PERMABOND® ML186 PURE™ & MM115 PURE™

NSF 61 Approved Anaerobic Threadlockers

Ref. #: 010104ML186P&MM115P

PERMABOND PURE Anaerobic Threadlocking Adhesive/Sealants conform to all applicable requirements of the ANSI/NSF Standard 61, Drinking Water System Components - Health Effects, as certified by the National Sanitation Foundation and the American National Standards Institute. Standard 61 was developed in conjunction with regulatory agencies, industry, water suppliers, consultants, and other users of the products covered in the standard. Standard 61 establishes requirements for the control of potential adverse human health effects from products added to water indirectly via contact with treatment, storage, transmission, and distribution system components. The NSF standards are widely recognized by public health officials, and certified products have been tested and determined to cause no adverse health effects. All PERMABOND PURE products have been certified by the NSF.

FEATURES & BENEFITS

- NSF certified drinking water system components
- Simple one part system
- Resistance to vibration loosening of fasteners
- Superior environmental resistance
- Ease of use

GENERAL DESCRIPTION

PERMABOND PURE Anaerobic Adhesive/Sealants are single component liquids that cure only when in contact with metal parts and oxygen is excluded. Anaerobic adhesives work by filling the gap between mated parts and curing to a hard plastic, locking the assembly in place. Thus, no relative movement between the parts is possible, and the potential loosening due to vibration is prevented. In addition to threadlocking, anaerobic adhesives can also be used as sealants as they fill (100%) and seal the gap between mated parts. PERMABOND PURE Threadlocking Adhesives/Sealants cure to a crosslinked plastic that has excellent environmental and temperature resistance.

The products come in a range of viscosities. The selection of viscosities offers the user an optimum balance between ease of dispensing and gap-filling. They are used for sealing and locking threaded parts, and also provide a more reliable and durable assembly of non- threaded, concentric joints.

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PHYSICAL PROPERTIES OF THE UNCURED ADHESIVE/SEALANTS

Properties	ML 186 PURE	MM 115 PURE
Base Resin	---------- Methylacrylate Esters ----------	
Solids, %	---------- 100 ----------	
Color	---------- Colorless to light amber ----------	
Mean Viscosity, cP* @ 25°C (77°F)	7.5	1200
Specific Gravity	0.95	1.09
Flash Point, °C (°F)	---------- Over 110° (230°) ----------	
Gel Time, minutes	----------30-60----------	
Shelf Life, months**	----- 12 when stored at room temperature-----	
Maximum Gap Filling, inches	0.004	0.006

*This grade has a thixotropic viscosity, i.e., easy to dispense, but no migration when the adhesive is on the parts.

**Package sizes greater than one liter, six months.

SPEED OF CURE

	ML 186 PURE	MM 115 PURE
Typical Fixturing Time, minutes	15	20
Full Strength, hours	3	8

BEHAVIOR ON DIFFERENT METALS

PERMABOND PURE Threadlocking Compounds perform best on steel, but will perform well on most metals, including aluminum, stainless steel, brass, and plated fasteners. They will also perform well on oily parts, but for optimum results the parts should be cleaned. When used on passive materials, speed of cure is slowed somewhat and ultimate strength may also be reduced. Generally, metals which induce a "fast cure" will achieve fixturing strength in about 15 minutes, while less active metals which induce a "slow cure" will take about 30 minutes to fixture (see Table 1).

TABLE 1 - SPEED OF CURE ON DIFFERENT MATERIALS AND FINISHES

Very Fast Cure	Fast Cure	Slow Cure	No Cure
brass	iron	anodized aluminum	ceramics
copper	steel	cadmium finishes	glass
magnesium	nickel	chrome finishes	plastics
	aluminum	passivated metals	paint finishes
		stainless steel	
		titanium	
		zinc	

EFFECT OF TEMPERATURE ON CURE SPEED

PERMABOND PURE products are designed to cure at room temperature but can be accelerated by heat if a faster cure is needed. Heating the liquid sealant above 120°C (248°F) is not recommended (once cured, it has an upper temperature limit of 150°C (300°F)). For every 10°C rise in temperature, the rate of cure will double. Conversely for every 10°C drop in temperature, the rate of cure is reduced by a factor of two.

PERFORMANCE PROPERTIES OF THE CURED ADHESIVE

Locking strength (in-lbs)*	ML 186 PURE	MM 115 PURE
Break	70-200	70-200
Prevail	20-200	20-200

* Note: When measured on cleaned grade 5 bolts and steel nut (3/8-16UNC2) per Mil-S-46163.

