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How Moisture and Alcohol Exposure Can Effect Konform® SR

Konform® SR silicone conformal coating is used primarily to coat printed circuit boards to protect them from exposure to moisture, high humidity, dirt, oil, and other environmental contaminants. Konform® SR contains a "moisture-cured" silicone resin, by which we mean the silicone resin in the product cures by exposure to moisture in the air. This reaction with atmospheric moisture, along with evaporation of solvent from the product as it dries, are the two curing mechanisms by which a flexible, smooth silicone rubber-like coating is obtained. But it is this reaction with atmospheric moisture that can cause some issues with both the aerosol and liquid forms of Konform® SR.

After the first use of the can, residual product trapped inside the aerosol; button will begin to harden under exposure to atmospheric moisture and will eventually clog the aerosol button and prevent the can from spraying, even though one can hear liquid product sloshing within the can when it is shaken. This is one reason why we include two extra aerosol buttons under the product cap. The aerosol button can be replaced once it shows signs of clogging.

For this reason ITW Chemtronics® places a "one year from date of manufacture" shelf-life on all cans of Konform® SR. Most cans of this product will continue to function properly after this time, but eventually all cans will stop spraying at some point as the aerosol valve and button become clogged with hardened silicone resin. Our laboratory testing has shown that the effective life of a can of Konform® SR is essentially one year from date of manufacture after initial use. Compare this with the five year shelf-life of our Ultrajet dusters and Electro-Wash®, Pow-R-Wash™ and Flux-Off® solvent cleaning products. This same effect is also at work with the Konform® SR liquid product, and over time can cause the liquid product in the bottle to thicken. Keeping the bulk liquid product tightly sealed between uses should extend its effective life to beyond the one year limit.

Another effect that exposure to moisture can have on Konform® SR is primarily encountered when using the bulk liquid version of this product and the liquid Konform® SR High Viscosity. In many applications it is easiest to apply liquid Konform® SR by dipping circuit boards into a container of the product. An automated dipping method can greatly speed up production when a large number of boards have to be coated. Problems can arise when using this application method in locales or at times when the relative humidity is very high. If the Konform® SR is exposed for a prolonged period to a relative humidity above eighty percent the product can come hazy. This haziness can be transferred to the finished circuit board if steps are not taken to first lower the moisture content of the air around the open dipping bath.

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The use of isopropyl alcohol (IPA) to dry circuit boards prior to conformal coating with Konform® SR is also not recommended. We have found that contact with IPA will effect the catalytic system of the silicone resin and prevent the resin from curing. Boards that have been cleaned using IPA or and IPA-based cleaner should be dried in an oven prior to conformal coating to insure that all traces of IPA have been removed.

Make sure that the boards to be coated are completely dry, especially if the boards have been cleaned using an aqueous cleaning process or cleaned with IPA. Make sure there is no residual water or alcohol remaining on the board surface or trapped under low-lying components. Coating a board that is not sufficiently dry can trap moisture under the coating and lead to a cloudy appearance in the coating. IPA trapped under the coating will prevent the coating from curing. If dip-coating boards, make sure the Konform® SR in the dip tank is clear and free of haziness and not exposed to alcohol fumes.. Keep the dipping bath is tightly covered when not in use to minimize exposure of the coating liquid to atmospheric moisture or alcohol vapor. Transfer the Konform® SR to a closed container if it will not be used again within a short time.

If the Konform® SR must be applied in an environment where the relative humidity is below 50%, which can be encountered in desert environments, the silicone coating will be extremely slow to cure. To correct this difficulty, place the board in a chamber which contains an open pan of water, to artificially raise the humidity around the board. The same should be done if heat-curing the board, by placing an open pan of water in the oven. Konform® SR cures best in an environment with 50% to 65% relative humidity. If the relative humidity above 80% it will also be necessary to dry the boards in a chamber or area that is maintained at a humidity between 50% and 65%. How rapidly the boards are dipped and the amount of physical agitation the coating bath receives during dipping can also be a source of concern. Excessive agitation of the coating liquid can also entrain fine air bubbles and moisture in the coating, giving the final coating a hazy appearance.

Heating the boards in an oven prior to coating then performing the coating immediately after the boards have cooled to room temperature will guarantee that the board surface is free of moisture. Do not attempt to apply the coating to a warm board, as this can cause a rapid evolution of solvent vapor bubbles that can become trapped in the coating as it cures. The Konform® SR technical data sheet lists the conditions for the proper heat curing of the coating. Our own experience has found that even boards that appear hazy initially will become clear once the coating has fully cured. Boards

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that still appear hazy once the coating has cured, can be heated in an oven at 350 ºF for ten minutes to clarify the coating.

Some or all of the above described techniques should be considered and employed in situations where the Konform® SR liquid is used in a dip-coating application under high humidity conditions. Care in maintaining the coating product in a manner that minimizes exposure to moist air, and curing the product in a way that drives off any entrained moisture during curing will eliminate a hazy appearance in the coated circuit board. Preventing exposure to isopropyl alcohol liquid and vapor will help the coating to cure completely.

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