

SECTION 23

ASPHALT EMULSION DEFINITIONS



Anionic (Anion) — A negatively charged ion in a solution; that portion of a compound which when dissolved (usually in water) tends to move toward the anode under the influence of a direct current.

Arc — The luminous bridge formed by the passage of a current across a gap between two conductors or terminals.

Asphalt — “A dark brown to black cementitious material in which the predominating constituents are bituminous which occur in nature or are obtained in petroleum processing” (ASTM D8). Asphalt is a constituent in varying proportions of most crude petroleum.

Asphalt Emulsion — An emulsion of asphalt cement and water which contains a small amount of a surface active agent (emulsifier). Emulsified droplets of asphalt may be of either the anionic (negative charge) or cationic (positive charge) type, depending on the surfactant used.

Asphalt Emulsion Distributor — An asphalt distributor, either truck or trailer mounted, which may consist of an insulated tank, self-contained heating system, pump, and a spray bar with nozzles through which asphalt emulsion is metered and applied under pressure onto the prepared aggregate materials or bituminous surfaces.

Asphalt Emulsion Prime — An application of a low viscosity asphalt emulsion to an absorbent surface or granular base, in preparation for an asphalt surface course.

Asphaltene — The high molecular weight hydrocarbon fraction precipitated from asphalt by a designated paraffinic naphtha solvent at a specified solvent: asphalt ratio.

Asphalt Rubber — Blend of asphalt and pre-vulcanized rubber.

Base — A layer of granular material placed on the subbase, an old bituminous, or non-bituminous pavement. It may be composed of suitably graded crushed stone, gravel, slag and sand, or combinations of these materials. These materials may be mixed or treated with asphalt emulsion for added stability.

Bell/Swedge Reducer — A pipe fitting that allows the connection of pipes of different diameters. The Bell reducer has the center points of the diameters concentric, the Swedge reducer is offset so the outside surfaces of the pipes are congruous.

Belt or Coupling Guard — A protective or safety device that surrounds the moving mechanical coupling parts between motors and pumps preventing accidental contact.

Binder Course — A transitional layer between the base course and the surface course (sometimes called intermediate course).

Block Copolymer — A copolymer whose structure is composed of alternating sections of one monomer separated by sections of a different monomer or a coupling group of low molecular weight.



Breakdown Rolling — The initial compaction of a mixture which usually begins as the emulsion starts to break as shown by a change in color of the mix.

Breaking — The phenomenon when the asphalt and water in the emulsion separate, beginning the curing process. The rate of breaking is controlled primarily by the emulsifying agent.

Cape Seal — A multiple surface treatment which consists of the application of a chip seal followed by the application of either slurry seal or micro-surfacing.

Cationic (cation) — A positively charged ion in a solution; that portion of a compound which when dissolved (usually in water) tends to move toward the cathode under the influence of a direct current.

Cavitation — The formation of partial vacuums in a liquid by a swift moving body (as a propeller or emulsion mill rotor).

Chip Seal — See Single Chip Seal, Multiple Chip Seal and Surface Treatment.

Choke (Blotter) Aggregate — A light application of sand, screenings, or open-graded aggregate (usually smaller in size than the aggregate in the mixture being treated) applied to a compacted asphalt emulsion aggregate surface that prevents pickup of the mix by traffic and interlocks aggregate.

Clay — A natural earthy material, plastic when wet, resulting from the decomposition of certain minerals. fine sized mineral particles, smaller than 0.005 mm. Clay materials are usually characterized by their water sensitivity as measured by Plasticity Index. (MSHTO T90, ASTM 0653) See Sand Equivalent Value definition.

Coarse Aggregate — Aggregate retained on the 2.36 mm (No. 8 sieve) (BAEM) or on the 4.75 mm (No. 4 sieve). (ASTM D692, D3515-81, or 0127)

Cold Mixed Asphalt — Emulsion and mineral aggregate mixed at or near ambient temperature.

Construction Seal — Light spray application of dilute recycling emulsion, applied to a newly constructed asphalt concrete surface which restores the chemical balance to the asphalt at the surface and some small depth below. This balance is lost primarily from the heat of the hot mix plant. This seal may also help to seal or prevent the formation of surface pores.

Copolymer — A polymer produced by the simultaneous polymerization of two or more dissimilar monomers.

Curing — The development of the mechanical properties of the asphalt binder. This occurs after the emulsion has broken and the emulsion particles coalesce and bond to the aggregate.

