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PERFORMANCE TEST AND RESULT ANALYSIS OF HIGH PERFORMANCE CONCRETE

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The sulfate corrosion resistance of shotcrete is: benchmark ≈ mineral powder alone < fly ash alone < compound mix ratio, and the compound mix ratio of mineral admixture (cured under the same conditions) is resistant to sulfate corrosion The ability is worse than that of compound mineral admixture (standard health). Generally speaking, the ability of shotcrete to resist sulfate corrosion is poor. The reason is that the quality of shotcrete is not high and the density is not very good.

The test equipment is the concrete electric flux measuring instrument produced by Beijing Naier Instrument Equipment Co., Ltd., as shown in Figures 1-2. The concrete electric flux test procedure is as follows: (1) first vacuum saturate the specimen, apply a 60V DC voltage in the axial direction of the specimen during the test, and place a concentration of 0.3mol in the test tanks on the positive and negative sides of the specimen respectively /L NaOH solution and 3% NaCl solution; (2) After turning on the power for 6 hours, calculate the total electricity Q passing through the test piece (that is, the electric flux of the test piece).

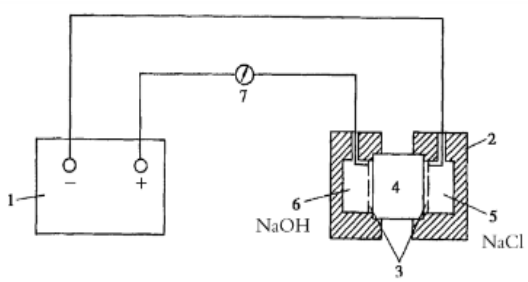

Figure 1. – Schematic diagram of the test device

Figure 2. – Electric flux measuring instrument

Five groups of specimens N1, N3, N4, N10, and N13 were selected for the sulfate corrosion resistance test. Through comparative analysis, the corrosion resistance in pure cement, single-mixed fly ash, single-mixed mineral powder, compounded with various mineral admixtures and health-preserving conditions were analyzed. The ability of shotcrete to resist sulfate corrosion under different conditions, the test results of shotcrete against sulfuric acid corrosion are shown in Table 1, Figures 3-4.

Figure 3. – Specimen soaked in sulfate

Figure 4. – Drying the specimen

Table 1 – Corrosion resistance coefficient of shotcrete anti-sulfuric acid corrosion test

Serial number	Types of	Wet and dry cycles （n）	Strength and corrosion resistance coefficient（%）
N1	ZJ	60	0.71
N3	S30	60	0.62
N4	F20	90	0.70

It can be seen from Table 2 that the sulfate corrosion resistance of shotcrete is: benchmark ≈ mineral powder alone < fly ash alone < compound mix ratio, and the compound mix ratio of mineral admixture (cured under the same conditions) is resistant to sulfate corrosion The ability is worse than that of compound mineral admixture (standard health). Generally speaking, the ability of shotcrete to resist sulfate corrosion is poor. The reason is that the quality of shotcrete is not high and the density is not very good [1-2].

Five groups of mix ratios N1, N3, N4, N10, and N13 were selected for antifreeze tests. Through comparative analysis, the conditions of pure cement, single-mixed fly ash, single-mixed mineral powder, mixed with various mineral admixtures, and different health conditions were analyzed. The anti-freeze ability of shotcrete under the above conditions, the results of anti-freeze test of shotcrete are shown in Table 2, Figures 5-8.

Figure 5. – Measure the fundamental frequency

Figure 6. – Place the test piece

Figure 7. – Freeze-thaw cycle device

Figure 8. – Antifreeze test piece

Table 2 – Shotcrete antifreeze test results

Serial number	Types	Freezing and thawing times	Dynamic elasticity Modulus	antifreeze durability factor	Antifreeze grade
N1	ZJ	175	0.71	0.41	F175
N3	S30	100	0.70	0.23	F100
N4	F20	100	0.51	0.17	F100
N10	S30F20	75	0.63	0.16	F75
N13	S30F20T	25	0.28	0.02	F25

It can be seen from the test results in Table 2 that, anti-freeze ability of shotcrete: the mix ratio of compound mineral admixture (same condition) is worse than that of compound mineral admixture (standard health), the single-mixed mineral admixture concrete is worse than the reference concrete, and the reference concrete is frost-resistant The maximum capacity can reach F175, but only F25 under the same conditions of curing, indicating that it is very necessary to carry out standard curing after shotcrete construction.

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