Technical Notes-Contractors

Water – A Critical Material In Sealcoatings.

Water is a Critical Material in Application of Sealcoatings.

What type of Water should be used?

The question about the suitability of the water to be used for mixing with sealer is best answered in our specifications, which state that:

Water shall be clean & potable, free of harmful soluble salts, & a temperature range of 50-80 º F.

What do you mean, Water is Water?

No! Absolutely Not. Water may be good or bad. Water is available everywhere, however, it should not be used from just any source. The water should be:

a. Clean- Meaning free of suspended solids, turbidity, etc.
b. Potable- drinkable.
c. Free from harmful soluble salts – It should be of low hardness, which refers directly to the soluble carbonates & bicarbonates of calcium & magnesium.
d. Free from metal contaminants, mainly iron.
e. Low in Total Dissolved Solids (TDS).

Water shall have:

Hardness **below 20**
PH **7-8**
Total Dissolved Solids (TDS) as low as possible

Water: Its Role in Sealcoatings

a. **In Application:** Water imparts fluidity to the sealer so the sealer can be uniformly applied at the specified coverage rate.
b. **In the Drying & Curing process:** After application the sealer dries & cures by water evaporation. Proper fluidly in the film is essential for the particles of tar to flow & fuse properly to form a continuous film. Clay & filler particles are encapsulated by tar in the film formation process.

Impurities in Water
Their Sources & Effect on Sealer Properties

Contaminants in water are either picked up in the normal course of the flow of water, or added as part of the municipal water treatment methods. The contaminants in water are primarily dissolved or suspended solids in water. They are measured as ***Hardness, Total Dissolved Solids (TSD), iron content***, etc. What are the factors that must be considered?

a. Hardness of water

Water hardness is a layman's term for the sudsing properties of water with soap. If soap lathers up properly, water is called "soft" & "hard" if it does not. When we wash with soap, organic matters (oil, grime, etc.) are ***emulsified by soap into water***. If soap does not lather up, it is because the contaminants (calcium, magnesium, metals,) in water interfere with the emulsification process.

The hardness in water is the result of the dissolved carbonate & bicarbonates of calcium & magnesium picked up by water from inorganic matter, on its course. Hardness, though expressed as
concentration of calcium carbonate in parts per million parts (ppm), of water, actually denotes the sum of both calcium & magnesium, present in water.

- Water with low concentrations (less than 15 p.p.m.) is termed 'soft'.
- Water with high concentrations (100-200) is called 'hard'.

Hardness is also denoted in degrees. One degree is one grain of calcium carbonate per gallon of water. It is equivalent to .017 gram per liter or 17 parts per million (ppm).

Patterns of hardness in the United States vary according to geographic region.

The Softest waters are common in parts of New England, the South Atlantic-Gulf, Pacific Northwest, & Hawaii regions.

Moderately hard waters are common in Tennessee, the Great Lakes, Pacific NW, & Alaska.

Hard & very hard waters are found in some of the streams in most of the regions throughout the country. Hardest waters (< than 1,000 mg/L) are measured in Texas, New Mexico, Kansas, Arizona, & S. California.

b. Total Dissolved & suspended Solids (TDS) e.g. clay, sand, silt etc.

How TDS is going to affect the sealer properties?

The dissolved salts in the water with high TDS may have a tendency to precipitate out & deposit on the sealer film, producing a grayish finish, which will not be easily washed away by rain. That means that sealer may never turn to its characteristic slate black color. The problem may be aggravated under hot humid conditions. Hot temperature of the pavement will accelerate the precipitation of the salts, which may spread over the sealer film. The problem may be aggravated by high humidity, which slows down the cure of the sealer.

c. Dissolved gases; Oxygen, nitrogen, carbon-dioxide, hydrogen-sulfide, ammonia, etc.
d. Dissolved organic matter from the decay of vegetable & animal matter.
e. Contaminants as part of municipal water-purification process are;

Alums (alum. sulfate) & lime are added before the filtration process & they promote settling of the suspended impurities & bacteria. A1 (OH) 3 formed as the result of chemical reaction between Alum & Lime is a gelatinous mass which carries down the impurities with it. Lime also helps neutralize bicarbonate in water.

- Chlorine is added to kill microorganisms.
- Soda ash is added to remove chlorine & sulfate but these contaminants are not easily removed. Sulfate can be removed as Barium Sulfate, by adding water-soluble Barium Chloride. Chlorides are generally very soluble & can be removed by deionizing the water.

Water treatment & its effects on pH of the water should be recognized.

- The alkalinity (high pH) of natural water arises from soluble salts of calcium & magnesium, particularly bicarbonates. Water treatment introduces carbonate & hydroxy1 ions, which also, elevate the alkalinity.
- The acidity (low pH) is elevated by chlorides, sulfates, etc. Sulfates & chloride ions significantly increase the viscosities of the clay slurries. Sulfates can be removed by adding Barium Chloride to a batch of sealer. The Barium Sulfate, thus formed will not interfere & at the very least act as a filler. The critical level for sulfate ions is 100 p.p.m. Chloride ions cannot be removed through precipitation due to the fact that they form highly soluble salts & stay ionized, in the sealer. The only practical way to eliminate chloride is to deionize the process water.

How is Sealer affected by acidity or alkalinity of the water?

The effect of the pH is augmented by other ions present in water & the ***best results are obtained between the 7 to 8 pH range.***

- **The higher pH, beyond 8.0** introduces water sensitivity & a tendency for re-emulsification of the cured sealer film. The pH of water can be easily adjusted by using minor amounts of weak acids, in the clay slurry of sealer batches.
- **Lower pH** may cause slight gelling & minor destabilizing of the sealer.

Do the properties of municipal or well water change?

Yes! Definitely.

Water properties vary from day-to-day, month-to-month, season-to-season & region-to-region. They may be natural or water-processing contaminants.

Water processing plants use different chemicals all the time to address the contaminants in the water being processed.