



CONSEAL™
CONCRETE SEALANTS INC.

TECHNOLOGY FOR TODAY AND TOMMORROW.
FOR VIRTUALLY ANY CONCRETE APPLICATION.

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GUIDE SPECIFICATION

SECTION 03 05 00

CONCRETE INTEGRAL WATERPROOFING ADMIXTURE – P.R.A.H.

NOTE TO SPECIFIER: This Guide Specification is provided for your review. Guide wording may be included at appropriate locations, modified, or omitted. Your consideration is appreciated. Respectfully submitted, Concrete Sealants, Inc.

NOTES TO SPECIFIER are informational and may be removed.

NOTES TO BIDDERS are intended be maintained in Specification to explain new admixture technology.

NOTE TO SPECIFIER: *(information also appears in PART 2, Paragraph 2)*

Guide Specification is based on ConBlock CDA <http://conseal.com/concrete-sealant-products/conblock-cda.html>

Manufactured by Concrete Sealants, Inc., 9325 State Route 201, Tipp City, OH 45371
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Concrete Sealants, Inc., located near Dayton, Ohio has been in business since 1970. Our “ConBlock” product line includes an “anti-microbial admixture” that protects concrete from the hydrogen sulfide gas phenomena that occurs in sewer pipes, manholes and WWTPs. Also available is a line of surface applied penetrating concrete sealers. The “ConSeal” product line includes preformed joint sealants, hydrophilic waterstops, self-adhesive sheet membranes, and water-based concrete coatings that help make concrete structures water-tight. We are a global leader and ship products to six continents.

PART 1 – GENERAL

1.1 SECTION INCLUDES - ADMIXTURES FOR INTEGRAL WATERPROOFING OF CONCRETE.

A. Concrete mixtures must include Polycarboxylate (PCE) High Range Water Reducer / Superplasticizer for ConBlock CDA to work as designed.

1. Lignan based water reducers and sulfonated-melamine formaldehyde superplasticizers are not approved in mixes with ConBlock CDA.

NOTE TO BIDDER: *Polycarboxylate ether PCE based high-range water reducers (HRWRA) / superplasticizers became available in the 1980's and were generally accepted for Self-Compacting Concrete SCC in precast operations by the early 2000's. Most DOT agencies approved precast concrete mix designs with PCE admixtures in the mid 2000's. Benefits include significant water reduction in concrete mixtures to achieve specified w/cm ratios, while producing flowability to facilitate concrete placement. PCE admixtures maintain the workability of concrete (slump retention) for longer periods, compared to traditional high-range water reducers. PCE admixtures work on two principles. The first is electrostatic repulsion, so cement grains with like charges repel each other. The second is steric hindrance, which is polymer molecules physically repelling cement particles.*

B. Concrete mixture must include ConBlock CDA. It is a Permeability-Reducing Admixture for Hydrostatic conditions, abbreviated as PRAH, that resists hydrostatic pressure. It is a proprietary blend of colloidal silica and hydrophobic polymers that create a hydrogel, which becomes a permanent part of the concrete matrix. <http://conseal.com/concrete-sealant-products/conblock-cda.html>

1. Permeability-Reducing Admixtures for Non-hydraulic conditions, abbreviated as PRAN and referred to as damp-proofers, are not approved for project concrete exposed to water pressure.
2. ConBlock CDA must be added to the concrete mixer at batch plant with tail water at end of batch sequence; or after tail water. Concrete load must be mixed at mixing speed for 5 to 10 minutes.
3. ConBlock CDA must be added to precast plant mixer at end of the batch sequence. Concrete batch must be mixed in the time period recommended by mixer manufacturer, approximately 2.5 minutes.

1.2 RELATED SECTIONS

A. [03] Concrete

1. 03 05 00 Concrete General
2. 03 05 00 Concrete Integral Waterproofing Admixture – P.R.A.H.

3. 03 05 00 Concrete Integral Anti-Microbial Admixture
4. 03 05 10 Concrete Color Additive
5. 03 15 13 Waterstops
6. 03 15 16 Waterproof Concrete Construction Joint
7. 03 30 00 Cast-in-Place Concrete
8. 03 31 26 Self-Consolidating Concrete
9. 03 40 00 Precast Concrete

B. [07] Thermal and Moisture Protection

1. 07 92 00 Joint Sealants
2. 07 10 00 Damp proofing and Waterproofing
3. 07 14 00 Fluid-Applied Waterproofing
4. 07 16 16 Crystalline Waterproofing

