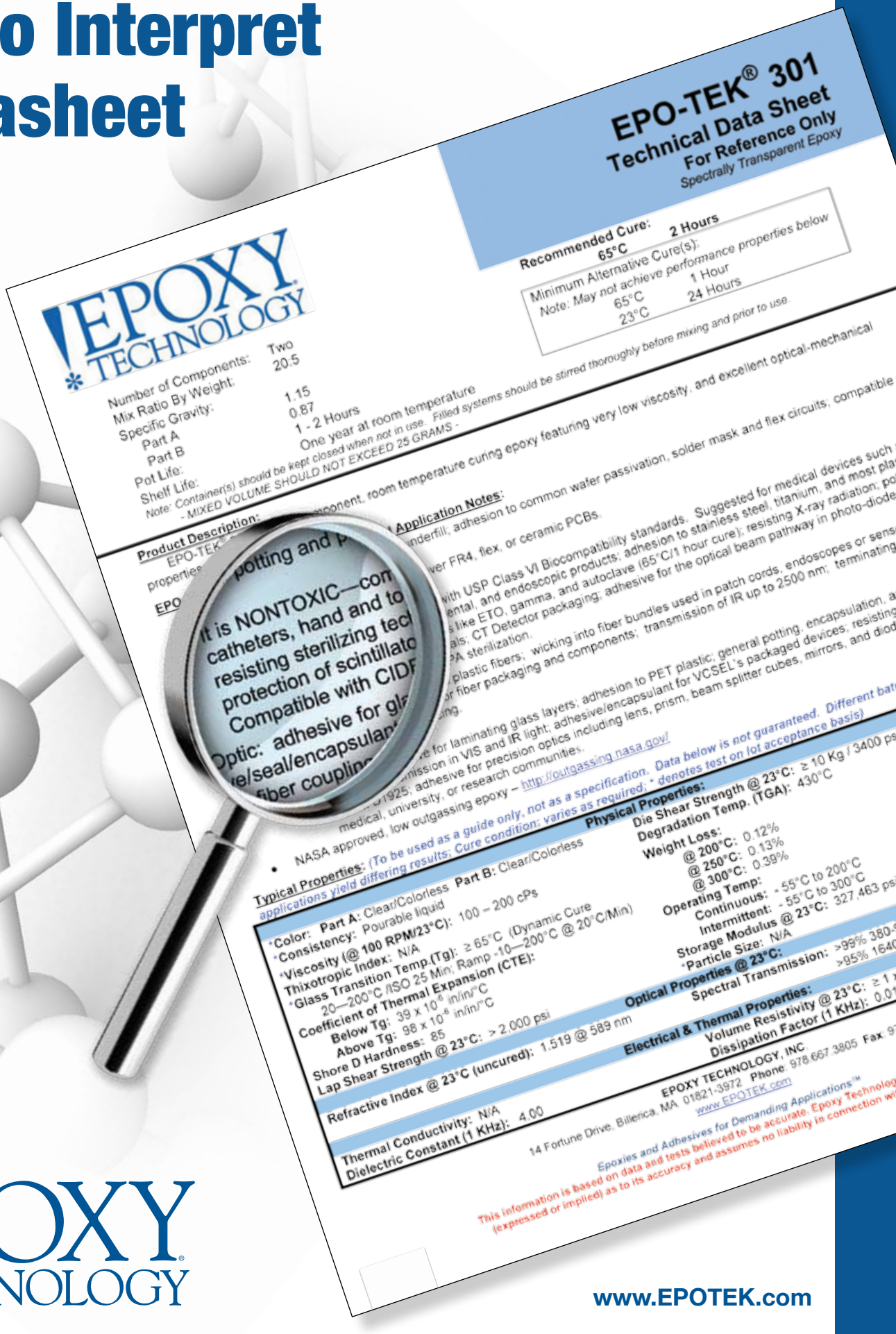
How to Interpret a Datasheet



EPOXY TECHNOLOGY

www.EPOTEK.com

A typical EPO-TEK datasheet is divided into three basic sections:

