

# 3D System

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## METALPLEX

### Methacrylate Structural Adhesive

MetalPlex is a two-component, 100% reactive, toughened structural methacrylate adhesive specifically formulated for bonding wide variety of metals, thermoplastics, thermosets, and composite assemblies.

#### FEATURE:

- 10:1 mix ratio, non-sag, large gap filling
- Requires no surface preparation.
- High strength, excellent fatigue endurance, impact resistance and toughness.
- Low exotherm temperature with excellent flexibility

#### APPLICATIONS:

- Ideal for Automotive Components, Marine Assembly, Plastic Tanks, Thermoform Enclosures, Electrical Components, Sign & Display, Metal Fabrications, etc.

#### ADHESIVE PROPERTIES:

Liquid		
	Adhesive	Activator
Appearance	Milky-White	Blue
Viscosity	100,000 - 125,000	50,000 - 70,000
@ 25 °C, Brookfield RVT		
Flash Point (TCC) °F	51	51
Density (lbs/gal)	8.00	8.95
(kg/liter)	0.96	1.07
Mix Ratio by Volume	10.0	1.00
by Weight	8.9	1.0

Cure Characteristics	
Working Time	8 - 12 minutes
Fixture Time	25 – 30 minutes
Full Cure	24 hours
Mixed Density (lbs/gal)	8.10
(kg/liter)	0.97

Cured Adhesive Properties	
Gap Filling	Up to 0.375 inches (10 mm)
Shore Hardness ASTM D 2240	73D
Strain to Failure ASTM D 638	30 - 50 %
Modulus, Psi ASTM D 638	75,000 – 100,000
Tensile Strength, Psi ASTM D 638	3,200 – 3,500
Service Temperature	-40 °C to 121 °C

#### Lap Shear Strength

MetalPlex formulated to bond wide variety of substrates. Lap shear strength data according to ASTM D 1002 reported for the most common substrates:

Substrates	Shear Strength & Failure Mode
Stainless Steel / Stainless Steel	3,100 Psi (21 MPa) – Cohesive Failure
Aluminum / Aluminum	2,910 Psi (20 MPa) – Cohesive Failure
ABS / ABS	1,200 Psi ( 8 MPa) – Substrate Failure
FRP / FRP	1,700 Psi (12 MPa) – Fiber Tear
Aluminum / ABS	2,150 Psi (15 MPa) – Substrate Failure

**Result**

Lap shear strength figures are lower for the plastic surfaces due to substrate failure which means substrate is failing before the adhesive bond.

**Cleavage Peel**

MetalPlex have the ability to withstand at high level of peel stresses. Following are the results of Cleavage Peel strength based on ASTM D 3807:

Stainless Steel / Stainless Steel	Initial Strength – 22 pli Average Strength – 20 pli
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**Result**

The above results show the strength required for the joint to begin to peel and joint resistant with average strength.

**Environmental Resistance**

MetalPlex have excellent resistance to harsh environment conditions. The testing data is as follows:

Condition	Lap Shear Strength & Mode of Failure
Initial	3,180 Psi (22 MPa) – Cohesive Failure
Environmental Cycle – 30 days	3,200 Psi (22 MPa) – Cohesive Failure

Lap Shear Strength ASTM D 1002 –  
Stainless Steel / Stainless Steel

Environmental Cycle = 8 hours @ -30 °C, 8 hours @ 85 °C, 8 hours @ 30 °C @ 100% Relative Humidity

**Result**

The lap shear strength has increased after environmental cycle. MetalPlex perform better under these conditions compare to the substrates bonded. Substrates may have less resistance to these conditions compare to adhesive.

**Temperature Resistance**



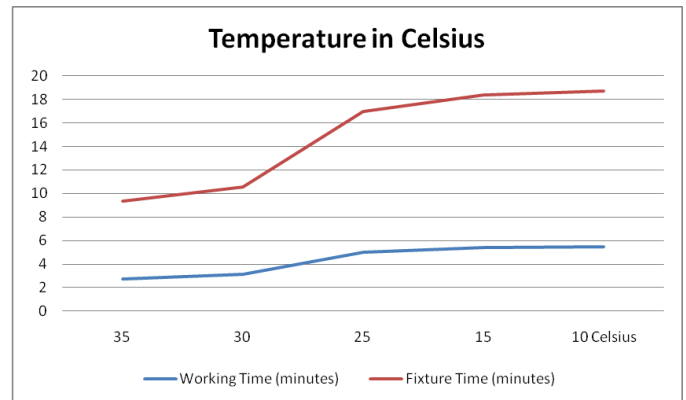
Lap Shear Strength ASTM D 1002 –  
Stainless / Stainless Steel

**Result**

The lap shear strength of the MetalPlex reduces with heat and increases in cold temperature. The failure mode was cohesive failure in all above cases.

**Effect of Temperature on Cure Speed**

MetalPlex methacrylate adhesives are designed to cure at room temperature but the ambient temperature will affect the working and fixture times as follows:



**Result**

We recommend using the product at around room temperature of 25 °C.