NOTE TO BIDDER: *Waterstops for non-moving joints create a continuous barrier to stop water ingress through joints where one side is subject to hydrostatic pressure. Rigid and flexible waterstops are embedded in concrete, across and along the joint to form a continuous seal. Waterstop systems that are strip-applied hydrophilic swelling rubber are approved by the Engineer for specific areas, in lieu of, or in addition to, rigid and flexible waterstops. Surfaces to receive hydrophilic strips must be dry and free of release agents, dirt, and debris; utilizing a pressure washer if necessary. Strips must be affixed with adhesive or mechanical means, so strips are not dislodged during concrete placement. Affix butt joint splices with adhesive. Overlapping of hydrophilic strips is not permitted.*

NOTE TO BIDDER: *Hydrophilic waterstop products by Concrete Sealants, Inc. include:*

CS-231 Controlled Expansion Waterstop Sealant
CS-235 Rapid Expansion Waterstop
CS-5000 Chloroprene Rubber Hydrophilic Waterstop

1.3 DEFINITIONS:

B. Permeability Reducing Admixture Hydrostatic (PRAH) are concrete admixtures that contain components that react with the calcium hydroxide created during the Portland cement reaction with water, which reduces water absorption of concrete exposed to hydrostatic pressure. Refer to ACI 212.3R

1.4 REFERENCES:

A. ACI International – American Concrete Institute

1. ACI 212.3R – Report on Chemical Admixtures for Concrete
2. ACI 301 – Specifications for Structural Concrete
3. ACI 301 M – Specifications for Structural Concrete
4. ACI 305.1 – Specification for Hot Weather Concreting
5. ACI 306.1 – Specification for Cold Weather Concreting
6. ACI 305R – Hot Weather Concreting
7. ACI 306R – Cold Weather Concreting
8. ACI 308.1 – Specification for Curing Concrete
9. ACI 309R – Guide for Consolidation of Concrete

B. ASTM International

1. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - a. ConBlock CDA increased 1-day, 7-day and 28-day strengths by more than 10%.
2. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete
3. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete
 - a. ConBlock CDA meets requirements of ASTM C494, Type S
4. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
 - a. Concrete with ConBlock CDA and 20% class F fly ash replacement of Portland cement meets Alkali Silica Reaction expansion below 0.100 % expansion in 28 days. Expansion results were below 0.080 % at age 16 days.
5. ASTM C1585 - Standard Test Method for Measurement of Rate of Absorption of Water by Hydraulic-Cement Concretes
 - a. ConBlock CDA reduced the rate of water wicking by 9% in concrete, compared to control mix.
6. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
7. International Organization for Standardization
 - a. ISO-9001 - Quality management systems – Requirements
 - b. Concrete Sealants, Inc is an ISO-9001:2015 company.

8. U. S. Army Corps of Engineers (USACE) CRD C-48-92 - Standard Test Method for Water Permeability of Concrete

a. Concrete mixtures with ConBlock CDA withstands passage of water when exposed to hydrostatic pressure test of 200 psi / 1.28 MPa for 14 days. Equivalent to 460 feet / 140 meters of head pressure.

b. ConBlock CDA reduced water penetration by 32% compared to control mix.

9. Scanning Electron Microscope SEM photos by independent SEM photographer must be submitted as evidence of enhanced CSH crystals within the concrete matrix.

a. ConBlock CDA Technical Data Sheet Technical Data Sheet displays SEM photo.

10. B3B flexural strength test for Biogenic Acid Resistance of concrete specimens tested by an independent lab.

a. ConBlock CDA reduced flexural strength reduction by 71%, when tested according to the ball-on-three-ball test B3B.

11. Sulfuric Acid Immersion Test of concrete specimens tested independent lab.

a. ConBlock CDA reduced sulfuric acid attack by 21%.

1.5 SUBMITTALS

A. General: If any portion of Contract Documents does not conform to manufacturer's standard recommendations, submit notification of portions of design at variance with manufacturer's specifications.

B. Certification: Submit manufacturer's Certificate of Conformance, signed by manufacturer showing the admixture meets specified performance requirements.

C. Product Data: Submit manufacturer's Submittal Packet with data sheets for Permeability Reducing Admixture Hydrostatic PRAH including guide specification, test data, technical data sheets, and general recommendations.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 30.

B. Source Quality: Obtain a proprietary waterproofing PRAH admixture from a single manufacturer.

C. Manufacturer Qualifications:

1. Company that manufactures a specialty Integral Waterproofing PRAH admixture for concrete that is a proprietary blend of colloidal silica and hydrophobic polymers that create a hydrogel, which become a permanent part of the concrete matrix.

