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TECHNICAL DATA SHEET

POLYWATER® BONDUIT® CONDUIT ADHESIVES

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DESCRIPTION

BonDuit® and BonDuit XL Conduit Adhesives join polyethylene duct to PVC, fiberglass, and metal duct using standard PVC couplings. These rapid-cure, two-part resin adhesives form durable bonds for strong, permanent joints. They create watertight, airtight seals. BonDuit is a versatile, field-friendly conduit joining solution. BonDuit creates a high performance bond. The XL version comes in a larger package and allows a longer work time. BonDuit is versatile and works with multiple conduit types and sizes. It is easy to use and requires no special training.

ADHESIVE SHEAR STRENGTH

BonDuit was used to join two pieces of HDPE conduit with a PVC coupling. Typical bond strengths were measured as the pull out force after 24 hours at 70°F (21°C).

CONDUIT DIAMETER	PULLOUT FORCE
1 inch (2.5 cm)	724 lb_f (3.22 kN)
1½ inch (4 cm)	1,233 lb_f (5.48 kN)
2 inch (5 cm)	2,025 lb_f (9.01 kN)
4 inch (10 cm)	5,333 lb_f (23.72 kN)

Results based on third-party laboratory testing.

HYDROSTATIC (PRESSURE) TESTING

BonDuit forms watertight joints. HDPE duct was joined to PVC duct with a PVC coupling using BonDuit. The ducts were filled with water, sealed, pressurized to 120 psi (8.3 bar), and observed over time for leakage. The joint was then subjected to a short-duration, high-pressure test.

TEST DURATION	RESULT
1,000 Hours	No leaks

Continuous pressure test based on ASTM D1598, "Time to Failure of Plastic Pipe Under Constant Internal Pressure."

SHORT-TIME HIGH PRESSURE (BURST TEST)	
MAXIMUM PRESSURE	**RESULT**
>250 psi (>17 bar)	No Leaks

Burst test based on ASTM D1599, "Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing and Fittings (Burst Test)."

BonDuit mixes as it is applied to create permanent joints.

PRODUCT FEATURES

- Versatile—Bonds different materials, multiple sizes
- Superior—Stronger pullout strength than mechanical couplings
- Durable—Bonds with high strength within an hour
- Easy to Use—Requires no special training
- Convenient—Contains required components for quick installation

END USE

BonDuit bonds polyethylene to:

- PVC and transition couplings
- Concrete vaults
- Above ground conduits
- Steel sweeps and elbows
- Fiberglass and composite connections
- PEX, CPVC, ABS, Polypropylene

APPROVALS

UL Recognized
Passes UL 746
Polymeric adhesive system for indoor and outdoor use with electrical equipment

COMPONENT PHYSICAL PROPERTIES

The BonDuit products are 2-part resins. Both parts of each product are thin pastes packaged in a mixing cartridge, a 50 ml cartridge for BonDuit and a 250 ml cartridge for BonDuit XL.

PROPERTY	PART A	PART B
Color	Dark grey/ black	White/ light yellow
Form	Paste	Paste
Odor	No odor	Slight sulfur odor
VOC	0 g/L	0 g/L
Specific gravity	1.2	1.2

CURED RESIN PROPERTIES

BonDuit cures to form a solid, durable resin seal.

PROPERTY (7 DAY CURE, 70°F)	RESULT
Color	Grey
Peak exotherm @ 70ºF (21°C)	<200ºF (<95°C)
Hardness (Shore D Durometer)	78–88
Flexibility (ASTM D790)	> 2%
Dielectric strength (ASTM D149)	450 Volts/Mil (nonconductive)
Airtight (continuous)	120 psi (8.3 bar)

TYPICAL ADHESIVE SHEAR STRENGTH

BonDuit will bond to dissimilar surfaces. Bond strength will be the same or greater than the weaker substrate when two different materials are joined.

SUBSTRATE	RESULT
HDPE	105 psi (0.72 N/mm^2)
PVC	185 psi (1.28 N/mm^2)
Fiberglass	2000 psi (13.8 N/mm^2)
Steel	2300 psi (15.9 N/mm^2)
Aluminum	860 psi (5.93 N/mm^2)
Copper	3500 psi (24.1 N/mm^2)

Tested using ASTM D1002. Samples sanded, cleaned and cured for 24 hours.

