SECTION 03 35 16

HEAVY DUTY CONCRETE FLOOR FINISHING, HARDENING, AND REINFORCING

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\*\* NOTE TO SPECIFIER \*\* ISE Logik Industries; extruded polypropylene products.  
This section is based on the products of ISE Logik Industries, which is located at:5635 Iron Works Rd.Theodore, AL 36581Toll Free Tel: 877-549-5159Tel: 585-474-3553Email: [request info (decraft@iselogik.com)](https://arcat.com/rfi?action=email&company=ISE%252BLogik%252BIndustries&message=RE%253A%2520Spec%2520Question%2520(03350ffs)%253A%2520&coid=49683&spec=03350ffs&rep=&fax=)  
Web: <http://www.iselogik.com>   
  
This section is based on the products of FullForce by ABC Polymers Industries, LLC, which is located at:  
Helena Industrial Park 545 Elm St.  
Helena, AL 35080  
Phone: 205-620-9889  
Web: https://fullforcesolutions.us/  
  
 [ [Click Here](https://arcat.com/company/ise-logik-industries-49683) ] for additional information.  
  
Full Force by ABC Polymer Industries LLC was founded in September 1994. Prior to that, the company operated for many years under a different name and ownership. Several of our current employees have worked in this facility for over 30 years. Our expertise in all facets of polypropylene extrusion, combined with our unwavering commitment to serving our customers, has been and will continue to be major contributors to our success.  
Polypropylene is one of the most important and readily available plastics in the manufacturing industry. We are the leading producer of extruded polypropylene products, including synthetic microfibers and macrofibers for concrete. We are also a major distributor of bulk bags, fibrillated yarns, synthetic snow, and more.  
As a company, we are committed to being lifelong students of the industries we serve. Subsequently, we never stop learning and innovating. Our ongoing commitment to excellence enables us to engineer and produce the highest quality, cost-effective products available. Our consistent investments in technology and training make it easier for our customers to do business with us. Our top-notch service, quality products, and 99 percent on-time delivery record have enabled us to build strong, lasting relationships with our customers - and will allow us to continue to meet and exceed their expectations for years to come.

1. GENERAL

\*\* NOTE TO SPECIFIER \*\* The section must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate this section with the concrete section.

\*\* NOTE TO SPECIFIER \*\* This section covers FullForce Fibers for use as secondary reinforcement in concrete. Consult FullForce for assistance in editing this section for the specific application.

* 1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* All three items below are required for project.

