

BR® 127

BR® 127 corrosion inhibiting primer is a modified epoxy primer. It is the industry standard for high-performance corrosion inhibiting primers and has been used in virtually every commercial aircraft built since its introduction.

BR® 127 primer can be used with essentially all 250°F (121°C) film adhesives and has been designed to provide optimal structural performance at temperatures ranging from -67°F to 300°F (-55°C to 149°C). BR® 127 primer is formulated to provide maximum environmental resistance and durability within the bond line, as well as prevent corrosive undercutting. It can also be used effectively as a protective coating outside bonded areas.

BR® 127 corrosion inhibiting primer can be cured prior to bonding. Recommended cure cycles range from 4 hours at 180°F (82°C) to 30 minutes at 250°F (121°C).

Primed details should be wrapped in Kraft paper (as protection from dust and dirt) and stored prior to adhesive bonding. Maintaining controlled conditions of 90°F (32°C) maximum temperature and 70% maximum humidity is recommended for extended storage life.

Cure cycles for adhesive films primed with BR® 127 primer may vary from 200°F to 350°F (93°C to 177°C) with minimum pressures to assure proper mating of bonded details.

Features and Benefits

- Industry-wide standard for corrosion resistant primers
- Prevents hydrolysis of oxide layers
- Structural performance from -67°F to 300°F (-55°C to 149°C)
- Compatible with a wide variety of adhesive systems
- Improves hydrolytic stability at the adhesive-to-metal interface
- Protects prepared surfaces from further oxidation
- Recommended use with FM® 73, FM® 87, FM® 94, BR® 95, FM® 123-2, FM® 123-5, FM® 300, FM® 300-1, or FM® 300-2

CHARACTERISTICS

Table 1 | Physical Properties (Liquid Primer)

Shelf Life	12 months at or below 0°F (-18°C) from date of shipment
Shop Life	10 days at 75°F (24°C) 5 days at 90°F (32°C)
Density	7.3 lb/gal (875 g/L)
Volatile Organic Content (VOC) ASTM D 3960	6.6 lb/gal (792 g/L)
Out-gassing ASTM E 595	TML - 0.48%, CVCM - 0.03% WVR - 0.19 %



Table 2 | Product Availability

Solids ASTM D 2369	10% ± 1%
Color	Yellow
Size	0.25 gal (0.95 L) 1.00 gal (3.79 L) 5.00 gal (18.9 L)

PROPERTIES
Table 3 | Mechanical Properties of Structural Adhesives Cured with BR® 127

Property	Test temperature	FM 73 ¹	FM 87-1 K ²	Substrate
Lap Shear ASTM D 1002	°F (°C)	psi(MPa)		0.063 in (1.60 mm) 2024-T3 aluminum
	-67 (-55)	6650 (45.9)	5500 (38.0)	
	75 (24)	6500 (44.9)	6700 (46.2)	
	180 (82)	4340 (29.9)	4120 (28.4)	
	250 (121)	1040 (7.2)	3250 (22.4)	
Wide Area Lap Shear ASTM D 3165	-67 (-55)	5460 (37.6)	5490 (37.9)	0.063 in (1.60 mm) 2024-T3 aluminum
	75 (24)	5100 (35.2)	5200 (35.9)	
	180 (82)	4080 (28.2)	4200 (29.0)	
	250 (121)	1410 (9.7)	2710 (18.7)	
Floating Roller Peel ASTM D 3167	°F (°C)	lb/in (kN/m)		0.025 in (0.63 mm); 0.064 in (1.63 mm) 2024-T3 aluminum clad
	-67 (-55)	66 (11.6)	60 (10.5)	
	75 (24)	65 (11.4)	70 (12.3)	
	180 (82)	96 (16.8)	66 (11.6)	
	250 (120)	55 (9.6)	55 (9.6)	
Climbing Drum Peel ASTM D 1781	°F (°C)	in-lb/in (Nm/m)		0.020 in (0.51 mm) 0.064 in (1.63 mm) 2024-T3 aluminum
	-67 (-55)	73 (325)	63 (280)	
	75 (24)	95 (423)	73 (325)	
	180 (82)	130 (578)	75 (334)	
	250 (121)	68 (302)	57 (254)	
Honeycomb Sandwich Peel ASTM D 1781	°F (°C)	in-lb/3in (Nm/m)		Skins: 0.020 in (0.51 mm) thick 2024-T3 aluminum, Core: 5052 0.25 in (6.40 mm) cell, 7.9 pcf (0.127 g/cc) density, 0.5 in (12.7 mm) thick
	-67 (-55)	53 (78.6)	53 (78.6)	
	75 (24)	95 (141)	63 (93.4)	
	180 (82)	41 (60.8)	59 (87.5)	
	250 (121)	5 (7.4)	50 (74.1)	
Flatwise Tensile ASTM C 297	°F (°C)	psi(MPa)		Skins: 0.020 in (0.51 mm) thick 2024-T3 aluminum skins, Core: 5052 0.25 in (6.40 mm) cell, 7.9 pcf (0.127 g/cc) density, 0.5 in (12.7 mm) thick
	-67 (-55)	1680 (11.6)	1360 (9.3)	
	75 (24)	1300 (9.0)	1050 (7.2)	
	180 (82)	660 (4.6)	640 (4.4)	
	250 (121)	72 (0.5)	380 (2.6)	

¹ Test Condition: 0.06 psf (293 gsm); Cure Temperature: 1 hour at 250°F (121°C); Service Temperature: 180°F (82°C)

² Test Condition: 0.06 psf (293 gsm); Cure Temperature: 1 hour at 250°F (121°C); Service Temperature: 250°F (121°C)


Table 4 | Mechanical Properties of Structural Adhesives Cured with BR® 127 Continued

Property	Test temperature	FM 123-2 ¹	FM 300 ²	FM 300-2K ³	Substrate
Lap Shear ASTM D 1002	°F (°C)	psi(MPa)			0.063 in (1.60 mm) 2024-T3 aluminum
	-67 (-55)	5790 (39.9)	5460 (37.7)	4580 (31.6)	
	75 (24)	5580 (38.5)	5850 (40.4)	5900 (40.7)	
	180 (82)	3350 (23.1)	5180 (35.7)	5300 (36.6)	
	250 (121)	1490 (10.3)	4200 (29.0)	3730 (25.7)	
	300 (149)	NA ⁴	3160 (21.8)	2300 (15.9)	
Wide Area Lap Shear ASTM D 3165	-67 (-55)	4900 (33.8)	5450 (37.6)	-	0.063 in (1.60 mm) 2024-T3 aluminum
	75 (24)	4240 (29.2)	4700 (35.2)	-	
	180 (82)	2980 (20.5)	3980 (28.2)	-	
	250 (121)	1250 (8.6)	-	-	
	300 (149)	NA ⁴	2550 (17.6)	-	
Floating Roller Peel ASTM D 3167	°F (°C)	lb/in (kN/m)			0.025 in (0.63 mm); 0.064 in (1.63 mm) 2024-T3 aluminum clad
	-67 (-55)	52 (9.1)	26 (4.6)	18 (3.2)	
	75 (24)	60 (10.5)	28 (4.9)	36 (6.3)	
	180 (82)	69 (10.5)	30 (5.3)	40 (7.0)	
	250 (121)	-	32 (5.6)	42 (7.4)	
	300 (149)	NA ⁴	25 (4.4)	42 (7.4)	
Climbing Drum Peel ASTM D 1781	°F (°C)	in-lb/in (Nm/m)			0.020 in (0.51 mm) 0.064 in (1.63 mm) 2024-T3 aluminum
	-67 (-55)	56 (249)	14 (62)	18 (80)	
	75 (24)	65 (289)	37 (165)	35 (156)	
	180 (82)	60 (267)	44 (196)	40 (178)	
	250 (121)	-	45 (200)	38 (169)	
	300 (149)	NA ⁴	30 (133)	40 (178)	
Honeycomb Sandwich Peel ASTM D 1781	°F (°C)	in-lb/3in (Nm/m)			Skins: 0.020 in (0.51 mm) thick 2024-T3 aluminum, Core: 5052 0.25 in (6.40 mm) cell, 7.9 pcf (0.127 g/cc) density, 0.5 in (12.7 mm) thick
	-67 (-55)	59 (87.5)	39 (57.8)	34 (50.4)	
	75 (24)	55 (81.5)	37 (54.9)	45 (66.7)	
	180 (82)	33	42 (62.8)	48 (71.2)	
	250 (121)	(48.9) -	38 (56.3)	44 (65.2)	
	300 (149)	NA ⁴	23 (34.1)	33 (48.9)	
Flatwise Tensile ASTM C 297	°F (°C)	psi(MPa)			Skins: 0.020 in (0.51 mm) thick 2024-T3 aluminum, Core: 5052 0.25 in (6.40 mm) cell, 7.9 pcf (0.127 g/cc) density, 0.5 in (12.7 mm) thick
	-67 (-55)	1270 (8.7)	1080 (7.4)	1080 (7.4)	
	75 (24)	840 (5.8)	1030 (7.1)	1120 (7.7)	
	180 (82)	420 (2.9)	870 (6.0)	960 (6.6)	
	250 (121)	-	660 (4.6)	690 (4.7)	
	300 (149)	NA ⁴	470 (3.2)	330 (2.3)	

¹ Test Condition: 0.06 psf (293 gsm); Cure Temperature: 1 hour at 250°F (121°C); Service Temperature: 180°F (82°C)

² Test Condition: 0.08 psf (391 gsm); Cure Temperature: 1 hour at 350°F (177°C); Service Temperature: 300°F (149°C)

³ Test Condition: 0.08 psf (391 gsm); Cure Temperature: 1.5 hour at 250°F (121°C); Service Temperature: 300°F (149°C)

⁴ Not Applicable: For additional information refer to the individual adhesive technical datasheet.