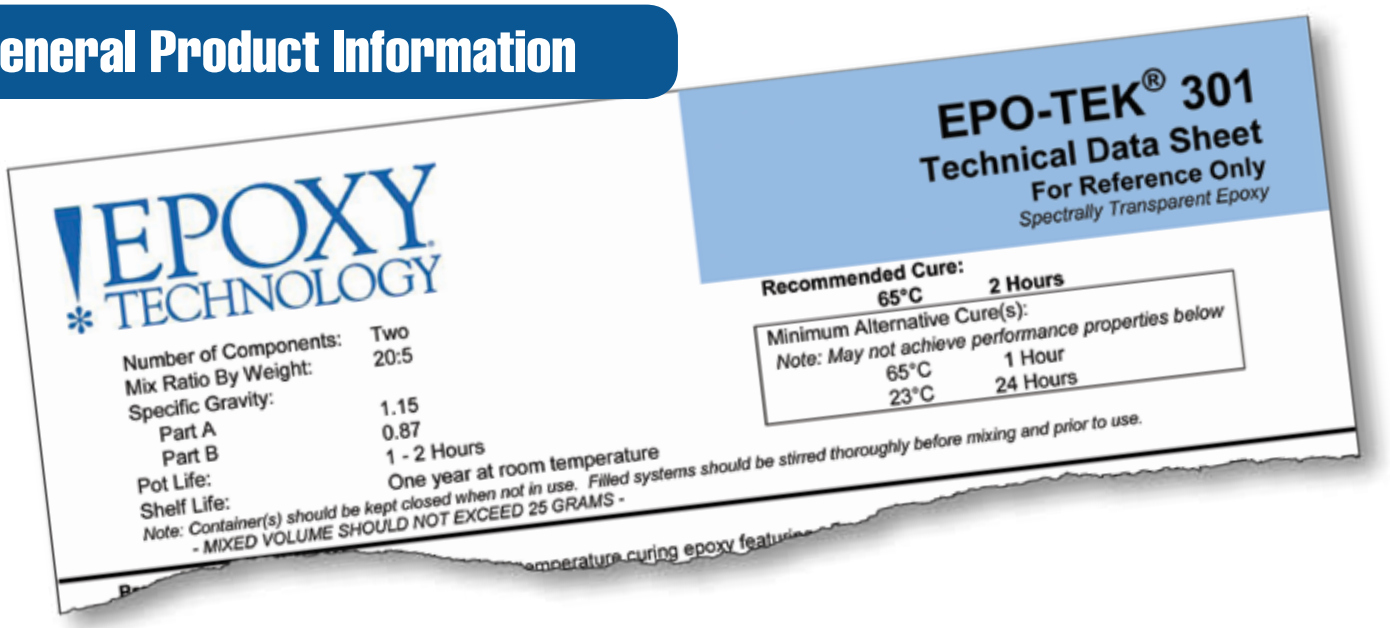
General Product Information

Application Notes

Typical Properties

When selecting an EPO-TEK® product for any application, the datasheet provides excellent information, and is a useful first reference guide. It is therefore important that the datasheet be correctly interpreted in order to achieve the expected properties and to avoid problems with any given product.

General Product Information



Found at the top left of a datasheet, this section specifies whether a product is **one or two components**, its' **mix ratio**, **specific gravity** as well as **pot life and shelf life**.

The pot life is defined to be the amount of time it takes for the viscosity to double, or to quadruple for low viscosity products (<1000 cPs). If a storage temperature is not specified, it can be assumed to be room temperature (23°C).

