unit roofing, the amount that the head of an underlying unit is lapped by the lower edge of the uppermost overlying unit at that location. For double-coverage units, the head lap is the unit width minus twice the exposure. A **Side Lap** is the horizontal distance that the shingle overlaps the adjacent shingle in the same course. Also the horizontal distance one sheet of roofing overlaps an adjacent sheet. **Lap Cement**: A cut-back asphalt used for cementing the overlaps of cold-application roll roofing.

LASE

In testing, the load at specified elongation.

Lateral Thrust

That component of a load which is exerted in the horizontal direction.

Latex

An aqueous colloidal **emulsion** of rubber (natural or synthetic or certain polymers. It generally refers to the emulsion obtained from a tree or plant or produced by emulsion **polymerization**. **Natural Latex** is a stabilized natural rubber latex having a total solids content of about 40 percent. Prior to 1940, it was a popular item of commerce but the concentrated versions of natural rubber latex have largely replaced it. **Synthetic Latex** is a synthetic rubber latex prepared by reacting monomers to a high molecular mass using an **emulsion polymerization** process. The reaction may be chemically stopped, unreacted monomers removed, stabilization increased, and the latex concentrated to higher solids. Some synthetic rubber lattices, such as cis-polyisoprene, may be made by emulsifying a solution of the rubber, stripping the solvent and concentrating the dilute latex.

Latex Cement

An adhesive cement made from liquid latex by compounding with suitably prepared **curing** agents and **fillers.**

Lath

A building element made of wood, metal, gypsum, or fiberboard fastened to the frame of a building to serve as a plaster or concrete base.

Laying Line

Lines printed in machine direction on roll roofing to provide a visible means of measure of the amount of lapping in laying a built-up roof.

Leaching

The dissolving out of soluble substances when water runs slowly through a roofing system, often responsible for ugly staining on ceilings and walls when the water leaks to the interior.

Leader

See "**Downspout**".

Lean-to

A sloping roof resting against a higher wall of a building. A roof elevated on two adjoining sides and ground level on the other two sides used as a temporary shelter.

Ledger Strip

A strip of lumber fastened along the bottom of the side of a beam on which joists rest.

Leg

In standing seam sheet metal roofing, the height of the seam from the metal roofing surface. Standard leg heights are 1½" for standard seam and 2" for double seams.

Life Cycle Costing - LCC

The extension of cost/benefit ratios over the complete design life of a structure; its premise in the roofing industry is that added initial costs can substantially reduce lifetime operating costs in relation to energy expended for heating and cooling, maintenance and repair, and replacement costs of inferior materials. Life cycle cost per square foot can be determined by taking the total initial cost of the entire roof and projected maintenance and repair expenses during the intended service life of the roof, divided by the number of square feet.

Lift

An expression used for the thickness of a single pass of sprayed polyurethane foam application. A device used to convey material to the roof for application. See "**Hoist**".

Light-Weight Concrete

See "**Concrete; Light-Weight**".

Light Well

A vertical tunnel through the roof/ceiling system which channels light from the roof level to the ceiling level. Increased light well depth will decrease the amount of light which reaches the interior of the building, although this can be partially compensated for by increasing the horizontal area (length times width) of the bottom of the light well.

Lignin

That part of plant material that together with cellulose forms the wood cells walls of plants and cements them together. A colorless to brown substance removed from paper-pulp using sulfite liquor. Lignin may be used in rubber formulation.

Lime

Hydrated Lime or calcium hydroxide ($Ca(OH)_2$), is an inorganic **accelerator**.

Limestone

Sedimentary rock, principally calcium carbonate ($CaCO_3$), an inexpensive inert **filler**.

Lining

A material used to protect inner surfaces, as of tunnels, pipes, or process equipment. A waterproofing structure used to contain or hold water from seepage (as in an artificial lake, fountain, swimming pool, or **spray pond**).

Liquid State

Characterized by free movement of the constituent molecules among themselves, but without the tendency to separate from one another.

Live Loads

Moving or non-permanent loads such as wind, snow, ice, rain, ponding water, portable equipment or traffic that the roof structure must endure in addition to the dead load. Compare "**Dead Load**".

Load Pounds

Unit of measurement for a mechanical fastener's ability to resist external forces.

Lookout Rafters

See "**Rafters; Lookout Rafters**".

Loosely Laid Roof System

Design concept in which insulation boards and membrane are not anchored to the deck, but ballasted by loose aggregate or concrete pavers. This assembly may only be used on roof structures capable of supporting the added weight of the ballast, which is generally applied at the rate of 10 pounds per square foot of roof area.

Louver

A slatted opening for ventilation in which the slats are so placed to exclude rain, sunlight, or vision.

Low Temperature Flexibility

A test which determines the lowest temperature a roofing membrane can resist cracking when wrapped around a mandrel with a given radius, and specified speed of bending after being cooled to a specific temperature. Low temperature flexibility is important, especially in a membrane which is to be installed during the winter and in cold climates.

Low Temperature Resistance

The lowest temperature at which a material does not fracture or crack under prescribed impact and flexing conditions. Expressed in °F or °C.

LP

Liquid Propane. Used in applying modified bitumen with a propane torch. The handling of liquid propane requires certain safety precautions and should not be used by other than knowledgeable individuals.

Machine Direction

The direction of a material being tested for strength being the same direction as the material is rolled on the spool. Abbreviated M.D. or MD. Compare "**Cross Direction**".

Macro Roof

See "**Prefabricated Roofing System**".

Macromolecule

A large molecule, usually a high polymer.

Macroscopic

Capable of being seen with the eyes without the use of a microscope.

Magnesia

(1) **Heavy calcined magnesium oxide** prepared by calcination of magnesite (natural magnesium carbonate), and then ground for use as an inorganic **accelerator** and **activator**, chiefly in molded goods and hard rubber. (2) **Light calcined magnesium oxide** prepared by calcination of purified magnesium carbonate, and magnesium hydroxide, or both. It has a fine particle size and a bulk factor of 160 or 480 kg/m^3 (10 to 30 lb/ft^3) and is used chiefly in **neoprene** stocks.

Magnetic Separator

In reclaiming, an electromagnet that removes ferrous metal from ground scrap passing under it.

Magnetic Sweeper

A surface preparation device containing a magnet on two wheels that can be rolled over a job site to remove nails, screws and other ferrous metal debris to avoid puncturing of membranes to be applied.

Mandrel

A hollow or solid pole, usually of steel or aluminum, often with the ends equipped for rotation in a striping lathe. It is used for forming lengths of rubber tubing or hose and in the testing of materials for their "**Low Temperature Flexibility**".

Manila

A strong rope made of hemp; the only type of rope recommended for hoisting operations.

Man-Made Mineral Fibers (MMMF)

Often abbreviated MMMF, it is also sometimes referred to as Man-made vitreous fibers (abbreviated MMVF), which is more technically accurate. It is a family of man-made, amorphous, glassy products, including fibrous glass, mineral wool (rock/slag) and ceramic fibers.

Mansard

A nearly vertical roof system, typically a **fascia**. A roof having a double slope, the lower of which is longer and steeper.

Mastic

A glasslike, brittle, yellow to greenish yellow resinous exudation of the mastic tree used in medicine, condiments, adhesive, incense, and lacquer. A mixture of finely powdered rock and asphaltic material used for highway construction. See "**Mastic Asphalt**".

Mastic Asphalt

Trowelable bituminous paste made by adding mineral fillers (sand, asbestos, crushed rock or similar material) to concentrated cutbacks that has a "non-sag" consistency. Also called **asphalt mastic**, **plastic** or **flashing cement**. **Mastic Pan** is a flanged metal collar incorporated into a Built Up-Roofing membrane around a penetrating item through the roof and filled with mastic. A mastic pan is also called a "**Pitch Pocket**" or "**Pitch Pan**".

Material Safety Data Sheet (MSDS)

A document containing information about a product, including chemical and physical properties, and health and safety considerations. Manufacturers are required by OSHA (see "**Hazard Communication Standard**") to prepare and distribute current and effective MSDSs to their customers.

MB

See "**Modified Bitumen**".

MBMA

Metal Building Manufacturers Association.

MCA

Metal Construction Association.

Mean Free Path

The average distance that an enclosed gas molecule travels before striking another gas molecule. In cellular thermal insulation, when the *mean free path* becomes equal to the average distance a gas molecule travels before striking a solid part of the insulation, the conductivity of the insulation begins to decrease with decreasing pressure.

Mean Stress

The algebraic difference between maximum and minimum stress in one cycle of fluctuating loading, as in a **fatigue test**. Tensile stress is considered positive and compressive stress negative.

Mechanically Attached

A method in which roofing materials are securely attached to the roof decking usually by means of screw-type fasteners and a load distribution plate or a bar attachment. See "**Fastener**".

Melamine Resin

A synthetic resin made from melamine and formaldehyde.

Melting Point

The temperature at which a polymer loses its crystalline character, as evidenced by X-ray diffraction studies. It is also called the "**X-ray Melting Point**". For low-molecular mass solids, it is the temperature at which a solid melts and becomes liquid.

Membrane

A continuous flexible (or semi-flexible) roof covering that forms the water control element of a roofing system. It is normally assembled on site from single or multiple plies of material, (e.g., polyvinyl chloride roofing in single-ply systems and bituminous felt roofing in multiple-ply systems). **Membrane Migration** is progressive movement of roofing membranes in one or in both directions that can occur on roofs due to thermal shrinkage. It can move improperly adhered insulation and tear flashing at roof edges. **Membrane Reinforcement** is woven or non-woven fabrics used for saturation and embedment in mastic and coating applications to provide strength, continuity and impact resistance.

Memory

The design properties of a material that give it a tendency to return to its original configuration. Sometimes called "**Recovery**" or "**Springback**".

Mer

A residual monomeric unit or the chemical-structural unit of a polymeric molecule. It is the simplest form in which the polymer may be expressed.

Mercaptan (R-S-H)

A group of organosulfur compounds that are derivatives of hydrogen sulfide (in the same way that alcohols are derivatives of water); have a characteristically disagreeable odor, and are found with other sulfur compounds in crude petroleum; an example is methyl mercaptan. Also known as "**Thiol**".

Mesh

(1) A metallic screen or woven wire used as a reinforcement for concrete, plaster or stucco. (2) The square opening of a sieve.

Mesothelioma

A rare cancer which affects mesothelial tissue, the tissue lining the outside of the lung and other organs. Inhalation of asbestos fibers can be a cause of mesothelioma.

Metal Building Manufacturers Association (MBMA)

Metal Construction Association (MCA)

Metal Film

A layer of foil made from a single metallic substance or from an alloy. This foil, when used in a modified bitumen roofing membrane, is laminated to the membrane at the factory. It serves as the weathering surface of the membrane, providing strength, reflectivity, and ultraviolet protection.

Mica

A mineral, muscovite, or aluminum potassium silicate ($3Al_2O_3{\cdot}K_2O^6SiO_2{\cdot}2H_2O$), a flake, which is used as a dusting powder and lubricant used in manufacturing processes. Also called "**Talc**".

Micrometer

An instrument by which minute measurements of length, depth, or thickness may be made.

Micron

An obsolete term, replaced by and equal to micrometer (µm). A unit of measure equal to one millionth of a meter, or one thousandth of a millimeter. Often used to indicate the thickness of a very thin sheet or film (25,400 microns = $^1/_{1000}$ inch = 1 mil).

Midget

Small.

Migration

The tendency of bitumen in a roof system to move or slip when exposed to high temperatures.

Mil

A unit used in measuring thickness, being 0.001 inch. (British equivalent: Thou., Metric equivalent: 25,400 microns = 0.00254 millimeter).

Mill Deck

A type of wood roof deck constructed from wood planks placed on edge vertically and spiked or nailed together.

Milligrams Per Cubic Meter (mg/m^3) or (mg/M^3)

The weight of dust, in milligrams, per cubic meter of air sampled (see "**Gravimetric Exposure Monitoring**"). There are one million cubic centimeters (cc or c^3) in a cubic meter.

Millimeter

A unit of measure equal to one thousandth of a meter or 0.03937 inches.

Millimicron (mµ)

An obsolete term, replaced by nanometer (nm) meaning one thousandth ($^1/_{1000}$) of a micron, or 10^{-9}m. A unit of length used in measuring light waves, etc.

Mineral Aggregate

An aggregate consisting of a mixture of broken stone, broken slag, crushed or uncrushed gravel, sand, stone, screenings and mineral powder.

Mineral Rubber

commonly used to denote solid bituminous materials such as natural **asphalt** (**gilsonite**) and artificial petroleum asphalts (usually **air-blown**) used in rubber compounding as an **extender** and a softener. Chemically, it is unrelated to rubber.

Mineral Stabilizer

A fine, water-insoluble inorganic material, used in admixture with solid or semisolid bituminous materials, usually limestone powder, up to 50% by weight.

Mineral Surfaced Roofing

Roofing that is coated on both sides with asphalt and on the weather side or exterior with natural or synthetic colored mineral granules, usually for only the exposed portion of the felt, not the part that is overlaid.

Mineral Wax

Ozokerite. Mixed natural hydrocarbons, solid paraffin.

Mineral Wool

A material used for insulating buildings, produced by sending a blast of steam through molten slag or rock; common types now in use include rock wool, glass wool and slag wool.

Mini Mopper

A small container with wheels that can be pushed along over the roof to dispense bitumen for the laying of roofing felts.

Minimum Bend Radius

The minimum radius to which a sheet material or wire can be bent to a specified angle without failure.

Modified Bitumen (MB)

Prefabricated bitumen roofing membranes modified by the use of polypropylene (Atactic Polypropylene - APP), polybutadiene (Styrene-Butadiene-Styrene - SBS), and elastomeric or polymeric compounds, which can be torch-applied or hot-mopped with asphalt during application. Modified bitumen sheets can be smooth

surfaced, or surfaced with granulated aggregates, polyethylene film, and metal (copper, aluminum, and/or steel). Reinforcements are generally fiberglass and polyester scrims and mats.

Modifier

Any compound that is added to a formulation to obtain a certain enhancement in properties and achieve a desired performance. An example would be a **mercaptan**, that enters the chain reactions in the polymerization system and modifies the average molecular mass of the polymer, giving a polymer with lower viscosity than would otherwise form. Another example would be adding a few percent of rubber to asphalt increases its toughness and elongation properties.

Modulus

(1) The "Absolute Value". (2) The ratio of stress to strain. In the physical testing of a material, it is the force in pounds per square inch or pascals of initial cross-sectional area necessary to produce a stated **percentage elongation**. Alternate term for "**Modulus of Elasticity**".

Modulus of Elasticity

The ratio of stress corresponding to strain (within the elastic limit of a material); A measurement of the stiffness of a material. Abbreviated **MOE**. Also known as "**Coefficient of Elasticity**" and "**Young's Modulus**". See "**Modulus**".

Depending on the type of loading represented by the stress-strain diagram, modulus of elasticity may be reported as: compressive modulus of elasticity (or modulus of elasticity in compression); flexural modulus of elasticity (or modulus of elasticity in flexure); shear modulus of elasticity (or modulus of elasticity in shear); tensile modulus of elasticity (or modulus of elasticity in tension); or torsional modulus of elasticity (or modulus of elasticity in torsion). Modulus of elasticity may be determined by dynamic testing, where it can be derived from complex modulus.

Modulus used alone generally refers to tensile modulus of elasticity. Shear modulus is almost always equal to torsional modulus and both are called modulus of rigidity. Also known as "**Elastic Modulus**" and "**Coefficient of Elasticity**".

Modulus of Rigidity

The rate of change of strain as a function of stress in a specimen subjected to shear or torsion loading. It is the modulus of elasticity determined in a torsion test. **Apparent modulus of rigidity** is a measure of the stiffness of plastics measured in a torsion test (ASTM D-1043). It is "apparent" because the specimen may be deflected past it proportional limit and the value calculated may not represent the true modulus of elasticity within the elastic limit of the material.

Modulus of Rupture

The value of unit fiber stress computed on the assumption of linear variation of stress when a beam is ruptured under a known transverse load. In a flexure test, modulus of rupture in bending is the maximum fiber stress at failure. In a torsion test, modulus of rupture in torsion is the maximum shear stress in the extreme fiber of a circular member at failure. Alternate terms are **flexural strength** and **torsional strength**.

Modulus of Toughness

The work done on a unit volume of material as a simple tensile force is gradually increased from zero to the value causing rupture. This may be calculated as the entire area under the stress-strain curve from the origin to rupture. See the diagram under "**Deformation Energy**". Toughness of a material is its ability to absorb energy in the plastic range of the material.

MOE

See "**Modulus of Elasticity**".

Moisture Barrier

See "**Vapor Barrier**".

Moisture Content

The amount of water in a material, such as wood, fabric, paper, and roofing membranes, generally expressed as a percentage of the oven-dry weight of the material.

