



APPLICATION MANUAL

*A Guide to Proper Sealant Design,
Specification, Application and Quality Control*

02-BFX AM- ver 17 08-15-05 supersedes 08-10-05

Introduction.....	3
SECTION I - PRODUCT OFFERING	
Bondaflex Technologies Product Descriptions	3
SECTION II - WHERE TO USE TABLES	
Selection Guide by Polymer/Cure Chemistry	7
Usage Table - Structure Type	8
Usage Table - Location	9
Usage Table - Construction Application	10
Usage Table - Substrate	12
Usage Table - Industrial Application	14
SECTION III - PRODUCT APPLICATION DESIGN	
Introduction	15
Joint Movement	15
Joint Types	16
Joint Design	17
Moving Joint Considerations	18
Joint movement in Shear	18
Movement During Cure	19
Backer Materials	19
EIFS Consideration	20
Weatherseal Design Examples	21
Sealant/Adhesive Quantity Estimating Guide	26
SECTION IV - PRODUCT USE / APPLICATION	
Surface Preparation and Sealant Application	
Introduction	27
Substrate Cleaning Procedure	27
Winter/Summer Solvent Considerations.	28
Two-Rag Wipe or Two Cloth Cleaning Method	28
Non-Porous Substrate	28
Porous Substrates	28
Porous Substrates - Solvent Considerations	29
Primer Application Procedure	29
Sealant Application Procedure	30
EIFS Application Procedures	31
Removal and Replacement of Existing Weatherseals	31
Introduction	31
Repairing Organic Sealant (Remedial Application)	31
Repairing Silicone Sealant (Remedial Application)	32
SECTION V - QUALITY ASSURANCE - GENERAL	33
Product Quality	33
Skin-Over Time/Elastomeric Test	33
Standard Field Adhesion Test	33
Field Adhesion Hand Pull Test Criteria	35
Sealant Repair in Adhesion Test Area	36
Documentation	36
Product Quality Control Log-One-Part Sealants	37
Field/Shop Adhesion Testing Log	38
SECTION VI - ADHESIVE APPLICATION GUIDE	
Adhesive Joint Design	39
SECTION VII - APPLICATION EQUIPMENT ILLUSTRATION	40
SECTION VIII - REFERENCES	44



APPLICATION MANUAL

INTRODUCTION

This manual was developed to aid the designer, specifier and user of sealants and adhesives in the proper selection, application and quality assurance practices. It is intended for weathersealing systems, and O.E.M. assembly using adhesive/sealants. As construction projects vary in many aspects, such as design, customer requirements, and environment, this manual may not be considered comprehensive, but will aid you in the correct application of Bondaflex products. Contact us when further assistance is needed and consult the Reference section for further industry information.

SECTION I - PRODUCT OFFERING

Bondaflex Technologies produce a full line of high performance weatherproofing sealants and adhesives. These products should be selected based upon the unique properties that each has for specific applications.

BONDAFLEX TECHNOLOGIES PRODUCT DESCRIPTIONS:

POLYURETHANES (PUR)

BONDAFLEX PUR 25 is a one-component, high-performance, non-sag, multi-purpose elastomeric, polyurethane sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX PUR 25 TEX is a textured, one-component, high-performance, non-sag, multi-purpose elastomeric, polyurethane sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content

BONDAFLEX PUR 35 SL is a one-component, high-performance, self-leveling, multi-purpose elastomeric, polyurethane sealant. Meets the requirements of ASTM C-920, Type S, Grade P, Class 25, Use T, M, G, A, O; TT-S-00230C, Type I, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX PUR 40 FC is a one-component, fast cure, high-performance, non-sag, multi-purpose elastomeric, polyurethane sealant and adhesive. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A,O; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX PUR 50 FC is a one-component, fast cure, high strength, high-performance, non-sag, multi-purpose elastomeric, polyurethane adhesive. Meets the requirements of California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX PUR 60 FC is a one-component, fast cure, high strength, high performance, non-sag, multi-purpose elastomeric, polyurethane adhesive. Meets the requirements of California Air Resources Board 2003 requirements for Volatile Organic Compound content.

HYBRIDS

BONDAFLEX STP 25 is a one-component, fast cure, high performance, non-sag, multi-purpose elastomeric, silyl terminated polyether sealant and adhesive. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX STP 35 is a one-component, high early green strength, high performance, non-sag, multi-purpose elastomeric, silyl terminated polyether adhesive and sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 12.5, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX STP SPRAYABLE is a sprayable, one-component, high performance, multi-purpose elastomeric, silyl terminated polyether coating/seam sealant. Meets the requirements of California Air Resources Board 2003 requirements for Volatile Organic Compound content.

SILICONES

BONDAFLEX Sil 100 GP is a general purpose, one-component, non-sag, elastomeric, 100% RTV acetoxy silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, G, A, O; TT-S-01543A, Class A; CAN-19.13-M87, recognized component under UL QMFZ2, MIL-A-46106A, FDA Regulation 21 CFR 177.2600 for incidental food contact, NSF Standard 51 for direct food contact and List 61 for use with potable water and California Air Resources Board 2003 requirements for Volatile Organic Compound content. Maintains elastomeric properties up to 450° F.

BONDAFLEX Sil 100 WF is an anti-microbial, general purpose, one-component, non-sag, elastomeric, 100% RTV acetoxy silicone sealant. Meets the

requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, G, A, O; TT-S-01543A, Class A; CAN-19.13-M87, recognized component under UL QMFZ2, MIL-A-46106A, FDA Regulation 21 CFR 177.2600 for incidental food contact, NSF Standard 51 for direct food contact and List 61 for use with potable water and California Air Resources Board 2003 requirements for Volatile Organic Compound content. Maintains elastomeric properties up to 400° F.

BONDAFLEX Sil 100 GC is a glass clear, general purpose, one-component, non-sag, elastomeric, 100% RTV acetoxysilicone sealant. Specially formulated for glass to glass weatherseals and general assembly applications where a long lasting perfectly optically clear seal is required. Meets the physical requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, G, A, O; TT-S-01543A, Class A and California Air Resources Board 2003 requirements for Volatile Organic Compound content. Maintains elastomeric properties up to 450°F.

BONDAFLEX Sil 100 HT RED is a general purpose, one-component, non-sag, elastomeric, 100% RTV acetoxysilicone sealant designed for high temperature applications. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87, recognized component under UL QMFZ2, MIL-A-46106A, FDA Regulation 21 CFR 177.2600 approved for incidental food contact, NSF Standard 51 for direct food contact and California Air Resources Board 2003 requirements for Volatile Organic Compound content. Maintains elastomeric properties up to 600° F.

BONDAFLEX Sil 150 is a general purpose, one-component, non-sag, elastomeric, RTV water based silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, M, G, A, O; TT-S-00230C, Type II, Class A; CAN-19.13-M87, California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 200 GPN is a general purpose, one-component, non-sag, elastomeric, 100% RTV neutral cure silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; TT-S-001543A, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 200 SL is a general purpose, one-component, self-leveling, elastomeric, 100% RTV neutral cure silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade P, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type I, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 201 FC is a fast curing, one-component, non-sag, elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 25, Use NT, T, M, G, A, O; TT-S-00230C, Type II, Class A; TT-S-001543A, Class A; CAN-19.13-M87, AAMA 802.3 Type I and II, AAMA 803.3 Type I, AAMA 805.2, AAMA 808.3 and California Air Resources Board 2003 requirements for Volatile Organic Compound content. Bondaflex Sil 201 FC is formulated for window fabrication and has passed the Florida Hurricane Glazing Code when used in designed systems.

BONDAFLEX Sil 290 is an ultra low modulus, one-component, non-sag, elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 100/50, Use NT, M, G, A, O; TT-S-00230C, Type II, Class A; TT-S-001543A, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 295 is a versatile, structural glazing and weatherseal, one-component, non-sag, elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM C-920, Type S, Grade NS, Class 50/50, Use NT, M, G, A, O; ASTM C-1184 Structural Silicone Sealant; TT-S-00230C, Type II, Class A; CAN-19.13-M87 and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Silbridge 300 / 300P is an extruded ultra low modulus elastomeric, silicone profile bonded in place with silicone sealants to bridge moving cracks and joints. Silbridge 300P (Paintable) is treated to accept coating with most common elastomeric wall coatings.

BONDAFLEX Sil 728SL is a self-leveling, one-component, ultra low modulus elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM D-5893; ASTM C-920, Type S, Grade P, Class 100/50, Use T, M, G, A, O with an ultra low Shore Hardness; TT-S-00230C, Type I, Class A; TT-S-001543A, Class A and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 728 RCS is a self-leveling, two-component, very rapid cure, ultra low modulus elastomeric, neutral cure silicone sealant. Exceeds the requirements of ASTM C-920, Type M, Grade P, Class 100/50, Use T, M, G, A, O with an ultra low Shore Hardness; TT-S-00227E, Type I and meets California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 728 SG is a slope grade, flowable, one-component, ultra low modulus elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM D-5893; ASTM C-920, Type S, Grade P, Class 100/50, Use T, M, G, A, O with an ultra low shore hardness; TT-S-00230C, Type I, Class A; TT-S-001543A, Class A and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

BONDAFLEX Sil 728 NS is a non-sag, one-component, ultra low modulus elastomeric, neutral cure silicone sealant. Meets the requirements of ASTM D-5893; ASTM C-920, Type S, Grade NS, Class 100/50, Use NT, T, M, G, A, O with an ultra low Shore Hardness; TT-S-00230C, Type II, Class A; TT-S-001543A, Class A and California Air Resources Board 2003 requirements for Volatile Organic Compound content.

SILICONIZED ACRYLIC

BONDAFLEX Sil-A 700 is a one-component, premium quality, low shrinkage, non-sag, multi-purpose, siliconized acrylic caulk. Meets the requirements of

ASTM C-834 and California Air Resources Board 2003 requirements for Volatile Organic Compound content. USDA compliant for use in meat and poultry areas

PRIMERS

BONDAFLEX Primer PUR 1000 is a one-part urethane based general purpose primer used to promote adhesion of urethane and silyl-terminated polyether sealants to difficult to adhere substrates, such as FRP, PVC, RTM and SST.

