



## SURFACE BLISTERS & HOW TO AVOID THEM

Every coatings application contractor, and his crew, should understand the conditions that can cause blisters and how to prevent them.

There is nothing inherent in properly mixed TUFFLEX Base Membrane Material (BMM) that causes surface blisters. What can cause them usually involves someone's carelessness in one of the situations identified below.

1. Lack of sufficient water, 15% minimum, to properly catalyze the material.
2. Whipping air into the material during mixing.
3. Unbroken dry lumps of rubber or sand filler material.
4. The expansion of air trapped in substrate pits and depressions.
5. The conversion of substrate moisture into water vapor during rising temperature conditions during application process.
6. Substrate surface contamination.

These six conditions known to cause surface blisters are explained in detail below along with suggestions and prevention and repair.

1. The catalyzing water must be mixed into the TUFFLEX Resin Binder Concentrate (RBC) within the range of 15 to 25%. (One quart of water per gallon of RBC.) Going below 15% might not provide enough water to completely catalyze the mass of resin binder material. Any amount of water over 25% will not readily mix into the Resin Binder and can cause voids, holidays or excessive shrinkage. Without its water catalyst, the RBC must revert to curing from the moisture it can get from the air just like "old technology" urethanes must do.

With the normally thicker TUFFLEX Membrane application, the top air-exposed surface would soon cure to a hardened skin. Under the skin, curing would slowly continue with what air could get through the skin. The result is that by product of urethane curing, small carbon dioxide mini-bubbles, would be trapped below the skin with no way to release. These can accumulate into blisters and the blisters can even merge into large areas of delimitation from the substrate. (A sign of not enough water is the membrane taking on a foam-like appearance on the inside. Not enough water added to completely catalyze the mass of the resin binder.)

2. The careless whipping-in of excess air during mixing must be avoided. It is recommended that mixing paddle speeds be kept low, 300 rpm and that the mixing head be kept at the bottom of the mixing bucket and not raised & lowered in a "jack-hammer" motion. When adding that catalyzing water let it be pulled down into the bottom of the mixture by the mixing paddle action, a smooth and even blend will occur in about 30 seconds with a minimum of entrapped air.

If the whipped in air fails to escape prior to the membrane setting up it will appear as air bubbles just under the surface that will expand and contract with the temperature. These must be cut out and patched prior to color coating.

3. Dry granule lumps contain air. Not only can large lumps make a physical bulge in the membrane but they also contain air that will expand in raising temperature and cause blisters. As above, the trapped air will cause a blister and must be cut out and patched.

4. The careless application of Base Membrane Mixture (BMM) over the top of unfilled substrate holes can trap air that may not bleed out prior to the membrane setting up. Very rough and/or porous substrates should be properly primed and prepped prior to membrane application. Double priming may be needed to fill all of the mini-pores in a degraded substrate.

5. It is important to recognize and avoid the combination of a moisture soaked substrate and a rising temperature condition that can change the water-vapor of greater volume. Water vapor will out-gas from the substrate that has just been over coated with a fluid base membrane (NO matter what brand) and will tend to cause blistering if it does not completely pass through. If in doubt, apply the BMM during the descending temperatures of the afternoon.

6. A failure to remove any contaminations and/or "bond-breakers" from the substrate surface could prevent the secure bonding for the membrane. Where there is no bond, there is delamination and the air in the void can expand into a blister.

Bond breakers may consist of a variety of previously applied or spilled materials. Concrete form-release oils, paint, sealers or other previously applied overlay systems that have failed. "You're only as good as your substrate," is the watch work of coatings contractors. A crude, but practical, test is to sprinkle water on the substrate and observe its penetration. If it beads up, a sealer or other bond breaker is present and must be removed to assure proper bonding. A test patch is always advised if there is any question of bonding problems.

The above points are also applicable to many other brands of membrane and paint systems and products. TUFFLEX does not have control over the end use and application of its products so the coatings contractor applying the materials and systems in the field must assume the responsibility of proper substrate preparation, proper detailing work and proper membrane application.