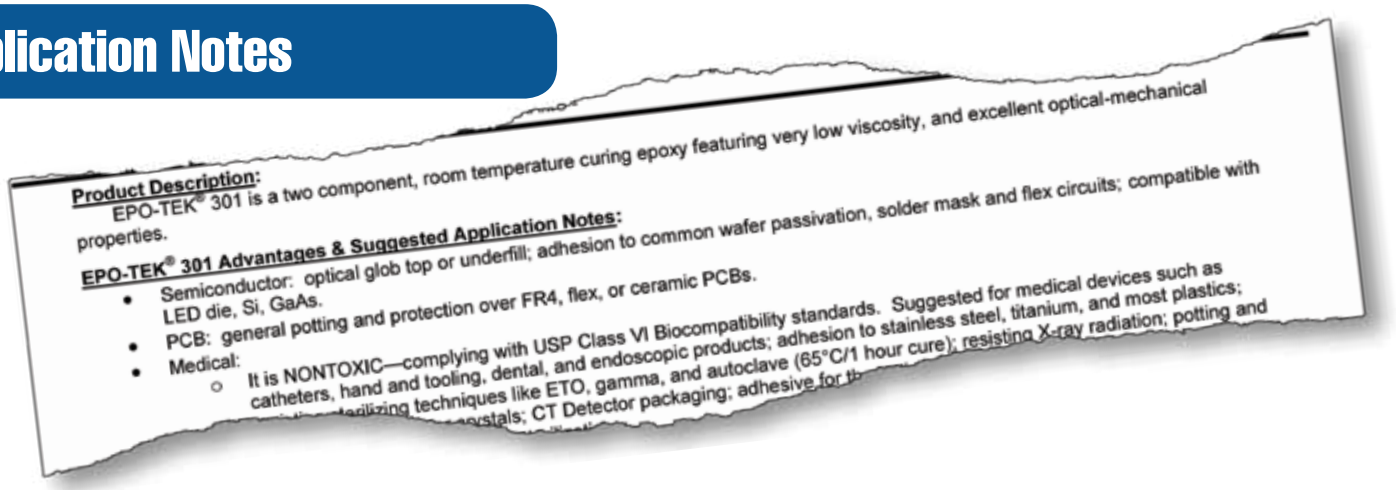
Some datasheets add a second column for an alternate pot life, shelf life, and specific gravity for products commonly sold in pre-mixed and frozen syringes. (If a datasheet does not contain this column, it does not necessarily mean that the product cannot be packaged into a frozen syringe). EPO-TEK does not create separate datasheets for products sold in frozen syringes, as they are the exact same as the two component material.

The top right side of the datasheet provides both the **recommended cure and suggested minimum cure schedules**. **Recommended cure** is the preferred cure schedule for optimal performance. **Minimum alternative cures** are the **minimum to ensure adhesion** and are by no means an absolute best cure recommendation.

Our adhesives will not cure at a temperature lower than the temperature indicated on the datasheet; even if it is cured for a longer time. It should also be noted that the cure schedules listed are all separate cure schedules (one time, one temperature), and are not individual steps in a longer cure process, unless otherwise specified. For additional information on cure, see *EPO-TEK Tech Tip 6*.

Note:
Some products are fast reacting, and can react very quickly or vigorously in large volumes. Datasheets for these products contain a warning below the shelf life and cure schedule area indicating the maximum recommended mass of epoxy to be mixed and/or cured at one time. ***This warning is to avoid a potential runaway reaction and should be followed closely.***

Application Notes



Product Description:
EPO-TEK® 301 is a two component, room temperature curing epoxy featuring very low viscosity, and excellent optical-mechanical properties.

EPO-TEK® 301 Advantages & Suggested Application Notes:

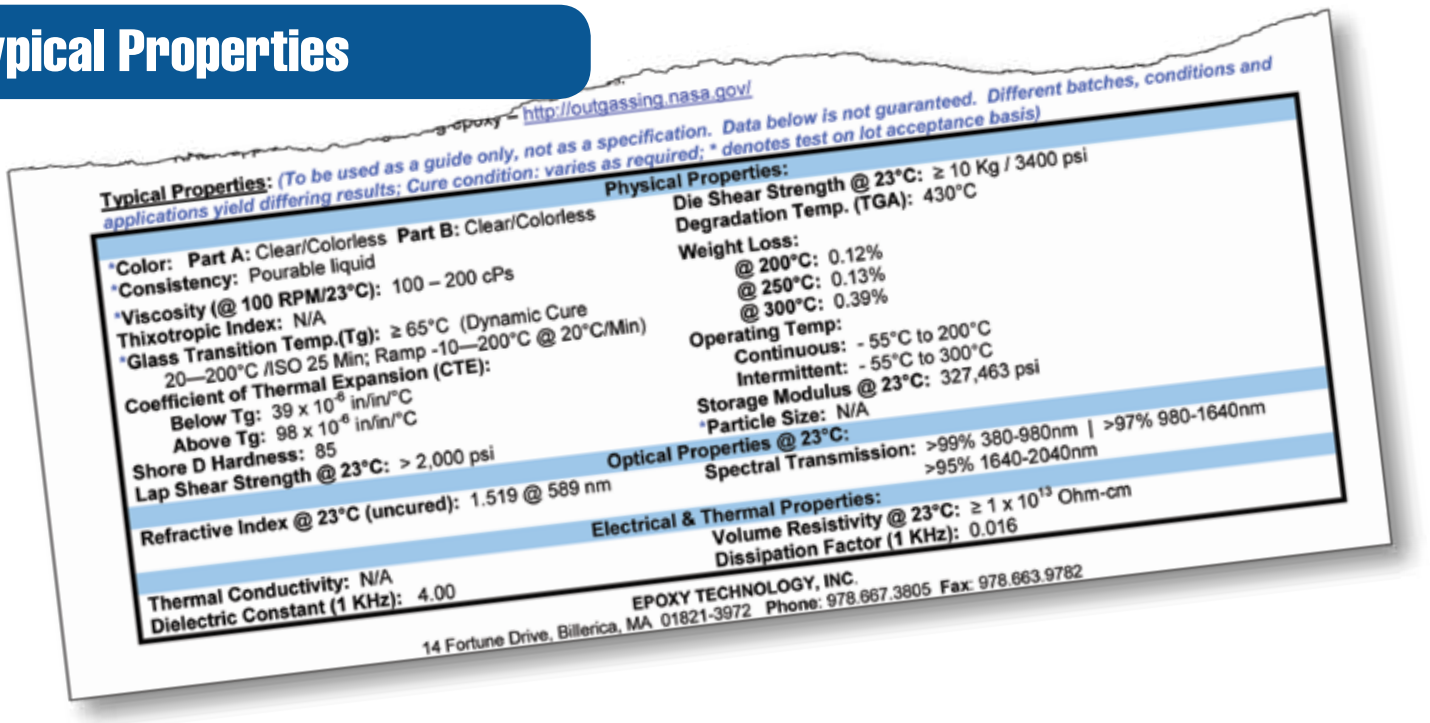
- Semiconductor: optical glob top or underfill; adhesion to common wafer passivation, solder mask and flex circuits; compatible with LED die, Si, GaAs.
- PCB: general potting and protection over FR4, flex, or ceramic PCBs.
- Medical:
  - It is NONTOXIC—complying with USP Class VI Biocompatibility standards. Suggested for medical devices such as catheters, hand and tooling, dental, and endoscopic products; adhesion to stainless steel, titanium, and most plastics; sterilizing techniques like ETO, gamma, and autoclave (65°C/1 hour cure); resisting X-ray radiation; potting and crystals; CT Detector packaging; adhesive for th

The middle portion of a datasheet contains a brief product description and type of epoxy (electrical, thermal, optical, UV, etc.) along with suggested application information.

Subsequent bullets contain detailed descriptions of how the product is commonly used and potential dispense methods.

Also indicated in this section are any special certifications such as: USP Class VI, ISO 10993, MIL-STD 883/5011, or NASA ASTM E595.

Typical Properties



http://outgassing.nasa.gov/

Typical Properties: *(To be used as a guide only, not as a specification. Data below is not guaranteed. Different batches, conditions and applications yield differing results; Cure condition: varies as required; * denotes test on lot acceptance basis)*

*Color: Part A: Clear/Colorless Part B: Clear/Colorless	**Physical Properties:**
*Consistency: Pourable liquid	Die Shear Strength @ 23°C: ≥ 10 Kg / 3400 psi
*Viscosity (@ 100 RPM/23°C): 100 – 200 cPs	Degradation Temp. (TGA): 430°C
Thixotropic Index: N/A	Weight Loss:
*Glass Transition Temp.(Tg): ≥ 65°C (Dynamic Cure 20—200°C /ISO 25 Min; Ramp -10—200°C @ 20°C/Min)	@ 200°C: 0.12%
Coefficient of Thermal Expansion (CTE):	@ 250°C: 0.13%
Below Tg: 39 x 10^{-6} in/in/°C	@ 300°C: 0.39%
Above Tg: 98 x 10^{-6} in/in/°C	Operating Temp:
Shore D Hardness: 85	Continuous: - 55°C to 200°C
Lap Shear Strength @ 23°C: > 2,000 psi	Intermittent: - 55°C to 300°C
	Storage Modulus @ 23°C: 327,463 psi
Optical Properties @ 23°C:	*Particle Size: N/A
Refractive Index @ 23°C (uncured): 1.519 @ 589 nm	Spectral Transmission: >99% 380-980nm | >97% 980-1640nm >95% 1640-2040nm
Electrical & Thermal Properties:	
Thermal Conductivity: N/A	Volume Resistivity @ 23°C: ≥ 1 x 10^{13} Ohm-cm
Dielectric Constant (1 KHz): 4.00	Dissipation Factor (1 KHz): 0.016

