HUMISEAL
RENEWABLE ENERGY
WIND
TURBINE
SOLAR CELL
WAVE
PHOTOVOLTAIC
HYDROELECTRIC
GREEN SOLUTION

PRODUCT GUIDE

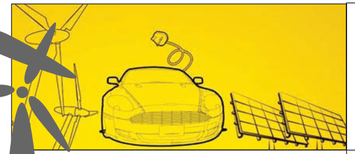
What's inside the machine?

Renewable Energy Electronics

HumiSeal®

Renewable Energy Electronics

HumiSeal®



With more than 50 years experience to draw on, our technical support is second to none.

HumiSeal is a leading supplier of conformal coatings to the renewable energy controls industry for inverter, junction box, communication and measurement devices and we offer the widest range of high performance conformal coatings, from every major type of protective chemistry, including acrylic, urethane and silicone.

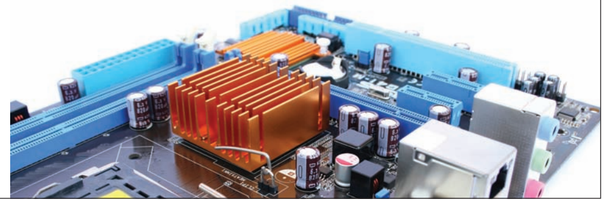
You can be certain that HumiSeal has a high-performance solution for your specific application.

Whether you are an environmentalist, an economist or simply a pragmatist at heart, there can be no arguing that it makes the utmost sense to utilize naturally occurring resources whenever possible – this has been the story of the evolution of man. Even the historical use of fossil fuels and nuclear reactions to derive the majority of our energy demands, could be said to be making use of natural resources.

Whether you believe in global warming and the "Greenhouse Gas" theory or not, the reality is that the use of fossil fuels has a finite lifetime and politicians in many countries have taken the responsible approach and committed to reduce emissions of carbon dioxide by 60% in the next 40 years or so. Fossil fuels are projected to become scarce in similar time frames, and so the attention has focused to the pragmatic task of harnessing nature's resources once again, in the form of wind, wave, tide, photovoltaic, geothermal, biomass and fuel cell technology to obtain the majority of our electrical supplies.

The obvious advantage of these sources of energy are that they have been largely unused and being the result of natural processes, clean and sustainable. The main drawbacks to these forms of renewable energy are the enormous costs of installing the required infrastructure, at a sufficient scale to be cost-effective due to the relatively low energy density of these sources, and of course the long payback times on these investments. Given the emergent nature of many of these technologies, achieving cost parity with other forms of power generation will be a key step forwards.

Given the extremely remote or very hostile locations of many of the best installation sites, bringing the generated energy into the existing grid networks is a challenge. The erratic levels of power generation create storage and transmissions issues, and the long lifetimes of facilities required for payback, coupled with remote locations make reliability a key issue. These challenges are predicted to result in the development and wide use of highly efficient, reliable power converters or inverters, in generation, distribution and end-user systems. In addition, the advanced measurement, monitoring and control/communication systems, vital to the efficient and remote monitoring of individual generators and entire sites will all be driven by ever more advanced electronics.



Whatever your requirements, HumiSeal has the solution.

HumiSeal®

HumiSeal®

Renewable Energy Electronics Product Range

These assemblies will continue to be placed in ever more remote and demanding applications and end-use environments, where the risk of degradation in performance, due to extraneous factors such as high humidity, salt-spray, corrosive gases, rain ingress and other drivers of corrosion will continue to increase rapidly.

These electronic assemblies and industrial computers continue to become an increasingly

sophisticated and important aspect of both the functionality and reliability of modern renewable energy generation systems.

The costs of failure and the competitive need to provide longer warranties and greater levels of reliability drive the need to increase the Mean Time Between Failures (MTBF) to the maximum possible duration.

Selection of the correct conformal coating is becoming an important methodology, tested, specified and requested by Original Equipment Manufacturers (OEMs) and used by EMS suppliers to prevent corrosion and degradation of assemblies in use, thus maximizing reliability and minimizing warranty claims due to extraneous corrosion.

With the requirement to use lead-free assemblies renewable energy electronics as a fledgling segment, has much work to do to ensure sufficient levels of reliability can be designed or engineered into their systems.

With the increasing adoption of Silver, both as a solderability finish and as part of a typical SAC (Tin, Silver Copper) alloy (Required by WEEE Initiative), and it's known susceptibility to creep corrosion and other electrochemically driven corrosion processes, this can result in expensive field failures, especially in the harsh marine, coastal and other remote rural installation sites.

HumiSeal® can supply materials pre-blended to your exact viscosity requirements, to eliminate on-site mixing and prevent batch-to-batch differences in material behaviour.

