

FRAP IS WORTH WHAT IT REPLACES.



RAP GLOSSARY

by Frank H. Eley, Jr.



AC. Abbreviation for asphalt cement.

aggregate. Inert material such as sand, gravel, crushed stone and slag used as the chief ingredient of HMA.

SAND is a fine granular material (usually less than 1/4-inch dia.) produced by natural disintegration of rock or by crushing friable sandstone rock or other suitable rocks.

GRAVEL is a coarse granular material (usually larger than 1/4-inch dia.) produced by natural erosion and disintegration of rock.

CRUSHED GRAVEL is produced by artificially crushing gravel, causing most fragments to have at least one fractured face.

CRUSHED STONE is produced by artificially crushing rocks, boulders or large cobblestones, causing the fragments to have all fractured faces.

ROCK suitable for making good aggregates is formed all over the world and used to make crushed stone, sand and gravel.

SLAG, is the air-cooled, non metallic by-product of a blast furnace operation. It consists essentially of silicates and alumino-silicates of lime and other bases.

asphalt. Commonly used as a shortened term for asphalt cement, but may also refer to asphalt pavement.

asphalt cement. The binder or “glue” in HMA. Commonly abbreviated AC. At ambient temperatures asphalt cement is a black, sticky, semi-solid and a highly viscous substance.

Asphalt cements used in HMA are made by distillation of crude oil and are available in various grades. They are more suited for HMA than asphalt made from other materials or asphalt obtained from native deposits in various parts of the world.

Use of coal tar is avoided by the HMA industry because its fumes are known to be carcinogenic, posing a health hazard for anyone working with HMA. The word bitumen is used in many parts of the world to mean asphalt cement.

asphalt concrete. A dense-graded HMA. Also called asphaltic concrete or bituminous concrete

bar grizzly. A grill or network of bars which passes material small enough to go through the spaces between the bars and withholds or separates material larger than the spaces between the bars. Grizzlies are available with various bar spacing.

belt conveyor. A continuous moving belt commonly used in an HMA facility to transport aggregate or RAP from their storage bins to a dryer or mixer. A belt conveyor is not usually inclined more than about 22 degrees to prevent material from sliding back down the conveyor belt.

belt feeder. A belt-conveyor that feeds aggregate or RAP from its bin onto another conveyor. It often has a precision variable-speed drive to ensure accurate mix formulas. A variable-speed drive also permits changing the production rate without changing the mix formula.

A tachometer on the tail shaft gives a reliable indication of belt speed to ensure accurate blending, even if the belt slips on the head shaft.

belt scale. A scale usually incorporated in the incline conveyor of continuous mix HMA facilities. It has a load cell that accurately indicates the weight imposed by a section of the belt running over a weigh idler. This information combined with the belt speed denotes how much material is entering the dryer drum.

The scale incorporates a test weight for initial calibration. Material calibration is done by running sample material across the scale. The sample is diverted to a container and weighed on an independent scale. Scale indications are compared. If necessary, the belt scale is calibrated to agree with the test scale.

bitumen. Used in many parts of the world to mean asphalt cement. (See asphalt cement.)

cfm. Abbreviation for cubic feet per minute.

cloth. The wire mesh material used in a scalping screen. (See scalping screen.)

cold planer. Also called a milling machine. A mobile machine that removes old paving from a roadway by



planing or milling. It has cutting teeth affixed to a rotating drum. It also has a belt conveyor that loads the removed material into a truck that moves along the road ahead of the machine.

concrete. A hard, strong manmade construction material consisting of sand, conglomerate gravel, pebbles, broken stone, or slag in a mortar or cement matrix. It is commonly used for building roads, bridges and architectural structures.

The word concrete is sometimes used with other words to designate another type of manmade construction material, for example asphalt concrete.

Note that concrete does not always refer to manmade construction materials. It can refer to substances formed in nature by the coalescence of separate particles or parts into one solid mass. An example is concreted earthy or mineral matter, such as rock.

crib. Jargon for shim. (See shim.) The term cribbing is sometimes used to mean a wall of timbers that confine earth and serve as a retaining wall.

deck. A platform that contains a screen used to separate materials. Cold feed systems normally use one or two screen decks. RAP systems normally use only one. Batch towers normally use three-and-one-half. Additional decks can be added if needed.

feeder belt. (See belt feeder)

fractionate. Process of taking recycled asphalt pavement apart and reducing it to its original ingredients

gpm. Abbreviation for gallons per minute.

grizzly. (See bar grizzly.)

HMA. Abbreviation for hot mix asphalt.

hopper. A sloped or funnel shaped container in which materials are collected to facilitate transferring them to another location.

hot mix. Hot mix asphalt.

hot mix asphalt (HMA). Road paving material produced by mixing hot dry aggregate and liquid asphalt cement. Basic types of HMA are dense-graded and open-graded. There are sub-types within the basic types.

The mixture is made with the ingredients heated to about 300 degrees F, which is the temperature normally used to dry the aggregate. The liquid asphalt cement will adhere to the aggregate only if it is dry. The mix may also include dust or fines from the aggregate, ground rubber, and additives fillers, such as lime. The mixture is maintained close to 300 degrees until it is applied to the road.

HMA is called by numerous other names, such as asphalt concrete, asphaltic concrete, asphalt cement concrete, asphalt mix(ture), asphalt paving mix(ture), bituminous concrete, bituminous mix(ture), bituminous paving mix(ture), etc.

impact crusher. A machine commonly used to crush material in stone quarries or metallic mines. They are also used in recycling asphalt or concrete.

