

Perlite Insulating Concrete Roofdecks

Perlite insulating concrete roofdecks offer architects, contractors and building owners several important benefits which include:

- Excellent Insulating Values
- Excellent Fire Ratings
- Lightweight
- Slope to Drain
- Monolithic Roofing Base

Insulating Values

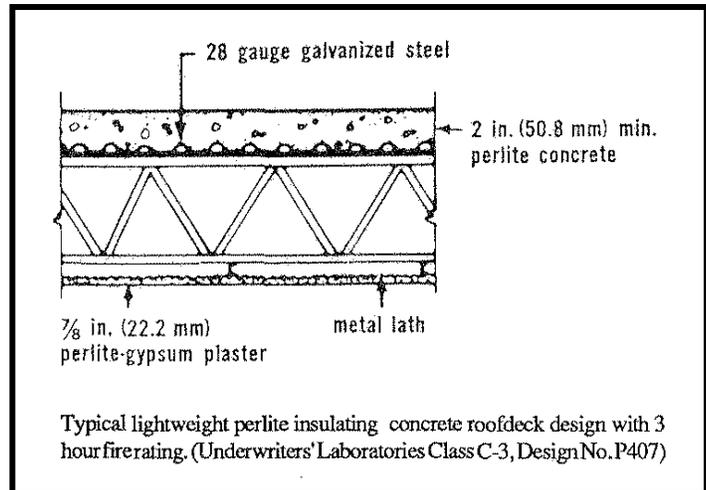
Insulating values of a perlite concrete roofdeck depends on the density of the concrete mix that is prepared. Typical U values range from 0.21 Btu/h•ft²•°F (1.19 W/m²•K) for a 2 inch (50.8 mm) 27 lb/ft³ (432 kg/m³) to 0.12 Btu/h•ft²•°F (0.6 W/m²•K) for a 4 inch (101.6 mm) thick roofdeck. The table below provides a range of typical insulating values.

"U" VALUES - PERLITE CONCRETE ROOF SLABS							
Slab Thickness		27 lbs/ft ³	432 kg/m ³	36 lbs/ft ³	576 kg/m ³	30.5 lbs/ft ³	488 kg/m ³
in	mm						
2	50.8	0.21	1.19	0.25	1.43	0.22	1.25
3	76.2	0.15	0.86	0.19	1.09	0.16	0.92
4	101.6	0.12	0.6	0.15	0.86	0.13	0.74

"U" values calculated for heat flow down with "C" values for outside air as 6.00 Btu/h•ft²•°F (34.08 W/m²•K); built-up roofing, 3.00 Btu/h•ft²•°F (17.04 W/m²•K); inside air, 1.08 Btu/h•ft²•°F (6.13 W/m²•K). Form is not included.

Fire Ratings

There are a number of different perlite concrete roofdeck designs that offer fire ratings of from 1 hour to 3 hours. A typical 3 hour rated roofdeck design consists of 2 inch (50.8 mm) minimum thickness of perlite concrete on 28 gauge galvanized corrugated steel supported by steel joists 4 feet (1.22 m) on-center. Ceilings of 7/8 inch (22.2 mm) perlite gypsum plaster on expanded metal lath that is attached to 3/4 inch (19.1 mm) furring channels wire-tied to the lower chord of the joists. The accompanying sketch details this typical design.



Lightweight

Perlite insulating concrete is light in weight, ranging from about 20-40 lb/ft³ (320-640 kg/m³) depending on the desired density and insulating value. Because of its lightweight, there can be economies in the design of the structure. Typical density is 27 lb/ft³ (432 kg/m³). For mix design information consult Technical Data Sheet 4-3 1980.

Slope to Drain

Standing water on a roofdeck is destructive to roofing membranes. Perlite concrete may be easily sloped to drain to internal drains or to the roof edge. Perlite concrete may be provided by transit mix or it may be mixed on-site and pumped or lifted by crane to the roof level. Once placed, it is simply screeded to the desired thickness and slope.

Excellent Roofing and Reroofing Base

Perlite concrete roofdecks offer several important benefits in roofing. As perlite concrete roofdecks are seamless, they provide a monolithic base for roofing that is smooth and even. In addition, roofing membranes may be adhered directly to the perlite concrete roofdeck or base sheets for built-up roofing may be nailed directly to the perlite concrete using one of several different design fasteners. Roofing can be applied as soon as the perlite insulating concrete can carry construction traffic and is sufficiently dry to develop adhesion with hot asphalt or pitch. Under normal conditions, this is about three days. Time will vary depending on weather.

When reroofing, the existing roof insulation should be inspected for soundness and moisture content. Particular attention should be paid to the support structure to determine if it is capable of safely supporting new roof loads. All loose gravel and dirt should be swept off the existing roof. For optimum roofing performance, it is recommended that drainage be provided by sloping the perlite concrete.

TYPICAL CONCRETE WEIGHT COMPARISONS			
Class	Aggregate	Weight	
		lbs/ft ³	kg/m ³
Insulating Lightweight	Perlite	20-40	320-640
	Expanded slag, shale or clay	60-120	960-1920
Heavy	Sand and gravel	140-150	2240-2400

TYPICAL PHYSICAL PROPERTIES OF PERLITE CONCRETE*									
Oven Dry Density		Dry Density Range		Compressive Strength Range		Minimum Compressive Strength		Wet Density When Placed	
lbs/ft ³	kg/m ³	lbs/ft ³	kg/m ³	lbs/in ²	kPa	lbs/in ²	kPa	lbs/ft ³	kg/m ³
36.0	576	34.0-40.0	544-640	350-500	2413-3447	350	2413	50.5±2.0	808.0±32.0
30.5	488	28.0-34.0	448-544	230-340	1585-2344	230	1585	45.5±2.0	728.0±32.0
27.0	432	24.0-28.0	384-448	140-200	965-1378	140	965	40.5±2.0	648.0±32.0
22.0	352	20.0-24.0	320-384	80-125	552-861	80	552	36.5±2.0	584.0±32.0

* Pittsburgh Testing Laboratory and R. W. Hunt Company Engineers



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