Dense Graded Aggregate — Aggregate that is graded from the maximum size down through filler with the objective of obtaining an aggregate blend with a controlled void content and high density.



Dense Surface — Tight, relatively non-absorbent smooth textured surface.

Direct Non-Reducing Drive — A drive mechanism that connects the driving shaft directly to the driven shaft. The drive to driven speed ratio is 1 : 1.

Discharge Head — A pumping condition when the discharge pressure of the pump equals the head pressure.

Elastomer — A polymer that can elongate (at least twice its original length) at relatively low stress levels and rapidly return to approximately original size.

Emulsifier — See Surface Active Agent.

Emulsion Break — The initial separation of the water from the emulsion, which can be detected by a marked color change from brown to black, and often by the release of fairly clear to straw brown water. This break results in the deposition of the base asphalt on an aggregate or a paved surface.

Feeler Gauge — An instrument, usually consisting of a series of specific sized wires or blades used for measuring a dimension or for testing mechanical accuracy.

Fine Aggregate — Aggregate passing either the 2.36 mm (No. 8) sieve (BAEM), or the 4.75 mm (No. 4 sieve) (ASTM D1073, D3515-81).

Flush Coat — A fog seal applied for the purpose of increasing the asphalt content of an under asphalted, usually newly constructed, surfaces of chip seals. Flush coats are treated herein as fog seals.

Fog Seal — A light spray application of dilute asphalt emulsion used primarily to seal existing asphalt surfaces to reduce raveling and to enrich dry and weathered surfaces. Can also be used as a color coating and as a paint stripping surface preparation.

Heat Jacketed — A heating method where the object to be heated is encompassed by an annular space through which water, steam, oil or any heat transfer medium can be circulated to heat the enclosed object.

High Tension Electric Power Lines — Primary electrical power lines capable of carrying or operating under current of high voltage, usually more than 600 volts.

Hot Asphalt Emulsion Mixes — Those emulsion aggregate mixtures (either open or dense-graded) which are mixed at temperatures greater than 104° C (220° F) and laid at temperatures substantially above ambient.

Hveem Design Method — A designing and testing method used to evaluate asphalt aggregate mixtures. The method involves three principle tests: a. The stabilometer test which measures mix stability b. The cohesiometer test which measures mix cohesion c. The centrifuge kerosene equivalent (CKE) test used to estimate asphalt content required by the mix.

Hydrophilic — Having an affinity for water. Hydrophobic Having no affinity for water.



Indirect Heat — A heating method where the actual heat source (i.e., steam, hot oil, water, open flame) does not come in direct contact with the material to be heated.

Ion(s) — Water soluble chemicals or substances which carry an electrical charge.

Ionic — See “Ions.”

Job Mix Formula (JMF) — The proportions of aggregate and asphalt emulsion used to produce a mixture. The proportions are determined by the engineer or the emulsion supplier using appropriate design methods and or specifications.

Latex — An aqueous stable, colloidal emulsion of a polymeric substance.

Lipophilic — Having an affinity for oils and fats.

Low Pressure Steam — Steam that is generated at pressures below approximately 100 psig.

Maintenance Mix — A mixture of asphalt material and mineral aggregate for use in relatively small areas to patch holes, depressions and distressed areas in existing pavements. Appropriate hand or mechanical methods are used in placing and compacting the mix (BAEM).

Maltene (Malthene) — A relatively high boiling fraction of asphalt (oils and resins) that is soluble in low boiling saturated hydrocarbons, (e.g., n-pentane).

Marshall Design Method — A designing and testing method used to evaluate asphalt aggregate mixtures. The method involves a density or void analysis and stability and flow tests.

Micro-surfacing — A mixture of polymer modified asphalt emulsion, crushed dense graded aggregate, mineral filler, additives, and water. Micro-surfacing provides thin re-surfacing of 10 to 20 mm (3/8 to 3/4 in.) to the pavement and returns traffic use in one hour under average conditions. Materials selection and mixture design make it possible for micro-surfacing to be applied in multiple applications and provide minor re-paving. The product can fill wheel ruts up to 40 mm (1.5 in.) in depth in one pass and produces high surface friction values. Microsurfacing is suitable for limited use on limited access, high-speed highways as well as residential streets, arterials, and roadways.

Mineral Dust — That portion of the fine aggregate passing the 0.075 mm (No. 200) sieve.

Mineral Filler — A finely divided mineral aggregate at least 70% of which will pass 0.075 mm (No. 200) sieve. pulverized limestone is the most commonly manufactured filler although other stone dust, hydrated lime, portland cement, and certain natural deposits of finely divided mineral matter are also used.

