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EVALUATION REPORT

ER-3404

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Filing Category: FIRE-RESISTIVE CONSTRUCTION—Other Fire-resistive Construction (080)

LITE-CRETE CELLULAR CONCRETE FLOOR-CEILING ASSEMBLIES

LITE-CRETE, INC.
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SUITE 102
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1.0 SUBJECT

Lite-Crete Cellular Concrete Floor-Ceiling Assemblies.

2.0 DESCRIPTION

2.1 General:

Lite-Crete is a cellular concrete produced by the addition of a Lite-Crete air-entraining agent. One part of the agent to 40 parts of water produces a stabilized foam when applied through a nozzle at 90 pounds per square inch of air pressure. When added to a conventional ready-mix concrete, neat cement or sand-grout mix this produces a density of 100 pounds per cubic foot to 135 pounds per cubic foot and strengths from 1,000 psi to 3,000 psi. The density is controlled by timing of air injection and by weighing.

The Lite-Crete assemblies noted in this report are fire-resistive, nonfire-rated and sound-transmission systems. The vertical and lateral design of these systems are not a part of this report and must be justified in conformance with the code.

2.2 Fire-resistive Applications:

2.2.1 One-hour Fire-resistive Wood-floor Ceiling: A minimum $1^1/_2$-inch-thick layer of cellular concrete is applied over a plywood deck covered with either a liquid membrane consisting of hydrocarbon wax resin and mineral spirits which is brushed, rolled or sprayed onto the deck at the rate of one gallon per 300 square feet of deck area or an approved building paper. A 4-inch-wide strip of asphalt-impregnated kraft paper is stapled in place to cover the joints. In lieu of the asphalt-impregnated kraft paper, a United States Gypsum all-purpose caulking compound may be used to seal the joints. The cellular concrete is used as a substitute for 1-inch tongue-and-groove finish flooring or plywood required by footnote 13 of Table 7-C of the code for a one-hour fire-resistive rating in wood-floor construction. Plywood may be unblocked if not required by Table 23-II-H of the code. The density of the concrete shall be a minimum 100 pounds per cubic foot, for this type construction and the mix proportions should include seven sacks of cement for one cubic yard of concrete with 35 percent air entrainment.

2.2.2 One-hour Noncombustible Fire-resistive Floor-Ceiling Construction: This assembly consists of a steel deck spanning between U.S. Steel's No. 18 gage, $7^1/_4$-inch-deep Super C steel joists conforming to ASTM A 446 Grade D or an approved equivalent, spaced 2 feet on center. The steel deck is covered with a 1-inch-thick (above top of flute) 100 pounds per cubic foot density, Lite-Crete cellular concrete fill. The mix proportions are identical to those set forth in Section 2.2.1, above. A $^5/_8$-inch-thick Type X gypsum wallboard ceiling is applied to the bottom of the joists. The steel deck is installed with corrugations perpendicular to the joists and fastened with 12-24 by $^7/_8$-inch hex washer-head TEKS/4 spaced 15 inches on center. The gypsum wallboard is installed perpendicular to the joists and fastened to each joist with 1-inch-long Type S-12 screws spaced 12 inches on center. End joints are staggered and blocked with a $^5/_8$-inch thick, 6-inch-wide strip of Type X gypsum wallboard with $1^1/_2$-inch-long Type G screws spaced 12 inches on center. The strips lap the ceiling wallboard 3 inches.

The steel deck must be minimum No. 28 gage (.016 inch), with $^9/_{16}$-inch-deep corrugations pitched at $2^1/_2$ inches. Maximum span of the joists is 13 feet 9 inches. The bottom flange is braced at midspan with 2-inch-wide No. 18 gage metal straps secured to the joists with $^1/_2$-inch-long Type S-12 pan-head screws. Splices in the straps are lapped one joist. Ceiling openings are permitted only as set forth in Chapter 7 of the *Uniform Building Code*™.

2.2.3 Nonfire-rated Floor System: This system consists of galvanized steel decking with a minimum $1^1/_2$-inch-thick cellular concrete having a density as described in Section 2.2.1.

2.3 Sound Transmission:

The airborne and impact sound-insulation ratings for the floor/ceiling assemblies described herein have a sound-transmission classification (STC) and an impact-insulation classification (IIC) of 50 or better.

2.3.1 Assembly 1: See Figure 1.

a. Floor Covering: High D-back Antron nylon, three-ply 20-ounce carpeting, with 38-ounce backing may be used, provided the total weight is at least 58 ounces per square yard.
b. Lite-Crete Cellular Concrete: One and one-half-inch thickness, and a density of 100 to 125 pounds per cubic foot.
c. Vapor-barrier paper: (optional).
d. Subfloor: Half-inch plywood installed in accordance with the code.
e. Two by ten-inch wood joists.
f. Batt insulation: Three and one-half-inch glass fiber insulation (R-11).
g. Ceiling board: One-half-inch-thick gypsum board nailed directly to joist in accordance with the code.

2.3.2 Assembly 2: See Figure 1.

a. Floor Covering: Cushioned Pacemaker Vinyl 3202 congoleum or equivalent.
b. Lite-Crete Cellular Concrete: One and one-half-inch thickness, and a density of 100 to 125 pounds per cubic foot.

c. Vapor-barrier paper: (optional).
d. Subfloor: Five-eighths-inch plywood installed in accordance with the code.
e. Two-by-ten-inch wood joists.
f. Batt insulation: Three-and-one-half-inch glass fiber insulation (R-11).
g. Ceiling board: One-half-inch gypsum board is attached to resilient channels at 24 inches on center with Type S, $1^1/_4$-inch drywall screws at 12 inches on center.

2.3.3 Assembly 3: See Figure 1.

a. Floor Covering: Nine by nine by one-eighth-inch-thick vinyl floor tile adhered to the cellular concrete in accordance with the manufacturer's instructions.
b. Lite-Crete Cellular Concrete: One and five-eighths-inch thickness and a density of 100 to 125 pounds per cubic foot.
c. Vapor barrier paper: (optional).
d. Subfloor: Five-eighths-inch plywood installed in accordance with the code.
e. Two by ten-inch wood joists.
f. Batt insulation: Three and one-half-inch glass fiber insulation (R-11), with vapor-barrier tabs stapled to the sides of each joist in a manner that the bottom vapor barrier at midspan will just be in contact with the resilient channels below.
g. Ceiling board: USG Type RC-1 resilient channels spaced 24 inches on center perpendicular to the joists and attached thereto with one and $^1/_4$-inch Type S drywall screws at 16 inches on center, and a layer of $^5/_8$-inch-thick Type X gypsum wallboard attached with $1^1/_4$-inch Type S drywall screws at 12 inches on center. All joints are treated with compound and tape.

2.3.4 Assembly 4: See Figure 2.

a. Floor Covering: Nylon 501 carpeting with cotton scrim backing weighing a total of 0.43 psf. The carpeting is 100 percent nylon pile yarn weighing 20 ounces per square yard of carpeting with a $^3/_{16}$-inch to $^5/_{32}$-inch textured pile height. An acceptable alternate is Mohawk 40-ounce hall hair carpeting and padding must be a minimum 0.7 psf.
b. Lite-Crete Cellular Concrete: One and one-half-inch thickness, and a density of 100 to 125 pounds per cubic foot.
c. Vapor-barrier paper: (optional)
d. Subfloor: One-half-inch plywood installed in accordance with the code.
e. Two by ten-inch wood joists.
f. Ceiling board: Five-eighths-inch Type X gypsum board attached to Donn DG-8 resilient furring strips at 24 inches on center running perpendicular to the joists. The gypsum board is placed perpendicular to the furring strips with adjacent end joints staggered 48 inches.

One and one-fourth-inch Type S drywall screws at 12 inches on center attach the board to the furring strips. All joints are treated with compound and tape.

2.3.5 Assembly 5: See Figure 2.

a. Floor Covering: One and one-half-inch felt pad, 40 ounces per square yard minimum. Shag carpet, 34 ounces per square yard minimum. The carpet and pad must also be approved by Lite-Crete, Inc., with the prescribed conditions.
b. Lite-Crete Cellular Concrete: One and one-half-inch thickness, and a density of 100 to 125 pounds per cubic foot.
c. Vapor-barrier paper: (optional).
d. Subfloor: One-half-inch plywood installed in accordance with the code.
e. Two-by-ten-inch wood joists.
f. Ceiling board: One-half-inch gypsum board nailed directly to joists in accordance with the code.

2.4 Identification:

All containers are labeled with the manufacturer's name and the word "Lite-Crete." A card noting the name of the installer and the date of installation is issued to each project owner. Steel deck and gypsum wallboard bear a label containing the product name and manufacturer's name and address.

3.0 EVIDENCE SUBMITTED

Descriptive literature, specifications, reports on fire tests conducted in accordance with UBC Standard 7-1, results of horizontal diaphragm test and reports of sound-transmission tests conducted in accordance with ASTM E 90, E 413, and E 492 have been submitted.

4.0 FINDINGS

That the use of Lite-Crete Cellular Concrete described in this report complies with the 1997 *Uniform Building Code*™, subject to the following conditions:

4.1 The cellular concrete is applied by factory-approved applicators.

4.2 The slab dimensions between screeds are limited to a maximum of 20 by 20 feet.

4.3 Where the slab widths change at alcoves and other similar recesses, the slabs must be reinforced with a 12-inch-wide by 16-inch-long strip of 4-inch by 4 X 4 - W0.5 X W0.5 welded-wire mesh extending each side of the corners at an angle of 45 degrees.

4.4 In lieu of Item 3 above, plates may be inserted through or a weakened plane joint made with a continuous $1^1/_2$-inch by 1-inch-thick light gage steel or plastic angle divider. Dividers are not used in the one-hour fire-resistive wood floor or horizontal diaphragm systems.

4.5 The slab is scored at doorways serving rooms larger than 200 square feet.

4.6 Edge blocking of plywood subfloor is not required where $1^1/_2$ inches of cellular concrete is placed over the subfloor. Blocking is required only for blocked diaphragm shear values as set forth in the *Uniform Building Code* and Table 23-II-H.

This report is subject to re-examination in two years.

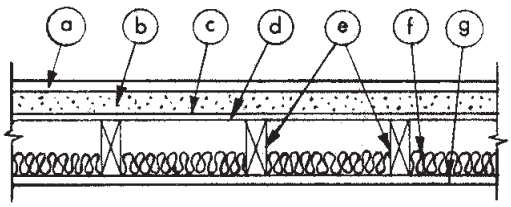

FIGURE 1

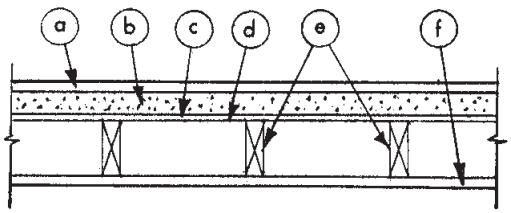

FIGURE 2