ResinFormulators
INNOVATIVE MATTERS

FULL-SERVICE LABORATORY AND TESTING SERVICES

Resin Formulators, the custom formulation division of GracoRoberts, is the time-tested and trusted brand of epoxy resins that can be uniquely customized, tested and certified on-demand.

We are excited to announce that we have built a completely new, state-of-the-art facility which includes a laboratory designed for state-of-the-art product development and expansive in-house mechanical testing capabilities. Our brand new, fully certified lab has tripled in size, and we've made significant investments in advanced testing equipment and chemical storage space. Resin Formulators' in-house testing capabilities speed up the product development timeline by fifty percent, and increases our ability to test for customer specifications, batch requirements, and assist with expedite delivery needs. Our advanced testing equipment enables us to test a wide range of unique physical and mechanical properties and make informed suggestions for production usages.

Customers benefit from our adaptable and nimble quality-focused approach and world-class technical and service experts who are dedicated to understanding your specification requirements. As part of the product development experience, you will receive a TDS with full specifications to verify that what we have formulated meets your requirements.

COMMITMENT TO QUALITY AND SERVICE

GracoRoberts and Resin Formulators are fully qualified to design, manufacture, and distribute products to a variety of industries. We are independently certified to three rigorous international quality standards: ISO 9001:2015, AS9100 (Rev. D) and AS9120 (Rev. B).

To verify compliance with the requirements of these certifications, we engage in routine on-site examinations and audits of our processes. These certifications, along with stringent self examination practices, help ensure that we provide the highest quality products and services to our customers.

AUTHORIZED TESTING CAPABILITIES

- Cure kinetics
- Density
- Specific gravity
- Viscosity
- Water absorption
- Compression
- Fracture toughness
- Shore hardness
- Lap shear
- Elongation
- Modulus
- Tensile strength
- Degree of cure
- Gel time
- Glass transition
- Heat capacity
- Melting point
- Reaction kinetics
- Dynamic mechanical analysis
- Differential scanning calorimetry
- Coefficient of thermal expansion (CTE)

TESTING EQUIPMENT

- Mechanical testing machine
- Rheometer/Parallel Plate viscometer
- Brookfield viscometer
- Instron Hardness devices, 00/A/D
- DSC
- DMA
- FTIR
- Boilers

MEET YOUR EXPERTS

DOUG SODEN, SENIOR RESEARCH CHEMIST

Doug Soden is Resin Formulators' in-house Senior Research Chemist and has over 37 years of extensive chemical research knowledge. He helps customers design and test new custom formulations or modify existing products using a comprehensive design, development, and review process.

DAVID ASH-GILBERT, DIRECTOR OF PRODUCT DEVELOPMENT

David Ash-Gilbert is Resin Formulators' Director of Product Development and utilizes his 15 years of experience to create unique solutions for the aerospace, electronics, and other advanced manufacturing industries. He is dedicated to offering consultative technical support to develop high-quality and cost-effective solutions for customers.

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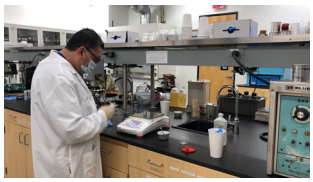

Resin Formulators, the custom formulation division of GracoRoberts, is the time-tested and trusted brand of epoxy resins that can be uniquely customized, tested and certified on-demand.

The in-house chemical testing services performed by Resin Formulators' team of highly experienced chemists and technicians cover a wide-range of physical and mechanical techniques to ensure the quality and desired performance of your specialty chemical products. Our testing capabilities speed up the product development timeline by fifty percent, and increases our ability to test for customer specifications, batch requirements, and assist with expedite delivery needs.

We are pleased to offer the following advanced testing services which enable us to test a wide range of unique physical and mechanical properties to support your product engineering and quality control efforts.

Resin Formulators can also test customer-supplied material for an additional fee.

