

Getters & Thermoplastic Adhesives Selector Guide

The key Inputs for all hermetic packaging types

SEMICONDUCTOR & ASSEMBLY SOLUTIONS

Selector guide

STAYDRY® HICAP™

Importance of Getters

STAYDRY products are developed to meet stringent industry requirements enabling hermetic package manufacturers security and peace of mind to meet industry reliability standards, including JEDEC, MIL STD 883, and NASA outgassing requirements.

Modules containing integrated microelectronic devices may out gas H₂, H₂O, CO₂, and other species over time. These outgassed species inside a hermetic package may degrade functionality of the device or specific components. Specific enabling technology products support stringent industry reliability standards, including JEDEC, MIL specification, and Bellcore.

THE ROLE OF STAYDRY GETTERS IN HERMETIC PACKAGES

STAYDRY getters capture, and in many cases, convert harmful species that are outgassed or present in a hermetic package. STAYDRY getters have been a proven solution in eliminating harmful contaminants for over 20 years in the aerospace, medical, and telecom markets.

HiCap and STAYDRY Getter Products

Film Products	Description	Applications	Features & Benefits	Material Characteristics							
				Operating Temperature (°C)	CTE (um/m*°C)	Density (g/cc)	Volume Resistivity (ohm-cm)	Loss Tangent	Dielectric Constant	Dielectric Breakdown	Thermal Stability @200°C
H2-3000	Hydrogen and moisture getter	Hermetically sealed packages where Gallium Arsenide (GaAs) based devices are affected by hydrogen and moisture	*Irreversible hydrogen reaction *Highly permeable to both hydrogen and moisture *Moisture capacity ≥3.5% of product weight *Maintains hydrogen levels at <1 ppmV *Hydrogen capacity ≥45 cm3/gram	-65 to 165	440	≥1.35	1.76x10 ¹²	4.14x10 ⁻⁶	3.76	1350	≤1% loss
H2-3000PSA	Hydrogen and moisture getter	Hermetically sealed packages where Gallium Arsenide (GaAs) based devices are affected by hydrogen and moisture	*Irreversible hydrogen reaction *Preapplied adhesive for easier & faster attach *Highly permeable to both hydrogen and moisture *Moisture capacity ≥3.5% of product weight *Maintains hydrogen levels at <1 ppmV *Hydrogen capacity ≥45 cm3/gram	-55 to 150	440	≥1.35	1.76x10 ¹²	4.14x10 ⁻⁶	3.76	1350	≤1% loss
Z20	Moisture getter	Hermetically sealed packages where Gallium Arsenide (GaAs) based devices are affected by hydrogen and moisture	*Reversible moisture activation *Preapplied adhesive for easier & faster attach *Highly permeable to moisture *Moisture capacity ≥8% of product weight	-55 to 150	440	≥1.15	2.84x10 ¹²	4.25x10 ⁻⁶	3.88	1350	≤1% loss
HiCap3000	High-capacity moisture and CO ₂ getter	MEMS/MOEMS and hermetic packages where moisture inhibits the functionality of the device's operation	*Film with preapplied adhesive *Allows fast room temperature attach *Room temperature stable *Moisture capacity ≥15% of product weight *No activation required *Irreversible moisture reaction	-25C to 165	110	1.29	N/A	4.14x10 ⁻⁶	3.38	580	≤1% loss

Paste Products	Description	Applications	Features & Benefits	Material Characteristics						
				Operating Temperature (°C)	CTE-a1 (µm/m*°C)	Tg°C	Dielectric Constant	Thermal Stability @200C	Cure Profile @200°C	Activation Conditions
HiCap2000	High-capacity moisture and CO2 getter	MEMS/MOEMS and hermetic packages where moisture inhibits the functionality of the device's operation	*One-part system *Room temperature stable *Moisture capacity ≥15% of product weight *No activation required *Blue or black color options	-55 to 150	50	90-98	2.4	≤1% loss	30 min @ 150-200°C	none
HiCap2100	High-capacity moisture and CO2 getter	Hermetic packages with high operating temperature (up to 420°C)	*One-part system *Room temperature stable *Moisture capacity ≥15% of product weight *Available colors: white	-55 to 420	56	180-185	2.0	≤0.5% loss	30 min @ 335°C	none
GA2000-2	Particle and moisture getter	MEMS/MOEMS packages where particle and moisture contaminants affect mechanical movements and delicate optics	*Two-part system *Room temperature stable *Moisture capacity ≥2% of product weight *Meets MIL STD 883D, Method 5011	-55 to 150	NA	NA	NA	≤1% loss	2 hours @ 150°C	30 min @ 225°C

