a) Silica fume reacts with lime present in paste matrix. Lime is considered as a dangerous compound, as it reacts with various chemicals causing expansion.
b) Silica fume mortar has a better pore structure which vastly reduces permeability.
c) Addition of silica fume as a partial replacement of cement reduces C3A content of the paste. C3A is seemed to react with acids causing expensive products.

2.12 SUPER PLASTICIZER

Superplasticizers are also known as high performance water reducers used as admixtures. It improves the flow properties of the suspension, for example in concrete applications. Their addition to concrete or mortar allows for a reduction in the proportion of water cement, which does not affect the functioning of the mixture, and allows the production of concrete and self-consolidating high-performance concrete. This effect significantly improves the performance of the freshly ground paste.

2.13 USE OF SUPER PLASTICIZER

The use of superplasticizers becomes essential to design blends to achieve HPC. As you can see, the relationship w / binder has an important relationship for achieving resistance parameters. To achieve dense concrete with reduced permeability, plasticizers of the following types are commonly used: i) condensates of sulfonated melamine formaldehyde (SMF)

i) Sulfonated formaldehyde naphthalene condensate (SNF)

ii) Polycarboxylate Ether Superplasticizer (PCE) of the above types, the newest superplasticizer and most effective when based on SNF.

iii) ASTM has also recommended the use of this type to achieve optimum benefits such as good processibility and minimum weight to binder ratio. About 2% by weight of the cementitious materials are normally used to achieve the required workability.**2.4 Bentonite**

Bentonite is a kind of clay, usually refined from volcanic ash. Its high absorbency makes it a useful substance for industrial applications. Although you can buy bentonite in the form of wet clay or gel-like substance, the most common, cheapest and most versatile form is powder. In concrete construction Sodium bentonite, a clay material, has gained popularity in recent years. The panel form is the choice of a growing number of architect and building. By collecting water, the clay becomes 15 times its initial volume and sinks into cracks and cavities. When it reaches its maximum volume, it remains permanently in these areas to protect itself from the water. The plate of a corrugated cardboard with a length of 4 x 4 feet, where the clay particles in the waves of the cardboard are retained. The panels can be nailed, fixed with a powder tool or simply suspended for horizontal applications.

Some water repellents are concerned about the use of bentonite panels. With other products, you can inspect the finished waterproofing application and verify seal integrity before filling. With the bentonite panels, the joint is not formed until the base fills and the water reaches the panel. Suppose something goes wrong? This is an annoying question for "traditional" waterproofing.
However, bentonite has advantages: it is safe for work, non-polluting, easy to apply and fast, and can continue even at low temperatures. A company manufactures a sheet membrane that uses a bentonite compound and butyl rubber.

2.14 SULFATE ATTACK IN CONCRETE

Sulphate attack is a mechanism of chemical degradation in which sulphate ions attack the components of the cement paste. Water-soluble sulfated compounds, such as alkaline earth (calcium, magnesium) and alkali (sodium, potassium) sulphates, which can react chemically with the constituents of the concrete, are responsible for the sulphate-attacking compounds. Sulphate attack can take different forms. The chemical form of sulfate Atmospheric environment to which concrete is exposed

2.15 WHAT HAPPENS WHEN SULFATES GET INTO CONCRETE?

When sulphate enter in to the concrete it makes ettengrites.

2.15.1 EXTERNAL SOURCES:

External sources of sulphates are more common and are usually the result of soils and sulphate-rich groundwater, or may be the result of atmospheric or industrial water pollution. The soil can contain excessive amounts of gypsum or other sulfates. Groundwater can be transported to concrete foundations, retaining walls and other underground structures.

INDUSTRIAL WASTE WATER

Nature of reaction: (chemical, Physical) Sulfate attack processes decrease the durability of concrete by changing the chemical nature of the cement paste, and of the mechanical properties of the concrete

CHEMICAL PROCESSES

The sulfate ion + hydrated calcium aluminates and/or the calcium hydroxide components of hardened cement paste + water = ettringite (calcium sulpho aluminate hydrate)

C3A.Cs.H18 + 2CH +2s+12H = C3A.3Cs.H32

C3A.CH.H18 + 2CH +3s + 11H = C3A.3Cs.H32

The sulfate ion + hydrated calcium aluminates and/or the calcium hydroxide components of hardened cement paste + water = gypsum (calcium sulfate hydrate)

$Na_2SO_4 + Ca(OH)_2 + 2H_2O = CaSO_4.2H_2O + 2NaOH$

$MgSO_4 + Ca(OH)_2 + 2H_2O = CaSO_4.2H_2O + Mg(OH)_2$

Two forms of Chemical reaction depending on

Concentration and source of sulfate ions .Diagnosis

Composition of cement paste in concrete.

PHYSICAL PROCESS:

The complex physic-chemical processes of "sulfate attack" are interdependent as is the resulting damage.

Physical sulfate attack, often evidenced by bloom (the presence of sodium sulfates Na_2SO_4 and/or $Na_2SO_4.10H_2O$) at exposed concrete surfaces.

It is not only a cosmetic problem, but it is the visible displaying of possible chemical and micro structural problems within the concrete matrix.

Both chemical and physical phenomena observed as sulfate attack, and their separation is inappropriate.

3 DISCUSSIONS AND CONCLUSIONS

In this article, we examine the effect of silica fume, bentonite and superplasticizer on concrete strength and durability. We use 12% fumed silica as a substitute for cement and 3% superplasticizer. We made 22 cylinders for normal concrete, 18 cylinders with silica fume, bentonite and fumed silica + bentonite for 7, 14, 28, 56 and 91 days, respectively, and we verified the resistance to pressure and the influence of silica fume. The results obtained are given above.
After carrying out the 20-day sulfate resistance test, the reduction in resistance was tested. The cylinders were sealed in Plaster of Paris and tested in Universal Testing Machine. When the results were compared with those obtained in the rebound hammer test, it was clearly shown that the concrete cylinders containing silica vapor showed a greater resistance to deterioration induced by sulphate attack, while the

concrete cylinders used lots were prepared showing a large reduction in resistance after exposure to the sulfate environment.

The quality of the concrete in terms of uniformity, frequency or absence of internal failures, cracks and segregation, etc., showing the level of work used, can be assessed using the recommendations presented below, developed to characterize quality. Concrete in structures in terms of ultrasonic pulse velocity. Finally, we found the following: silica fume, bentonite and superplasticizers can be used to prepare high performance concrete. The Super plasticizer is also used to achieve high strength and make the concrete more sustainable in silica fume locations. High compression is usually the first property associated with silica fume. The relationship between tensile strengths, flexibility and compression in silica fumes is determined in the same way as concrete strength. Tensile strength and flexibility strength is the result of increasing compressive strength by using silica fume. This plays an important role when silica fume concrete is used in bridge, floor and road projects.

After the 20 day sulfate resistance test was carried out, resistance testing was reduced. The cylinders were sealed in Paris plates and tested in a universal test machine. When the results were compared to the results obtained in the rebound test, it was clearly demonstrated that concrete cylinders containing silica vapor are more resistant to deterioration that stimulates sulfate attack, and batch bottles of concrete. They have been prepared to significantly reduce resistance after exposure to sulphate.

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