2. Manufacturer must be ISO 9001 registered.
3. Manufacturers who cannot provide performance test data specified will not be considered for the project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Ordering: Comply with manufacturer's lead time requirements for testing samples and batch plant inventory to avoid construction delays.
- B. Delivery: Deliver liquid containers to concrete production facility in original undamaged containers with manufacturers labels and seals intact.
- C. Identification: Containers fully identified with manufacturer's label listing type, grade, class, and other qualifying information. Provide Material Safety Data Sheet.
- D. Storage: Store liquid materials so that they are protected from freezing, as required by manufacturer.

1.8 TRIAL MIXES

- A. Concrete Producer is required to produce test batches with ConBlock CDA at least 15 calendar days prior to first concrete placement, using admixture samples provided by the manufacturer.
 1. Batch one cubic yard / cubic meter minimum and conduct concrete field tests to determine if mix adjustments are required.
 2. Cast minimum of four compression test specimens for testing at 7 days and 14 days.
 3. Provide Batching Test Results, including admixture dosages, temperature, slump, air content and unit weight; to the General Contractor who will relay to Consultant.

NOTE TO BIDDERS: *Responsibility to ensure compatibility: ConBlock CDA was tested compatible with several polycarboxylate PCE admixtures during development and it is believed compatible with most PCE admixture used in the production of quality concrete. However, Concrete Sealants, Inc. makes no representations or warranties regarding such compatibility with additives or admixtures. It is the responsibility of the Contractor to take precautions necessary, including testing, to ensure compatibility of ConBlock CDA with other additives or admixtures being used in the concrete mix.*

1.9 PRE-PLACEMENT CONFERENCE

- A. Pre-Placement conference with ready mixed concrete at least 7 calendar days prior to first concrete placement of ready mixed concrete with ConBlock CDA
 1. General Contractor will convene and conduct pre-placement conference with owner's representative, concrete contractor, and concrete supplier.

- a. Discuss project requirements as set out in Contract Documents.
 - b. Discuss manufacturer's product data, recommendations and instructions.
 - c. Discuss time-line and precautions in hot and cold weather.
 - d. If necessary, invite ConBlock CDA manufacturer's representative.
- B. Pre-Placement Conference in precast concrete plant at least 7 calendar days prior to first precast concrete placement with ConBlock CDA.
 - 1. General Contractor will convene and conduct pre-placement conference with owner's representative, subcontractor involved, and entity who will purchase ConBlock CDA.
 - a. Discuss project requirements in Contract Documents.
 - b. Discuss manufacturer's product data, recommendations etc.
 - c. Discuss time-line and precautions in hot and cold weather.
 - d. If necessary, invite ConBlock CDA manufacturer's representative.

1.10 WARRANTY

A. Project Warranty: Refer to conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Concrete Sealants, Inc. www.conseal.com

1. This information is presented in good faith, however Concrete Sealants, Inc. cannot anticipate all conditions under which this information and our products, or the products of other manufactures in combination with our products, may be used. Concrete Sealants, Inc. accepts no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the users' responsibility to satisfy himself as to the suitability and completeness of such information for this own particular use. Concrete Sealants, Inc. sells this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: ConBlock CDA <http://conseal.com/concrete-sealant-products/conblock-cda.html>

B. Approved Manufacturer: Concrete Sealants, Inc., www.conseal.com

1. Located at 9325 State Route 201, Tipp City, OH 45371

a. Sales questions: 800-332-7325 or 937-845-8776
hello@conseal.com Fax: 937-845-3587

b. Technical questions: khanson@conseal.com or
slines@conseal.com

C. Subject to compliance with requirements, provide products by one of the following:

1. Xypex Chemical Corporation, xypex.com

2. SIKA Corporation, usa.sika.com

3. Kryton International, Inc.; kryton.com

4. ICS Penetron International Ltd., penetron.com

5. Hycrete, hycrete.com

6. BASF, basf.com

D. SUBSTITUTION REQUESTS: Submit no later than 15 calendar days prior to bid date, to allow time for review and response.

1. If Substitution Form is not located under Instruction to Bidders section, utilize "CSI form 13.1 – Substitution Request (During the Bidding Phase)"

NOTE TO BIDDERS: Example of "CSI Form 13.1 Substitution Request (During the Bidding Phase) can be viewed at: haynephillips.com/images/Substitution_Request_Form1-blank.doc

An alternate form is titled: "CSI Form 13.1 Substitution After Negotiating and Bidding"

2.2 MATERIALS

A. System Description:

1. Permeability-Reducing Admixture for Hydrostatic conditions PRAH: ASTM C494/C494M, Type S, permeability-reducing admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure.

a. ConBlock CDA is a plant added liquid Permeability-Reducing Admixture: ASTM C494/C494M, Type S, Hydrostatic.

b. ConBlock CDA is a proprietary blend of colloidal silica and hydrophobic polymers that become a permanent part of the concrete matrix. <http://conseal.com/concrete-sealant-products/conblock-cda.html>

- c. Concrete with ConBlock CDA passes the hydrostatic pressure test of 200 psi for 28 days, per CRD-C48-92.

