

TECHNICAL ADVISORY BULLETIN



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To: GAF Commercial Sales, Commercial Contractors, Field Services

From: Technical Services Department

Subject: Structural Concrete Roof Decks Utilizing Lightweight Aggregate

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Background Information

Types of Concrete Roof Decks

There are three types of concrete used to construct roof decks:

1. Standard structural concrete – with a density ~150 lbs/ft³
2. Lightweight structural concrete – with a density ~85-120 lbs/ft³
3. Lightweight insulating concrete – with a density ~20-40 lbs/ft³

What are the Differences in Structural Concrete?

Standard structural concrete uses normal weight aggregate that is generally dense and will not hold moisture (typically called “hard rock”). Lightweight structural concrete uses lightweight, porous aggregate, such as shale, which can absorb up to 25% water by weight. As listed above, there are also density differences between both types of structural concrete.

How is Structural Concrete Used as Roof Decks?

There are three types of applications where concrete is poured for roof decks:

1. Cast-in-place over removable forms
2. Cast-in-place over a metal form deck that is not removed
3. As a topping material over pre-cast concrete planks or tees

Why is Lightweight Structural Concrete a Concern for the Roofing Industry?

Concrete decks are “poured” in place and consequently contain a high level of water when poured. Typically the roofing industry has required a 28-day curing period prior to testing the roof deck for “dryness” and suitability for roofing. Lightweight structural concrete decks typically have much higher moisture content than traditional hard rock structural concrete.

When installed over non-removable metal form decks (or other impermeable substrates), much of this water will stay in the roof deck and can be pressure driven to condense as liquid water within the roofing system. Even when poured over removable forms, these decks may take a very long time to dry, which can present problems for roofing systems.

Care must also be taken to avoid installing materials that retard the flow of vapor directly below the deck. Foil-faced insulation attached to the underside of a deck, spray-on fireproofing, or paint which obstructs the downward movement of moisture in the concrete are just a few examples of materials that should be avoided.

Problems and issues with lightweight structural concrete that pose significant risks to the roofing system and its installation include:

- Determining when a deck is ready for roofing
- Measuring concrete moisture content
- Loss of adhesion
- Insulation facer delamination
- Loss of R-value
- Microbial growth potential
- Water-based adhesive curing and re-wetting
- Corrosion of roof fasteners and other ferrous-containing roof components

Has the Roofing Industry Addressed These Concerns?

There are several technical advisories that have been issued to raise awareness about the potential for roof failures over lightweight structural concrete roof decks. The National Roofing Contractors Association has issued an Industry Issue Update, the Asphalt Roofing Manufacturers Association has issued a technical statement on Performance Concerns, and SPRI, the Polyisocyanurate Insulation Manufacturers Association and the Roof Consultants Institute have issued a joint Technical Bulletin regarding Moisture Concerns with these decks.

Technical Advisory

What is GAF's Position Regarding Lightweight Structural Concrete Decks?

Roofing professionals must take care with lightweight structural concrete decks.

GAF concurs with ARMA's position: *"The selection of the deck material and its suitability for use is the responsibility of the designer of record, who must make appropriate design accommodations to address high moisture content encountered in lightweight structural concrete decks."*

For GAF's RUBEROID® modified bitumen and GAFGLAS® built-up membranes, GAF does not accept any structural concrete poured over non-vented metal decks or pans that remain in place.

For GAF's EverGuard® TPO and PVC roofing systems, GAF recommends that a vapor retarder be used directly over any poured structural concrete installed over non-removable form decks or any impermeable substrate and requires the use of a vapor retarder for lightweight aggregate poured decks in this configuration.

The following chart summarizes these recommendations and requirements:

System Type	Poured in Place Structural Concrete Non-vented substrate or metal form that remains	
	Lightweight Aggregate	Standard Concrete
MB/BUR	Deck not acceptable	Deck not acceptable
TPO/PVC	Vapor Retarder Required	Vapor Retarder Recommended

GAF is not responsible for moisture related problems associated with any deck material.

A Caution to Roofing Contractors

For new construction, roofing contractors should not accept responsibility for determining when a newly placed concrete substrate is ready for roofing. That decision should be made by the building's structural engineer, general contractor, concrete contractor and/or the roof system designer.

Where these decks are encountered in re-roofing, GAF recommends that roofing contractors consult a design professional for the appropriate roofing system design to address high moisture content.

Where Can I Get More Information?

If you have specific questions regarding these decks, please contact your Regional Field Services Manager.

GAF Technical Services can assist you... GAF Technical Services can be contacted at 800-ROOF-411 (800-766-3411). Also, the GAF website is a great resource for just about any question you may have or for additional information you may require. Please visit: www.gaf.com.