



**HIGH PERFORMANCE
EPOXY SYSTEMS FOR
INDUSTRIAL APPLICATIONS**



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Quality in Service and Products



Epoxy Systems For Room Temperature Service

EPOXY SURFACE COATS FOR TOOLING

Epoxy surface coats are generally paste-viscosity resins designed to be applied by brush or squeegee to a model or pattern and function as the surface of the cured tool. They generally possess handling properties that facilitate easy mixing and application, and their cured properties provide a tough, durable surface that can be sanded or scribed with ease. The products listed in this section are designed to be used in normal ambient temperature

PT1105	White general purpose surface coat with smooth thixotropic viscosity. Applies well to severely contoured surfaces without drain or run-off.
PT1154	Thixotropic, off-white, soft paste viscosity surface coat that has a lower mixed viscosity than PT1105 for faster & easier application to broad flat tooling surfaces.
PT1158	A white, very low viscosity surface coat system for special applications where its ability to duplicate fine detail is very important.
PT1414	Blue abrasion resistant surface coat and die casting resin. The extremely hard surface wears well in demanding applications. Can be cast in thin sections for facing dies, and is an excellent adhesive which will bond very well to a variety of surfaces.

EPOXY LAMINATING SYSTEMS

Epoxy laminating resin systems consist of both unfilled materials and filled products that are intended for use with reinforcing fabrics to construct high performance composite tooling and prototype and/or production parts. The pertinent handling and cured properties of these systems are listed on the next page to aid in selecting the right material for your application. The products listed in this section are designed to be used in normal ambient temperature applications where no external heat is applied.

PT2050	Medium viscosity, unfilled, light amber laminating resin that is designed for structural and production applications. It has excellent wet-out of fiberglass, carbon and aramid fibers, and has very good cured properties.
PT2059	General purpose unfilled system for use in fabricating tooling or structures for room temperature service applications. It has good handling and cured properties.
PT2114	White filled laminating system with easy handling characteristics for durable stable tooling. It has minimum drain on vertical and contoured surfaces.
PT2125	White, room temperature laminating system with slightly heavier viscosity than PT2114. An economical filled system for general tooling uses.
PT2179	White filled laminating system for producing a wide variety of tooling and fixtures that are economical and durable.

EPOXY CASTING SYSTEMS

Epoxy casting resins are versatile products that can provide an excellent solution to a variety of industrial applications. They generally contain a filler of some type that is provided to produce specific handling or cured properties. These fillers can be of a metallic nature, or of a variety of non-metal fillers. The specific fillers used can provide lower shrinkage, higher compressive strengths, better metal forming properties, or other characteristics suited to a particular use. A variety of systems, for room temperature service are listed here. Each has different hardeners available, to more closely match the material to the application. The products listed here are designed to be used in normal ambient temperature applications where no external heat is applied.

PT4151	A tan non-metallic filled system with features especially designed for tough metal forming applications.
PT4250	A bright white, non-metallic filled system well suited to a variety of tooling and production operations.
PT4420	Gray aluminum filled system with good cured toughness and easy machining.
PT4431	Gray aluminum filled casting resin with lower viscosity for easier pouring and good detail reproduction. Works well with PA0703 aluminum needle bulk filler.
PT4450	Black iron filled resin with lower viscosity for easier handling and pouring.
PT4455	Black highly filled casting resin with very high cured properties. High iron content yields very low cured shrinkage for accurate castings.

SPECIALTY EPOXY SYSTEMS FOR ROOM TEMPERATURE SERVICE

These products are paste viscosity filled epoxy systems designed for use in a number of applications. Generally, they have been formulated for a particular purpose, and have characteristics suited to such use. The individual descriptions outline the intended use of each, and describe their suitability to the task. The products listed here are designed to be used in normal ambient temperature applications where no external heat is applied.

