

### A NOVEL ADMIXTURE - KR-2 EMULSION

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It is well known that the properties of the cement can be altered by using suitable additives. These additives are known as admixtures and are materials used in cement mortar and cement concrete to improve or impart some of its properties.

They are defined as material, other than cement, water and aggregate, that are used as an ingredient of concrete and are added to the batch immediately before or during mixing. A proper use of admixtures offers certain beneficial effects to concrete, including improved quality, acceleration or retardation of setting time, enhanced frost and sulfate resistance, control of strength development, improved workability, and enhanced finishability.

The use of these admixtures and additives has been a matter of controversy and several technologists have discouraged the use of these admixtures. But there are many on the contrary, who highly commend and foster the use and development of admixtures as they impart many desirable characteristics and effect economy in concrete construction.

There are large number of proprietary products available in the market with their effects described but the full details of the action of these additives, known as admixtures are yet to be determined and the performance of the admixtures should be carefully checked before use.

Admixtures are classified according to the purpose for which they are used in concrete, (1) Accelerating admixtures (Calcium Chloride) (2) Retarding admixtures (3) Water reducing admixtures and also the so called superplasticizers.

There are other additives like air entrainment admixtures etc. there exist additives for other purposes also such as water proofing and fungicidal action etc., but it may be noted that these are not sufficiently standardised. Here it suffices to say that waterproofing admixtures (Calcium, Ammonium Stearate, Butyl Stearate, Calcium Oleate etc.) are supposed to repel water by an electrostatic charge which they form after reacting with calcium ions on the walls of the capillaries in the hydrated cement paste. It is doubtful whether this effect persists over long periods.

### \* PRESSED CEMENT EMULSION

For fungicidal purposes, Copper Sulphate and Pentachlorophenol have been suggested. These also control the growth of algae or lichen on hardened concrete but again their effectiveness is lost with time. Needless to say toxic admixtures should not be used.

To understand the present status of admixture, it would be appropriate to quote from “**Properties of Concrete by A.M. Neville**”.

“An important feature of the majority of admixtures for concrete is that they are used primarily on the basis of experience or adhoc tests. Theoretical information on a scientific basis is generally not available to permit a reliable quantitative prediction of behaviour in concrete under the various possible circumstances. This is due to the marketing of admixtures largely as proprietary products”.

In view of the above, it is important that admixtures should be used judiciously and with proper instructions, because of these different views and difficulties faced by the users.

We at **Tech-Dry (India) Pvt. Ltd.**, decided to develop a novel Emulsion - KR2 which has got certain unique properties. Before we go into it let us understand why this new Emulsion admixture is novel and what does it do. Mostly chemical admixtures are added to concrete in a small amount mainly for the entrainment of air, reduction of water or cement content, plasticization of fresh concrete mixtures, or control of setting time and based on that they are divided in the following categories.

- Air-Entrainment
- Water-Reducing
- Set-Retarding
- Accelerating
- Superplasticisers

However, EMULSION-KR2 is a solvent-free aqueous organic copolymer water based emulsion. This unique Emulsion creates hydrophobicity in the pores and capillaries and therefore, evaporation is slow and the water already present enables the hydration. Because of its unique ability to create this hydrophobicity it reduces the water absorption by 80% besides increasing the compressive and flexural strength.

### **DESCRIPTION**

Emulsion KR-2 is designed to be used as an admixture during the in-plant manufacture of low slump cement containing blocks paving products, and **as Admixture in Ready-mix-concrete, freshly made concrete and MORTAR FOR PLASTER**

1. When EMULSION-KR2 is incorporated into low slump cementitious products such as imitation stone blocks and pavers, the permeability to water and the occurrence of unsightly efflorescence is dramatically reduced. Additionally, the 28 day compressive strength and transverse breaking load strength is increased by up to 50%. The use of EMULSION KR-2 enhances the intrinsic quality of cementitious products by increasing the compressive strength and reducing the damage caused by water uptake and efflorescence.
2. WHEN INCORPORATED IN COCNRETE/OR MORTAR, IT REDUCES THE WATER ABSORPTION BY 80% (TEST RESULTS FROM SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH & VICTORIA UNIVERSITY OF TECHNOLOGY, MELBOURNE ON REQUEST)

## OUTSTANDING FEATURES

- ◆ Reduces water absorption by over 80%
- ◆ EMULSION KR-2 is permanently bonded to the substrate and can not be washed out.
- ◆ Does not leave an oily residue on the product.
- ◆ Easy to use. Can be used in existing processes.
- ◆ The degree of water resistance can be varied by changing the rate of addition.
- ◆ No hazardous solvents emitted during use.
- ◆ Non flammable and non corrosive
- ◆ Cost effective.

