



Various admixtures used in Mortar – Comparison of Performance, Limitations and Cost

Admixtures in Mortar

It is not usual to use admixtures in mortar, however, in a few cases we get to see air-entrainers and integral water proofing compounds in use. Additionally, some use fibers with the objective of control cracking. We recommend using RenderCon admixtures, specially designed only for mortar to achieve self-curing, crack resistance and hydrophobic properties. This Technical Bulletin helps understanding different products in the market and how RenderCon is different from each of them. Here are the products available in the market.

Air-Entrainers or Air Entraining Agents

These admixtures entrain micro-air bubbles, which help in improving the following:

1. Workability of the mortar for the masons – improves troweling properties of the mortar and improves cohesion of the mortar by making it creamier.
2. Minimizes drying shrinkage cracks –air entrainment will have reduced drying shrinkage in comparison to a conventional mortar without admixture.

Air Entrainment largely depends on shape and size of the aggregate and the quantity of water. Shape influences more than the size. Spherical aggregate (River Sand) helps development of air giving a ball-bearing affect. Whereas, angular aggregate (all crushed sand) will not allow air entrainment due to friction between the aggregates. On the size, finer sand will need lower dosage while coarser sand will need higher dosage. The most important of all is water content. Watery mixes will develop air content, while dry mixes will be devoid of air. Mortar is applied at near-zero slump, hindering air entrainment. Air entrainment reduces strength and causes dusting on the plaster.

River sand, in which air can be entrained, little additional water will make it creamier. In crushed sand, the same quantity of water as above will make it watery – indicating that the air entrainment is negligible. Therefore, when river sand is used, Air-entrainment is the most cost-effective option to avoid drying shrinkage. However, right dosage and early curing is very critical to achieve desired results. It is better not use Air Entrainers on crushed sand mixes, since air entrainment reduces strength causing dusting.

Integral Water Proofing compounds

Dosage recommended is 125-200ml per 50 Kg cement bag.

These admixtures help reduction in water content, which help in improving the following:

1. Reduction in water content reduces water-cement ratio and improves strength.
2. Reduction in water-cement ratio from these products reduces permeability of the mortar by at least 50% of the conventional mortar. This is called Integral waterproofing property. Please read foreword of IS 2645, which will be in line to the above.

Lowest water-cement ratio is possible when used at highest recommended dosage. As the dosage increases, the troweling properties of the mortar diminish. Yellow spots and bleeding may be observed depending on the extent of dosage. These admixtures cannot control drying shrinkage. However, plastic shrinkage can be controlled due to lower w/c.

Fibers for Mortar

Fibers are best at controlling cracking of plaster. However, fibers highly impede troweling of mortar. Masons struggle to handle the mortar with fibers. The recommended dosage is **0.9 Kg – 1.5 Kg per cum** of mortar. It is very difficult to ensure uniform spread of fiber in the mortar. Even when mixed in rotary mixers, many times fibers do not disperse properly. Fibers are recommended in concrete when mixed in batching plants having pan type mixers / twin-shaft mixers, which apply shear force / torque on the mix for a proper uniform mix.

What is Drying Shrinkage?

In simple terms, it is the shrinkage caused by drying of the plaster. As the plaster starts drying right from the time it is laid on the structure, drying shrinkage is a continuous process. Plastic shrinkage is also a kind of drying shrinkage, which happens until the time plaster is plastic, i.e., before setting. In generic use, all shrinkage after setting is termed as drying shrinkage. Drying Shrinkage is promoted due to the following reasons

1. First drying happens soon after the set and before the first curing. Such drying is very high and is almost irreversible.
2. Higher water-cement ratio and use of crushed sand promotes drying shrinkage.

Use of RenderCon products, limits drying shrinkage in mortar.

RenderCon

Crushed sand exhibits lot of drying shrinkage due to its properties of higher water absorption and faster drying. Mortar dries faster than concrete due to mortar's composition with just powder and water.

First curing is usually received by the mortar only after 12-16 hours of mixing water. By this time, a lot of water has evaporated from the mortar, making the mortar susceptible to cracking due to low strength and higher drying shrinkage.

RenderCon products helps in dealing with the above.

Property Comparison

The following is a comparison table of properties of products available.

Property	Air Entrainer	WaterProofing	Fibers	RenderCon
Water Reduction	N/A	+	-	++
Pot Life Increase	+	+	-	++
Mason Friendly	++	+	--	++
Dispersion into mix	+	+	-	+
Use of Crushed Sand	-	+	-	++
High Powder in Sand	-	-	-	++
Cracking due to delayed curing	++	++	+	---
Water Permeability Resistance	-	++	N/A	+++
Drying Shrinkage resistance	+	-	++	++
Efflorescence Resistance	--	--	--	+++
Works on AAC Block	--	--	--	++
Curing Elimination	--	--	--	+

Legends:

'N/A' – Not applicable – property unaffected

'+', '++', '+++' Property enhancement rating

'-', '--', '---' Property detraction rating