PRODUCT GUIDE

What's inside the machine?

HUMISEAL
CENTRAL LOCKING
POWER SUNROOF CONTROL
CLIMATE CONTROLS
FUEL LEVEL SENSING
KEYLESS ENTRY
AIRBAG CONTROL MODULES
PARKING SENSORS
STEERING SYSTEMS
POWER SEAT CONTROL
ENTERTAINMENT SYSTEM
TYRE PRESSURE MONITOR

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                    U S E R J O R S I T V O L C M T F
                  T S T E V E L I T E S S E Q U A E N I U I L S
                U A R U R Q U H U M I S E A L E L T N I U E E R L R
              I S S O S C I P I T L A B O R I O S S M T I S L U T O L I
            A D K E Y L E S S E N T R Y Q U I S N O S T Y U M R X E L C I R A T S
          P O W E R S E A T C O N T R O L B O R E E T D O L O S E M A A N A E A L T Q U A
        T E T U R A D I P I S C E V E L I T S E D Q U I A N O G N U M Q L A M V I U N M O D
      Y E L I S Q U P O W E R S U N R O O F C O N T R O L M N U I A D O L O R E I T O M E T C
    C I U N T N E Q U E P O G R C O N F O R M A L C O A T I N G S A T I O N E L O L C P T A T E
  J C T A E N T E R T A I N M E N T S Y S T E M M I P S R M V O L U P T C D Y S B O E C L K Q P F
  A R C H I T E C T O B I A T A E V I T A E D I W D I E B C Y F I K S P K C H E K V T E N I A X U
  A E R I A M E A Q U K I P S A Q U A E A B I L L O E N V E N T O R E V I R I N A T A S E T Q U A
  S E D U T Y R E P R E S S U R E M O N I T O R N T S I S T E N A T U S N R R S R S M T V O L U
    I C I A I R B A G C O N T R O L M O D U L E S U F E J R O C S I T V G L U I T A I E M A C C
          A P N T I U M D                                                 T A M N E M L J
            U N D E O M                                                     U P G A T C
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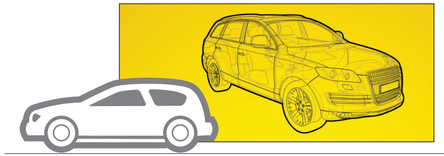
Automotive

HumiSeal®

Automotive Electronics



HumiSeal® is the only supplier specialized in conformal coating manufacture.

With a rich history of innovation for more than 50 years, our product offerings and technical support is second to none.

Automotive electronic assemblies continue to become an increasingly sophisticated and important aspect of both the functionality and reliability of modern automobiles.

These assemblies continue to be placed in ever more demanding end-use environments, where the risk of degradation in performance, due to extraneous factors such as humidity, salt-spray, noxious gases and other sources of corrosion continues to increase rapidly.

The costs of failure (both direct fiscal from recalls and longer-term to brand equity) 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.

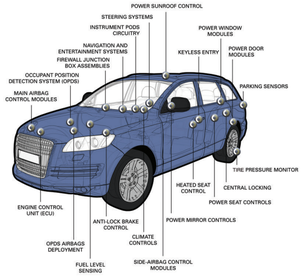
Increasingly, conformal coating is becoming one of the most important methodologies requested by Original Equipment Manufacturers (OEMs) and used by Tier 1 – Tier 3 automotive electronics suppliers to prevent corrosion and degradation of assemblies in use.

HumiSeal is a leading supplier of conformal coatings to the automotive industry for in-cabin electronics, under-hood electronics and exterior electronic applications, supplying every major OEM and multiple Tier 1 – Tier 3 suppliers.

Today, electronics manage critical automotive controls guiding power train, safety, comfort, entertainment, and navigation systems. Many mechanical components, such as hydraulic power steering and hydraulic power brakes, are being replaced with innovative electronics.