## PHYSICAL PROPERTIES

Appearance	Milky white liquid with slight alcoholic odour.
Specific gravity	0.95
pH value	7
Solubility in water	Miscible
Flash Point	> 100°C

## HOW TO USE EMULSION-KR2

### 1) Dosage rate

The rate of addition depends on the specific mix design and the level of water repellency which is required. The usual dosage rate range is between 0.125 and 0.75 litres under undiluted Emulsion-KR2 per tonne (1000 kgs) of dry mix ingredients.

### 2. Addition

Emulsion -KR2 is designed to be added as part of the gauging water during the mixing process.

If a typical mix is normally produced by mixing 1000 kgs of dry ingredients with approximately 10 litres of water, the procedure to incorporate 0.5 litres of Emulsion KR2 into this 1000 kgs of dry mix would be as follows:

- a) Thoroughly mix all the dry ingredients (1000 kgs) in a batch mixer.
- b) Shake EMULSION - KR2 before use.
- c) Measure out 0.5 litres of EMULSION-KR2 and dissolve in 5 litres of clean water.
- d) Add the above solution to the dry mix.
- e) Blend thoroughly while adding water to attain the desired consistency.
- f) The mix can now be processed as us usual.
- g) **For RMC/Fresh concrete Mix/Mortar for plaster 125 ml/per bag of cement.**

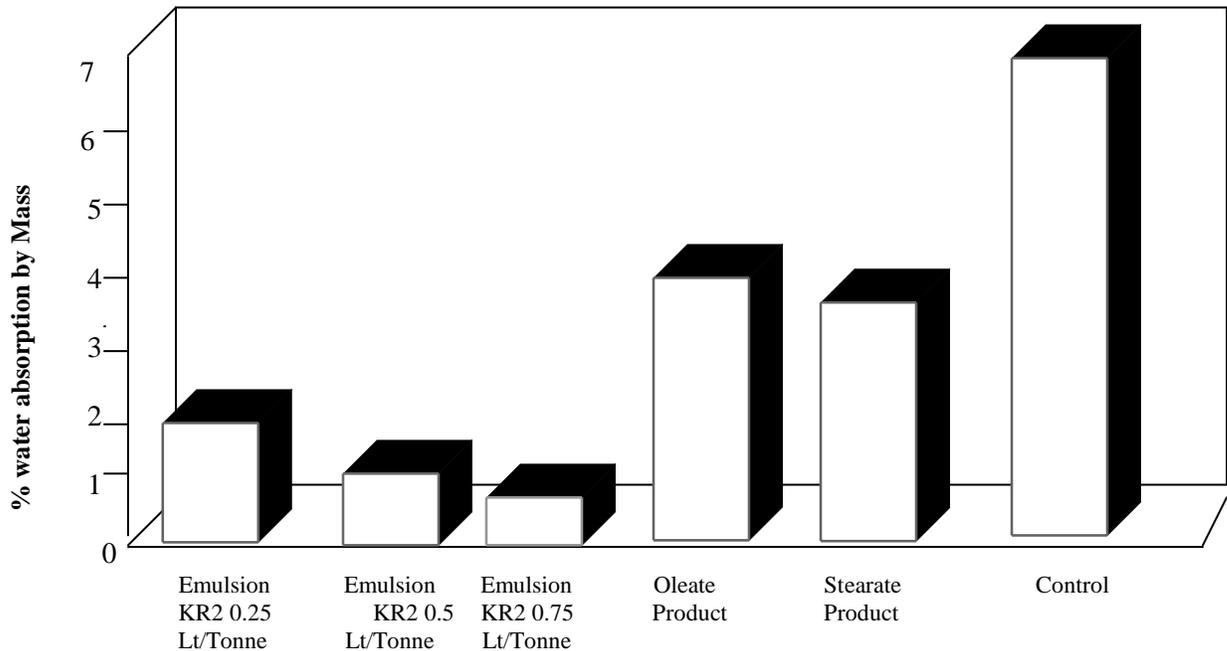
## **PERFORMANCE**

### **1) Reduction in Water Absorption**

A comparison of the performance of EMULSION-KR2 at three different concentrations versus an Oleate-Based product (1.8 Lt/Tonne) and a Stearate-based product (2 kg/Tonne) can be seen in Figure 1.