BONDAFLEX Primer PUR 1500 is a one-part silane based urethane primer used as an adhesion activator for most all EPDM and PVC substrates. This primer is also used to promote adhesion to difficult to adhere substrates, such as FRP, RTM and SST when applying urethane, epoxy, acrylic, silicone and latex based sealants.

BONDAFLEX Primer Sil 2000 is used to promote adhesion of silicone sealants to a variety of porous construction materials such as natural stone, concrete, masonry and brick.

BONDAFLEX Primer Sil 2100 is used to promote adhesion of certain silicone sealants to a variety of construction materials such as stone, masonry, metal, coated glass and plastics.

BONDAFLEX Primer Sil 2300 is a low volatile organic content primer used to promote adhesion of certain silicone sealants to a variety of both porous and non-porous construction surfaces to increase the bonding capacity. Conforms to the requirements of the Bay Area Air Quality Management District Regulations, Rule 51 and South Coast Air Quality Management District Regulations for Architectural Sealant Primers for both porous and non-porous substrates

SECTION II – Where to Use Tables

Selection Guide by Polymer/Cure Chemistry

Property	PUR		Hybrid		Silicone		
	<i>sealant</i>	<i>adhesive</i>	<i>sealant</i>	<i>adhesive</i>	<i>acetoxo</i>	<i>neutral</i>	<i>water-based</i>
UV Non-Yellowing			X	X	X	X	X
Non-Staining	X	X	X	X		X	
Paintability	X	X	X	X			X
Adhesion below grade	X	X	X	X			
High Service Temperature					X	X	
Low VOCs	X	X	X	X	X	X	X
Gunnability					X	X	X
Extended tooling time	X	X					
Fast tack-free time		X			X	X	
High Green Strength		X		X			
High Tensile Strength		X		X			
High Tear strength		X					
Ultra low modulus						X	

Note: These are general characteristics of the type of polymer and curing chemistry of the product lines. Please consult technical data sheets or a Bondaflex representative for further detailed product information.

USAGE TABLES

STRUCTURE TYPE

	Bridges	Exterior Buildings	Interior Buildings	Metal Buildings	Parking Decks	Parking Structures Vertical Joints	Plazas/Walkways	Prison Security Sealant	Roadways and Highways/Pavements	Stadiums	
PUR 25		X	X			X	X			X	PUR 25
PUR 25 Tex		X				X	X			X	PUR 25 Tex
PUR 35 SL		X			X		X	X		X	PUR 35 SL
PUR 40 FC		X		X							PUR 40 FC
PUR 50 FC			X	X				X			PUR 50 FC
PUR 60 FC			X	X				X			PUR 60 FC
STP 25		X		X						X	STP 25
STP 35		X									STP 35
STP SPRAYABLE											STP SPRAYABLE
SIL 100 GP		X									SIL 100 GP
SIL 100 HT RED											SIL 100 HT RED
SIL 100 WF			X								SIL 100 WF
SIL 100 GC		X	X								SIL 100 GC
SIL 150		X	X								SIL 150
SIL 200 GPN		X	X	X		X					SIL 200 GPN
SIL 200 SL		X					X				SIL 200 SL
SIL 201 FC		X									SIL 201 FC
SIL 290		X				X				X	SIL 290
SIL 295		X		X		X				X	SIL 295
SILBRIDGE 300/P		X				X				X	SILBRIDGE 300/P
SIL 728 NS	X				X	X	X	X	X	X	SIL 728 NS
SIL 728 SL	X				X		X	X	X	X	SIL 728 SL
SIL 728 SG	X				X		X	X	X	X	SIL 728 SG
SIL 728 RCS	X				X		X	X	X	X	SIL 728 RCS
SIL-A 700			X								SIL-A 700

USAGE TABLES

LOCATION

	Above Grade	Below Grade	Horizontal On Grade	Vertical Joints	Exterior	Interior	
PUR 25	X	X	X	X	X	X	PUR 25
PUR 25 Tex	X	X		X	X		PUR 25 Tex
PUR 35 SL	X	X	X		X		PUR 35 SL
PUR 40 FC	X	X		X	X	X	PUR 40 FC
PUR 50 FC	X	X				X	PUR 50 FC
PUR 60 FC	X	X				X	PUR 60 FC
STP 25	X	X	X	X	X		STP 25
STP 35	X	X			X		STP 35
STP SPRAYABLE	X	X				X	STP SPRAYABLE
SIL 100 GP	X			X	X	X	SIL 100 GP
SIL 100 HT RED	X			X		X	SIL 100 HT RED
SIL 100 WF	X			X		X	SIL 100 WF
SIL 100 GC	X			X	X	X	SIL 100 GC
SIL 150	X			X	X	X	SIL 150
SIL 200 GPN	X		X	X	X	X	SIL 200 GPN
SIL 200 SL	X		X		X	X	SIL 200 SL
SIL 201 FC	X			X	X	X	SIL 201 FC
SIL 290	X			X	X		SIL 290
SIL 295	X			X	X		SIL 295
SILBRIDGE 300/P	X			X	X		SILBRIDGE 300/P
SIL 728 NS	X		X		X		SIL 728 NS
SIL 728 SL	X		X		X		SIL 728 SL

USAGE TABLES

CONSTRUCTION APPLICATION

Page 1 of 2

	Ceramic Tile Grouting	EIFS Systems and Renovation	Expansion and Control Joints	Glazing & Curtain Wall Internal Joinery	Glazing, Curtain Wall Unitized Assembly and Field Installation	Horizontal Highway Parking Bridge Joints	HVAC	Insulating Glass Secondary Seal	Interior Glass Partitions	Kitchen, Laboratory and Manufacturing Countertops	Metal Buildings	Metal Panel Stiffeners	
PUR 25			*	X								*	PUR 25
PUR 25 Tex			X	X									PUR 25 Tex
PUR 35 SL			*			X							PUR 35 SL
PUR 40 FC			X	X								*	PUR 40 FC
PUR 50 FC							*	*					PUR 50 FC
PUR 60 FC							X					X	PUR 60 FC
STP 25		X	X				X					X	STP 25
STP 35							X					X	STP 35
STP SPRAYABLE													STP SPRAYABLE
SIL 100 GP					X		X	X	X			X	SIL 100 GP
SIL 100 HT RED							X						SIL 100 HT RED
SIL 100 WF	X						X		X	*			SIL 100 WF
SIL 100 GC					X				*				SIL 100 GC
SIL 150	*								X				SIL 150
SIL 200 GPN	X		X	X	X		X	X		*			SIL 200 GPN
SIL 200 SL			X										SIL 200 SL
SIL 201 FC					X		X	*		X			SIL 201 FC
SIL 290		*	*		X								SIL 290
SIL 295		X	X	*	*		*	X	X	*	*	*	SIL 295
SILBRIDGE 300/P		*	*	X									SILBRIDGE 300/P
SIL 728 NS			*			X							SIL 728 NS
SIL 728 SL			X			*							SIL 728 SL
SIL 728 SG			X			*							SIL 728 SG
SIL 728 RCS			X			*							SIL 728 RCS
SIL-A 700									X				SIL-A 700

* PREFERRED PRODUCTS

X ALTERNATE PRODUCT BASED UPON SPECIFIC APPLICATION REQUIREMENT

USAGE TABLES

CONSTRUCTION APPLICATION

Page 2 of 2

	Pavers, Sidewalks and Plaza Decks	Perimeter Sealing of Windows, Doors and Sidewalks	Precast/Tilt Up	Siding & Fascia Trim and Molding	Preparing Walls to be Painted or Coated	Roofing Applications	Sealing Glass Block Systems	Sealing Shower-Tub Enclosures, Tubs, Sinks and Whirlpools	Structural Glazing	Waterproofing Cavity Walls	Window and Door Fabrication and Back Bedding	
PUR 25	X	*	*	X	*	*						PUR 25
PUR 25 Tex	*	*	X	X	X	X						PUR 25 Tex
PUR 35 SL	X					X						PUR 35 SL
PUR 40 FC		X	X	*	X	X						PUR 40 FC
PUR 50 FC				X								PUR 50 FC
PUR 60 FC				X								PUR 60 FC
STP 25				X	X	X				X		STP 25
STP 35						X						STP 35
STP SPRAYABLE									*			STP SPRAYABLE
SIL 100 GP		X				X	X					SIL 100 GP
SIL 100 HT RED												SIL 100 HT RED
SIL 100 WF						X	*					SIL 100 WF
SIL 100 GC						*	X					SIL 100 GC
SIL 150		X		*	*		X					SIL 150
SIL 200 GPN		X	X	X		X	X	*				SIL 200 GPN
SIL 200 SL	X					X	X					SIL 200 SL
SIL 201 FC		X					*	X		*		SIL 201 FC
SIL 290		X	*			X						SIL 290
SIL 295		*	X	X				*		X		SIL 295
SILBRIDGE 300/P						X						SILBRIDGE 300/P
SIL 728 NS	X					*						SIL 728 NS
SIL 728 SL	*					*	X					SIL 728 SL
SIL 728 SG	*											SIL 728 SG
SIL 728 RCS	X											SIL 728 RCS
SIL-A 700				X	X		X					SIL-A 700

* PREFERRED PRODUCTS

X ALTERNATE PRODUCT BASED UPON SPECIFIC APPLICATION REQUIREMENT

USAGE TABLES

This table is prepared to assist the user in selecting a product that will adhere to a commonly used substrate without priming. Adhesion is based on a properly cleaned and prepared substrate. Substrates not listed, questionable or not previously tested should be pre-tested prior to use. Adhesion may be enhanced by the use of primers. Pre-application adhesion test is recommended prior to job start-up. This will evaluate preparation and application under actual job conditions. Reference Application Manual for testing procedures.