Moisture Detection

Nuclear Meters sense the amount of hydrogen in the roofing system at each spot. Since most dry roofs contain hydrocarbons, they do not give zero readings. When water also is present on the roof, nuclear

readings increase since water contains hydrogen. **Capacitance Meters** create an alternating current electrical field in the roofing system below. When there is water in the roof, its dielectric properties change and the reading on the capacitance meter increases. Capacitance Meters do not "see" deeply (a few inches at most) into the roofing system. Both Nuclear Meters and Capacitance Meters take readings at the spots on the roof where they are placed. It is common to mark a grid on the roof with points spaced from 5 to 10 feet apart. **Infrared Scanners** sense the temperature of the surface of the roof. Wet insulation changes the ability of the roofing system to store and conduct thermal energy, thereby causing changes in its surfaced temperature which the infrared scanner can detect. Instead of a meter reading, the infrared results are presented as shades of brightness on a video monitor. This qualitative visual image provides information about every square inch of the roof, but the information is more subjective than the numbers generated at grid points by nuclear or capacitance meters.

Mole Run

A meandering ridge in a membrane not associated with insulation or deck joints.

Monitor

A continuous section of roof raised to admit light on a vertical plane.

Monolithic

A single form or piece. A continuous mass of material, e.g., monolithic concrete. Formed or composed of a material without joints or seams.

Monomer

Class of molecules with molecular weight ranging roughly between 30 and 250, capable of combining into huge, polymeric macromolecules, 100 to 10,000 times as large as the basic monomeric molecules, through chain-like repetition of the basic monomeric units.

Mooney Shearing Disc Viscometer

See "**Viscometer; Mooney Shearing Disc**".

Mop

A tool used for the application of hot bitumen made from a bundle of cotton or other yarn (such as fiberglass) attached to a long wooden handle. Bitumen soaked up and held by it when dipped into a container of hot material is transferred to and spread on the roof. See "**Mopping**".

Mop and Flop

Application technique in which roof system components (e.g., insulation boards, felt plies, cap sheets) are first placed upside down adjacent to their final locations, coated with adhesive, turned over, and adhered to the substrate.

Mopping

An installation of bitumen applied with a mop or mechanical device to the substrate or to the felts of a Built Up-Roofing membrane. **Full Mopping** is an application to provide a continuous reasonably uniform layer of bitumen over the entire surface being mopped. Also called "**Solid Mopping**". **Spot Mopping** is an application of bitumen in roughly circular spots 16 inches to 20 inches (400 mm to 500 mm) in diameter in a uniform pattern providing unmopped strips in a grid pattern or between staggered spots. **Strip Mopping** is an application of bitumen in parallel bands roughly 8 inches (200 mm) wide with 4 inches (100 mm) unmopped bands between . Also called **Channel** or **Ribbon Mopping**. **Sprinkle Mopping** is an application by haphazardly sprinkling or dribbling of small amounts of bitumen onto a surface with a mop or broom. Also called **Drip** or **Dribble Mopping**.

Mortar

A substance produced from prescribed proportions of cementing agents, aggregates and water which gradually sets hard after mixing.

Movement Joint

See "**Expansion Joint**".

MSDS

Material Safety Data Sheet, now required by Federal Occupational Safety and Health Administration regulations for all construction materials. (U.S. Department of Labor Occupational Safety and Health Administration Form OMB No. 44-R1387, OSHA-20, Rev. May 72)

Mud Cracking

Surface cracking resembling a dried mud flat.

Nailer

(1) A member, usually of wood, set into or secured to non-nailable roof decks or walls to allow for positive anchorage by nailing of roofing felts, insulation or flashings. Also called "**Nailing Strips**". (2) A mechanical tool, driven by electricity, air (pneumatic), hydraulics, or powder used for nailing roofing components to a substrate or other component.

Nailing

Fastening of roofing materials by nails or other hammer driven special fasteners. **Back Nailing** is the practice on a sloping roof of blind nailing overlapping roofing felts to a nailable substrate or to specially provided nailing strips in addition to adhering all the plies with bitumen to prevent slippage. **Blind Nailing** is an application of roofing in such a manner as to cover all nail heads by overlapping material. Also known as **Concealed Nailing**. **Butt Nailing** is the placing of nails in the butt portion of a shingle (face nailing). **Clinch Nailing** is to bend over the protruding ends of nails to resist withdrawal. **Exposed Nailing** is an application where the nail heads are exposed to the environment. **Face Nailing** is an application where nails are driven through at right angles to its exposed surface.

Nailing Planks

Wooden planks set in hot bitumen so finish flooring can be nailed over a waterproofed deck or subfloc

Nails

Based on the process of manufacture, there are three kinds of nails in common use: 1) Plate or Cut Nails, Wire Nails, and Clinch Nails. **Aluminum Nails** are used for the same purposes as wire nails. Also a special purpose nail for roofing, aluminum flashing, etc. **Brads** are thin nails with a small head used for small finish, panel molding, etc. They vary from ¼ to 2 inches in length. **Clinch Nails** are made from open hearth or Bessemer steel wire. These nails are only used in places where it is desired to turn over the end of the nails to form a clinch, as in the case of battens or cleats. In **Coated Wire Nails,** the coating consists of various resinous gums to increase the withdrawal resistance. **Copper** and cast **Brass Nails** are used in building for attaching similar metal to wood. **Cut Nails** are stamped from a strip of rolled iron or steel of the same thickness as the nail and a little wider than its depth. **Pin Nails** are small galvanized nails (3d or 4d) used for face nailing on a ridge when needed. **Wire Nails** are made from wire, of the same section-diameter as the shank of the nail, by a machine which cuts the wire in even lengths, heads and points them, and when desired, also barbs them.

Nap

The texture formed by the length of the fibers on the head of a roller mop.

NBP

"**Acrylonitrile Butadiene Polymer**".

NBR

"**Acrylonitrile Butadiene Rubber**".

NDE

"**Non-Destructive Evaluation**".

Neat Cement

A cement mortar mixture made up without the addition of sand or other aggregate.

Necking

The localized reduction in cross section that may occur in a material under tensile stress.

Neoprene

A generic term for polymers and copolymers of 2-chloro-1,3-butadiene. A material formed by the polymerization of chloroprene (Polychloroprene) which are compounds resistant to oil, sunlight, and ozone (O_3).

Neoprene Coatings

Elastomeric coatings based on polychloroprene rubbers. They are low-solids, fast-drying, single-component coatings used as vapor retarders and as primers for other coatings. They should be **top coat**ed from exterior exposure.

Neoprene Rubber

An elastomer (synthetic rubber - polychloroprene) having physical properties closely resembling those of natural rubber, but not requiring sulphur for vulcanization. It is made by polymerizing chloroprenes produced from acetylene and hydrogen chloride.

NESCA

National Environmental Systems Contractors Association located in Arlington, VA

Nineteen-Inch Selvage

A prepared roofing sheet with a 17 inch (432 mm) granule-surfaced exposure and a 19 inch (483 mm) selvage.

Ninety Pound Roll Roofing

A prepared roll roofing with a granule-surface exposure that has a mass of approximately 90 lb/108 ft^2 (4400 g/m^2)

NIOSH

National Institute for Occupational Safety and Health. It is a branch of the Department of Health and Human Services. NIOSH's responsibility includes the development of sampling and analytical test methods for industrial hygiene monitoring, and the recommendation of workplace permissible exposure limits (PEL

NIST

National Institute for Standards and Technology. Formerly known as the National Bureau of Standards (NBS)

NIST Abrader

National Institute for Standards and Technology Abrader is a type of abrasion tester used principally for rubber soles and heels in which the volume loss of the test article is compared with that of a standard vulcanizate.

Nitrile Alloy

An elastomeric material of synthetic non-vulcanizing polymers. These alloys are generally compounded from butadiene-acrylonitrile copolymers, (NBP), PVC, plasticizers, and other proprietary ingredients.

Nitrile Rubber

A generic term comprising the various copolymers of butadiene and acrylonitrile. The copolymers very essentially in butadiene-acrylonitrile ratios, **Mooney Viscosities**, and staining properties. They are resistant to solvents, oils and greases, and to heat and abrasion. Their trade names are Butaprene, Chemigum, Hycar, and Paracril. The Germans first produced the nitrile rubbers before World War II (Perbunan).

Nominal

Meaning "in name only". Used in the roofing industry to indicate that stated thicknesses of insulation may vary slightly.

Nominal Stress

In testing, the stress calculated on the basis of the net cross-section of a specimen without taking into account the effect of geometric discontinuities such as holes, grooves, fillets, etc.

Non-Bearing Partition

A wall which separates space into rooms, but supports no vertical load except its own weight. Also called "**Curtain Wall**".

Non-Combustible

As applied to building construction, means a material that is classed as noncombustible when tested in accordance with CSA B54.1 "Determination of Non-combustibility of Building Materials".

Non-Destructive Evaluation (NDE)

A method of measuring any property of a material that leaves the material intact and without damage to its physical properties or function. Compare "**Destructive Evaluation**".

Non-Oxidizing

Descriptive of a compound that withstands accelerated weathering, without oxidizing. Does not become hard after exterior exposure.

Non-Slip or **Non-Skid**

A term applied to walk, road, floor or other surfaces specially prepared to minimize slipping.

Non-Vulcanized

A membrane manufactured from thermoplastic compounds that retains its thermoplastic properties throughout the life of the membrane and is therefore "uncured".

Non-Woven

A term used to describe the random arrangement of reinforcing fibers (e.g., glass, polyester, etc.) in a mat or scrim. A fiber that is not weaved or knitted. Compare "**Fabric**".

NR

Nitrile Rubber.

NRCA

National Roofing Contractors Association (USA).

NTB

Non-Thermal Bridging.

OD

The abbreviation for Outside Diameter.

OEM

Original Equipment Manufacturer.

Oil Canning

Slight buckling in metal that causes a wavy or uneven appearance.

Oil Resistance

The ability to withstand swelling by a specified oily liquid for a specified time and temperature, expressed as percentage swelling or volume increase of specimen.

Oil Swell

The change in volume of a rubber article resulting from contact with oil.

Oil Soluble

Capable of being dissolved almost completely in vegetable or mineral oils, including linseed oil, turpentine, benzene, solvent naphtha, and mineral spirits.

Olefin

[ORG CHEM] C_nH_{2n} A family of unsaturated, chemically active hydrocarbons with one carbon-carbon double bond; included ethylene and propylene. [TEXTILE] A manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 85% by weight of ethylene, propylene, or other olefin units except amorphous (noncrystalline) polyolefins qualifying as rubber.

Oleoresin

A resin-essential oil mixture with pungent taste; extracted from various plants. Varnishes and other sealants can be made with oleoresin by compounding the resin with oxidizable oils, such as linseed oil or soy oils, used as a drying agent.

Oligomer

A polymer consisting of only a few monomer units such as a dimer, trimer, tetramer, etc., or other mixtures.

On Center (o.c.)

a term used to define the point from which measurements are taken - from the center of one member to the center of the adjacent member as in the spacing of studs, joists or nails. Also called "**Center to Center**".

Open Time

After a contact adhesive has been applied and allowed to dry, the period of time during which an effective bond can be achieved by joining the two surfaces to be adhered.;

Open or Vented System

Positive flow of air primarily relating to D.W.V. (Drain, waste or vent pipe.)

Operating Stress

The stress imposed on a material in service.

Optimum Cure

The state of vulcanization that comes closest to developing the desired combination of properties.

Orange Peel

An uneven (but acceptable) surface of a sprayed polyurethane foam (PUF), somewhat resembling an orange peel.

Organic

Any chemical or chemical compound which is composed of or which contains carbon. See "**Hydrocarbon**". Compare "**Inorganic**".

Orthotropic

Having elastic properties with considerable variations of strength in two or more directions perpendicular to

one another. Compare "**Anisotropic**", "**Isotropic**".

OSHA

Occupational Safety and Health Administration. An agency of the U.S. Department of Labor that is charged with the responsibility for ensuring the safety and health of the American worker through development and enforcement of standards and regulations.

Outriggers

Supports extending over the roof edge and securely counter-balanced to support the weight of a debris chute used during reroofing tear-off.

Oven-Aging Test

Accelerated aging test in which aging proceeds in a dark oven through which hot air flows slowly at atmospheric pressure and the changes in the test piece are measured.

Oven Curing

An oven for vulcanizing rubber compounds. Shoes and many other compounds are often vulcanized in ovens under the pressure of steam or air.

Overdriving

Torquing down a mechanical fastener too hard or trying to drill it farther into the deck than it should go, which can damage the substrate causing the fastener to lose pullout strength, or can damage the membrane or insulation through excessive compression.

Overhang

The part of a roof structure that extends beyond the exterior walls of a building.

Overheating

The heating of bitumen for application of roofing to a temperature that permanently alters the characteristics of the material.

Overspray

Excessive airborne spray when applying a liquid coating.

Overstressing

In testing, the application of high fluctuating loads at the beginning of a fatigue test and lower loads toward the end. It is a means for speeding up a fatigue test.

Oxidation

In asphalt refining, the addition of oxygen to the hot liquid bituminous material by blowing air through the melted material to improve its properties. On a roof, the hardening of the asphalt coating caused by the action of the sun and air.

Ozone (O_3)

An allotropic form of oxygen, produced by the action of electrical discharges or of certain ultraviolet wave lengths of light on oxygen. It is a gas with a characteristic odor, and is a powerful oxidizing agent. Rubber compounds in a stretched condition are susceptible to the deteriorating action of ozone in the atmosphere which results in the surface cracking.

Ozone Resistance

The ability of rubber to resist the deteriorating effects of ozone. Test methods for ozone resistance are described under ASTM D-3041 (static); ASTM D-1149 (flat specimen); ASTM D-1171 (triangular specimen); under dynamic strain conditions.

Paint

Blistering is the of forming of bubbles or blisters on the painted surface while the paint coat is still elastic. **Checking** is the act of cracking in paint. **Colloidal Paints** are those made with pure pigments and without fillers. The pigments are not ground, but are reduced to extremely fine particles and colloidally suspended in the vehicle. A **Drier** is a volatile liquid that assists the paint mixture in drying. **Filler** consists of a drying vehicle and an inert filler to level out the pores or cells of coarse grained wood, such as oak. **Incompatibility** refers to successive paint coats of radically different composition causing premature failure of the final coat. **Peeling** is the final stage in the failure of a coat of paint due to excessive moisture in the wood behind the paint, or to incompatibility of successive coats. **Pigment** is the solid ingredient of paint, giving it color and contributing to the body of the paint. **Plastic** paint is a coating applied by brush

or spray that contains plastic resins. The **Priming Coat** is the first coat of paint applied to the new surface. **Varnish** is a coating containing natural or synthetic varnish resins which will reveal the grain and natural or stained color of the wood it protects. The **Vehicle** is the liquid ingredient which, upon drying, gives adhesion of pigment particles to each other and to the object being painted and contributes to the body of the coat.

Pan Tile

A bottom roll tile or "pan" used in clay tile application. This tile is inverted on the deck so that the cover tiles fit and drain into them. See "**Cover Tile**" and "**Roll Tile**".

Panel

A large, thick board or sheet of lumber, plywood, or other material. A thin board with all its edges inserted in a groove of a surrounding frame of thick material. A portion of a flat surface recessed or sunk below the surrounding area, distinctly set off by molding or some other decorative device. Also, a section of floor, wall, ceiling or roof, usually prefabricated and of large size, handled as a single unit in the operations of assembly and erection.

Paraffinic Oils

Petroleum oils containing chiefly long chained paraffin hydrocarbons, having the general formula of C_nH_{2n+2}.

Paraffins

Paraffin saturates are that portion of the material that does not react with cold fuming sulfuric acid. A further analytical characteristic of paraffins is that they are not adsorbed on silica gel; All the other components are adsorbed on silica gel under certain prescribed conditions.

Parapet (**Wall**)

A low wall along the edge of and surrounding a roof deck. It is generally an extension of exterior building walls or party and fire walls that usually extend about 3 feet (1 meter) or less above the roof. A wall which serves as a guard at the edge of a balcony or roof.

Partially Attached

A roofing assembly in which the membrane has been "spot fixed" to a substrate, usually with an adhesive, such as contact cement, or a mechanical device. See "**Mechanically Attached**". Compared "**Loosely-Laid**".

Parting Agent

Fine sand, mica, talc or similar material spread over the surface of, typically, coated bituminous felt or EPDM, to prevent sticking to itself in the roll.

Patina

[MET] The greenish complex product, usually basic copper sulfate ($CuSO_4 \cdot 5H_2O$) as its main constituent, while containing other metal oxides and carbonates, formed on copper and copper-rich alloys as a result of prolonged atmospheric exposure. Can be produced artificially, and this process is referred to as patination. Many formulations of patinations are kept as trade secrets or are patented.

Pattern

The repeating design features formed by the shingles when properly applied.

Pattern Lines

Normally the vertical alignment of the **bond lines** (or **cut outs**) on a 3-tab or 2-tab shingle roof.

Patterns

4 Inch Pattern. On a 3-tab roof when the bond lines of adjacent rows are offset four inches. **5 Inch Pattern**. On a 3-tab roof when shingles are consistently offset to either the left or right forming slanted or diagonal bond lines five inches apart. **6 Inch Pattern**. On a 3-tab roof when the shingles are offset either left or right six inches leaving pattern lines six inches apart vertically. **Half Pattern**. When the shingles are offset on half tab. With 3-tabs, six inches (a six inch pattern), with 2-tabs, 9 inches.

Peaked Roof

See "**Roof; Peaked**".