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The bottom portion of the datasheet lists product properties measured by Epoxy Technology for both cured and uncured material. These properties are designed to provide an overall picture of expected performance. **Application-specific testing should always be performed by the end user.**

If a property is blank, it either has not yet been tested, or it is not applicable to that specific type of product, for example; not testing the thermal conductivity of an optical product, or the index of refraction for an opaque product.

An asterisk (*) listed next to a property is an indication of a lot acceptance property and is tested on every batch. Each test listed is performed on cured material, unless otherwise noted. Properties that do not have the asterisk are not tested batch to batch, and will usually have a single typical value rather than a lot acceptance range.

Unless otherwise specified, all properties are measured at room temperature (23°C).

Summary Explanation of Datasheet Properties

Property	Notes
Color	Described color on datasheet is prior to cure and may change upon curing. Color falls within the expected internal specification range for a given product. *See EPO-TEK Tech Tip 14.*
Consistency	Describes in words what the viscosity and thixotropic index convey with numbers, such as: smooth thixotropic paste or pourable liquid.
Viscosity	Based on ½ cc of product, and is measured with a Brookfield Viscometer. Different viscometers, speeds, and amounts of material can yield different values for viscosity. Not all products are measured at the same RPM; the RPM chosen is determined by which speed will yield the best resolution. *See EPO-TEK Tech Tip 3.*
Thixotropic Index	If listed as N/A, the value can be assumed to be "1" meaning the material is not thixotropic. *See EPO-TEK Tech Tip 3.*
Tg	Dynamic cure is used to yield the maximum Tg. Individual oven cures can yield slightly different results. This dynamic cure is not recommended as a standard cure schedule. *See EPO-TEK Adhesive Application Guide* for Test Method details.
CTE	*See EPO-TEK Adhesive Application Guide,* for Test Method details.
Hardness	Shore A indicates softer materials. Shore D indicates harder materials. Values of +/- 5 are acceptable.
Lap Shear Strength	*See EPO-TEK Adhesive Application Guide,* for Test Method details.
Die Shear Strength	*See EPO-TEK Adhesive Application Guide,* for Test Method details.
Degradation Temperature	*See EPO-TEK Adhesive Application Guide,* for Test Method details.
Weight Loss	A quantitative look at outgassing. If a material seems to be low outgassing, but it is not indicated that it meets NASA ASTM E595, it may simply have yet to be tested under exact NASA specs.
Operating Temperature	Operating temperatures are recommendations based on outgassing and the degradation temperature of the epoxy.
Storage Modulus	Measured using Dynamic Mechanical Analysis (DMA). Good proxy to Young's Modulus. *See EPO-TEK Tech Tip 19.*
Ions	Only reported if a particular ion exists in the product. If blank, no ion data is available.
Particle Size	Based on the Hegman Gauge, with a tolerance of +/- 10 microns. *See EPO-TEK Tech Tip 17.*
Thermal Conductivity	Highly cure dependent. Not measured for products that are not designed for applications requiring thermal conductivity.
Volume Resistivity	Read at 23°C, but based on the cure indicated under "Typical Properties", unless otherwise specified.
Dielectric Constant	Measured at the frequency indicated.
Dissipation Factor	Measured at the frequency indicated.
Spectral Transmission	Tested for optical products only. Thickness of the test sample varies from product to product. Typically reported between 400 and 2000nm. *See EPO-TEK Tech Tip 18.*
Index of Refraction	Tested for optical products only. Test is run at 589nm for uncured material only. Index increases when the product cures, and decreases with increasing wavelength. *See EPO-TEK Tech Tip 18.*

Please consult our Technical Experts for any questions or assistance at techserv@epotek.com.

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