



**Glossary of Terms
Common to the Spray
Polyurethane Foam
Industry**

Spray Polyurethane Foam Alliance
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A

A-SIDE: (A-Component) One component of a two component system. For polyurethane foam and coatings the isocyanate component. (See **ISOCYANATE**)

ABSOLUTE HUMIDITY: The actual

concentration of water vapor in air. May be expressed in units of kPa, grains of moisture per pound of dry air, pounds of moisture per pound of dry air, or as a partial pressure as inches of mercury (in. Hg).

ACCELERATOR: A chemical additive to coating or polyurethane foam systems used in relatively small amounts to increase the speed of the reaction or decrease the time required to cure or dry.

ACRYLIC COATING: A coating system based on an acrylic resin. Generally, a “water based” coating system that cures by coalescence and air-drying.

ACRYLICS: Resins resulting from the polymerization of derivatives of acrylic acids, including esters of acrylic acid, methacrylic acid, acrylonitrile, and their copolymers. They can be carried in a water or solvent solution and they are film-forming materials.

ADHESION: The degree of attachment or bonding of one substance to another. The degree of attachment or bonding between applications of the same substance. (For comparison, see also: **COHESION**)

AGGREGATE: Any mineral surfacing material. May include crushed gravel, river washed gravel, roofing granules, etc.

AGING: The effect on materials that are exposed to an environment for an interval of time.

AIR BARRIER: A material that is applied in conjunction with a building component (such as a wall, ceiling or sill plate) to prevent the movement of air through that component.

AIR BARRIER SYSTEM: The assembly of components used in building construction to create a plane of air tightness throughout the building envelope and to control air

leakage.

AIR EXFILTRATION: Air passing from the conditioned interior of a building to the exterior.

AIR INFILTRATION: Exterior air passing into the conditioned area of a building.

AIR LEAKAGE: The uncontrolled flow of conditioned air through gaps, cracks or holes in the building envelope or its components.

ALIPHATIC (POLYURETHANE): An organic polymer containing straight or branched chain arrangements of carbon atoms. As compared to aromatic urethanes, coatings based on aliphatic urethanes usually have better gloss, color retention, and weathering.

ALLIGATORING: Pattern cracking of a coating or mastic. So called because of its resemblance to the pattern of an alligator skin. (See **CHECKING**)

AMBIENT TEMPERATURE: The surrounding air temperature.

APPLICATION RATE: The quantity (mass, volume, or thickness) of material applied per unit area.

AREA DIVIDER: A raised, flashed assembly (typically a single or double wood member attached to a wood base plate) that is anchored to the roof deck. It is used to relieve thermal stresses in a roof system where an expansion joint is not required, or to separate large roof areas (sometimes between expansion joints), and may be used to facilitate installation of tapered insulation.

AROMATIC (POLYURETHANE): An organic polymer usually containing one or more benzene rings structures. Coatings are usually tougher and at a lower cost than aliphatics. As compared to aliphatic, coatings based on aromatic polyurethane's usually have tougher physical properties and cost less.

AROMATIC SOLVENTS: Hydrocarbon solvents comprised of organic compounds, which contain an unsaturated ring of carbon atoms, including benzene, xylene, toluene and their derivatives.

ASPHALT: A dark brown to black bituminous substance, solid or semi-solid in consistency, obtained from petroleum refining. It consists mainly of hydrocarbons. Asphalt products are available for hot or cold application. Asphalt will dissolve in mineral spirits.

ASTM: American Society for Testing and Materials. A test standards development agency.

ATOMIZATION: The break up of liquid or fluid into spray when forced through a small opening or orifice at high pressure.

B

B-SIDE: (B-component) One component of a two component system. For polyurethane foam and coatings the resin component. (See **RESIN**)

BACK ROLLING: Rolling wet coating behind a spray or roller application to insure better coverage on rough surfaces.

BASE COAT: The first coat of a multi-coat system. This should be applied the same day as the spray polyurethane foam.

BIRDBATH: Random, inconsequential amounts of residual water on a roof membrane.

BITUMEN: A class of amorphous, dark brown to black (solid, semi-solid, or viscous), high molecular weight hydrocarbons derived from petroleum refining (asphalt) or coal reduction (coal tar).

BLEEDING: (1) The diffusion of coloring matter through a coating from its substrate (such as bleeding of asphalt mastic through coating). (2) The absorption of oil or vehicle from a compound into an adjacent porous surface.

BLISTER: An uplifting of coating or polyurethane foam caused by an enclosed pocket of gas or liquid entrapped between coating passes, foam and coating, foam and substrate, or within the foam itself. Caused by the **DELAMINATION** (see also) of one or two components in an insulation or roofing system.

BLOWING AGENT: A gas or a substance capable of producing a gas used in making foamed materials.

BLOWHOLES: Holes in the coating and/or polyurethane foam surface caused by escaping gas that was produced during the foaming application.

BOCA: Building Officials and Code Administrators, International. One of the three model building codes in the U. S.

BOND, CHEMICAL: Adhesion between surfaces, usually of similar materials, resulting from a chemical reaction or cross linking of polymer chains.

BOND, MECHANICAL: Adhesion between surfaces resulting from interfacial forces or a physical interlocking.

BUILDING CODE: A system of principles or rules governing the design and construction of buildings. Local governments generally adopt or modify one of the national model building codes. (See **BOCA, ICBO, IBC, SBCCI**)

BUILDING ENVELOPE: The exterior shell of a building designed for energy

conservation and weather protection.

