

SAND in SEALCOATINGS



SAND &/or AGGREGATE is commonly added to the sealer for the following benefits:

- **APPEARANCE:** Uniform Texture, Reduced Sun Glare & Streak-free appearance.
- Hides minor surface defects.
- Fills hairline cracks.
- Improves traction & skid resistance.
- Improved longevity.



Use Sand in Recommended Quantities

Too little sand or no sand: You will not have above-mentioned benefits.

Too much sand: Sealer becomes brittle, loses flexibility & resistance to chemicals & fuel.

Recommended Sand Amounts

1. For normal application - 2 to 2.5 lbs. per gallon of undiluted sealer.
2. For rougher pavements, sand loading of 4 to 4.5 lbs. per gallon of undiluted sealer is used to accomplish proper texturing & filling of the surface profile.

It should be emphasized that sand added in the mix absorbs the binder (refined coal tar) & water from the sealer. The amount of sand in the sealer must be limited to an extent where it does not absorb excessive amounts of the binder from the sealer, ***otherwise binder will not be available to bond to the pavement & form a continuous film.*** The limit is 5 lbs. of sand per concentrated gallons of sealer. At this level binder & filler in the system are in still in balance to expect optimum performance. Sand loading exceeding 5 lbs. will rob the sealer of the binder thus rendering the sealer film, porous, brittle, poor in adhesion & resistance to chemicals, salts, fuel, etc.

Sand Must Be

- Clean, water-washed, pure silica type, with irregular particle shape,
- Free of contaminants, metals, clay, trash & organic matter.
- Of fineness 50-75 MESH AFS (American Foundrymen Specification)
- Angular.

Sand Gradation/Size - Why is it so important?

In selecting sand or aggregate it is imperative that the average particle size be very close to the cured film thickness of the sealer. The sand particles should be at least $2/3^{\text{rd}}$ imbedded in the cured sealer film. For example, a sealer in two coats (25% dilution) will dry to approximately 11-13 mils therefore the AFS of the sand shall be around 50-70.

One of the most common ways of measuring & specifying particle size of sand is by the use of sieves, often called meshes or screens.

How they work:

Particle sizes are separated industrially or in the laboratory by passing material over sieves that have opening of certain specified sizes.



These sieves can range from extremely coarse devices that look like sewer grates for large size separations [range of inches] to sieves that look very much like window screens for middle separations [millimeter], to very fine woven screens for fine separations [~50 micrometers]. Separation can be either dry or wet. Wet screening is more efficient, but drying of the product adds cost.

What do the numbers mean?

Each sieve has a number, such as 20 mesh, 50 mesh, 200 mesh, 325 mesh. This number relates to the number of **openings in the screen per inch**.

Lower the sieve number, larger is the screen opening & coarser the particles passing through it, e.g. a 20 mesh sieve has a screen opening of 33.5 mils, whereas a 50 mesh sieve has screen opening of 11.7 mils. Modern practice is to refer to the screen by the size of the opening in microns, but for our purpose mil unit suits better because we denote the cured film thickness in mils.

Some Units:

1 millimeter (mm)	=	1000 microns
1 millimeter	=	39.37 mils.
1 mil	=	1/1000 of an inch
1 micron	=	0.03937 mils.

Sand Selection

Sand is supplied in different grades, classified according to their average particle size & denoted as AFS (American Foundrymen Specifications) numbers. For example, AFS 60 grade has majority of the particles passing through a 60-mesh screen.

Sieve analysis of one of the recommended grades, No 1, Dry Sand as follows:

<u>U.S. SIEVE</u>	<u>Screen Openings</u>		<u>% RETAINED</u>	<u>% Cumulative</u>
	<u>(mm)</u>	<u>(mils)</u>		<u>retained</u>
20 Mesh	0.850	33.46	-	-
30	0.600	23.62	1.50	1.5
40	0.425	16.73	7.00	8.5
50	0.30	11.81	22.0	30.5
70	0.212	8.35	23.0	53.5
100	0.15	5.91	22.5	76.0
140	0.106	4.17	14.5	90.5
200	0.075	2.95	6.50	97.0
PAN			3.0	100

Sand shall not have:

1. Too many fines i.e. finer than 200 mesh.

Sand particles absorb water & binder (refined coal tar) from the sealer & the degree of absorbency increases with the surface area. The surface area increases with the number of particles, for the same weight of sand. For example, one pound of 200-mesh sand has 4 times the surface area of sand at 50 mesh. Sand with too many fines will soak up excessive binder amounts from the sealer, thus resulting into poor performance of the sealer.

2. Too many coarse particles, coarser than 30 mesh.

Too many coarse particles will not have enough fines to effectively interlock, knit & reinforce the cured sealer film. Additionally they will not be properly anchored in the cured sealer film & are likely to be dislodged from the cured film under traffic. The loose sand thus dislodged, acts as a sand paper on the cured sealer film & may cause premature failure.

Ideally, the major proportion of sand particles in a particular grade should fall within 40 to 100 mesh to properly interlock without placing excessive demands on the binder (for surface absorption & saturation of the sand particles). Sand with medium fineness between 50 to 70 AFS rating produce the best results.

Do not use

1. Recycled sand from steel sand blasting. It has lots of iron & will cause brown rust streaking of the sealer.

2. Foundry spent sand. It may contain various metals that may interfere with the stability of the sealer & its performance. Additionally, foundry sand becomes very fine & has excessive absorbance for the sealer. Sealer thus absorbed by the foundry sand may not be sufficient to bond to the pavement & adhesion failure may result.

Beach Sand, unwashed because of the very high salt content that will make the sealer film water sensitive, which may lead to premature wear & tracking.