With 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. With recent changes in OEM requirements related to new car outgassing and ISO14001 compliance requirements amongst their subcontractors, HumiSeal has a wide range of environmentally compliant, low-outgassing, solvent-free materials, in addition to a wide range of traditional solvent-borne chemistries. Whatever your requirements, HumiSeal has the solution.

SELECTION HumiSeal offers the industry's widest range of high performance coatings, drawn from the widest range of chemistries and they can be applied by any of the common application methodologies. This will enable you to select the product that best meets your project needs, production throughput, floor space, and capital equipment requirements. Whether you are upgrading an existing product, transferring a production process from another facility, or are working on a new product introduction



Whatever your requirements, HumiSeal has the solution.

Application	Specified Coating/s
Airbag control modules	1B31, 1B66, 1A32R2
Anti-lock brake control	1B31, UV40-250
Climate controls	1B31, 1B51LU, 1R32A-2, UV40-250
Engine control module (ECU)	1B31, 1B51, 1B51LU, UV500 1R32A-2, 1B66, UV40-250
Firewall junction box assemblies	1C55
Heated seat control module	1B31
Keyless entry	1B66, UV40-250
Occupant position detection system	1B51LU, 1B66
Occupant position detection airbag control	1B51LU, 1B66
Power door control modules	1B66, 1R32A-2, UV500
Power mirror controls	1R32A-2
Power seat control	1B31
Power sliding door control	1B51
Power sunroof control	1B51, 1B31, UV40
Power window modules	1B51, 1B31, 1B66, 1R32A-2
Side airbag modules	1B31, 1B66
Speedometer modules	1A33, 1B66, UV40-250
Tyre pressure monitor	1B66

