Arathane® 3427 PO / Arathane® 3304 IS

Product Description

Arathane® 3427 PO with Arathane® 3304 IS is a two component, room temperature curing, non-slumping, polyurethane adhesive of high strength and toughness. It is designed for bonding a variety of reinforced thermoset plastics, including glass and carbon reinforced polyester or epoxy composites, SMC, as well as a wide range of metals and thermoplastics. The adhesive is designed to be easily pumped and mixed, but to rapidly develop high thixotropy to prevent slumping.

Features

- High shear strength
- Tough and resilient
- Bonds GRP, GRE, SMC and metals
- Non slumping on vertical surfaces

Typical Properties*

Property	3427 PO	3304 IS	Mixed System
Appearance	Beige paste	Brown liquid	Neutral paste
Density, g/cm^3	~1.4	~1.2	~1.35
Viscosity at 25°C, cP	35 - 70	~0.2	Thixotropic
Pot life at 25°C, min 145 g at 68°F 50 g at 78°F	--	--	 120 100

*Properties are based on Huntsman test methods. Copies are available upon request

Processing

Mix Ratio

Product	Parts by weight	Parts by volume
Arathane® 3427 PO	100	100
Arathane® 3304 IS	40	45

The resin and hardener should be blended until they form a homogeneous mix.

Pretreatment

The strength and durability of a bonded joint are dependent on proper treatment of the surfaces to be bonded. At the very least, joint surfaces should be cleaned with a good degreasing agent such as acetone, iso-propanol (for plastics) or other proprietary degreasing agents in order to remove all traces of oil, grease and dirt. Low-grade alcohol, gasoline, or paint thinners should never be used. The strongest and most durable joints are obtained by either mechanically abrading or chemically etching ("pickling") the degreased surfaces. Abrading should be followed by a second degreasing treatment.

Application of adhesive

The resin/hardener mix is applied with a spatula or by automated extrusion equipment to the pretreated and dry joint surfaces. When bonding reinforced polyester or epoxy laminates the adhesive thickness depends on the evenness of the substrates. Bondlines of 0.02 - 0.2 in. (0.5 - 5 mm) are normal. Optimum results are obtained with low thickness of the adhesive. The joint components should be assembled and clamped as soon as the adhesive has been applied. contact pressure throughout the joint area will ensure optimum cure.

Mechanical Processing

Specialist firms have developed metering, mixing and spreading equipment that enables the bulk processing of adhesive. We will be pleased to advise customers on the choice of equipment for their particular needs.

Equipment Maintenance

All tools should be cleaned with hot water and soap before adhesives residues have had time to cure. The removal of cured residues is a difficult and time-consuming operation. If solvents such as acetone are used for cleaning, operatives should take the appropriate precautions and, in addition, avoid skin and eye contact.

Cure times to reach minimum shear strength

Temperature, °C	10	15	23	40	60	80	100
Cure time to reach LSS* > 145 psi (1N/mm^2)							
hours	18	12	7	2	-	-	-
minutes	-	-	-	-	40	25	10
Cure time to reach LSS > 1450 psi (10N/mm^2)							
hours	40	25	10	3	1.5	-	-
minutes	-	-	-	-	-	45	15

*LSS = Lap shear strength

Working open time (assessed at 55 - 60% RH and 73°F) >60 minutes.

Typical Physical Properties

Unless otherwise stated, the data were determined with typical production batches using standard test methods. They are typical values only, and do not constitute a product specification.

Unless otherwise stated, the figures given below were all determined by testing standard specimens made by lap-jointing ca. 4.5 x 1 x 0.060" (115 x 25 x 1.5 mm) strips of aluminum alloy. The joint area was ca. 0.5 x 1" (12.5 x 25 mm) in each case. Samples were cured at 16 hours at 40°C and tested at 23°C, unless noted otherwise.

Property	Test Method	Value
Tensile strength at 23°C, psi (MPa) Cure: 2 hours at 140°F + 14 days at 73°F	ISO 527	4,350 (30)
Tensile modulus, kpsi (GPa) Cure: 2 hours at 140°F + 14 days at 73°F	ISO 527	363 (2.5)
Elongation at tensile break, %	ISO 527	5
G' modulus (0.01 - 10 rad/sec), psi (MPa) at 23°C at 60°C	--	 218,000 (1500) 10,150 (70)
Glass transition temperature (DSC), T_g, °C Cured 2 hours at 176°F 2 hours at 140°F + 2 days at 73°F 2 hours at 140°F + 28 days at 73°F	Huntsman	 50 40 47
Flow at 73°F in 10 mm x 17 mm bead	--	None
Shore D hardness Cured 40 min at 140°F 40 min at 140°F + 36 hours at 78°F	--	 62 80
Charpy impact test,* mean, kJ/m^2 73°F (23°C) 32°F (0°C) -22°F (-30°C)	--	 20 13.7 11.6
Thermal cycling,† psi (N/mm^2)	--	3,335 (23)