TYPICAL IMPACT RESISTANCE

SUBSTRATE	RESULT
HDPE	24.8 in-lb (2.8 N·m)
PVC	37.2 in-lb (4.2 N·m)
Fiberglass	22.3 in-lb (2.5 N·m)
Galvanized steel	37.2 in-lb (4.2 N·m)

Tested using ASTM G14. Samples are sanded, cleaned and allowed to cure for 24 hours.

BONDING MATERIALS

BonDuit adheres to:

- Polyethylene
- PVC, CPVC
- Composite
- PEX
- ABS
- Polypropylene
- Fiberglass
- Concrete
- Porcelain
- Steel
- Aluminum
- Copper

ENVIRONMENTAL RESISTANCE

BonDuit can withstand the typical rigors of the conduit environment.

OPERATING TEMPERATURE
-31°F to 140°F (-35°C to 60°C)

Exposure testing shows no significant loss in adhesion. Test protocols include: 1000 hours at 140°F (60°C), 24 hours at -31°F (-35°C), 7 days at 140°F (60°C) and 95% humidity, and temperature cycling from 77°F (25°C) water immersion to 95°F (35°C) with 90% humidity to -31°F (-35°C).

BonDuit, if applied and frozen before cure, shows no significant change in adhesion when warmed and allowed to cure after temperature is raised.

BonDuit withstands ultraviolet and direct sunlight exposure with no decrease in functionality.

CHEMICAL RESISTANCE

The chemical resistance of a polyethylene to PVC bond joined with BonDuit Adhesive is tested by measuring shear strength after exposure to the reagent compared to a non-exposed control. The joint cured for 7 days, immersed in the reagent, and then aged at ambient temperature for 3 months.

CHEMICAL EXPOSURE	% CONTROL
Salt water (4%)	85% (Pass)
Alkaline soap solution (pH 12)	100% (Pass)
Odorless mineral spirits	>100% (Pass)

BonDuit Adhesive bonds show good resistance to salt water, alkaline solutions, and odorless mineral spirits (paraffinic solvent). A 6-month water and oil soak test also shows no significant change in adhesion compared to a control.

APPLICATION

BonDuit Adhesives are easy to use. For full installation information, please see BonDuit and BonDuit XL Usage Instructions.

One 50-ml cartridge of BonDuit will produce a ¼-inch (6 mm) bead of mixed adhesive approximately 42 inches (1.1 meter) long, while one 250 ml cartridge of BonDuit XL will produce a ¼–inch (6 mm) bead of mixed adhesive approximately 210 inches (5.3 meters) long.

Preparation:
Proper surface preparation ensures a strong, long-lasting, airtight and watertight bond. For best adhesion, surface should be sanded and cleaned with Type RP™ Cleaner Wipe to remove oils and displace any remaining water. Comparison of preparation technique is below:

SURFACE PREPARATION	BOND STRENGTH (% CONTROL)
No preparation	100% (Control)
Cleaner only	120%
Sanding only	410%
Cleaner and sanding	480%

Adhesion between HDPE and PVC substrates tested using ASTM D1002 (lap shear) with different preparation methods.

Application Temperature:
Keep BonDuit above freezing during application.

Working Temperature:
40°F to 120°F (4°C to 50°C)

General Installation:
Joints made with BonDuit can be placed into position once the connection is made. Adhesive cures underwater or underground. Conduits can be put into service once full cure is reached.

Cool Weather Application:
In cool weather (below 60°F, 16°C) keep BonDuit and couplings warm before using, above 60°F (16°C). It may be necessary to heat the transition joint to force adhesive cure. Below 40ºF (4°C), the joint should be heated to cure the adhesive.

Warm Weather Application:
In warm weather (above 85°F, 29°C), keep BonDuit below 70°F (21°C). This will help keep the adhesive from curing before coupling is attached. If possible, use during cooler mornings and out of direct sunlight to slow down cure rate.

Underwater Application:
BonDuit will retain their strength when cured underwater. Surface should be abraded and cleaned per standard instructions. Joint can be placed underwater within 5 minutes of application.

CURE RATE

Each BonDuit develops a strong bond, allowing movement or burial quickly.

