

# Celcore Roof Insulation

SHORTFORM

## SCOPE

The approved Celcore Applicator shall furnish all labor, materials, equipment and supervision for the installation of the complete insulating roof deck system (including corrugated metal deck when applicable) as noted on drawings, and as detailed in the specifications.

## GENERAL

Surfaces on which Celcore is to be placed shall be clean of foreign objects, and free of standing water. It is the responsibility of the Celcore Applicator to inspect and approve the substrate prior to the placement of the Celcore deck system. All expansion joints, bulkheads, wood nailers, angles and the framing of openings or perimeters shall be provided by others.

## MATERIALS

### Insulating Concrete

1.) Foaming agent - Celcore Foam Concentrate shall be manufactured and strictly controlled by Celcore Inc.. The concentrate shall have clear identification on each container, and shall bear the UL and FM marking.

2.) Cement - Portland Cement shall be Type I, II, III ASTM - C150 unless otherwise approved.

3.) Water for mixing and curing shall be clean, fresh, and free from injurious quantities of acid, alkali, salt, oil, organic matter or other impurities. Installation during cold weather may require the use of heated water.

4.) Admixtures - No admixtures shall be used without the approval of Celcore, Inc., the Architect, and/or the Engineer. Approved admixtures shall be used in strict accordance with the manufacturer's recommendations.

### Corrugated Metal Deck

The galvanized high strength corrugated steel deck shall be of type and quality that is recommended by its manufacturer for use as a supporting deck for insulating concrete. The steel deck shall have a minimum thickness of 26 gauge, and shall meet ASTM-A525 G-60 minimum galvanizing treatment, and be of type and gauge to properly carry the live and dead loads. Attachment of the deck to the supporting members shall be by welding or by screw fastening, done in

accordance to the recommendations of the manufacturer, the Building Code requirements, the Architect and/ or the Engineer. Slotted or perforated deck, if used, shall not exceed .50% opening.

### Insulation Board

The insulation board used in the Celcore roof deck system shall be a product of expanded polystyrene having a nominal weight of one pound per cubic foot. The Board shall be fabricated in 2 ft. by 4 ft. size in specified thickness with 6 or 8 - 2 1/2 inch (+/- 1/2") diameter holes to provide a positive keying action. All insulation board shall be manufactured in accordance with ASTM C578.

### Reinforcing Mesh

When required, mesh reinforcements shall be equal to keydeck Type 21602-1619.

## APPLICATION

### Physical Properties

The mix proportions shall be designed by Celcore, Inc. to yield the proper physical properties, i.e compressive strength, density and thermal conductivity.

### Mixing & Placing

1.) Celcore insulating concrete shall be mixed and pumped into place by an approved Celcore batch plant. All ingredients of the mix shall be thoroughly blended before being discharged from the mixer.

2.) A minimum wet density of 36 pcf.

3.) The consistency of the mix shall be such as to provide a flowable mixture that can be screeded to a smooth finish.

4.) Celcore insulating concrete shall have a minimum thickness of 2" over the top of the corrugations, substrate or insulation board.

5.) When the air temperature is predicted to be above 40°F for the first 24 hours after the placement of the Celcore insulating deck, normal placing procedures shall apply.

6.) Cold weather placement (40°F and falling) of Celcore should be avoided due to the possibility of freezing of the concrete prior to final set. If cold weather installations are required, then special considerations must be met. Contact your Celcore representative.

### Insulation Board Placement

1.) Prior to placement of the insulation board, the substrate shall be filled with Celcore Insulating Concrete to a minimum thickness of 1/8". On a corrugated metal deck this fill shall be 1/8" minimum above the tops of the corrugations.

2.) The insulation board shall be placed into the plastic slurry coat immediately upon the placement of the slurry coat on the substrate.

3.) The insulation board shall be placed in the slurry in such a manner as to cause full contact of the slurry with the board, and to cause the slurry to enter the keying holes in the board. The board shall be placed in a brick-like pattern of staggered joints. All joints shall be butted tightly together.

4.) Polystyrene boards, particularly in thicknesses of 2" or more, have a tendency to float if the top surface is applied prior to the adequate bonding of the polystyrene board to the substrate. It is the responsibility of the Celcore applicator to install the board in a manner that assures the proper thickness of the Celcore concrete.

### Curing

Apply a Celcore (PVA) Curing Compound film over deck surface as early as is practical once the deck has developed strength sufficient to support foot traffic. Curing is most effective when applied within 24 hours after topping placement. This (PVA) film shall be an integral part of the deck system. Prevent excess roof traffic for 24 hours.

