EPO-TEK® Low Outgassing Adhesives

Products Meeting Standards:

NASA ASTM E595

MIL-STD 883/5011

Telcordia GR-1221

EPOXY TECHNOLOGY

Innovative Epoxy Adhesive Solutions for Over 45 Years™

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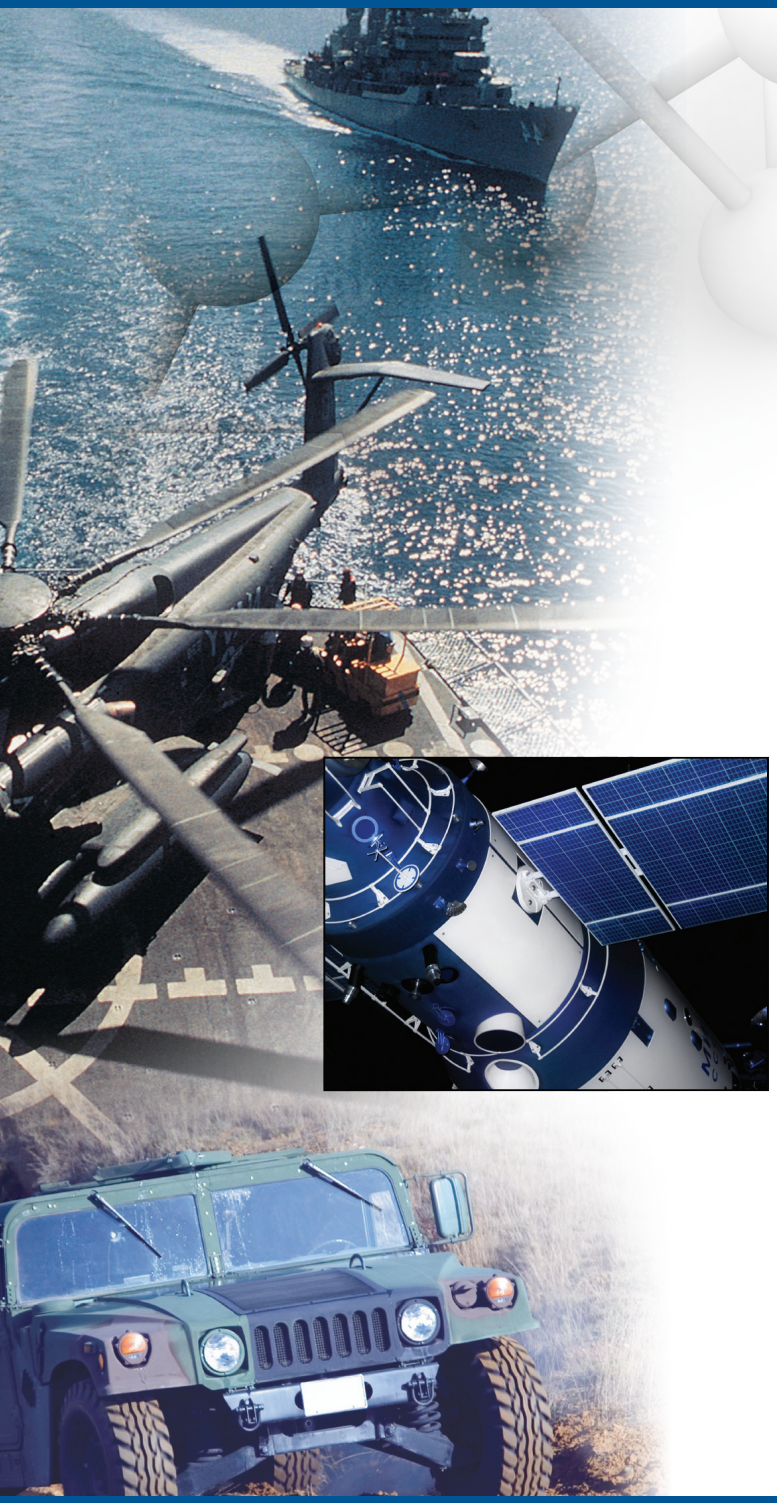


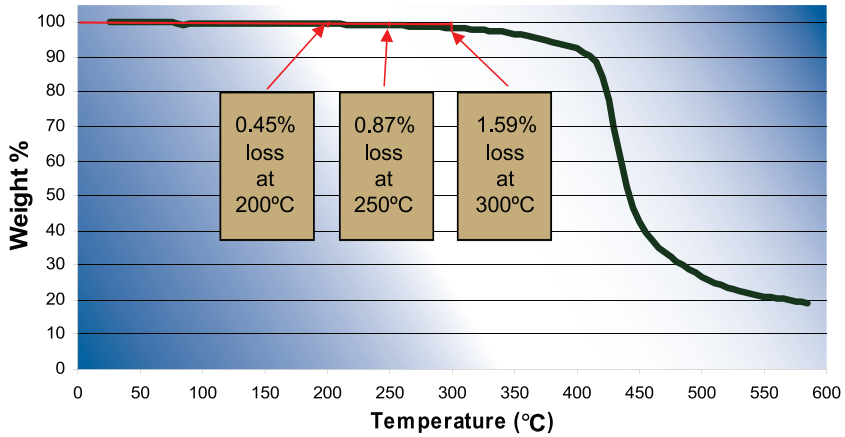
What Is Outgassing?