		1H20 WATER BASED				UV CURE		SILICONES				ACRYLICS	
		1H20AR1/D	1H20AR1/S	1H20UR5/D	1H20UR5/S	UV40	UV40/250	1C49	1C49LV	1C51	1C55	1B31LOC	1B73LOC
QUALIFICATIONS	MIL-I-46058C	Yes		Yes		Yes	No	Yes	Yes	Yes	No	Yes	Yes
	IPC CC-830B	Yes		Yes		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
	UL746E	Yes		No		Yes	No	Yes	Yes	Yes	No	No	Yes
	UL94	V0		No		V0	V0	V-1	V1	V-0	No	No	V0
LIQUID PROPERTIES	Available as an Aerosol	Yes		No		No	No	No	No	No	No	Yes	Yes
	Solids Contents (%w/w)	38	37	32	34	100	100	100	100	100	100	35	29.5
	Viscosity (MAX)/cPs	1000	50	600	200	800	300	10500	800	690	300	215	270
	Flash Point °C (°F)	>100	>100	>100	>100	85 (185)	80 (176)	102 (215)	102 (215)	121 (249)	121 (249)	1 (33)	1 (33)
	VOC (grammes/litre)	<40	<50	65	65	0	0	0	0	0	0	592	654
	Drying Time Tack-free/mins	30	30	60	60	0.5	0.5	180	60	15 mins @ 110°C	15 mins @ 110°C	10	30
	Dry	24 Hrs	24 Hrs	24 Hrs	24 Hrs	N/A	N/A	24 Hrs	24 Hrs	15 mins @ 110°C	15 mins @ 110°C	24 Hrs	24 Hrs
	Optimum Properties	1 Week	1 Week	1 Week	1 Week	72 Hrs	72 Hrs	1 Week	1 Week	15 mins @ 110°C	15 mins @ 110°C	1 Week	1 Week
	Pot Life at Room Temperature (RT)	12 Months	12 Months	12 Months	12 months	N/A	N/A	N/A	N/A	1 Month	> 30 days	12 Months	12 Months
	Shelf Life at RT	18 Months	18 Months	18 Months	18 Months	12 Months	12 Months	6 Months	16 Months	12 Months	12 Months	24 Months	24 Months
	Coverage m^2/litre (25 microns thickness)	16	14	14	12	40	32	40	40	40	40	14	12
PHYSICAL PROPERTIES	Continuous Use Operating Range °C (°F)	-65(-85)+125(+257)		-65(-85)+125(+257)		-65 (-85) + 150 (+302)	-65 (-85) + 150 (+302)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 125 (+257)	-65 (-85) + 125 (+257)
	Thermal Shock °C (°F)	-65(-85)+125(+257)		-65(-85)+125(+257)		-65 (-85) + 150 (+302)	-65 (-85) + 150 (+302)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 200 (+392)	-65 (-85) + 125 (+257)	-65 (-85) + 125 (+257)
	Glass Transition Temperature (Tg) °C	0.5		43		45	26	<-65°C	<-65°C	<-65°C	<-65°C	14	42
	CTE (x 10^6 / °C) Below Tg	189		213		85	112	N/A	N/A	N/A	N/A	170	193
	Above Tg	330		349		197	283	367	323	340	154	340	338
ELECTRICAL PROPERTIES	Dielectric Constant (1MHz @ 25°C)	2.5		2.5		2.5	2.41	2.5	2.5	2.7	2.4	2.5	2.6
	Dissipation Factor (1MHz @ 25°C)	0.01		0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Dielectric Withstand Voltage V (1 minute)	>1500		>1500		>7500	>1500	>1500	>1500	>1500	>1500	>1500	>1500
	Insulation Resistance Per MIL-I-46058C (ohms)	2.1 x 10^13		2.3 x 10^13		8.0 x 10^14	8.0 x 10^14	5.0 x 10^14	5.0 x 10^14	5.0 x 10^14	5.0 x 10^14	8.0 x 10^14	5.5 x 10^14
	Moisture Insulation Resistance Per MIL-I-46058C (ohms)	3.2 x 10^10		8.2 x 10^10		6.7 x 10^10	4.7 x 10^10	1.0 x 10^10	1.0 x 10^10	1.0 x 10^10	1.0 x 10^10	6.0 x 10^10	7.0 x 10^10
	Resistance to chemicals and solvents	Good		Very Good		Excellent	Excellent	Moderate	Moderate	Moderate	Moderate	Poor	Poor
	Recommended Thinner (Dip & Brush/Spray)	N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	701	701
	Recommended Stripper	1063, 1072		1063, 1072		Thermal/Mechanical	Thermal/Mechanical	1090/Mechanical	1090/Mechanical	1090/Mechanical	1090/Mechanical	1080/1080A	1080/1080A

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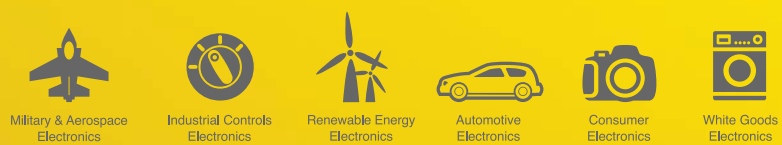
www.humiseal.com

What's inside the machine?

HUMISEAL®, THE WORLD'S LEADING FORMULATOR OF
PROTECTIVE COATINGS FOR ELECTRONIC CIRCUITS



CHASE Electronic Coatings
We make a material difference