HumiSeal® UV40 UV Curable Conformal Coating Technical Data Sheet

HumiSeal® UV40 is a single component, high solids, UV curable, acrylated polyurethane conformal coating that possesses excellent chemical resistance, surface hardness, flexibility and moisture resistance.

HumiSeal® UV40 has been specifically developed to:

- Cure tack-free with microwave or arc UV light.
- Have a secondary cure mechanism that will fully cure any unexposed areas of the coating within 2-3 days at ambient conditions*
- Fluoresce under UV light to allow coating inspection.
- Be applied by all selective coating equipment.
- Have excellent chemical and moisture resistance.

*At higher temperature or humidity levels, this time may be reduced.

HumiSeal® UV40 meets the following requirements:

- MIL-I-46058C
- IPC-CC-830
- ISO 10993-5 certified
- Recognized under UL File Number E105698
- Compliant to Reach and RoHS Directive EU 2015/863
- Compliant to China Standard GB30981-2020

Typical Properties of HumiSeal® UV40

Density	1.10 ± 0.05 g/cm^3
Minimum Solids Content	95 %
Viscosity, per Fed-Std-141, Meth. 4287	650 ± 150 centipoise
Recommended Coating Thickness	25 - 125 microns
Recommended UV Cure*	See curing section below
Shelf Life at Room Temperature, DOM	12 months
Recommended Stripper**	HumiSeal® Stripper 1100

Typical Properties of HumiSeal® UV40 Cured Coating

Coating Thickness, as recommended by IPC guidelines	25 - 125 microns
Coating Thickness, as recommended for application	75 - 130 microns
Time to reach optimum properties	2-3 days after UV cure
Thermal Shock, 50 cycles per MIL-I-46058C	-65°C to 125°C
Glass Transition Temperature - DSC	45°C
Coefficient of Thermal Expansion - TMA	85 ppm/°C Below T_g 197 ppm/°C Above T_g
Modulus - DMA	10360 MPa @ -40ºC 4280 MPa @ 25ºC 66 MPa @ 80ºC
Flammability, per UL-94	V-0
CTI, per DIN EN 60112	600 - <1
RTI, per UL-746E	135 ºC
ISO 10993-5	Certified
GB30981-2020	Compliant
Dielectric Withstand Voltage, per MIL-I-46058C	>1500 volts

Typical Properties of HumiSeal® UV40 Cured Coating

Dielectric Constant, at 1MHz and 25°C per ASTM D150-98	2.5
Dielectric Constant, at 10GHz and 22°C per ASTM D2520	3.21
Dissipation Factor, at 1MHz and 25°C per ASTM D150-98	0.01
Insulation Resistance, per MIL-I-46058C	8.0×10^{14} ohms (800TΩ)
Moisture Insulation Resistance, per MIL-I-46058C	4.7×10^{10} ohms (47GΩ)
Fungus Resistance, per ASTM G21	Pass
Resistance to Chemicals	Excellent

*Microwave UV cure ovens equipped with "H" style bulbs recommended
**Stripper 1100 is not available in the EU

Application of HumiSeal® UV40

Conformal coatings can be successfully applied to substrates that have been cleaned prior to coating and also to substrates assembled with low residue, "no clean" assembly materials. Users should perform adequate testing to confirm compatibility between the conformal coating and their particular assembly materials, process conditions and cleanliness level. Please contact HumiSeal® for additional information.

Spraying

HumiSeal® UV40 can be applied via standard selective coating equipment or by conventional hand spray equipment. The air source used for spraying must be dry (a dry inert gas is highly recommended) to prevent premature curing via the secondary cure mechanism. The spraying should be done with adequate ventilation so that the vapor and mist are carried away from the operator.

Brushing

HumiSeal® UV40 may be applied by brush for rework or touch up only. The brush must be cleaned with solvent promptly after use.