BUILDING SCIENCE: Involves the application of basic science knowledge and analysis procedures to the design of buildings. There is a special knowledge and experience required, and such expertise is also beneficial in determining how to correct problems in existing buildings and to explain what went wrong to cause the problem.

BUILT-UP ROOF (BUR): A roofing membrane consisting of alternating applications of bituminous impregnated felts (or fabrics) and hot (or cold) mopped bitumen. The membrane is generally surfaced with aggregate.

BUTYL COATING: An elastomeric coating system derived from polymerized isobutylene. Butyl coatings are characterized by low water vapor permeability.

C

CABO: Council of American Building Officials. A code agency.

CALORIMETER: An apparatus for measuring quantities of heat developed by combustion.

CANT: A beveling of polyurethane foam at a right angle joint for strength and water run off.

CANT STRIP: A beveled strip used under flashings to modify the angle at the point where the roofing or waterproofing membrane meets any vertical element.

CAP FLASHING: Usually composed of metal, used to cover or shield the upper edges of the membrane base flashing, wall flashing or primary flashing.

CAPACITANCE METER: A device used to detect moisture or wet materials within a roof system by measuring the ratio of the change to the potential difference between two conducting elements separated by a nonconductor.

CAPILLARY ACTION, CAPILLARITY: The movement of liquid in the interstices of insulation or other porous material as a result of surface tension.

CATALYST: An ingredient in a coating or polyurethane foam system that initiates a chemical reaction or increases the rate of a chemical reaction.

CAULK: A flexible waterproofing material used to seal cracks, seams, or small breaks in a waterproofing or an air seal system. Usually supplied in tubes and applied with a caulking gun. (See **SEALANT**)

CAVITATION: The vaporization of a liquid under the suction force of a pump. Usually due to inadequate flow to a pump; the vaporization can create voids within the

pump or the pump supply line. In polyurethane foam spray pumps, cavitation will result in **OFF-RATIO FOAM** (see also).

CAVITY WALL: An exterior wall, usually of masonry, consisting of an outer and inner width separated by a continuous air space.

CELLULAR: Describes a composition of plastic or rubber with relative density decreased by the presence of cells dispersed throughout its mass. In closed-cell materials, the cells are predominately separate from each other. In open-cell materials, the cells are predominately interconnected.

CENTIPOISE: (cps) A unit of measure of absolute viscosity. (Note: The viscosity of water is one centipoise. The lower the number, the less the viscosity.)

CHALKING: The formation on a surface of a powdery substance due to weathering.

CHECKING: A defect in a coated surface characterized by the appearance of fine fissures in all directions. Designated as “surface checking” if superficial, or “through checking” if extending deeply into the coating or to an adjoining surface.

CHEMICAL BOND: See **BOND, CHEMICAL**

CHEMICAL RESISTANCE: The ability to withstand contact with specified chemicals without a significant change in properties.

CHLORINATED RUBBER: Resin formed by the reaction of rubber and chlorine to form a coating (i.e. primer or Hypalon ^ℓ) or single ply membrane.

COAL TAR: A dark brown to black hydrocarbon obtained from the destructive distillation of coal. Used in built-up roofs or in below grade construction as a waterproofing agent. Coal tar when mixed with mineral spirits will produce a yellow-green to amber color, but will not dissolve.

COALESCENCE: The formation of a film of resinous or polymeric material when water evaporates from an emulsion or latex system, permitting contact and fusion of adjacent latex particles. Action of the joining of particles into a film as the volatile evaporates.

COARSE ORANGE PEEL SURFACE TEXTURE: A surface showing a texture where nodules and valleys are approximately the same size and shape. This surface is acceptable for receiving a protective coating because of the roundness of the nodules and valleys.

COATING: A layer of material applied over a surface for protection or decoration. Coatings for polyurethane foam are liquids, semi-liquids, or mastics; spray, roller, or brush applied; and are elastomeric. (See **ELASTOMERIC**) **COBWEBBING:** Production of fine filaments instead of the normal atomized particles when some

coatings are sprayed.

COEFFICIENT OF THERMAL EXPANSION: A mathematical formulation used to predict the change in dimension (typically length) of a material as a function of temperature change.

COHESION: The degree of internal bonding of one substance to itself. (See **ADHESION**)

COLD APPLIED: Capable of being applied without heating as contrasted to hot-applied. Cold-applied products are furnished in a liquid state, whereas hot-applied products are furnished as solids that must be heated to liquefy them.

COLLECTOR BOX: (See **CONDUCTOR HEAD**)

COLLOIDAL DISPERSION: A mixture wherein a finely divided material is uniformly distributed within a liquid. Latex emulsion is a colloidal dispersion of resin in water. (See **LATEX**)

COLOR STABILITY: The ability to retain the original color without significant change over time.

COMBUSTIBLE: Capable of burning.

COMPARATOR: An eyepiece with magnification ranging from 4-12 power, with a scale used for measuring thickness.

COMPATIBLE MATERIALS: Two or more substances that can be mixed, blended, or attached without separating, reacting, or affecting the materials adversely.

COMPRESSIVE STRENGTH: The stress or force applied parallel to the direction of the polyurethane foam rise at 10% deformation or at yield point.