*Specimens: 10 mm width x 4 mm thickness - cured 5 days at 104°F (40°C).
†100 cycles of 6 hour duration from -22°F to158°F (-30°C to 70°C)

Figure 1. Average lap shear strengths of typical metal-to-metal joints (ISO 4587)
Sand blasting pretreatment

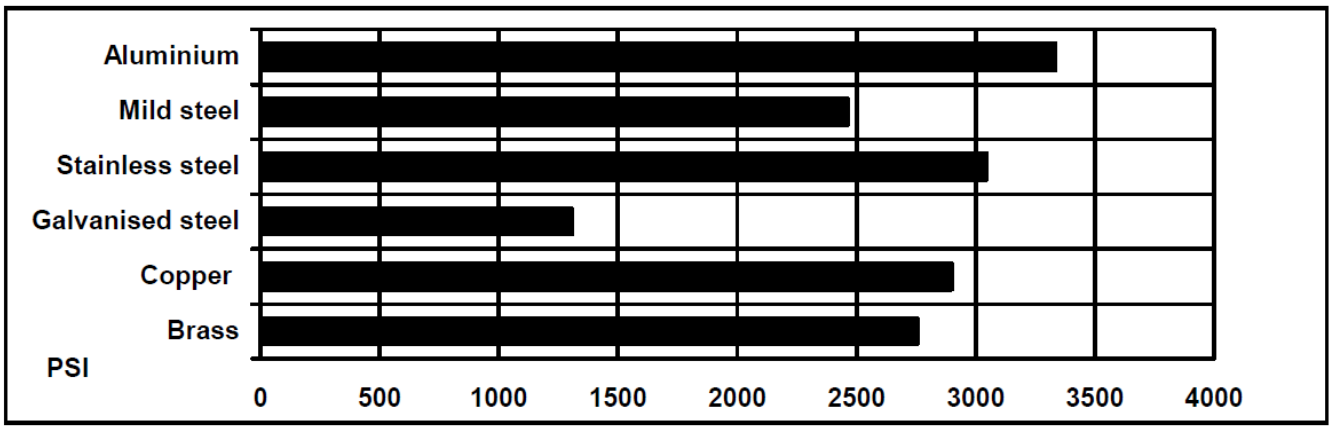


Figure 2. Average lap shear strengths of typical plastic-to-plastic joints (ISO 4587)
Lightly abrade and iso-propanol degrease pretreatment

