ADINOX®
METAL BONDING SOLUTIONS

Technical Data Sheet

ADINOX® M460

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Description

ADINOX® M460 is a two-component, slow-cure toughened structural adhesive formulated for bonding a wide range of metals, thermosets, thermoplastics, and composite materials. Its extended open time allows precise part positioning in complex assemblies, while delivering full structural strength with excellent impact, fatigue, and thermal cycling performance. The thixotropic, black-pigmented formulation resists sagging and cures at room temperature without extensive surface preparation, making it particularly well-suited for manufacturing processes that require extended adjustment times.

Features:

- Slow cure with 12–18 min open time for precise positioning and complex assemblies.
- High impact, dynamic fatigue, and thermal cycling resistance.
- Sag-resistant thixotropic formulation — cures at room temperature.
- Little or no surface preparation required on metallic substrates.

Applications

ADINOX® M460 is suitable for complex large-format assemblies requiring precise positioning, aerospace composite panels, and multi-component industrial equipment where extended alignment time is essential.

Physical Properties - Liquid

Property	Resin (A)	Activator (B)
Appearance	White	Black
Viscosity @ 77 °F, cP	103,000-122,000	52,000-68,000
Flash Point (TCC)	51 °F	51 °F
Density	8.0 lbs/gal	8.9 lbs/gal

Mixing	Value
Mix ratio by volume	10 : 1
Mix ratio by weight	9 : 1
Color (mixed)	Black
Mixed density	8.1 lbs/gal

Physical Properties - Cured

Property	Value
Open time	12–18 min
Working time	40–55 min
Full cure	24 hours @ 77 °F
Gap filling capacity	Up to 0.31 in
Elongation (ASTM D 638)	50%
Tensile Modulus (ASTM D 638)	77,000–98,000 PSI
Tensile Strength (ASTM D 638)	3,191–3,481 PSI
Impact Resistance (ASTM D 256)	21 ft·lb/in
Shore Hardness (ASTM D 2240)	73–75
Service temperature	-40 to 250 °F

Lap Shear Strength (ASTM D 1002)

Substrates	Shear Strength (PSI)	Failure Mode
SS / SS	3,100	Cohesive failure
Al / Al	2,910	Cohesive failure
ABS / ABS	1,200	Substrate failure
FRP / FRP	1,700	Fiber tear
Al / ABS	>2,031	Substrate failure

Composites and plastics show substrate failure; metals show cohesive failure (bond strength exceeds the adhesive's internal strength).

Material Compatibility

Substrate	Compatibility
Metals	
Stainless steel	✓
Aluminum Series 1000-6000	✓
Anodized aluminum	✓
Carbon steel / cold rolled steel	✓
Aluminum 7000 Series (Al-Zn)	✗
Copper	✗
Bronze / Brass	✗
Galvanized steel (zinc)	✗
Thermoset Plastics	
Phenolics	✓
Gelcoat	✓
Epoxies	✓

Polyurethane (PU rigid / elastomer)	✓
Polyurethane (RIM / SRIM)	✓
Rigid urethane	✓
Liquid molding resin	✓
Bakelite	✓
Thermoplastics	
ABS	✓
Nylon (PA)	✓
PBT	✓
PPO	✓
PVC / Vinyl	✓
Acrylic (PMMA)	✓
PET	✓
EVA	✓
Polycarbonate (PC)	✓
PE / PP (polyolefins)	✗
PTFE (Teflon)	✗
Silicone	✗
Composites	
Fiberglass (FRP / FRT)	✓
Epoxy / polyester composites	✓
Carbon fiber	✓
Kevlar	✓
Other	
Wood	✓
Porcelain	✓
Ferrites	✓

Legend: ✓ = Compatible ✗ = Not recommended

Cleavage Peel Strength (ASTM D 3807)

Substrates	Measurement	Strength (pli)
Stainless Steel / Stainless Steel	Initial peel strength	>23 pli
	Average peel strength	>17 pli

Initial value: force to initiate joint separation. Average value: resistance during propagation.

Environmental Resistance

Condition	Lap Shear Strength (PSI)	Failure Mode
Initial (baseline)	3,180	Cohesive failure
Environmental cycle - 30 days	3,200	Cohesive failure

Lap Shear Strength per ASTM D 1002 - Stainless Steel / Stainless Steel. Environmental Cycle = 8 hours at -22 °F, 8 hours at 185 °F, 8 hours at 86 °F at 100% RH.