SUBSTRATE

Page 1 of 2

	Acrylic FRP	Aluminized Steel	Aluminum	Brick/Masonry	Common Woods**	Concrete/Mortar	EIFS	Fiberglass	Fluoropolymer Painted Surface	
PUR 25	X		X	X	X	X	X	X	X	PUR 25
PUR 25 Tex	X		X	X	X	X		X		PUR 25 Tex
PUR 35 SL	X		X	X	X	X		X		PUR 35 SL
PUR 40 FC	X	X	X	X	X	X		X		PUR 40 FC
PUR 50 FC	X	X	X	X	X	X		X		PUR 50 FC
PUR 60 FC	X	X	X	X	X	X		X		PUR 60 FC
STP 25	X		X	X	X	X	X	X		STP 25
STP 35	X		X	X	X	X		X		STP 35
STP SPRAYABLE	X	X	X	X	X	X		X		STP SPRAYABLE
SIL 100 GP			X		X			X		SIL 100 GP
SIL 100 HT RED			X		X			X		SIL 100 HT RED
SIL 100 WF			X		X			X		SIL 100 WF
SIL 100 GC			X		X			X		SIL 100 GC
SIL 150			X	X	X	X	X	X		SIL 150
SIL 200 GPN	X	X	X	X	X	X		X	X	SIL 200 GPN
SIL 200 SL	X		X	X	X	X		X	X	SIL 200 SL
SIL 201 FC	X		X	X	X			X	X	SIL 201 FC
SIL 290	X	X	X	X	X	X	X	X	X	SIL 290
SIL 295	X	X	X	X	X	X	X	X	X	SIL 295
SILBRIDGE 300/P	X	X	X	X	X	X	X	X	X	SILBRIDGE 300/P
SIL 728 NS			X	X	X	X				SIL 728 NS
SIL 728 SL			X	X	X	X				SIL 728 SL
SIL 728 SG			X	X	X	X				SIL 728 SG
SIL 728 RCS			X	X	X	X				SIL 728 RCS
SIL-A 700			X	X	X	X				SIL-A 700

* MAY CAUSE STAINING

X DOES NOT INCLUDE PRESSURE TREATED AND WOODS THAT EXUDE OILS OR TANNINS, SUCH AS, TEAK, MAHOGANY AND RED WOOD

USAGE TABLES

This table is prepared to assist the user in selecting a product that will adhere to a commonly used substrate without priming. Adhesion is based on a properly cleaned and prepared substrate. Substrates not listed, questionable or not previously tested should be pre-tested prior to use. Adhesion may be enhanced by the use of primers. Pre-application adhesion test is recommended prior to job start-up. This will evaluate preparation and application under actual job conditions. Reference Application Manual for testing procedures.

SUBSTRATE

Page 2 of 2

	Galvanized	Glass	Granite	Other Natural Stones	Polyester Powder Coating	PVC	Standard Drywall	Steel	Tile & Ceramics	
PUR 25	X	X	X	X	X		X	X	X	PUR 25
PUR 25 Tex	X	X	X	X				X	X	PUR 25 Tex
PUR 35 SL	X	X	X	X			X	X	X	PUR 35 SL
PUR 40 FC	X	X	X	X	X	X	X	X	X	PUR 40 FC
PUR 50 FC	X	X	X	X		X	X	X	X	PUR 50 FC
PUR 60 FC	X	X	X	X		X	X	X	X	PUR 60 FC
STP 25	X	X	X	X		X	X	X	X	STP 25
STP 35	X	X	X	X		X	X	X	X	STP 35
STP SPRAYABLE	X	X	X	X		X	X	X	X	STP SPRAYABLE
SIL 100 GP		X	X*	X*				X	X	SIL 100 GP
SIL 100 HT RED		X	X*	X*					X	SIL 100 HT RED
SIL 100 WF		X	X*	X*					X	SIL 100 WF
SIL 100 GC		X							X	SIL 100 GC
SIL 150		X					X		X	SIL 150
SIL 200 GPN	X	X	X*	X*		X	X		X	SIL 200 GPN
SIL 200 SL	X	X	X*	X*		X	X		X	SIL 200 SL
SIL 201 FC	X	X	X*	X*	X	X	X		X	SIL 201 FC
SIL 290	X	X	X	X		X	X		X	SIL 290
SIL 295	X	X	X	X	X	X	X		X	SIL 295
SILBRIDGE 300/P	X	X	X	X	X	X	X		X	SILBRIDGE 300/P
SIL 728 NS	X	X	X	X*					X	SIL 728 NS
SIL 728 SL	X	X	X	X*					X	SIL 728 SL
SIL 728 SG	X	X	X	X*					X	SIL 728 SG
SIL 728 RCS	X	X	X	X*					X	SIL 728 RCS
SIL-A 700		X					X		X	SIL-A 700

* MAY CAUSE STAINING

X DOES NOT INCLUDE PRESSURE TREATED AND WOODS THAT EXUDE OILS OR TANNINS, SUCH AS, TEAK, MAHOGANY AND RED WOOD

USAGE TABLES

INDUSTRIAL APPLICATION

	Body to Cab Joints	Bonding Rubber Gaskets, Profiles & Appliance Trim	Collision Repair	Corrosion Protection	Form in Place Gaskets	Heating and Refrigeration Units	Lap Seams	Marine Cabins	Marine Decks	OEM Assembly	Sealing Rivets/Fastener Heads	Subfloor to Metal	
PUR 25	X					X	X	X		X	X		PUR 25
PUR 25 Tex													PUR 25 Tex
PUR 35 SL								*		X	X		PUR 35 SL
PUR 40 FC	*	*				X			X	X	*		PUR 40 FC
PUR 50 FC	X	X	*			*			*	*	X		PUR 50 FC
PUR 60 FC	X	X	X			X			X	X	X		PUR 60 FC
STP 25	X	X				X	*	X		X	X		STP 25
STP 35	X	X	X			X	X	X	X	X	X		STP 35
STP SPRAYABLE			*	*		X	X		X	X			STP SPRAYABLE
SIL 100 GP		*		X	X	X	X		X	X	X		SIL 100 GP
SIL 100 HT RED		X		*	*		X		X				SIL 100 HT RED
SIL 100 WF		X			X		X						SIL 100 WF
SIL 100 GC							X						SIL 100 GC
SIL 150							*						SIL 150
SIL 200 GPN		X		X	X	*	X		X	*	X		SIL 200 GPN
SIL 200 SL								*	X				SIL 200 SL
SIL 201 FC		*					X		*				SIL 201 FC
SIL 290													SIL 290
SIL 295									X				SIL 295
SILBRIDGE 300/P					X								SILBRIDGE 300/P
SIL 728 NS													SIL 728 NS
SIL 728 SL													SIL 728 SL
SIL 728 SG													SIL 728 SG
SIL 728 RCS													SIL 728 RCS
SIL-A 700							X						SIL-A 700

* PREFERRED PRODUCTS

X ALTERNATE PRODUCT BASED UPON SPECIFIC APPLICATION REQUIREMENT

SECTION III - PRODUCT APPLICATION DESIGN

Introduction

The successful performance of a building exterior is frequently defined by its ability to keep rain and the elements outside, away from the building's occupants. One of the critical links to ensuring a weatherproof building is the joint sealant. Building joints can be sealed effectively by following a few simple guidelines for designing workable joints, selecting the correct sealant, performing appropriate surface preparation, and performing quality checks to ensure proper performance. This section of the guide addresses design, sealant selection, surface preparation, job site adhesion testing and remedial procedures.

Joint Movement

Regardless of the size and height of structures, joint movement inevitably occurs by various factors such as: changes in temperature, seismic movement, elastic frame shortening, creep, live loads, concrete shrinkage, and moisture induced movements and design errors. Therefore, each joint should be designed to absorb these movements, using the correct sealant.

When movement is caused by temperature change, the degree of joint movement for each material should be considered since all materials have their own coefficient of linear thermal expansion (CTE). Joint movement caused by thermal expansion can be calculated by the following equation:

Movement (Mt) = CTE x Temp. Change x Length of Material

Examples are below:

Max. Temp (Deg F)	Min. Temp (Deg F)	Material Length (in)	Material	Thermal Coefficient In/in/F	Movement (in)
160	-20	96	Glass	0.0000051	0.088
100	50	180	Aluminum	0.0000132	0.119

Max. Temp (Deg C)	Min. Temp (Deg C)	Material Length (mm)	Material	Thermal Coefficient Mm/mm/C	Movement (mm)
60	-20	4000	Glass	0.0000101	3.232
70	-20	3500	Aluminum	0.0000238	7.497

Average Coefficients of Linear Thermal Expansion for Building Materials - Reference ASTM C-1193

Material	mm/mm/°C x 10 ⁻⁶	in/in/°F x 10 ⁻⁶
Glass	9.0	5.0
Aluminum	23.2-23.8	12.9-13.2
Granite	5.0-11.0	2.8-6.1
Marble	6.7-22.1	3.7-12.3
Concrete	9.0-12.6	5.0-6.0
Stainless Steel	10.4-17.3	5.8-9.6
Acrylic	74.0	41.0
Polycarbonate	68.4	38.0

Note: The coefficient of expansion for natural materials (brick, stone, wood, etc.) or fabrications of natural materials can be highly variable. If a specific material is contemplated then the coefficient for that material should be established and used rather than an average value. Moisture induced movement of brick masonry will cause the brick to swell and reduce joint sizes over the life of the project.

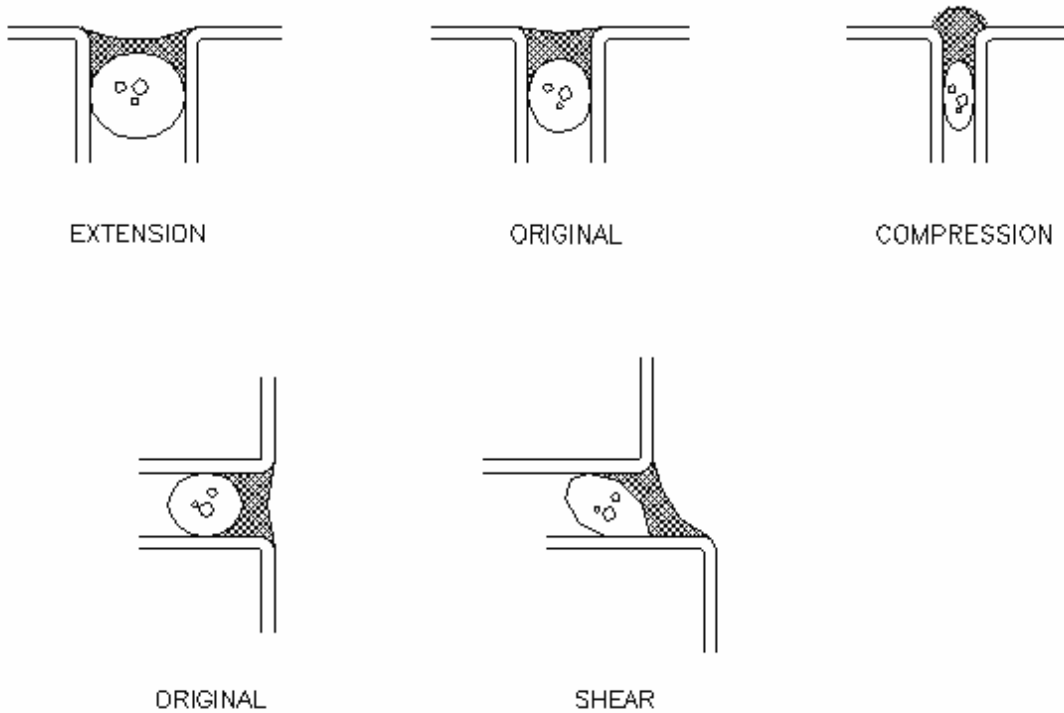
Joint Types

From a functional point of view, joints for construction can be put into two classes depending on the degree of movement. Working (moving) and Fixed (non-moving) joints.