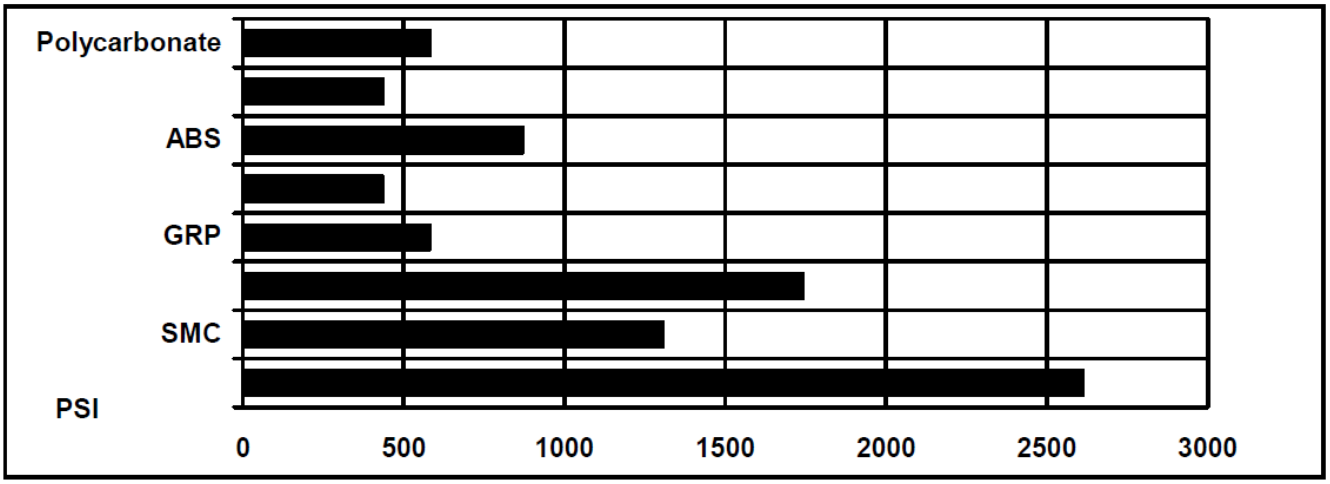


Figure 3. Lap shear strength versus temperature (ISO 4587) (typical average values)
a) Cure: 2 hours at 140°F (60°C) Aluminum: 0.1 mm bondline - open time before assembly 50 minutes.
b) Cure: 7 days at 73°F (23°C) Aluminum: 0.2 mm bondline.

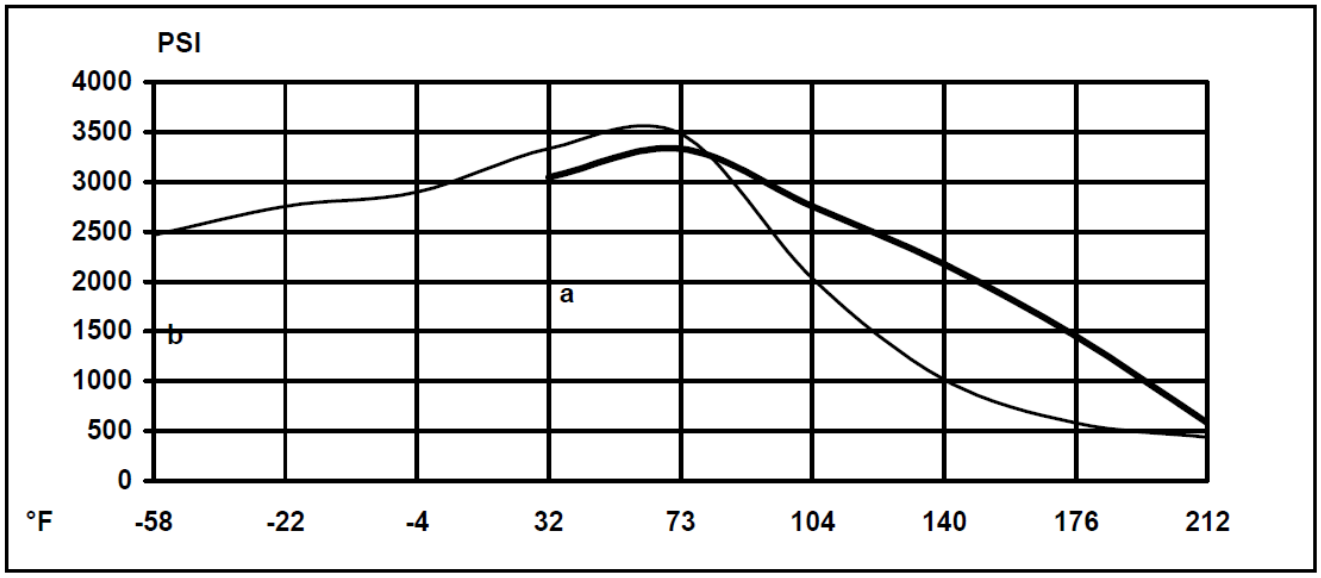


Figure 4. Lap shear strength versus immersion in various media (typical average values)
Unless otherwise stated, L.S.S. was determined after immersion for 90 days at 23°C