Peel Resistance

Torque required to separate and adhesive and adherend in the climbing drum peel test. (ASTM D-1781). It is a measure of **bond strength**.

Peel Strength

The average force (or force per unit width) required to peel any flexible sheet-formed material from a similar

material or other material to which it is bonded, expressed linearly in lbs/in where the angle of separation is 180° and separation rate is 6 in/min. (ASTM D-903). Also called "**Stripping Strength**".

PEL

Permissible Exposure Limit. It is the maximum level of a substance to which an employee may be exposed during any eight-hour sift of a 40-hour week. PELs are established by **OSHA** and are enforceable by law.

Penetration

A measure of the hardness related to viscosity of bitumen as determined by an empirical test that gives the depth of penetration of a weighted needle into a sample after a definite time and at a specified temperature.
A pipe, vent, duct or other device that passes through the roof deck resulting in a discontinuous roofing membrane.

Penthouse

Enclosed space above the level of a main flat roof, as at the top of an elevator shaft or above-roof apartment.

Percolation

Gravity flow of groundwater through the pore spaces in rock or soil, or, slow movement of a liquid through a porous material. In underground waterproofing, a percolation layer refers to a porous material layer above the waterproofing membrane to aid drainage beneath the subfloor to an appropriate drainage system. **Percolation layers** may consist of drainage tiles designed or prefabricated porous panels for this purpose, coarse or fine aggregates. **Percolation tests** are techniques used to determine the rate of flow of water through soil and subgrade materials to assure proper waterproofing design.

Perimeter

The total length of the outer boundary or edge of a roof.

Perimeter Railing

A guardrail or railing placed around the edge of a roof or the use of guardrails in combination with warning lines and a verbal safety monitoring system to protect roofers from the danger of falling off a roof.

Perlite

Aggregate used in lightweight insulating concrete and in preformed perlite insulating board. It is formed by heating and expanding siliceous volcanic glass or ash.

Perlite Institute, Inc.

Perlite Institute, Inc., is an international trade association which establishes product standards and specifications, and encourages the development of new product uses through research. Names of suppliers, cost information, literature and application instructions are available from member companies.

Perm

A unit of water vapor transmission. Defined as one grain of water vapor per square foot per hour per inch of mercury pressure difference (1 inch of mercury (Hg) = 0.491 psi). The formula for perm is:

$$P = \frac{\text{grains of water vapor}}{\text{square foot} \times \text{hour} \times \text{inch mercury}}$$

Petroleum Pitch

A dark brown to black, predominantly aromatic, solid cementitious material obtained by the processing of petroleum, petroleum fractionation, or petroleum residue.

Phased Application

The installation of a roofing or waterproofing system in two or more time intervals requiring nightly tie-offs to the roofing system to maintain roof integrity. Required on some large roofing and waterproofing applications.

phr

Abbreviation used in formulations of rubber compounds indicating parts in mass units (**p**)er (**h**)undred parts of (**r**)ubber or (r)esin.

PIB

"**Poly Iso Butylene**". A synthetic thermoplastic material, from which single-ply roofing membranes can be made.

Picture Framing
The ridging and patterning of roofing membrane over and around deck or insulation joints.

Pigment
(1) properly, a dry colored powder used for coloring paint, rubber, or other mediums by direct **admixture**. In biology, any organic coloring matter whose presence in plant or animal tissues gives color to them. (2) Incorrectly used when including **fillers** and **reinforcing agents**, as well as coloring materials.

Pigment Volume Content (PVC)
In the paint industry, refers to the amount of pigment used in a specific formulation.

PIMA
Polyisocyanurate Insulation Manufacturers Association.

Pimpling
See "**Blisters**, **Surface**".

Pin Hole
A tiny hole in a film, foil or laminate comparable in size to one made by a pin.

Pin Nails
See "**Nails; Pin**".

Pipe Boot
See "**Flashing; Pipe**".

Pitch
(1) A black or dark brown solid cementitious residue that results from the distillation of tar. A tar derived from coal is referred to as **Coal Tar**, and a pitch derived from coal tar is referred to as **Coal Tar Pitch.** (2) The slope of a roof. Also called "**Fall**", "**Incline**", or "**Slope**".

Pitch Pocket
A flanged metal collar placed over penetrating items on roofing and filled with coal tar pitch. Plastic, pitch or mastic pans are also sometimes called pitch pockets. The pocket is filled with hot bitumen and/or flashing cement to seal the joint. The use of pitch pockets is not recommended by NRCA.

Pitched Roof
A roof having a relatively steep slope. See "**Incline**" or "**Slope**".

Plain Concrete
See "**Concrete; Plain**".

Plank Deck
A wood deck of planks, usually 1½ inches to 3½ inches (40 mm to 90 mm) thick and 6 inches to 8 inches (150 mm to 200 mm) wide laid on the flat with tongue and groove or splined edges, and spiked togeth

Plastic Cement
See "**Flashing Cement**".

Plastic Film
A flexible sheet made by the extrusion of thermoplastic resins. When used in a modified bitumen roofing membrane, the plastic film may be used on the outer surface of the membrane to prevent the membrane from sticking to itself when in the roll; or the film can be used as an integral layer within the membrane to serve as a reinforcement.

Plastic Flow, Plastic Deformation
The deformation of a plastic material beyond the point of recovery, accompanied by continuing deformation with no further increase in stress.

Plasticity
The tendency of a material to remain deformed, after reduction of the deforming stress, to a value equal to or less than its yield strength.

Plasticity Number
An index of the compressibility of rubber at elevated temperatures. Equal to 100 times the height of a standard specimen, after a 3 to 10 minute compression by a 5 kg load (ASTM D-926).

Plasticizer
A chemical substance incorporated into natural or synthetic resins to increase its workability, or flexibil

Plastisol
A suspension of a finely divided polymer in a plasticizer.

Plastomeric

Of a thermo**plast**ic elast**omer**. A term used to describe any of a large group of plastic- based materials, possessing elastic or rubber-like properties that repeatedly melts when heated and solidifies when cooled. Compare "**Elastomeric**", "**Thermoset**".

Plastometer

An instrument for measuring the plasticity of a material. See also "**Viscometer**". A **Goodrich Plastometer** is an instrument that measures the plasticity as deformation and recovery of a plastic mass when subjected to a definite load for a specified period of time. A cylindrical sample 10mm long and 1 cm^2 in cross section is placed between two plates having an area of 1 cm^2 and is compressed under a constant load for a defined period of time and specified temperature.

Plaza

A roof terrace. Also called "**Podium**", "**Promenade**"or "**Terrace Deck**".

Plumb

Vertical. To make vertical.

Plumb Bob

A weight attached to a line for testing perpendicular surfaces for trueness.

Ply

A single layer or thickness of roofing material in a roofing membrane. In the case of single-ply membranes, refers to the membrane itself.

Ply Adhesion

The force required to separate to adjoining plies in a rubber product.

Ply Laminate Strength

In a laminated sheet, the force required to separate the coating or facing from the reinforcing or non-reinforcing fabric when peeled in a 180° plane. Expressed as pounds force per prescribed width of sample.

PMR or **PMRA**

"**Protected Roofing Membrane**" or "**Protected Roofing Membrane Assembly**".

Podium

A roof terrace. Also called "**Plaza**", "**Promenade**" or "**Terrace Deck**".

Point Weight

See "**Felt Mill Ream**".

Pointing Trowel

A trowel used in tuckpointing mortar. Tuckpointing is a repair method in which mortar is dug out of joints and replaced.

Poisson's Ratio

The ratio of lateral strain to axial strain in an axial loaded specimen. It is the constant that relates **modulus of rigidity** to **Young's Modulus** in the equation:

$$r = \frac{E}{2G} - 1$$

Where: E = Young's Modulus
G = modulus of rigidity
r = Poisson's Ratio

The formula is only valid within the elastic limit of a material. A method for determining Poisson's ratio is given in ASTM E-132.

Polyamide Resins

A class of resins usually derived from adipic acid and alkylene diamines. Nylon is a well-known polyamide resin.

Polyblended

A generic term for colloidal blends of compatible polymers, such as **poly(vinyl chloride)** and **nitrile rubbers**.

Polybutadiene

Various polymers of 1.3-butadiene. They can be prepared by treatment of butadiene with metallic sodium,

by emulsion type of polymerization and by various stereo catalytic polymerizations in solution by **alfin catalytic** polymerization.

Polychloroprene

The chemical name for Neoprene, a synthetic rubber. See "**Neoprene**".

Polyester

A polymeric resin which is generally cross-linked or cured, and made into a variety of plastic materials and products. Polyester fibers are widely used as the reinforcing medium in reinforced single-ply membranes as they provide high tensile strength and tear resistance. See "**Scrim**".

Polymer

A natural or synthetic chemical compound of high molecular weight, or a mixture of such compounds, formed when small individual molecules, called **monomers**, are combined and linked together to form large long-chain molecules. See "**Polymerization**".

Polymer Chain

The chain of elements that form the basis of the structure of a polymer. The elements may be all carbon atoms, carbon and oxygen in the esters and polyethers, silicon and oxygen in the silicones, carbon and nitrogen in the polyamides, etc.

Polymer Crystallization

See "**Crystallization, Polymer;**".

Polymerization

A chemical reaction in which the molecules of a monomer are linked together to form large molecules whose molecular weight is a multiple of that of the original substance. When two or more monomers are involved, the process is called **copolymerization** or **heteropolymerization**. **Condensation Polymerization**

Polymerization of a monomer or monomers by a **condensation reaction** with the splitting out of water, alcohol, ammonia, etc. **Emulsion Polymerization** is a procedure where by a monomer or a mixture of monomers is emulsified with soap in water, stirred and treated with a polymerization agent, usually a peroxide or hydroperoxide, and a **modifying agent** (**mercaptan**), at a temperature generally above freezing, for several hours to 60 to 75 percent or higher conversion. A short-stop agent, hydroquinone, is added, the unreacted monomers distilled out, an **antioxidant** added, and the product coagulated, washed, and dried. **SBR** is prepared by this method. **Ionic Polymerization** is polymerization catalyzed by ions. **Butyl rubber** is prepared by this method. **Linear Polymerization** is a polymerization that produces a chain consisting of repeating units of atoms arranged in a linear fashion. **Polyvinyl chloride**, polyethyl acrylate, nitrile rubber, poly**butadiene**, and **silicone** rubber are all linear polymers. **Olefinic Polymerization** is the most common type of addition polymerization in which the monomers are ethylene or its derivatives, and the reaction involves the replacement of a double bond in each monomer by two single bonds in the polymer chain. **Suspension Polymerization** is when a monomer is kept dispersed in a non-solvent, usually water, by mechanical action without the aid of an emulsifying agent , and polymerized in large droplets in the presence of a polymerizing agent. Since the drops become sticky as the polymerization proceeds, they would adhere to each other upon collision. However, they are prevented from doing so by the addition of suspension stabilizers, such as slightly soluble calcium salts, finely divided oxides or silicates, and colloidal organic stabilizers, like gelatin and poly-(vinyl Alcohol), all of which are easily removed afterward by washing. The beads or pearls are suspended and are more free of impurities than when polymerized by other methods. This is also known as "**Bead** or **Pearl Polymerization**". **Vinyl Polymerization** are polymerizations of compounds containing the vinyl radical, such as vinyl chloride and methyl acrylate. They are considered to be free radical reactions when they are initiated by peroxides, hydroperoxides, persulfates, diazoamino compounds, bisazonitriles, diazothiolic esters, and diazonium salts or diazotates.

Poly(methyl methacrylate) - (PMMA) - Plexiglas®

A thermoplastic polymer derived from methyl methacrylate, $CH_2$44C(CH_3)COOCH_3; transparent slide with excellent optical qualities and water resistance; used for aircraft domes, lighting fixtures, skylight glazing, optical instruments, and surgical appliances.

Poly(tetrafluoroethylene) - (PTFE) - Teflon®

A thermoplastic, especially used in coatings for fabric roofs due to its flexibility and resistance to heat,

ultraviolet rays, mildew, and salt air.

Polyurethane

A synthetic rubber or resin prepared by the condensation of an organic isocyanate and a polyester or poly ether. The rubber has high abrasion resistance, high tear resistance, and low hysterises.

Poly(vinyl-acetate) - (PVAc)

A polymer of vinyl acetate ($CH_2$44CH-$OCOCH_3$), one of the early commercial polymers. It is used chiefly as an adhesive also in protective films, lacquers, and inks.

Poly(vinyl chloride - (PVC)

Thermoplastic $(CH_2\text{-}CHCl)_n$ polymer of vinyl chloride ($CH^2$44CHCl); tasteless, odorless; insoluble in most organic solvents; a member of the family of vinyl resins; used in soft flexible films for food packaging and in mold rigid products such as pipes, fibers, upholstery, and bristles. A single ply roofing membrane either reinforced or non-reinforced.

Ponding

The collection of water in shallow pools on the top surface of roofing. This is generally from rain and deflection, but certain roofs are designed to hold a shallow depth of water over the whole roof surface for evaporative cooling in summer, often with a water supply to the roof. Unless the roof is specifically designed for evaporative cooling, ponding should be avoided by the design of proper roof slope and proper drainage. Ponding encourages microorganism and bacterial degradation, roof deflection, magnified ultraviolet exposure and ultimate premature failure of the roofing system.

Pop-Up

Condition in mechanically attached roofing systems where the fastener head is pushing the membrane upward and the screw-type fastener has not backed out. Caused by compression of the insulation due to roof traffic, or, in some cases, the insulation has aged causing loss in compressive strength. Compare "**Backout**", "**Tenting**".

Porosity

The presence of numerous small cavities or pores.

Portico

A roofed space, open or partly enclosed, forming the entrance and centerpiece of the facade of a hous

Portland Cement

Hydraulic cement used for making concrete and grout.

Post Cure

Heat or radiation treatment, or both, to which a cured or partially cured thermosetting plastic or rubber composition is subjected to enhance the level of one or more properties.

Pot Life

The period of time during which a reacting thermosetting plastic or rubber composition remains suitable for its intended use after mixing with a reaction initiating agent. Compare "**Shelf Life**".

Pour or **Pour Coat**

A layer of bitumen deposited on the roof surface or the felts by pouring from a bitumen container. **Double Pour** is the application of the top layer of bitumen and the gravel surfacing of Built Up-Roofing into separate operations. This is accomplished by spreading gravel into a first pour coat, brooming off the loose gravel, and then applying additional gravel to a second top coat. **Top Pour** or **Top Coat** is the application by pouring of the top layer of bitumen on Built Up-Roofing. Often used to describe the top layer of bitumen, no matter how it is applied. See "**Flood Coat**". Compare "**Glaze Coat**".

Pourable Sealer

A specific type of sealant used at difficult-to-flash penetrations, typically in conjunction with "Pitch Pockets" to form a weathertight seal. See "**Sealant**".

Powdered Rubber

Rubber, usually prepared by discontinuous coagulation of latex or compounded latex by means of metal salts. The small particles formed do not readily coalesce because of the **protective colloid** present. It is made by flocculating field latex with acid, the flocculate (additive to increase settling) being separated by **centrifuging**, then washed and dried. It appears to be of special use in **asphalt** compositions.

Prefabricated Membrane

See "**Composition Roofing**".

Prefabricated Roofing System

Self supporting, rigid, roofing panels which includes substrate, insulation, vapor barrier, and the exposed membrane in one unit. Also called "**Macro Roof**".

Preload

In a mechanically fastened roof system, the tension between the fastener stress plate and the roof deck. Preload causes friction on the fastener threads in the deck. This is a positive factor in preventing **backout** and **side tear**.

PRIDE

Professional Roofers Improvement Development Education

Primer

A thin solution of coating applied to a surface to improve the adhesion of a heavier coating. Usually refers to a "cutback" bituminous coating of thin consistency.

Principals

See "**Rafters; Principals**".

Processing

Commonly, the manufacturing operations through which rubber passes before it reaches the stage of finished product (for example, mixing, sheeting, calendering, frictioning, coating, spreading, and extruding).

Profile

An outline drawing of a section, especially a vertical section through a structural part. A contour drawi

Promenade

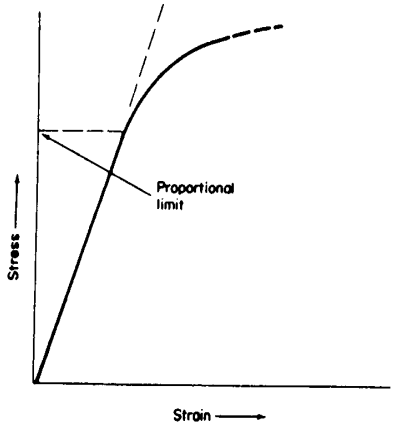
See "**Terrace Deck**".

Proof Stress

In testing, the stress that will cause a specified permanent deformation.

Proportional Limit

The highest stress at which stress is directly proportional to strain. It is the highest stress at which the curve in a stress-strain diagram is a straight line. Proportional limit is equal to elastic limit for many metals.



Protected Membrane Roof (PMR)

A roofing system with the insulation and protective surfacing or landscaping outward from it. Also called "**Inverted Roofing Membrane Assembly**" (IRMA), "**Upside Down Roof**".