Outgassing is a measure of the level of residual low molecular weight species (including water if the material is not conditioned in a low moisture environment prior to testing) that can be evolved at elevated temperatures.

How Is It Measured?

One method for measuring levels of outgassing is **Thermal Gravimetric Analysis** or **TGA**. This technique measures very small weight changes in a material as a function of temperature. The resultant percent weight versus temperature curve is then used to determine the weight loss or outgassing at specific temperatures. Below is an example of a typical weight loss vs. temperature scan.

TGA Outgassing Scan*



*Ramp rate, temperature and duration may vary according to the requirements of each standard listed below.

What Are The Standards?

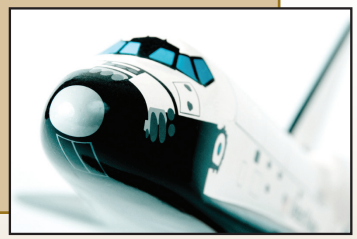
- **NASA ASTM E595**
- **MIL-STD 883/5011**
- **Telcordia GR-1221**

EPO-TEK® Low Outgassing Adhesives

NASA

NASA ASTM E595

Products that meet the **NASA outgassing requirements** must exhibit less than 1.0% Total Mass Loss (TML) after being exposed to 125°C for 24 hours in a vacuum. They must also contribute less than 0.1% Collected Volatile Condensable Materials (CVCM) during this exposure.



Optical Adhesives

Product	TML* (<1.0%)	CVCM** (<0.1%)	Cure Time	Cure Temp (°C)
301	0.98	0.01	1 hour	65
301-2	0.89	0.01	3 hours	80
302-3M	0.70	0.01	7 days	25
314	0.77	0.00	2 hours 1 hour	120 150
353ND	0.76	0.01	30 minutes	100
377	0.54	0.02	1 hour	150
390	0.43	0.01	1 hour	200 ✦
U300-2	0.97	0.01	30 minutes	150

* Total Mass Loss
**Collected Volatile Condensable Materials

✦ This material was pre-dried for 30 minutes at room temperature before the heat cure.

Electrically & Thermally Conductive Adhesives

Product	TML* (<1.0%)	CVCM** (<0.1%)	Cure Time	Cure Temp (°C)
E2101	0.32	0.01	1 hour	150
E2116	0.32	0.01	1 hour	150
E4110-LV	0.97	0.01	3 days 3 hours	25 80
H20E	0.62	0.01	1 hour 4 hours	150 245
H20E-PFC	0.76	0.01	1 hour	150
H22	0.99	0.01	20 minutes	100
H27D	0.52	0.09	1 hour	150
H31	0.54	0.01	1 hour	150
H31D-LV	0.47	0.02	1 hour	125
H35-175MP	0.54	0.01	1 hour	150
H37-MP	0.47	0.02	1 hour	125
H44	0.27	0.00	1 hour	150
H81	0.06	0.00	12 hours	50

MILITARY

MIL-STD 883/5011

For **military applications**, products must produce 1.0% or less outgassing when exposed to 200°C in order to pass MIL-STD 883 Method 5011.

Epoxy Technology is an approved DSCC testing facility for this standard.

Electrically & Thermally Conductive Adhesives

Product	Outgassing (≤1.0%)	Cure Time	Cure Temp (°C)
EK1000-MP	0.11	1 hour	200
H20E-MP	0.25	1 hour	150
H35-175MP	0.33	1.5 hours	150
H37-MP	0.69	1 hour	150

Thermally Conductive Adhesives

Product	Outgassing (≤1.0%)	Cure Time	Cure Temp (°C)
H65-175MP	1.00	1.5 hours	165
H67-MP	0.37	1.5 hours	150

Please consult our Applications Experts at Epoxy Technology for the most suitable adhesives for specific technical challenges.