Working Joints

Working joints are joints in which the shape and size of the sealant joint changes dramatically when movement occurs. Usually, a working joint occurs on the building envelope when different materials abut each other or joints are designed to allow thermal expansion of materials. Typical examples of working joints include:

- Control Joint
- Expansion Joint
- Lap Joint
- Butt Joint
- Stack Joint



Fixed Joint

Joints which are mechanically fixed to prohibit movement. Movements are generally less than 10% of joint width. These joints are typically designed as air and/or water seals.

Joint Design

Sealants have been designed to perform when installed in compliance with accepted weathersealing procedures. Industry guides documenting, in detail, the procedures for designing weatherseal joints are available. Some good examples are included in the reference section of this document.

A few underlying principles are critical to consider in virtually all joint designs using sealants. This section is intended as a review of these underlying design principles. When considering the design of weatherproof joints, the following basic points must be addressed:

- In all cases, a minimum depth of 6 mm (1/4") sealant/substrate bond is necessary to ensure adequate adhesion.
- In most cases, a minimum of width of 6mm (1/4") opening is necessary to ensure that sealant applied from a caulking gun will flow into the sealant joints. Note: In some cases where the sealant is used simply as a non-moving bedding compound and is applied to one substrate before both substrates are pressed together, thinner joint dimensions are acceptable.

- One-part sealants require atmospheric moisture to fully cure. Therefore, the sealant joint must be designed to ensure that the sealant is not isolated from the air.

Moving Joint Considerations

When designing moving joints, the following points also need consideration:

- A minimum 6 mm (1/4") joint width is recommended. Wider joints accommodate more movement than narrow joints.
- Three-sided adhesion limits the amount of movement that a joint can accept without inducing a tear. Three-sided adhesion can be eliminated by the addition of a bond breaker tape or backer rod. With three-sided adhesion, no more than +/-15 percent movement can be accommodated.
- A thin sealant joint (6 mm +/- 3 mm) will accommodate more movement than a thick joint. Sealants are designed to deliver optimum performance when the joints are shaped like an hourglass. An hourglass shape, formed using a backer rod and by tooling, maximizes the bond line to the substrate and minimizes the thickness of the sealant so as it elongates, less stress occurs.
- As a practical matter, as the sealant joint width becomes larger than 25 mm (1"), the depth should be held at approximately 9 to 12 mm (3/8 to 1/2"). There is no need for greater sealant depth with most sealants.

$$\text{Minimum Joint Width} = 100/X (Mt+Ml)+T$$

X = Sealant Movement Capacity (%)
 Mt = Movement due to thermal expansion
 Ml = Movement due to Live loading
 T = Construction Tolerance

For example:

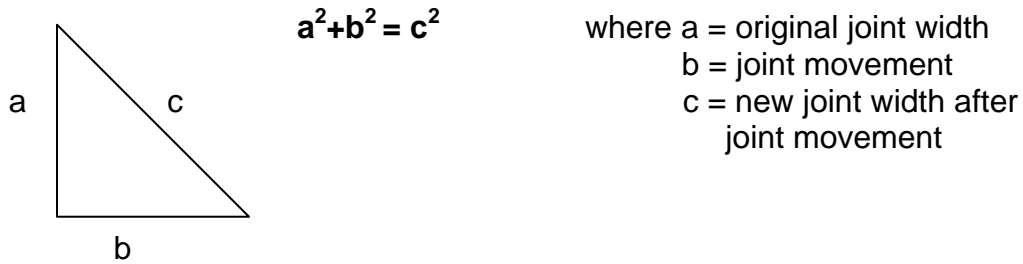
A horizontal joint between an aluminum curtainwall and a concrete panel with a thermal movement of 8 mm (5/16"), a live load movement of 6 mm (1/4"), a construction tolerance of 6 mm (1/4") and 25 % movement capacity sealant would be:

$$\begin{aligned} \text{Width} &= 100/25(8+6)+6 \\ \text{Width} &= 62\text{mm} \\ \text{Width} &= 100/25(5/16 + 1/4) + 1/4 \\ \text{Width} &= 2 \frac{1}{2} \text{ inches} \end{aligned}$$

Joint Movement in Shear

When joints move in shear, greater joint movement can be accommodated since actual movement on the sealant is less. The joint width required (a) for joint movement (b), as calculated below, or the allowable movement (b) for a

particular joint width dimension (a), can be calculated using Pythagoras' Theorem. The new joint width after movement (c) is limited by the movement capability of the sealant in shear in a weatherseal joint configuration. The calculation is as follows:



Original Joint Width (in)	Sealant Movement Capability Expansion	Max. Shear Joint Movement (in)
0.25	50	.280
Original Joint Width (mm)	Sealant Movement Capability Expansion	Max. Shear Joint Movement (mm)
10	50	11.18

Joint Movement During Cure

One-part sealants cure by reacting with atmospheric moisture. Joint movement during cure can cause unsightly aesthetics due to joint deformation e.g. wrinkling. Premature adhesion loss can also occur because the adhesive characteristics of the sealant are obtained after the sealant has cured. Adhesion loss due to movement during cure can be minimized by the use of a primer. Primers can decrease the adhesion cure time lag. Wrinkling can be minimized following these suggestions:

- Use open-cell polyurethane backer rod where allowed, not with E.I.F.S. or horizontal on grade joints for example.
- Seal when the joint surface is cool and will experience minimum temperature changes, typically in the late afternoon or early evening.
- Place no more than 6 mm (1/4") of sealant over the backer rod at the center.
- Use a faster curing sealant or one with a shorter skin over time assuming it meets the other performance requirements for the joint.

These suggestions should help minimize wrinkling, but may not eliminate it, as all sealants are prone to this aesthetic issue.

Backer Materials

A backer rod is the typical backer material for most weatherseal joints. The role of a backer rod is to allow a sealant to be installed and tooled to a proper joint profile. Once the sealant cures, the backer material must not restrict the movement of the sealant or cause "3-sided adhesion." To provide sufficient backpressure during sealant installation, the backer rod should be sized ~25 %

larger than the joint opening. Sizing differs among backer rod types; refer to manufacturer's recommendations. The key to achieving the proper sealant joint profile is the correct selection and placement of the backer rod.

Generally, three common backer rod types can be used with Bondaflex Sealants:

- Open cell polyurethane
- Closed cell polyethylene
- Non-gassing polyolefin

Each backer rod type has demonstrated successful performance with Bondaflex Sealants. When selecting a backer rod, consider the following:

- Open cell polyurethane backer rod allows the sealant to cure through the backer rod, which is beneficial when fast sealant cure is desired. Open cell polyurethane backer rod can absorb water, which may have a detrimental effect in certain joint types, such as horizontal on grade or in E.I.F.S.
- Closed cell polyethylene backer rod may outgas if punctured during installation, requiring it to be left for 30 minutes before application of the sealant.
- Non-outgassing polyolefin combines many of the application and performance benefits of closed cell rod, but is more compressible like open-cell which help when dealing with varying joint sizes. It is suitable for most applications, except where curing from both sides of the joint is desired.
- Other back-up materials such as expanding foam tapes or glazing gaskets should be reviewed or tested for compatibility prior to use.
- When a backer rod cannot be positioned in a joint opening, a Teflon or polyethylene tape should be used to prevent 3-sided adhesion.

We recommend the following exceptions when selecting backer rod types:

- For double weatherseal joints, open-cell polyurethane backer rod must be used unless the interior seal is allowed 7 days cure before installing the exterior seal, or the interior sealant bead is installed from the interior side of the building.
- Open cell polyurethane backer rod is recommended for use in certain conditions against non-porous surfaces such as metal when it is necessary to promote cure from both sides of the joint.
- Because EIFS manufacturers do not permit the use of open-cell polyurethane backer rod with their systems, open cell polyurethane backer rod should not be used.
- On horizontal on grade joints where water can collect, open cell polyurethane backer rod should not be used.

EIFS (Exterior Insulation and Finish Systems) Applications

EIFS offers unique challenges due to its composition. Silicone sealants have a demonstrated history of success when used with Exterior Insulation and Finish Systems. If selecting polyurethane or co-polymer/hybrid sealants (S.T.P., S.T.P.E., S.P.U.R.) in this application, use only low modulus products to minimize stress on the E.I.F.S. lamina.

Silicone sealants are UV stable and are virtually unaffected by outdoor weathering. Silicone sealants have a life expectancy of greater than 20 years compared to 5 to 10 years of life expectancy for many organic sealants.