PT5315	This is a machinable epoxy styling compound.
PT5326	Light blue smooth paste viscosity resin designed for a variety of splining, filling and patching uses.
PT5331	A light blue syntactic foam system designed for use as a lightweight backup material for tooling surfaces.
PT5355	White filled epoxy laminating system with cured fire retardant characteristics that meet the requirements of FAR 25.853 specification.
RT₂C	A strong, lightweight, fiber reinforced paste system for use in preparing sandwich panel tooling, fixtures or other structures.

PRODUCT SPECIFICATIONS and SELECTED MECHANICAL PROPERTIES*

Product	Color	Mixed Viscosity	Cured Hardness	Specific Gravity	Tensile Strength	Flexural Strength	Compressive Strength
EPOXY SURFACE COATS FOR TOOLING							
PT1105	White	Thixotropic Paste	88-91 Shore D	1.27	6,300 psi	7,100 psi	15,300 psi
PT1154	Off-White	Thin Paste	86-88 Shore D	1.35	6,730 psi	14,604 psi	16,030 psi
PT1158	White	Very Thin Paste	90 Shore D	1.29	9,355 psi	19,659 psi	15,553 psi
PT1414	Blue	50,000 cps	90 Shore D	1.71	6,500 psi	9,700 psi	17,400 psi
EPOXY CASTING SYSTEMS							
PT4151	Tan	6,500 cps	85 Shore D	1.34	9,200 psi	13,500 psi	17,000 psi
PT4250	White	1,300 cps	87 Shore D	1.56	7,000 psi	12,500 psi	13,000 psi
PT4420	Gray	80,000 cps	89 Shore D	1.69	9,650 psi	6,400 psi	16,000 psi
PT4431	Gray	5,400 cps	90 Shore D	1.51	8,900 psi	10,450 psi	15,800 psi
PT4450	Black	6,500 cps	89 Shore D	1.62	8,450 psi	11,870 psi	12,200 psi
PT4455	Black	18,000 cps	90 Shore D	2.24	8,300 psi	9,400 psi	17,500 psi

Product	Color	Mixed Viscosity	Cured Hardness	Specific Gravity	Tensile Strength	Flexural Strength	Flexural Modulus
EPOXY LAMINATING SYSTEMS							
PT2050	Amber	950 cps	87 Shore D	1.12	45,362 psi	65,380 psi	2,530,000 psi
PT2059	Amber	900-1000 cps	82 Shore D	1.09	31,030 psi	65,048 psi	1,941,597 psi
PT2114	White	3,100 cps	88 Shore D	1.38	29,200 psi	32,850 psi	2,524,300 psi
PT2125	White	4,200 cps	88 Shore D	1.45	31,420 psi	41,400 psi	2,010,000 psi
PT2179	White	5,000 cps	89 Shore D	1.43	26,390 psi	43,153 psi	2,730,000 psi
SPECIALTY EPOXY SYSTEMS FOR ROOM TEMPERATURE SERVICE							
PT5315	Gray	Smooth Putty	48 Shore D	0.57	725 psi	1,423 psi	110,944 psi
PT5326	Light Blue	Creamy Paste	86 Shore D	1.54	3,750 psi	6,500 psi	14,210 psi
PT5331	Blue	Syntactic Paste	55 Shore D	0.61	1,210 psi	1,690 psi	2,720 psi (Compressive)
PT5355	White	900-1000 cps	88 Shore D	1.19	45,775 psi	59,437 psi	2,894,587 psi
RT₂C	Green	Smooth Paste	68-70 Shore D	0.7	3,929 psi	7,000 psi	608,000 psi

* Individual Product Bulletins are available for download at our web site (www.ptm-w.com). They contain complete handling guidelines, packaging information, and additional cured properties.



Epoxy Systems For High Temperature Service

EPOXY SURFACE COATS FOR TOOLING

Epoxy surface coats are generally paste-viscosity resins designed to be applied by brush or squeegee to a model or pattern and function as the surface of the cured tool. They generally possess handling properties that facilitate easy mixing and application, and their cured properties provide a tough, durable surface that can be sanded or scribed with ease. The products listed in this section are designed for use in applications where the cured tooling is exposed to elevated temperatures in service.