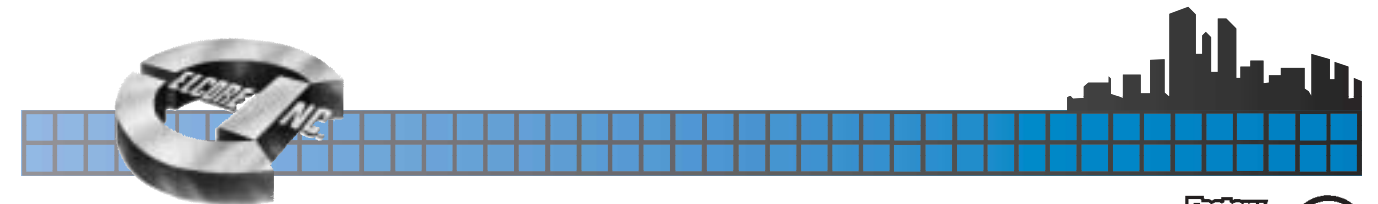
### Testing

Celcore Insulating Concrete shall be tested in accordance with ASTM C-495, as modified below:

1.) Test specimens may be cylinders 6" in diameter and 12" in length or test cubes not smaller than 2" x 2", or larger than 6" x 6".

2.) In molding the specimens, the concrete shall be placed in two approximately equal layers. The cylinders or cubes shall be raised and dropped approximately (1) in. three times on a hard surface after placing each layer. The concrete shall not be rodded.

3.) Specimens shall not be removed from the molds for at least 7 days.



# Celcore Roof Insulation Systems

## CELCORE INCORPORATED

3148 US Hwy 70 West  
Black Mountain, N.C. 28711  
Phone: (828) 669-4875  
Fax: (828) 669-4874  
Web Site: www.celcoreinc.com

## THE PRODUCT

Basic Use: Celcore, Celcore MF Foam Concentrates are mixed with water and generated into preformed foam for addition to a cement/water slurry mixture to create a **closed cell** cellular concrete of a specific density. Typical air-dry densities are in the range of 28 — 40 pcf. Oven dry densities are in the range of 24 - 38 pcf.

Celcore Cellular Insulating Concretes are a **key** component of a Celcore Cellular Insulating Roof Deck System. Celcore systems may be used in conjunction with expanded polystyrene board to produce a thermally efficient, fire rated, Underwriter s Laboratories Approved, Factory Mutual Approved, South Florida, and ICBO Approved insulation assemblies.

Celcore Cellular Concretes can be poured over non-vented substrates including some existing roof membranes in reroofing applications, galvanized steel deck form non-vented or vented 0.50%, opening precast concrete, or poured-in-place structural concrete. Celcore s monolithic insulating concrete roof deck fills placed over metal deck form can be designed into structures as shear diaphragms. These composite systems provide good resistance to shear forces, which may result from wind or seismic activity. Shear diaphragms provide bracing to the structures they cover acting to transfer and distribute an active load force throughout the structure.

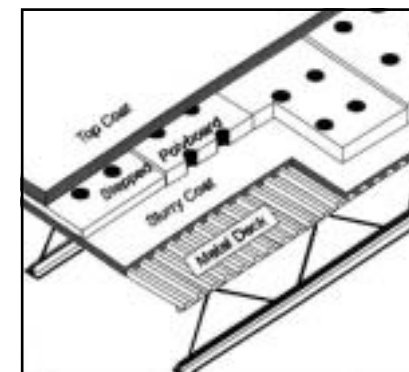
Celcore and Celcore MF Foam Concentrate are non-corrosive, non-hazardous, and readily biodegradable. It is packaged in (5) gallon pails and displays the UL, FMRC, ICBO, and Metro Dade mark on the product label. Celcore Roof Insulation is a superb product to use in meeting the World s environmental concerns.