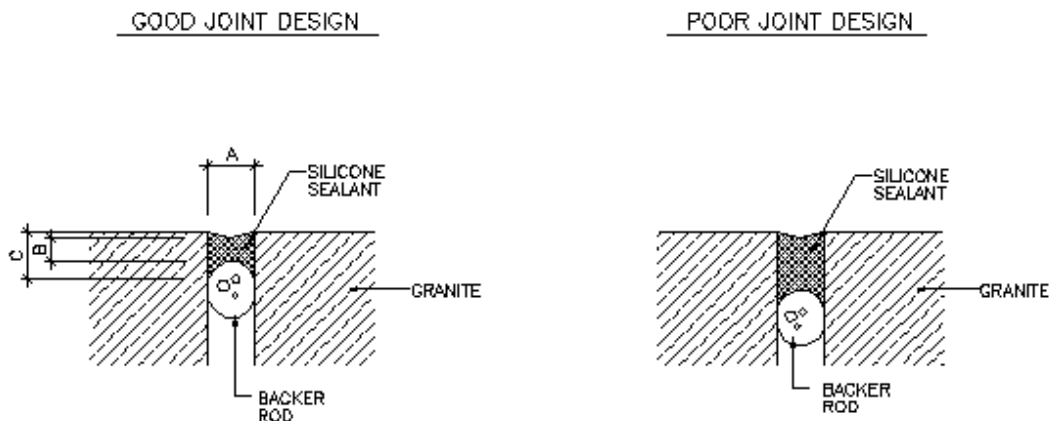
An inorganic silicone sealant maintains its low modulus when cold whereas an organic polyurethane sealant can get 2 to 3 times stiffer in cold temperatures. Low modulus silicone sealants put less stress on softer EIFS coatings when a joint opens up during cold temperatures. If using a silicone sealant, joints should be designed for two times the anticipated movement. If an organic sealant (polyurethane or STP) is to be used, design joint size four times anticipated movement to minimize stresses on the bond surface.

When sealing to E.I.F.S., apply to the base coat only and not the finish coat wherever possible or otherwise recommended by the manufacturer. Follow the manufacturer's recommendations to help ensure long-term performance and maintain eligibility for potentially available system warranties.

Weatherseal Design Examples

Examples of a variety of weatherseal joints follow with a review of joint type for key points and concerns.

CONVENTIONAL MOVING WEATHERSEAL



Good Joint Design

Key Points:

1. Dimension A must be at least 6 mm (1/4").
2. Dimension B must be at least 3 mm (1/8")
3. Dimension C must be at least 6 mm (1/4")
4. Ratio of A:B should be 2:1 minimum.
5. Joint surface tooled
6. Dimension B suggested Maximum = 12 mm (1/2")
7. Dimension A Maximum = 100 mm (4"). Joints wider than 50 mm (1/2") may slump slightly; therefore double application techniques of the sealant may be required.

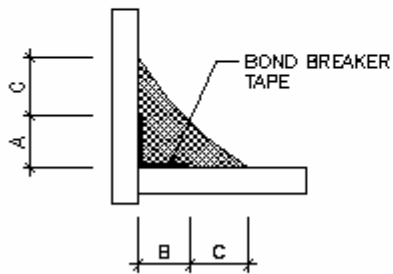
Poor Joint Design

Concerns:

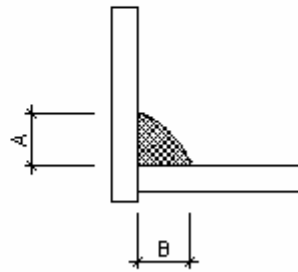
1. A deep sealant joint will not have the same movement capability as a properly designed joint
2. Slow cure due to excessive sealant depth

MOVING CORNER JOINT

GOOD JOINT DESIGN



POOR JOINT DESIGN



Good Joint Design

Key Points:

1. Dimension A and B must be at least 6mm (1/4").
2. A bond breaker tape or backer rod must be present if joint movement is anticipated.
3. Joint must be tooled flat or slightly concave.
4. Dimension C must be at least 6 mm (1/4").

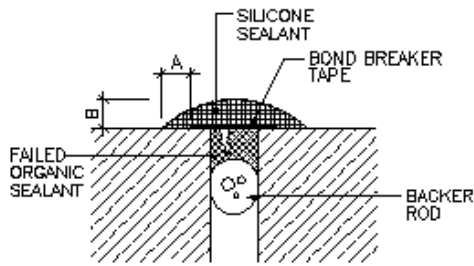
Poor Joint Design

Concerns:

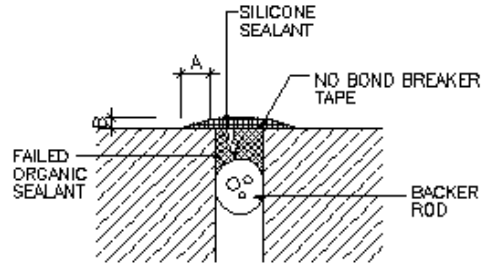
1. Dimension A or B less than 6 mm (1/4").
2. Joint not properly tooled.
3. No bond breaker material; therefore the joint will not accept movement.

REMEDIAL JOINTS

GOOD JOINT DESIGN



POOR JOINT DESIGN



Good Joint Design

Key Points:

1. Dimension A must be at least 6mm (1/4").
2. Dimension B must be at least 3 mm (1/8")
3. Bond breaker tape must be used to isolate fresh sealant from failed organic weatherseal and to allow joint movement.

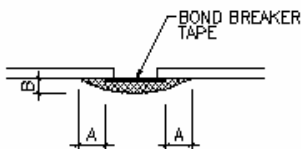
Poor Joint Design

Concerns:

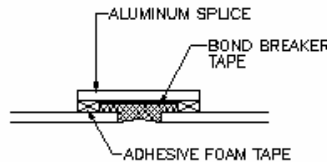
1. Dimension A less than 6 mm (1/4") increases difficulty in obtaining adhesion and increases the likelihood for voids.
2. Dimension B less than 3 mm (1/8") increases the likelihood of pinholes or voids in tooling; poor cohesive integrity.
3. No bond breaker material; therefore the joint will not accept movement.

SPLICE JOINT

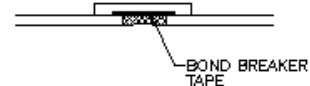
GOOD JOINT DESIGN



GOOD JOINT DESIGN



POOR JOINT DESIGN



Good Joint Design

Key Points:

1. Dimension A must be at least 6mm (1/4").
2. Use two sided tape or spacer so that at least 6mm (1/4") sealant thickness can be installed.
3. Size joint to accommodate movement plus a safety factor of four times to

help prevent failure.

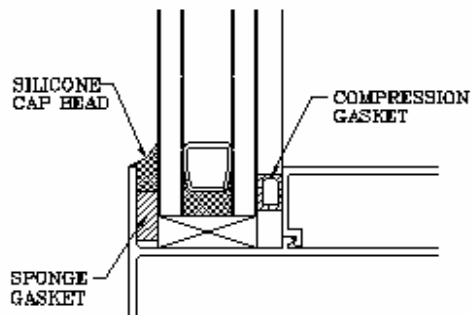
Poor Joint Design

Concerns:

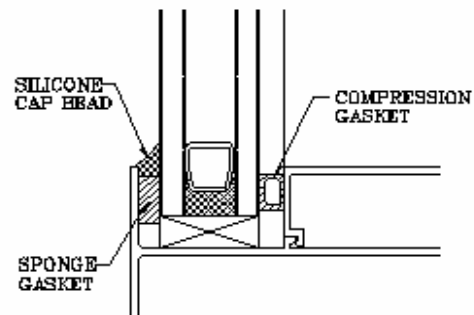
1. Joint is very difficult to clean.
2. Bond breaker hard to position/size correctly.
3. Movement during cure can cause joint failure.

CAP BEAD GLAZING JOINT

GOOD JOINT DESIGN



POOR JOINT DESIGN



Good Joint Design

Key Points:

1. Adhesion contact on glass and metal is at least 6 mm (1/4").
2. Confirm Silicone is compatible with gasket.
3. Dark-colored sealant masks possible discoloration from the gasket.

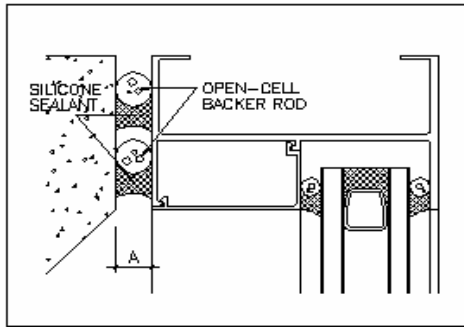
Poor Joint Design

Concerns:

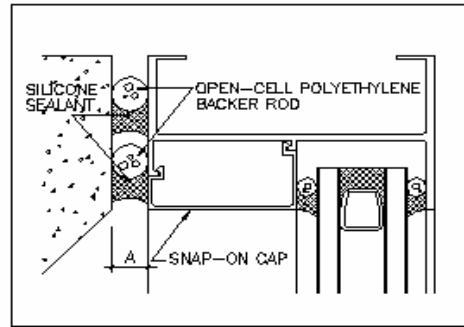
1. Inadequate contact between sealant and external metal.
2. Gray sealant prone to discoloration.

Dual-Sealed Moving Weatherseal

Good Joint Design



Poor Joint Design



Key Points :

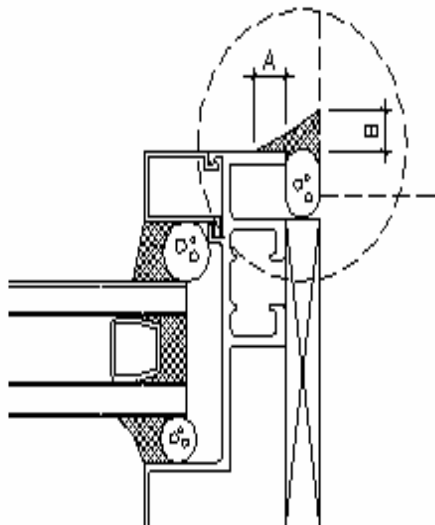
1. Both weatherseals comply with the requirements for conventional moving weatherseals (addressed previously)
2. Open-cell backer rod is used to ensure full cure of the back weatherseal.
3. If closed-cell backer rod is used, the back weatherseal must be fully cured prior to the installation of the exterior seal.
4. Dimension A is at least 3/4" wide to assist application of the rear sealant joint.

Concerns :

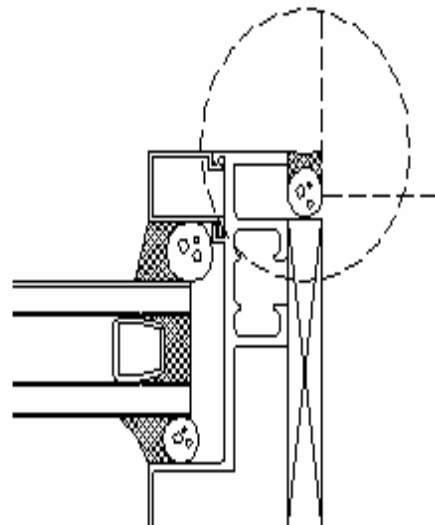
1. If both joints are sealed at or near the same time, the closed-cell backer rod will prevent moisture from reaching the rear sealant joint, and this seal will not cure.
2. Dimension A less than 3/4", making application of rear joint difficult
3. Exterior joint seal to aesthetic snap-on cap.