PT1520	Gray, general purpose, aluminum filled surface coat for intermediate high temp. service, with a smooth thixotropic paste viscosity
PT1540	Black graphite filled surface coat for high temperature service, with a thin paintable viscosity.
PT1554	Gray general purpose aluminum filled surface coat system with slightly lower viscosity than PT1520.
PT1935	Black high temperature surface coat that can be polished to a high gloss when cured.
PT1945	Black high temperature surface coat with special characteristics developed for prepreg layup tooling. Carbide filled for a very tough hard surface that resists damage caused by cutting prepreg right on the tool surface.
PT1995	Black graphite filled surface coat for high temperature service, with thermal expansion characteristics designed for high performance composite tooling.

EPOXY LAMINATING SYSTEMS

Epoxy laminating resin systems consist of both unfilled materials and filled products that are intended for use with reinforcing fabrics to construct high performance composite tooling and prototype and/or production parts. The pertinent handling and cured properties of these systems are listed on the next page to aid in selecting the right material for your application. The products listed in this section are designed for use in applications where the cured tooling is exposed to elevated temperatures in service.

PT2520	Medium viscosity, unfilled, light amber laminating resin that is designed for the construction of tooling and components that will operate in the intermediate high temperature range. Cured structures are durable and have good heat resistance.
PT2620	Gray filled intermediate high temperature laminating resin for tools and fixtures. Filled to allow lower shrinkage and laminating on vertical and severely contoured surfaces without runoff. Three hardeners for a variety of laminate sizes.
PT2846	Amber unfilled high temperature epoxy laminating resin designed specifically for demanding high performance composite tooling. Good handling and fabric penetration, and very high physical properties.
PT2848	Black, lightly filled high temperature epoxy laminating resin designed specifically for demanding high performance composite tooling. Good handling and fabric penetration, and very high physical properties.

EPOXY CASTING SYSTEMS

Epoxy casting resins are versatile products that can provide an excellent solution to a variety of industrial applications. They generally contain a filler of some type that is provided to produce specific handling or cured properties. These fillers can be of a metallic nature, or of a variety of non-metal fillers. The specific fillers used can provide lower shrinkage, higher compressive strengths, better metal forming properties, or other characteristics suited to a particular use. Two systems, for high temperature service applications are listed here. Both have different hardeners available to more closely match the material to the requirements of the application.

PT4925	Gray high temperature epoxy casting resin with a very high aluminum filler content. Finished casting looks, feels and machines like an aluminum casting. Very good heat resistance and thermal conductivity, and very high compressive strength.
PT4935	Gray casting resin with excellent heat resistance and handling qualities. Lower viscosity allows easy mixing and pouring to pick up fine detail with ease. Fillers do not hard pack in transit or storage. Works well with PA0703 aluminum needles bulk filler.

SPECIALTY EPOXY SYSTEMS FOR HIGH TEMPERATURE SERVICE

These products are paste viscosity filled epoxy systems designed for use in a number of applications. Generally, they have been formulated for a particular purpose, and have characteristics suited to such use. The individual descriptions outline the intended use of each, and describe their suitability to the task. The two products listed here are designed for use in elevated temperature service applications.

PT5965	A tan paste epoxy system designed for general patching and the bonding or potting of inserts and bushings into tools and fixtures. Mix ratio can be varied between 100 : 20 and 100 : 30 to adjust the mixed viscosity and/or working time to suit the application.
HT₂C	High temperature, lightweight, fiber reinforced paste system for use in preparing sandwich panel tooling, fixtures or other structures. Similar handling and cured properties to RT ₂ C with higher heat resistance up to 350°F.