One type of crusher is known as a horizontal shaft impactor (HSI). It has long bars, known as blow bars or hammers, fixed on a rotor so they cannot rebound. The bars strike the material breaking it and throwing it against hinged aprons which cause further breakage.

impactor. (See impact crusher.)

liquid AC. (See liquid asphalt cement.)

liquid asphalt cement. Asphalt cement that is heated to a liquid state to make it suitable for mixing with aggregate to make HMA. At ambient temperatures, asphalt cement is a semisolid. (See asphalt cement.)

macadam. An early paving material consisting of compacted broken stone. Now, it is usually bound with tar or asphalt. The term is often used synonymously with hot mix asphalt, but is a somewhat antiquated term. [After John Loudon McAdam (1756-1836), Scottish civil engineer.]



mesh numbers. Size designations for wire mesh sieves used to analyze aggregate particles. Two

systems are used to designate size.

One system designates particles smaller than 1/4-inch and uses numbers ranging from 4 to 400. These numbers indicate the number of openings per linear inch of the sieve.

The other system designates particles 1/4-inch and larger and uses either inches or millimeters to directly indicate the clear space between the wires of the mesh.

Sieves typically used for sieve analysis and gradation specifications for HMA are shown in the table below. On sieves with numbered designations, the sieve clear opening will change if the wire diameters are changed from those shown.

TYPICAL SIEVE SIZES USED FOR HMA		
Sieve Designation (inches)	Nominal Wire Diameter (inches)	Sieve Clear Opening (inches)
2 inches	.1988	2.0
1-1/2 inches	.1807	1.5
1 inch	.1496	1.0
3/4-inch	.1299	0.75
1/2-inch	.1051	0.5
3/8-inch	.0894	0.375
No. 4	.0606	0.187
No. 8	.0394	0.0937
No. 16	.0256	0.0469
No. 30	.0154	0.234
No. 50	.0085	0.0117
No. 100	.0043	0.0059
No. 200	.0021	0.0029

milling machine. Also called a cold planer. (See cold planer.)

mineral. A natural, homogeneous, inorganic, solid substance used as the main ingredient of HMA. A wide variety of minerals can be used in HMA, but the main ones used are sand and stone.

The materials available vary widely according to geographical location. The following materials are used in HMA in various parts of the world:

- | | |
|----------------|----------------|
| soft limestone | quartzite |
| limestone | trap rock |
| dolomite | gravel |
| sandstone | granite gravel |
| granite | slag |

modified asphalt. Asphalt cement that has been modified by the addition of another material, usually a polymer such as SBS. The addition of certain polymers to asphalt cement improves the performance of HMA made with it.

neat asphalt. Unmodified, virgin asphalt cement.

paving. Pavement. A hard, smooth surface, especially the surface of roads traveled by the public. The most common pavement materials used in modern roads are HMA and concrete. Concrete roads that need repair are often re-paved with HMA.

RAM. Acronym for Reclaimed Aggregate Material, which is removed pavement materials containing no reusable binding agent (asphalt cement).

RAP. Acronym for Reclaimed Asphalt Pavement. RAP is sometimes erroneously interpreted to mean Recycle Asphalt Product, which means virtually the same thing, but is less specific than reclaimed asphalt pavement. Note that RAP contains asphalt cement, whereas RAM does not.

Reclaimed asphalt pavement (RAP). Asphalt paving material recovered from old road beds either by milling or excavation by ripping. It includes aggregate as well as reusable binding material (asphalt cement).

RAP produced by milling can be hauled to the asphalt plant and recycled by adding it directly to virgin HMA. RAP produced by excavation is usually in the form of large chunks, which must be crushed before it can be used at the asphalt plant.



recycle. When used as a verb, recycle means to reuse. When used as a noun, recycle is jargon for

RAP.

recycle material. Commonly used to mean RAP, but could also mean RAM.

recycling. Reuse of reclaimed asphalt pavement in construction of new roadways and other structures.

scalping screen. A wire mesh screen, which passes material small enough to go through the spaces between the wires and withholds or separates material larger than the spaces between the wires. Screens with various mesh sizes are used in making HMA.

screen mesh sizes. (See mesh numbers.)

segregation. An unwanted separation of larger sized aggregate from smaller sized aggregate after the aggregates have been mixed with each other.

Segregation usually occurs as a result of moving mixed material from one place to another. When mixed material flows into a pile, the larger pieces tend to roll off the top of the pile to one side while the smaller pieces remain near its center. This, of course, segregates the material. Special techniques are used to avoid segregation.

shim. To insert timbers or other materials under a leg or support pad of equipment in a HMA facility to make it level or to adapt it to an uneven surface.

shingles. Roofing material containing asphalt materials that can be recycled for use in HMA.

stockpile. A pile of material, usually aggregate or RAP, used as an ingredient of HMA. Stockpiles are usually created and maintained by dump trucks unloading material into piles on the ground. In most facilities, front-end loaders scoop up material from the stockpiles and empty it into either cold feed or RAP bins.

tph. Abbreviation for tons per hour. Unless noted otherwise, a ton in Astec publications refers to a short ton (2,000 pounds.)

variable speed drive. A variable speed drive system used for belt feeders. (See belt feeder.)

virgin aggregate. Aggregate not previously used in paving products.

virgin asphalt. Asphalt cement not previously used in paving products.

waste. Material not suitable for inclusion in a particular HMA mix.