WINDOW PERIMETER JOINT : INSUFFICIENT ALUMINUM EXTRUSION

GOOD JOINT DESIGN



POOR JOINT DESIGN



Good Joint Design

Key Points:

1. Dimensions A and B are each 6 mm (1/4") or larger.

Poor Joint Design

Concerns:

1. Attempting to apply sealant onto the edge (or behind) thin gauge metal, results in inadequate sealant/substrate contact, and water leakage.

Sealant/Adhesive Quantity Estimating Guide

Joint Size D X W (inches)	Linear Feet Sealed					
	10.1 fl. oz. (300ml) Cartridge	20 fl. oz. (600ml) Sausage	29 oz. (857ml) Qt. Cartridge	Gallon	2 Gal. Pail	4.5 Gal. Pail
3/16 x 1/4	33.0	64.2	93.1	411	821	1848
3/16 x 3/8	22.0	42.8	64.3	274	548	1232
3/16 x 1/2	16.0	32.0	46.6	205	411	924
3/16 x 5/8	13.0	25.6	37.2	164	329	739
3/16 x 3/4	11.0	21.4	31.0	137	274	616
1/4 x 1/4	25.0	48.1	70.0	308	616	1386
1/4 x 3/8	16.0	32.0	46.4	205	411	924
1/4 x 1/2	12.0	24.0	34.9	154	308	693
1/4 x 5/8	10.0	19.2	27.9	123	246	554
1/4 x 3/4	8.3	16.1	23.3	103	205	462
1/4 x 1	6.2	12.0	17.5	77	154	346
3/8 x 3/8	11.0	21.4	31.0	137	274	616
3/8 x 1/2	8.3	16.1	23.3	103	205	462
3/8 x 5/8	6.6	12.8	18.6	82	164	370
3/8 x 3/4	5.5	10.6	15.4	68	137	308
3/8 x 1/2	4.1	8.0	11.6	51	103	231
3/8 x 1.5	2.7	5.3	7.7	34	68	154
3/8 x 2	2.0	3.9	5.7	25	51	115
3/8 x 3	1.4	2.7	3.9	17	34	77
1/2 x 1/2	6.2	12.0	17.5	77	154	346
1/2 x 5/8	5.0	9.7	14.0	62	123	277
1/2 x 3/4	4.1	8.0	11.6	51	103	231
1/2 x 1	3.1	6.1	8.8	39	77	173
1/2 x 1.5	2.0	3.9	5.7	25	52	115
1/2 x 2	1.5	3.0	4.3	19	38	86
1/2 x 3	1.0	1.9	2.7	12	26	58

SECTION IV - PRODUCT USE / APPLICATION

Surface Preparation and Sealant Application

Introduction

The application procedures outlined in this manual describe the general requirements for installing Sealants. By following these procedures closely, you will help ensure good sealant performance. To be eligible to receive a warranty, these procedures must be followed. Since sealants are applied in many different environments and situations, these procedures are not intended to be a complete and comprehensive quality assurance program.

Field adhesion tests are required to ensure good sealant performance and to verify any sealant recommendation (see "Quality Assurance").

There are five basic steps for proper joint preparation and sealant application:

- 1) **Clean** - Surfaces must be clean, dry, sound, dust free, and frost free.
- 2) **Prime** - If required, primer is applied to the clean surface(s).
- 3) **Pack** - Backer rod or bond breaker are applied as required.
- 4) **Seal** - Sealant is applied into the joint cavity.
- 5) **Tool** - Dry tooling techniques are used to create a flush joint and make certain the sealant has the proper configuration and fully contacts the joint walls.

The following sections are intended to provide more detailed information in each of these areas.

Substrate Cleaning Procedure

This section provides information on cleaning solvents and general cleaning procedures for porous and non-porous substrates. The key to good sealant adhesion is a clean surface. You should always check with the supplier of the substrate to ensure that the cleaning procedures and solvents are compatible with the substrate.

Organic Solvent Usage

The proper use of solvents is an important part of the surface preparation requirements for substrates that are to be bonded. Solvents all differ in their effectiveness in removing certain contaminants. We will test with the specific solvents selected and cleaning and priming recommendations will be based on the use of this solvent.

Please be aware that certain aggressive solvents can adversely affect finishes such as polyester powder coated aluminum. Therefore, milder solvents such as IPA (isopropyl alcohol) or high quality white spirit (greater than 98% pure) can be used without damaging the substrate surface. Aggressive solvents, MEK for example, can soften or even remove certain paints such as fluoropolymers (Kynar and Hylar) as well as being hazardous to use and flashes too quickly making two-rag wipes difficult. Check with the substrate supplier for solvent compatibility with their materials.

Please follow the solvent manufacturer's safe handling recommendations and local, state and national regulations regarding solvent usage.

Winter/Summer Solvent Considerations

IPA and MEK are soluble in water and may be more appropriate for winter cleaning as it helps in removing condensation and frost. Xylene and toluene are not soluble in water and may be better suited for warm weather cleaning.

"Two-Rag Wipe" or "Two-Cloth" Cleaning Method

Clean, soft, absorbent, lint-free cloths along with the appropriate choice of solvent must be used. The two-cloth cleaning method consists of a solvent wipe followed by a dry cloth wipe to lift and remove the solvent and contaminants suspended in the solvent. Multiple cleanings may be required to properly clean a substrate.

1. Pour or dispense an acceptable cleaning-grade solvent onto the cloth. A plastic (solvent-resistant) squeeze bottle works best for organic cleaning solvents. Do not dip the cloth into the container of solvent, as this will contaminate the cleaning agent.
2. Wipe vigorously to remove contaminants. Check the cloth to see if it has picked up contaminants. Rotate the cloth to a clean area and re-wipe until no additional dirt is picked up.
3. Immediately wipe the cleaned area with a second clean, dry cloth before the solvent has evaporated. This technique will allow dirt and contaminants suspended in the solvent to be lifted and removed with the second dry cloth. Multiple cleanings may be required to adequately clean a substrate.

Organic solvent must be removed with the dry cloth before the solvent evaporates or the cleaning will be less effective. Some surfaces such as porous ones or weather conditions will allow a small amount of residual organic solvent to remain on the top surface layer. If this is the case, the surface must be allowed to dry before continuing with the sealant installation.

Non-Porous Substrate

Non-porous surfaces must be cleaned with a solvent before the sealant is applied. The solvent used will depend on the type of dirt or oil to be removed and the substrate to be cleaned. Non-oily dirt and dust can usually be removed with a 50 percent solution of isopropyl alcohol (IPA) and water, pure IPA or methylated spirit. Oily dirt or films generally require a degreasing solvent such as xylene, or white spirit. White Spirit will need to be a minimum of 98 % pure to prevent leaving an oily film on the substrate surface.

Porous Substrates

Building materials such as, cement board panels, concrete, granite, limestone and other stones or cementitious materials that absorb liquid are considered porous substrates.

Porous Substrates-Solvent Considerations

Porous stone substrates such as granite or marble might not be sufficiently cleaned by solvent cleaning. Depending on the condition of the surface, porous substrates may require abrasion cleaning, solvent cleaning or both. Laitance and surface dirt must be completely removed.

High pressure water blasting is an effective cleaning method, or a bristle brush with running water may suffice. Porous materials will trap water or solvents after cleaning or priming. Hence water or solvents used for cleaning must be allowed to evaporate completely before sealant is applied.

Dusting alone may be sufficient cleaning for new porous substrates. Depending on the condition of the surface, porous substrates may require abrasion cleaning, solvent cleaning or both. Laitance and surface dirt must be completely removed. Concrete form-release agents, water repellents and other types of surface treatments, protective coatings, and old sealant all affect sealant adhesion. Removal of these treatments, coatings or sealants by abrasion cleaning may be required to obtain acceptable adhesion.

Abrasion cleaning involves grinding, saw cutting, sand or water blasting, mechanical abrading or a combination of these methods. Remaining dust and loose particles should be removed by dusting the surface with a stiff brush, vacuuming, or blowing the joints with water and oil-free compressed air. Once the abraded surface is clean and dry, the sealant can be applied. If the surface is dirty, it must be solvent cleaned with the "two-rag wipe" method explained later in this section. Some porous materials will trap solvents after cleaning or priming. Allow this solvent to evaporate before sealant is applied.

Please note that recommendations for removal of existing sealants, substrate leaning, joint preparation and installation of new sealants are not intended and may not be appropriate for remedial work involving existing sealants and/or joints containing PCBs or other potentially hazardous substances. If you know or suspect that the existing sealants and/or joints contain PCBs or other hazardous substances, contact a knowledgeable authority on appropriate removal, handling and disposal procedures.

Primer Application Procedure

Primers should be applied as follows:

1. Joint surfaces should be clean, sound and dry. Apply masking tape to the surfaces next to the joint to keep excess primer and sealant off areas where they are not intended.
2. Pour some primer into a small, clean container, and be sure to replace and tighten the cap on the primer can. To prevent deterioration of the primer, do not pour more than a 10-minute supply into the container.
3. Depending on the substrate and job conditions, two different methods can be used to apply the primer. The preferred application is to dip a clean, dry, lint-free cloth into the primer and gently wipe a thin film onto the surface. For "hard-to-get-to" areas and rough surfaces, apply the primer in a thin film with a clean brush.

4. **Caution:** Over priming can cause adhesion loss between the sealant and the primer. If too much primer has been applied, a powdery, chalky, dusty film will form on the surface. Excess primer should be removed by dusting the joint with a clean, dry, lint-free cloth or a non-metallic bristle brush
5. Allow the primer to dry until all the solvent evaporates. This typically takes 5 to 30 minutes, depending upon the temperature and humidity.
6. Inspect the surface for dryness. If too much primer has been applied, a powdery, chalky, dusty film will form on the surface. In this case, remove excess primer with a clean, dry, lint-free cloth or a non-metallic bristle brush before applying sealant.
7. The surface is now ready for application of the backer rod and sealant. Sealant must be applied the same day the surfaces are primed. Any surfaces primed but not sealed on the same day must be re-cleaned and re-primed before applying sealant.

