IJDPP
International Journal of Development and Public Policy
| e-ISSN: 2792-3991 | www.openaccessjournals.eu | Volume: 1 Issue: 6

Resistance of Cement to Cold and High Temperatures

Egamberdiev Murad Saidovich
Candidate of the department of general Professional Disciplines Bukhara branch of Tashkent Institute of irrigation and agricultural engineers, Republic of Uzbekistan

Abstract: The resistance of the cement stone to frost and high temperatures was determined by experiments. "Clinker stock", that is, unreacted cement grains, is the process of filling these grains with formations that have reacted with the clinker stock, when the cement cracks and water begins to penetrate, the process of filling with reacting derivatives became known in research. Issues of increasing the strength of concrete were considered.

Keywords: Mineralogical composition of clinker, clinker reserve, surfactant compound, hydrophobic compound, Volsky sand, cement - sand.

Introduction

Concrete structures are particularly severely damaged when exposed to cold in combination with water. The water in the cement pits turns to ice at a negative temperature. When water freezes, its volume expands by about 10%. The resulting ice acts forcefully on the walls of the pits and breaks them down. The resistance of cement stone to such an external environment depends on how fine it is saturated, the cement composition, the mineralogical composition of the clinker and the amount of water added to the mix.

Based on the results of a number of studies, the following conclusions can be drawn; When the cement is finely saturated to a certain level (500 ... 600 m2 / kg), the frost resistance of the cement stone increases slightly, but when it is saturated so finely, the frost resistance begins to decrease significantly, because very finely saturated cement new products have porous structure and crack goes Cement has "clinker reserves", ie unreacted cement grains, which, when the cement cracks and water begins to enter the cracks, fill these cracks with products that react with clinker reserves ("self-healing process").

Even if the amount of hydraulic additives in the cement is high, it has a negative effect on the quality of the cement, i.e. if the additives are too high, the frost resistance of the cement stone will decrease.

Among the minerals of cement clinker, tri-calcium aluminate is the most resistant to frost.

The amount of water poured for mixing has a large effect on the frost resistance of the cement, if more water is poured, the cement will become more porous and it will be less resistant to frost.

By optimally selecting the cement and clinker composition, it is possible to make the cement stone more resistant to cold by thoroughly compacting the concrete mixes, as well as by adding surfactant additives. After the cement hardens, small holes appear in it. These reduce its water absorption as well as its negative impact on cold temperatures. Such tiny pores withstand the pressure of frozen water, cutting off the destructive power of ice. This will increase the frost resistance of the cement.

Hydrophobic compounds, such as milonaft, increase the homogeneity of the cementite structure and hydrophobicize the cavity and capillary walls, thereby increasing the water resistance of the cementite. It is also true that hydrophilic additives (e.g. sulfide-alcohol bard-SSB) significantly reduce the water demand of concrete mixes while maintaining the required viscosity, thereby reducing the porosity of the cement stone. This increases its frost resistance and waterproofness.

The above additives make up 0.1 ... 0.25% of the total mass of cement. It should be noted that freezing in the initial period of hardening is especially dangerous for cement stone, as the porous structural cement, which is not yet strong enough, cannot withstand the ice pressure. If it is sufficiently hardened, i.e. when it reaches

50% of the brand strength, it can withstand frost well. If the cement freezes before it starts to bite, it will not damage the strength, because once it melts, the hardening processes are restored.

The effect of high temperatures on portland cement stone.

At temperatures up to 0 ° C (in a dry environment) no physicochemical changes occur in the cement stone. However, as long as it is exposed to a much higher temperature for a certain period of time, the consistency will start to change. For example, at a temperature of 200 ° C, the strength of Portland cement-based concrete decreases to about 50%, and this strength is not restored even after the heat source is removed. As the temperature increases, the strength of the concrete decreases further. For example, if the concrete is heated and moistened to 500 ... 550 ° C, the cement structure will be damaged; at this temperature Ca (ON) 2 decomposes into calcium oxide (SaO) and water, when the cement stone is wetted the lime inside the stone is extinguished again and the stone is broken.