CONDENSATE: The liquid resulting from the **CONDENSATION** (see also) of a gas or vapor.

CONDENSATION: The action of a vapor converting into a liquid.

CONDITIONING: The exposure of a material to the influence of a prescribed atmosphere for a stipulated period of time or until a stipulated relation is reached between material and atmosphere.

CONDUCTOR HEAD: A transition component between a through-wall scupper and downspout to collect and direct run-off water.

CONTROL JOINT: (See **AREA DIVIDER**)

COPING: The covering at the top of a wall or parapet designed to shed water.

COPOLYMER: A polymer consisting of molecules containing large numbers of units two or more chemically different types in irregular sequence.

CORE SAMPLE: The actual material of a cross section of the roofing material, insulation, etc. showing the various layers.

COUNTERFLASHING: Formed metal or elastomeric sheeting secured on or into a wall, curb, pipe, roof-top unit, or other surface to cover and protect the upper edge of a base flashing and its associated fasteners.

COVERAGE: The unit quantity of material necessary to apply to achieve a desired thickness. Usually expressed in (square feet per gallon) square meter per liter or (gallons per hundred square feet) liters per square meter.

CRAZING, CRAZE CRACKS: Fine, random cracks in forming a network on the surface of a coating or film.

CREAM TIME: The time, measured in seconds at a given temperature, when the polyurethane foam components will begin to expand after being mixed.

CREEP: (1) The permanent deformation of a material caused by slow movement over time resulting from thermal or load stresses. (2) Lateral movement of expanding foam.

CRICKET: A relatively small, elevated area designed to facilitate the flow of water around an obstruction on a roof such as a chimney or skylight.

CROSS HATCH: An application method for liquid applied materials whereby successive layers or passes are applied at 90° to the previous application.

CROSSOVER: An undesirable mixing of iso and resin components as a result of unbalanced pressures at the spray gun. May result in an equipment blockage.

CURE: The chemical and physical changes in a substance which result in achieving the desired, final characteristics of the substance.

CURE TIME: The time required to effect curing. The time required for a material to reach its desired, long-term characteristics.

CURING AGENT: An agent in a coating or adhesive that increases the rate of cure.

CURTAIN WALL: A lightweight exterior wall system supporting no more than its own weight, the roof and floors being carried by an independent structural framework.

D

DEAD LEVEL: Absolutely horizontal, or zero slope.

DEAD LOADS: The weight imposed on a structural roofing system, including the waterproofing system, roof mounted equipment, roof structural members, and anything hung from the roof structure.

DECK: The structural surface to which the roofing or water proofing system (including insulation) is applied.

DEFLECTION: The deviation of a structural element from its original shape or plan due to physical loading, temperature gradients, or movement of its support.

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

DELAMINATION: The separation of layers within a material or materials. May result in **BLISTER** (see also) formation.

DESSICANT: A drying agent.

DEW POINT: The temperature at which a vapor begins to condense.

DIFFUSION: The movement of water vapor from regions of high concentration (high water vapor pressure) toward regions of lower concentration (due to random thermal motion).

DIISOCYANATE: An organic chemical compound having two reactive isocyanate (-N=C=O) groups; used in the production of polyurethane foams and coatings.

DIMENSIONAL STABILITY: The ability of a material to retain its original size and shape. For polyurethane foam, dimensional stability is determined over time under conditions of controlled temperature and humidity. Measured as a percent of original dimension.

DISCOLORATION: Any change from the initial color. (See **COLOR STABILITY**)

DRAINAGE: (See **POSITIVE DRAINAGE**)

DRIP EDGE: A projecting piece of material shaped to throw off water and prevent its running down the face of the wall or other surface.

DRY BULB TEMPERATURE: The temperature of air as measured by an ordinary thermometer.(See **AMBIENT TEMPERATURE**)

DRYING TIME: The time required for the material to become tack free and will no longer be adversely affected by weather phenomena such as dew, rain, or freezing. (Contrast with, CURE TIME).

E

ELASTOMER: A material which at room temperature is capable of being stretched repeatedly at least twice its original length 100% elongation and, upon release of stress, will return to its original dimensions. (See **ELONGATION**)

ELASTOMERIC: The elastic, rubber-like properties of a material that will stretch when pulled and will return relatively quickly to its original shape when released.

ELASTOMERIC COATING: A coating system which, when fully cured, is capable of being stretched at least twice its original length (100% elongation) and recovering to its original dimensions. (See **ELONGATION**)

ELONGATED CELLS: Excessively large cells in foam or coating generally caused by off-ratio materials, moisture contamination, or excessive heat.

ELONGATION: The increase in length of a specimen at the instant that rupture occurs (expressed as a percent of the original length).

EMISSIVITY: The ability of a material to radiate or absorb radiant energy.

EMULSION: A colloidal dispersion of one liquid in another. (See **LATEX**; **COLLOIDAL DISPERSION**)

EPOXY: A class of synthetic, thermosetting resins, which produce tough, hard, chemical-resistant coatings and adhesives.

EXOTHERM: Heat generated by a chemical reaction.

EXPANSION JOINT: A joint designed to accommodate movement in the structure or components of the system due to thermal or stress-load variation.

F

FAST SET: A coating system with a very fast initial cure time, usually five seconds to one hour.

FEATHERED EDGE: The thin tapered outside edge of a polyurethane foam pass.