Modified Binders — A bituminous material whose physical or performance characteristics, or both, are modified by addition of a polymer or other additives.



Multiple Chip Seal — Two or more successive applications of asphalt emulsion and cover aggregate followed by rolling of each application.

Natural Rubber — A naturally occurring polymer (poly cis-1-4-isoprene) found in some species of trees, shrubs, and plants.

Natural Rubber Latex — A naturally occurring latex containing polyisoprene (natural rubber). Neoprene A synthetic elastomer made by polymerization of chloroprene (2-chlorobutadiene-1, 3). A generic name for polychloroprene.

Nonionic — A hydrophilic compound that does not ionize in water.

OGAEM — Open Graded Asphalt Emulsion Mix.

Open Graded Aggregate — Aggregate containing little or no mineral filler or in which the void spaces in the compacted aggregate are relatively large and interconnected. Aggregate gradations vary.

Open Surface — An open, relatively porous rough textured surface. This type of surface will require a higher rate of application to compensate for the emulsion which flows into the large voids and cracks.

Outboard Bearing — A bearing, external to the pump, that supports the shaft.

Packing Gland — See packing seal.

Packing Seal — Material used to seal a pump rotor shaft from the fluid material being pumped. A typical packing material is a high temperature lubricant impregnated rope. The material is formed into a square shape that approximately fills the space between the pump shaft and housing. This area may take 3 to 10 rings of packing material.

Plastic — A polymer that exhibits flexible characteristics when subjected to heat and or pressure but does not have elastomeric properties.

Polarity — Quality of the electrical charge (i.e., positive or negative charge) on particles or electrodes.

Polymer — A large molecule made by the repetitive combination of a large number of simpler, identical units called monomers.

Polymer Modified Asphalt — A blend of asphalt and any compatible polymer.

Polymerized Asphalt Cement — A chemically modified asphalt produced by the controlled chemical combination of asphalt with monomers and polymers.

Pugmill — An asphalt and aggregate mixing device that proportions and mixes aggregate and asphalt emulsion to yield a uniform, properly coated mixture. A pugmill may be mobile or stationary. A stationary pugmill is usually supplied aggregated by a system of bins and a conveyor belt system.

Pump Head — A part of the pump housing opposite the shaft that supports various internal parts. It can usually be removed, allowing internal inspection.



Reclaimed Asphalt Pavement (RAP) — Asphalt pavement that has been scarified and pulverized or crushed. No attempt is made to control gradation, except for maximum particle size. The resulting asphalt aggregate mix may be recycled.

Recycle — The reuse, usually after processing of a material that has already served its first intended purpose.

Restorative Seal — A light spray application of dilute recycling emulsion, applied to an existing asphalt concrete surface which restores the chemical balance to the asphalt at the surface and some small depth below. This balance is lost from the heat of the hot mix plant, exposure to water and air, as well as deicing agents and other contaminants which primarily affect the surface asphalt. This seal may also help to seal hairline cracks and fill surface pores which develop due to aging.

Ring Staggered — A typical arrangement of packing arrangement which staggers the gap at the ends of the packing rings. The packing material is held in place by the packing gland. See Packing Seal.

Rotary Mixer — A rotary type mixer consists of a mobile mixing chamber mounted on a self-propelled machine. The mixing chamber is open at the bottom and has one or two transverse rotating shafts equipped with tines or cutting blades which cut the in-place material to a specified depth and mix it with asphalt emulsion. Rotary mixers are sometimes referred to as Stabilizers.

Rubber — A natural or synthetic polymer having elastic properties and, after vulcanization has elastic recovery.

Rubberized Asphalt — A blend of asphalt and elastomers.

Sand Emulsion Mixes — A mixture of asphalt emulsion and sand. Bank run poorly graded gravel and dune or sugar sands can be used but generally sand mixes are restricted to granular sands and silty sands low in clay content. Sand emulsion mixes can be used for both base and surface courses.

Sand Equivalent Value — The relative proportion of detrimental fine dust or clay-like materials in fine aggregate used in paving mixtures and mineral aggregates or soils used for base courses measured by the sand equivalent test. (ASTM 02419 or MSH-TO T176)

Sand Seal — A surface treatment consisting of an application of an asphalt emulsion followed by the uniform application of fine aggregate.

Sandwich Seal — A surface treatment which consists of the uniform application of one course of aggregate to a prepared surface, followed by the application of an asphalt emulsion, which is then followed by the uniform application of a second course of smaller aggregate, which is then rolled.