HERMETIC PACKAGES

Hydrogen from the hermetic package itself is a primary concern to long-term device reliability of GaAs devices which are susceptible to hydrogen poisoning. Hermetically sealed packages with semiconductor devices containing Pd or Pt gate metallization can have the hydrogen diffuse in the gate metallization and cause current or gain reduction of the device. Hydrogen trapped inside a hermetic package may degrade device functionality due to hydride formation with other metal substrates within the package. In some cases hydrogen can also create moisture in the presence of O2.

STAYSTIK®

Thermoplastic Adhesives

STAYSTIK products are a complete line of high purity, low ionic, thermoplastic adhesives specifically developed to meet stringent industry reliability standards, including JEDEC and MIL STD 883 requirements.

STAYSTIK is available in film or paste form, allowing process flexibility, as well as a variety of filler technologies (silver, aluminum nitride, alumina, and non-filled). STAYSTIK polymer systems allow for a wide range of temporary or permanent bonding applications including substrate attach.

STAYSTIK® Thermoplastic Adhesives														
	Format		Filler	Features/Benefits	Overall System Bonding Range		Recommended Rework Temperature (°C)	Glass Transition Temperature (°C)	Die Shear Adhesion @ 25°C (PSI)	Thermal Conductivity (W/m²K)	Volume Resistivity (ohm*cm)	Elastic Modulus (PSI)	Dielectric Constant	
	Paste	Film			Temp °C	PSI								
A	101 211 701 301	501 611 811 415	Silver AlN Alumina None	*High temperature applications *Low RGA moisture in hermetic packages *Meets MIL STD 883 requirements	300-375	1 to 50	350	180-185	>3500 >3000 >3000 >3500	3.0 - 3.5 1.0 - 1.5 0.5 - 1.0 0.25 - 0.30	<5.0x10 ⁻⁴ >1.0x10 ⁹ >1.0x10 ⁹ >1.0x10 ⁹	360,000	--- 3.8 3.6 3.6	
	181 282 783 383	581 682 882 482	Silver AlN Alumina None	*Mid-temperature applications *Meets MIL STD 883 requirements * High solvent resistance	160-275	1 to 50	200	98	>2500 >3000 >2500 >2500	3.0 - 3.5 1.0 - 1.5 0.5 - 1.0 0.25 - 0.30	<5.0x10 ⁻⁴ >1.0x10 ⁹ >1.0x10 ⁹ >1.0x10 ⁹	350,000	--- 4.6 4.5 4.5	
	171 272 --- 371	571 672 872 472	Silver AlN Alumina None	*Low temperature applications *Low modulus/stress systems	125-200	1 to 50	140	25	>1800 >3000 >3000 >2400	3.0 - 3.5 1.0 - 1.5 0.5 - 1.0 0.25 - 0.30	<5.0x10 ⁻⁴ >1.0x10 ⁹ >1.0x10 ⁹ >1.0x10 ⁹	60,000	--- 5.9 5.7 5.6	
	191 292 793 393	591 692 892 492	Silver AlN Alumina None	*Solvent soluble for temporary attach *Low temperature applications	150-220	1 to 50	160	50	>2400 >3000 >2400 >2500	3.0 - 3.5 1.0 - 1.5 0.5 - 1.0 0.25 - 0.30	<5.0x10 ⁻⁴ >1.0x10 ⁹ >1.0x10 ⁹ >1.0x10 ⁹	500,000	--- 4.4 4.3 4.2	
	B	336T		None	*Low temperature wafer attach	100-150	1 to 25	110		>1800	0.25 - 0.30	>1.0x10 ⁹		
	Applications									Standard Thicknesses for Films				
	A	Substrate attach, SAW & BAW devices, magnetic head processing, heat spreader attach, board bonding, wafer processing, EMI/RF grounding applications.									1.5 mil (+ 0.5 mil) 3.0 mil (+ 0.5 mil)			
	B	Wafer mounting adhesive for backside grinding									5.0 mil (+ 0.5 mil)			

POLYSOLDER®

Specifically designed for electronic component assembly; POLYSOLDER is a lead-free, no clean, and environmentally friendly conductive adhesive. Tailored rheology allows for a variety of application methods including screen printing, stencil printing or dispensing. POLYSOLDER is bonded by thermal processing in IR, convention or box oven equipment. Enabling low temperature processing and fast bonding with substantial stress absorbing properties. POLYSOLDER is a unique silver filled polymer matrix that forms stable electrical and mechanical junctions with standard components and substrates, even after extensive environmental aging.