Table 5 | Effect of Salt Spray on Strength Retention

Property	Exposure Time	Strength	Substrate
Lap Shear ASTM D 1002	Days	psi (MPa)	0.063 in (1.60 mm) 2024-T3 aluminum clad
	0	5680 (39.2)	
	30	5890 (40.6)	
	90	4970 (34.3)	
	180	4480 (30.9)	

Primed with BR® 127 and bonded with a 250°F (121°C) cure elastomer modified epoxy adhesive.

PROCESSING

Mixing

Allow the container to warm to room temperature, 75°F (24°C), before opening. Thoroughly mix BR® 127 upon opening, primer should be agitated lightly during application.

Surface Preparation

A clean, dry, grease-free surface is required for bonding. BR® 127 is used with standard cleaning techniques involving a four step procedure of solvent degreasing, alkaline cleaning, chemical deoxidizing (etching) and phosphoric acid anodizing*.

General guidance for etching and phosphoric acid anodizing can be found in ASTM D 2651 and ASTM D 3933, respectively. Best results for aluminum feature priming after appropriate surface preparation.

*Boeing patent 4,085,012 April 1978. Phosphoric acid anodizing is now being used by a large number of aircraft manufacturers due to the improved surface bond durability it provides.

Equipment

BR® 127 may be sprayed using a variety of equipment including hand-held, automated, or conventional air-atomizing HVLP spray equipment. Parts may be racked for spray and cured in any position convenient for the process. Refer to Tables 6 and 7 for specific equipment set-up recommendations.

Primer Thickness

Spray a dry primer thickness of 0.0001 in to 0.0003 in (0.0025 mm to 0.0076 mm) for optimum mechanical properties. Spray technique consists of applying smooth and even coats. The primer should be applied using two to three thin box coats (4 - 6 cross coats) to obtain the final film thickness. Additional coats of primer may be sprayed and cured onto previously cured areas without loss of properties.

Spraying

For uniform coating, apply one thin coat of primer to cover the entire part and allow to dry completely (primed portion color will change to lighter yellow when dry). Then spray additional box coats on top to achieve the desired primer thickness. Allow 30 to 60 seconds drying between each box coat.

Spray Gun Cleaning

If using a gun in which a water-based material has been used, the spray gun must be rinsed and sprayed for at least 1 minute with a suitable solvent (Acetone or MEK) prior to loading the gun with BR® 127 primer. Clean the gun immediately after use by rinsing and spraying with a suitable solvent (Acetone or MEK).



Dry Time

15 to 60 minutes at 75°F (24°C) and less than 55% relative humidity is recommended.

Primer Cure Cycle

Dry primer coatings are to be cured at 250°F ± 10°F (121°C ± 6°C) for 30 minutes to obtain a surface which is scratch and MEK resistant. Assemblies primed with BR® 127 and then cured may be stored for six months or longer without degradation of the final bond strength. Assemblies that have been primed and cured should be protected from dust and oil by wrapping in protective sheeting such as Kraft paper. Stored assemblies should be wiped with a suitable solvent prior to bonding.

Bonding cycles

Primed details may be exposed to up to three 60 minute 250°F (121°C) cure cycles with no significant loss of primer properties.

Spray Gun Settings

Table 6 | Settings for Binks 95 Model

Fan Adjustment	0.5 to 1 counter-clockwise turn
Fluid Control (needle adjustment screw)	2 to 2.5 counter-clockwise turns
Needle	Part #665
Air Cap Model	66SD
Cup Pressure	8-12 psi (0.056-0.082 MPa)
Fluid Tip	Model 66SS
Spraying Distance (nozzle to panel)	14 in – 16 in (36 cm – 41 cm)
Room Temperature	70°F – 90°F (21°C – 32°C)
Humidity	< 65%
Air Supply Pressure	35-50 psi (0.24-0.34 MPa)

Table 7 | Settings for Devilbiss Spray Gun (HVLP) Model GTI H05

Fan Adjustment	1 to 1.25 counter-clockwise turns
Fluid Control (needle adjustment screw)	1 to 1.5 counter-clockwise turns
Needle	Part # GTI-413
Air Cap Model	2000
Cup Pressure	7 psi (0.05 MPa)
Fluid Tip	2.0
Spraying Distance (nozzle to panel)	14 in – 16 in (36 cm – 41 cm)
Room Temperature	70°F – 90°F (21°C – 32°C)
Humidity	< 65%
Air Supply Pressure	35-50 psi (0.24-0.34 MPa)



Table 8 | Settings for SATA Jet 4000 B RP

Fan Adjustment	± 45°
Fluid Control (needle adjustment screw)	2 to 2.5 counter-clockwise turns
Needle	Jet 4000 B RP 1.0
Air Cap Model	Jet 4000 B RP 1.0
Cup Pressure	5-10 psi (0.034-0.069 MPa)
Fluid Tip	Jet 4000 B RP 1.0
Spraying Distance (nozzle to panel)	8 in – 14 in (20 cm – 36 cm)
Room Temperature	70°F – 90°F (21°C – 32°C)
Humidity	< 65%
Air Supply Pressure	25-35 psi (0.172-0.241 MPa)

HEALTH & SAFETY

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

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