## Novec<sup>™</sup>Replacement Technology Comparison

# nanoproof

Aculon® NanoProof® electronic coating series offers anti-wetting, anti-stiction, chemical protection, corrosion protection and moisture protection. The NanoProof® 3 series has similar performance and chemical properties as 3M<sup>™</sup> Novec<sup>™</sup> products (see figure A), providing a readily available and accessible alternative to the 3M<sup>™</sup> Novec<sup>™</sup> product series.

<b>3M<sup>™</sup>Novec<sup>™</sup>Product</b>	Aculon <sup>®</sup> Replacement	
1700	NanoProof 3-02	
1702	NanoProof 3-002	
1710	NanoProof 3-10	
1902	NanoProof 3-02	
1904	NanoProof 3-04	
1908	NanoProof 3-08	
2704	NanoProof 3-04	
2708	NanoProof 3-08	

#### Figure A

<b>3M</b> ⊺	<sup>™</sup> Novec™ Prod	uct	Aculon <sup>®</sup> Replacement NanoProof <sup>®</sup> Product			
1700	1702	1710	3-02	3-002	3-10	

	1700	1702	1/10	3-0Z	3-00Z	3-10
Solids	Fluoroacrylate 2%	Fluoroacrylate 0.2%	Fluoroacrylate 10%	Fluoroacrylate 2%	Fluoroacrylate 0.2%	Fluoroacrylate 10%
Solvent		7100DL		347		
Appearance		Clear		Light Green		
Density		1.5 g/ml			1.5 g/ml	
Viscosity	0.91 cP	0.63 cP	4.3 cP	<20 cP	<20 cP	<20 cP
Boiling Point		61°C			56°C	
Flash Point		None			None	
Environmental		low in toxicity, low in G r U.SEPA), contains r	•		, low in toxicity, low in G r U.SEPA), contains n	-
Shelf Life	4yrs in unop	ened package from ma	anufacture date	2yrs in unope	ned package from man	ufacture date
Thickness (depending on application style)	0.1-1um	<100nm	0.1-1um	0.2-2um	0.1-1um	0.25-6um
Solvent and Chemical Resistance	Resists a	variety of solvents and dissolves in acetone	chemicals,	Resists a variety of solvents and chemicals. Attacked fluorosolvents and ketones.		-
Tg (glass transition)		44°C		~95°C from peak on DSC (Viscous Pool by 70°C)		ool by 70°C)
Thermal Stability of Dry Film			5°C for 24hrs and maintain repellency			
Contact Angles			WCA/OCA: 120°/80°			
Refractive Index		1.39			n=1.376 @632.8nm	
Solder Through Repairability	Yes				Yes	
Non-flammability	Meets UL 94 V-0			Wi	ll meet UL 94 V-0 (Met	via 5.5)
Coefficient of Thermal Expansion - TMA	70 um/(m·°C)				In Process	
Thermal Conductivity		0.1 W/m*K			In Process	
Dielectric Constant @ 30% RH		3.2(@1kHz)			In Process	
Dissipation Factor @ 30% RH		0.002(@1kHz)		In Process 3600V/mil		
Dielectric Breakdown Strength @ 35% RH		2000 V/mil				
Cure		None			None	
Application	Anti-stiction, Chemical Protection, Corrosion Protection, Moisture Protection			e Anti-Wetting, Anti-stiction, Chemical Protection, Corrosion Protection, Moisture Protection		
Application Location	PC	B, Electrical Compone	nts	F	PCB, Electrical Compon	ents

Contact an Aculon<sup>®</sup> representative to learn which NanoProof<sup>®</sup> product best suits your application!

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3M <sup>™</sup> Novec <sup>™</sup> Product	Aculon <sup>®</sup> Replacement	
1700	NanoProof 3-02	
1702	NanoProof 3-002	
1710	NanoProof 3-10	
1902	NanoProof 3-02	
1904	NanoProof 3-04	
1908	NanoProof 3-08	
2704	NanoProof 3-04	
2708	NanoProof 3-08	

#### Figure A

<b>3M</b> ⊺	<sup>™</sup> Novec™ Prod	uct	Aculon <sup>®</sup> Replacement NanoProof <sup>®</sup> Product			
1902	1904	1908	3-02	3-04	3-08	