FELTS: A flexible sheet manufactured by the interlocking of fibers through a combination of mechanical work, moisture, and heat. Roofing felts may be manufactured principally from wood pulp and vegetable fibers (organic felts), asbestos fibers (asbestos felts), glass fibers (fiberglass felts or ply sheet), or polyester fibers.

FERROUS METAL: An iron compound, i.e., steel, cast iron, or galvanized steel. As

a rule of thumb, most ferrous metals are magnetic.

FILLER: A relatively inert ingredient added to coating or polyurethane foam formulations to modify physical characteristics.

FILM THICKNESS: The thickness of a membrane or coating. Wet film thickness is the thickness of a coating as applied; dry film thickness is the thickness after curing. Film thickness is usually expressed in mm/mils (thousandths of an inch).

FIRE RESISTANCE: The ability of a building component to resist the spread of fire.

FISHEYE: Coating defect that manifests itself by the separation of wet coating into a recognized pattern resembling small “dimples” or “fish eyes”.

FISHMOUTH: (Also referred to as an Edge Wrinkle) 1) A half-cylindrical or half-conical shaped opening or void in a lapped edge or seam, usually caused by wrinkling or shifting of ply sheets during installation; 2) In shingles a half-conical opening formed at a cut edge.

FLAME-RETARDANT: A substance that is added to a coating or polyurethane foam formulation to reduce or retard its tendency to burn.

FLAME SPREAD: Per ASTM E-84, a measure of relative combustibility. The flame spread of a tested material is rated relative to asbestos cement board (flame spread = 0) and red oak flooring (flame spread = 100).

FLAMMABILITY: Relative ability of a material to support combustion as expressed by its flash point.

FLASH COAT: A thin initial pass of a spray-applied material.

FLASH POINT: The lowest temperature of a material at which it gives off vapors sufficient to form an ignitable mixture with air near its surface.

FLASHING: The portion of a roof system used to waterproof at termination's or vertical surfaces.

FLUOROCARBONS: Components used as blowing agents.

FLUTES: The grooves in the lower section of metal decking that give it added strength.

FM: Factory Mutual. An independent testing agency.

FMRC: Factory Mutual Research Corporation. A part of FM.

FOAM STOP: The roof edge treatment upon which polyurethane foam is

terminated.

FREEZE THAW CYCLE: The freezing and subsequent thawing of material.

FRIABILITY: The tendency of a material or product to crumble or break into small pieces easily.

FROTH PACK: Pressurized containers of polyurethane foam components.

G

GLASS EYES OR GLASS WINDOWS: A thin clear membrane that forms over elongated polyurethane foam cells. Glass eyes may break when coated, forming a pinhole.

GLOSS: The shine, sheen, or luster of a dried film.

GRANULE: Size No. 11 ceramic aggregate embedded into wet coating over polyurethane foam for aesthetics, traction, and mechanical resistance.

GRAVEL STOP: The roof edge treatment designed to retain gravel.

H

HARDNESS: Ability of a coating film, as distinct from its substrate, to resist cutting, indentation, or penetration by a hard object.

HCFC: Hydrochlorofluorocarbon. A second generation blowing agent for polyurethane foam.

HEAT AGING: Controlled exposure of materials to elevated temperatures for a period of time.

HEAT SINK: A cold substrate that absorbs the SPF exothermic heat, slowing down the reaction and / or rise of the polyurethane foam or coating.

HFC: Hydrofluorocarbon. A possible third generation blowing agent for SPF.

HIDING POWER: The ability of a coating to hide or obscure a surface to which it has been uniformly applied.

HOLIDAYS: Application defects whereby small areas are left uncoated.

HYDROPHILIC: Having an affinity or attraction for water; having the ability of uniting with or dissolving in water. "Water loving".

HYDROPHOBIC: Having no affinity for water; not compatible with water. “Water fearing”.

HYGROSCOPIC: Attracting, absorbing, and retaining atmospheric moisture.

HYGROSCOPICITY: The capacity of a compound or substance to absorb water.

I

IBC: International Building Code.

ICAA: Insulation Contractors Association of America.

ICBO: International Conference of Building Officials. One of the model building codes in the U.S.

ICC: International Code Council. Recently formed to publish a common and single code to replace SBCCI, BOCA, and ICBO which will be called the International Building Code Council (IBC).

IGNITION TEMPERATURE: The minimum temperature to which a solid, liquid, or gas must be heated in order to initiate or cause self-sustained combustion independent of the heating element.

IMPACT RESISTANCE: Ability to withstand mechanical or physical blows without the loss of protective properties. The impact resistance of the roofing assembly is a function of all its components not just the membrane itself.

INTERLAMINAR ADHESION: Adhesion between polyurethane foam passes or coating passes.

ISO: Short for isocyanate.

ISOCYANATE: A highly reactive organic chemical containing one or more isocyanate (-N=C=O) groups. A basic component in polyurethane foam chemical systems and some polyurethane coating systems.

K

k-FACTOR: Thermal conductivity for a unit thickness of material. Expressed as $W/m \cdot K$ (Btu \cdot in/hr \cdot ft $^2 \cdot$ F). **R-VALUE** (see also) is equal to the thickness of the material divided by the k-factor ($R = x/k$ where $x =$ thickness).

KNIT LINE OR LIFT LINE: Interchangeable terms describing the adhesion plane

where one pass is sprayed over another.