LAB TESTING SERVICES

COMPRESSION STRENGTH | $450

Compression Strength is the stress required to cause plastic deformation. Plastic deformation is the permanent change in the shape or size of a solid body without fracture, resulting from sustained stress beyond the elastic limit. Cylinder shaped specimens are placed in a test machine that applies an increasing compressive force until plastic deformation weakens the sample. The highest force recorded prior to deformation is the Compression Strength.

CTE | $350

Coefficient of linear thermal expansion of solid materials using thermomechanical analysis techniques.

DEGREE OF CURE | $450

The Degree of Cure is one of the key state variables in that it can describe the physical state of the thermoset as it transitions from a flowing resin into a solid matrix material. The degree of cure value can provide insight as to whether the polymer is still a flowing resin, has become a gelled semi-solid, or become a physical solid with some insight into the potential mechanical strength of that solid.

DENSITY (SPECIFIC GRAVITY) | $100

Density is mass divided by volume. We conduct these tests after conditioning the material to 75°F (24°C) to eliminate variation in density assessment due to temperature variation. Density will be provided in either pounds per gallon, or grams per cubic centimeter (also referred to as specific gravity).

DIFFERENTIAL SCANNING CALORIMETRY (DSC) | $350

DSC is a thermal analysis apparatus measuring how physical properties of a sample change, along with temperature against time. In other words, the device is a thermal analysis instrument that determines the temperature and heat flow associated with material transitions as a function of time and temperature.

DYNAMIC MECHANICAL ANALYSIS (DMA) | $450

A Dynamic Mechanical Analysis, otherwise known as DMA, is a technique where a small deformation is applied to a sample in a cyclic manner. This allows the materials' response to stress, temperature, frequency, and other values to be studied. It is extremely useful for defining engineering limitations for a materials capacity to withstand specific temperature exposure.

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LAB TESTING SERVICES (CONT.)

ELONGATION (RESIN CHARACTERIZATION) | $250

As a specimen is stretched due to tensile stress, the percent change from the original length is recorded with an extensometer. The elongation at the point of ultimate failure is reported.

FOURIER TRANSFORM INFRARED SPECTROSCOPY (IR OR FTIR) | $250

Fourier Transform Infrared Spectroscopy (FTIR) is a technique used to obtain infrared spectrum of absorption, emission, and photoconductivity of a solid, liquid, or gas. It is used to detect different functional groups in PHB. FTIR spectrum is recorded between 4000 and 400 cm−1. The resulting image is a chemical fingerprint of the material in question.

GEL TIME | $150

Gel Time is the time it takes for a mixed resin system to gel or become so highly viscous that it can no longer be considered workable or able to be handled. These tests are run using a 100-gram mass in our gel time test device.

GLASS TRANSITION (TG) | $350

Glass Transition Temperature (Tg) is a very useful property for understanding the thermal characteristics of an epoxy resin system. The Tg is the temperature at which the epoxy changes from a glassy (solid) state to a soft, rubbery state. It can be considered the point at which a measurable reduction in physical properties occurs resulting from exposure to elevated temperatures. Please note that Tg values can be reported after a second heat. The second heat is the process of testing the sample after it has been exposed to an initial first heat which results in an elevated temperature, 392°F (200°C), post-cured sample. The second scan test is useful to understand the outcome of a post cure exposure to the resin system, which, in many cases can boost the defined temperature resistance.

HEAT CAPACITY | $350

Heat capacity describes how much heat must be added to a substance to raise its temperature by 1 degree Celsius.

HEAT OF REACTION/CURE KINETICS | $350

This test method determines the exothermic heat of reaction of thermally reactive chemicals or chemical mixtures, using milligram specimen sizes, by differential scanning calorimetry. This test method is useful in determining the extrapolated onset temperature, the peak heat flow temperature and the heat of reaction of a material via ASTM E2160.

LAP SHEAR (ASTM D1002) | $350

Lap Shear measures the strength of an epoxy bonded joint when loaded in shear. The test is performed by bonding two metal coupons together with a 1/2" overlap and then pulling them apart with tension in a test machine. The tensile force creates a shear force in the bond line and the resulting stress is reported as the Lap Shear strength.

MELTING POINT | $350

Determining the melting point of a compound is one way to test if the substance is pure.