Curing

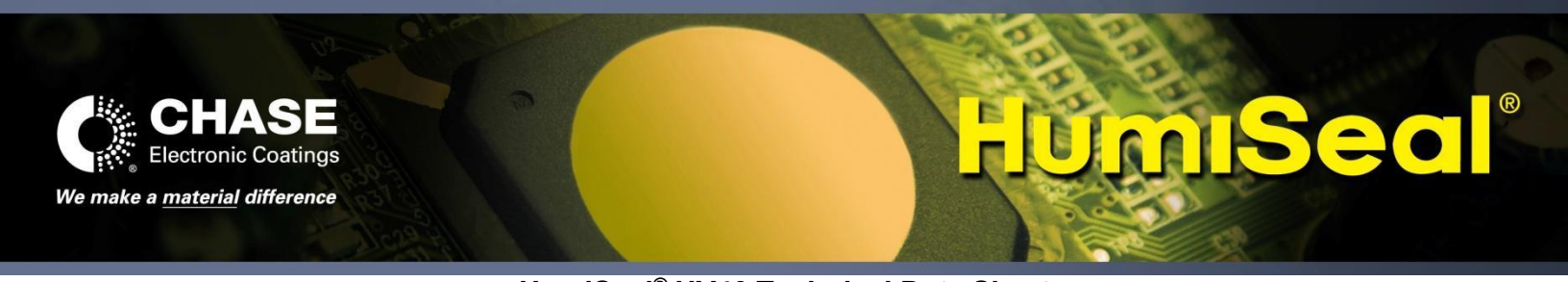
HumiSeal® UV40 is a highly cross-linked coating. In order to achieve maximum cross-linking density, the product must be exposed to the correct spectral output. HumiSeal has modelled the performance of UV40 using Arc and Microwave based UV curing equipment. The table below outlines the required dosage and irradiance values necessary to render HumiSeal® UV40 tack free post UV exposure with both equipment types. Minimum figures should provide a tack free surface. The maximum recommendation represents highest tested values by HumiSeal. The cure recommendations may change as curing technology develops.

		Dose J/cm2*			Irradiance W/cm2*		
		UVA	UVB	UVC	UVA	UVB	UVC
Min	Arc System	1.5	1.5	0.40	0.50	0.50	0.10
Min	Microwave System	2.0	2.0	0.40	0.70	0.70	0.15
Max	Arc System	2.8	2.7	0.80	0.90	0.80	0.20
Max	Microwave System	3.0	3.0	0.60	1.15	1.15	0.24

**Values measured with a Powerpuck II UV radiometer*

Heat is also an important component with UV cure, and different systems produce different heat outputs. Higher heat levels allow UV to cure at lower dose/irradiance levels. Consequently, HumiSeal recommend that curing is discussed with HumiSeal® Technical staff to ensure the exact customer process being used will meet the coating cure requirements. After UV exposure and return to room temperature the coating should be tack free.

HumiSeal® UV40 contains a reliable secondary moisture cure mechanism which will cure shadow areas on the assembly within 2-3 days at ambient moisture.



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HumiSeal® UV40 was designed to be cured using a microwave UV oven equipped with an "H" style bulb. Arc systems can cure HumiSeal® UV40, however care must be taken during the equipment selection process to ensure minimum dosage and irradiance values obtained will properly cure the coating. Because of the variations possible in curing equipment type and configuration, it is strongly recommended that you contact HumiSeal Technical Support to discuss your equipment and process in detail.

Clean Up
To flush equipment and clean uncured HumiSeal® UV40, non-alcohol-based solvents should be used. HumiSeal® Thinner 521, Thinner 521EU or Thinner 73 are recommended.

Rework
HumiSeal® UV40 is a highly cross-linked UV cured coating. The cured film has a high degree of environmental and chemical resistance and will be more difficult to remove than traditional conformal coatings. Thermal displacement, mechanical abrasion and, where available, HumiSeal® Stripper 1100 are suitable options for rework of HumiSeal® UV40.

Storage
HumiSeal® UV40 is photosensitive. The product should not be exposed to direct sunlight or full spectrum fluorescent lighting. HumiSeal® UV40 should be stored away from excessive heat, in tightly closed opaque containers at 0 to 25°C to ensure maximum shelf life is achieved. Prior to use, allow the product to equilibrate for 24 hours at room temperature. HumiSeal® UV40 is a moisture curing material and care should be taken to protect process vessels and partial containers from moisture. Partial containers must be purged with a dry, inert gas such as dry air, nitrogen or argon before closure, otherwise premature polymerization by atmospheric moisture will occur.

Caution
Application of HumiSeal® Conformal Coatings should be carried out in accordance with local and National Health and Safety regulations.

Use only in well-ventilated areas to avoid inhalation of vapours or spray. Avoid contact with skin and eyes. Consult SDS prior to use.

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