Do Not Apply Primer Over Backer Rod

Store primer with cap tightly closed as primers will react quickly when exposed to moisture, reducing their adhesion-promoting capabilities.

Sealant Application Procedure

It is critical that the sealant fills the entire joint or cavity and firmly contact all surfaces intended to receive sealant. If the joint is improperly filled, good adhesion will not be achieved, and sealant performance will be weakened.

To obtain full adhesion, sealants require a clean, dry, frost-free surface. The practical application temperature can be dictated by frost formation on the joint edges, which can begin to occur below 4°C (40°F). To assist in the drying of a frost-containing joint, a water-soluble solvent such as IPA should be used.

Sealant should be applied as follows:

- 1) Masking tape should be used to keep excess sealant from contacting adjacent areas where it is not intended to ensure an aesthetically pleasing job.
- 2) Apply the sealant in a continuous operation using a caulking gun or pump. A positive pressure, adequate to fill the entire joint width, should be used. This can be accomplished by “pushing” the sealant ahead of the application nozzle. Care must be taken to ensure complete fill of the sealant cavity.
- 3) Tool the sealant with constant pressure before a skin begins to form. Tooling forces the sealant against the back-up material and the joint surfaces. Do not use liquid tooling aids such as water, soap or alcohols. These materials may interfere with sealant cure and adhesion and create aesthetic issues.
- 4) Remove the masking tape before the sealant skins over.

EIFS Application Procedures

- 1) Allow the EIFS coating to dry a minimum of 24 hours prior to application of the sealant. Do not apply sealant to EIFS finish coat unless approved by the EIFS manufacturer. Drying time may be greater depending on temperature and humidity. Consult the EIFS manufacturer for recommended drying time.
- 2) The joints must be clean and dry prior to installation of the sealant. If sealant is to be applied immediately following the drying time of the EIFS coating, simply brush or wipe the joint surfaces to ensure that there is no dust or debris in the joint. If the fully dried coating is exposed for greater than one day, joint surfaces must either be wire brushed or blown with oil-free compressed air or cleaned with a suitable solvent such as Isopropyl Alcohol (IPA) using the "two rag" cleaning method. Consult the EIFS manufacturer to determine if a specific solvent is compatible with their system as some may effect the integrity of the mesh. Allow sufficient time for the solvent to evaporate prior to priming or installing sealant.
- 3) Lightly apply Bondaflex Sil 2000 primer or other recommended primer with a soft bristle brush to the inside of the joint. While one brush wipe of the substrate should be sufficient when priming non-porous surfaces as well as many porous, apply a heavier coat to certain EIFS finishes. Use of a brush aids in the application. On many installations it may be recommended that a white primer stain be observed indicating enough primer has been applied. Allow the primer to dry a minimum of one hour prior to backer rod installation.
- 4) Install either closed cell polyethylene or non-gassing polyolefin backer rod with EIFS. Open cell polyurethane backer rod should not be used with or adjacent to EIFS surfaces.

Removal and Replacement of Existing Weatherseals

Introduction

In some cases when an existing building is to be repaired or resealed, the existing weatherseal must be removed before a new weatherseal can be installed.

When a failed sealant is to be cut out and replaced, the old sealant must be completely removed as described in the following paragraphs. When a silicone weatherseal is to be replaced with a new silicone sealant, complete removal of the existing functional joint may not be necessary. Follow the directions for removal and replacement of cured silicone sealant.

Repairing Organic Sealant (Remedial Application)

If a sealant has failed, it is good practice to understand why it failed and replace it with a sealant offering higher performance properties. Please note that recommendations for removal of existing sealants, substrate cleaning, joint preparation and installation of sealants are not intended and may not be appropriate for remedial work involving existing sealants and/or joints containing PCBs or other potentially hazardous substances. If you know or suspect that the existing sealants and/or joints contain PCBs or hazardous substances, contact a

knowledgeable authority on appropriate removal, handling and disposal procedures.

Follow this procedure to repair organic sealants with a new Bondaflex sealant in remedial applications:

- 1) Cut away the old sealant as close to the joint edges as possible.
- 2) Clean all joints of contaminants and impurities to the depth at which the new sealant and backer rod are to be installed. This may be accomplished by several methods: abrading with a wire brush (power or hand), grinding, saw cutting or solvent cleaning.
- 3) Blow out dust, loose particles and other debris with water and oil-free compressed air. Occasionally, a second pass with a wire brush and air blast is needed to ensure the joint is clean. Loose pieces of caulk or backer rod that have become lodged in the joint should also be removed.
- 4) After cleaning, the joints must be thoroughly dry, dust free and frost free before resealing.
- 5) Mask joint edges if possible to facilitate application and clean-up,
- 6) If priming is recommended, follow directions for applying the desired primer to the cleaned surfaces before installing the sealant.
- 7) Install back-up material in joints to proper design depth.
- 8) Apply the appropriate sealant in a continuous operation to properly fill and seal the joint.
- 9) Using a blunt instrument, dry tool the joint so it is slightly concave. Tooling should be done as soon as possible after sealant application. Remove masking as necessary.
- 10) Seal a test joint and check adhesion after curing 7 to 21 days

Repairing Silicone Sealant (Remedial Application)

In instances where the joint has experienced mechanical damage or otherwise and replacement is required, follow the procedures below.

Assess problem with the joint.

1. If sealant is cured properly and performing application but its appearance is poor (i.e., due to improper tooling), then cleaning the sealant surface with a solvent and recapping the joint should be sufficient.
 - a) Clean sealant with a solvent (i.e., xylene, toluene) to remove dirt using "two rag" method. Allow solvent to evaporate.
 - b) Remask the joint.
 - c) Apply a thin bead of fresh sealant over the cured sealant.
 - d) Dry tool the sealant.
 - e) Remove the masking material.
2. If the sealant is mechanically damaged and a recapping will not improve the joint appearance, then remove the section of old sealant and replace.
 - a) Cut away the old sealant. If excellent adhesion to the substrate is still maintained, then leave some sealant at the edges of the joint (up to 2 mm thick).
 - b) If adhesion to the substrate is poor, then remove sealant down to substrate and clean the substrate and recondition if necessary (i.e., clean with xylene and prime with appropriate primer).
 - c) Mask the joint

- d) Apply the sealant (If resealing does not occur on the same day, the joint will have to be recleaned using a solvent such as xylene or toluene before applying the fresh sealant).
- e) Dry tool the joint.
- f) Remove the masking material.
- g) Check adhesion after sealant has cured for 7 days

SECTION V - Quality Assurance – General

Product Quality

Bondaflex products are manufactured under rigid quality control standards to ensure quality and performance. This section is intended to provide the end-user with simple screening tests to verify that the material, as received and used at the job site on actual substrates, will perform as intended.

Skin-Over Time/Elastomeric Test

For one-part sealants, a skin-over test and an elastomeric test should be performed once per week and on every new lot of sealant used. The purpose of this test is to check sealant working time and to ensure the sealant cures fully. Any great variation (excessively long times) in the skin-over time may indicate an out-of-shelf-life sealant.

This test is performed as follows:

- a. Spread a 1mm (0.05 in.) film of sealant on a sheet of polyethylene or wax paper.
- b. Every few minutes, touch the sealant film lightly with a tool.
- c. When the sealant does not adhere to the tool, the sealant has skinned over. Note the time required to reach this point. If a skin has not formed within 4 hours, do not use this material; contact your local representative or distributor.
- d. Allow the sealant to cure for 24 hours. After 24 hours, peel the sealant away from the polyethylene sheet. Stretch the sealant slowly to see that it has cured. If the sealant has not cured, contact your local or distributor representative.
- e. Record the results in a product quality control log book. This testing must be completed and results recorded, retained and available for review upon request.

Standard Field Adhesion Test

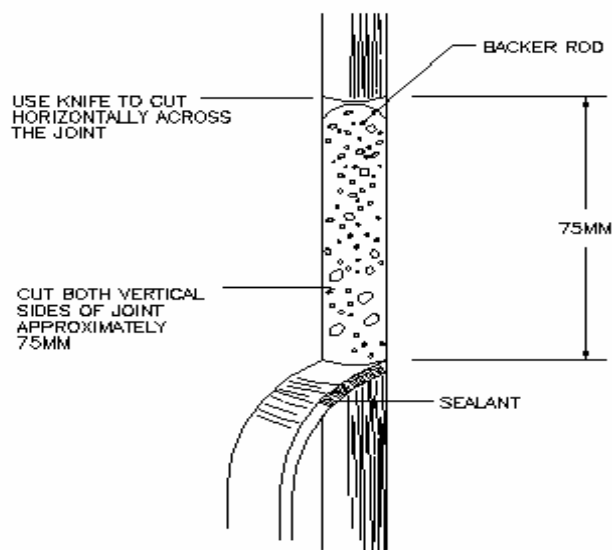
The field adhesion test is a simple screening procedure that may help detect application problems such as improper cleaning, use of improper primer, poor primer application or improper joint configuration. As a check for adhesion, a simple hand pull test is required at the job site after the sealant is fully cured (usually within 7 to 21 days). Field adhesion testing should be documented using the field adhesion testing log. It is suggested that 5 tests for the first 300

meters (1000 feet) and one test per 300 meters (1000 ft) thereafter be submitted or one test per floor per elevation.

The hand pull test procedure is as follows:

- a. Make a knife cut horizontally from one side of the joint to the other.
- b. Make two vertical cuts (from the horizontal cut) approximately 75 mm (3 in.) long, at both sides of the joint.
- c. Place a 25 mm (1 in.) mark on the sealant tab as shown in the illustration.
- d. Grasp 50 mm (2 in.) piece of sealant firmly just beyond the 25 mm mark and pull at a 90° angle.
- e. If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately. This is accomplished by extending the vertical cut along one side of the joint, checking adhesion to the opposite side, and then repeating for the other surface.
- f. Pass/fail criteria for each sealant are shown in Table 1. If the sealant does not pass according to the guidelines provided, consult your local Bondaflex Account Manager or distributor representative.
- g. Inspect the joint for complete fill. The joint should not have voids, and joint dimensions should match those shown in the weathersealing details. Your local representative can assist in determining when corrective action is required.
- h. Record the test results in a field adhesion test log. An example is provided in the documentation section. This log will need to be retained as a part of the warranty procedure. Some building officials may also require it.

