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GENERAL ENGINEERING TERMS AS APPLIED TO BUILDINGS

This glossary was written to help individuals become more familiar with some of the common engineering terms used by the building industry.

ALLOY -- Composition of two or more metals fused together, usually to obtain a desired property.

ALUMINIZING -- Applying a coating of aluminum, or an aluminum-silicon alloy, to steel by the hot dipping process.

AMBIENT TEMPERATURE -- Temperatures of the surrounding air on all sides.

BASE PLATE -- A plate that a portion of a beam or column rests on for support.

BATTEN -- Type of metal roofing seam; raised rib in a metal roof, or a separate part or formed portion on a metal roofing panel.

BAY -- The distance between two trusses or columns or transverse beams.

BEAM -- A structural member which is ordinarily subject to bending, and is usually a horizontal member carrying vertical loads.

BEAM - CONTINUOUS -- A beam which has more than two points of support.

BEAM - SIMPLE -- A beam freely supported at both ends, theoretically with no end restraint.

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

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.

BOCA -- Building Officials and Code Administration - Basic Building Code

BRACKET -- A support projecting from wall or column.

BRIDGING -- A structural member used to give weak axis stability to joints.

BUR (BUILT-UP ROOF) -- A roofing membrane built up on the job, made of several sections or layers fastened together with bituminous saturated or coated felts. The top can be finished with crushed slag or gravel.

CAMBER -- Slight upward curve given to beams, girders, or trusses to counteract the effect of deflection or sag.



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CLIP ANGLE -- An angle used for fastening various members together.

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

COLLECTOR BOX -- Transition piece between a gutter and downspout to facilitate the flow of water.

COLUMN -- A vertical structural member that supports either trusses or beams and is compressed end-wise by either concentric or eccentric loads.

COMPRESSION -- Forces acting on a body which tends to shorten it.

CONCENTRATED LOADS -- A load that is concentrated to one small area.

CONDENSATION -- Formation of water from vapor in the air upon contact with cold materials at the dew point temperature.

CURB -- A framed opening rising above the roof surface.

DEAD LOADS -- Non-moving rooftop loads, such as mechanical equipment, air conditioning units and the roof system itself.

DEFLECTION -- The displacement of a structural member in the direction of the load and is measured from its no-load position.

DEW POINT -- The temperature at which water vapor forms condensation.

DUCTILITY -- The property of the material to withstand deformation by stretching without recovery of shape upon removal of the stretching force.

EAVE -- The low edge of a sloping roof.

ELASTICITY -- The capacity of a material to recover its original size and shape after deformation.

EMBOSSING -- The process of decorating, or covering with design, by depressing the surface of the metal strip using a patterned or "coining" roll.

EXPANSION JOINT -- A joint where movement is allowed to take place, usually in response to thermal stress.

FACTORY MUTUAL ENGINEERING & RESEARCH CORP. (FM) -- Organization located in Norwood, Mass., that classifies roof assemblies on their fire characteristics and wind uplift resistance for insurance companies in the United States.



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FASCIA -- A narrow trim where a roof meets a wall, or a wide exterior bank of material which often covers the construction between the ceiling and roof.

FLANGE -- A projecting portion of a beam, girder, channel, or column.

FLASHING -- Sheet metal, felts or elastomeric sheet used in waterproofing roof valleys or hips or the angle between a wall and roof and all joints.

FOOTING -- The projecting portion at the base of a wall or column to spread the load over a greater area.

FOUNDATION -- The sub-structure on which a building rests.

GABLE -- The walls at the ends of a building directly under the sloping roof planes.

GAGE, GAUGE -- A designation of metal thickness.

GALVANIZED -- Zinc coating on steel for corrosion resistance.

GALVALUME -- Patented material in which an aluminum-zinc alloy coating is applied to steel.

GIRDER -- The beam which receives its loads in concentrations.

GIRT -- A member fastened to columns to support side wall coverings.

HARDNESS -- The relative resistance of material to denting, scratching, or bending.

HAUNCH -- A deepened portion of a girder or column.

HEADER -- A beam which supports loads over doors and windows.

ICBO -- International Conference of Building Officials, Uniform Building Code.

IMPACT -- Analysis has shown that the stress produced in a member by a load which is applied suddenly by a blow (impact) is greater than that produced by the same load applied gradually.

INCLINE -- The slope of a roof, expressed in the number or vertical units of rise per horizontal units of run, or in percent. (See Slope: Pitch).

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

JAMBS -- The side posts or lining of a doorway, window or other opening.



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JOISTS -- Light beam for supporting the floor or roof.

KIP -- 1000 lbs.

KNEE BRACE -- A corner brace used to prevent angular movement. Knee bracing stiffen wall and roof joints to resist high winds.

LINER --An interior covering which covers insulation, studs, etc. for protection.

LIVE LOADS -- Moving or non-permanent loads such as wind, snow, ice, rain or portable equipment.

MANSARD -- A nearly vertical roof; typically a fascia.

MEMBRANE -- 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.

MIL -- A unit used in measuring thickness, being 0.001 inch (British equivalent: Thou.) (Metric equivalent: 0.0254 mm.).

MODULUS OF ELASTICITY -- The ratio of stress corresponding to strain (within the elastic limit of a material); it is a measure of the stiffness of a material.