EPOXY LAMINATING SYSTEMS FOR THE VARTM PROCESS

Vacuum-Assist Resin-Transfer Method (VARTM) is the procedure of infusing a resin matrix into plies of dry fabric, under vacuum, to make composite laminates. In this process, dry plies of fabric are laminated onto a hard mold surface along with release plies, flow media, vacuum lines, and resin distribution lines, with the entire laminate placed under a vacuum bag. Infusion resin/hardeners are batch-mixed and sucked into the laminate, by vacuum, through resin distribution lines. VARTM-type resin systems are identified by very low mixed viscosities and longer working times. Resin infusion for tooling has a number of advantages over using prepreg tooling materials: much lower material costs; easier ply positioning; less chance of delamination; no autoclave required; room-temperature demold; free-standing post cure; no refrigerated storage and long shelf life. Resin infusion for production parts offers the same advantages as for tooling. This process is usually reserved for large structures such as boats or composite car bodies.

PT2712	PT2712, with various hardener choices, is ideal for infusing production fiberglass, carbon or Kevlar parts.
PT5712 & PT5714	PT5712 and PT5714 are amber and black versions of the same epoxy resin system, for infusing high-temperature tools or parts that require elevated temperature service.

PRODUCT SPECIFICATIONS and SELECTED MECHANICAL PROPERTIES*

Product	Color	Mixed Viscosity	Cured Hardness	Specific Gravity	Tensile Strength	Compressive Strength	Glass Transition (Tg)
EPOXY SURFACE COATS FOR TOOLING							
PT1520	Gray	150,000 cps	90 Shore D	1.48	11,593 psi	19,850 psi	290°F
PT1540	Black	Thin Paste	82-85 Shore D	1.18	6,560 psi	14,600 psi	271°F
PT1554	Gray	106,000 cps	90 Shore D	1.42	9,850 psi	16,110 psi	260°F
PT1935	Black	52,000 cps	90 Shore D	1.39	5,610 psi	19,800 psi	330°F
PT1945	Black	144,000 cps	90 Shore D	1.48	6,930 psi	19,200 psi	345°F
PT1995	Black	140,000 cps	89 Shore D	1.39	7,690 psi	20,870 psi	305°F
EPOXY CASTING SYSTEMS							
PT4925	Gray	117,000 cps	91 Shore D	1.69	8,100 psi	20,760 psi	309°F
PT4935	Gray	25,000 cps	91 Shore D	1.58	7,790 psi	21,846 psi	285°F

Product	Color	Mixed Viscosity	Cured Hardness	Specific Gravity	Tensile Strength	Flexural Strength	Glass Transition (Tg)
EPOXY LAMINATING SYSTEMS							
PT2520	Amber	1,900 cps	88 Shore D	1.17	36,680 psi	52,679 psi	272°F
PT2620	Gray	4,500 cps	89 Shore D	1.29	29,250 psi	45,333 psi	170°F
PT2846	Amber	4,500 cps	90 Shore D	1.17	29,440 psi	47,649 psi	308°F
PT2848	Black	4,500 cps	93 Shore D	1.24	29,820 psi	41,028 psi	286°F

SPECIALTY EPOXY SYSTEMS FOR ROOM TEMPERATURE SERVICE							
PT5965	Cream	Non-Sag Paste	92 Shore D	1.46	4,970 psi	15,750 (Compressive)	Up To 300°F Operating Temp.
HT₂C	Dark Gray	Smooth Paste	60 Shore D	0.67	6,800 psi (Compressive)	9,100 psi	331°F

EPOXY-N-FUSION SYSTEMS							
PT2712	Lt. Amber	320 cps	86 Shore D	1.08	41,415 psi	54,863 psi	204°F
PT5712 & (PT5714)	Amber (Black)	575 cps	84 Shore D	1.105	46,970 psi	74,727 psi	302°F



EPOXY HANDLING INSTRUCTIONS

INTRODUCTION

Epoxy resins and hardeners have been commercially available for over 40 years. They have been used successfully with minimal handling difficulties in the surface coatings, structural components, and adhesives industries. This experience indicates that health problems associated with these materials can be minimized and controlled with proper handling procedures.