The mix used was a standard block formulated containing 18% cement and 70% graded sand. The samples were steam cured at 60°C over night and let stand in ambient conditions for 28 days. The test blocks were placed on a water saturated sponge for 24 hours, after which the capillary water absorption was measured. The results show that the performance of EMULSION-KR2 is far superior to that of both Oleate, and Stearate-based products.

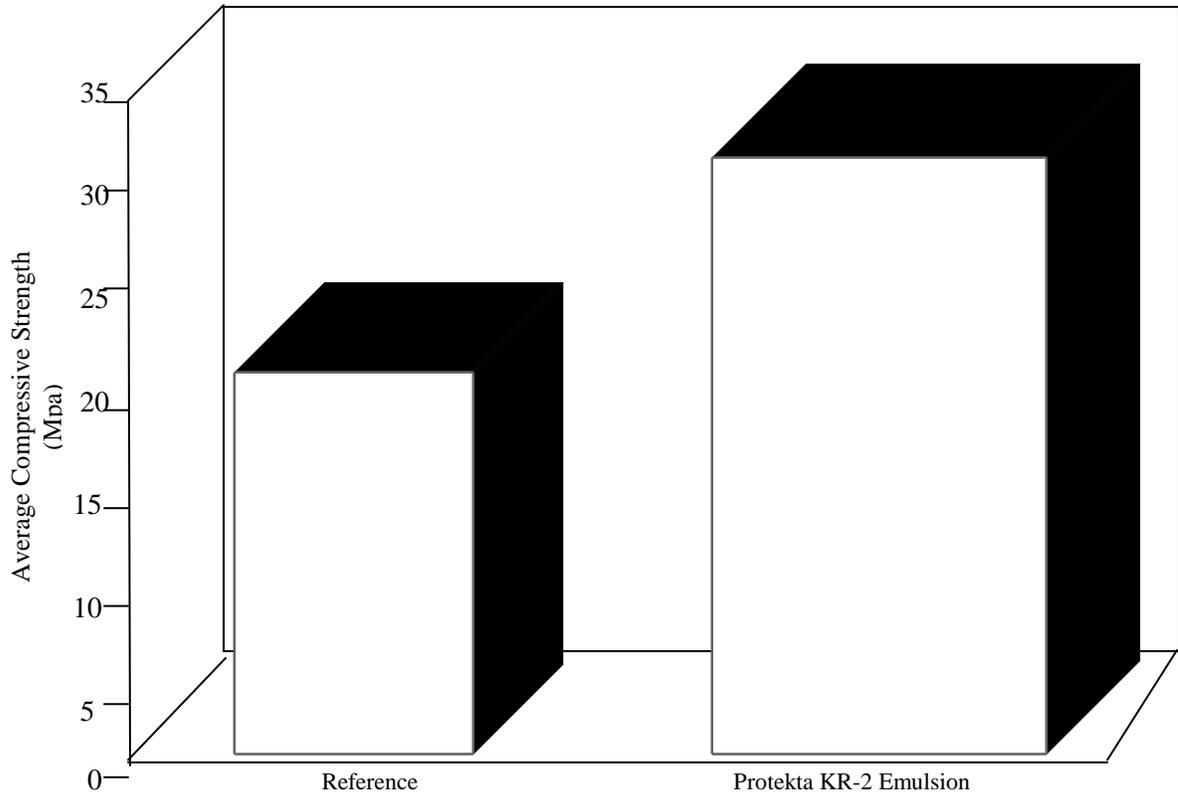
Fig 1. Reduction of Water Absorption



### **2. Increase in compressive strength**

A comparison of the 28-day compressive strength of pavers with and without Protekta KR-2 Emulsion can be seen in Figure 2. Sample paving slabs were cast using Protekta KR-2 Emulsion at a rate of 0.5 litre per tonne of dry mix ingredients as above. The slabs were steam cured at 60°C and left to cure at ambient conditions for 28 days.

**Figure 2. Increase in Compressive Strength**



**3. Increase in Flexural Strength**

The flexural strength of paving units with and without Protekta KR-2 Emulsion is presented in Figure 3. The results show that the flexural strength is increased by 32% over the control specimens.

**Figure 3: Increase in Flexural Strength**