			ACRYLICS			URETHANES			UV CURE			SYNTHETIC RUBBER & SILICONES						EPOXY
			1R32A-2	1B16	1B78	1A20R	1A33	2A64	UV40	UV500	UV50 LV	1B51 NSLU	1B59 LU	1C49LV	2C51	1C51	1C63	2A53
QUALIFICATIONS	MIL-I-46058C		No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No	Yes
	IPC CC-830B		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
	UL746E		Yes	Yes	No	No	Yes	No	Yes	No	Yes	No	No	Yes	No	Yes	Yes	No
	UL94		V0	V0	No	No	V0	No	V0	No	V0	No	No	V0	No	V0	V1	No
	BMW QPL		No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	Yes	No	No
LIQUID PROPERTIES	Available as an Aerosol		No	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	-
	Solids Contents (%w/w)		29	29.5	275	50	44	55	95	98	95	22	18.5	90	99	98	100	54
	Viscosity (MAX)/cPs		250	270	270	130	200	180	800	275-375	80-120	215	280	800	A350, B700	780	5000	500
	Flash Point °C (°F)		7 (45)	-1 (30)	-	28 (83)	-1 (30)	N/A	80 (176)	N/A	N/A	4 (39)	??	48 (118)	N/A	121 (250)	220 (392)	N/A
	VOC (grammes/litre)		645	661	674	511	531	501	35	-	-	632	648	0	0	0	<50	455
	Drying Time	Tack-free/mins	10	30	30	60	15	15	0.5	0.5	0.5	10	10	60	10	N/A	0.5, 60	300
		Dry	24 hrs	24 hrs	24 hrs	24 hrs	20 hrs	3 hrs @ 76ºC	N/A	N/A	N/A	24 hrs	24 hrs	24 hrs	60 mins	15 mins	24 hrs	2 hrs @ 93ºC
		Optimum Properties	1 week	1 week	1 week	1 week	1 month	1 week	72 hrs	1 week	1 week	1 week	1 week	1 week	60 mins	15 mins	1 week	1 week
	Pot Life at Room Temperature (RT)		N/A	N/A	N/A	N/A	N/A	8 hrs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	24 hrs
	Shelf Life at RT		24	24	24	12	24	12	12	6 months	12 months	18	6 months	12	12	12	6	12
	Coverage m^2/litre (25 microns thickness)		13	12	11	20	18	34	40	40	40	9	7	40	40	40	40	32
PHYSICAL PROPERTIES	Continuous Use Operating Range °C		-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 150	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 125
	Thermal Shock °C		-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 125	-65 to 200	-65 to 200	-65 to 200	-65 to 200	-65 to 125
	Glass Transition Temperature (Tg) °C		14	42	42	71	26	12	45	-43	-1	14	-49.6	<-65	<-65	<-65	<-90	19
	CTE (x 10^6 / °C)	Below Tg	170	138	-	193	119	82	85	137	122	195	18.5	-	-	-	-	N/A
		Above Tg	340	-	-	532	225	255	197	311	264	330	130	323	-	296	N/A	N/A
ELECTRICAL PROPERTIES	Dielectric Constant (1MHz @ 25°C)		2.5	2.6	2.6	3.5	3.6	3.5	2.5	2.5	2.5	2.5	1.9	2.5	-	2.4	N/A	3
	Dissipation Factor (1MHz @ 25°C)		0.01	0.01	0.01	0.03	0.03	0.03	0.01	0.01	0.01	0.07	0.004	0.01	-	0.01	N/A	0.03
	Dielectric Withstand Voltage V (1 minute)		>1500	>1500	>1500	>1500	>1500	>1500	>1500	>1500	>1500	>1500	>1500	>1500	-	>1500	> 1500	>1500
	Insulation Resistance Per MIL-I-46058C (Ω)		8.0 x 10^{14}	5.5 x 10^{14}	5.5 x 10^{14}	3.0 x 10^{14}	2.0 x 10^{14}	4.5 x 10^{14}	8.0 x 10^{14}	4.5 x 10^{11}	*8.61 $\log_{10}\Omega$	2.0 x 10^{14}	8.4 x 10^{12}	5.0 x 10^{14}	*5.2 x 10^{13}	5.0 x 10^{14}	1.1 x 10^{12}	2.0 x 10^{14}
	Moisture Insulation Resistance Per MIL-I-46058C (Ω)		6.0 x 10^{10}	7.0 x 10^{10}	7.0 x 10^{10}	4.8 x 10^{10}	1.6 x 10^{10}	4.8 x 10^{10}	4.7 x 10^{10}	1.6 x 10^{10}	**3.0 x 10^{9}	1.0 x 10^{10}	1.8 x 10^{10}	1.0 x 10^{10}	-	1.0 x 10^{10}	1.1 x 10^{10}	2.8 x 10^{10}
	Resistance to chemicals and solvents		Poor	Poor	Poor	Excellent	Very Good	Excellent	Excellent	Good	Excellent	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Excellent
	Recommended Thinner (Dip & Brush/Spray)		503, 505/ 521(EU), 600	73	73, 600	521 (EU)	503, 521, 521EU	64	N/A	N/A	N/A	903/905	903/904	N/A	N/A	N/A	N/A	535
	Recommended Stripper		1080 (EU)	1080 (EU)	1080 (EU)	1072	1063	1072	1100*, Mech	1072/1100*/ Mech	072/1100*/ Mech	1080 (EU)	1080 (EU)	1090, Mech	1090	1090, Mech	1090, Mech	Mech

* Surface Insulation resistance per IPC-J-STD-004 (mod.) ! ** IPC-CC-830 ! # Volume resistivity ASTM D275

Version: 2017.001

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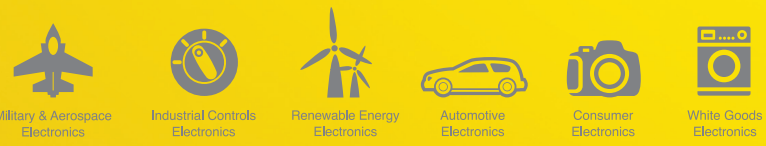
What's inside the machine?

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



CHASE Electronic Coatings
We make a material difference