TEMPERATURE	WORK TIME	SET TIME
35°F (2°C)	40 min (XL 80 min)	7 hrs
52°F (11°C)	20 min (XL 40 min)	3½ hrs
60°F (16°C)	10 min (XL 20 min)	1½ hrs
70°F (21°C)	6 min (XL 12 min)	60 min
88°F (31°C)	4 min (XL 8 min)	40 min

After one hour at 70°F (21°C), BonDuit (1½ hours for BonDuit XL) will reach approximately 50% of its cure strength and will “set”. It will continue to cure and will reach maximum bond strength after approximately 24 hours at 70°F (21°C).

Once cured, conduit joints made with BonDuit Adhesive will hold adequate air pressure for cable blowing operations.

CURE TIME, 70°F (21°C)	AIR PRESSURE	RESULT
90 Minutes	150 psi (10.3 bar)	Pass
120 Minutes	200 psi (13.8 bar)	Pass

The prepared conduit system holds the above pressure for 10 minutes.

SAFETY

BonDuit has low levels of toxicity. Good industrial hygiene practice and appropriate precautions should be employed during use. Provide appropriate ventilation/respiratory protection against decomposition products during welding/flame operations (i.e., torches used to install heat shrink products) on or near cured product. See SDS for specific details.

STORAGE AND HANDLING

Keep cartridge tightly closed in a cool, dark, dry location. Reseal cartridge after use. Keep away from sources of ignition and protect from freezing. All cartridges should be disposed of in an environmentally safe manner and in accordance with government regulations.

Unopened product has a shelf life of 18 months.

MODEL SPECIFICATION

The statement below may be inserted into a customer specification to help maintain engineering standards and ensure work integrity.

Approved conduit joining systems are BonDuit and BonDuit XL Conduit Adhesives. Adhesive shall be UL recognized for outdoor use in electrical equipment. The conduit adhesive shall come in a multiple-use cartridge to bond various conduit connections without special fitting or positioning jigs. The packaging shall automatically mix and meter the adhesive. The cure rate for the adhesive shall be fast, reaching 50% of final strength in less than 1 ½ hour (@ 75°F, 24°C), and 80% of final strength in less than 3 hours (@ 75°F, 24°C). The peak exotherm temperature of mixed product shall not exceed 200°F, 93°C (20-gram sample). Product shall be suitable for use on various duct materials, multiple duct sizes and connection types.

Once cured, the adhesive seal shall be airtight and watertight. A one-inch, PVC coupling sealed to a polyethylene duct with the adhesive shall hold 120 psi (8.3 bar) air pressure after curing one hour at 75°F (24°C). The pull-out strength of a 2-inch (5 cm) polyethylene duct sealed to a PVC coupling shall be at least 910 lbs. force (4.05 kN) after curing one hour at 75°F (24°C) and at least 1820 lbs. force (8.10 kN) after curing for 24 hours. The adhesive shall have a minimum flexural strain of 2% as measured by ASTM D790.

The cured adhesive shall be resistant to water, salt water, oils, and UV degradation. The cured bond shall withstand temperature extremes from -60°F (-50°C) to 250°F (120°C). It shall withstand multiple freeze-thaw cycles. The cured product shall be non-conductive with a minimum dielectric strength of 450 Volts/Mil as measured by ASTM D149.

ORDER INFORMATION

CAT #	PACKAGE DESCRIPTION
BT-KIT	2 – adhesive cartridges; 8 – mixing nozzles; 1 – strip of sanding cloth; 8 – Type RP cleaning wipes (cat # RP-1)
BT-KITG	Same as kit above; includes TOOL-50-11
BT-KITB6	Bulk kit contains 6 individual kits, BT-KIT
BT-KITB6G	Same as kit above; includes TOOL-50-11
TOOL-50-11	1 – dispensing tool
MXR-12T-10	10-pack of mixing nozzles for BonDuit
BT-CART12PK	12 – adhesive cartridges; 36 – mixing nozzles
BTXL-250KIT1	1 – adhesive cartridge, 5 – mixing nozzles, 1 – strip of sanding cloth, 5 – Type RP cleaning wipes (cat # RP-1L)
BTXL-250KITB6	Bulk kit contains 6 individual kits, BTXL-250KIT1
BTXL-250CART12	12 – adhesive cartridge, 12 – mixing nozzles, 1 – strip of sanding cloth,
MXR-25B-10	10-pack of mixing nozzles for BonDuit XL

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