KREBS UNITS (K.U.): A measurement of viscosity for materials that have the property of changing resistance to flow when under shear. Such materials are called thixotropic. Measuring is done with a Krebs/Stormer viscometer.

L

LAITANCE: A layer of weak non-durable material containing cement and fines, brought by bleeding water to the top of overwet concrete. Laitance may be detected by scraping the concrete surface with a putty knife; if a quantity of loose powdery material is observed or easily removed, excessive laitance may be considered to be present.

LATEX: A colloidal dispersion of a polymer or elastomer in water that coalesces into a film upon evaporation of the water. (See **EMULSION; COLLOIDAL DISPERSION**)

LEADER HEAD: (See **CONDUCTOR HEAD**)

LIFT: The sprayed polyurethane foam that results from a pass.

LIVE LOAD: The weight on a roof of temporary, mobile loads such as foot traffic, roofing equipment, water, snow, and ice.

LOW-DENSITY SPF INSULATION: SPF having a nominal density of less than one pound per cubic foot and used primarily as an insulation and air seal. Relative to medium-density SPF, typically Low-Density SPF Insulation is characterized by having a lower closed-cell content, higher water vapor permeance, and higher yields. Most Low-Density Insulations use water as a reactive blowing agent and are considered non-structural.

LOW TEMPERATURE FLEXIBILITY: The ability of a membrane or other material to remain flexible (resist cracking when flexed), after it has been cooled to a low temperature.

M

MASTIC: A coating material of relatively thick consistency.

MATERIAL SAFETY DATA SHEET (MSDS): A standard formatted information sheet prepared by a material manufacturer which describes the potential hazards, physical properties, and procedures for safe use of a material.

MECHANICAL BOND: (See **BOND, MECHANICAL**)

METHYLENE DIPHENYL DIISOCYANATE (MDI): Component A in spray polyurethane foam. An organic chemical compound having two reactive isocyanate (-N=C=O) groups. It is mixed with the B component to form polyurethane.

MECHANICAL DAMAGE: Breaks or punctures to insulation and coating systems as a result of impact or abrasion.

MEMBRANE: A flexible or semi-flexible roof covering whose primary function is the exclusion of water.

MEMBRANE REINFORCEMENT: Fabrics or fibers embedded in mastic or coating to provide strength and impact resistance.

MIL: One-thousandth of an inch; 0.001 inch (0.025mm). A unit used to measure coating thickness.

MILDEW: A superficial coating or discoloring of an organic material due to fungal growth, especially under damp conditions. (See **MILDEW**)

MIST COAT: A very thin sprayed coat.

MOLD: Fungal growths often resulting in deterioration of organic materials, especially under damp conditions.

MOISTURE VAPOR TRANSMISSION (MVP): (See **WATER VAPOR TRANSMISSION**)

MONOLITHIC: Formed from or composed of a single material; seamless.

MSDS: (See **MATERIAL SAFETY DATA SHEET**)

MUD CRACKING: The defect in an applied coating or mastic when it cracks into large segments or shrinks (also called alligatoring). When the action is fine and incomplete, it is usually referred to as “checking.”

MULTIPLE COAT: Two or more layers of coating applied to a substrate.

N

NEOPRENE RUBBER: A synthetic rubber having physical properties closely resembling those of natural rubber. Made by polymerization of chloroprenes.

NIGHT SEAL: A material and or method used to temporarily seal a membrane edge during construction to protect the roofing assembly in place from water penetration. May be removed when roofing application is resumed.

NON-BREATHING MEMBRANE: A membrane material that has a significantly greater resistance to the diffusion of water vapor than the other materials with which it is used.

NON-FERROUS METAL: All metals that are not iron compounds, i.e., copper, lead, gold, silver, and aluminum. These metals are non-magnetic.

NON-FLAMMABLE: Liquid having no measurable **FLASH POINT** (see also).

NON-OXIDIZING: A material that resists oxidation in exterior exposures or accelerated weathering.

NON-VOLATILE CONTENT: That portion of a coating material that does not evaporate under normal ambient conditions. (For Comparison See **SOLIDS CONTENT**)

NRCA: National Roofing Contractors Association.

O

OFF-RATIO FOAM: Polyurethane which has a lack of isocyanate or resin. Off-ratio foam will not exhibit the full physical properties of normal foam.

ORANGE PEEL SURFACE TEXTURE: The surface texture of polyurethane foam resembling that of an orange peel.

ORGANIC: Compounds containing carbon.

ORIFICE: An opening or aperture. The opening in the tip of a spray gun.

OVERSPRAY: (1) Airborne spray loss of polyurethane foam or coatings. (2) Undesirable depositions of airborne spray loss.

OVERSPRAY SURFACE TEXTURE: The surface shows a linear coarse textured pattern and/or a pebbled surface. This surface is generally downwind of the sprayed polyurethane path and is unacceptable for proper coating coverage and protection, if severe.

P

PARAPET: A wall or top portion of a wall extending above an attached horizontal surface such as a roof, terrace, or deck; often used to provide a safety barrier at a roof edge.

PASS: The amount of coating or polyurethane foam applied by moving the gun from

side to side and moving away from fresh material. A pass is delineated by its width, length and thickness.

PASS LINES: The overlapping of the polyurethane foam or coating as the newly applied material ties into the previous pass.

PEEL STRENGTH: The average force (or force per unit width) required to peel a membrane or other material from the substrate to which it has been bonded.

