

Description

Plexus® MA590 is a two-part methacrylate adhesive designed for structural bonding of thermoplastic, metal, and composite assemblies. Combined at a 1:1 ratio, MA590 has a working time of 90 to 105 minutes and achieves approximately 500 and 1000 psi in 5 and 6.5 hours, respectively, at 74°F (23°C). This product has been designed for use on large marine structures where a very long open time product is needed. Plexus MA590 is commonly used for bonding stringers and liners into large fiberglass boats with bond lines up to one inch thick. In addition, this product provides a unique combination of excellent fatigue endurance, outstanding impact resistance, and superior toughness. Plexus MA590 is gray when mixed and is available in ready-to-use 400-mL cartridges, 5-gallon (20-liter) pails, and 50-gallon (200-liter) drums to be dispensed as a non-sagging gel.

| Typical Uncured Properties | Part A | Part B |
|-------------------------------|-----------|-----------|
| Color | White | Black |
| Mix Ratio by Volume | 1.00 | 1.00 |
| Mix Ratio by Weight | 1.00 | 1.00 |
| Component Density, g/ml | 0.93 | 1.03 |
| Component Viscosity, cP x1000 | 140 - 230 | 165 - 230 |
| VOC's during cure, % | < 0.5 | |
| Shelf Life, Months | 7 | |

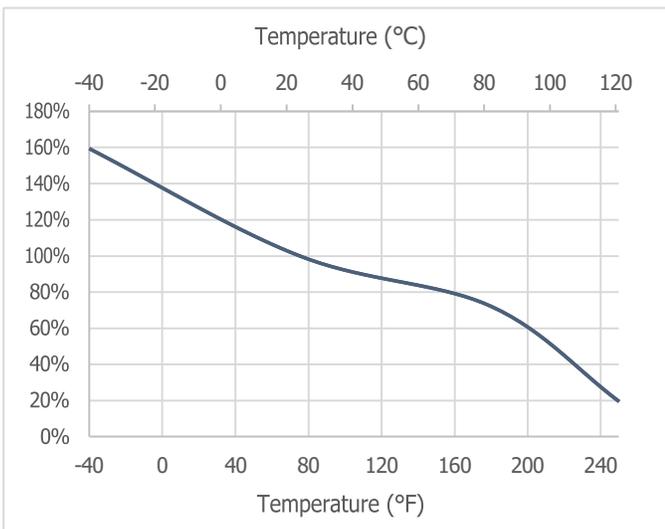
| Typical Cured Properties | |
|-------------------------------|-------------------------|
| Peak Exo Time (100g), min | 170 - 260 |
| Peak Exo Temp (100g), °F (°C) | ~180 (82.2) |
| Gap Tolerance, in (mm) | 0.03 - 1.50 (0.75 - 38) |
| Hardness, Shore D | 68 |
| Tensile Strength, psi (MPa) | 1,880 - 2,500 (13 - 19) |
| Tensile Modulus, kpsi (MPa) | 48 - 87 (330 - 600) |
| Elongation at Break, % | >130 |

Tensile in accordance with ISO 527

Typical Cure Profile at Different Temperatures

| Temperature | 60°F (15.6°C) | 75°F (23.9°C) | 90°F (32.2°C) |
|---------------------------------|------------------|------------------|------------------|
| Work Time, min | 145 - 150 | 90 - 105 | 70 - 75 |
| Time to 50 psi (0.3 MPa), min | 240 - 245 | 135 - 140 | 90 - 95 |
| Time to 500 psi (3.4 MPa), min | 295 - 300 | 185 - 190 | 100 - 105 |
| Time to 1000 psi (6.9 MPa), min | 395 - 415 | 240 - 245 | 130 - 135 |

Strength Retention vs Temperature
(ASTM D1002 on Al 6061)



| Substrate | Lap Shear (Typical) ASTM D1002 | | Failure Mode |
|--------------------|--------------------------------|------|--------------|
| | psi | MPa | |
| Aluminum | 1,585 | 10.9 | CF |
| SS (cycled) | 1,787 | 12.3 | CF |
| Polyester | 703 | 4.8 | FT |
| Gel coat | 1,285 | 8.9 | FT |
| PVC | 1,115 | 7.7 | SF |
| Carbon Fiber | 1,094 | 7.5 | SF |
| SS(500hr Salt fog) | 1,749 | 12.1 | CF |

PC120 Cleaner Conditioner recommended on metal

SF = Substrate Failure, FT = Fiber Tear, CF = Cohesive Failure,
CP = Coating Pull, AF = Adhesive Failure

Application

- To ensure maximum bond strength, surfaces must be mated within the specified working time.
- Use sufficient material to fill the joint completely when parts are mated and fixed.
- Apply adhesive using handheld cartridges or automatic meter/mix/dispense equipment.
- Load the cartridge into the dispenser and remove the end caps.
- Attach mixing tip and dispense a mixer's length of adhesive.
- Apply adhesive to the substrate and mate the parts within the working time of the adhesive.
- Fix in position until the adhesive reaches sufficient bond strength is achieved.