## Chemical Resistance

The chemical resistance of MetalPlex was studied by bonding the Aluminum/Aluminum as per specification and cured for 7 days @ 25° C then kept immersed in the media listed here and tested for lap shear strength.

Effect of immersion in different media.  
(Immersion for 1 month in various media)

Media	Lap Shear Strength, in PSI ASTM D 1002
Gasoline	3180 (22 MPa)
Acetic acid (10%)	3120 (21 MPa)
Xylene	3150 (21 MPa)
Lubricating oil-HD30	3240 (23 MPa)
Paraffin	2950 (20 MPa)
Water@23 °C	3100 (22 MPa)
Water@90 °C	3000 (21 MPa)

## Packaging:

MetalPlex available in 50 ml, 380 ml co-axial cartridge & 490 ml side by side cartridge, as well as in hobok 18 kg drum and barel 182 kg drum.

### **HANDLING AND PRECAUTIONS:**

Read Material Safety Data Sheet before handling or using this product. Adhesive component A contains methyl methacrylate monomer and always use in a well-ventilated area. Activator component B contains peroxide. Both materials must be stored in a cool place away from sources of heat and open flames or sparks. Keep containers closed when not in use. Prevent contact with skin and eyes. In case of skin contact, wash with soap and water. In case of eye contact, flush with water for 15 minutes and seek immediate medical attention. Harmful if swallowed. Keep out of reach of children.

**Note:** The chemical curing reaction that occurs when components A and B are mixed generates heat. The amount of heat generated is controlled by the mass and thickness of the mixed product. Large masses over 1/2 inch thick can develop heat in excess of 121°C and can generate harmful, flammable vapors. Large curing masses should be carefully moved to a well-ventilated area where the chance of personal contact is minimized.

**DISPENSING EQUIPMENT:** Dispensing directly from disposable cartridges or meter-mix-dispensing equipment is strongly recommended. Both methods employ convenient static motionless

mixer technology. Product supplied in pre-measured cartridges is dispensed from approved manual or pneumatic powered guns. When meter-mix dispense systems are used, care must be taken to assure compatibility between the adhesive components and the materials in the equipment that they contact. All wetted metal components should be constructed of stainless steel or aluminum or have a sufficient thickness of chemically resistant material that prevents contact between the adhesive components and the base metal. Contact with copper, zinc, brass or other alloys containing these materials must be strictly prevented. All non-metallic seals and gaskets should be fabricated from Teflon® or UHMW polyethylene based materials..

### **MIXING AND APPLICATION:**

All surfaces must be clean, dry, dust and grease free. Best result will be achieved with surfaces that have been lightly abraded immediately prior to bonding. Always dispense a quantity of adhesive at start-up to assure that the adhesive exiting the tip of the mixer is the proper color and is uniform, without streaks. If previously opened or aged material is being used, allow the purged material to cure to assure quality before proceeding. Carefully dispense a sufficient quantity of adhesive on the substrate to assure that the bond gap will be completely filled when the parts are joined. Allow for squeeze-out at the edges of the bond to assure filling. Carefully secure or clamp parts to prevent joint movement while the adhesive sets. Do not apply excessive pressure that can cause excessively thin gaps and starve the bond line. Test the curing adhesive at the edges for fingernail hardness before removing clamps or fixtures.

**CURING:** Working time is the approximate time after mixing components A and B, that the adhesive remains fluid and bondable. Fixture time is the approximate time after mixing components A and B required for the adhesive to develop sufficient strength to allow careful movement, unclamping or demolding of assembled parts. Parts can generally be put in service when 80 percent of full strength is developed. The time to achieve 80% cure is approximately 2-3 times that required for fixturing.

**CLEAN UP:** Adhesive components and mixed adhesive should be removed from mixing and application equipment with a suitable industrial solvent or cleaner before the mixed adhesive cures. Once the adhesive cures, soaking in a strong solvent or paint remover will be required to soften the adhesive for removal.

### **STORAGE AND SHELF LIFE:**

Shelf life of adhesive (Part A) is 6 – 9 months from day of shipment from producer. Shelf life of activator (Part B), including cartridges that contain activators, is 6 - 9 months from day of shipment. Shelf life is based on continuous storage between 12,7°C and 23,8°C. Long term exposure above 23,8°F will reduce the shelf life of these materials. Prolonged exposure of activators, including cartridges which contain activators, above 100°F quickly diminishes the product's reactivity and should be avoided. Shelf life can be extended by refrigeration 7,2°C-15°C. These products should never be frozen.

**Warranty:** All information presented in this data sheet is based on laboratory testing under controlled conditions and is not intend for design purposes. Due to variance of storage, handling & application of these materials; producer makes no representations or warranties of any kind concerning this data. The ultimate suitability for any intended application must be verified by the end user under anticipated test conditions. All products purchased from or supplied by producer are subject to terms and conditions set out in the contract. All other information supplied by producer is consider accurate but are furnished upon the express condition the customer shall make its own assessment to determine the product's suitability for a particular purpose. Producer makes no other warranty, either express or implied, including those regarding such other information, the data upon which the same is based, or the results to be obtained from the use thereof; that any product shall be merchantable or fit for any particular purpose; or that the use of such other information or product will nor infringe any patent.