Protection Board

Sheet materials applied over waterproofing or dampproofing to protect the applications from the damage of backfilling or other construction activity.

Protective Colloid

A colloid substance which, when added to a lyophobe sol, has the power of preventing the precipitation or coagulation of the sol by electrolytes. Protective power is only shown be reversible (lyophile) colloids and varies from one to another, certain albuminoids such as gelatin and casein showing high protective power,

while other substances such as starch and dextrin have much less effect. Very small concentrations of strongly protective substances are sufficient to prevent precipitation. The protective action of the Lyophile colloid is explained on the assumption that it forms a thin film (**adsorption layer**) over the dispersed particles.

PSF

Force per unit area expressed in pounds per square foot. Note: 1 square foot = 144 square inches.

PSI

Force per unit area expressed in pounds per square inch.

PTFE

See "**Poly(tetrafluoroethylene)**".

PUCA

Polyurethane Contractor's Association is a division of Society of Plastics Industry located in Washington, DC.

Pullout Force

Force required to pull out a mechanical fastener from the deck or substrate measured normally measured in pounds per square inch or kilograms per centimeter squared.

Pullover

When the insulation pulls over the stress plate of the fastener or when the stress plate is pulled through the insulation.

Pullthrough

The point at which the head of the fastener pulls through the stress plate.

Pump

A device for transferring liquid materials, commonly used on kettles and for hot bitumen, proportioners for polyurethane foam, coating systems, or spray applied insulation, among others.

Purlin

A horizontal structural member spanning between beams, frames o trusses to support a roof deck or the rafters or joists supporting a roof deck.

Pushout Force

Force required to push a mechanical fastener head away from its original position to a plane that would adversely affect the roof system.

PVAc

See "**Poly(vinyl)-Acetate**".

PVC

See "**Poly(vinyl) Chloride**" and "**Pigment Volume Content**".

Queen Post Truss

A truss, framed with two vertical tie posts, as distinguished from the King post, which has but one. The upright ties are called Queen Posts.

Radiative Cooling

The process whereby the temperature of a surface drops below outside air temperature as the surface exchanges long-wave radiation with cold night air. Compare "**Solar Radiation**".

Radome

A plastic housing sheltering the antenna assembly of a radar set.

Rafter

One of a number of closely spaced structural members of a sloped roof, usually extending from the eaves to a ridge or hip on a small roof or between purlins on larger roofs to carry the roof deck. **Fascia Rafters** are end rafters at the end of the rake. A **Hip Rafter** is a rafter which forms the hip of a roof. A **Jack Rafter** is a short rafter that spans from the wall plate to a hip rafter or from a valley rafter to the roof ridge. **Lookout Rafters** are short wood members cantilevered over a wall to support an overhanging portion of a roof. **Principal Rafters** are the main rafters of a roof, usually corresponding to the bay divisions of the space below.

Ragging Method

The process of working hot enamel around a pipe by moving a felt sling back and forth around the pipe until the enamel sets up and the felt can be properly adhered to the pipe. See "**Cold Wrap**", "**Hot Wrap**".

Raggle Block

See "**Flashing Block**".

Rake

The edge of a sloped roof at its intersection with a gable. The outer edge of the first or last rafter.

Raspberry

See "**Blister**". Also called "**Blueberry**".

Rate of Cure

The time required to reach a predetermined state of vulcanization under specified conditions.

Rebound Test

A method of determining the resilient properties of vulcanized rubber, by measuring the rebound of a steel ball or a pendulum bob falling from a definite height onto a rubber sample.

Recovery

The degree to which a rubber product returns to its normal dimensions after being stretched or distorted in the deformation under load test (ASTM D-621) and the plastometer test (ASTM D-926). In the deformation under load test, it indicates the extent to which a nonrigid plastic recovers from prolonged compressive deformation at an elevated temperature. It is given as %, and is calculated by dividing the difference between height recovered 1½ hours after load is removed and height after three hours of loading, by the change in height under load. In the plastometer test, it indicates the extent to which an elastomer recovers from compressive loading at an elevated temperature. It is equal to plasticity number minus recovered height.

Re-entrant Corner

An inside corner of a surface, producing stress concentrations in the roofing or waterproofing membra

Reflectivity

The ability of a material to reflect or "throw back" light, heat, radiation, etc. In an air-conditioned building, the reflectivity of a roofing membrane's surface may provide energy savings. Tests have shown that proper reflective properties can reduce roof surface temperatures by as much as 50°F (10°C).

Reglet

A horizontal grove or slot in a wall or other vertical surface projecting above a roof surface or top of the based flashing into which the metal counterflashing is placed and flashing can be secured and sealed. It is either formed in concrete or consists of a metal insert, or a "reglet block" of masonry.

Reinforcement

The strengthening of a membrane by the addition or incorporation of one or more reinforcing materials, including woven or non-woven glass fibers, polyester mats or scrims, nylon, or polyethylene sheeting.

Relative Humidity

The ratio of weight (or partial pressure) of water vapor in an air-vapor mixture to the saturated weight (or partial pressure) of water vapor. It can be stated also as a good approximation that it is the ratio of the vapor pressure of water present in a sample of air to the saturation vapor pressure at the same temperature. Abbreviated R.H.

Relative Modulus

In testing, the ratio of the modulus of a rubber at a given temperature to its modulus at 73°F (22.78°C). It is determined in the Gehman torsional test.

Relaxation

Rate of reduction of stress in a material due to creep. An alternate term is **Stress Relaxation**. When installing certain single-ply membranes, allowing enough time (depending on temperature) for relaxation to occur is important before adhering membrane to the substrate or the material may not lay flat. This is due to memory of the material after being on the roll when delivered from the factory.

Reroofing

The installation of a new roofing membrane or system over an existing roof.

Resilience

Elasticity, or capability of a strained body to recover its size and shape after deformation. The ratio of energy output to energy input in a rapid (or instantaneous) full recovery of a deformed specimen.

Resin

A solid, semi-solid, or pseudo-solid amorphous (non-characteristically shaped) organic material which has an indefinite and often high molecular weight, exhibits a tendency to flow when subjected to stress, usually has a softening or melting range and usually fractures conchoidally. One of a group of components in asphalt.

Retarder

A substance used as an additive to increase curing time. Compare "**Accelerator**".

Rheology

The study of the deformation and flow of matter, especially non-Newtonian (shear stress is *not* proportional to shear rate based on the Newtonian friction law) flow of liquids and plastic flow of solids. The quality or state of being able to be deformed or to flow. See "**Viscosity**".

Rheometer

(1877) An instrument for measuring the flow of Viscous substances.

Rib

A raised portion of a metal panel for stiffening or structural spanning. Compare "**Corrugated**".

Ribbon Course

A double layer of shingles used for visual distinction. Also called "**Shadow Course**".

Ribbon Stock

Slate which contains narrow ribbons of rock that are not the same color as the slate.

Ridge

The horizontal line where two opposite sloping sides of a roof join at a higher level of the roof. Also called a "**Roof Tree".** A **Ridge Beam** is a horizontal structural member, usually 2 inches thick, in wood frame construction supporting the upper end of rafters. A **Ridge Board** is a horizontal board, usually ¾ inch thick, in wood frame construction at the upper end of the common rafters to which the rafters are nailed. A **Ridge Cap** is the covering of wood, metal or other roofing material that tops the ridge of a roof. The **Ridge Course** is the last or top course of roll roofing, shingles or tiles on a sloping roof cut to length as required.
A **Ridge Vent** is a vent that runs along the ridge forming the top horizontal line of the roof allowing ventilation along the entire length of the gable.

Ridging

A roofing defect characterized by narrow or relatively narrow ripples in a membrane generally along the machine direction for roofing felts and over deck or insulation joints or base sheet edges, and usually less than 1 inch (25 mm) in height.

RIEI

Roofing Industry Educational Institute.

Rise

In an inclined or sloped roof, the rise is the height of the slope in relation to the run. Generally expressed as a ratio in the following form: Rise:Run. For example, 4:12 would be a height of 4 inches to a horizontal distance of 12 inches or a rise of 4 inches per foot of run. See "**Run**".

RMS&T

Roofing Materials Science & Technology, a roofing consulting firm maintained by the author housing the HOL Library, located at 9037 Monte Mar Drive, Los Angeles, CA 90035-4235, Tel: (310) 559-6090.

Roll Roofing

Any roofing material which is applied from the manufacturer in rolls, but more specifically, applied to coated felts either smooth or mineral surfaced used for roofing without additional top coatings or surfacings (i.e., 90 pound roll roofing cap sheet).

Roll Tile

A clay or ceramic tile shaped in a half circle or curved with or without interlocking features, that when applied into a roofing system, consist of a pan tile and cover tile. See "**Pan Tile**" and "**Cover Tile**".

Roof

A construction on top of a building that together with walls, forms a separator between inside and outside environments. A **Roof System** is a structurally supported, air, heat, interior moisture and rain control combination system. A **Barrel Vault Roof** is the simplest form of an arched roof consisting of a continuous arch of semi-circular or pointed sections unbroken in length by cross vaults. Also called "**Tunnel Vault Roof**". A **Bowstring Roof** is a roof constructed with curved timber trusses and

horizontal tie-beams connected by light diagonal lattices of wood. Also called a "**Belfast Roof**". A **Comb Roof** is a double sloping or gable roof. A **Couped Roof** is a roof constructed without ties or collars, its rafters being fixed to the wall plates and ridge pieces. A **Curb Roof** is a roof in which the slope is broken on two or more sides. So called, because a horizontal curb is built at the plane where the slope changes. A **Dead Flat Roof** is a roof with no intentional slope. A **Deck Roof** is a roof having sloping sides below a flat deck on top. An **Extra Steep Roof** is a roof with a slope over 1 unit of rise to 1 unit of run (or 45°). A **Flat Roof** is a roof with a slope of 1:50 to 1:6 ratio (or 1° to 10°) or pitched only enough to provide drainage. A **Flat Pitch Roof** is one with only a moderately sloping surface. A **Gable Roof** is a ridged or double-sloped roof which terminates at one or both ends in a gable. A **Gambrel Roof** is one which has its slope broken by an obtuse angle, so that the lower slope is steeper than the upper slope (similar to a barn construction). A **Helm Roof** is a steeply pitched roof that has four faces converging at the top, with a gable at the foot of each. A **Hip Roof** is, in general, a roof which has one or more hips. A roof which has four sloping sides that mat at four hips and a ridge. A **Hyperbolic Paraboloid Roof** is a special form of double-curved shell, the geometry of which is generated by straight lines. The shape consists of a continuous plane developing from a parabolic arc in one direction to a similar inverted parabola in the other direction. A **Lean-To Roof** is a roof which has a single sloping surface that is supported at the top by a wall that is higher than the roof. A roof which has a single sloping surface. A **Mansard Roof** is a type of curb roof in which the pitch of the upper portion of a sloping side is slight and that of the lower portion steep. The lower portion is usually interrupted by dormer windows and doubles as an upper story siding. A **Monitor Roof** is a type of gable roof, commonly used on industrial buildings, which has a raised portion along the ridge with openings for light and/or air. A **Pavilion Roof** is a roof which in plan forms a figure of more than four straight sides. A **Peaked Roof** is any roof rising either to a point or to a ridge. A **Pent Roof**, other than a Lean-to Roof that has a single sloping surface. A **Polygonal Roof** is a roof which in plan forms a figure bounded by more than four straight lines. A **Pyramid Roof** is a hip roof which has four sloping surfaces, usually of equal pitch that meet at a peak. A **Ridge Roof** is a roof with two opposite slopes meeting at the top and with a gable at either end. A **Saw Tooth Roof** is a roof which is formed of a number of north light trusses. When viewed from the end, such a roof presents a serrated or toothed profile similar to the teeth of a saw. A **Shed Roof** is a roof with only one set of rafters falling from a higher to a lower wall. A **Steep Roof** is a roof with a slope of 1:6 to 1:1 ratio (or 1° to 45°). For **Tunnel Vault Roof**, see "**Barrel Vault Roof**".

Roof Boards

See "**Substrate**" or "**Deck**".

Roof Bolting

A method of roof support in which steel bolts are inserted in drill holes so as to pin supporting steel beams under the roof of a slope.

Roof Brackets

Braces used to support scaffold planks on a roof during steep roof application.

Roof Divider

A building detail used to limit the size of a continuous roofing membrane, dividing a roof into a number of smaller areas. The divider extends only to the roof deck and is not an expansion joint.

Roof Guard

A contrivance or fence-like barrier fitted to a steep sloping roof usually near the edge of the eave to prevent the sliding of snow or ice off of the roof.

Roof Hatch

See "**Scuttle**".

Roof Jack

Adjustable safety platform used to support workers on roof.

Roof Slate

[GEOL] A term widely applied to rocks of fine grain in which regional metamorphism has developed a good "slatey" cleavage. Cf. Collyweston Slate, Stonesfield Slate.

Roof Terminal

The upper end of a vent stack above a roof. Drains are also sometimes called terminals.

Roof Tree

See "**Ridge**".

Roofer's Pitch

See "**Pitch"** and "**Coal Tar Pitch**".

Roofing

(1) The materials used for constructing a water shedding or waterproofed roof. 2) That part of the architectural specifications and building construction contract that deals with the supply and application of roofing materials and systems. See "**Roofology**".

Roofing Copper

Copper that has been hot-rolled to sheets in 14- to 32-ounce (approx. 400- to 900-gram)/ft^2 weights.

Roofing Industry Educational Institute (RIEI)

An industry supported roofing educational institute located in Englewood, CO.

Roofology

The science and technology which concerns the study of roofing system engineering, materials, practices, and performance, by using physical and chemical methods.

Rosin

The hard resin that remains after the volatilization of turpentine from crude turpentine oil. It consists chiefly of abietic acid and its anhydride. It is used in rubbers as a **tackifying agent**; also in varnishes and soaps; and it is converted into disproportionated rosin, the potassium salt of which is an **emulsifier** in the manufacture of **SBR.** The rubber rosin products are rather poor aging vulcanizates.

Rosin Sized Sheathing

A sheet of wood fiber paper of a nominal 4 lbs. (1.8 kg) to 6 lbs. (2.7 kg) per 100 square feet (9.3 m^2) weight.

Rubber

A material that is capable of recovering from large deformations quickly and forcibly and can be, or already is, modified to a state in which it is essentially insoluble but can swell) in boiling solvents such as benzene, methyl ethyl ketone (MEK), and ethanol toluene azeotrope. A rubber in its modified state, free of diluents, retracts within 1 min to less then 1.5 times its original length after being stretched at room temperature (18 to 19°C) to twice its length and held for 1 min before release. $-(-CH_2-CH44C(CH_3)-CH_2-)_n$ is the nonpolar hydrocarbon backbone of **natural rubber**. See "**Elastomer**", "**Elastomeric**".

Run

(1) The horizontal distance to which the fall or vertical distance for an inclined roof is referenced. A unit horizontal distance of one foot (or meter) is taken for the run to which the fall in inches (millimeters) is given to describe the incline. Compare "**Span**". See "**Run**". Sometimes incorrectly used to denote the slope distance from the eave to the ridge. (2) A single row of shingles across the roof or a row of shingles in an application procedure, vertically or diagonally.

Rupture Resistance

An indication of the ability of rubber to withstand tensile loading. It is the load required to rupture a rubber specimen under conditions set out in ASTM D-530.

Rupture Strength

The nominal stress developed in a material at rupture. It is not necessarily equal to ultimate strength.

R-Value

See "**Thermal; Resistance**".

Saddle

A ridge in a roof deck that divides two sloping parts of the surface so that water will be diverted to roof drains. Usually constructed in a level valley, or behind a projection above a sloping roof. Also called a "**Cricket**". A water diverter used on the high side of a chimney, usually metal. Also called "**Saddle Flashing**".

Safety Harness

Either a manufactured leather strap vest and rope unit, or a looped and tied rope vest and safety line. See "**Skyhook**".

Sag

Undesirable excessive flow of applied liquid material after application to a surface, resulting in "curtaining" or running.

SAM

Self Adhesive Membrane.

Sand Blasting

A cleaning process that employs grit or sand in a stream of high-velocity air to clean metal or other hard surfaces in preparation for coating, painting, or other surface protection, providing proper adhesion.

Sandwich Board

A composite insulation board composed of various layers. Some sandwich boards are actually roofing with thermal insulation "sandwiched" in between rigid panels.

Saturant

A bitumen of low softening point for impregnating the dry felt in the manufacture of saturated roofing felts.

Saturated Felts

Felts that have been impregnated with bitumen of low softening point (between 100°F and 160°F). See "**Felt**".

Saw Tooth

A roof formed by a number of north light trusses. When from the end of the building, such a roof presents a serrated or toothed profile.

SBCC

Southern Building Code Congress. Standard Building Code

SBR

See "**Styrene Butadiene Rubber**".

SBS

See "**Styrene Butadiene Styrene**".

Scaffold or **Scaffolding**

A temporary erection of timber and/or steel work used in the construction, alteration o demolition of a building to support workmen, their tools and materials.

Scraper

A tool or piece of equipment for removing aggregate surfacing from Built Up-Roofing or removing shingles for repair or re-roofing. Also called a "**Spud**" or "**Spudder**".

Screed

Lightweight fill placed on the surface of a roof deck to create slopes to roof drains. Also the guide used to achieve the sloped fill.

Screw

Lag Screw is a heavy wood screw with a square head and a coarse thread used as a bolt chiefly where a bolt would not be suitable.

Scrim

A thin reinforcing mat for single-ply membranes usually non-woven but may be woven or knitted, and normally made of glass or polyester fiber. Scrim may be combined with the membrane by coating or lamination.

Scupper

An outlet in the wall of a building or a parapet wall for drainage of overflow water from a floor or roof directly to the outside. Special scupper drains connected to internal drains are also sometimes installed at roof and wall junctions.

Scuttle

A small opening provided with a waterproof cover through the ceiling and roof to provide access to the roof from the interior. The scuttle may have its own curb, or may be placed on a built-up curb. Also called a "**Roof Hatch**".

Seal

(1) a substance used to close a crack or other aperture against air or water leakage. (2) Narrow strips of bituminous material used to fill or cover such apertures.

Seal Down or **Positive Seal Down**

A powerful asphalt adhesive, factory applied, so that the shingles, once installed, have a concealed strip of sealing compound that securely bonds each shingle to the one above to provide excellent wind resistance.

Seal Cap

The layer of mortar at the top of a chimney.

Sealant

(1) A single- or multi-component polymeric- or asphalt-based material used to weatherproof many types of construction joints. The materials come in various grades; pourable, self-leveling, non-sag, gun-applied, and cured or uncured tapes. Sealants are used in single-ply roofing systems for lap seam sealers, pitch pocket fillers, and water cut-off mastics. (2) A rubber or rubber-like material intended particularly for use as gaskets. (3) A soft or highly viscous rubber composition used in puncture proof tire inner tubes and tubeless tires for the self-sealing of punctures.

Sealer

A liquid applied directly over uncoated wood for the purpose of sealing to keep subsequent coats of paint or varnish from seeping in. Similar to "**Primer**".

Sealing a Vent

The application of plastic cement to a vent so as to make it watertight.

Seam

A lap or area of juncture for two separate membrane sheets. A line formed by joining material to form a single ply or layer. See "**Factory Seam**", "**Field Seam**".

Seasoning

The act of drying lumber, either naturally or artificially in a kiln. The removal of moisture from wood to improve its serviceability.

SEBS

Styrene Ethylene Butadiene Styrene. A grafted (two-stage polymerization process) terpolymer.

Self-Adhering Membranes

Single-ply membranes which can adhere to a substrate and to itself at overlaps without the use of an adhesive. The undersurface of a self-adhesive membrane is protected with a release paper, which prevents the membrane from bonding to itself during shipping and handling. Successful application of self-adhering membranes requires a clean and dry substrate and the application of firm, uniform pressure.

Self-Curing or **Self-Vulcanizing**

Refers to thermoplastics that are compounded so that the polymers eventually cure forming cross-links sometime after installation and lose their thermoplastic properties.

Self-Healing

Used in reference to bitumen that softens with heat from the sun and flows to seal cracks that earlier formed in the bitumen from other causes.

Self-Ignition Temperature

The minimum temperature at which the self-heating properties of a material lead to ignition in the absence of an outside ignition source. It is dependent upon specimen size, heat loss conditions and possible other variables, such as moisture content. Compare "**Flash Point**".

Self-Spacing

A notch or small tab at one of both end

Selvage

The portion of mineral surfaced roofing where the mineral surfacing is omitted to allow for the overlapping sheet to achieve better adhesion. A sheet edge or edging which differs from the main part of the finished roof sheet. See "**Wide Selvage Roofing**".

Selvage Edge or **Selvage Joint**

A specifically defined edge of a membrane, which is designed for some special purpose, such as overlapping such as a lapped joint detail for mineral-surfaced cap sheets in which the main surfacing is omitted for 2 inches of the 36 inch width so that the overlapping side will achieve better adhesion.

Separation Sheet

See "**Slip Sheet**".

Serrated

Cross notching, such as on the face of the hatchet head.

Service Temperature Limits

A specification of the limiting temperatures a coated surface within which limits the applied coating will have satisfactory performance.

Shadow Course

See "**Ribbon Course**".

Shake

A **Shingle** split (not sawn) from a block of wood and used for roofing and siding.

Shark Fin

Curled felt projecting up through the aggregate surfacing of a built up roofing membrane. Result of inadequate embedment of the ply at edges.

Shear

An action or stress resulting from applied forces causing adjacent layers of an object to slide relative to each other in a direction parallel to their plane of contact.

Shear Modulus

The ratio of the **shear stress** to the corresponding shear strain for shear stresses below the proportioned limit in shear of the material. A method for determining shear modulus of elasticity of structural materials by means of a twisting test is given in ASTM E-143. A method for determining shear modulus of structural adhesives is given in ASTM E-229.

Shear Pull

Applied forces resulting in an action or stress that causes or tends to cause two contiguous parts of the body to slide, relatively to each other, in a direction parallel to their plane of contact.

Shear Strength

In testing, the maximum shear stress that can be sustained by a material before rupture. It is the ultimate strength of a material subjected to shear loading. It can be determined in a torsion test where it is equal to torsional strength. The shear strength of a plastic is the maximum load required to shear a specimen in such a manner that the resulting pieces are completely clear of each other. It is reported in psi based on the area of the sheared edge (ASTM D-732). The shear strength of a structural adhesive is the maximum shear stress in the adhesive prior to failure under torsional loading (ASTM E-229).

Shear Stress (FL^{-2})

The stress component tangential to the plane on which the forces act. A stress in which the material on one side of a surface pushes on the material on the other side of the surface with a force which is parallel to the surface. Also known as shearing stress and tangential stress.

Sheathing

Board or sheet-type material fixed to studding or roof rafters or joists as the base for application of wall cladding or roof covering.

Sheathing Paper

A medium to heavy weight wood fiber paper or felt, often fastened to sheathing, as the base for the application of exterior covering materials.

Shed Roof

A roof having only one incline that slopes from a higher to a lower wall. Also referred to as a "**Lean-to**". See "**Roof; Shed**".

Shedding

The loss of mineral surfacing from prepared roofing materials.

Sheet

An unrolled piece of felt roofing. Also called "**Ply**".

Sheet Rubber

A form of plantation rubber prepared by coagulating latex either in shallow rectangular pans or in tanks partitioned into narrow chambers of depth corresponding sheet width. The sheet of coagulum so obtained are not broken up as in the preparation of crepe, but are passed through a series of even-speed squeeze rolls that squeeze out much of the serum, and roll the sheets down to the desired thickness. If the rolls of the last mill are ribbed, the soft rubber takes the imprint, resulting in ribbed sheets. The sheets are then dried with or without smoking, the products being known as smoked or unsmoked sheets. Sheet rubber contains more serum substances than crepe rubber.

Shelf Aging

The natural deterioration of rubber articles kept in storage or "on the shelf" under atmospheric conditions.

Shelf Life

The date on a material label that indicates an approximate time after which the material should not be used. Compare "**Pot Life**".

Shingle

Any overlapping and sloped or vertical component which allows water shedding. **Asphalt Shingles** generally are made of wood fiber and rag fiber felt impregnated with asphalt and coated with fine gravel. Most are strips 3 feet long and 1 foot wide. Two 5 inch deep slots, called "**Cutouts**" divide each strip into three 1 by 1 foot sections called tabs. Most come with dabs of adhesive across each strip just above the cutout tops. when the adhesive is softened by the heat of the sun, it seals the tabs of the overlapping shingles against strong winds and heat-caused curling. See "**Seal Down**", "**Shake**".

Shingle Flashing See "**Flashing; Step Flashing**".

Shingling

(1) The application of any roofing material by overlapping of units in horizontal courses with the overlapping down the slope to shed water. (2) The usual method of laying roofing felts in Built Up-Roofing with overlapping sufficient to produce the number of plies desired.

Shore Hardness

The measurement of the resistance of a material to indentation or penetration, as measured by a **Durometer**, having the ranges A through D under specified testing conditions.

Shoulder

(1) The contour on a dumbbell specimen that lies between the constricted portion of a dumbbell and the wide end of a dumbbell. (2) Transitional area between the sidewall and the tread of a rubber tire.

Shrinkage

(1) The percent loss of mass of a material when put through a particular process (for example, the washing and drying of crude rubber). (2) The percent diminution in area or volume of a piece of processed unvulcanized rubber compound on cooling. (3 The contraction of molded vulcanized rubber on cooli

Side Lap

See "**Lap; Side**".

Side Shear

The point at which a fastener breaks sideways when a force is applied.

Side Tear

The point at which a membrane tears away from the fastener at a lap in a mechanically attached syste

Sieve

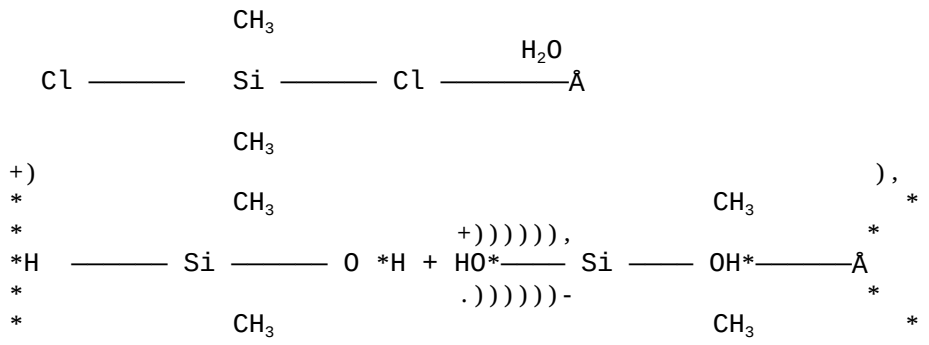
An apparatus with square apertures for separating sizes or grades of material.

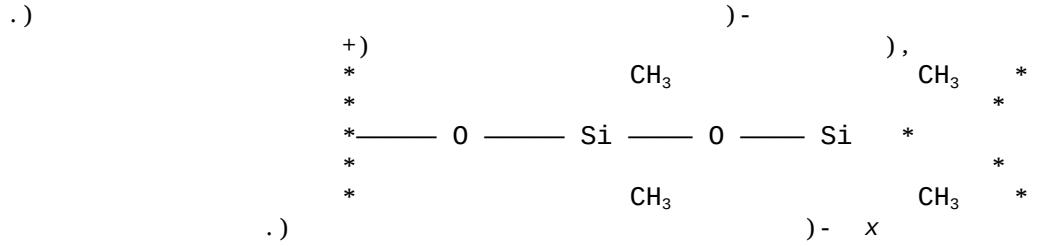
Silica Gel

A form of colloidal silica that has the appearance of coarse sand and has many fine pores. It is extremely absorbent and is used as a desiccant (drying agent), a catalytic material, and for de-ammoniating late

Silicone Rubber

A rubber, prepared by the action of moisture on dimethyldichlorosilane and other holosilanes. The reaction is generally represented as follows:





These rubbers, containing about 5 percent of diphenylsilicon groups, withstand temperatures from -81 to +260°C (-120 to +500°F). The are vulcanized with peroxides.

Single Course

A single row of shingles when applying wood or shake shingles to a sidewall.

Single Ply Membrane

A membrane, either sheet- or fluid-applied, with only a single layer of material (either homogenous or composite), designed to act as a waterproofing barrier. However, the manufacture of the single-ply sheeting may involve lamination or several layers of the same or different materials.

Skater's Cracks

Curved cracks observed in smooth-surfaced built-up membranes.

Skein

A fiberglass or cotton coil used for making a mop head.

Skimming

Separating old roof membranes from insulation or gravel from roof membrane to prepare for reroofing

Skinning or **Skinning Over**

A condition occurring generally in solvent based coatings or paints when a thick coat is applied and only the top surface or skin of the coat dries.

Skydome

Dome-shaped plastic cover for a curbed opening in a roof to admit light to the interior.

Skyhook

A trade name for a device fastened to the ridge of a building under construction with a boom, safety line and harness for working on a roof.

Skylight

Any cover or enclosure placed above a roof opening to provide for the admission of natural light and/or ventilation while preventing the entrance of rain or snow.

Slag

A gray porous aggregate produced by air cooling and crushing residue from blast furnaces, used as a protective surfacing for Built Up-Bituminous Roofing comprising silicates and alumina-silicates of calcium and other bases or metal oxides.

Slag Stop

See "**Gravel Stop**".

Slate

[MATER] Hard varieties of slate varying in size from 12 x 6 inches (30 x 15 centimeters) to 24 x 14 inches (60 x 35 centimeters), and from $^{1}/_{8}$ to ¾ inch (3 to 19 millimeters) in thickness. **Ribbon stock** is slate which contains narrow ribbons of rock that are not the same color as the slate. **Clear slate** is slate that as been trimmed so that ribbons are eliminated. **Unfading slate** is that which exhibits minimal color change when exposed to the weather. **Weathering slate** is that which exhibits obvious color change when exposed to the weather. **Barge slates** are special slates used under the regular course of slates along gable ends where a shadow effect is desired.

Sleeper

A wooden beam laid horizontally on a roof deck to support rooftop equipment.

Slip Sheet

Sheet material placed, such as reinforced draft paper, polyester scrim or polyethylene sheeting, placed between two layers of a roofing system (such as membrane and insulation) to ensure that there is no adhesion between them, allow transmission of differential movement, or to prevent damage from chemical incompatibility. Also called "**Separation Sheet**", "**Divorce Sheet**", or "**Isolation Layer**".

Slippage

Sliding movement, usually down a slope, between plies of felt along the bitumen film separating them. It can also take place between gravel surfacing and roofing, between roofing membrane and the insulation, or between the insulation and the roof deck. More frequently found on inclines where "**Backnailing**" was omitted or a lower softening point binding asphalt has been used.

Slop Sheet

A guide strip for laying mineral surface cap sheet.

Slope

The angle of incline in a roof surface measured in degrees, as a slope ratio of fall to run, or as a percentage of fall to run. For example, a roof with a slope ½-inch or less per foot is considered as "**dead level**," "**flat**," or "**level slope**"; a slope ½ to 1½-inch per foot is considered as "**low slope**"; and more than 1½-inches is considered a "**steep slope**".

SMACNA

Sheet Metal and Air-Conditioning Contractors National Association located in Vienna, VA, USA

Smoke Pipe

A pipe conveying products of combustion from a solid or liquid fuel-fired appliance to a chimney flue.

Smooth Surfaced Roofing

Roofing Felt that is asphalt coated on both sides with either a smooth or veined surface. Built Up-Roofing that may have an applied coating but which has no protective surfacing of gravel, mineral granules, or other aggregate. Also called "**Bald Roofing**".

S-N Diagram

A plot of stress (S) against the number of cycles (N) to cause failure of similar specimens in a fatigue test. The stress axis can represent stress amplitude, maximum stress, or minimum stress. A log scale is almost always used to the N scale and sometimes for the S scale.

Snow Guard

See "**Roof Guard**".

Soffit

The underside of any subordinate member of a building. For roofs, the underside of a roof overhang or eave.

Softening Point

The temperature at which a thermoplastic material changes from solid to liquid as measured by the **ring and ball test**. An index of bitumen fluidity. Asphalt softening point is measured by the "ring-and-ball" test (ASTM D-2398). Coal-tar pitch's softening point is measured by the "cube-in-water" test (ASTM D-61)

Softening Point Drift

See "**Fallback**".

Soil Stack

See "**Vent**".

Solar Radiation

The process whereby the temperature of a surface rises above outside air temperatures as the surface absorbs heat rays from the sun. Compare of "**Radiative Cooling**".

Solvent

A liquid capable of dissolving another substance (solute) into a form which is uniformly dispersed in a mixture (solution). Water (H_2O) is the most common of all solvents, followed by dimethyl sulfoxide (DMSO), called the "universal solvent".

Solvent Cleaners

Heptane, hexane, white gas, and unleaded gas, used to clean the membrane prior to applying the splicing adhesive to form field seams in some single-ply membrane systems.

Solvent Welding

The joining of two, clean, separate surfaces (usually thermoplastic) by treating with a solvent, such as tetrahydrofuran (THF) that partially dissolves the surface, chemically welding the two surfaces together

based on molecular interlocking principles. Compare "**Thermal Welding**".

Spalling

The breaking off of the surface layer of concrete or brick work, usually caused by frost action.

Span

The horizontal distance between supports for beams, joists, rafters, etc. The distance between two load bearing walls in which the roof truss is supported.

Specific Gravity

The ratio of the density of a material to that of water. The ratio is quoted as a pure number and is more precisely a measure of relative density.

Specification

A concise statement of a set of requirements to be satisfied by a product, material, or a process indicating, whenever appropriate, the procedure by means of which may be determined whether the requirements given are satisfied. As far as practicable, it is desirable that the requirements be expressed numerically in terms of appropriate units together with their limits. Specifications are usually directed to subcontractors in the various building trades to indicate requirements for materials and installation; these become a part of the "**Working Drawings**".

SPI

The Society of the Plastics Industry, Inc. which has several divisions; one of which is: Polyurethane Foam Contractors Division.

Spikes

Protrusions from the underside of a fastener stress plate designed to reduce **backout** of the fastener due to the stress plate turning from vibration. These protrusions may penetrate the membrane based on the density of the insulation and the strength of the membrane and should be used only for the attachment of membranes for which it was specifically designed.

Spire

A tall tower roof that tapers upward to a point.

Splice

See "**Seam**".

Splicing Tape

Cured or uncured synthetic rubber tape used for splicing, usually one side of which consists of a contact adhesive.

Split Sheet

See "**Wide Selvage Roll Roofing**".

Splitting

The formation of long cracks,usually completely through a Built Up-Roofing membrane, representing a tension failure of the membrane caused by loss of it tensile strength or by movement of the substrate.

Splitting Resistance

In testing, the measure of the ability of felt to withstand tearing. It is the load required to rupture a slit felt specimen by gripping lips of the cut in jaws and pulling them apart (ASTM D-461). An alternate term is "**Tear Resistance**".

Spray Pond

Intentional ponded water on a roof with a system of piping and jets to spray water above the roof to achieve good evaporative cooling.

Spread or **Spread Coating**

A manufacturing process used to apply a thin coat of material over a surface by means of a knife, bar, or doctor blade. the material may be a rubber dough, latex, plastisol, or molten bitumen.

Spring Rubber

See "**Crumb Rubber**".

Springback

The degree to which a material returns to its original shape after deformation. In plastics and elastomers, it is also called "**Memory**", or "**Recovery**".

Springing Line

The point from which an arch, coved ceiling or similar construction departs from the vertical plane.

Spud or **Spudder**

A hand tool resembling a coal shovel with a notched blade for pulling nails used for removing shingles. Also called "**Shingle Remover**", or "**Scraper**".

Spunbond Polyester Mat

Continuous filament, uniformly dispersed polyethylene terephthalate fiber mat. A binder is used to stabilize the mat, which serves as reinforcement to the membrane. See "**Scrim**".

Square

A measure for roof area equal to 100 square feet, (10 feet by 10 feet, or 9.3 m^2). In roofing, it is expressed as 1P.

Squared-Up

Having the shingles at a right angle to the bottom edge of the roof.

Squeegee

An extra strip of pure gum friction compound placed between plies in the construction of a tire.

Stabilizer

An additive material that prevents or retards degradation of rubber polymer (uncompounded, unvulcanized) by heat, light, or atmospheric exposure, and usually aid in the manufacturing process. See also "**Antioxidant**" and "**Filler**".

Stack Effect

Air flow into a building at the lower levels and out at the higher levels caused by the pressure difference that exists because of the temperature differences of the air masses inside and outside of buildings similar to the phenomenon that produces draft in a chimney.

Stack Venting

The practice of providing small vertical pipe outlets through a roofing membrane to relieve the pressure of water vapor entrapped in the system and with the hope of drying materials such as insulation below the membrane.

Stair-Step

The diagonal method of applying shingles.

Standardization

For **ASTM** purposes, the process of formulating and applying rules for an orderly approach to a specific testing activity for the benefit and with the cooperation, of all concerned. Standardization is based on the consolidated results of science, technique, and experience. It determines not only the basis for the present, but also for future development and it should keep pace with progress. Some particular applications are: (1) Unit of measurement, (2) Terminology and symbolic representation, (3) Products and processes (definition and selection of characteristics of products for defining their quality, regulation of variety, interchangeability, etc.) and, (4) safety of persons and goods.

Standards

The results of a particular standardization effort, approved by a recognized authority. It takes the form of a document containing a set of conditions to be fulfilled or an object for comparison.

Stapling

The use of a specially designed staple gun to drive staples in place of nails for anchoring roofing materials to nailable substrates (i.e., roof decks) or other elements of the roofing system.

Starter Course

The roofing material (roll roofing or singles) applied to the bottom edge at the eave before applying the first row of shingles. Also called "**Drip Course**". Compare "**Starter Strip**".

Starter Strip

Partial width strip of felt applied at the eaves or other starting line of Built Up-Roofing to serve as the base for the first full course of roofing so that the plies and exposure will be uniform throughout the installation. Compare "**Starter Course**".

Steep Asphalt

Asphalt of high melting point suitable for steeply sloped roofs with inclines greater than a rise/run ratio of 1:6. Type 3 Asphalt, as defined by the Canadian Standards Association, and Type IV Asphalt, as defined by the

American Society for Testing and Materials.

Steeple

A tower and spire, typically on a church.

Step Flashing

See "**Flashing; Step**".

Stiffness

Rigidity, or tendency to resist deformation under a stress. Sometimes used to describe the stress-strain qualities of soft vulcanized rubber. For example, of two compounds, that which requires the greater stress to produce a given elongation in like specimens is said to be stiffer. It frequently refers to resistance to bending. It includes both plastic and elastic behavior, so it is an apparent value of elastic modulus rather than a true value (ASTM D-747). Also used in testing machine specifications as an apparent spring rate for elastic deformation under load.

Straight-Up Method

The vertical application of 3-tab shingles.

Strain

In testing, a dimensional expression for the elongation of a material under stress. Strain is expressed as the ratio of elongation per unit length or as a percent of change per unit length in a linear dimension of a part or specimen. True or natural strain is based on instantaneous length, and is equal to:

$$\ln = l/lo$$

Where: l = instantaneous length
lo= original length

Shear strain is the change in angle between two lines originally at right angles. **True Strain** is instantaneous % of change in length of a specimen in a mechanical test. It is equal to the natural logarithm of the ratio of length at any instant to original length.

Strain Energy

Measure of energy absorption characteristics of a material under load up to the point of fracture. It is equal to the area under the stress-strain diagram, and is a measure of the toughness of a material.

Strain Rate

The time rate of elongation.

Strain Relaxation

Alternate term for **creep** of rubber.

Strainer

A wire, plastic or cast metal cage place over the top of a roof drain to prevent debris and leaves on the roof from entering the drain. It may be screwed into place or bolted on. Also called a "**Dome**" or "**Beehive**".

Strapping

A general term for battens fixed to the faces of walls as a support for lath and plaster or other cladding

Straw Nail

A long nail used to fasten cover tiles or the high crown in many tile designs that extend above the deck four or five inches where wood nailers within the crown tile are not used.

Strawberry

See "**Blister**". Also called "**Raspberry**" or "**Blueberry**".

Stress

An internal force that resists a change in shape or size caused by external forces, measured as a force per unit area. **Working Unit Stress** is the ultimate stress divided by the factor of safety. Expressed as the load on a specimen divided by the area through which it acts. As used with most mechanical tests, stress is based on original cross-sectional area without taking into account changes in area due to applied load. This sometimes is called **conventional** or **engineering stress**. **True stress** is equal to the load divided by the instantaneous cross-sectional area through which it acts.

Stress Amplitude

One-half the range of fluctuating stress developed in a specimen in a **fatigue test**. Stress amplitude often is used to construct an **S-N Diagram**.

Stress Plate

In a mechanically fastened roofing system, a plate generally made from metal or plastic that aids the **fastener** in securing the membrane or insulation or both to the deck. These take on many shapes and sizes and are specifically designed by the manufacturer to perform with a certain insulation or single ply membrane formulation and thickness, and a particular style of fastener. Even though some stress plates *look* the same as others, they should never be substituted with another product without consulting the fastener manufacturer, the insulation or membrane manufacturer or both.

Stress Plate Set

In a mechanically fastened roofing system, the point at which a stress plate bends and has "set" in that shape, not able to return to its original shape. This condition can be measured in load pounds.

Stress Ratio

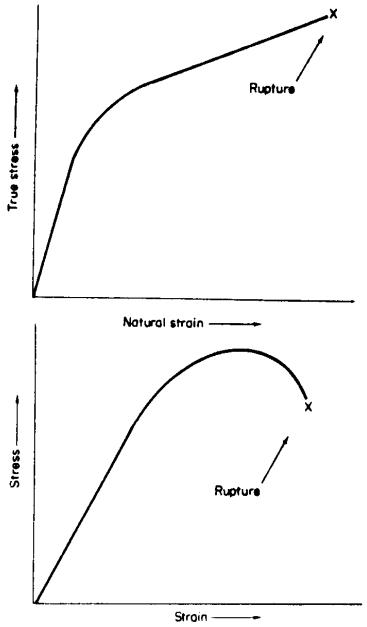
Ratio of minimum stress to maximum stress on one cycle of loading in a **fatigue test**. Tensile stresses are considered positive and compressive stresses negative.

Stress Relaxation

Decrease in stress in a material subjected to prolonged constant strain at a constant temperature. Stress relaxation behavior is determined in a **creep test**. Data often is presented in the form of a stress vs time plot. **Stress relaxation rate** is the slope of the curve at any point.

Stress-Strain Diagram

Graph of stress as a function of strain. It can be constructed from data obtained in any mechanical test where load is applied to a material, and continuous measurements of stress and strain are made simultaneously. It is constructed for compression, tension (stretching) and torsion (twisting) tests.



Stress-Strain Ratio

Stress divided by strain at any load or deflection. Below the elastic limit of a material, it is equal to **tangent modulus of elasticity**. An alternate term is the secant modulus of elasticity.

Strip Fastener

See "**Batten**".

Stripper

A metal device that separates and hangs the nails by the heads for easy handling. Worn strapped to the roofer's chest.

Stripping

(1) A narrow width of felt used to complete flashing details, particularly to cover the edges of metal flanges. (2) The technique of completing flashing details with narrow strips of felt or fabric and hot or cold-applied bitumen.

Strut

A structural member which is designed to resist longitudinal compressive stress such as members supporting a ridge beam or rafters. A short column.

Styrene Butadiene Rubber

A random copolymer of styrene and butadiene with properties between those of the pure homopolyme

Styrene Butadiene Styrene (SBS)

A high molecular weight block copolymer having the properties of the pure homopolymers but contained in the same molecule. The three block copolymer formed has a center block of butadiene with end blocks of styrene. These polymers are sometimes used as the modifying compound in certain modified bitumen roofing membranes. Membranes modified with Styrene Butadiene Styrene and is typically more flexible than the Atactic Polypropylene modified bitumens.

Sublimation

[THERMO] The process by which solids are transformed directly to the vapor state or vice versa without passing through the liquid phase.

Substrate

The upper surface of the roof deck, insulation or other roofing structure upon which a roofing membrane or other component of the roofing system is placed or to which it is attached. The underlying surface of a roofing membrane. The surface of the deck or the insulation that is the supporting base for the roofing. Compatibility between the substrate and the immediate overlying component of the roofing system must always be ensured.

Sump

A reservoir forming part of a roof drain. A depression in the roof deck or insulation around a roof drain to provide a water reservoir.

Surface Active Agent

A substance that affects markedly the interfacial or surface tension of solutions even when present in very low concentrations. See also "**Surfactant**".

Surfacing

Any aggregate or granular material or coating used as a protective covering on the weather surface of roofing. The protective and traffic-bearing layer of a roof terrace. Also called the "**Top Cover**", or "**Top Coat**".

Surfacing Screeds

A screed used to produce a level surface on an element and/or give it the mechanical properties required for the application of the next layer. A distinction is made between the screed applied to the insulation and the screed applied to the load bearing structures. (UEAtc definition MDAT No. 27:1983)

Surfactant

Surface **act**ive age**nt**. A soluble compound, such as a synthetic detergent, that reduces the surface tension of liquids, or reduces interfacial tension between two liquids or a liquid and a solid having a cationic (positive charge), anionic (negative charge), or non-ionic (no charge) nature.

Synthetic Rubber

Any of several elastic substances resembling natural rubber, prepared by the polymerization of butadiene, isoprene, and other unsaturated hydrocarbons. Synthetic rubber is widely used in the fabrication of single-ply roofing membranes.

System

An assembly of interacting components. A roof system is designed to weatherproof and normally also to insulate the top of a building.

Tab

The individual exposed portion of a shingle.

Tack

A property of a rubber or rubber compounds that causes two layers of compound that have been pressed together to adhere firmly in the areas of contact. Note: Tacky rubber does not necessarily stick to other surfaces.

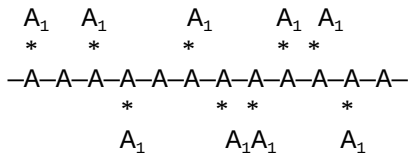
Tackifier

A substance used to make a material (as a resin adhesive) tacky or more tacky.

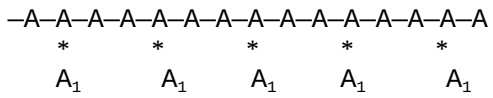
Tacticity

A way of describing the arrangement of certain groups in a chain polymer. The polymer branches or functional groups may be placed on the main chain in different ways:

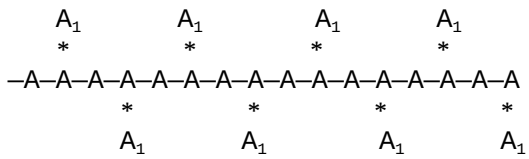
Atactic Polymers are without any order in the functional groups or secondary patterns



Isotactic Polymers are where the groups are regularly placed on one side of the chain



Syndiotactic Polymers are where the groups are regularly and alternatingly placed relatively to the principal chain



Tail

The top end of a wood or shake shingle, the thin end.

Tail Piece

A relatively short beam, joist, or rafter, supported on one end by a header.

Talc

See "**Mica**".

Tangent Modulus of Elasticity

Instantaneous rate of change of stress as a function of strain. It is the slope at any point on a stress-strain diagram.

Tanker

A bulk tank truck specially designed with heating and pumping equipment for conveying and dispensing hot liquid bitumen.

Tapered Edge Strip

Usually cut from fiberboard roof insulation—to provide an included base between one elevation and another, such as deck level to top of low perimeter curb.

Tapered Insulation

Insulation either cut or manufactured in a wedge shape that is applied in layers to achieve a positive slope for proper drainage before the membrane is applied.

Tar

Black or dark brown liquid or semi-liquid condensates derived from the heating or baking, sometimes called destructive distillation, of wood, peat, oil shale, bone, petroleum, coal or other organic materials. The word is incorrectly used to describe coal tar pitch as in the expression "tar and gravel roofing".

Tarbuck Knot

A safety knot designed for use by mountain climbers. The Tarbuck Knot is used in creating a rope safety harness.

Tear Resistance

Measure of the ability of sheet or film materials to resist tearing. For paper, it is the force required to tear a single ply of paper after the tear has been started. Three standard methods are available for determining tear resistance of plastic films: ASTM D-1004 details a method for determining tear resistance at low rates of loading. A test in ASTM D-1922 measures the force required to propagate a pre-cut slit across a sheet specimen; and ASTM D-1038 gives a method for determining tear propagation resistance that is recommended for specification acceptance testing only. Tear resistance of rubber is the force required to tear a 1 in. thick specimen under the conditions outlined in ASTM D-624. Tear resistance of textiles is the

force required to propagate a single-rip tongue-type tear (starting from a cut) by means of a falling pendulum apparatus (ASTM D-1424).

Tear Strength

A measure of the tensile strength needed to continue rupturing the elastomeric sheet, usually after a pre-cut slit has been initiated in the sheet (ASTM D-2261 and ASTM D-2262), expressed in pounds per square inch (psi) or pounds-force.

Tearoff

A complete removal of a failed roof system down to the structural deck.

Tectum

A bodily structure resembling or serving as a roof.

Tedlar

Polyvinyl Fluoride. (Tedlar is a registered trademark of E.I. du Pont de Nemours & Co.) and has several unique properties.

Temperature Rods

Small steel rods embedded in concrete to overcome cracking due to expansion and contraction.

Tenacity

The tensile strength of a material for its given dimensions. The force required to break a yarn or filament, expressed in grams per **denier**. It is equal to breaking strength divided by denier.

Tensile Fatigue Resistance

The ability of the membrane to resist cyclic induced internal and external tensile forces.

Tensile Set

The extension remaining after a specimen has been stretched and allowed to retract in a specified manner expressed as a percentage of the original length.

Tensile Strength

A laboratory test indicating the force per unit of the original cross sectional area of an unstretched specimen which is applied at the time of rupture of the specimen. It is calculated by dividing the breaking force in pounds by the dimension of the cross section of the unstretched specimen in square inches, psi, or Newtons/m^2. Tensile strength is the maximum stress developed in a material in a **tension** (stretching) **test**.

Tensile Stress

A stress applied to stretch a test piece (specimen).

Tensile Stress at Given Elongation

The stress required to stretch the uniform cross section of a test specimen to a given elongation.

Tension

The stress that resists the tendency of two forces acting away from each other, to pull apart two adjoining planes of a body.

Tension Impact Test

A method for determining the energy required to fracture a specimen under shock tensile loading as in ASTM D-1822.

Tension Set

The extent to which vulcanized rubber is permanently deformed after being stretched a specified amount for a short time. It is expressed as % of original length or distance between gauge marks (ASTM D-41

Tension Test

Method for determining behavior of materials under axial stretch loading. Data from test are used to determine elastic limit, elongation, modulus of elasticity, proportional limit, reduction in area, tensile strength, yield point, yield strength and other tensile properties. Tension tests at elevated temperatures provide creep data. Methods for tension tests of plastics are outlined in ASTM D-638, ASTM D-2289 (high strain rates), and ASTM D-882 (thin sheets). ASTM D-2343 outlines a method for tension testing of glass fibers; ASTM D-897, adhesives; ASTM D-412, vulcanized rubber.

Tenting

A phenomena whereby a fastener screw securing insulation to the deck has backed out and lifts the membrane causing a small tent around the fastener head, or at a roof/wall junction.

Termination

The treatment or method of anchoring the perimeter of the membrane in a roofing system. See "**Flashing**",

"**Gravel Stop**", **"Termination Bar**".

Termination Bar

A strip of usually extruded aluminum used in securing the perimeter of single-ply roofing membranes using several methods of attachment depending on building design, parapet height, substrate, etc.

Tern

Metal, Lead Alloy having a composition of 10-20% tin and 80-90% Lead, used to coat Iron or Steel surfaces.

Terpolymer

A copolymer made from three different monomers.

Terrace Deck

A flat or "Dead Level" roof deck used for traffic, parking or landscaping. Also called "**Podium**", "**Promenade** "or "**Plaza**".

Test Cut

A sample of a roof membrane, usually measuring 4 inches by 40 inches, that is cut from a roof system to determine its condition. A 2-inch diameter circular sample removed with a special device is called a "**core cut**".

Tetrahydrofuran

A solvent used to weld together some thermoplastic materials, such as PVC.

Textile

(1) The general name applied to fibrous material which may be woven, as a woven cloth. (2) Being spun and woven into cloth. (3) Fiber, yarn, fabric, or garment.

Thatch

Various natural vegetation such as straw, reed, flax, heather, or palm leaves, etc., used as a roof covering. Derived from the ancient word "thack" which meant any kind of roof covering. The most common material used is water reed (Phragmites Communis). The roof ridge lines are decoratively finished by capping with treated sedge (Cladium Mariscus).

Thermal

Of or relating to temperature. **Thermal Barrier** is an insulated separation between hot and cold air masses. **Thermal Bridging** is a phenomenon caused by a metallic material, or combination of materials that induces heat loss or transfer through the roofing system to the interior or exterior of the structure, such as the thermal conductivity of metal fasteners. May be of considerable consequence when it passes through the insulation of a well insulated wall or roof. **Thermal Conductance** is a unit of heat flow and a measure of the heat-insulating efficiency of a material or component of a particular thickness. The symbol "C" and units $W/(m^2 \times {}^\circ C)$ are used. **Thermal Conductivity (k)** is the basic unit of heat flow, being the amount of heat energy conducted through a unit area of unit thickness in unit time with unit temperature difference between the faces and is considered the "Coefficient of Thermal Conductivity." Expressed in watts (joules per second) per square meter per meter thickness per degree Celsius temperature difference. The symbol is a small "k", referred to as k-value or k-factor and the units reduce to $W/M \times {}^\circ C$. $C = k/n$ where n is the unit thickness in meters. May also be expressed by the calculation: $(BTU \times inches)/(ft^2 \times hr \times {}^\circ F)$. Compare "**R-value**". **Thermal Expansion** is the expansion of a material due to heat. **Thermal Resistance (R = 1/C)** is a material's resistance to conductive heat flow, in $^\circ F/(Btuh \times ft^2)$—that is, for a 5°F temperature difference surface to surface, 1 Btuh would flow through a 1 ft specimen with R = 5. Referred to as "**r-value**" or "**R Factor**". Compare "**k-Factor**". **Thermal Shock Factor (TSF)** is the stress-producing phenomenon resulting from sudden temperature changes. **Thermal Welding** is the joining of two, clean, separate surfaces by applying heat (usually in the form of hot air) from an electric heat gun. Used with thermoplastic materials like PVC, CPE and CSPE. Also called "**Hot Air Welding**".

Thermal Black

A soft **carbon black** formed by the thermal decomposition of natural gas. It has relatively little stiffening effect on rubber, but imparts toughness, resilience, good resistance to tearing, and fair abrasion resistance.

Thermal Insulation

See "**Insulation**".

Thermal Shock

The dynamic stress imposed on a membrane due to a sudden or very rapid change in the temperature (about 100°F) of the membrane, as for example, when a cold rain follows a period of bright sunshine. In some climates, some degree of thermal stress may be caused by the simple setting of the sun, especially

where the temperature differential between daytime and nighttime may be as great as 45° to 50°F or more.

Thermal Stabilizer

Material added to rubber to prevent or minimize the effects of heat.

Thermal Stress

Internal stress in a material or part caused by uneven heating.

Thermal Welding (Hot Air Welding)

The joining of two, clean, separate surfaces by applying heat from an electric heat gun. Used with thermoplastic materials like **PVC**, **CPE** and **CSPE**.

Thermocouple

A device used in testing of thermal properties of materials composed of two wires of dissimilar metals joined at their ends used to measure temperature by means of the electric current developed when there is a difference of temperature between the junctions.

Thermoplastic

A polymeric material capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature. Note: Thermoplastic applies to those materials whose change upon heating is substantially physical (e.g., synthetic resin). Compare "**Thermosetting**".

Thermoset(ting)

Capable of being formed into a substantially infusible or insoluble product when cured under application of heat or chemical reaction. In other words, a material which cannot be reshaped or formed by heating: cured synthetic rubber sheet materials (such as EPDM, Butyl, etc.) are thermosets. Phenolic and epoxy resins belong to this group of plastics. Compare "**Elastomeric**", "**Thermoplastic**".

THF

See "**Tetrahydrofuran**".

Thixotropy

[PHYS CHEM] Property of certain gels which liquify when subjected to vibratory forces, such as ultrasonic waves or even simple shaking, and then solidify again when left standing.

Threshold Limit Value (TLV)

The time weighted average for a normal 8-hour work shift and a 40-hour work week, below which it is believed that nearly all workers may be repeatedly exposed to a substance, day after day, without adverse effect—established as guidelines by the **ACGIH**.

Throat

The narrowing passage located between a fireplace and smoke chamber or flue.

Tie-In

The joining of shingles from separate shingle areas.

Time for Rupture

Time required to rupture specimen under constant stress and temperature in a creep test. Also called "**Time to Rupture**" or "**Rupture Time**".

Tin Caps

Small flat metal discs used with nails for securing roofing felts to nailable decks.

Titanium Dioxide

(TiO_2), A white, water-insoluble powder that melts at 1560°C, and is produced commercially from the titanium doxide minerals ilmenite and rutile; used in paints, plastics, rubbers and cosmetics as a white pigment. Also known as titania; titanic anhydride; titanium oxide; titanium white.

Toe Board

The scaffold board normally used only at the bottom edge of a roof.

Toggle Bolt

A bolt with a toggle end that expands and flattens, usually spring loaded, after being forced through the substrate, allowing penetration through the deck and positive securement.

Tolerance

(1) The amount by which a property of a material or object can vary from a specified value or dimension and

still be acceptable.

Tongue and Groove

Any material made or prefabricated in such a manner that there is a groove on one edge and a corresponding tongue on the other edge.

Top Coat or **Top Pour**

The top coating of bitumen on a Built-Up Roof system. Can also mean the last or final coat applied in a liquid applied membrane which is usually white or light colored for better reflectivity, reducing rooftop temperatures due to **solar radiation**. See "**Pour**".

Torch and Flop Method - (Modified Bitumen)

A roofers' term used to describe the heating and placement of modified bitumen roofing. The process includes torch heating the surface of the roll of modified bitumen which will be turned over, or "flopped", and mated to the horizontal or vertical substrate.

Torch Welding

The joining of two, clean, separate surfaces by applying heat from a torch (open flame) usually liquid propane (Liquified Petroleum Gas-LPG), to the layer of bitumen on the bottom side of the roll of roofing material until it is molten and is hot enough to soften and flow. Used with some modified bitumen membranes. Compare "**Thermal Welding**".

Torque

Force applied to an object, particularly, to screw a mechanical fastener into the roof decking.

Torsion

A twisting **shear** deformation and internal moment or couple of restitution produced in an object when a torque or twisting action is applied.

Torsion Test

Method for determining behavior of materials subjected to twisting loads. Data from torsion test is used to construct a **stress-strain diagram** and to determine **elastic limit**-**torsional modulus of elasticity**, modulus of rupture in torsion, and **torsional-strength**. Shear properties are often determined in a torsion test (ASTM E-143).

Torsional Deformation

Angular displacement of specimen caused by a specified torque in a **Torsion Test**. It is equal to the angular twist (radians) divided by the gauge length (inches).

Torsional Modulus of Elasticity

Modulus of elasticity of a material subjected to twist loading. It is approximately equal to **Shear Modulus** and is also called **modulus of rigidity**.

Torsional Strain

Strain corresponding to a specified torque in a **Torsion Test**. It is equal to **torsional deformation** multiplied by the radius of the specimen.

Torsional Strength

Measure of the ability of a material to withstand a twisting load. It is the ultimate strength of a material subjected to torsional loading, and is the maximum torsional stress that a material sustains before rupture. Alternate terms are **modulus of rupture** and **shear strength**.

Torsional Stress

Shear stress developed in a material subjected to a specified torque in a torsion test. It is calculated by the equation:

$$S = \frac{Tr}{J}$$

Where: T = torque
r = distance from the axis of twist to the outermost fiber
J = polar motion of inertia

Totally Adhered

See "**Fully Adhered**".

Traffic

Any rooftop activity, either during or after construction, that potentially can damage the roof surface, cause deck deflection, or in any way damage the roof. See "**Live Load**", "**Traffic Board**", "**Walkway**".

Traffic Board

Any protective material, usually in board form that protects the roof surface from traffic. A **Walkway** usually consists of traffic boards, although in some cases additional layers of the roofing material that are properly secured may be used. See "**Walkway**".

Transition

First Order Transition is a change in state, usually synonymous with crystallization, or melting in a polymer. **Glass Transition** is the second order transition between a brittle glassy condition and a rubber-like condition. **Second Order Transition** is a Thermally induced physical change in the amorphous phase of a polymer which is associated with an abrupt change in the temperature coefficient of a physical property. Note: The measured temperature is dependent on the rate of deformation or rate of temperature variation.

Trim

The finish material (usually wood) that covers the rafters and rafter ends.

Trimmer

The beam or roof joist into which a header is framed in the formation of a roof opening.

Truncated Roof

A hip type of roof terminating in a flat roof.

Truss

A combination of members, such as beams, bars and ties, usually arranged in triangular units, to form a rigid framework for supporting loads over relatively long spans as in wide span roof construction. A **Bay** is the portion of the roof between two adjacent trusses. A **Bent** is a truss is supported at its ends by columns. The truss together with its columns considered as a unit. **Ceiling Beams** are beams supported by the lower chords, spanning between trusses and supporting the ceiling construction. **Chord Members** are the upper and lower flange members of a truss and are called the upper and lower chords respectively. **Compression Web Members** are those which are subject to compression stress. A **Counter** is a member of a truss system which acts only for a particular partial loading and which has zero stress when the truss is completely loaded. A **Counter Brace** is a web member which is designed to resist either tension or compression. The **Panel** or **Panel Length** is the distance between two adjacent joints along either the upper or lower chords. The **Panel Point** is the intersection of two or more members of the truss. Also called a "**Joint**". The **Pitch** of a roof truss is the ratio of the rise to the span for a truss symmetrical about its center line. **Purlins** are beams supported by the upper chords, spanning from truss to truss, and supporting the roof construction. A **Rafter** is an inclined beam resting on and supported by the purlins usually about 16 inches to 24 inches on centers, and which supports the sheathing directly, or may support sub-purlins. The **Rise** is the distance between the apex (the highest point) of the truss and the line joining the points of support. The **Slope** if an included chord member is the tangent of the angle of inclination with the horizontal, usually specified in inches of rise per foot of horizontal run. The **Span** of a roof truss is the distance between the centers of the supports, unless otherwise designated. The **Structural Covering** is the construction above the purlins, such as rafters and sheathing designed to support the weathering surface. Also called "**Roof Deck**". The **Sub-Purlins** are a secondary system of beams parallel to the purlins and supported by the rafters and is sometimes used to support tile or slate weathering surfaces. **Web Members** are those members of a truss which are framed between, and join the upper and lower chords.

T-Seam

A critical point in a roofing membrane where three sheets of material intersect or overlap.

TSL

Technical Service Laboratory, Toronto, CANADA.

TSF

See "**Thermal; Thermal Shock Factor**".

Tuck Pointing

The rebuilding or replacing of mortar in a stone or brick wall.

Twist

(1) Non-symmetry due to improper molding. (2) The rotation about its axis of a hose subjected to internal pressure. **Direction of Twist** is the direction of twist in yarns and other textile strands is indicated by the capita letters "S" and "Z." Yarn has S-twist if, when the yarn is held in a vertical position, the visible spirals or helices around its central axis conform in direction of slope to the central portion of the letter "S," and Z-twist if the visible spirals or helices conform in direction of slope to the central portion of the letter "Z." When two or more yarns, either single or plied, are twisted together, the letters "S" and "Z" are used in similar manner to indicate the direction of the last twist inserted.

Two-Part Compound

A product which is necessarily packaged in two separate containers. It is composed of a base and the curing agent (hardener) or accelerator. The two components are uniformly mixed just prior to use. When mixed, the product cures and its life in the application duration is quite limited.

U Factor

The overall coefficient of heat transfer of an assembly measured in B.T.U.'s per square foot, per degree Fahrenheit difference in temperature per hour.

UL

Underwriters Laboratories

UL 1479

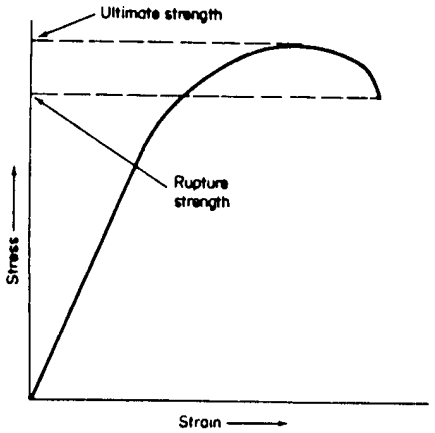
The test devised by Underwriters Laboratories for testing fire stops.

Ultimate Elongation

Alternate term for elongation of material at rupture under tensile loading. See also "**Elongation; Ultimate**".

Ultimate Strength

The highest unit of stress a piece of material can sustain at, or just before, rupture or failure. Normally, changes in area due to changing load are disregarded in determining ultimate strength. Also called "**Ultimate Stress**". See also "**Tensile Strength**".



Ultracentrifuge

An apparatus for applying centrifugal force up to 1,000,000 times gravity, used to separate small particles. The velocity of sedimentation can be determined according to Stokes" law and the mean size and size distribution can also be determined. Molecular masses of particles can be calculated.

Ultraviolet Light (UV)

A form of luminous energy occupying a position in the spectrum of sunlight beyond the violet, and having wavelengths of less than 390 nm (nanometer), which is the limit of the visible spectrum. Ultraviolet rays are very active chemically, exhibit bactericidal action, and cause many substances to fluoresce. Ultraviolet rays can be artificially produced by the mercury arc light. Their action accelerates deterioration of many organic materials exposed to them. Also called "**Actinic Rays**". Formulations with stabilizers and UV absorbers can effectively inhibit the potentially deleterious effects of UV exposure.

Underlayment

A material, usually felt, used in covering a roof deck before other roofing components are applied.

Underside Wind Pressure

Wind pressure on underside of roof resulting from unbalanced openings in side walls of buildings. It is also known as "**positive pressure**". Negative pressure is created on the to surface of the roofing interior at the roof/wall junction area.

Underwriters Laboratories (UL)

An independent, non-profit agency which functions as the testing arm of the National Board of Fire Underwriters. It maintains laboratories for the examination and testing of various devices, systems, and materials to determine their safety against the hazards of fire, wind, and accidents. UL is organized around a number of separate departments, including "Chemical Hazards", "Electrical Hazards", and "Fire Protection." Compare "**Factory Mutual**".

"Up and Over" Application

See "**Vertical Application**".

Upside Down Roof

See "**Protected Membrane Roof**".

Urea-Formaldehyde Resins

A class of resins produced by a reaction between urea and formaldehyde, used in latex compounding, laminating, textile finishing, etc.

Urethane Foam

Flexible Urethane Foam is cellular elastomeric material made by the condensation of a polyol with an organic isocyanate and containing open cells.

UTI

Useful Temperature Interval. The temperature range in which a substance has the desired properties.

Valley

(1) The horizontal line formed along the depressed angle at the bottom of two inclined roof surfaces. (2) The sloping line of the depressed interior angle formed by two inclined roofs whose eaves meet at right angles.

A **Closed Valley** is when the shingles join together in the valley (half lace and full lace). A **Full Lace Valley** is when the shingles are woven or laced back and forth forming the valley. A **Half Lace Valley** is when the shingles are lapped up on one slope and the shingles on the other slope are lapped back over these and then trimmed off evenly. A **Smooth Valley** is a valley where the shingles on both slopes are trimmed back leaving a smooth water trough. The valley material is usually 90 pound roll roofing or flat galvanized metal. A **Woven Valley** is a Full Lace Valley.

Valley Gutter

Open gutter in a roof valley receiving water from sloping roofs on both sides.