PEELING: Top-coating film inadequately bonded with undercoats resulting in partial delamination or detachment of final coat.

PENETRATION: Any object passing through a roof.

PERM: A unit of water vapor transmission defined as 1 grain of water vapor per square foot per hour per inch of mercury pressure difference (1 inch of mercury = 0.49 psi).

PERM RATING: The permeance of a material. Breather materials have relatively high perm ratings, vapor retarders have relatively low perm ratings, vapor barriers have essentially zero (negligible) perm ratings.

PERMEABILITY: The rate at which water vapor will diffuse through a unit area of material induced by a unit differential in water vapor pressure. Permeance values are reported for specific thicknesses (usually recommended application thickness). Units are $\text{ng/s} \cdot \text{m}^2 \cdot \text{Pa}$ (Grains/ft²·hr·in Hg).

PERMEANCE: The time rate of water vapor transmission through unit area of water vapor transmission through unit area of flat material or construction induced by unit vapor pressure difference between two specific surfaces, under specified temperature and humidity conditions.

pH: A measure of acidity/alkalinity of aqueous mixtures. A measure of pH 7 is neutral, lower is more acidic, higher is more alkaline.

PICTURE FRAMING: Outlining the perimeter of a stud wall cavity with spray polyurethane foam prior to filling the center.

PIGMENT: Fine solid particles dispersed in a coating to impart color.

PINHOLE: A small hole in a mastic, coating, or polyurethane foam.

PLASTICIZER: A substance added to a plastic or coating to increase its flexibility or elongation.

POLYMER: A substance consisting of high molecular weight chemical compounds characterized by chains of repeating simpler units.

POLYOL: Polyol is the main ingredient of the resin component that reacts with the

isocyanate to form polyurethane.

POLYURETHANES: A compound based on the reaction of various isocyanates and various polyol resins. These compounds or polymers can create rigid foams, flexible foams, elastomeric coatings or structural resins and many other forms. They are either an aromatic or aliphatic polyurethane (See **AROMATIC, ALIPHATIC, ISOCYANATE, POLYOL, and RESIN**)

POLYURETHANE COATINGS: A one or two part coating that contains polyisocyanate monomer and a hydroxyl containing resin, which react during cure to form polyurethane elastomeric.

POPCORN SURFACE TEXTURE: A polyurethane foam surface texture where valleys form sharp angles. This surface is unacceptable for uniform coating application.

PONDING: The accumulation of water in low-lying areas that exceeds the manufacturer's specification and/or contract documents. (See **POSITIVE DRAINAGE**)

POSITIVE DRAINAGE: The condition in which there is no consequential standing water on the roof 48 hours after a rain. (See **PONDING**)

POT LIFE: The period of time during which a multi-component or catalyzed material remains suitable for application after being mixed.

PRIMER: The first layer of coating applied to a surface to improve the adhesion of subsequently applied materials or to inhibit corrosion.

PROPORTIONER: The basic pumping unit for spraying polyurethane foam or two component coating systems. Consists of two positive displacement pumps designed to dispense two components at a precisely controlled ratio.

PSI: Pounds per square inch.

PSYCHROMETER: A device for measuring ambient humidity by employing a dry bulb thermometer and a wet bulb thermometer.

PSYCHROMETRIC CHART: A diagram relating the properties of humid air with temperature.

PURGE: To cleanse or remove liquid materials from equipment or hoses.

Q

QUV: An apparatus used to simulate the effects of weathering of materials.

R

R VALUE: The resistance of a material to heat transfer. Insulators have relatively high R values. Units are $\{K\}m^2/W$ ($\{F\}ft^2\{hr\}/Btu$).

RCI: Roof Consultants Institute.

RECOVERING: The process of installing a new roofing system over an existing roofing system.

REGLET: A sheet metal receiver for the attachment of counterflashing. (A reglet may be inset into a raggle, embedded behind cladding, or be surface mounted.)

RELATIVE HUMIDITY: The ratio of absolute humidity to saturation humidity, expressed as a per cent.

REPLACEMENT: The process of removing an existing roof and installing a new roofing system.

RE-ROOFING: Either recovering or replacement of a roofing system. (See **RECOVERING;** **REPLACEMENT**)

RESIN: 1.) Component B in SPF. This component contains a polyol catalyst, blowing agent, fire retardant, and surfactants. It is mixed with the A component to form polyurethane. 2.) General term applied to a wide variety of more or less transparent and fusible products, which may be natural or synthetic. Higher molecular weight synthetic resins are referred to as polymers. 3.) Any polymer that is a basic material for coatings and plastics.

RETROFIT: The modification of an existing building or facility to include new systems or components.

ROOF CURB: Raised frame used to mount mechanical units such as air conditioning or exhaust fans, skylights, etc.

ROOF SLOPE: The angle of a roof surface measured in the number of inches of vertical rise in a horizontal length of 12”.

RUST BLUSH: The earliest stage of rusting characterized by an orange or red color. Occurs frequently on freshly sandblasted steel if allowed to stand too long before coating.

S

SADDLE: A relatively small raised substrate or structure constructed to channel or direct surface water to drains or off the roof. A saddle may be located between drains or in a valley, and is often constructed like a small hip roof or like a pyramid with a

diamond-shaped base. (See **CRICKET**)

SAG: Undesirable excessive flow or run in material after application to a sloped or vertical surface.