MIXED VISCOSITY | $250

Mixed Viscosity is the measurement of a materials resistance to flow for an A/B material system. Viscosity is taken at 75° F for the catalyzed resin system and is designed to assist with manufacturing process development.

MODULUS (RESIN CHARACTERIZATION) | $400

The slope of stress applied to deform a specimen, and the percent change in the deformation along the direction of stress is defined as the modulus. This linear relationship holds indefinitely until the material is deformed passed its yield point, and will no longer reversibly deform and reform under load. The modulus may be analyzed in tension, compression, or flexure in a 3-point bending configuration.

POT LIFE | $200

Pot Life is the amount of time a mixture of resin and hardener has a workable viscosity while in the mixing container. Pot life is determined using 100-gram sample mass in a standardized container at 75° F. Both mass and ambient temperature affect the rate at which an epoxy system will cure. Pot life should be used only for comparative purposes when evaluating a resin system's cure time.

LAB TESTING SERVICES (CONT.)

SHORE HARDNESS (00, A , D) | $100

Hardness is a measure of how hard the surface of a substance is. The harder the surface of a coating is, the more abrasion resistant it is. We test for this with a durometer which accurately measures the hardness of the surface of a cured resin. We use a Shore 00/A/D testing devices to assess a wide range of material hardnesses. Because hardness increases with degree of cure, the test is conducted after 5 days of cure at room temperature, or following an appropriate oven curing profile for the material in question. The results of a hardness test can also be important for comparative purposes or determining the degree of cure.

SUB AMBIENT (-80F) AND ELEVATED (600F) LAP SHEAR TESTING) | $600

(Price is per set of 5 specimens)

Testing of tensile lap shears at either sub ambient or elevated temperature range from -200F to 600F. Specimens will be conditioned in thermal chamber for 10 minutes at desired testing temperature, then pulled inside the thermal chamber at the defined temperature.

TENSILE STRENGTH | $450

Tensile Strength is the stress that is required to fracture the epoxy and cause a failure. During this test, dog bone-shaped specimens are placed in a test machine that applies an increasing tensile force until failure. The highest stress recorded prior to failure is the Tensile Strength.

T-PEEL STRENGTH | $475

(Customer-supplied coupons required)

The primary purpose of this test method is to determine the relative peel resistance of adhesive bonds between flexible adherends by means of a T-type specimen. The term flexible refers to the ability of the adherend to bend through 90° without breaking or cracking.

VISCOSITY: BROOKFIELD, ELEVATED TEMPERATURE ASSESSMENT | $250

This test provides the materials' resistance to flow when tested at elevated temperature. The testing temperature ranges from 75° F to 400° F. Material resistance to flow will decrease as temperature increases. This test is designed to assist with manufacturing process development.

VISCOSITY: BROOKFIELD, AMBIENT | $200

This test measures the materials' resistance to flow. Testing is conducted after conditioning the sample to 75° F to standardize outcomes relevant to a set temperature as the material flow will change as a product is heated or cooled.

VISCOSITY: PARALLEL PLATE | $1,000

Viscocity testing uses a parallel plate rheometer, in which a small sample is placed between two oscillating parallel plates and then heated. During curing, the resin is converted from a liquid (not cross-linked) or semi-solid into a rigid cross-linked solid.

WATER ABSORPTION | $150

The Water Absorption test is used for the calculation of the relative water absorption rate by plastics during immersion in specified conditions. The samples are dried for a given time at specified temperature and then cooled to 75F. The samples are measured immediately after cooling. Then the material is placed inside water under specified conditions, usually at 23°C for 24 hours or until it reaches an equilibrium. Finally, the samples are removed from the water, patted dry with a lint-free cloth, and weighed. Water absorption is expressed as an increase in weight percent.
Percent Water Absorption = [(Wet weight – Dry weight)/ Dry weight]100

CUSTOMER SUPPLIED COUPONS | $450 SPECIMEN PREP & TESTING FEE | $600

Customers may supply their own material and this service includes 5 specimens per test. Additional specimen prep and testing fee is required.