* + 1. Fibrous reinforcing, abrasion resistant concrete slab system.
       1. Synthetic Macrofibers for use as secondary reinforcement in concrete.
       2. Integral liquid concrete hardening admixture.
       3. Topical liquid concrete hardener.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 03 39 00 - Concrete Curing.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. American Concrete Institute (ACI):
       1. ACI 544.1R - State-of-the-Art Report on Fiber Reinforced Concrete.
       2. ACI 544.3R - Guide for Specifying, Proportioning, and Production of Fiber Reinforced Concrete
       3. ACI 544.4R - Guide for Design with Fiber Reinforced Concrete
       4. ACI 302 - Guide for Concrete Floor and Slab Construction
       5. ACI 360 - Guide to Design of Slabs-on-Ground
    2. ASTM International (ASTM):
       1. ASTM C31/C31M - Practice for Making and Curing Concrete Test Specimens in the Field
       2. ASTM C78 - Test Method for Flexural Strength of Concrete
       3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
       4. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
       5. ASTM C 1609 - Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).
       6. ASTM D7508 - Standard Specification for Polyolefin Chopped Strands for Use in Concrete
    3. International Code Council Evaluation Service (ICC-ES)
       1. ICC-ES AC383 - Polyolefin Chopped Strands for Use in Concrete
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00.
     2. Product Data:
        1. Manufacturer's data sheets on each product to be used.
        2. Product data and application rate.
        3. Storage and handling requirements and recommendations.
        4. Mixing and placing instructions.
     3. Test Reports. Manufacturer must furnish an Engineering Report which provides ASTM C1609 test data encompassing the proposed addition rate required for the subject project from a qualified, independent laboratory. ASTM C944 test data consisting of a specimen with fiber reinforcement, integral hardener, and topical densifier must be submitted.
     4. Manufacturer's Quality Assurance: Submit manufacturer's certification that fibers comply with ASTM C 1116, Type III and other specified requirements and are suitable for intended application
  2. QUALITY ASSURANCE
     1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
     2. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
     3. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
       1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
       2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
       3. Retain mock-up during construction as a standard for comparison with completed work.
       4. Do not alter or remove mock-up until work is completed or removal is authorized.
  1. PRE-INSTALLATION CONFERENCE
     1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
     2. Prior to pre-installation conference, prepare pre-construction trial mix or mixes, using proposed ingredients, fabricated to ensure targeted engineering properties are met and the mix workability is within standard parameters.
        1. For fiber-reinforced concrete, prepare test specimens with the following modifications to ASTM C31/C31M:
           1. Prepare test specimens using external vibration (or rubber mallet) to consolidate the specimens. Do not use rodding since it may produce preferential fiber alignment and nonuniform fiber distribution that may cause variance in the results.
           2. Cast test specimens in a single layer (i.e., a single dump, not lifts) to avoid the reorientation of the fibers or fiber-free planes.
           3. Use a cylinder mold with a diameter at least three times larger than the fiber length.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Deliver products in manufacturer's original unopened containers.
        1. Product Labeling: Minimum Information.
           1. Material name.
           2. Manufacturer.
           3. Weight of material.
        2. Damaged containers will not be accepted.
     2. Storage:
        1. Fibers:
           1. Keep material in a dry environment.
           2. Do not store in direct sunlight.
           3. Keep containers sealed until ready for use.
        2. Integral Liquid Concrete Hardening Admixture:
           1. Keep containers sealed until ready for use.
           2. Do not store in direct sunlight for long periods of time.
           3. Do not allow to freeze.
        3. Topical Liquid Concrete Hardener:
           1. Keep containers sealed until ready for use.
           2. Do not store in direct sunlight for long periods of time.
           3. Do not allow to freeze.
     3. Handling: Handle materials to avoid damage.
  3. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  4. SEQUENCING
     1. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress
  5. WARRANTY
     1. Manufacturer's standard limited warranty unless indicated otherwise.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: ISE Logik Industries, which is located at:5635 Iron Works Rd.Theodore, AL 36581Toll Free Tel: 877-549-5159Tel: 585-474-3553Email: [request info (decraft@iselogik.com)](https://arcat.com/rfi?action=email&company=ISE%252BLogik%252BIndustries&message=RE%253A%2520Spec%2520Question%2520(03350ffs)%253A%2520&coid=49683&spec=03350ffs&rep=&fax=);Web: <http://www.iselogik.com>
      2. Acceptable Manufacturer: FullForce, which is located at: Helena Industrial Park, 545 Elm Street, Helena, AL 35080; Tel: 205-620-9889; Web: [www.FullForceSolutions.us](http://www.FullForceSolutions.us).

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 .
    3. Basis of Design: FullForce(HP) High Performance Slab System by FullForce.

\*\* NOTE TO SPECIFIER \*\* All three articles are required for the fibrous reinforcing, abrasion resistant concrete slab system.

* 1. FIBER REINFORCEMENT

\*\* NOTE TO SPECIFIER \*\* FiberForce 750 is a unique blend of macro/macro synthetic fibers that has excellent distribution and finishing properties.

