Application of wet shotcrete technology in tunnel construction

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Abstract: describes the principle and function of wet shotcrete construction technology, from raw material selection and concrete mix control two aspects analysis of wet-sprayed concrete raw material control side method, Research on application of wet shotcrete technology in tunnel construction, including pre-construction preparation, wet shotcrete Construction Technical essentials, and propose wet shotcrete Construction Notice, to ensure the construction quality of the tunnel works.

Keywords: wet shotcrete technology; Tunnel Construction; Technical Principles Figure category

1. Wet shotcrete Construction Technology Overview
   1.1. Wet shotcrete Construction Technical principle

   Wet shotcrete Construction technology is to mix the quick-pour agent with the concrete, Then spray the Mixing concrete directly on the building surface with a jet, from to further enhance the external structure of the building, to protect architectural knot construct, Strengthening the purpose of building strength. Shotcrete Technology in the construction process mainly through high-speed jet to achieve concrete compaction, it does not need to be vibrated after a jet ' because the construction process is simple and convenient, Construction is fast,, so the shotcrete construction technology is very wide in the tunnel construction. Generic Application, wet shotcrete construction and 10 shotcrete construction performance for example table 1 show.

   1.2. The role of Shotcrete

   Use of shotcrete in engineering construction to enter the for exposed slits Row Fill, to effectively raise the strength of surrounding rock, Ensure structure stability. During Construction because concrete can interact effectively with surrounding rock, Can make strong contact with large area of surrounding rock, so often the best branch Guard Mode, during tunnel construction through concrete spraying in tunnels The beam can effectively disperse the stress of the concrete to the surrounding rock, to effectively avoid Free Local stress sets in tunnels, avoids local removal of the tunnel inside drop, during construction of tunnels, Apply shotcrete Construction technology also can Fill the concave of the surrounding rock, This effectively avoids stress concentration, hardening soft layer, and after tunnel excavation can be mixed by Jet to achieve the timely coverage of surrounding rock by the application of the geotechnical, To avoid weathering.

2. wet-sprayed concrete raw material control
   2.1. Raw Material selection

   The most important material for wet shotcrete during construction is concrete, and the main component of concrete is cement, therefore in wet spray coagulation the Most important quality control of soil construction material is to control the quality of cement. System, When choosing a type of cement, generally choose P. O 425 or P. 0525, you often need to add certain additions to the concrete raw material.
configuration Agent, includes medium sand, mechanism gravel and quick-pour agents, etc. [2]. When you make a choice to add a additive ,, Make sure to select The most appropriate additive material according to the specific requirements of the engineering construction, Ensure quality of construction material.

2.2. Concrete Mix control

Be sure to do the same when mixing ratio of wet shotcrete materials The experiment for ,, is often performed by the site's constructors before making the determinato determine several different match schemes, and then according to these scenarios making several different concrete, Then the performance of the concrete test checktest. The uses a spray experiment to determine the best mix ratio for concrete. In the following the Construction process must be in strict accordance with the project to determine the proportion of the mix condensate configuration, not able to change the mix scheme at will.

3. Application of wet shotcrete technology in tunnel construction

3.1. Pre-construction preparation

To test the construction injection area first before tunneling. amount, specifying concrete ejection area, outlines and dimensions, should also make certain trimming of the parameters of the test before the is constructed, True to guarantee compliance with engineering requirements. in the determination of the surrounding Rock detection, If the surrounding rock is found to be broken, loose phenomena should be in time to clean up. You should also pay attention to the problem of seepage in the surrounding rock when testing, such as the fruit found a water seepage problem should be done before the formal construction of the waterproof office of the surrounding rock reason, then clean inside the tunnel, generally through high-pressure water gun to surrounding rock Flushing. This will remove some of the soft rock from the surrounding rock surface. start at the top of the tunnel for Flushing, From the top down. after completion to build the relevant construction facilities in the tunnel, ready for construction requires Mechanical Devices, and check their quality. also, should also be done in the construction area Good related spray thickness flag, to indicate the specific spray thickness.

3.2. Technical Essentials of Wet shotcrete construction

The concrete construction process of the wet shotcrete is shown in the diagram 1 shows.

During Construction, make sure that the order of all mixtures is in the Required Order, not free to drop. in the process of charging, should be set according to the defined match ratio, strictly controls the quality of the concrete. "" concrete feed compound pump should be made to ensure its mixing time in the 2 min with on, but not more than 4 min, Mixing time is too long or too short for coagulation The jet quality of the soil affects. should be sprayed from in the course of concrete spraying, and the When ejecting S as an internal in the form of a curve eject, This effectively avoids the contamination of the rebound material on the inside of the tunnel. Make sure that the last spray site is condensed before the next injection of the line [3]. If the interval between two jets is greater than when the is ejected 1 H, The second time flush the concrete surface with a high-pressure water gun before spraying, and then two jets.

To strictly grasp the wind pressure during the injection process. If the wind presses over small, reduces the injection pressure, causes the concrete to not be compactedby, can eventually can not reach design requirements; and once the wind is too large, on top of a layer of coagulation dirt will be blown away by the next Mighty Wind,causes concrete to rebound. to Analyze the types of surrounding rock and the hydrogeological features of its location, determines the coagulation number of Earth jets and thickness :II class surround rock using 3 Secondary Injection, III class surround Rock 2 Secondary Injection, IV The class surrounding rock is generally divided into 1 ~ 2 Times; use a wet spray method on the Project site to be sprayed, Guarantee thickness of first spray layer at 4~5cm left-right-to-left, and two-time jet thickness can exceed 10 cm. The nozzle will rotate uniformly in the spiral trajectory, and guaranteed to move slowly. If sprayed surrounding rock surface not ping, the then sprays the pit leveling before the. after concrete jet condensation 1h On its sprinkler maintenance, Ensure the wetting of the concrete
jet surface, and at least maintain 7 D above.
4. wet shotcrete construction precautions

before wet shotcrete construction must be done to the wet spray machine and send the inside the tube for wetting, General with cement slurry wet, and in the wet spray the first time the concrete construction completes the inside of the wet jet and The feed pipe Line Wash, Otherwise the internal concrete will affect the use of the device. toControl the air pressure of the wet jet during the wet spray process, generally remains in 0.15 ~ 0.2 MPa scope.

If a seepage section is encountered during wet shotcrete construction, should be based on infiltration Water Details. If seepage section is less permeable, should first Drying with a compressor, When the surface is dry, follow normal Construction order construction. If the seepage section is found to be large,, should be applied Reduce the amount of water before the work, then close the jet distance, and increase the speed The content of the coagulant, water seepage wall rock first check, wait until stop water In accordance with the normal construction technology for the construction of the.

During the injection process the crew must always keep an eye on the nozzle, Contact the operator once It is found the control, stop Wind, Check pipeline.

5. Epilogue

application of wet shotcrete technology in tunnel construction effectively resolves Some problems in concrete construction, Improve construction quality of tunnel concrete amount. wet shotcrete technology as a newer technology, Its actual should There are some deficiencies in the use of, in practical application construction personnel should knot work with actual conditions, Science, reasonably apply wet shotcrete construction technique, to maximize the construction quality of the tunnel works.

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