FIELD ADHESION TEST—WEATHERSEAL JOINT



NOTE: When a sealant is used to weatherseal between two dissimilar substrates, it is recommended that the sealant adhesion to each side of the joint be individually tested. (See step e.)

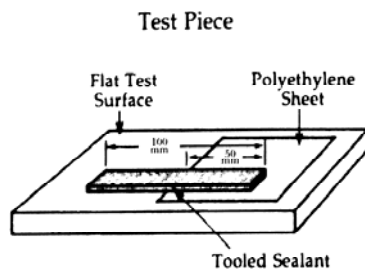
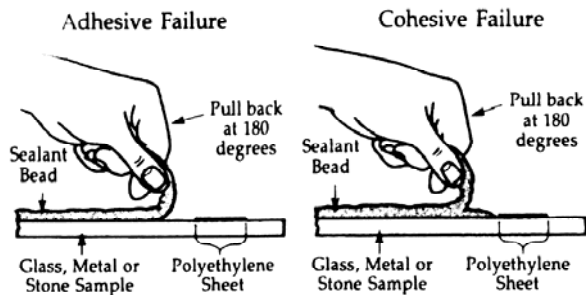
Field Adhesion Hand Pull Test Criteria

Bondaflex Sealant	Adhesion Requirements
Bondaflex Sil 290 Silicone Building Sealant	Pull tab 75 mm or 3 in. (300% extension) without bond loss
Bondaflex Sil 295 Silicone Building Sealant	Pull tab 38 mm or 1½ in. (150% extension) without bond loss
Bondaflex Sil 100, 200 Silicone Building Sealants	Cohesive failure: no adhesion loss
Bondaflex PUR & STP Sealants & Sealant/Adhesives	Cohesive failure: no adhesion loss
Bondaflex Silbridge 300 Silicone Extrusions	Cohesive failure of adhesive sealant: no adhesion loss

Sealant Repair in Adhesion Test Area

Repair the sealant pulled from the test area by applying new sealant to the test area. Assuming good adhesion was obtained, use the same application procedure to repair the areas as was used to originally seal it. Care should be taken to ensure that the original sealant surfaces are clean and that the new sealant is in contact with the original sealant.

Tab Adhesion -in- Peel Test Procedure



Another simple screening test can be done on a flat test surface. A test piece like that shown above is recommended.

1. Clean and prime the substrate following the project-specific recommendations.
2. Place a piece of polyethylene sheet or bond breaker tape across the flat test surface.
3. Apply a bead of sealant and tool it to form a strip approximately 200 mm long, 25 mm wide and 3 mm thick. At least 50 mm of the sealant should be applied over the polyethylene sheet or bond breaker tape.
4. After cure (7 to 21 days) of the sealant pull the sealant perpendicular to the substrate until failure. Record the mode of failure and elongation of the test sealant.

Documentation

Suggested logs referred to in this manual are provided on the following pages. In the event of a warranty claim or inspection, these must be available for review by May National Associates, Inc. and/or the local building official.

Therefore, it is suggested that they be kept together with the project files. A hard cover logbook may be preferential to copies of the logs suggested here. A quality assurance engineer should be responsible for documenting these data on a job-to-job basis. All curtainwall units must be numbered so the sealant installation dates, sealant lot numbers, and quality assurance testing can be obtained from the project log.

We will be happy to assist you during the implementation of this quality control program. If you have any questions, contact your local representative.

SECTION VI - Adhesive Application Guide

Adhesive Joint Design

The designs of adhesive joints play a significant role in determining how they will survive external loads. Although it may be tempting to use joints originally intended for other methods of fastening, adhesives require joints of a special design for optimum properties. The practice of using joints designed for some other method of assembly and slightly altering them to adapt to adhesive bonding can lead to unfavorable results.

The adhesive joint should be designed to take advantage of the high shear and tensile strength properties of most adhesive materials and to spread the resulting loads over as great an area as possible. The following 10 principles and rules should be taken into consideration when designing adhesive joints. They also serve as a good starting point when examining the joint design of failed parts. Significant departure from these rules may be the cause of a premature failure.

1. Keep the stress on the bondline to a minimum.
2. Whenever possible, design the joint so that the operating loads will stress the adhesive in shear.
3. Peel and cleavage stress should be minimized. (If unavoidable, a toughened adhesive should be used).
4. The stress should be distributed as uniformly as possible over the entire bonded area.
5. Adhesive strength is directly proportional to bond width; increasing the depth of overlap does not always increase strength.
6. Generally, rigid adhesives are better in shear, and flexible adhesives are better in peel.
7. Although typically a stronger adhesive material may produce a stronger joint, a high elongation adhesive with a lower tensile strength could produce a stronger joint in applications where the stress is distributed nonuniformly.
8. The stiffness of the adherends and adhesive influences the strength of the joint. In general the stiffer the adherend with respect to the adhesive, the more uniform the stress distribution in the joint and the higher the bond strength.
9. The higher the E_t (modulus x thickness) of the adherend, the less likely the deformation during load, and the stronger the joint.

10. Within reasonable limits, the adhesive bondline thickness is not a strong influence on the strength of the joint. More important characteristics are a uniform joint thickness and void free adhesive layer.

SECTION VII - APPLICATION EQUIPMENT ILLUSTRATIONS



Backer rod roller to ease application at the right depth - the key to the proper width to depth ratio is the correct placement of backer rod. This tool also helps prevent puncturing closed cell backer rod which could cause bubbling in the sealant.



Standard 12 oz caulk cartridge manual caulk gun



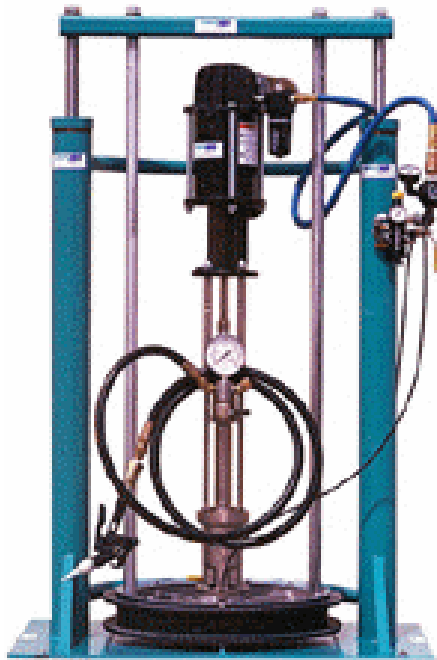
Battery operated caulking gun



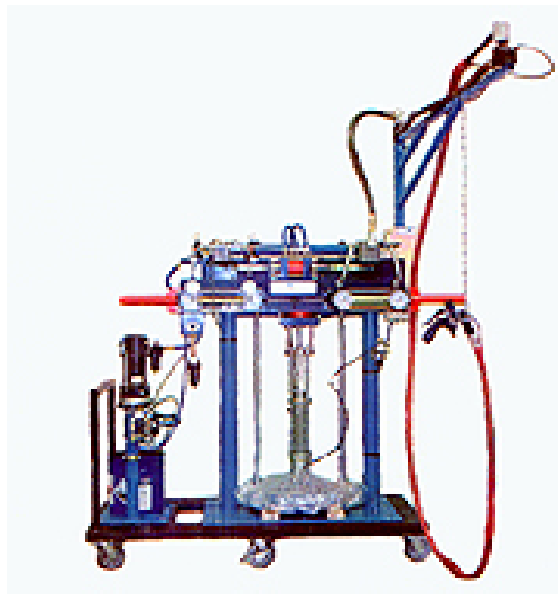
Bulk caulking gun - accommodates the use of different nozzle types or those that can be made using standard fittings to aid installation in special applications.



Bulk sausage pack caulking gun - for typical construction and other large joint applications. Standard cone nozzles (black) are cut to proper joint width, or special cones (translucent) can be ordered.



55 Gallon drum pump, air operated.



2 part air operated pumping unit

SECTION VIII - REFERENCES

For further information on the design, specification, application and quality control of sealant and adhesive applications we suggest you contact the following standards organizations and trade associations:

AAMA

American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173-4268
Phone (847) 303-5664
www.aaanet.org



ASTM

100 Barr Harbor Drive
PO Box C700
W. Conshohocken, PA 19428-2959
Phone (610) 832-9585
www.astm.org

GAN

National Glass Association
8200 Greensboro Drive, Suite 302
McLean, VA 22102
Phone (866) DIAL NGA
www.glass.org

ICRI



International Concrete Repair Institute
3166 S. River Road, Suite 132
Des Plaines, IL 60018
Phone (847) 827-0830
www.icri.org



SWRI

3101 Broadway, Suite 585
Kansas City, MO 64111
Phone (816) 561-8230

MAY NATIONAL ASSOCIATES, INC. (MNA) PRODUCTS ARE WARRANTED TO BE FREE OF MANUFACTURING DEFECTS AND TO MEET MNA'S PUBLISHED TYPICAL PHYSICAL PROPERTIES WHEN APPLIED IN ACCORDANCE WITH MNA'S DIRECTIONS AND TESTED IN ACCORDANCE WITH ASTM AND MNA'S STANDARDS. SHOULD THERE BE MANUFACTURING DEFECTS OF ANY KIND, THE EXCLUSIVE REMEDY OF THE USER WILL BE TO RETURN ALL MATERIALS ALLEGED TO BE DEFECTIVE, FREIGHT PREPAID, TO MNA FOR REPLACEMENT. THERE IS NO OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, RELATING TO THE GOODS BEING SOLD, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE IN CONNECTION WITH THIS PRODUCT. MNA'S LIABILITY IS LIMITED TO REPLACEMENT OF DEFECTIVE MATERIAL AND MNA SHALL NOT BE LIABLE FOR DAMAGES OF ANY SORT, INCLUDING PUNITIVE, ACTUAL, CONSEQUENTIAL, INCIDENTAL OR REMOTE DAMAGES, RESULTING FROM ANY CLAIMS OF BREACH OF CONTRACT, BREACH OF WARRANTY, WHETHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR FROM ANY OTHER CAUSE WHATSOEVER, REGARDLESS OF LEGAL THEORY.

May National Associates, Inc.

**1700 Route 3 West
Clifton, NJ 07013**

Ph: 800-641-0234 Fax: 973-473-4222 www.bondaflex.com