**CELCORE S TECHNICAL INFORMATION** is available through print and electronic media. You have two options for obtaining the following information electronically. Celcore s Website: www.celcoreinc.com. The information that is available is as follows:

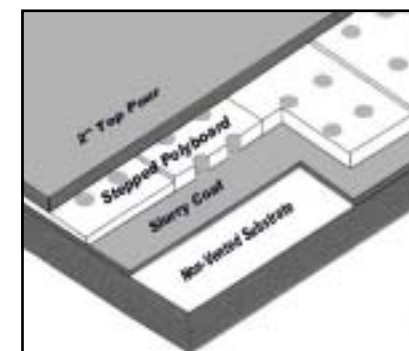
- (1) CSI formatted specification for Celcore s Roof Insulation
- (2) Roof over existing roof specifications
- (3) Factory Mutual Product Approval Listings
- (4) Celcore Product Data Sheets
- (5) Geo Technical specifications
- (6) Thin Patch patching material specifications
- (7) Celcore PVA curing compound specifications
- (8) Diaphragm design information and tables
- (9) EPS Polystyrene board configuration & installation
- (10) Rain Water Intrusion Removal
- (11) Celcore Quality Control Guidelines
- (12) South Florida Product Approval Listings
- (13) ICBO Evaluation Reports Approval Listings
- (14) Material Safety Data Sheets

## ATTACHMENT CAPABILITY

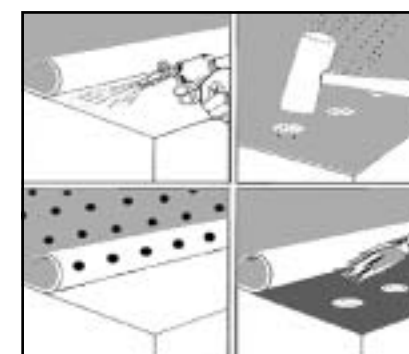
Celcore roof insulations will accommodate most attachment methods for all roof membrane systems. This includes, but is not limited to nailing directly to the Celcore insulation with base ply fasteners, perforated base sheet spot attachment with hot asphalt, ballasted single ply and fully adhered for single ply, adhesives include water base, contact and urethane adhesives.



Celcore, Celcore MF Roof Insulation Systems in combination with expanded polystyrene board over non-vented metal form deck



Celcore Systems over non-vented substrate



Roof Systems Attachment Capability

Project Name:

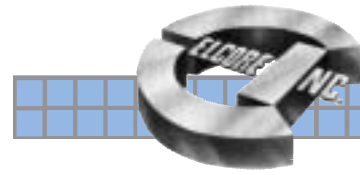
Project NO:

CELCORE INCORPORATED, 3148 US Hwy 70 West, Black Mountain, NC 28711 (828) 669-4875 . Fax (828) 669-4874

Web Site: www.celcoreinc.com

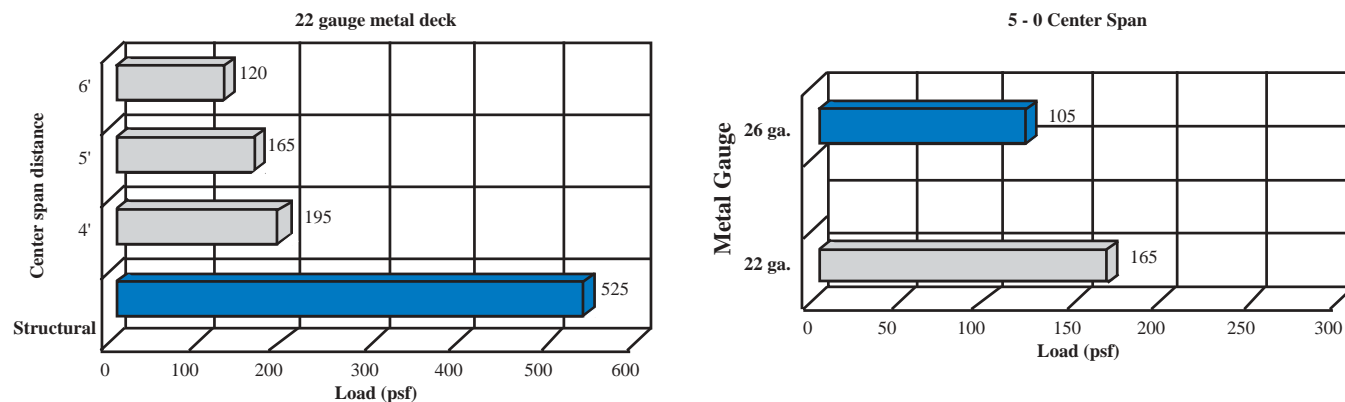
[celcoreinc.com](http://www.celcoreinc.com)

828-669-4875



# Celcore Roof Insulation Wind Uplift Resistance

The uplift resistance of Celcore cellular concrete applied to corrugated metal deck depends upon the gauge of the metal, deck profile, side lap fastening, attachment to structural supports and the support span of the structure to which it is attached. The values, indicated in the graphs, represent the point at which the interface between the Celcore cellular concrete and various deck interfaces may fail. This represents an upper limit to the performance of a roof deck system. The first figure shows that for a given gauge metal deck, the wind uplift resistance increases almost linearly with decreasing separation between structural supports. These data are compared to Celcore insulating concrete on a structural concrete deck. The second graph shows a 5-0 support span, the uplift resistance for a deck system placed on 22 gauge and a 26 gauge corrugated metal.