Application

Surface Preparation - Plexus adhesives typically require little or no surface preparation, but are dependent on the material and degree of contamination in the bonding area. For optimal performance, ITW PP recommends surfaces to be free of grease, dirt, and other contaminants.

- > Plastics and coated metals - wipe with a dry rag or a light solvent may be sufficient.
- > Raw metal - wipe with a dry rag or a light solvent may be sufficient.
- > Metals may be affected by the degree of oxidation, scaling, fluids or other contaminants.
- > Composites - dust free surfaces can be bonded as is, or may require light abrasion to remove mold releases, or to increase the surface area.

Other surfaces should have the same considerations. ITW PP recommends customers test to determine the optimal preparation for their materials to ensure suitability.

Recommended Application Temperature

Application of adhesive at temperatures between 65°F (18°C) and 85°F (30°C) will ensure proper cure. Temperatures below 65°F (18°C) or above 85°F (30°C) will slow down or increase cure rate significantly. Temperature affects viscosity of Parts A and B of this adhesive. To ensure consistent dispensing of adhesive and activator, the adhesive system temperature should be held reasonably constant throughout the year.

Clean-Up

Clean up is easiest before the adhesive has cured. Common lab solvents, Citrus terpene or N-methyl pyrrolidone (NMP)-containing cleaners, degreasers, or soap & water can be used for best results. If the adhesive is already cured, careful scraping, followed by wiping with a cleaning agent, may be the most effective method of clean up.

Temperature Resistance

See "Strength Retention vs Temperature" graph on page 1.

Bulk Dispensing of Drums or Pails

Plexus may be applied manually/pneumatically from cartridges or with bulk dispensing equipment. Bulk equipment must be explosion proof. All parts in direct contact with the liquid adhesive and activators should be stainless steel. Avoid contact with brass, carbon steel, copper or copper-containing alloys in all fittings, pumps, etc. Seals and gaskets should be made of Teflon, Teflon-coated PVC foam, ethylene/propylene, or polyethylene. Avoid the use of Viton, BUNA-N, Neoprene, or other elastomers for seals and gaskets. Automation is available from a variety of equipment manufacturers.

Safety & Handling

ITW Performance Polymers (ITW PP) recommends users to follow all recommended safe practices for handling its products. Refer to the product Technical Data Sheet (TDS), Safety Data Sheet (SDS), and label for health and safety information before using this product. Also refer to itwpp.com for additional information and other frequently asked questions.

Note: When mixing large masses of material at one time, a large amount of heat may be generated due to the exothermic reaction created by the rapid-curing of the product. This heat can result in the release of entrapped air, steam, and volatile gases. To prevent this, dispense only enough material for use within the working time of the product and confine gap thickness to no more than its maximum gap fill capability.

Chemical Resistance

Chemical resistance is impacted by direct or indirect contact, frequency, duration of contact, and ambient or solution temperatures.

Excellent Resistance to: Hydrocarbons, acids and bases (pH 3-10), and salt solutions

Susceptible to: Strong polar solvents, strong acids, and bases

Shelf Life & Recommended Storage

Shelf Life is based on continuous storage between 55°F and 77°F (13°C and 25°C). Exposure, intermittent or prolonged exposures above 80°F (27°C) will result in a reduction of shelf life. Exposure above 100°F (38°C) can quickly degrade shelf life and should be avoided. Shelf life may be extended by cool storage between 45°F and 65°F (7°C and 18°C). If stored cold, allow product to return to room temperature before using.

Product Use

Industrial Use Only. Many factors beyond ITW PP control and uniquely within user's knowledge and control can affect the performance of this product in any particular application. Given the variety of factors that can affect use and performance, the end user is solely responsible for evaluating any ITW PP product and determining its suitability and fitness for a particular purpose, product design, production, final application, and end result.

Exclusion of Warranties

The Data stated here are typical values and offered in good faith. Given the variety of factors that can affect the use and performance of an ITW PP product, the end user is responsible for evaluating any ITW PP product and determining whether it is fit for purpose and suitable for user's design, production, and final application. Unless an additional Warranty is expressly stated, ITW PP warrants that the ITW PP product meets the applicable ITW PP product specification at the time ITW PP Ships the product. As to the herein described materials and test results, there are no warranties which extend beyond the description on the face hereof. ITW PP MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. IF THE ITW PP product does not conform to this warranty, then the sole and exclusive remedy is, at ITW PP's option, replacement of the ITW PP product or refund of the purchase price.

Limitation of Liability

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ITW Performance Polymers (ITW PP)

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|-------------------|------------------|
| North America | EMEA |
| Danvers, MA 01923 | Shannon, Ireland |
| +1 855-489-7262 | +353 61 771500 |

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