* + 1. Basis of Design: FiberForce 750, Synthetic Macro Fiber Reinforcement as manufactured by FullForce. A blend of macro synthetic fibers that combines a mechanically embossed tape macro fiber with a modified fibrillated macro fiber. The modified fibrillated portion has been engineered so the main fibrils are enlarged to increase tensile properties.
       1. Standards Compliance:
          1. ASTM C1116: Section 4.1.3 Type III and Note 2 for synthetic reinforced concrete.
          2. ASTM D7508.
          3. ICC-ES AC383.
       2. Physical Characteristics:
          1. Material: Polyolefin (Polypropylene/Polyethylene).
          2. Absorption: None.
          3. Specific Gravity: 0.91.
          4. Alkali, Salt, and Acid Resistance: High.
          5. Melting Point: 330 degrees F (165 degrees C).
          6. Electrical Conductivity: Low.

\*\* NOTE TO SPECIFIER \*\* Delete length not required.

* + - * 1. Length: 2.0 inches (51 mm). Aspect Ratio: 93.
        2. Length: 1.5 inches (38 mm). Aspect Ratio: 70.

\*\* NOTE TO SPECIFIER \*\* The dosage rate for FiberForce 750 is typically between 3.0 to 11.0 lbs per cu yd. Specific dosage rate should be established by the project engineer or government agency for a given application based on project conditions and requirements. For Slabs on Composite Metal Deck, the Steel Deck Institute's provision recommends a minimum of 4 lbs per cu yd.

* + - * 1. Dosage Rate: \_\_\_\_\_\_\_\_ lbs per cu yd.
      1. Mixing:
         1. After proper dosage, mix for a minimum of 5 minutes at full charging speed (75 - 100 revolutions per minute) to ensure complete dispersion of fibers.
         2. Use appropriate water reducing chemical admixture for any slump modification that may be necessary.
  1. INTEGRAL LIQUID CONCRETE HARDENING ADMIXTURE PRODUCT

\*\* NOTE TO SPECIFIER \*\* DuraForce (i) is a chloride-free, water-based liquid integral concrete hardener that increases the abrasion resistance of concrete flooring.

* + 1. Basis of Design: DuraForce(i), as manufactured by FullForce. A chloride-free, water-based liquid integral concrete hardener that increases the abrasion resistance of concrete flooring. Its reactive ingredients create additional hydration products within the multitude of capillaries resulting in 3-Dimensional performance throughout the entire slab. DuraForce(i) is non-toxic and volatile organic compound (VOC) free.
       1. Closed capillaries restrict bleed water pass through.
       2. Helps retain moisture promoting internal curing and early strength gain with decreased set time.
       3. Reduces hydrostatic permeability.
       4. Standards Compliance:
          1. Increased Wear Resistance: Per ASTM C779 and ASTM C944.
          2. Reduced Long Term Shrinkage: Up to 35 percent based on ASTM C494 in compliance with ASTM C157.
          3. Type S Admixture: Per ASTM C494/C494M.
       5. Physical Characteristics:
          1. Physical State: Liquid.
          2. Toxicity: None.
          3. Flammability: None.
          4. Odor: Odorless.
          5. Color: Hazy Whitish Liquid.
          6. Turbidity: 60-70.
          7. Freezing Point: 32 degrees F (0 degrees C).
          8. Boiling Point: 212 degrees F (100 degrees C).
          9. VOCs: 0.0 grams per L.
          10. Active Solids: 20 to
          11. pH: 11.0 to 12.0.
          12. Specific Gravity: 1.19 to 1.23.

\*\* NOTE TO SPECIFIER \*\* The dosage rate for DuraForce(i) is 10 oz (295 mL) per 100 lb (45 kg) total cementitious material. However, a specific dosage rate should be established by the project engineer or government agency for a given application based on project conditions and requirements. DuraForce(i) shall be added per project specifications or engineer's instructions.

* + - 1. Dosage Rate: \_\_\_\_\_\_\_\_ oz/cwt.
      2. Mixing:
         1. For best results, add to the freshly batched ready-mixed concrete at the end of the batch process with the tail water.
         2. Mix for a minimum of 7 minutes at full charging speed (75 - 100 revolutions per minute) to ensure complete and uniform dispersion of integral liquid hardener.
  1. TOPICAL LIQUID CONCRETE HARDENER

\*\* NOTE TO SPECIFIER \*\* DuraForce (t) is a chloride-free, water-based liquid topical concrete densifier that increases the abrasion resistance of concrete flooring.