	1902	1904	1900	3-0Z	3-04	3-00	
Solids	Fluoroacrylate 2%	Fluoroacrylate 4%	Fluoroacrylate 8%	Fluoroacrylate 2%	Fluoroacrylate 4%	Fluoroacrylate 8%	
Solvent		blend 7100/7200					
Appearance		Clear					
Density		1.43 g/ml			1.5 g/ml		
Viscosity	0.81 cP	1.11 cP	2.2 cP	<20 cP	<20 cP	<20 cP	
Boiling Point		75°C			56°C		
Flash Point		None			None		
Environmental		low in toxicity, low in C r U.SEPA), contains r			, low in toxicity, low in G r U.SEPA), contains n		
Shelf Life	2yrs in unop	ened package from ma	nufacture date	2yrs in unope	ned package from man	ufacture date	
Thickness (depending on application style)	0.1-1um	0.5-6um	0.4-5um			0.25-4um	
Solvent and Chemical Resistance	Resists a v	variety of solvents and dissolves in acetone	chemicals,	Resists a variety of solvents and chemicals. Attacked fluorosolvents and ketones.			
Tg (glass transition)		44.5°C		~95°C from peak on DSC (Viscous Pool by 70°		ool by 70°C)	
Thermal Stability of Dry Film	Can withstand 17	withstand 175°C for 24hrs and maintain repellency Can withstand 175°C for 24		75°C for 24hrs and mai	and maintain repellency		
Contact Angles		WCA/OCA: 105°/65°	/CA/OCA: 105°/65°		WCA/OCA: 120°/80°		
Refractive Index		1.39		n=1.376 @632.8nm			
Solder Through Repairability		Yes			Yes		
Non-flammability		Meets UL 94 V-0		Wi	ll meet UL 94 V-0 (Met	via 5.5)	
Coefficient of Thermal Expansion - TMA	70 um/(m·°C)				In Process		
Thermal Conductivity		0.1 W/m*K			In Process		
Dielectric Constant @ 30% RH		3.2(@1kHz)			In Process		
Dissipation Factor @ 30% RH		0.002(@1kHz)	In Process				
Dielectric Breakdown Strength @ 35% RH		2000 V/mil		3600V/mil			
Cure		None			None		
Application	Anti-stiction, Chemical Protection, Corrosion Protection, Moisture Protection			ture Anti-Wetting, Anti-stiction, Chemical Protection, Corrosio Protection, Moisture Protection			
Application Location	PC	B, Electrical Compone	nts	F	PCB, Electrical Compor	ents	

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1700	NanoProof 3-02	
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1710	NanoProof 3-10	
1902	NanoProof 3-02	
1904	NanoProof 3-04	
1908	NanoProof 3-08	
2704	NanoProof 3-04	
2708	NanoProof 3-08	

#### Figure A

3M™ Novec	<sup>™</sup> Product	Aculon <sup>®</sup> Replacement NanoProof <sup>®</sup> Product		
2704	2708	3-04	3-08	

	2704	2700	J=04	3-00	
Solids	Fluoroacrylate 4%	Fluoroacrylate 8%	Fluoroacrylate 4%	Fluoroacrylate 8%	
Solvent	7200 and <	5% PGMEA	347		
Appearance	Yellow-	Orange	Light Green		
Density	1.4	g/ml	1.5	g/ml	
Viscosity	1.75 cP	4.9 cP	<20 cP	<20 cP	
Boiling Point	78	°C	56	6°C	
Flash Point	No	one	N	one	
Environmental	•	ity, low in GWP, RoHS compliant , contains no chlorine or bromine	Non-ozone depleting, low in toxic and VOC exempt (per U.SEPA)		
Shelf Life	2yrs in unopened packa	ge from manufacture date	2yrs in unopened packag	e from manufacture date	
Thickness (depending on application style)	0.1-4um	0.4-5um	0.25-2um	0.25-4um	
Solvent and Chemical Resistance	-	variety of solvents and chemicals, dissolves in acetone 53°C 795°C from peak on DSC (Vis			
Tg (glass transition)	53			DSC (Viscous Pool by 70°C)	
Thermal Stability of Dry Film	Can withstand 175°C for 24hrs and maintain repellency WCA/OCA: 105°/65°		Can withstand 175°C for 24hrs and maintain repellency		
Contact Angles			WCA/OCA: 120°/80°		
Refractive Index	1.3	9	n=1.376 @632.8nm		
Solder Through Repairability	Ye	es	Y	es	
Non-flammability	Meets UL	94 V-0	Will meet UL 9	4 V-0 (Met via 5.5)	
Coefficient of Thermal Expansion - TMA	88 um/(m·°C)		In	Process	
Thermal Conductivity	0.1 W	//m*K	In Process		
Dielectric Constant @ 30% RH	3.2(@	)1kHz)	In Process		
Dissipation Factor @ 30% RH	0.001(@	@1kHz)	In Process		
Dielectric Breakdown Strength @ 35% RH	2500V/mil		3600V/mil		
Cure			None		
Application	Anti-stiction, Chemical Protection Prote	n, Corrosion Protection, Moisture ection	Anti-Wetting, Anti-stiction, Chemical Protection, Corrosion Protection, Moisture Protection		
Application Location	PCB, Electrica	I Components	PCB, Electrical Components		

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