

## PIM Shield® Paint: Rooftop Application

### INTRODUCTION

When mitigating external Passive Intermodulation (PIM) on rooftop cell sites the “loudest” PIM sources are often found underneath the roofing membrane in front of the site antennas. Common sources of PIM originating from the roof include overlapping steel deck members, hardware used to secure insulation, and overlapping sheet metal used for flashing. Rather than reconstruct the roof, it’s far more economical to apply a radio frequency (RF) barrier over the roof surface to prevent downlink signals from reaching PIM sources below the roof membrane. Such a barrier material needs to be durable, able to withstand harsh environments, and not generate PIM on its own.

[PIM Shield® Paint](#) is a is an RF barrier material developed by ConcealFab that effectively mitigates external PIM sources and maintains its integrity in harsh outdoor environments. It is highly elastic, allowing it to withstand expansion and contraction of roofing membranes due to daily temperature swings. Greater than 17 dB RF attenuation is achieved with two coats of PIM paint, resulting in >47 dB IM3 reduction. An [Application Note](#) is available from ConcealFab that describes the extensive testing done to validate both the RF and mechanical performance of PIM Shield® Paint. This Application Note conveys the recommended process and materials for applying PIM Shield® Paint to single ply and multi-ply roofing systems such as TPO, PVC, KEE, EPDM and modified bitumen (asphalt).

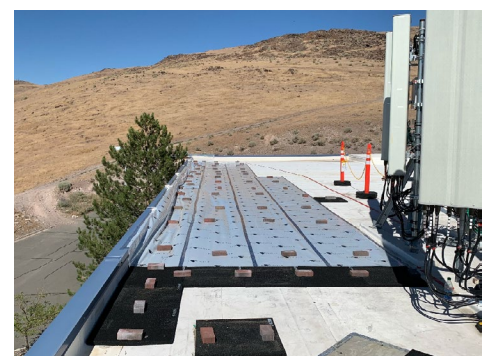


PIM Shield® Paint

### DETERMINE COVERAGE AREA

Before installing PIM Shield® Paint, a PIM hunt should be conducted at the cell site to identify PIM source locations. Do not guess! While PIM sources may likely exist underneath the roofing membranes, covering the roof with PIM Paint may be pointless if more powerful PIM interference originates from somewhere else at the site. ConcealFab’s step-by-step [PIM hunting process](#) should be used to locate the “loudest” PIM sources before proceeding with PIM Paint application.

Once the PIM sources have been located, cover the area to be treated with a temporary RF barrier such as ConcealFab’s [PIM Blankets](#) or [PIM Foil](#). With the temporary RF barrier in place, confirm that uplink noise level (RTWP or RSSI) has improved to the required level. Take plenty of pictures and record dimensions of the area covered during this test so that the required square footage of basecoat, PIM paint, and topcoat can be calculated.



Temporary RF barrier (PIM Foil) installed on roof

**RECOMMENDED MATERIALS**

A basecoat material (primer) is required to guarantee adequate adhesion of PIM Shield® Paint to the roofing membrane. Different basecoat materials are required based on the type of roof membrane. Two coats of reflective topcoat material are required to reduce surface temperatures and to provide foot traffic protection. PIM Shield® Paint has been tested for compatibility and adhesion (via pull-testing) with the recommended basecoat and topcoat materials shown below. DO NOT SUBSTITUTE.

	Coating	Applied to	Coverage rate	App Temp	# Coats
<b>Basecoat</b>	<a href="#">APOC 583</a> or <a href="#">Johns Manville RS-2383</a>	Modified Bitumen (Asphalt)	100 sq ft / gal	>55 °F	1
	<a href="#">APOC 296</a> or <a href="#">Johns Manville RS-2389</a>	TPO, PVC, KEE, EPDM	400-600 sq ft / gal	>50 °F	1
<b>PIM Shield® Paint</b>	<a href="#">ConcealFab PIM Shield® Paint</a>	Basecoat	150-175 sq ft / gal / coat	>40 °F	2
<b>Reflective topcoat</b>	<a href="#">APOC 248</a> or <a href="#">Johns Manville RS-2384</a>	PIM Shield® Paint	66 sq ft / gal / coat	>55 °F	2

The pictures below show roof surface temperature measurements recorded immediately following a PIM paint application. PIM paint should be coated with the recommended reflective topcoat to prevent excessive heating.



White PVC roof



Black PIM Shield® paint

**SURFACE PREPARATION**

Before applying the basecoat layer, all surfaces must be prepared to promote good adhesion to prevent blistering and delamination. Sweep the area to be covered to remove all dust, dirt, debris, and loose granules. Remove any rust present on steel metal flashing that will be coated. Pressure wash all surfaces (use wide fan tip) and scrub with mild detergent. Remove any mildew prior to pressure washing using diluted bleach. After pressure washing, make sure that the surface has completely dried before applying the basecoat.



Before



After

**COATING INSTALLATION**

All coatings should be applied on warm, dry days to facilitate curing. Check the weather forecast before starting work. Do not apply coatings if rain or heavy dew is expected within 48 hours. Work should begin early each day to maximize drying time. Stir materials prior to use to ensure even mix. As a rule of thumb, allow for a minimum of 4 hours cure time between application layers. Shorter cure times may be possible in hotter, dryer environments. Refer to the manufacturer’s technical datasheet for additional application instructions. Below are images showing the required process steps for a PIM Shield® Paint installation.

1) Clean roof surface.  
Allow time to dry.



2) Apply basecoat. Cure 4 hrs.



3) Apply 1st PIM Paint layer.  
Cure 4 hrs.



4) Apply 2nd PIM Paint layer.  
Cure 4 hrs.



5) Apply 1st topcoat layer.  
Cure 4 hrs.



6) Apply 2nd topcoat layer.



**CAUTIONS**

The following cautions apply to PIM Shield® Paint installations at rooftop cell sites:

- Do not install without landlord approval.
- Only use the recommended basecoat and topcoat materials. Do not substitute!
- Use roofing contractors with experience deploying coating systems to perform all work.
- Coordinate with mobile operator to turn off RF transmitters while performing work in front of antennas.
- Read Safety Datasheet (SDS) for each material prior to use and abide by all safety warnings.