Chemical Resistance

Media	Lap Shear Strength (PSI)
Gasoline	3,180
Acetic acid (10%)	3,120
Xylene	3,150
Lubricating oil HD30	3,240
Paraffin	2,950
Water @ 73 °F	3,100
Water @ 194 °F	3,000

Lap Shear Strength per ASTM D 1002 - Aluminum / Aluminum. Specimens cured for 7 days at 77 °F and immersed for 1 month in the listed media.

Storage and Shelf Life

Component	Shelf Life	Conditions
Resin (Part A)	9–12 months	Store between 55 - 75 °F. Refrigeration (45 - 55 °F) extends shelf life.
Activator (Part B)	7–9 months	

- Sustained exposure above 75 °F shortens shelf life progressively.
- Prolonged storage above 100 °F can reduce shelf life to less than one month.
- Do not freeze.
- Bring the adhesive to room temperature for at least 24 hours before use to ensure proper cure and viscosity.
- Keep containers tightly sealed when not in use.
- Date of manufacture is printed on each container label.

Packaging

Packaging	Volume	Description
Dual cartridge 10:1	50 ml	
Dual cartridge 10:1	250 ml	
Dual cartridge 10:1	490 ml	
5 Gallon Pail	5 gal	

Application

Surface Preparation

Bonding surfaces must be clean, dry, and free of oil, grease, dust, and loose particulates.

Wipe both surfaces with isopropyl alcohol (IPA) or acetone. Remove rust or mill scale by abrasion before solvent cleaning.

Light scuff-sanding immediately before bonding improves surface wetting and maximizes joint strength. Most metals can be bonded directly after a solvent wipe without primer.

Mixing and Dispensing

Purge the dual cartridge before and after attaching the static mixing nozzle until a uniform color with no streaks is achieved.

For previously opened or aged cartridges, allow a small amount of purged adhesive to cure to confirm proper reactivity.

Apply enough adhesive to completely fill the bond gap; plan for controlled squeeze-out at joint edges.

Mix ratio is 10:1 by volume (9:1 by weight). Use only 10:1 cartridges and the corresponding mixing nozzles.

Assembly

Position and align parts, then dispense the adhesive. Repositioning is possible within the open time (12–18 min).

Clamp or fixture parts firmly during initial cure. Avoid excessive clamping pressure that thins the bond line.

Check adhesive hardness at joint edges with a fingernail before releasing fixtures.

Parts can typically be moved within 40 to 55 minutes at 77 °F. Full mechanical properties develop over 24 hours.

Temperature Conditions

Optimal bonding between 65 - 85 °F. Below 65 °F, cure slows noticeably and viscosity increases. Above 85 °F, cure accelerates and open time shortens; plan the assembly sequence accordingly. The viscosity of both components is temperature-sensitive.

Cleanup

Condition	Method
Uncured adhesive	Wipe away with acetone, MEK, or a compatible industrial solvent before polymerization begins.
Cured adhesive	Mechanical removal required. Soaking in a strong solvent or paint stripper may soften the cured material.
Mixing nozzles	Single-use and disposable; replace after each application session.

Dispensing Equipment

Recommended: disposable 10:1 dual cartridges with static mixing nozzles, or volumetric meter-mix-dispense systems.

Dispense from approved manual or pneumatic applicator guns for 10:1 cartridges.

For meter-mix systems, verify chemical compatibility between the adhesive components and all wetted surfaces.

Wetted metal parts should be stainless steel or aluminum, or lined with chemically resistant materials.

Non-metallic seals and gaskets: Teflon (PTFE) or UHMW polyethylene are recommended.

Precautions

⚠ Component A contains reactive monomer — use only in well-ventilated areas.

- ADINOX® M460 is flammable (flash point 51 °F). Keep away from heat sources, sparks, and open flames.
- Industrial use only.
- Avoid adhesive contact with copper, zinc, brass, or alloys in dispensing equipment (causes premature polymerization); does not affect adhesion to galvanized substrates.

Limitations and Recommendations

- **Not suitable for polyolefins (PE, PP), PTFE, silicone, or bituminous surfaces.**
- Not recommended for continuous immersion in strong polar solvents (ketones, esters), concentrated acids, or concentrated alkalis.
- Structural gap filling up to 0.31 in. Maximum safe thickness 0.59 in.
- Bond surfaces must be clean, dry, and contaminant-free.
- Use only 10:1 ratio cartridges and compatible equipment — PTFE or UHMW polyethylene seals.

Legal Information and Disclaimer
Limitation of Warranty
The technical data and guidance contained in this Technical Data Sheet are derived from controlled laboratory testing and are provided solely for informational reference. They are not intended as design specifications. Given the inherent variability in storage conditions, handling practices, application techniques, substrate types, surface preparation, and end-use environments, ADINOX provides no representations or warranties, whether express or implied, regarding this information, including any implied warranties of merchantability or suitability for a particular purpose.