Note: The graphed values are for Celcore cellular insulating concrete only and are based on FM Testing. The decking shall be filled with cellular concrete to the top of the corrugations plus a minimum thickness of 1/8 in. above. A minimum 1-inch thick EPS insulation boards are immediately placed in the plastic concrete. The assembly is then allowed to set overnight. On the following day a topping pour, at a minimum thickness of 2 inches, is placed over the bonded EPS layer. The deck assembly shall then be allowed to cure for several days prior to receiving final roof cover.

## UL FIRE RESISTANCE DESIGNS

### Metal Deck Designs:

P213, P214, P215, P216, P231, P241, P246, P251, P264, P405, P406, P407, P410, P509, P511, P513, P902, P903, P907, P908, P919, P920, P921, P922, P923

### Concrete Deck Designs:

P708, P8 10, P812, P905, P910, P913, P916

## FACTORY MUTUAL APPROVALS

Noncombustible & 1-60 (minimum) Windstorm Rated. Approved under FMRC Revised Approval Standard 4454 for wind up-lift ratings, using the 12-0 x 24-0 test basis

- 26 Gauge minimum metal deck constructions
- One through twelve inch thick EPS board rated
- Ratings over metal deck and structural concrete, with mechanically fastened base sheet FM 1-60, FM 1-90, FM 1-120, FM 1-150
- Ratings over metal deck and structural concrete, with a fully adhered single ply membranes for FM 1-60, FM 1-90, FM 1-120, FM 1-150, FM 1-180, FM 1-525
- Types of approved roof covers: Asphaltic BUR, Modified Bitumen and Single Ply
- Recover application Approvals for placement over asphaltic vapor retarder over structural concrete decks for ratings to FM 1-525

**METROPOLITAN DADE COUNTY, FLORIDA PRODUCT CONTROL**  
NOTICE OF ACCEPTANCE Product Control No: 03-0923.03.

**ICBO EVALUATION SERVICE INC.** Evaluation Report No. ER-4839

## CELCORE DIAPHRAGM DESIGN

Shear diaphragms are essentially flat assemblies of structural elements, such as those in roofs or floors, which are able to resist shear forces developed in their own plane. Shear forces may arise from wind or seismic activity and the diaphragm assemblies then must serve as bracing to maintain the shape of the areas they cover. The diaphragm design depends on two major properties, strength and stiffness. These are used to determine what portion of the acting forces can be transferred off the system to other parts of the Structure.

**CELCORE, Inc.**, has developed a roof system that uses a lightweight insulating concrete placed over typical corrugated and galvanized steel deck. As the concrete cures, it develops strength and adheres to the steel deck creating the additional shear paths. The **CELCORE** system has been load tested in the Major Units Laboratory at West Virginia University using full-scale roof assemblies. Test results are given in the West Virginia University Report, Diaphragm Tests – The Celcore Roofing System, July 30, 1988, by L. D. Luttrell. This report and load tables may be obtained by contacting a Celcore approved applicator or by using **CELCORE S** Website [www.celcoreinc.com](http://www.celcoreinc.com)

# Celcore Roof Insulation



## CELCORE CELLULAR CONCRETE TECHNICAL DATA

Cast (wet) Density	-	33 to 49 pounds per cubic foot (Pcf)
Air Dry Density	-	27 to 39 Pcf
Compressive Strength	-	175 pounds per square inch (Psf)
Drying Shrinkage	-	0.20 to 0.40
Thermal Expansion	-	5.0 to 7.0 x 10 <sup>-6</sup> / °F
Thermal Resistance	-	"R" 1.00 to 2.22 per in. thick (avg. 18°F - 190°F)