Vapor

A liquid substance in gaseous state. In relation to building, it generally refers to water vapor. Vapor pressure of liquids is reciprocally proportional with their molecular weight and is temperature depende

Vapor Barrier

A material, usually in sheet form, used to retard the passage of water vapor in a wall or roof. Normally, a vapor barrier has a perm rating of 0.5 or less. See "**Perm**". Also called "**Vapor Retarder**".

Vapor Migration

The movement of water molecules from a region of high to one of lower vapor pressure through the walls and roofs of buildings.

Vapor Permeability

The rate at which water vapor will diffuse or permeate through a unit area in unit time with unit vapor pressure difference across a unit thickness of a material. The units are nanograms per square meter per meter of thickness per second of time per pascal of pressure difference. The symbol is μ and the units are written NG/(Pa·s·m)

Vapor Permeance

The rate at which water vapor will diffuse through a material of a particular thickness. The symbol is M and the units are nanograms per square meter per second of time per pascal vapor pressure difference written NG/(Pa·s·m^2)·M = _/l, where l = thickness in meters.

Vapor Pressure

The pressure at which a liquid and its vapor are in equilibrium at a definite temperature. If the vapor pressure reaches the prevailing atmospheric pressure, the liquid boils. **Water Vapor Pressure** is the component of atmospheric pressure caused by the presence of water vapor, usually expressed in pascals.

Vapor Resistance

A measure of the resistance to water vapor flow. Vapor resistance is the reciprocal of permeance - 1/m and the units are written (Pa·s·m^2)/NG. See "**Vapor Permeability**".

Veneer

A thin protective film placed on a rubber substrate for protection against ozone cracking. It is also a thin film or sheet applied over a substance to prevent or reduce oxygen or ozone attack, to act as a migration barrier or to beautify the finished article, or wall.

Vent

An opening designed to convey water vapor or other gas from inside a building or a building component to the atmosphere. A ventilating duct. A **Breather Vent** is a type of roof vent consisting of a hooded flanged pipe 2" to 8" in diameter, penetrating the roofing membrane to allow escape of moisture from insulatio

Venting Layer

Continuous air layer located under the roofing system or under the water vapor barrier in order to equalize the water vapor pressure. This layer may or may not be vented to the outside. Also called "**Equalizing Layer**".

Verge

The edge of the tiling in a tile roof that projects over a gable. These are called "**Verge Tiles**".

Verge Board

See "**Barge Board**".

Vermiculite

An aggregate closely related to mica used for lightweight insulating concrete, plaster and roof fills, formed by the expansion of mica rock through heating.

Vertical Application

Roll roofing laid parallel to the rafters or slope of a roof. The roofing is laid up and down the slope, rather than horizontally across the slope. Also up and over when carried over the roof ridge.

Vinyl Chloride (CH_2-CHCl)

A compound formed chiefly by the catalytic addition of hydrogen chloride to acetylene.; It is polymerized to a white high-softening point polymer which can be plasticized for use in elastomeric product manufacture.

Vinyl Polymerization

See "**Polymerization, Vinyl**".

Viscoelastic

Characterized by changing mechanical behavior, from nearly elastic at low temperatures to plastic, like a viscous fluid, at high temperature.

Viscometer or **Viscosimeter**

An instrument used for measuring the viscosity or fluidity of liquids and plastic materials. Various types are in use, as the Saybolt, Redwood, Engler, based on the rate of flow through a tube. Some types (Brookfeld, Stormer, Mooney) are based on the torsion principle, and other on the time taken for a metal ball to fall through a column of the liquid of definite length. For rubbers, including SBR, the Mooney viscometer is widely used for both the raw and compounded material. A **Mooney Searing Disc Viscometer** is a laboratory testing machine for measuring the viscosity of raw rubber or unvulcanized rubber compounds. A steel rotor disk, which is centrally embedded in the heated rubber specimen firmly held in a cavity is caused to rotate at a low speed (2 rpm). The resistance offered by the plastic rubber mass to the rotation of the rotor disk is the measure of the viscosity of the rubber. The machine is also used to determine the scorch characteristics of rubber mixes.

Viscosity

[FL MECH] The resistance that a gaseous or liquid system offers to flow when it is subjected to a shear stress. The flow characteristics of bitumen measured in centistokes. Asphalt may vary from 30 to 500 centistokes when heated from 175°C to 260°C depending on the asphalt type. Also known as flow resistance. The resistance of a material to flow under stress. **Dynamic Viscosity** is numerically, the product of kinematic viscosity and the density of the liquid, both at the same temperature. The cgs (centigrams) unit of dynamic viscosity is the **poise**, (P), which has the dimensions grams per centimeter per second. **Inherent Viscosity** is the quotient of the natural logarithm of relative viscosity by the concentration, that is 1n $(N)_{rel}$ /c. The concentration should be specified. **Intrinsic Viscosity** is the limiting value of reduced viscosity, $(N)_{sp}$ /c, as c (concentration) approaches zero. The IUPAC Committee of Nomenclature has recommended the expression "**Limiting Viscosity Number**" for this. **Mooney Viscosity** is a measure of the viscosity of a rubber or rubber compound determined in a **Mooney Shearing Disk Viscometer**. **Relative Viscosity** is the ratio of the viscosity of a solution to that of the pure solvent. The IUPAC Committee of Nomenclature has recommended the expression "**Viscosity Ratio**". **Specific Viscosity** is the difference between the viscosity of a solution and that of a solvent, divided by the latter.

Viton

A proprietary fluoroelastomer. Highly chemically resistant, but expensive synthetic elastomer. Used in the production of protective gloves for handling chemicals and in other protective clothing.

Vitreous Tile

A glazed tile.

Volatility

The tendency of a solid or liquid material to pass into the vapor state at a given temperature.

Volclay

See "**Bentonite**".

Volume Cost

Costs calculated on the basis of unit volume, rather than unit mass.

Vulcanizate

Preferably used to denote the product of **vulcanization**, without reference to its shape or form.

Vulcanization

An irreversible process during which a rubber compound through a change in this chemical structure (for example, cross-linking), becomes less plastic and more resistant to swelling by organic liquids and elastic

properties are conferred, improved, or extended over a greater range of temperature and it increases strength and resiliency of the polymer.. Note: Vulcanization was discovered by Charles Goodyear in 1839. The term was originally applied by Brockedon, in England, to the process of heating raw rubber with sulfur, which converts it into a form suitable for practical use by improving its physical properties. Since a variety of substances other than sulfur are now known to be capable of producing a similar change and, furthermore, since the change itself can be produced without heat, vulcanization has not yet been adequately explained, but it seems clear that the usual sulfur vulcanization involves the mutual interaction of sulfur, accelerator, and zinc salt with the rubber. Also called "**Curing**".

Walking In

Manually forcing insulation boards against previously installed boards to tighten the joints. To embed insulation panels in hot bitumen or adhesive by walking on them immediately after application.

Walk On

A non-destructive, visual roof inspection and assessment of the condition of the roofing system, usually performed by a qualified roofing consultant.

Walkway

A path over the roof surface comprised of **Traffic Boards** or other materials that protect the roof surface from damage. Walkways are usually used to direct traffic directly to regular maintenance sites on the roof, such as air conditioning units or other rooftop equipment. Walkways can be directly secured to the roof's surface, or may be in the form of a raised platform to assure no **Traffic** on the roof's surface. Raised walkways should never be placed along a roof edge without a parapet wall for safety reasons.

Wall Plate

A timber laid longitudinally on the top of a wall to cover the ends of the rafters.

Warp

Any variation from a true surface such as bow, cup, twist, etc.

Warranty

Collateral engagement that a certain fact regarding the subject of a contract is, or shall be, as it is expressly or by implication declared or promised to be.

Waste

The left over, unusable portion of a roofing material.

Waterproofing

Treatment of a surface or structure to prevent the passage of water under hydrostatic pressure.

Water Absorption

The increase in weight of a test specimen expressed as a percentage of its dry weight after immersion in water for a specified time at a given temperature.

Water Cut-Off Mastic

A thermoset material used to form a seal between membrane sheets at indicated termination points. See "**Mastic**".

Water Guard

A turned up edge on valley metal or continuous wall flashing.

Water Resistance

The ability to withstand swelling by water for a specified time and temperature, usually 48h at 100°C (212°F), expressed as the percentage swelling or volume increase of the specimen. In roofing membranes, it is expressed in terms of percent dimensional change of the specimen and is done at 24 h at 50°C. In many cases it has been found that three weeks at room temperature is equivalent to 24 h at 50°C. Also called "**Water Absorption**" or **"Percent Dimensional Change**".

Water Trough

The cut back portion of a valley where rain water runs.

Water Vapor Barrier

Those materials or systems that adequately retard the transmission of water vapor under specified conditions. (For practical purposes, it is assumed that the permeance of an adequate barrier will not exceed 1 perm, although at present, this value may be adequate only for residential construction. For certain types of construction, the permeance must be very low.)

Water Vapor Permeance

The water vapor transmission of a material under unit vapor pressure difference between two specific surfaces. An acceptable unit of permeance is the perm.

Water Vapor Transmission Rate (WVT)

The steady water vapor (Gaseous Water) flow in unit time through unit area of a membrane, normal to its parallel surfaces, under specific conditions of temperature and humidity at each surface. Generally reported as grains/hour per square foot or grams/hour per square meter. (Multiply g/h.m^2 by 0.00249 to obtain grains/h ft_2.

Waterproof

The quality of a membrane, membrane material, or other component, which prevents water from entering the roofing system.

Weather Blister

See "**Blister**".

Weather

To undergo the changes in color, texture or efficiency brought about by continued exposure to wind, rain, sun, frost, snow, pollution and other elements.

Weatherability

The ability of the membrane to resist weathering; i.e., degradation due to sun, rain, wind, etc.

Weathering Apparatus

An apparats for estimating the comparative resistance of soft vulcanized rubber compounds to deterioration when exposed to light having a frequency range approximating that of sunlight, but with a greater intensity in the ultraviolet range than sunlight. The criterion is the observed extent of surface cracking, crazing, and chalking. During the test, sprays of clean water are forced on the specimens to simulate the action of rain.

Weep Hole

A small drain or hole located on the bottom edges of curbs and/or flashing of skylights, roof windows and other roof accessories or building components to allow moisture from condensation to be drained onto the outside. Weep holes allow excess condensation to escape but, in doing so, also allows direct air infiltration and condensation which causes up to half of the heat gain or loss in skylights.

Weld, Fillet

A weld of approximately triangular cross section joining together parts that overlap or that meet at an angle.

Wet-Bulb Temperature

Temperature indicated by the **wet-bulb thermometer** of a standard sling psychrometer or its equivalent. Theoretically, it is the temperature at which the atmosphere would become saturated by evaporation of water without loss or gain in total heat content of the air and vapor. Isobaric wet bulb temperature, that is, the temperature an air parcel would have if cooled adiabatically to saturation at constant pressure by evaporation of water into it, all latent heat being supplied by the parcel. The temperature read from the wet bulb thermometer; for practical purposes, the temperature so obtained is identified with the isobaric wet bulb temperature.

Wet Bulb Thermometer

A thermometer having the bulb covered with a cloth, usually muslin or cambric, saturated with water.

Wet Strength

Breaking strength of paper saturated with water. Also, the strength of an adhesive bond after immersion in water.

Wide Selvage Roofing

Mineral surfaced roofing designed for double coverage in which the selvage is slightly greater than half the width of the felt.

Wind Load

Total force exerted by the wind on a structure or part of a structure. **Wind Loading** refers to cyclic (repetitive) force applied to a roofing installation caused by wind, creating a positive and/or negative pressure.

Wind Uplift

The loss of attachment between a roof system or components in a roof system resulting from wind-induced pressures. Wind that is deflected around and across the surfaces of a building which causes a drop in air pressure immediately above the roof surface; as a result, the air in the building will flow beneath the membrane and roof deck and lift the roof upward. Wind Uplift may also be caused by the introduction of

wind underneath the membrane and roof edges, where it can cause the membrane to balloon and pull away from the substrate or deck. Roof loss by wind can be avoided or prevented by proper installation and adequate adhesion, attachment or ballasting, especially proper perimeter attachment.

Working Drawings

The combination of "**Blueprints**" and "**Specifications**" arranged in order and numbered page by page to provide a convenient reference for the various parts of a total construction activity. In the building trades, working drawings, along with written instructions to the contractor are usually referred to as "**Specs**".

Wrinkling

Creases, ridges, furrows, or folds formed at the surface of roofing membranes similar to ridging. See also "**Ridging**".

Wrinkled Ply

See "**Buckled Ply**".

X-ray Diagram

A pattern recorded on a photographic plate or film by a beam of X rays after traversing a specimen of material under examination in X-ray spectrography. It is also called "**Diffraction Pattern**". Natural rubber, neoprene, and butyl rubber all yield definite X-ray diffraction patterns when stretched, while SBR does not. The diffraction pattern is used to identify ingredients in compounded rubber, to study crystallization effects, to determine particle size, and to study the structure of rubbers and fibers.

X-ray Spectroscopy

The method of investigating the inner structure of matter, by allowing a narrow beam of X rays of definite wavelength to traverse a small quantity of the substance under investigation, and photographing the X-ray spectrum produced by the emergent rays. The form of the spectrum or diagram so obtained is characteristic for different materials: Amorphous solids and liquids produce a broad diffuse band or ring, solids composed of minute crystals in random orientation yield a diagram consisting of a series of concentric rings; wile with individual crystals or solids composed of crystals in definite or regular arrangement, traversed by the rays along an axis of symmetry, the rings are replaced by definite patterns composed of discrete spots or streaks, radial streaks, arcs of circles or combinations of these: From the positions of rings and spots, definite information as to the structure of crystals, spacing of atoms, and size of molecules may be obtained. See also "**Crystallinity**" and "**Crystallization**".

Yield Point

Stress at which strain increases without accompanying increase in stress. Only a few materials (notably steel) have a yield point, and generally only under tension loading.

Yield Point Elongation

Strain at yield point of a material. It is an indication of **Ductility**.

Yield Strength

Indication of maximum **stress** that can be developed in a material without causing **plastic deformation**. It is the stress at which a material exhibits a specified permanent deformation and is a practical approximation of **elastic limit**. **Offset yield strength** is determined from a **Stress-Strain Diagram**. It is the stress corresponding to the intersection of the stress-strain curve, and a line parallel to its straight line portion offset by a specified **strain**. The offset for plastics is usually 2%.

Yield Strain Elongation

Strain corresponding to **Yield Strength** of material. It is an indication of **Ductility**.

Yield Value

Stress in an adhesive joint at which a marked increase in deformation occurs without an increase in lo

Young's Modulus

The ratio of normal stress to corresponding strain for tensile or compressive stresses below the proportional limit of the material. Also called "**tensile modulus of elasticity**", or "**modulus of elasticity in tension**".

Zerk

A grease fitting.

Zoning

Restriction as to size or character of buildings permitted within specific areas as established by urban

authorities.

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ERRATA FOR VOLUME 2

Section/Chapter	Page Number	Paragraph	Line	Word
Chapter 49	49-4	3	6	"thing" s/b "think"
	49-9	1	8	")" at end of line
	49-15	2	4	capitalize "consideration"
Chapter 50	50-1	2	3&4	remove "This water."
	50-4	2	7	"This" s/b "Thus"
	50-7	1	4	end of line "if" s/b capitalized
	50-9	2	1	col 1, "Resolution Areas" s/b one line higher
	50-11	4	1	"single flies" s/b "single plies"
Chapter 51	51-2	1	2	"$CaCo_3$" s/b "$CaCO_3$"
	51-3	Fig. 51-1		in caption, "Tap" s/b "Tape"
	51-8	5		indent right side of paragraph
Chapter 58	58-3	2	1	"andit" s/b "and it"
	58-4	6	2	"(CBD 52)" s/b "(Canadian Building Digest 52)"
	58-12	2	4	"bigggest" s/b "biggest"
	58-14	3	2	""why"?" s/b ""Why?""
	58-16	2	2	"gourd" s/b "ground"
	58-17	2	2	in bullet no. 5, remove "e" between "the" and "like"
	58-21	4	2	at end of line "created" s/b "create"
	58-23	5	4	remove subscript "2" from "energy"
		References		missing: Smith, Thomas;
Chapter 60	60-12	1		bullet 4, col 1 "blacks" s/b "blocks"
	60-22	5		2nd to last line on page "times" s/b "items"
	60-25	2	22	"Huetterrauch" s/b "Huettenrauch"
	60-26	4	1	"lease" s/b "base"
	60-28	3	3	"aligatoring" s/b "alligatoring"
		References		missing: Whitman
Chapter 61	61-2	4	2	"follwoed" s/b "followed"
	61-5	3	7	"calk" s/b "caulk"
	61-6	1	10	"an" s/b "and"
	61-10	Fig. 61-4		in caption, "defection" s/b "deflection"
Chapter 62	62-41	Fig. 62-2		in caption, "Source: FRSA, Pride Manual, Vol. 1"
Chapter 64	64-2	5	2	"preforms" s/b "performs"
	64-3	1	2	"term" s/b "terms"
	64-4	5	3	last paragraph, 2nd "you" s/b "your"
	64-5	2	2	"you should to" s/b "you should do to"
	64-6	4	6	"you" s/b "your"
		References		missing: Curtis, Gerald B.; Gibson; SPRI;