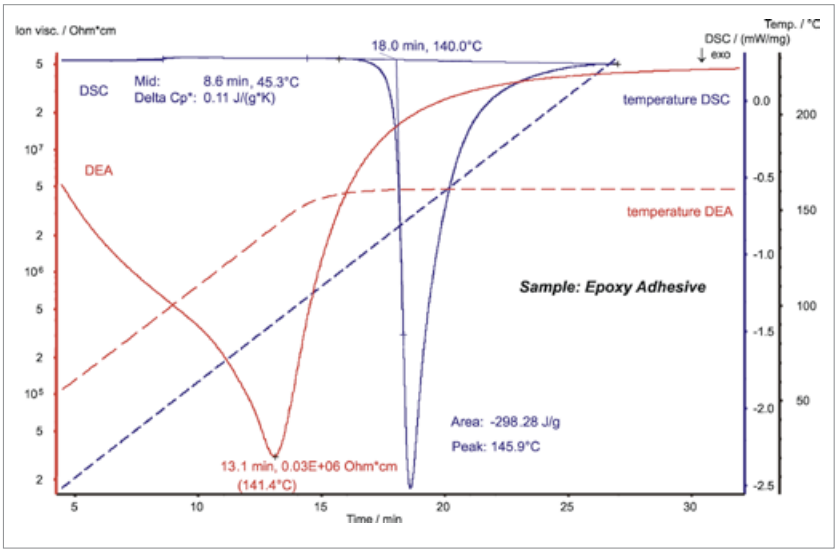
APPLICATION**SHEET**

POLYMERS – ADHESIVES

EPOXY RESIN

Epoxy resins are used in the construction of airplanes, automobiles, bikes, golf clubs, skis, snowboards, and many other applications where high strength bonds are required. Epoxy adhesives are exceptional adhesives for wood, metal, glass, stone, and some plastics. They can be made flexible or rigid, transparent or opaque/colored, fast setting or extremely slow. Epoxy adhesives are almost unmatched in heat and chemical resistance among common adhesives. In general, epoxy resins cured with heat will be more heat- and chemical-resistant than the same formulation cured at room temperature.



Instrument

DSC 200 F3 *Maia*®/DEA 230/2 *Epsilon*

Test Conditions DSC

Temperature range	-20 ... 230°C
Heating rate	10 K/min
Atmosphere	Nitrogen (20 ml/min)
Crucible/sensor	Al, pierced lid
Sample mass	14.27 mg
Frequency	-

Test Conditions DEA

Temperature range	25 ... 160°C and isothermal
Heating rate	10 K/min
Atmosphere	Static air
Crucible/sensor	IDEX sensor (comb structure and electrode distance of 115 µm)
Sample mass	Sample spread on sensor
Frequency	1 Hz

NGB · AS · 131-2006 · EN · 07/13 · Technical specifications are subject to change.

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Results

DSC curve (blue curve): The endothermic step at 45°C (mid-point) is due to the glass transition of the uncured resin. The exothermic effect at 18 min (140°C, onset) corresponds to the beginning of the curing process and provides the curing peak at 146°C with an enthalpy of 299 J/g.
DEA curve (red curve): During the heating segment, the ion viscosity of the sample decreases because of the softening of the material. It increases after 13.1 minutes (141.4°C) indicating the beginning of the curing process.

Curing is not entirely finished at 170°C after 32 min since the ion viscosity still slightly increases. The DSC 200 ***F3*** *Maia*® and DEA 230/2 Epsilon are ideal tools to study the curing behaviour of resins. The results show the excellent correlation of these complementary techniques. In contrast to DSC, the DEA technique can show the flow behaviour (low ion viscosity level) before curing and can be used in-process (on the production line), not only in the laboratory.

Instrument

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