STAYSTIK® Thermoplastic Adhesives											
Paste Products	Description	Applications	Features & Benefits	Material Characteristics							
				Viscosity (kcps) (hours)	Pot Life @25°C	Cure Profile	Tg (°C)	CTE α1 (µm/m*°C)	Volume Relativity (ohm*cm)	Thermal Conductivity (W/m²K)	Die Shear @25°C (PSI)
SE3001	Microdot dispensing silver-filled electrically conductive paste	*Provides mechanical and electrical interconnect for surface mount components to substrate *Stencil or dispense applications *Microdot dispensing with 23-gauge needle *EMI/RF grounding applications	*Pb-Free solder alternative *Low stress *No flux or post-soldering residues to clean *No alpha particle emission	150-220	8-12 hours	30 min @130°C	90	54	≤1.0 x 10 ⁻⁴	4 to 5	≥2300 Au on Au

STAYCHIP®

Encapsulant and Bonding Applications

STAYCHIP epoxies are a unique line of specially developed adhesives for a variety of bonding applications requiring stress relief and adhesive properties after environmental aging.

STAYCHIP Encapsulants												
Product	Description	Applications	Features & Benefits	Material Characteristics								
				Density (g/cc)	Brooksfeld Viscosity @25°C	Flow Speed	Filler Content (wt%)	Pot Life @25°C (20% Increase)	Cure Profile	Tg (°C)	CTE α1 (µm/m*°C)	Storage (°C)
3082	Capillary underfill	For FCIP applications	*High Tg *Enhanced thermal cycle performance *Excellent adhesion *Fast cure	1.5	3300	Moderate	52	20 hours	10 min @165°C	127	39	-40

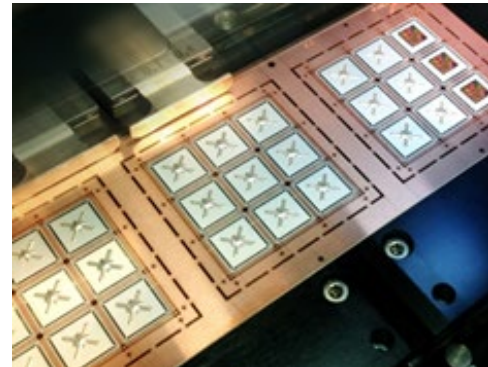
STAYCHIP Adhesives												
Product	Description	Applications	Features & Benefits	Material Characteristics								
				Density (g/cc)	Brooksfeld Viscosity @25°C	Dielectric Constant	Filler Content (wt%)	Pot Life @25°C (20% Increase)	Cure Profile	Tg (°C)	CTE α1 (µm/m*°C)	Storage (°C)
5692	Low Temperature Adhesive	Low temperature substrates, LCP, stainless steel & FR4	*Low Tg *Fast cure *Excellent LCP & stainless steel adhesion	1.2	4000-9000	5.55	44	3 days	25 min @80°C	25	65	<5
F614-3A	Electrical Insulating Adhesive	Substrate attach, metal, solder mask, FR4	*High Tg *Enhanced thermal cycle performance *Excellent adhesion *Fast cure	1.2	45000	4.29	40	22 hours	30 min @150°C	117	165	<5

ATROX DIE ATTACH

We offer a comprehensive range of die attach products designed to provide you with superior performance for today's stringent reliability requirements.

HYBRID SILVER SINTERING DIE ATTACH

The ATROX 800HT Series is a thermosetting conductive die attach adhesive with high thermal conductivity (>100 W/m-K) designed for high power semiconductors and exposed pad semiconductor packages. It has excellent adhesive strength to NiPdAu, Ag, and MEP leadframes with low out gassing, which minimizes oven contamination and is ideal for excellent MSL performance.



SINTERED DIE ATTACH

Advanced sinter and solder solutions addressing a wide variety of challenges for power electronics. Our engineered sinter materials are proven to enable high throughput and reliability while providing flexible, easy-to-use form factors that reduce the capital cost, and accelerate time to market.