MOMENT -- The effect a load has on a structural member causing the member to bend/twist about a fixed point. The magnitude of the moment is dependent on the load and the distance from the fixed point. Moment is equal to the magnitude of the load multiplied by the distance of load from a fixed point ($M = L \times D$). It is moment that causes a member to bend under load.

MOMENT OF INERTIA --An external moment is resisted by the built-in internal moment that is determined by the shape and size of a member. This internal moment is the moment of inertia.

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

PARAPET --An extension of a wall above a roof.

PERM -- 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 = 0.491 psi). The formula per perm is: $P = \text{grains of water vapor/square foot} \times \text{hour} \times \text{inch mercury}$.

PIER -- Any mass of masonry to support a girder or column.



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PILASTER -- A flat, square column attached to a wall and projecting from it.

POLE -- A post or column which is supported by a concrete pad and is secured by packed soil.

POST -- Same as column.

PURLIN -- Horizontal members extending between rafters, used as (light) beams, for supporting roofing material.

RAFTERS -- Girders or truss members supporting the purlins.

RAKE -- The intersection of the plane of the roof and the plane of the endwall.

REACTIONS -- Forces required to resist the loads from a structure.

REINFORCING STEEL -- Steel rods placed in concrete to take tension stresses.

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.

RETROFIT -- The placing of new metal roof or wall systems over deteriorated roofs or walls.

REVERSE COATING -- Coating with the applicator roll revolving in a direction opposite to the direction of travel of the metal strip.

RIB -- A raised portion of a metal panel for stiffening or structural spanning.

RIDGE -- The intersection of the two planes of the roof (at the peak of the truss).

RIGID CONNECTION -- A joint capable of transmitting moment to another member of a system.

RIGID FRAME -- Any structure in a plane, made up of beams or girders and columns, so constructed that the joints are rigidly fixed to transmit moment, and thus reduce moment in other parts of the frame.

ROLL FORMING -- An operation used in forming metal strip. The metal is run progressively through rolls of definite settings that bend the strip to a final predetermined contour.

ROOF PITCH -- Slope of a roof plane expressed as a ratio of vertical rise per unit of horizontal run.



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SAG ROD -- The rods used lessen weak axis deflection of girts and purlins.

SANDWICH PANEL -- A panel assembly used as covering. It consists of an insulating core material with interior and exterior metal skins.

SBCC -- Southern Building Code Congress. Standard Building Code.

SEAM -- A lap or area of juncture for two separate sheets.

SHEAR -- The tendency of a portion of a body on one side of a section to slide by the portion on the other side of the section.

SILL -- A beam which supports and anchors studs, windows and doors.

SKIRT BOARDS -- Members that are attached to the bottom of posts or poles in pole construction to provide support and protection of interior.

SOFFIT -- The underside of a canopy or overhang.

SPAN -- The distance between supports of a given member.

SPANGLE -- The result of the unrestricted growth of zinc crystals during normal solidification.

SPECIFICATION -- A description of the kind, quality, and quantity of materials and workmanship that are to govern the fabrication and erection of a building; also includes design loads.

SPLICE -- A longitudinal connection between the parts of a continuous member.

SQUARES -- Measure of roofing materials equaling 100 square feet.

STANDING SEAM -- Longitudinal side joints of roof panels arranged in a vertical position above the roof line.

STRUT -- A structural member in any position that is compressed endwise by concentric loads.

STUDS -- Light structural members used in partitions and walls to support the wall covering. In bearing walls, studs can also sustain vertical loads.

SWAY FRAMES -- Light trusses used in secondary structural systems.

TENSILE STRENGTH -- The force per unit of the original cross sectional area (of an unstretched



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specimen) which is applied at the time of rupture of the specimen. It is calculated by dividing the breaking force in pounds by the cross section of the unstretched specimen in square inches.

TENSION -- Forces acting on a body which tends to elongate it.

THERMAL CONDUCTIVITY (K) -- Heat energy in BTU per hour transferred through a 1-in.-thick, 1-sq-ft. area of homogeneous material per F temperature difference from surface to surface.

TIE -- A structural member that tends to lengthen under stress.

TRUSS -- A pre-fabricated member composed of three or more individual members so designed and connected that the pre-fabricated member as a whole acts as a beam and the individual members are subjected primarily to longitudinal stress.

UNIFORM LOAD -- Loads that cover an area uniformly such that the amount of load per unit of area is the same.

VALLEY GUTTER -- Open gutter in a roof valley receiving water from sloping roofs on both sides.

WALL, BEARING -- Wall capable of supporting a vertical load.

WALL, NON-BEARING -- Wall not capable of supporting a vertical load.

WASH COAT -- Same as backer except that it is not closely controlled for color, gloss, or applied film thickness. Usually a functional coating designed to protect the topside coating during transit, to prevent corrosion of the reverse side, and to facilitate roll forming by providing lubrication.

WEB -- The part of a channel, beam, girder, or column between the flanges.

WINDLOAD -- Total force exerted by the wind on a structure or part of a structure.

WIND UPLIFT -- Wind force that, at its strongest, could lift the roof off a building. Underwriters Laboratories, Northbrook, IL, assigns one of three ratings (1-30, 1-60, 1-90, with the last being the most wind-resistant) according to how well a roof assembly resists uplift forces.

YIELD POINT -- The yield point of metal, expressed in pounds per square inch (PSI), is that point in loading below which the metal will return to its original shape or position when the load is removed. Above this point, the metal will take a "permanent set" or be permanently distorted when the load is removed.