The end user assumes full responsibility for evaluating the fitness of ADINOX® M460 for any proposed application under the anticipated service conditions. All products acquired from or supplied by ADINOX are governed by the terms and conditions of the applicable purchase agreement.

In no event shall the total liability of ADINOX, whether arising in contract, tort, or on any other basis, exceed the purchase price of the specific product that is the subject of the claim.

Test Methods Applied

Standard	Description
ASTM D 638	Standard test method for tensile properties of plastics. Used to determine tensile strength, modulus, and elongation of bonded assemblies by tension loading.
ASTM D 1002	Standard test method for apparent shear strength of single-lap-joint adhesively bonded metal specimens by tension loading (lap shear). The primary test for structural adhesive bond strength.
ASTM D 2240	Standard test method for rubber property - durometer hardness. Used to measure Shore D hardness of the cured adhesive.
ASTM D 3807	Standard test method for strength properties of adhesives in cleavage peel by tension loading. Measures resistance to peel forces in structural joints.
ASTM D 256	Standard test method for determining the Izod pendulum impact resistance of plastics. Used to measure impact resistance of the cured adhesive.

Recommendation of Prior Testing
The end user must verify ADINOX® M460 performance under actual production conditions before committing to series use. Representative prior testing for the intended application and process is strongly recommended.

Units of Measurement and Glossary

SI / Imperial Equivalencies

SI Unit	Imperial Equivalent
1 MPa	= 145.04 PSI
1 PSI (lb/in²)	= 0.00689 MPa
1 N/mm²	= 1 MPa = 145.04 PSI
1 kg/cm²	= 14.22 PSI = 0.098 MPa
1 mm	= 0.0394 in
1 in	= 25.4 mm
1 ml	= 0.0338 fl oz
1 fl oz	= 29.57 ml
1 g/mL	= 8.345 lb/gal
1 pli	= 0.175 N/mm
°C to °F	°F = (°C × 9/5) + 32

Glossary of Abbreviations

Abbreviation	Meaning
PSI	Pounds per Square Inch
MPa	Megapascal (SI pressure unit)
cP / mPa·s	Centipoise / Millipascal-second (viscosity)
UHMW	Ultra-High Molecular Weight (polyethylene)
PTFE	Polytetrafluoroethylene (Teflon®)
TCC	Tag Closed Cup (flash point test)
FRP	Fiber Reinforced Plastic
PBT	Polybutylene Terephthalate
IPA	Isopropyl Alcohol
ASTM	American Society for Testing and Materials

SDS	Safety Data Sheet
UV	Ultraviolet
pli	Pounds per Linear Inch (peel strength)

Technical Terms

Term	Definition
Open time	Period after combining components A and B during which the adhesive remains fluid and parts can be positioned or repositioned. For ADINOX® M460: 12–18 minutes at 77 °F.
Working time	Elapsed time after mixing needed to develop initial handling strength, allowing clamps or fixtures to be removed and parts to be moved carefully. For ADINOX® M460: 40–55 minutes at 77 °F.
Full cure	Time to reach maximum mechanical properties. Typically 24 hours at 77 °F. ADINOX Series M adhesives cure exclusively by chemical reaction between components; elevated temperature accelerates cure, reduced temperature slows it. Assemblies can enter service at approximately 80% strength (roughly 2 to 3 times the working time).
Elongation	Percentage of stretch a material undergoes before fracture, expressed as a proportion of original length.
Modulus	Ratio of stress to strain in the elastic region of a material. Higher modulus indicates a stiffer bond. Reported in PSI or MPa.
Tensile strength	Peak stress a material endures before fracture under a uniaxial pulling force, reported in PSI or MPa.
Cohesive failure	Fracture occurs within the adhesive layer itself, demonstrating that adhesion to both substrates exceeds the internal strength of the adhesive.
Substrate failure	Fracture occurs in the bonded material rather than in the adhesive, indicating the bond is stronger than the substrate.
Cleavage peel	Test measuring resistance to peeling forces applied at one edge of a bonded joint, reported in pli (pounds per linear inch). High peel strength indicates a tough adhesive that resists crack propagation.
Thixotropic	Non-sagging at rest but flows readily under applied force (during dispensing). Prevents dripping on vertical and overhead surfaces.
Exothermic reaction	Chemical reaction that generates heat. In ADINOX Series M adhesives, large confined masses can reach temperatures above 250 °F and release flammable vapors.
Static mixing nozzle	Disposable tube containing internal helical elements that homogeneously blend the two adhesive components as they are dispensed.
Gap filling	Maximum clearance between mating surfaces that the adhesive can span while maintaining full structural performance.