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Legacy report on the 1988 Uniform Building Code™

DIVISION: 03—CONCRETE
Section: 03520—Lightweight Concrete Roof Insulation

ELASTIZELL CELLULAR CONCRETE

ELASTIZELL CORPORATION OF AMERICA
POST OFFICE BOX 1462
ANN ARBOR, MICHIGAN 48106

1.0 SUBJECT

Elastizell Cellular Concrete.

2.0 DESCRIPTION

2.1 General:

Elastizell liquid foaming agent is diluted in water and mixed with air under pressure in a foam generator to produce a stable foam. For roof decks, Type II Elastizell concrete consists of this preformed foam added to a cement slurry in a specialized mixer. Concrete consisting of the preformed foam added to a cement/sand grout in a ready-mix truck for floor fills is designated Type F Elastizell concrete. The cast density is checked by weighing the material at the point of placement in a tarred container of a known volume. When the concrete is used on the exterior and is not protected from the weather, up to 10 percent aeration of the concrete is permitted, and shall have a minimum 28-day compressive strength of 2,000 psi.

2.2 Elastizell Floor Fill Applications:

2.2.1 General: Elastizell concrete is applied on wood frame construction at a minimum thickness of 1 1/2 inches. A subfloor bond breaker is optional. If used, common-bond breakers may be an asphalt-impregnated kraft paper stapled to the wood subfloor, a liquid-applied membrane consisting of a latex bonder with 48 percent solids diluted with water, or Thompson's C & B. These may be brushed, rolled, or sprayed onto the deck at a rate of one gallon per 400 square feet. For liquid bond breakers, the subfloor joints are sealed with a 4-inch-wide strip of building paper stapled into place or with a United States Gypsum or equal all-purpose caulking compound.

2.2.2 One-hour Fire-resistive Wood Floor-ceiling Construction: The Type F Elastizell concrete is a substitute for 1-inch tongue-and-groove finish flooring or plywood required by Table No. 43-C of the code for a one-hour fire-resistive wood floor assembly. The density is 100 pcf for this type of construction and typical mix proportions for one cubic yard of concrete are as follows: cement—600 pounds,

sand—1,900 pounds, water—41 gallons, and 7.33 cubic feet of foam. In lieu of 1,900 pounds of sand, 1,600 pounds of sand and 300 pounds of 3/8-inch stone may be substituted.

2.2.3 Sound Transmission: The sound transmission and impact insulation class for the floor systems indicated in Figures 1 and 2 are 50 minimum. A 1/8- to 1/4-inch bead of resilient caulking is required at the juncture of the concrete slab and perimeter walls. In addition to details noted in Figures 1 and 2, items indicated in Sections 2.2.3.1 or 2.2.3.2 below must be installed to have a minimum impact insulation (Class IIC) rating of 50.

2.2.3.1 Figure 1: Impact Insulation Class (IIC).

- 1. When covered with Gro-Point Bigelow carpet, 44-ounce-per-square-yard carpet, and 50-ounce-per-square-yard pad or equivalent carpet and pad.
2. When covered with Sikes Tough-One Carpet Type 203-05 Foam Back or equivalent.

2.2.3.2 Figure 1: In lieu of a 1/2-inch gypsum wallboard ceiling, USG Type RC-1 or equivalent resilient channels spaced at 24 inches on center attached to each joist with 1 1/4-inch-long drywall screws and a layer of Type 5/8-inch-thick gypsum wallboard attached to the channels with 1-inch-long drywall screws spaced 12 inches on center is permitted. All joints are treated with compound and tape. Impact Insulation Class (IIC), include either (1) or (2).

- 1. When covered with Armstrong Cork Company Quiet Zone II Vinyl Corlon.
2. When covered with Armstrong Cork Company Tredway Corlon.

2.2.3.3 Figure 2: Impact Insulation Class (IIC), include either (1) or (2) below:

- 1. When covered with carpet pad as described in Figure 1, Part (1) above.
2. When covered with carpet as described for Figure 1, Part (2) above.

2.3 Elastizell Roof Deck Applications:

2.3.1 Structural: For horizontal diaphragm values with Elastizell Type II concrete as infill with steel decks, see Evaluation Report ER-3081.

2.3.2 Fire-resistive Roof Construction:

2.3.2.1 Unrestrained: Two-hour fire-resistive roof deck construction consists of minimum No. 24 gage fluted or corrugated galvanized steel decking welded to the support

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framing and covered with Type II Elastizell concrete leveled to a minimum  $\frac{3}{4}$  inch thickness over the flutes or corrugations. Nominal 24-inch by 48-inch polystyrene foam plastic insulation board having a maximum thickness of 8 inches is firmly seated and leveled on the Elastizell concrete surface. Depth of concrete beneath the insulation may be reduced to  $\frac{1}{8}$  inch when the insulation board has a minimum thickness of 2 inches. A minimum 2 inch thickness of Type II Elastizell concrete is cast over the insulation board. As an alternate, the foam plastic insulation board may be omitted, provided the steel deck is covered with a minimum thickness of  $2\frac{3}{4}$  inches of Type II Elastizell concrete measured to the top of the steel form unit corrugations.

The concrete must be covered with a minimum Class C roof covering.

Maximum noncomposite deck span is 7 feet, 6 inches. In no case can the span exceed that required to support the vertical live and dead loads. Corrugated steel decks must have a minimum depth of  $1\frac{5}{16}$  inches and 24 to 36 inch width. Fluted steel decks must have a minimum depth of  $1\frac{1}{2}$  inches and width of 26, 28 or 30 to 36 inches.

Steel deck sidelaps must be welded, button punched or otherwise attached with No. 12 self-drilling, self-tapping steel screws located midway between deck supports but spaced not more than 36 inches on center. Corrugated units must overlap one corrugation and be welded to supports through welding washers 15 inches on center, maximum. Fluted steel decks must be welded to supports at 12 inches on center maximum. End joints of fluted decks must be covered with 2-inch-wide cloth adhesive tape or equivalent.

The polystyrene foam plastic insulation board has a maximum density of 2.5 pounds per cubic foot with each board having six nominal 3-inch-diameter holes oriented in two rows of three holes each with the holes spaced 12 inches on center transversely and 16 inches on center longitudinally. See Figure 3. Foam plastic insulation board must be recognized under a current evaluation report.

The Type II Elastizell concrete has a cast density of 39 pcf plus or minus 3 pcf and a 28-day minimum compressive strength of 190 psi as determined by ASTM C 495. Concrete must be reinforced with wire mesh centered within the top 2-inch depth with the long dimension parallel to the steel corrugations and edges lapped 3 to 6 inches. The mesh consists of No. 19 SWG galvanized steel twisted to form 2-inch hexagons with straight No. 16 SWG galvanized steel wire woven into the mesh and spaced 3 inches apart for stiffness.

The steel deck must be supported by beams or open web steel joists having two-hour fire-resistive protection in accordance with Evaluation Report ER-1244.

**2.3.2.2 Restrained:** The restrained fire-resistive assembly is identical to the unrestrained assembly as described in Section 2.3.2.1, except details concerning the steel decks as noted in Table 1.

#### 2.4 1990 Accumulative Supplement to the UBC:

This report is unaffected by the Supplement.

#### 2.5 Identification:

Each installation must have a job card presented to the building official informing him of the installation date and the name of the Elastizell Cellular Concrete is to be applied only by applicators approved by Elastizell Corporation of America. The insulation board bears the name of the product and Underwriters Laboratories Inc., NER-QA403 the quality control agency.

#### 3.0 EVIDENCE SUBMITTED

Brochure containing installation procedure, material specifications, fire and sound test reports and Elastizell application instructions.

#### 4.0 FINDINGS

**That the use of the Elastizell Cellular Concrete as described in this report complies with the 1998 *Uniform Building Code*<sup>™</sup>, subject to the following conditions:**