ELECTRICAL & THERMAL PROPERTIES OF THE CURED ADHESIVE/SEALANT:

PERMABOND	ML 186 PURE	MM 115 PURE
Dielectric Strength	---------- Approx. 11.0 MV/m ----------	
Electrical Resistance	---------- Over 10^{17} ohm ----------	
Thermal Conductivity	---------- Approx. 0.19 W/m°K ----------	
Thermal Expansion Coefficient	$80x10^{-6}$ in/in°C	$90x10^{-6}$ in/in°C
Operating Temperature, °C (°F)	---------- Up to 150 (300) ----------	

HEAT RESISTANCE

Since PERMABOND PURE products cure to a crosslinked, thermoset plastic, they exhibit excellent environmental and heat resistance. Low temperatures do not markedly affect strength.

CHEMICAL RESISTANCE

The fully cured and crosslinked threadlocking adhesive/sealants resist most chemicals well, even at elevated temperatures. Chemical washes of any kind will have no effect on the adhesives because of the generally short duration of exposure. Anaerobic products are not recommended for use in the severe environment of pure oxygen or strong acids or alkalis.

VIBRATION RESISTANCE

ML 186 PURE and MM 115 PURE prevent loosening of mated parts under vibration. In fact, they perform significantly better than lockwashers, springwashers, nylon patch (prevailing torque screw), and other so-called vibration-resistant locking systems. Table 2 shows an accelerated vibration test done with a transverse vibration tester. It shows that lockwashers actually aid the loosening of the fastener under

conditions of vibration. Nylon patches and other prevailing torque systems may provide some resistance, but only anaerobic adhesive/sealants provide complete resistance to vibration. This is because anaerobic

compounds fill the gaps between mated parts and thus no movement of the parts is possible. Therefore, the assembly will not loosen due to vibration.

TABLE 2 - CLAMPING LOAD RETAINED UNDER VIBRATION

	Clamping Force Retained, %		
Sample	10 seconds	20 seconds	40 seconds
Plain Nut	66%	40%	10%
Split Washer	40%	10%	<5%
Anaerobic Sealant*	95%	95%	95%

* The initial loss in bolt tension is caused by the relaxation of the metal parts.

EFFECT OF LUBRICITY

PERMABOND MM 115 PURE is specifically designed to provide a lubricity similar to "as received" fasteners so that standard torque tension tables can be used. Other non-lubricated anaerobic products generally will cause a frictional factor of approximately 20-25% on "as received" fasteners.

VISCOSITY AND GAP FILLING PROPERTIES

The range of viscosities of PERMABOND PURE Anaerobic products allows selection of the proper balance between ease of dispensing and gap filling. If too thin a product is used, then inadequate filling of the "airspace" between parts may result, leading to a loss of locking strength. If too thick a product is used, it may be "squeezed out" during assembly and not enter into the joint at all. The higher viscosity sealants are able to fill larger gaps. Low and medium viscosity products provide filling of small and moderate gaps and are also easy to dispense.

MM 115 PURE is thixotropic, i.e., the product is thin when squeezed out of the bottle or other dispenser, but thick when it rests on the parts (similar to most latex wall paints). Thus, MM 115 PURE combines ease of dispensing and application with excellent gap filling capability.

The low viscosity of ML 186 PURE makes this product ideal for wicking applications. This product can be used to lock and set parts after adjustment or assembly, and it will also penetrate and seal weld porosities.

MATERIAL COVERAGE

PERMABOND PURE Anaerobic Threadlockers are an inexpensive way of locking parts against vibration. They need only be applied in amounts sufficient to fill the inner air space between male and female parts. Any excess of product provides no additional locking action.

APPLICATION

PERMABOND PURE ML 186 PURE and MM 115 PURE can be readily dispensed directly out of the bottle onto the parts. The products are also suitable for application through automated dispensing equipment. Consult your PERMABOND sales representative for the best selection.

STORAGE & HANDLING

PERMABOND PURE products have a shelf life of one year when stored at room temperature. Storage at low temperatures will extend the shelf life, while storage at high temperatures will shorten the shelf life. For extended product life, the anaerobic can be stored in a refrigerator.

The containers have a large air space to help provide stability. Contamination with metal could cause the anaerobic to polymerize in the "air starved" center of the container. "Leftover" product should never be poured back into the container.

Uncured (liquid) Anaerobic Adhesive/Sealants

Uncured anaerobic compounds contain reactive chemicals. These chemicals can cause skin irritation on individuals with sensitive skin. Good housekeeping to keep work areas and tools clean, is usually sufficient to prevent skin irritation. Barrier creams and plastic gloves should be used to ensure worker protection against accidental or chronic exposure.

Atomizing the liquid compound into the air can allow it to be inhaled and thereby expose the lungs to the contact irritation possible on the skin. Spray applications are not recommended.

Cured (solid) Anaerobic Adhesive/Sealant

The cured product is a hard inert plastic, which is safe to handle. The curing reaction reacts all of the liquid adhesive (100%) into a solid plastic. No solvents or other substances are released upon cure as is the case with many other adhesives. Once cured, PERMABOND ML 186 PURE and MM 115 PURE have been determined to cause no adverse health effects and are NSF certified drinking water system components.

FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN.