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Initial Approval
August, 1998

Re-Approved
March, 2020

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Report Owner

ITW Polymer Sealants North America, Inc.

111 S. Nursery Road
Irving, TX 75060

Product

Miracle Foamseal F-2100 Two-Part

Polyurethane Foam Adhesive

Approved Manufacturing Location

ITW Polymer Sealants North America, Inc.

56 Air Station Industrial Park
Rockland, MA 02370

For Evaluation Report Questions

www.itwsealants.com

Contact: Keith Begin - 781-681-0457

General Details

The **Miracle Foamseal F-2100** Two-Part Polyurethane Foam Adhesive is used to attach various gypsum board, sheathing, and finish products to framing in walls and ceilings without the use of mechanical fasteners. Wood and steel framing options are provided in this **PER**. The manufacturing location shown above has an approved Quality Control Manual to manufacture the **Miracle Foamseal F-2100** adhesive and is inspected quarterly by *Progressive Engineering Inc. (Pei)*.

Product Description

The **Miracle Foamseal F-2100** is a two-part polyurethane foam adhesive system. It is applied by pumping two components at a 1 to 1 volumetric ratio under pressure through heating equipment to produce one continuous bead. The two components are an "A ISO" and a "B Resin". The "A ISO" is a purchased material and the "B Resin" is manufactured by **ITW POLYMER SEALANTS**.

Containers and Storage

The A & B components are shipped in 2700 - 3250 lb. caged totes or in 450 - 550 lb. steel drums. Storage of these containers shall be in an indoor dry place between 65°F. and 95°F. Unopened containers have a storage life of up to 12 months in these conditions.

General Product Use and Limitations

Gypsum board being used shall meet ASTM C 1396. Nominal dimension lumber shall be kiln dried and graded and steel framing shall be in accordance with the approved assemblies in Table 2. All substrate surfaces shall be clean, dry and free of dust, wax, ice and loose particles and shall have a surface temperature greater than or equal to 50°F. **Miracle Foamseal F-2100** adhesive shall be applied in an ambient temperature range of 50°F. to 100°F. Adhesive is applied along the intersection of the gypsum, T&G pine, or other sheathing product and the framing according to **ITW POLYMER SEALANTS** Application Instructions. The adhesive temperature at the heater block and application hose shall be between 105°F. and 120°F, while the proportioning pumps must be accurately metered to a 1:1 by volume and develop at least a 800 psi hydraulic pressure when in use. After the last bead is applied, the structure shall not be moved for a minimum of two minutes.

Miracle Foamseal F-2100 adhesive shall be used on a maximum wood framing spacing of 16-in for walls and 24-in o.c. for ceiling applications. The fillet beads produced shall be sized per Figure 1 on page four (4) and per Note 1 of Table 2 - Wall Shear Design Values. A bead shall never be greater than 1-1/8-inches in size. The adhesive beads are applied along one side of field framing and along both sides at gypsum/sheathing seams. The adhesive is applied to both sides of all framing members when applying to T&G pine. The T&G Pine is for ceiling applications only.

- **Miracle Foamseal F-2100** adhesive shall be installed according to **ITW POLYMER SEALANTS** Application Instructions. A copy of these instructions must be made easily available at the assembly areas.
- This **Product Evaluation Report (PER)** is for **Miracle Foamseal F-2100** to be applied in an indoor manufacturing facility and shall not be applied in an outdoor uncontrolled environment.
- **Miracle Foamseal F-2100** adhesive is to be manufactured at the **ITW POLYMER SEALANTS** plant in Rockland, MA following their approved Quality Control Program with unannounced inspections by *Progressive Engineering Inc.*
- The use of **Miracle Foamseal F-2100** adhesive in a fire rated assembly is not addressed in this **PER**.
- A vapor barrier shall not be used between the adhesive and the substrates.
- **Miracle Foamseal F-2100** adhesive shall be applied to the back side of standard raw gypsum and shall not be applied to other gypsums such as foil backed, moisture resistant or water resistant gypsums.
- **Miracle Foamseal F-2100** adhesive shall not be used for insulation or be considered insulation.
- Ceiling Diaphragm Repair can be accomplished using **ITW Polymer Sealants** instructions with PR-32 adhesive or **ITW's F6400LVR** one-part polyurethane.

Building Code Compliance

Must be used with an approved thermal barrier not less than 1/2" gypsum wallboard or approved material equivalent in compliance with the requirements of the 2006 **IRC**, Section R314.4 and the 2009, 2012, 2015 and 2018 **IRC**, Section R316.4.

Must be used with an approved thermal barrier not less than 1/2" gypsum wallboard or approved material equivalent in compliance with the requirements of the 2006, 2009, 2012, 2015 and 2018 **IBC**, Section 2603.4

The HUD code does not require a thermal barrier for adhesives.

August 1, 2017 Texas Industrialized Housing and Buildings Administrative Rules - Section: 70.103. (c) (2)

ASTM E84-10 - Class B Fire Rating: Flame Spread Index - 35 and Smoke Development Index - 300

Meets or exceeds Acceptance Criteria of UL-1715 for use with 1/2" Gypsum Wallboard after 15 Minute Exposure Requirements, where flames shall not extend to the extremities or through the doorway opening of the tested specimen.

Meets or exceeds Acceptance Criteria of UL-1715 for use with 5/8" Gypsum Wallboard after 15 Minute Exposure Requirements, where flames shall not extend to the extremities or through the doorway opening of the tested specimen.

Tested to

Pei Standard No. 89-1 - Simple Span Ceiling or Roof Diaphragm Shear Resistance Test Procedure for Manufactured Homes

Pei Standard No. 93-7 - Performance Requirements for Fastening Gypsum Board to Wood Framing using a Two-Part Urethane Adhesive

Pei Standard No. 93-8 - Ceiling Board Dead Load Test Procedure

Pei Standard No. 94-9 - Large Scale Ceiling Board Dead Load Test Procedure

Pei Standard No. 94-12 - Interior Wall Test Procedure for Manufactured Homes - Transverse Load Test

Pei Standard No. 2007-27 - Adhesive Bead Yield Measurement

ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing

ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction

ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM D6464 - Standard Specification for Expandable Foam Adhesives for Fastening Gypsum to Wallboard Framing to Wood Framing

UL-1715 - UL Standard for Safety Fire Test of Interior Finish Material

UL 723 (ASTM E84) - Surface Burning Characteristics of Building Materials

Table 2 - Wall Shear Designs with Gypsum Board for Foamseal F-2100 Adhesive^{1,2}

Wood Framing				Gypsum/ Sheathing Orientation	Gypsum Brand/ Sheathing Type	Single or Double Sided	Ultimate Load PLF ⁴	Test Report #
Top Plate	Bott. Plate	Studs ³	Stud Spacing					
1x3	1x3	2x3	16" o.c.	5/16" Vertical	U.S Gypsum	Single	376.6	1991-1752A
					U.S Gypsum	Single	458.3	1991-1752B
					U.S Gypsum	Single	513.7	1991-1752C
					Georgia Pacific	Single	461.6	1991-1874A
					Georgia Pacific	Single	630.4	1991-1874B
					Georgia Pacific	Single	627.9	1991-1874C
					Gold Bond	Single	652.0	1991-1890B
					Gold Bond	Single	557.0	1991-1890C
					U.S Gypsum	Single	584.5	1992-0598A
					U.S Gypsum	Single	588.7	1992-0598B
				Gold Bond	Double	680.0	1991-2094A	
				James Hardie	Single	546.7	1995-1470A	
				James Hardie	Single	781.2	1995-1470B	
				USG SHEETROCK	Single	452.5	1991-1752D	
				USG SHEETROCK	Single	592.5	1991-1752E	
				Georgia Pacific	Single	542.5	1991-1874D	
				Georgia Pacific	Single	632.9	1991-1874E	
				Gold Bond	Single	556.2	1991-1890D	
				Gold Bond	Single	667.0	1991-1890E	
				U.S Gypsum	Single	688.7	1992-0598C	
American Gypsum	Single	650.7	2000-0764					
USG UltraLight MH	Single	508.0	2012-1569K					
USG UltraLight MH	Single	576.0	2012-1569L					
USG UltraLight MH TB	Single	618.0	2017-6271A					
2X3	1x3	2x3	16" o.c.	5/16" Vertical	CertainTeed ProRoc	Single	597.9	2000-1638
2x3	1x3	P/C 2x3 Field 1x3	16" o.c.	1/2" Horizontal	USG Fiberock MH	Single	489.8	1999-1080F
				1/2" Vertical	USG Fiberock MH	Single	595.5	1999-1080G
1x4	1x4	2x4	16" o.c.	1/2" Vertical	James Hardie	Single	535.9	1994-1650
1x3	1x3	2x3	24" o.c.	5/16" Vertical	Georgia Pacific	Single	415.9	1996-1420C
					Gold Bond	Single	610.0	1994-0764
1x3	2x3	2x3	24" o.c.	5/16" Vertical	Gold Bond	Single	782.6	1994-0388
					Gold Bond	Single	696.3	1995-1206
1x3	1x3	P/C 2x3 Field 1x3	24" o.c.	5/16" Vertical	Gold Bond	Single	442.2	1996-1420A
					Blendtex	Single	482.3	1996-1420B
2x3	2x3	2x3	16" o.c.	1/2" Horizontal	USG UltraLight MH TB	Single	717.0	2017-6271B
Steel Framing								
T/B Plate		Studs	Stud Spacing					
3"x1"x 20 Ga. C-Channel		ASSI 3 C	24" o.c.	1/2" Vertical	USG SHEETROCK MH	Single	458.5	1997-1200A
3-3/4"x1-1/4"x20 Ga. C-Channel		MW 358 DWS			USG SHEETROCK MH	Single	207.5	1997-1200B
					OSB Sheathing	Single	462.0	1997-1200C
.019" Galv. Steel Stud Track		3-5/8"x25 Ga. (1-1/4" Leg)	16" o.c.	1/2" Vertical	USG Fiberock MH Gypsum Fiber Board	Single	361.9	1999-1080H

Note:

1. Bead sizes as described in each test report
2. Tested in Accordance to ASTM E72 - Static Wall Racking Tests
3. Stud P/C - Perimeter and Center of tested specimen
4. Ultimate load does not include any required safety factors

Design Values

Ceiling Diaphragm Design Load = **180 plf** (11'-9" minimum width x 48-ft Maximum diaphragm span using Gypsum Board only)

Ceiling Dead Load Resistance = **12 psf** (Gypsum Board)

Ceiling Dead Load Resistance = **20 psf** (1x8 - Tongue and Groove Pine)

Note:

Ceiling Diaphragm and Dead Load Resistance testing is valid for all gypsum boards listed below, as long as the gypsum manufactured maintains a third party product listing showing compliance to ASTM C1396.

Gypsum Brands and Products Tested for Ceiling Use

- | | |
|--|---|
| 1/2" American Gypsum Ceiling Board | 1/2" Gold Bond Brand High Strength LTE Gypsum Board |
| 1/2" CertainTeed Gypsum Easi-Lite™ Gypsum Board | 5/8" Gold Bond Type X Gypsum |
| 5/16" CertainTeed ProRoc™ Gypsum Board | 5/16" National Gypsum Gold Bond Gypsum |
| 1/2" Georgia-Pacific Gypsum Board | 5/16" USG SHEETROCK® Brand MH |
| 5/16" Georgia-Pacific Gypsum Board | 1/2" USG SHEETROCK® Brand MH Ceiling Board |
| 5/8" Georgia-Pacific Type X Fireguard Board (Dead Load use only) | 1/2" USG Lightweight Gypsum Board |
| 5/16" Gold Bond Gypsum Board | 1x8 T&G Knotty Pine Boards (Dead Load Use Only) |

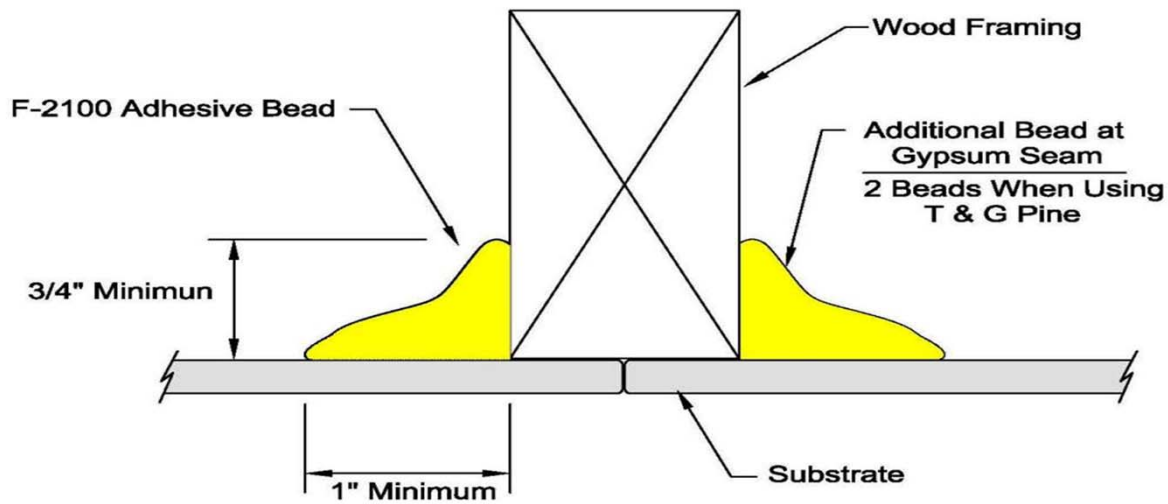


Figure 1 - Ceiling use bead sizes

Product Labeling

Each container shipped of **Foamseal F-2100**, that is covered by this **Product Evaluation Report**, must have a label attached with at least the following information:

- | | |
|--|--|
| 1. ITW POLYMER SEALANTS Name & Address. | 4. This PER Number & Pei ES Logo |
| 2. Date of Manufacture | 5. Smoke & Flame Spread Ratings |
| 3. Shelf Life Information | 6. Component Name |

Acceptable Evaluation Marks



Product Documentation

- A Product Evaluation Service Agreement between **Pei Evaluation Service®** & **ITW POLYMER SEALANTS**
- A Follow-up Inspection Service Agreement between **Progressive Engineering Inc.** & **ITW POLYMER SEALANTS**
- ITW POLYMER SEALANTS** Quality Control Manual - Dated: 1/20/2017
- Miracle Foamseal F-2100** Guidelines for Use, Application & Safe Handling - Dated: September, 2020
- A SDS sheet for F-2100 - Dated: 11/28/2017
- A SDS sheet for F-2100A - Dated: 11/28/2017

Product Documentation

Opinion Letter - Dated: 9/14/1992 Opinion Letter - Dated: 8/18/1994 Opinion Letter - Dated: 10/31/2000 Opinion Letter - Dated: 7/16/2008 Opinion Letter - Dated: 3/14/2019
 Opinion Letter - Dated: 9/14/1992 Opinion Letter - Dated: 1/21/1997 Opinion Letter - Dated: 7/14/2004 Opinion Letter - Dated: 10/21/2008 Opinion Letter - Dated: 5/7/2019
 Opinion Letter - Dated: 7/30/1993 Opinion Letter - Dated: 3/27/1997 Opinion Letter - Dated: 2/28/2006 Opinion Letter - Dated: 5/15/2009
 Opinion Letter - Dated: 8/26/1993 Opinion Letter - Dated: 2/1/1999 Opinion Letter - Dated: 8/28/2006 Opinion Letter - Dated: 11/23/2011
 Opinion Letter - Dated: 12/6/1993 Opinion Letter - Dated: 8/17/2000 Opinion Letter - Dated: 4/18/2008 Opinion Letter - Dated: 9/24/2014

Ceiling Diaphragm Test Reports

A *Pei* test report no. 1987-1098 - Full Scale Cantilevered Ceiling Diaphragm Test on a 13'-8" x 56'-0" Dated: 3/28/1988
 A *Pei* test report no. 1993-1036 - Full Scale Ceiling Diaphragm Test on an 11'-9" x 48'-0" Flat Ceiling using F-2100 - Dated: 8/27/1993 - Revised: 10/15/1993
 A *Pei* test report no. 1993-1038 - Full Scale Ceiling Diaphragm Test on an 15'-6" x 48'-0" Flat Ceiling using F-2100 - Dated: 9/3/1993 - Revised: 10/15/1993
 A *Pei* test report no. 1993-1066 - Full Scale Ceiling Diaphragm Test on an 11'-9" x 48'-0" Flat Ceiling using F-2100 - Dated: 7/16/1993 - Revised: 11/2/2016
 A *Pei* test report no. 1993-1068 - Full Scale Ceiling Diaphragm Test on an 11'-9" x 48'-0" Cathedral Ceiling using F-2100 - Dated: 8/5/1993 - Revised: 6/24/1994
 A *Pei* test report no. 1993-1070 - Full Scale Ceiling Diaphragm Test on a 15'-6" x 48'-0" Flat Ceiling using F-2100 - Dated: 8/16/1993
 A *Pei* test report no. 1993-1072 - Full Scale Ceiling Diaphragm Test on a 15'-6" x 48'-0" Cathedral Ceiling using F-2100 - Dated: 8/13/1993
 A *Pei* test report no. 1999-0558 - Full Scale Cathedral Ceiling Diaphragm Test 11'-9" x 48'-0" using Foamseal F-2100 Adhesive - Dated: 5/17/1999
 A *Pei* test report no. 1999-2086 - Full Scale Cathedral Ceiling Diaphragm Test on a 15'-6" x 48'-0" using F-2100 Adhesive - Dated: 9/9/1999
 A *Pei* test report no. 1999-0646 - Full Scale Ceiling Diaphragm Test on a 11'-9" x 48'-0" Ceiling using F-2100 - Dated: 2/24/1999
 A *Pei* test report no. 1999-2084 - Full Scale Ceiling Diaphragm Test on a 11'-8" x 48'-0" Ceiling using F-2100 - Dated: 9/16/1999
 A *Pei* test report no. 2000-1669 - Full Scale Cathedral Ceiling Diaphragm Test on an 11'-8" x 48'-0" Ceiling using F-2100 - Dated: 9/20/2000 - Revised: 11/30/2000
 A *Pei* test report no. 2000-2193 - Full Scale Cathedral Ceiling Diaphragm Repair Test on an 11'-8" x 48'-0" using Foamseal F-2100 Adhesive and PR-32 Adhesive - Dated: 11/3/2000
 A *Pei* test report no. 2020-6143 - Validation of Foamseal F6400LVR One-Part Adhesive as a Replacement for PR-32 Adhesive - Dated: 9-8-2020

Ceiling Dead Load Test Reports

A *Pei* test report no. 1992-0596 - Ceiling Dead Load Tests - Dated: 4/1/1992
 A *Pei* test report no. 1994-1260 - Ceiling Dead Load Tests - Dated: 9/22/1994 - Revised: 12/1/1994
 A *Pei* test report no. 1996-1630 - Ceiling Dead Load Tests using 1/2" Modulux Phase V - Dated: 9/26/1996
 A *Pei* test report no. 1997-0640 - Ceiling Dead Load Tests - Dated: 3/20/1997
 A *Pei* test report no. 1997-2296(A) - Ceiling Dead Load Tests with 1/2" Gap - Dated: 11/6/1997
 A *Pei* test report no. 1997-2296(B) - Ceiling Dead Load Tests with 3/4" Gap - Dated: 11/3/1997
 A *Pei* test report no. 1999-2908 - Ceiling Dead Load Tests - Dated: 12/22/1999 - Revised: 1/21/2000
 A *Pei* test report no. 2000-0288(A) - Ceiling Dead Load Tests using F-2100 Adhesive and Gold Bond Gypsum - Dated: 1/18/2000
 A *Pei* test report no. 2000-0288(B) - Ceiling Dead Load Tests using F-2100 Adhesive and USG Sheetrock MH Gypsum - Dated: 1/19/2000
 A *Pei* test report no. 2007-1819 - Ceiling Dead Load Tests on Tongue & Groove Knotty Pine Boards with 24" o.c. Framing - Dated: 12/28/2007

Ceiling Sag Test Reports

A *Pei* test report no. 1992-1090(#1) - Ceiling Sag Test using Gold Bond High Strength Ceiling Board attached to wood trusses with Foamseal F-2100 - Dated: 8/10/1992 - Revised: 12/20/1993
 A *Pei* test report no. 1992-1090(#2) - Ceiling Sag Test using Gold Bond Type X Ceiling Board attached to wood trusses with screws - Dated: 8/10/1992
 A *Pei* test report no. 1992-1090(#3) - Ceiling Sag Test using Gold Bond 1/2" High Strength Ceiling Board attached to wood trusses with screws - Dated: 8/10/1992
 A *Pei* test report no. 1995-1014 - Ceiling Sag Test Comparing Three (3) Gypsum Types - Dated: 8/11/1995
 A *Pei* test report no. 2001-0955(A) - Ceiling Sag Test using 1/2" American Gypsum and F-2100 Two-Part Adhesive - Dated: 6/18/2001

Transverse Load Test Reports

A *Pei* test report no. 1995-0844(A) - Transverse Load Test on Interior Walls using F-2100 and U.S. Gypsum - Dated: 7/10/1995
 A *Pei* test report no. 1995-0844(B) - Transverse Load Test on Interior Walls using F-2100 and Domtar Gypsum - Dated: 7/10/1995
 A *Pei* test report no. 1995-0844(C) - Transverse Load Test on Interior Walls using F-2100 and Gold Bond Gypsum - Dated: 7/11/1995
 A *Pei* test report no. 1995-1594 - Transverse Load Test on Interior Walls using F-2100 and U.S. Gypsum - Dated: 11/6/1995

ASTM D6464 Test Reports

A *Pei* test report no. 2018-6178 - ASTM D6464 Foam Adhesive to Lumber Using ITW's Miracle F2100 Two Part Adhesive - Dated: 7/18/2018

Small Scale Ceiling Test Reports

A *Pei* test report no. 1992-1122 - Small Scale Ceiling Diaphragm Comparison Tests - Dated: 1993

A *Pei* test report no. 1993-0732 - Small Scale Ceiling Diaphragm Comparison Tests - Dated: 5/14/1993

2x4 Header Test Reports

A *Pei* test report no. 1995-1122(A) - Double 2x4 Flat Header Test using F-2100 - Dated: 7/18/1995

A *Pei* test report no. 1995-1122(B) - Single 2x4 Flat Header Test using F-2100 - Dated: 7/12/1995

Bead Yield Test Report

A *Pei* test report no. 2007-0714 - PEI Standard No. 2007-27 - Adhesive Bead Yield Measurement For 2100 Two-Part Polyurethane Adhesive - Dated: 5/29/2007 - Revised: 6/25/2007

Creep Test Reports

A *Pei* test report no. 1993-0374 - PEI Standard No. 93-7 - Test on F-2100 Adhesive - Dated: 2/19/1993 - Revised: 6/16/1999

A *Pei* test report no. 2007-1696 - PEI Standard No. 93-7 - Creep Test on F-2100 Two-Part Polyurethane Adhesive on Tongue & Groove Knotty Pine Boards - Dated: 1/28/2008

A *Pei* test report no. 2008-0483 - PEI Standard No. 93-7 - Creep Test on F-2100 Two-Part Polyurethane Adhesive on Gypsum Board Paper - Dated: 4/1/2008

A *Pei* test report no. 2015-1798(B) - PEI Standard No. 93-7 - Creep Test on F-2100 Two-Part Polyurethane Adhesive on Gypsum Board Back Paper - Dated: 2/5/2016

Fire Test Reports

Test Report No. RCB-0806 - UL-1715 - Fire Test of Interior Finish Material Foamseal F-2100 - Dated: 6/16/2008

Test Report No. MH10928, 93NK1218 - Interior Building Construction - UL-1715 - In Accordance with Test of Surface Burning Characteristics of Building Materials - UL-723 - Dated: 2/22/1993

Test Report No. FH-2058-1 - ASTM E84-10 - Surface Burning Characteristics of Building Materials - Dated: 4/5/2010

Shelf Life Testing

A *Pei* test report no. 2019-6160 - 12 Month Shelf Life Test Using F-2100 Two-Part Adhesive - Dated: 10/17/2019



Figure 2 - Application for Foamseal F-2100 Adhesive



Figure 3 - 55 Gallon Steel Drums



Figure 4 - Foamseal F-2100 ISO NT Black Tote



Figure 5 - Foamseal F-2100 Resin NT Blue Tote