- 4.1 **The cellular concrete is applied only by applicators approved by Elastizell Corporation of America.**
- 4.2 **The maximum size of slab between control joints is 20 by 20 by 20 feet.**
- 4.3 **The density of the material is not less than 100 pounds per cubic foot for the one-hour wood floor-framing assembly. Density is determined in accordance with this report.**
- 4.4 **Where the slab widths change at alcoves and other similar recesses, it is reinforced with a 12-inch-wide-by-16-inch-long strip of 4-inch-by-4-inch 14/14 gage welded wire mesh, extending each side of the corners at an angle of 45 degrees.**
- 4.5 **In lieu of Item No. 4 above, plates may be inserted through or a weakened plane joint made with a continuous  $1\frac{1}{2}$  inch by 1-inch light gage steel angle divider.**
- 4.6 **The slab is scored at doorways serving rooms larger than 200 square feet.**
- 4.7 **Edge blocking of plywood subfloor is not required where  $1\frac{1}{2}$  inches of Elastizell concrete is placed over the subfloor. Blocking is required only for blocked diaphragm shear values as set forth in Table No. 25-1 of the *Uniform Building Code*<sup>™</sup>.**
- 4.8 **When materials are incorporated into an otherwise fire-resistive assembly which may change the capacity for heat dissipation, fire test results or other substantiating data shall be made available to the building official to show that the required fire-resistive time period is not reduced.**

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

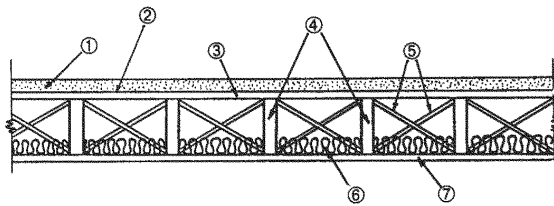
TABLE 1—MAXIMUM SPANS AND HOURLY RATINGS FOR RESTRAINED FIRE-RESISTIVE ASSEMBLIES<sup>1</sup>

DECK TYPE	MINIMUM DECK THICKNESS (Gage)	MINIMUM DECK DEPTH (inches)	MAXIMUM DECK SPAN <sup>2</sup> (feet)	MAXIMUM HOURLY RATING (Hours)
Fluted	22	1 1/2, 2 or 3	8	2
	28	9/16	4 <sup>3</sup>	1
Corrugated	26	15/16	6	2
		9/16	8 <sup>3</sup>	1
	24	15/16	8	2

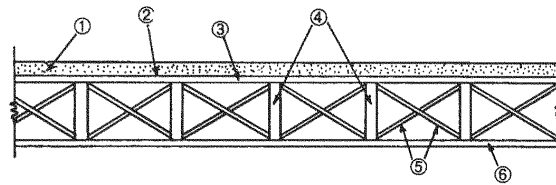
<sup>1</sup>See Section 2.3.2.1 for support attachment, side-joint attachment and end-joint treatment.

<sup>2</sup>Span must not exceed that allowed for the steel deck to support the vertical dead and live loads without noncomposite construction.

<sup>3</sup>A maximum of 75 percent of the allowable steel bending stress may be used to determine allowable spans in supporting the design load.



1. Elastizell Controlled Density Concrete—1 1/2-inch nominal thickness; density 100 to 105 pounds per cubic foot.
2. Vapor barrier paper (optional).
3. Subfloor—5/8-inch plywood installed in accordance with the code.
4. Wood Joists—2 by 10.
5. Bridging—1 by 3's nailed diagonally between joists at midspan (optional).
6. Batt insulation—3 1/2-inch R-11 fibreglas insulation.
7. Ceiling board—1/2-inch gypsum board nailed direct to joists in accordance with the code.



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\*Gypsum board with proper core and thickness must be used where fire-resistive construction is required.

FIGURE 1

FIGURE 2

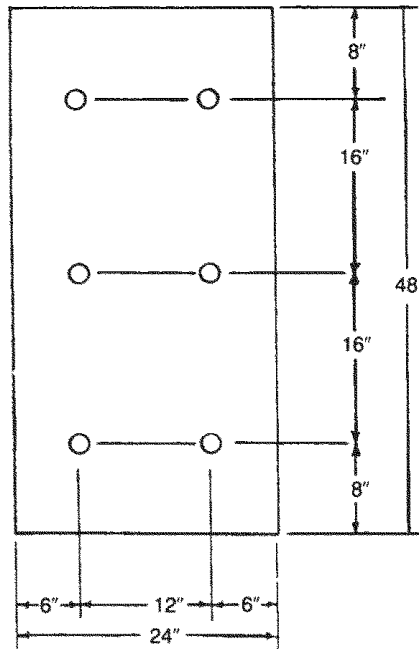


FIGURE 3—POLYSTYRENE BOARD