SBR — A synthetic polymer made by the random copolymerization of styrene and butadiene. Styrene-Butadiene Rubber.



SBS — A synthetic block copolymer consisting of blocks of polystyrene and polybutadiene.

Scholar, Gentleman and — See Norman W. Mcleod.

Seal Coat — A thin surface treatment used to improve the surface texture and protect an asphalt surface. The main types of seal coats are surface treatments, fog seals, sand seals, slurry seals, micro-surfacing, cape seals, and sandwich seals.

Shim Material — A thin strip of any material for filling in, leveling, or spacing, as for bringing one part in line with another.

SIS — A synthetic block copolymer consisting of blocks of poly-styrene and polyisoprene.

Single Chip Seal — A wearing surface consisting of a uniform application of a rapid setting (RS or CRS) or medium setting (MS or CMS) or high float asphalt emulsion to a prepared surface followed by a uniform application of cover aggregate, which is then rolled.

Slurry Seal — A mixture of emulsified asphalt, well-graded fine aggregate, mineral filler or other additives, asphalt emulsion, and water. It is applied from 3 to 10 mm (1/8 to 3/8 in.) thick and used to renew pavement surfaces and retard moisture and air intrusion into underlying pavement. Slurry seal will fill minor cracks, restore a uniform surface texture, and restore friction values.

Stabilization — Changing of soils or aggregates by blending materials that increase the load bearing capacity, firmness and resistance to weather or displacement.

Steel Alloy — Steel that has been alloyed with other metals to produce variations in hardness, strength, elasticity, or chemical resistance.

Subbase — A foundation course, that along with the base, helps distribute the load which is applied to the surface. The subbase should consist of select materials such as natural gravels that are stable and drainable.

Subgrade — The foundation course that supports the pavement system. Desirable properties that the subgrade should possess include strength, drainage, ease of compaction, and permanency of strength and compaction.

Submerged — Outlet An outlet situated such that under all circumstances it is below the liquid level in the tank.

Suction Lift — The condition where a pump will pump a liquid that is below the level of the pump suction port. A condition that exists when the pressure at the suction flange is below atmospheric.

Surface Active — Designation for substances that tend strongly to concentrate on surfaces.



Surface Active Agent — A substance that alters the energy relationship at interfaces; organic compounds displaying surface activity; including detergents, wetting agents, dispersing agents, and emulsifiers.

Surface Course — The top course of an asphalt pavement, sometimes called asphalt wearing course. This course must possess skid resistance, resist load and non-load associated fracture, and resist permanent deformation.

Surface Treatment — A chip seal applied to a prepared consolidated gravel, crushed stone, water bound macadam, stabilized soil, or similar base.

Surfactant — See Surface Active Agent.

Tack Coat — A spray application of asphalt emulsion (usually applied in a diluted state) to an existing asphalt or portland cement concrete surface prior to a new asphalt overlay or patch to provide a bond between new and existing pavement layers.

Thermoplastic Polymer — A polymer that softens and flows when exposed to heat and returns to its original consistency when cooled.

Thermoset Polymer — A polymer that softens and flows when subjected to heat. An irreversible chemical reaction also occurs, preventing it from softening and flowing when subjected to further heat.

Thermostatic Control — A temperature sensing device that controls a heating or cooling source using a set point temperature relative to the actual measured temperature.

Traced — A heating method where the object to be heated is wrapped, in contact with, or in close proximity to a heating source capable of transferring heat to the object. Typical heat sources are electrical resistance wires or tapes and small diameter pipes or tubes with circulating hot oil, steam, or hot water.

Travel Plant — Self-propelled pugmill plants that receives aggregate into its hopper from a haul truck, adds and mixes asphalt emulsion, and spreads the mix to the rear as it moves forward.

Virgin Aggregate — Aggregate which has not been used in pavement construction. In recycling, virgin aggregate is added to existing reclaimed material to adjust gradation, improve structural stability and adjust asphalt content.

Warm Asphalt Emulsion Mixture — Those emulsion aggregate mixtures (either open or dense-graded) which are mixed above ambient temperature but below 104° C (220° F) and laid at ambient or above ambient temperature.

Windrow — A long narrow bank of uncompacted material (treated or untreated on a road bed, yard or mix pads), shaped to size with a spreader box, windrow sizer, proportioning windrow box or a motor grader.

Young Method — A laboratory procedure that determines the pure asphalt requirement for sand mixes.