NOTE TO BIDDERS: Colloidal Silica consists of nano-scale particles of pure silicon dioxide (silica) in a liquid medium. Colloidal Silica, referred to as nano-silica, is Ultra-Fine Amorphous Colloidal Silica UFACS. Colloidal silica particles react with Calcium Hydroxide CaOH, the weak crystals that are the byproduct of cement hydration; just as fly ash, slag cement and silica fume react with CaOH. As CaOH is converted to Calcium Silicate Hydrate CSH strong crystals; compressive strengths are increased and set times are reduced. CSH crystals are considered the Concrete Super Hero of cement hydration. The term “colloidal” means in suspension, and the cohesive hydrogel created reduces segregation and minimizes bleed water, which means finishing operations occur more quickly. In addition to densification, ConBlock CDA creates molecular hydrophobicity (water repellency) to protect concrete from harsh conditions.

B. Dosage Rate:

1. General: Add ConBlock CDA to concrete mix at the batch plant.
2. Dosage: 21 to 40 ounces per hundred pounds of cementitious materials, per CWT, which is 1.5% to 2.5% of cementitious materials weight.
3. Color: Red pigment pack available separately, to indicate ConBlock CDA presence in the concrete.

PART 3 - EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

- A.** Comply with manufacturer’s submittal packet which includes product data, technical data sheets, and product instructions.

3.2 APPLICATION PROCEDURES

- A.** General: Concrete mixture must include a Polycarboxylate PCE High Range Water Reducer / Superplasticizer for ConBlock CDA to work as designed. Lignan based water reducers are not permitted.

B. Add ConBlock CDA to concrete mix at the batch plant.

1. Ready Mix Batch Plant – ConBlock CDA must be added to the concrete mixer at batch plant at end of batch sequence, with tail water or after tail water. Concrete load must be mixed at mixing speed 5 to 10 minutes.

- a. Batch and mix materials in accordance with ASTM C 94/C 94M.

b. If sequence for tail water addition of ConBlock CDA presents problems due to batch plant configuration, contact manufacturer to discuss.

2. Precast Batch Plant - ConBlock CDA must be added to the precast plant mixer at the end of the batch sequence. Concrete batch must be mixed for the time recommended by mixer manufacturer, approximately 2.5 minutes.

3.3 PROJCT CONDITIONS

A. Conform to ACI 305R when concreting during hot weather.

B. Conform to ACI 306R when concreting during cold weather.

***NOTE TO BIDDERS:** Depending on many factors, the set time of the concrete may be delayed or accelerated due to chemical and physical composition of ingredients, brand and quantity of Portland cement and supplementary cements, admixtures, concrete temperature and climatic conditions. Due to reduced bleed characteristics of Colloidal Silica based admixtures; in hot, dry or windy conditions, the Contractor is encouraged to utilize fogging devices or a monomolecular film (evaporation retardant) to minimize surface drying and crazing.*

3.4 CURING

A. Concrete must be cured in accordance with ACI 308.1 - Specification for Curing Concrete.

3.5 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Facilitate daily access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.

3.6 PROTECTION

A. Protect installed product and finished surfaces from damage during construction.

B. Provide security and protection for test samples and for testing and inspection equipment at Project site during initial curing and field curing of test samples.

C. Include equipment and continuous electrical power at Project site to maintain curing temperatures between 60 degrees F and 80 degrees F during initial curing period of compression strength test specimens.

3.7 FIELD QUALITY CONTROL

A. Examination for Defects: Do not conceal concrete with ConBlock CDA before it has been observed by testing technicians, owner's representatives, or other designated entities; to look for structural defects such as faulty construction joints, cold joints, cracks, and honeycomb areas. Defects to be repaired in accordance with manufacturer's repair procedures.

B. Flood Testing

- 1.** Perform flood test on completed waterproofing installation before placement of other construction.
- 2.** Plug or dam drains and fill area with water to a depth of two inches (50 mm) or to within 0.5 inch (12.5 mm) of top of waterproofing treatment.
- 3.** Let water stand for 24 hours. If leaks are discovered, make repairs and repeat test until no leaks are observed.

C. Backfilling: Use normal backfilling procedures after concrete has reached 75% of specified compressive strength.

- 1.** If backfill takes place within seven days after concrete placement, backfill material shall be moist so as not to draw moisture from the concrete.