* + 1. Basis of Design: DuraForce(t), as manufactured by FullForce. A chloride-free, water-based liquid topical concrete densifier that increases the abrasion resistance of concrete flooring. Its reactive ingredients penetrate the concrete slab's surface pore structure and creates additional hydration products throughout the surface matrix, thereby densifying the concrete slab surface during the curing process. DuraForce(t) is non-toxic and volatile organic compound (VOC) free. DuraForce(t) can also be used as a curing agent when used at the appropriate application rates.
       1. Permanent increased surface density.
       2. Solidifies within the concrete mass.
       3. Mitigates dust from the concrete.
       4. Compatible with all types of coverings.
       5. VOC Compliant.
       6. Standard Compliance:
          1. Wear resistance per ASTM C779 and ASTM C944: Meets.
          2. Moisture Retention per ASTM C309 and ASTM C1315: Exceeds performance of both.
          3. Deleterious Effects per ASTM C309: Meets.
          4. Acid and Alkali resistance per ASTM C1308: Meets.
          5. Perfect suspension per ASTM C1309.
          6. Topical liquid hardener - DuraForce(t).
       7. Physical Characteristics:
          1. Physical State: Liquid.
          2. Odor: Odorless.
          3. Color: Hazy Whitish.
          4. Turbidity: 60 to 70.
          5. Freezing Point: 32 degrees F (0 degrees C).
          6. Boiling Point: 212 degrees F (100 degrees C).
          7. VOCs: 0.0 grams per L.
          8. Active Solids: 20 to 25 percent.
          9. pH: 11.0 to 12.0.
          10. Specific Gravity: 1.09 TO 1.13.
       8. Application rate: Varies depending on use. 500 sq ft per gallon (12 sq m per L) when used as a topical densifier. Contact the manufacturer for application rate when used as a curing compound or as a cure and seal compound.

1. EXECUTION
   1. EXAMINATION
      1. Do not begin installation until substrates have been properly constructed and prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
   2. PREPARATION
      1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   3. INSTALLATION
      1. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
      2. Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and the requirements of section 03 30 00.
      3. Fiber reinforcement product:
         1. Add fibers to concrete mix at dosage rate in accordance with manufacturer's instructions and approved submittals.
         2. Add pre-weighed water-soluble fiber bags at the end of the batching sequence. Do not add the fiber bags with the cement. Add the bags while the drum is rotating at charging speed and mix for the time required by ASTM C1116. Mix for an additional 70 drum revolutions minimum at mixing speed after adding fiber (about 5 minutes).
      4. Integral liquid hardener:
         1. Add integral liquid harder to concrete mix at dosage rate in accordance with manufacturer's instructions and approved submittals.
      5. Topical liquid hardener:
         1. Apply topical liquid hardener to concrete surface in accordance with manufacturer's instructions and approved submittals.
   4. PLACING, CURING, AND FINISHING
      1. As specified in Section 03 30 00.
      2. To ensure the fibers at the surface of the slab are encapsulated in the concrete matrix, and to improve the quality of consolidation of the concrete, utilize a laser or vibrating screed.
      3. FullForce(HP) High Performance Slab System shall receive a mirrored/burnished finish.
      4. If fibers are visible at the surface of the concrete, they may be removed with a torch burner.
   5. FIELD QUALITY CONTROL
      1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

\*\* NOTE TO SPECIFIER \*\* Include if manufacturer provides field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Delete if not required.

* + 1. Manufacturer's Field Services: Manufacturer's representatives shall provide technical assistance as required.
    2. Project team: Upon request, provide batch tickets indicating presence and dosage of fiber reinforcement.
    3. Project team: Upon request, provide batch tickets indicating presence and dosage of integral liquid hardener.
  1. CLEANING AND PROTECTION
     1. Touch-up, repair or replace damaged areas before Substantial Completion.

END OF SECTION