SATURATION HUMIDITY: The maximum concentration of water vapor in air at a given temperature before condensation occurs.

SBCCI: Southern Building Code Congress International. One of the three model building codes.

SCARF: To remove the surface or coating from polyurethane foam by cutting, grinding, or other mechanical means. Synonymous with **SCARIFY**.

SCARIFY: (See **SCARF**)

SCRIM: A woven, non-woven, or knitted fabric, composed of continuous strands of material used for reinforcing or strengthening membranes. Scrim may be incorporated into a membrane by the laminating or coating process.

SCUPPER: An opening in a parapet wall allowing runoff water to exit a roof.

SCV: Solid content by volume.

SEALANT: Any of a variety of compounds used to fill and seal joints or openings in wood, metal, masonry and other construction materials. Some common types of sealants are Neoprene®, polysulfide, acrylic latex, butyl, polyurethane, foams and silicone.

SEALANT FOAM: One or two component polyurethane foam applied as a bead and used to control air leakage as part of an air barrier system within the building envelope.

SELF-FLASHING: The ability of sprayed polyurethane foam to be applied around a penetration or at a roof transition without the need for other materials.

SERVICE TEMPERATURE LIMITS: The maximum temperature at which a coating, polyurethane foam, or other material will perform satisfactorily.

SET: To convert into a fixed or hardened state by chemical or physical action.

SHELF LIFE: The period of time within which a material remains suitable for use. Synonymous with **STORAGE LIFE**.

SHORE HARDNESS: A measure of hardness based on the shore scale.

SILICONE COATING: A liquid applied elastomeric coating whose principal polymer in the dispersion contains more than 95% silicone resin.

SKINNING: The formation of a dense film on the surface of a liquid coating or mastic.

SLIT SAMPLES: Small cut samples approximately 2” long, ½” wide, and ¾” deep which are taken for evaluation of sprayed materials.

SMOOTH SURFACE TEXTURE: The surface shows spray undulation and is ideal for receiving a protective coating.

SOLIDS CONTENT: The percentage of non-volatile matter in a coating or mastic formulation; may be expressed as a volume or weight percent.

SOLVENT: A liquid that dissolves other substances. (See also **THINNER**)

SPI: The Society of the Plastics Industry.

SPI / SPFD: The Society of the Plastics Industry / Spray Polyurethane Foam Division.

SPRAY POLYURETHANE FOAM (SPF): A foamed plastic material formed by the reaction of an isocyanate and a polyol and employing a blowing agent to develop a cellular structure. SPF may be a two-component reactive system mixed at a spray gun or a single-component system that cures by exposure to moisture. SPF can be formulated to have physical properties (such as density, compressive strength, closed cell content, and R-value) appropriate for the application requirements. Common uses of SPF include insulation, air barrier and roofing membrane.

SPUD: To remove the roofing aggregate and most of the bituminous top coating by scraping and chipping.

SQUARE: A standard measurement for roofing area equal to 100 square feet. Also called “roofing square.”

STORAGE LIFE: (See **SHELF LIFE**)

STRESS: An applied force which tends to deform a body. May be tensile stress (pulling or stretching force), compressive stress (pushing or compacting force) or shear stress (opposite but offset parallel forces tending to produce a sliding motion).

STRESS-CRACK: External or internal cracks within a material caused by long term stress.

SUBSTRATE: The surface to which polyurethane foam is applied.

SURFACE EROSION: The wearing away of a surface due to abrasion, dissolution, or weathering.

SURFACE TEXTURE: The resulting surface from the final pass of SPF. The following terms are used to describe the types of SPF surfaces: smooth, orange peel, coarse orange peel, verge of popcorn, popcorn, treebark, and overspray.

SURFACING: The top layers of a roof covering, specified or designed to protect the

underlying roofing from direct exposure to the weather.

SURFACTANT: Short for “surface active agent.” Used to alter the surface tension of liquids. An ingredient in polyurethane foam formulations to aid in mixing and controlling cell size.

T

TACK-FREE: A curing phase of polyurethane foam wherein the material is no longer sticky.

TEAR STRENGTH: The maximum force required to tear a specimen, the force acting substantially parallel to the major axis of the test specimen. Values reported as a stress per unit of thickness.

TENSILE STRENGTH: The tensile (pulling or stretching) force necessary to rupture a material sample divided by the sample’s original cross sectional area. Units are usually kPa or psi or lb/in².

TERMINATION: The treatment or method of anchoring and/or sealing the free edges of the membrane in roofing or waterproofing system.

THERMAL BARRIER: A material applied over polyurethane foam designed to slow the temperature rise of the foam during a fire situation and delay its involvement in the fire. Thermal barriers for use with polyurethane foam must have a time rating of not less than 15 minutes.

THERMAL BRIDGE: A thermally conductive material which penetrates or bypasses an insulation system; such as a metal fastener or stud.

THERMAL CONDUCTANCE (C): A unit of heat flow that is used for a specific thickness of material or for materials of composite construction, such as laminated insulation. $C=k/\text{thickness}$. Units are $W/m^2\{K$ or $Btu/hr\{ft^2\{F$.

THERMAL CONDUCTIVITY (k): The heat energy that will be transmitted by conduction through 1 square foot of 1 inch thick homogeneous material in one hour when there is a difference of 1 degree Fahrenheit perpendicularly across the two surfaces of the material. Units are $W/m\{K$ or $Btu\{in/hr\{ft^2\{F$.