At present, methods have been developed to create cement that can withstand very high temperatures, such as 1000 ... 1300 ° C, and can be used in the coating of various heating devices. With the addition of finely saturated chamotte, chromite, magnesite and other minerals, the high temperature resistance of portland cement stone is increased. Under high temperature conditions, the compounds bind Ca (ON) 2, thereby helping the cement to be as strong and of a specific structure as needed when heated and cooled.

This means that Portland cement has very valuable building properties, i.e. it is extremely durable, its strength increases relatively quickly, and it is also resistant to various adverse environmental influences. Getting it is also relatively inexpensive. This allows for a high degree of mechanization of portland cement production.

At a time when precast concrete and reinforced concrete structures are increasingly used in industrial construction, the production and economical use of valuable binding materials such as portland cement is extremely important.

Portland cement bulk density 1000.... 1100 kg / m3, density 1400... 1700 kg / m3; the actual density is between 3050 ... 3150 kg / m3

In terms of fineness, № 0.08 is characterized by a residual of not more than 15% in the sieve (size 0.08 mm). The specific surface area of Portland cement is calculated from the grain surface area of 1 g of cement (in cm2). The specific surface area of Portland cement should be 2500 ... 3000 cm2 / g. The higher the saturation fineness of the cement, the more active it becomes. For example, if the saturation grain is 4000 ... 5000 cm2 / g, the solidification rate will increase and the cement stone will be stronger.

The water demand of cement is determined by the amount of water required to prepare a cement mixture of normal thickness. This property occurs when the depth of immersion of the pica of the Vika tool is 5 ... 7mm, or when the water demand of porland cement varies by a scale of 22 ... 26%.

The time of hardening and full hardening of porland cement can be determined by the depth of sinking of the needle of the Vika tool. The onset of solidification occurs after 45 minutes, and the end occurs no later than 10 ... 12 hours. The uniform change in the volume of cement is determined by sampling samples made of normal cement mixture, boiling them in water and placing them on steam. Cement is of good quality if there are no cracks on the front of the puddles to the edge of the puddles or small cracks that can be seen with a magnifying glass and the naked eye, as well as any creases.

The strength of Portland cement is characterized by its brand. Cement grade is determined by the limit of strength for bending copies of prisms measuring 40x40x160 mm and compression of their halves. Such samples are prepared from a cement-sand mixture containing 1: 3 (by mass) of standard volcanic sand at a water-cement ratio of S / Ts = 0.4 and tested after 28 days. The compressive strength limit of a 28-day sample is called the activity of the cement, and the cement grade is determined by its size. For example, if the activity in the testing of cement is 520 MPa, then the cement will belong to the 500 mark.

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021

IJDPP International Journal of Development and Public Policy
| e-ISSN: 2792-3991 | www.openaccessjournals.eu | Volume: 1 Issue: 6

Used literature

1. Butt Yo.LocationTimashev V.V. Portlandsement. Location, 1974.
2. Butt Yo.LocationTimashev V.V. Portlandsement and klinker. Location, 1967.
3. VolkonskyB.V.,Konovalov P.F., MakashevS.D.Mineralizers in the cement industry. 1964.
4. Egamberdiyev M.S. A new method of obtaining high density concrete.The Republic Of Uzbekistan-Government Agencies scientific – practical conference on energy saving problems (Scientific articles collection)- Bukhara, 1993. 304 – 306 p.
5. Egamberdiyev M.S., Atakuziev T.A. Role of cement exothermy and the formation of the temperature field of the solid concrete mixture during layer-by-layer concreting.//New ingorganic materials and technical conferences dedicated to the fifth anniversary of independence of the Republic of Uzbekistan with the participation of foreign scientists- 1996.p.130
6. Egamberdiyev M.S. A new method of obtaining high density concrete// Resources of the people's Republic of Uzbekistan on the network scientific practical conference "neck and energy saving problems" (Scientific summaries) Bukhara, 1993.1.
7. https://cyberleninka.ru/article/n/primenenie-sovremennyh-tehnologiy-orosheniya-vodosnabzheniya-v-usloviyah-buharskoy-oblasti-na-primere-peshkunskogo-rayona-buharskoy

ISSN 2792-3991 (online), Published under Volume: 1 Issue: 5 in October -2021