

# UL Evaluation Report

**UL ER25733-01**

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**UL Category Code: ULEU**

**CSI MasterFormat®**

**DIVISION: 03 00 00 – CONCRETE**  
**Sub-level 2: 03 30 00 – Cast-in-Place Concrete**  
**Sub-level 3: 03 31 00 – Structural Concrete**  
**Sub-level 4: 03 31 16 – Lightweight Structural Concrete**

**COMPANY:**

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**1. SUBJECT:**

**ELEMIX® TYPE XE AND GREY XE CONCRETE ADDITIVE**

**2. SCOPE OF EVALUATION**

- 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2012, 2009 and 2006 *International Residential Code*® (IRC)
- ICC-ES Acceptance Criteria for Structural Concrete With Lightweight Synthetic Particles (AC408), Dated February 2010
- ICC ES Acceptance Criteria for Quality Documentation (AC10), Dated December 2012

**The products were evaluated for the following properties:**

- Physical Properties
- Mechanical Properties
- Durability Properties
- Combustibility
- Fire-Resistance Rated Construction



### 3. REFERENCED DOCUMENTS

- ICC-ES Acceptance Criteria for Structural Concrete With Lightweight Synthetic Particles (AC408), dated February 2010
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated December 2012
- ASTM C94, Standard Specification for Ready-Mix Concrete
- American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318)
- ASTM C1524 Standard Test Method for Water-Extractable Chloride in Aggregate (Soxhlet Method)

### 4. USES

The lightweight synthetic particles designated as Syntheon Inc. Elemix® Type XE and Grey XE concrete additive is used as a partial replacement for conventional code-complying fine and coarse aggregate to reduce structural plain concrete or reinforced concrete unit weight. The concrete with the maximum permitted replacement amount as noted in this report is considered to be noncombustible. This report recognizes use of the Elemix® Type XE and Grey XE concrete additive in concrete in fire resistance rated construction.

### 5. PRODUCT DESCRIPTION

Elemix® Type XE and Grey XE concrete additive consists of expanded polystyrene beads with a closed cell inner structure containing air having a maximum bead diameter of 0.25 inches (6.4 mm), bulk density of 1.40 lb/ft<sup>3</sup> (22.45 kg/m<sup>3</sup>) to 1.50 lb/ft<sup>3</sup> (24.06 kg/m<sup>3</sup>), maximum 5.5 percent water absorption by weight and specific gravity 0.0042. The product is available in white (Elemix® Type XE) or grey (Elemix® Type Grey XE). The finished product may be packaged in a bulk truck, flexible intermediated bulk containers (FIBC) or poly bags. The poly bags may be packaged in fiber drums or corrugated boxes for shipping protection. The product does not require special handling or storage considerations. Elemix® has an unlimited shelf life when stored in accordance with the manufacturer's recommendations.

### 6. INSTALLATION

#### 6.1 General:

Concrete mixtures must be designed with Elemix® Type XE or Grey XE concrete additive as a replacement for fine or coarse aggregate. The maximum allowable replacement amount is 17.9 percent by volume of the concrete mix design, which is equivalent to a maximum dosage of 12.7 lb/yd<sup>3</sup> (7.5 kg/m<sup>3</sup>).

#### 6.2 Installation:

Elemix® Type XE or Grey XE concrete additive must be added in accordance with the manufacturer's published instructions during the concrete batching process in order to be distributed uniformly into the concrete mix.

### 6.3 Fire-Resistance Rated Construction:

Elemix® Type XE and Grey XE concrete additive have only been evaluated for fire resistance when used as a component of UL Fire Resistive Rated Designs. Refer to the UL's On-Line Directory to UL Fire Resistance Certification Information for File R25733 for applicable design coverage and details for the fire resistance rated assemblies covered by this report. Fire resistance ratings apply only to assemblies in their entirety. Fire resistance ratings are only applicable when the assemblies are constructed in accordance with the published designs.

Product Designation	Applicable UL Fire Resistive Rated Designs
Elemix® Type XE and Grey XE concrete additive	D974, D976, D977 ( <a href="#">Link</a> )

### 7. CONDITIONS OF USE

The Syntheon Inc. Elemix® Type XE and Grey XE concrete additive described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 2 of this report, subject to the following conditions:

- 7.1 Elemix® Type XE and Grey XE concrete additive must be added to the concrete mixtures in accordance with the manufacturer's instructions and this report.
- 7.2 Use of Elemix® Type XE and Grey XE concrete additive in structural concrete must be approved by the project engineer or architect. Trial mixtures may be required to show strength and durability. Concrete quality must comply with Section 1905 of IBC.
- 7.3 In addition to the items noted in Section 16.1 of ASTM C94, the delivery ticket from a ready-mix plant shall include the type and amount of Elemix® Type XE or Grey XE concrete additive added to the concrete mixture.
- 7.4 Plain or reinforced concrete systems must be designed in accordance with the provisions of Chapter 16 and 19 of the IBC, and ACI 318. Concrete containing Elemix® Type XE or Grey XE concrete additive is considered as structural lightweight concrete.
- 7.5 For applications where calculated deflections contain long-term deflections due to sustained loads, creep effects shall be considered based on creep test results, which must be submitted to the code official for approval.
- 7.6 The evaluation report holder must disclose to the design professional the amount of water-soluble chloride in Elemix® Type XE or Grey XE concrete additive for every project. Tests shall be conducted in accordance with ASTM C1524.
- 7.7 See UL Online Certifications Directory for Fiber Reinforcement and Concrete Additives (CBXQ) ([Link](#))
- 7.8 The concrete additive products covered under this report are produced by Syntheon Inc. in Leetsdale, Pennsylvania under the UL LLC Classification and Follow-Up Service Program, which includes audits in accordance with quality elements of ICC-ES Acceptance Criteria for Quality Documentation, AC 10.

## 8. SUPPORTING EVIDENCE

- 8.1** Data in accordance with ICC-ES Acceptance Criteria for Structural Concrete with Lightweight Synthetic Particles (AC408), dated February 2009 (Editorially revised October 2010). The following tests were modified to measure the properties of concrete with the lightweight synthetic particles:
- ASTM C136 (Due to the low density of the material, the required weight was reduced to give a sample of equivalent volume. The sample did not require oven drying to reach constant mass)
  - ASTM C29 (The sample container was vibrated for 15 seconds during the filling step. The sample did not require oven drying to reach constant mass)
  - ASTM C128 (Due to the density of the material, the required weight was reduced to give a sample of equivalent volume. The sample was oven dried to constant mass at 160°F instead of 230°F).
  - ASTM C1524 (due to the sample density and buoyancy, the modifications included using a sample mass of 0.5 gram, glass wool to seal the particulate in the thimble, and a glass weight to prevent the sample-filled thimbles from floating).
  - ASTM C567 (4-by- 8-inch cylinders were used instead of 6-by-12-inch cylinders).
- 8.2** UL Classification Reports in accordance with ANSI/UL 263 (ASTM E119). See UL Product Certification category, Fiber Reinforcement and Concrete Additives (CBXQ) ([Link](#)).
- 8.3** Documentation of quality system elements described in AC10.

## 9. IDENTIFICATION

The Syntheon Inc. Type Elemix® XE and Grey XE concrete additive in this evaluation report are identified by a marking bearing the report holder's name (Syntheon Inc.), the plant identification, the UL Classification Mark, the registered product trade name and the evaluation report number UL ER25733-01. The validity of the evaluation report is contingent upon this identification appearing on the product.

## 10. USE OF UL EVALUATION REPORT

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