This information is provided to help users handle epoxy products properly. It is recommended that users establish internal programs for occupational health and safety. Programs for the proper handling of epoxy resins and systems should include the following:

CONTROLS and PRECAUTIONS

Employers should establish administrative controls to educate the users of epoxy resins and hardeners. These should include:

- **Handling Instructions:** Literature and Material Safety Data Sheets for the specific epoxy system being used should be readily available.
- **Training:** Personnel should be trained in the proper use and handling of these products.
- **Protective Clothing & Equipment:** Persons handling resins, solvents, catalysts, hardeners, or reactive diluents should wear appropriate protective clothing and equipment such as gloves, rubber aprons, and chemical goggles or face shields as required to prevent contact of the material with the skin and eyes. Employees must be instructed on the proper use of such equipment.
- **Ventilation:** Fumes, vapors, or dust from resins, catalysts, curing agents, solvents, or auxiliary materials must be controlled in the workplace.
- **Housekeeping:** The work area should be kept clean, uncluttered, and free of spills.
- **Personal Hygiene:** All persons handling epoxy materials or auxiliary materials should be instructed to wash their hands thoroughly before each job break, before eating, smoking, drinking, or using toilet facilities.
- **Storage:** Epoxy resins, curing agents and auxiliary materials should be stored in a cool place in tight, sturdy containers away from sparks and open flames.
- **Emptied Containers:** Emptied containers will retain residual amounts of product(s) and can be hazardous. All label instructions and precautions should be observed for containers which are full, partially filled, or emptied.
- **Handling and Dispensing:** Resins, curing agents and auxiliary materials should be properly labeled to

avoid improper use or indiscriminate handling. These materials should be dispensed only with proper instructions on proportions and mixing.

- **Emergency Instructions:** Supervisors and employees should be provided with instructions on what to do in case of a Fire or Explosion emergency, or if First Aid assistance is required.

SENSITIZATION

Sensitization is the development of an allergic dermatitis or allergic respiratory response in susceptible individuals. It usually makes a delayed appearance after some weeks or even months of frequent and/or prolonged contact with the sensitizing agent. Following the development of sensitization to one component of epoxy resin formulation, susceptible persons may also become sensitized to other components.

Any employee who develops dermatitis or redness of the skin while handling resins or other materials should report this immediately to his or her supervisor who should refer such employees to an appropriate physician.

Employees who develop skin sensitization should be temporarily removed from exposure and further exposure permitted only when approved by a physician.

Employees who develop respiratory sensitization and display asthmatic symptoms may require permanent removal from further exposure to the causative material(s). Medical consultation on an ongoing basis is strongly recommended in such cases.

RESPONSIBILITIES of the WORKER

An effective preventative program requires the understanding, concern, diligence, and self-discipline of the worker.

Persons working with resins and auxiliary material should understand that they have important roles in preventing adverse health hazards and fire and explosion hazards from developing into serious problems.

One of the greatest contributions the worker can make is to ask for information when there is any uncertainty about any part of the program.

**For More Information, See The
Technical Paper "RECOMMENDATIONS
FOR HANDLING EPOXY PRODUCTS"
Available for Download at our Website:
www.ptm-w.com**



ACCESSORY PRODUCTS FOR TOOLING AND PRODUCTION APPLICATIONS

PRODUCTS

PTM&W provides a variety of accessory tools and materials for tooling and production processes. They include:

RELEASE AGENTS	
PA0801	Non-silicone paste wax for room temperature or elevated temperature applications. Easy to apply, works equally well on metal or composite tooling. Can be used to release epoxies, polyurethanes, polyesters, and most adhesives based on those materials. Service temperature to 375° F.
PA0810	A green water/alcohol solution of water soluble, film forming PVA for use as a parting agent for separation between polyester or epoxy resins and various mold surfaces. Used with PA0801 paste wax for easy, effective production release in a variety of applications.
PA0828	Rich silicone release for tooling or production uses. PA0828 is the best all purpose release for metal and plastic molds - easy release every time! Also an effective lubricant.
PA0868	Modified silicone release designed to provide glossy surface finish and easy release from the mold. PA0868 is especially effective for releasing thermosetting urethane elastomers from either epoxy or metal tooling. PA0868 can be removed from the parts easily with soap and water, thereby avoiding the use of potentially dangerous solvent cleanup.

BULK FILLERS	
PA0738	Hydrated alumina bulk filler for use with epoxy and polyurethane casting resins. Economical, it provides lower overall cost castings. Generally, the addition of PA0738 lowers the exotherm of the casting and thereby lowers the cured shrinkage. Castings made with a high content of PA0738 are very easy to machine or work with hand tools.
PA0703	An aluminum needle bulk filler. PA0703 is a high purity aluminum product with an elongated needle-like configuration. This unique shape is designed to give optimum packing density and particle distribution when mixed with a high temperature epoxy resin to construct a reinforcing backup structure. The ability to provide high filler loading provides excellent heat transfer and compressive strength to the casting.

ACCESSORY PRODUCTS	
Tooling Brushes	2-Inch Wooden handle brushes with 3/4" blunt-cut solvent resistant bristles designed specifically for hand laminating and surface coat application. The 100% Pure China bristles have excellent chemical resistance, so the brushes can be used with solvent-containing systems if desired. The bristles are firmly locked into the ferrule, so they will not pull out during use and contaminate the material being applied.
Squeegees	Durable 3" x 5" plastic squeegees for spreading thick resins and for laminating. The high density plastic composition allows easy cleanup in common shop solvents. Cured resin pops off the flexible squeegees. Dual tapered sides and rounded corners allow use with thin fabrics with minimum snags. These squeegees are equally useful for graphics applications or other projects.
Epoxy Color Dispersions	Epoxy-based, opaque color pastes for pigmenting epoxies and some polyurethanes: PA0501 - Black PA0502 - White PA0503 - Red PA0504 - Green PA0505 - Blue PA0506 - Yellow PA0507 - Orange PA0508 - Brown
Urethane Color Pastes	Opaque color pastes made especially for use with urethanes, with compatible raw materials and additives to minimize moisture contamination: PA0518 - Black PA0538 - Red PA0598 - Tan

PRODUCT DIRECTORY

In addition to the epoxy tooling and production materials featured in this brochure, PTM&W Industries manufactures an extensive line of polyurethane products and other materials for a wide variety of industrial uses. These materials are grouped in the following product lines. Literature and technical assistance on these products are available for the asking.



Polyurethane elastomers are very versatile materials that are used for a wide variety of industrial applications including high performance tooling, molds, dies and fixtures. They vary in hardness from very soft, elastomeric materials with high elongation to hard, rigid products with extremely tough cured properties.



The epoxy and polyurethane products in this line combine ease of handling with superior cured physicals to provide prototype and production parts with many beneficial properties. The proper choice from these products will allow the user to duplicate the properties of a number of engineering plastics with low-cost tooling in a very short time. They cover a broad range of applications, both rigid and flexible, and include high performance materials for clear casting as well as excellent fire retardant systems.



The PTM&W Poly Filler line of polyester filler pastes are unique high performance products that have been extensively used in a broad range of industrial applications very successfully for many years. These are high quality fillers which use the best raw materials for the purpose. They are smooth viscosity products that are very easy to apply, and exhibit very low shrinkage, for quicker repairs with minimal rework.



The Wyn-Stik product line consists of epoxy and polyurethane systems designed for the protection and/or repair of concrete, clay pipe and composite materials in the construction-related industry. Included in these products are paste and liquid adhesives and repair materials with high bond strengths and the capabilities to adhere to casually prepared surfaces, for quick field repairs. There are also epoxy and polyurethane coatings and primers for brush, trowel or spray application that have excellent resistance to harsh chemical environments. These materials have been utilized in the construction industry for many years, and have proven to be reliable, high-performance products that provide years of strength and protection.



We manufacture a wide variety of structural adhesives for industrial applications. The standard line includes a number of stock products that encompass a broad range of properties. Many of our adhesives are tailored to specific uses and individual applications. If you have a requirement that cannot be fulfilled by these standard products, let us select or design a high performance adhesive that works for you.

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