THERMAL MOVEMENT: Changes in dimension of a material as a result of temperature changes.

THERMAL RESISTANCE (R): An index of a material’s resistance to heat flow; it is the reciprocal of thermal conductance (C) or the thickness divided by k.

THERMAL SHOCK: The stress producing phenomenon resulting from sudden

temperature drops in a roof membrane, for example, a rain shower following brilliant sunshine.

THERMOGRAPHY: A technique used to locate wet areas in a roof assembly by measuring differences in temperature.

THERMOPLASTIC: A polymeric material which softens upon heating and hardens upon cooling.

THERMOSET: A polymeric material whose physical properties are relatively unaffected by modest changes in temperature; when heated, thermosets will degrade rather than melt.

THINNER: A liquid used to reduce the viscosity of coatings or mastics. Thinners evaporate during the curing process. Thinners may be used as solvents for clean up of equipment.

THIXOTROPIC: Having the property of decreasing viscosity with increasing shear stress. A coating is thixotropic if it thins with stirring or pumping but thickens back up when movement ceases.

TIE IN LINES: The starting or stopping point at which new foam is applied to foam which had been sprayed earlier.

TINT: A color produced by the introduction of small amounts of a colored pigment.

TOXICITY: The quality, property, or degree of being poisonous or toxic.

TREEBARK SURFACE TEXTURE: A rolling foam surface texture where the valleys form sharp angles generally caused by spraying foam at an angle. This surface is unacceptable for coating application.

TWIST & RACK: Colloquial name for ASTM Standard E72, “ Standard Methods of Conducting Strength Tests of Panels for Building Construction.” ASTM E72 tests a stud wall’s resistance to wind, seismic, and weight loads.

TWO-PART SYSTEM: A coating or polyurethane foam formed by the mixing and the reaction of two different materials.

U

UBC: Uniform Building Code. Model building code generated by ICBO.

UL: Underwriter’s Laboratory. An independent testing agency.

ULTRA-VIOLET RADIATION (UV): Electro-magnetic radiation beyond the visible spectrum at its violet end. Invisible high-energy sunlight which degrades many

organic materials.

UNDERLAYMENT: A material that is laid down as a substrate for the sprayed polyurethane foam to make the surface smooth or to give a specific rating for interior fire exposures.

UPLIFT: (See **WIND UPLIFT**)

UV: An abbreviation for ultraviolet. (See also **ULTRAVIOLET RADIATION**)

U VALUE: Overall thermal conductance. U value is equal to the inverse of the sum of the R-values in a system ($U = 1/R$ total). Units are $\text{K}\cdot\text{m}^2/\text{W}$ ($\text{F}\cdot\text{ft}^2\cdot\text{hr}/\text{Btu}$).

V

VAPOR BARRIER: A material that prevents the migration of water vapor across it.

VAPOR MIGRATION: The movement of water vapor from a region of high vapor pressure to a region of lower vapor pressure.

VAPOR PRESSURE: The portion of atmospheric pressure contributed by water vapor; an indicator of absolute humidity. Units are kPa (in Hg).

VAPOR RETARDER: A film, coating, sheet, or other building component which restricts the migration of water vapor relative to the building components with which it is used.

VERGE OF POPCORN SURFACE TEXTURE:

The roughest texture suitable for receiving the protective coating on a sprayed polyurethane foam roof. The surface shows a texture where nodules are larger than valleys, with the valleys relatively curved. This surface is acceptable for receiving a protective coating only because of the relatively curved valleys. However, the surface is considered undesirable because of the additional amount of coating material required to protect the surface properly.

VISCOSITY: The thickness or resistance to flow of a liquid. Viscosity generally decreases as temperature increases.

VOC: Abbreviation for Volatile Organic Compounds. (See **VOLATILE ORGANIC COMPOUNDS**)

VOLATILE ORGANIC COMPOUNDS: Any compound containing carbon and hydrogen or containing carbon and hydrogen in combination with other elements that has a vapor pressure of 1.5 pounds per square inch absolute (77.6 mm Hg) or greater under actual storage conditions.

W

WALKWAYS: High traffic and high service areas on a rooftop, particularly those with vents, hatches, and heavy duty air conditioning units, that have been reinforced with extra coating and granules to prevent damage to the polyurethane foam system.

WATER ABSORPTION: The percent increase in weight of a specimen after contact with water for a specified time.

WATER VAPOR TRANSMISSION: The migration of water vapor.

WATER VAPOR TRANSMISSION RATE: The rate at which water vapor will diffuse through a unit area of material. Units are usually grains/ft²·hr.

WET BULB TEMPERATURE: The temperature of air as registered by a thermometer whose bulb is covered by a water wetted wick. Units are °C or °F.

WET FILM GAUGE: A gauge for measuring the thickness of wet coating as applied to a flat smooth surface.

WET FILM THICKNESS: The thickness, expressed in mm or MILS, of a coating or mastic as applied but not cured. (For comparison, See **DRY FILM THICKNESS**) (See **MILS**)

WINDSCREEN: A device to minimize the effects of wind on coating or polyurethane foam application.

WIND UPLIFT: The force caused by the obstructions causing a drop in air pressure deflection of wind at roof edges, roof peaks, or immediately above the roof surface.



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