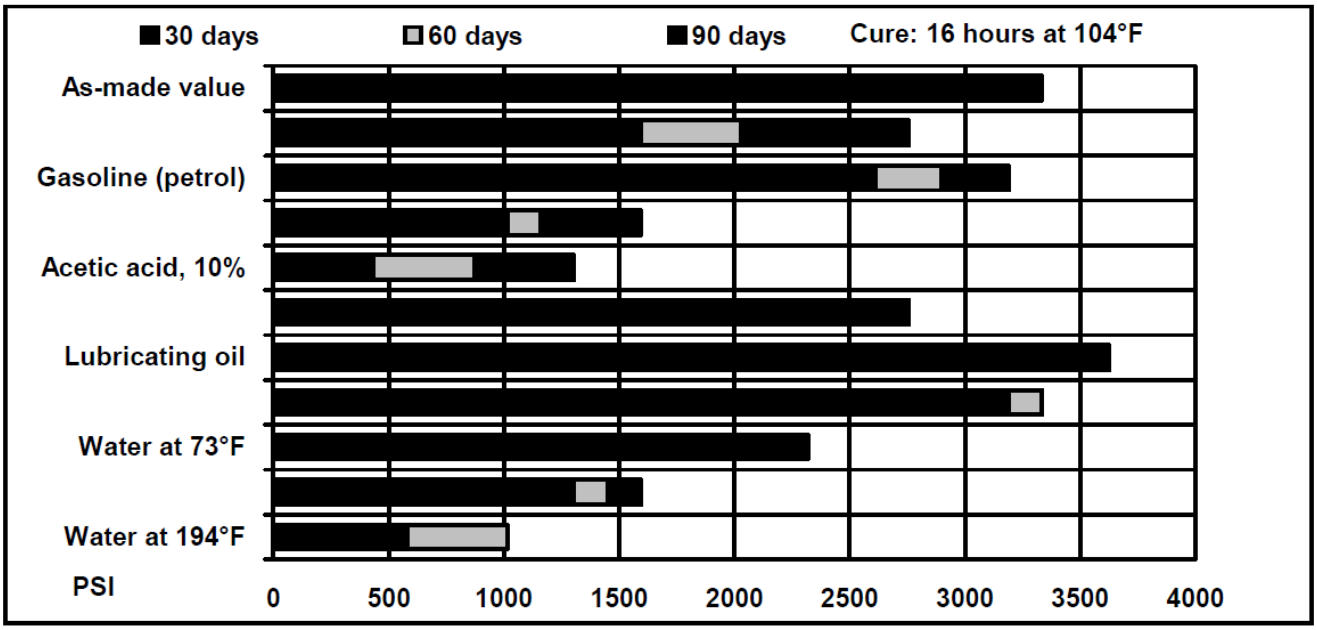


Figure 5. Lap shear strength versus tropical weathering
(40/92, DIN 50015; typical average values) Cure: 16 hours at 40°C, tested at 23°C

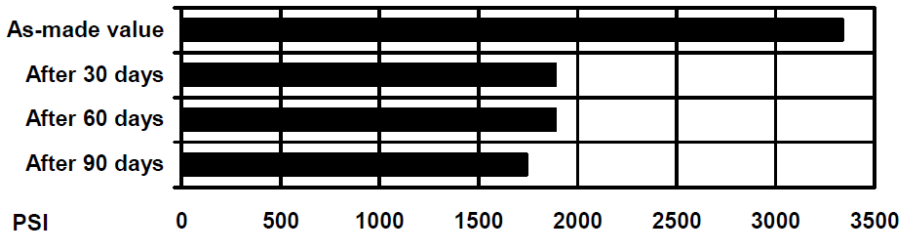
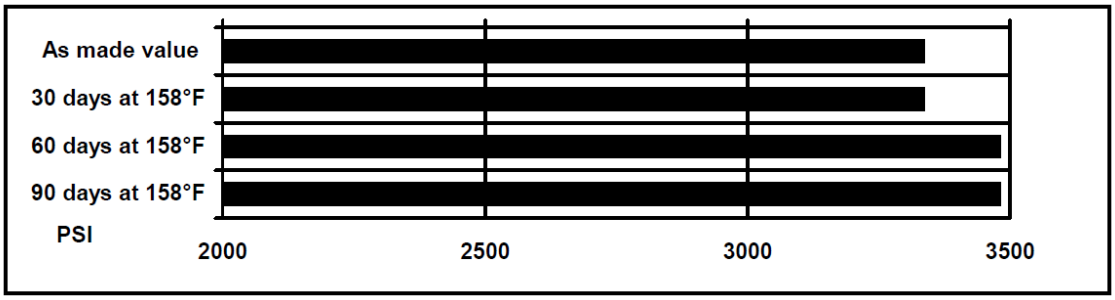


Figure 6. Lap shear strength versus heat ageing
Cure: 16 hours at 40°C



Storage

Arathane® 3427 PO and **Arathane® 3304 IS** should be stored in a dry place, in the original sealed containers, at temperatures between 2°C and 40°C (36°F and 104°F). Under these storage conditions, the product has a shelf life of **2 years** and **18 months**, respectively (from date of manufacture). The product should not be exposed to direct sunlight.

Precautionary Statement

Huntsman Advanced Materials Americas LLC maintains up-to-date Safety Data Sheets (SDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material.

First Aid!
Refer to SDS as mentioned above.

KEEP OUT OF REACH OF CHILDREN

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