Thermally Conductive Adhesives

Product	TML* (<1.0%)	CVCM** (<0.1%)	Cure Time	Cure Temp (°C)
920	0.65	0.01	45 minutes	80
930	0.49	0.00	45 minutes	80
H63	0.19	0.01	1 hour	120
H67-MP	0.22	0.01	1 hour	150
H70E	0.99	0.03	12 hours	60
H72	0.31	0.00	30 minutes	100
H73	0.43	0.01	20 minutes	100
H74	0.56	0.00	30 minutes	150
H77	0.22	0.00	1 hour	125
T7109 †	0.80	0.13	1 hour	150

† Under certain cure conditions, this product may be compliant with NASA low outgas requirements.

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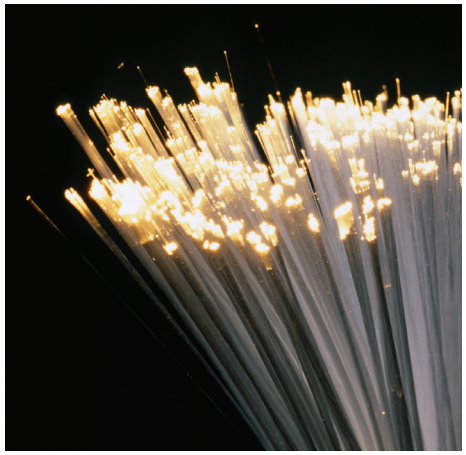
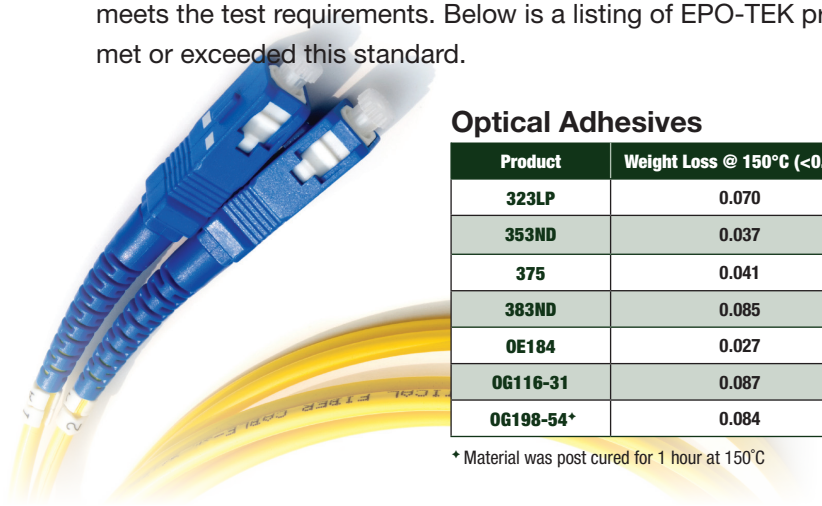
Telcordia® GR-1221 *(previously known as Bellcore®)* Low Outgassing for the Fiber Optic Industry

The fiber optic industry goes by many names including: photonics, telecommunications or optical components. There are many testing requirements within this industry. Epoxy Technology adhesives have been tested in accordance with Telcordia (formerly Bellcore) Standard GR-1221, "*Generic Reliability Assurance Requirement for Passive Optical Components*". This testing helps to assure the practical, useful life for certain manufactured devices relating to long term (25 year) performance.

For this test, the cured adhesive is heated from 50°C to 150°C at 5°C/minute in the TGA. A 0.1% weight loss for heat cured systems and a 0.25% weight loss for UV cured systems is considered evidence of a properly cured system and meets the test requirements. Below is a listing of EPO-TEK products that have met or exceeded this standard.





Optical Adhesives

Product	Weight Loss @ 150°C (<0.1%)	Cure Time	Cure Temp (°C)
323LP	0.070	1 hour	150
353ND	0.037	30 minutes	150
375	0.041	30 minutes	150
383ND	0.085	1 hour	150
OE184	0.027	30 minutes	150
OG116-31	0.087	UV - 2 minutes	320 - 500 nm
OG198-54*	0.084	UV - 2 minutes	320 - 500 nm

* Material was post cured for 1 hour at 150˚C

Company

Since 1966, Epoxy Technology Inc. (EPO-TEK®) has manufactured high quality specialty adhesives for advanced industries worldwide. All Epoxy Technology products are tested thoroughly and consistently in our state-of-the-art laboratories to ensure product reliability.

Epoxy Technology is very proud of its recognized quality program, including comprehensive ISO 9001 and MIL-STD 883/5011 certifications as well as REACH and RoHS Compliance.

As leaders in the industry, superior product quality, exceptional customer service and unsurpassed technical assistance are the foundation of our business.

For additional information, please visit us at: www.epotek.com, or email our Technical Services Group at: techserv@epotek.com

For ordering information contact us at:
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REACH COMPLIANCE

RoHS COMPLIANT

MIL-STD 883/5011 COMPLIANT

ISO 9001 COMPLIANT

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