SECTION 7

SHOTCRETE

OBJECTIVE

The purpose of special observation for shotcrete is to verify that the materials, processes, and the particularly unique application techniques conform to the project documents. The process moves rapidly in often noisy and congested environments; it relies heavily on experienced working crews.

The Statement of Special Inspections, prepared by the responsible design professional, will define the special inspection task(s) required. Qualified special inspectors who diligently perform the duties listed below while under the direct supervision of the materials engineering laboratory can best achieve this objective.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and contractor submittals for applications process used.
2. Verify crew qualifications.
3. Verify material sources and approved mix design.
4. Verify test methods and sample procedure.

B. Observation Procedures

1. Verify main and auxiliary equipment for compliance, capacity, pressures, and proper functioning.
2. Check for hot or cold weather limitations and precautions.
3. Verify reinforcing is proper type, grade, and size; free of oil, dirt, and rust; properly coated and/or sheathed as specified; located within acceptable tolerances and adequately supported; and will allow for minimum shotcrete cover.
4. Verify that placement of reinforcing steel (or ducts) complies with spacing, profile, and quantity requirements.
5. Verify hooks, bends, ties, stirrups, and supplemental reinforcement are fabricated and placed as specified.
6. Verify required non-contact lap lengths.
7. Verify proper installation of approved mechanical connections and/or bolts.
8. Ensure all welds of reinforcing steel and other weldments are as specified and have been inspected and approved by welding inspector.
9. Verify formwork is proper size and shape; location of all construction joints; and penetrations and embeds are correct and adequately supported.
10. Check for ground wires or other thickness gauging control method.
11. Verify the nozzleman has suitable shooting positions and access to achieve placement with minimal rebound.
12. Review mixing and placing procedures with crew before commencement of application.
13. Verify that batch tickets indicate delivery of the approved mix as specified.
14. Observe placement for:
    a) Consistency
    b) Consolidation
    c) Coverage
    d) Rebound
    e) Finish
15. Check completed job for defects and corrective action.
16. Verify protection from temperature extremes and determine proper curing is initiated.

C. Sampling and Testing

1. Determine required type, quantity, and frequency of tests on fresh and hardened shotcrete.
2. When required, observe preparation of preconstruction test panel(s), simulating job conditions as closely as possible. The panel(s) thickness and reinforcing should represent:
    a) Most congested area specified in the structural design.
    b) Shot at the same angle, using the same nozzleman, and with the same mix design that will be used.
    c) Same equipment to be used during construction, unless substitution has been approved by the Building Official.
3. During construction, observe preparation of a test panel (either 18” x 18” or 12” x 12” based on aggregate size), or as otherwise specified, to obtain suitable cores for testing. Arrange correct positioning of sample panel to represent job shotcrete. Prearrange with nozzleman the correct timing of the test sample preparation and verify that it is representative of job placement, finish, and cure. Refer to ACI 506 for further guidance.
4. Strength testing requires not less than three specimens from each panel. Specimens shall be either 3” diameter cores or 3” cubes when maximum-size aggregate is larger than 3/8”. Specimens shall be at least 2” diameter cores or 2” cubes when maximum-size aggregate is 3/8” or smaller.
5. Mark panel with specimen identification, protect for curing period, and arrange for transportation to the testing laboratory.

D. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work. Itemize any changes authorized by architect/engineer. Report all uncorrected deviations from plans or specifications.