ATROX 800HT-Series Material Properties

Properties	Target Package	Die Size (mm)	Die backside	Viscosity (cps)	Thixotropic Index	Modulus 25C (Gpa) 260C	Vol. Resistivity (ohm*cm)	Bulk Thermal Conductivity (W/mK)
800HT1V	Small die packages High thermal conductivity	< 6 x 6	Metallised Bare Si: <3 x 3mm	20,000	5.9	14.5 2.3	0.00002	135
800HT2V	Small die packages High thermal conductivity	< 6 x 6	Metallised Bare Si: <3 x 3mm	17,000	5.9	9.1 1.9	0.00002	170
800HT5	Low-stress Small and medium die sizes	2 x 2 ~ 6 x 6	Metallised or bare Si	13,000	5.5	9.5 0.9	0.00002	75
800HT6B	Low-stress Small and medium die sizes	2 x 2 ~ 6 x 6	Metallised or bare Si	10,000	5	9.6 1.4	0.000025	85
800HT7A1	Ultra-low stress for large die sizes and thin lead-frames, such as QFP	< 7 x 7	Metallised or bare Si	21,000	6.0	4.9 0.5	0.00003	75
900HT-P1	Printable High thermal conductivity	< 6 x 6	Metallised	45,000	6.0	8.0 0.9	0.00002	>100
850HT1	High thermal conductivity	< 7 x 7	Metallised	20,000	5.5	17.5 8.0	0.00001	210

Cure Profile	800HT1V	800HT2V	800HT5	800HT6B	800HT7A1	900HT-P1	850HT1
	Primary: 150C / 30 min + 200C / 120 min Alternative: 150C / 30 min + 250C / 120 min						150C / 30 min + 250C / 120 min








MARKING INKS

MacDermid Alpha has a portfolio of two-part ink systems for stamping, screen printing, and spraying applications. These inks meet critical specifications in military, aerospace, and industrial electronics markets.

ENTHONE M SERIES INKS - FORMULATED FOR TRANSFER MARKING

Permanent, two component, epoxy-based transfer marking inks, designed for use with a selection of catalysts which cure at elevated and/or room temperatures.

When properly applied and cured, ENTHONE M Series inks have excellent adhesion to glass, metal and thermosetting plastics. These inks also have high chemical and thermal resistance properties.

MacDermid Enthone M-Series Thermal Two Part Epoxy Inks - Transfer Marking Ink or Manual Application							
Product	Color Description	Color Chip	Fed-STD-595 Approximate Color Reference	Fed-STD-595 Color Reference from A-A-56032	Mil-I-43553, A-A-56032 Status*	RoHS Compliant	Pb Free Assembly Compatible
M-2-N	Red		11140	11140	Type I, Type II, & Type III	No	Yes
M-4-N	Yellow		13655	13655	Type I, Type II, & Type III	No	Yes
M-5-N	Green		24190	Not Applicable	Type I, Type II, & Type III	No	Yes
M-6-N	Blue		15180	15102	Type I, Type II, & Type III	Yes	Yes
M-9-N	White		17925	17875	Type I, Type II, & Type III	Yes	Yes
M-0-N	Black		17038	17038	Type I & Type II	Yes	Yes
M-0-NC	Inorganic Black		17038 M-0-NC has a Blue Tint	Not Applicable	Type I, Type II, & Type III	Yes	Yes

* Inks cured with Catalyst 20/A at room temperature will not meet Type II requirements (heat cure OK)
For air cure Type II use Catalyst 77 or B-13/28














ENTHONE 50 – SERIES CAT L INKS

Designed for Screen Printing

Permanent, two component, epoxy-based screen-printing inks are designed for use with a selection of catalysts which cure at elevated and/or room temperatures.

When properly applied and cured, ENTHONE 50 Series Cat L Inks have excellent adhesion to solder masks, glass, metal and plastic. They have excellent chemical and thermal resistance properties.

ENTHONE 50 Series Cat L Inks are used in the electronics, aerospace, automotive, appliance and decorative container industries. Some uses in electronics include the permanent marking of circuit boards, semiconductor components and connectors.

MacDermid Enthone 50-Series Thermal Two Part Epoxy Inks - Screen Print, Spray, or Manual Application								
Product	Color Description	Color Chip	Fed-STD-595 Approximate Color Reference	Fed-STD-595 Color Reference from A-A-56032	MIL-I-43553, A-A-56032 Status*	RoHS Compliant	Pb Free Assembly Compatible	Low Halogen ** (representative test values listed for total halogens, not to be used for specifications)
50-100R	White		17925	Non-applicable (N/A)	Type I, Type II, & Type III	Yes	Yes	Yes (419 ppm)
50-110RX	White, Matte		37925	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (541 ppm)
50-120R	White, High Hide		27925	N/A	Type I, Type II, & Type III	Yes	Yes	Yes - No Test Data
50-201AR	Lemon Yellow, Cd		x	N/A	Type I, Type II, & Type III	No	Yes	Yes (310 ppm)
50-202BR	Medium Yellow, Pb Chromate		13655	N/A	Type I, Type II, & Type III	No	Yes	Yes (406 ppm)
50-206R	Orange, Pb Chromate		12197 50-206R Less Brown	N/A	Type I, Type II, & Type III	No	Yes	Yes (403 ppm)
50-300R	Emerald Green, Pb Chromate		14193 50-300R Slightly More Yellow	N/A	Type I, Type II, & Type III	No	Yes	No - No Test Data
50-301R	Deep Green, Pb Chromate		14036	N/A	Type I, Type II, & Type III	No	Yes	No (1.64%)
50-400R	Ultramarine Blue		15056	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (633 ppm)
50-403R	Light Blue		15180	N/A	Type I, Type II, & Type III	Yes	Yes	No Test Data
50-507R	Medium Red, Cd		11105	N/A	Type I, Type II, & Type III	No	Yes	Yes (608 ppm)
50-508R	Medium Red, Pb Chromate		11105	N/A	Type I, Type II, & Type III	No	Yes	Yes (473 ppm)
50-700R	Black, Carbon Pigment (low electrical resistance)		17038	N/A	Type I & Type III	Yes	Yes	Yes (534 ppm)
50-710R	Black, Matte Carbon Pigment (low electrical resistance)		37038	N/A	Type I & Type III	Yes	Yes	No Test Data
50-770R	Black, Matte (high electrical resistance)		37038	N/A	Type I, Type II, & Type III	Yes	Yes	No Test Data
50-771R	Black, Gloss (high electrical resistance)		17038	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (467 ppm)
50-800R	Clear		N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes - No Test Data
50-810R	Clear, Matte		N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes - No Test Data

* Inks cured with Catalyst 20/A at room temperature will not meet Type II requirements (heat cure OK). For air cure Type II use Catalyst 77 or B-13/28.

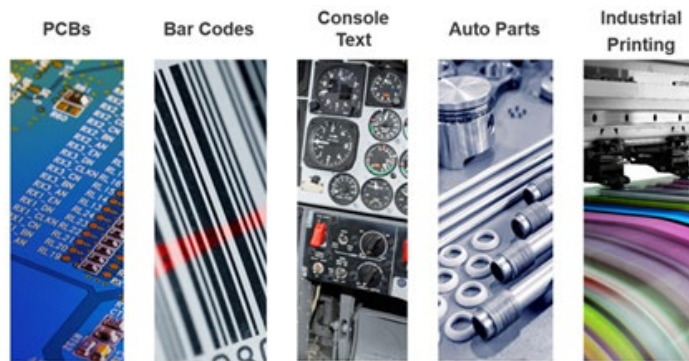
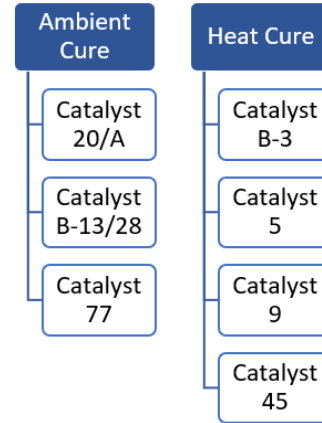
** Low Halogen ("Halogen Free") Listed by the IEC as < 900 ppm Cl-, < 900 ppm Br-, and < 1500 ppm total halogens. Tested using the combustion method – total halogens.

ENTHONE M-SERIES AND 50-SERIES CATALYSTS

These catalysts can be used in both M and 50 Series

CATALYST CHOICE

1. Allows ink pot life from 1 to 24 hours
2. Determine post-cured material conditions such as conductivity, electrical resistance and outgassing levels
3. Can affect resistance to chemicals, moisture, and anti-yellowing

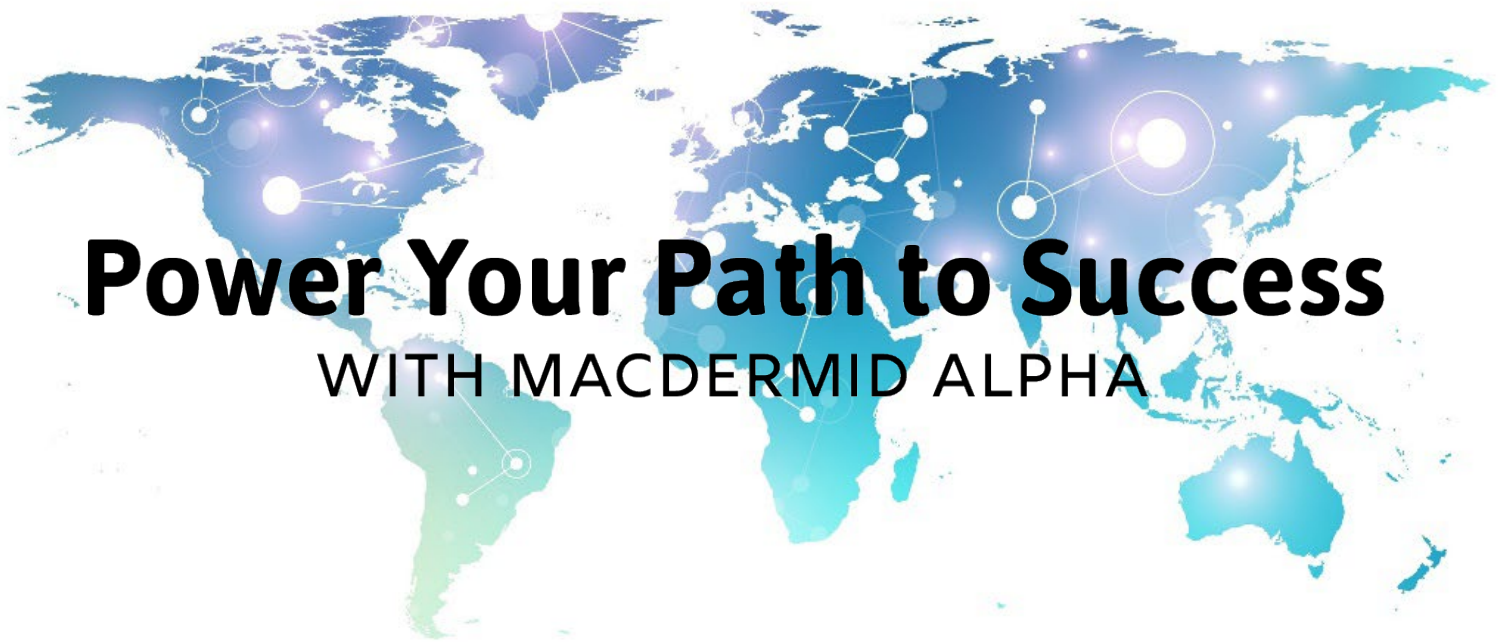


MacDermid Enthone 50-Series & M-Series Catalysts						
Product	Fed-STD-595 Approximate Color Reference	Fed-STD-595 Color Reference from A-A-56032	Mil-I-43553, A-A-56032 Status*	RoHS Compliant	Pb Free Assembly Compatible	Low Halogen** (representative test values listed for total halogens, not to be used for specifications)
Catalyst 20/A	N/A	N/A	Type I & Type III (air cure), add Type II for heat cure	Yes	Yes	No Test Data
Catalyst B-3	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	No Test Data
Catalyst 5	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (<50 ppm)
Catalyst 9	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (<50 ppm)
Catalyst B-13/28	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (<50 ppm)
Catalyst 45	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	No Test Data
Catalyst 77	N/A	N/A	Type I, Type II, & Type III	Yes	Yes	Yes (235 ppm)

* Inks cured with Catalyst 20/A at room temperature will not meet Type II requirements (heat cure OK).

For air cure Type II use Catalyst 77 or B-13/28

** Low Halogen ("Halogen Free") Listed by the IEC as < 900 ppm Cl-, < 900 ppm Br-, and < 1500 ppm total halogens.



Power Your Path to Success

WITH MACDERMID ALPHA



techinfo@macdermidalpha.com

macdermidalpha.com

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