## TYPICAL CELCORE MIX DESIGNS

Cast Density	36 pcf	38 pcf	40 pcf	42 pcf	45 pcf
Type I Cement	663 lbs.	703 lbs.	742 lbs.	782 lbs.	850 lbs.
Mix Water	29 gals.	31 gals.	32 gals.	34 gals.	37 gals.
Celcore Foam	19.80 cu. ft.	19.32 cu. ft.	18.94 cu. ft.	18.51 cu. ft.	17.75 cu. ft.
Concrete Yield	1 cu. yard	1 cu. yard	1 cu. yard	1 cu. yard	1 cu. yard
Theoretical Psi	175 psi	225 psi	250 psi	300 psi	350 (+) psi

## "U" FACTOR TABLES FOR CELCORE INSULATING FILL OVER CORRUGATED METAL DECKS & STRUCTURAL CONCRETE SUBSTRATES

Thickness of CELCORE concrete over top of deck corrugations, structural concrete or EPS Insulation	Thickness of EPS in inches R/In.=3.85 Nominal density @ 1 pcf	26 Gauge metal deck 15/16" Corrugation depth		24 Gauge metal deck 1 1/2" Corrugation depth		22 Gauge metal deck 1 1/2" Corrugation depth		Structural Concrete Substrate Thickness 5 1/2" Density 142 pcf					
		Weight of the Deck Composite in lbs./sq. ft.	"U" FACTOR No ceiling HEAT FLOW		Weight of the Deck Composite in lbs./sq. ft.	"U" FACTOR No ceiling HEAT FLOW		Weight of the Deck Composite in lbs./sq. ft.	"U" FACTOR No ceiling HEAT FLOW				
			UP	DOWN		UP	DOWN		UP	DOWN			
2"	0	6.08	.139	.132	6.91	.128	.123	7.20	.128	.123	4.00	.140	.113
	1	6.68	.090	.087	7.49	.086	.083	7.78	.086	.083	5.08	.091	.088
	1 1/2	6.73	.077	.075	7.54	.074	.072	7.83	.074	.072	5.13	.078	.075
	2	6.77	.067	.065	7.58	.065	.063	7.87	.065	.063	5.17	.067	.066
	2 1/2	6.81	.059	.058	7.62	.057	.056	7.91	.057	.056	5.21	.060	.058
	3	6.85	.053	.052	7.66	.052	.051	7.95	.052	.051	5.25	.054	.051
2 1/2"	3 1/2	6.89	.048	.047	7.70	.047	.046	7.99	.047	.046	5.29	.049	.048
	4	6.93	.044	.043	7.74	.043	.042	8.03	.043	.042	5.33	.044	.044
	0	7.08	.123	.117	7.91	.114	.110	8.20	.114	.110	5.00	.124	.118
	1	7.68	.083	.080	8.49	.079	.077	8.78	.079	.077	6.08	.084	.081
	1 1/2	7.73	.072	.070	8.54	.069	.067	8.83	.069	.067	6.13	.072	.069
	2	7.77	.060	.061	8.58	.061	.059	8.87	.061	.059	6.17	.063	.062
3"	2 1/2	7.81	.056	.055	8.62	.054	.053	8.91	.054	.053	6.21	.057	.055
	3	7.85	.051	.050	8.66	.049	.049	8.95	.049	.049	6.25	.051	.049
	3 1/2	7.89	.046	.045	8.70	.045	.044	8.99	.045	.044	6.29	.047	.046
	4	7.93	.042	.042	8.74	.041	.041	9.03	.041	.041	6.33	.042	.042
	0	8.08	.106	.102	8.91	.100	.096	9.20	.100	.096	6.00	.107	.103
	1	8.68	.075	.073	9.49	.072	.070	9.78	.072	.070	7.08	.076	.074
3"	1 1/2	8.73	.066	.064	9.54	.063	.062	9.83	.063	.062	7.13	.066	.063
	2	8.77	.058	.057	9.58	.057	.055	9.87	.057	.055	7.17	.059	.057
	2 1/2	8.81	.052	.051	9.62	.051	.050	9.91	.051	.050	7.21	.053	.052
	3	8.85	.048	.047	9.66	.046	.046	9.95	.046	.046	7.25	.048	.047
	3 1/2	8.89	.044	.043	9.70	.043	.042	9.99	.043	.042	7.29	.044	.043
	4	8.93	.040	.040	9.74	.039	.039	10.03	.039	.039	7.33	.040	.040

All of the above values on this page are based on materials at minimum dry density and allow for winter and summer conditions. All values shown are intended only as guidelines, thermal value performance for all materials and/or systems is affected by building environment, installation, various densities and design procedures that may cause variations from estimated calculated values.