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PER-09039

Initial Approval	Re-Approved
October, 2013	October, 2021

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Report Owner

The Dow Chemical Company
1881 West Oak Parkway
Marietta, GA 30062

Product

Voramer ME 3513 One-Part Polyurethane Adhesive

Approved Manufacturing Locations

The Dow Chemical Company
1881 West Oak Parkway
Marietta, GA 30062

Evaluation Report Information

www.dow.com
DOW Contact: Shawn George - (678) 832-7077

General Details

Voramer ME 3513 adhesive is used to bond structural wood framing to gypsum wall construction by applying adhesive beads between these materials and using mechanical fasteners.

Product Description

Voramer ME 3513 is a one-part MDI polyurethane adhesive system meant to be used in an indoor manufacturing facility. This adhesive is not to be applied in an outdoor uncontrolled environment. This adhesive may be used in high temperature and humidity conditions and does not off-gas Formaldehyde into the air.

Containers and Storage

The one-part adhesive is shipped in 2500 lb. disposable totes and 475 lb. steel drums. Storage of these containers should be in an indoor conditioned place between 59˚F. and 86˚F. Unopened containers will have a storage life of up to six months in these conditions.

General Product Use

The gypsum board being used shall meet ASTM C 1396. The lumber is to be kiln dried and graded. Both substrates shall be clean and dry with loose dust blown off and free from liquids, oil, grease, etc. **Voramer ME 3513** polyurethane adhesive shall be applied in an ambient temperature range of 50˚F and higher. The adhesive is applied along the framing member according to The Dow Chemical Company Application Instructions. After the last bead has been applied, the structure shall not be moved for a minimum of fifteen to twenty (15-20) minutes and shall remain in the same ambient conditions for a minimum of twelve (12) hours.

Voramer ME 3513 adhesive is approved for use in shear wall assemblies. Two (2) beads shall measure a minimum of 1/16" to 1/8" on 2x3 dimension lumber and one (1) bead measuring at a minimum of 1/16" to 1/8" on 1x3 dimension lumber. See Table 1 for tested assembly requirements and shear wall capacities.

Evaluation Criteria

1. The **Voramer ME 3513** adhesive shall be applied according to The Dow Chemical Company Application Instructions in an indoor manufacturing facility. A copy of these instructions must be made easily available at the assembly areas.
2. **Voramer ME 3513** adhesive is to be manufactured at The Dow Chemical Company plant in Marietta, GA following their approved Q.C. program with unannounced inspections by ICC Pei LLC.
3. The use of **Voramer ME 3513** polyurethane adhesive in a fire rated assembly is not addressed in this Evaluation.
4. A vapor barrier cannot be used between the adhesive and the substrates.
5. **Voramer ME 3513** is to be adhered to the back side standard raw gypsum and is not intended for other gypsums such as foil backed, moisture resistant or water resistant gypsums.
6. Construction of assemblies using **Voramer ME 3513** and their design values shall be in accordance with the assemblies listed in Table 1 and the applicable test reports.

Building Code Compliance

2012, 2015, 2018 & 2021 International Residential Code	2012, 2015, 2018 & 2021 International Building Code
Section R104.11	Section 104.11

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

Tested to

ASTM E 72-05 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
ASTM D 5582 - Standard Test Method for Determining Formaldehyde Levels from Wood Products Using a Desiccator
CA 25-4 - Standard for the Evaluation of Adhesives for Structural Use in Multi-Unit Manufactured Housing and Commercial Coach Construction
ASTM D 905-03 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading
ASTM C 557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing
ASTM D 3498 - Standard Specification for Adhesives of Field-Gluing Plywood Lumber to Lumber Framing for Floor Systems

Shear Wall Designs with Gypsum Board

Table 1 - Shear Wall Designs with Gypsum Board[1,2]

Framing				Gypsum Orientation	Gypsum Brand	Single or Double Sided	Ultimate Load lb/ft	Test Report #
Top Plate	Bott. Plate	Studs	Stud Spacing					
1x3	1x3	2x3	16" o.c.	5/16" Vertical	AG - EagleRoc	Single	655.9	2008-1526(A)
					National Gyp	Single	643.2	2008-1110(A)
					USG Gyp	Single	624.6	2008-1110(B)
					National Gyp	Double	907.9	2008-1110(C)
					USG Gyp	Double	972.1	2008-1110(D)
					AG - EagleRoc	Double	966.9	2008-1526(B)
				1/2" Vertical	USG MH UL-TB	Single	529.0	2014-1223(A)
					USG MH UL-TB	Double	885.0	2014-1223(B)
				1/2" Horizontal	ProRoc	Single	565.1	2008-1634(A)
					ProRoc	Double	944.4	2008-1634(B)
					USG MH UL-TB	Double	950	2012-1569(AA)
2x3	2x3	2x3	16" o.c.	1/2" Horizontal	USG MH UL-TB	Single	785	2012-1569(W)
					USG MH UL-TB	Double	1125	2012-1569(R)

Notes:
1. Bead sizes as described in each test report

2. Ultimate load does not include any required safety factors. Applicable safety factors shall be determined and applied by the designer of record. The 2012 & 2015 IBC requirement for tested assemblies (See Section 1709) may be used for guidance on safety factor requirements.

Strength and Durability Testing

Table 2 - ASTM D3498 Testing Properties

ASTM D3498 Test Method	Lumber Type	ASTM D3498 Requirement	Average Results (psi) OSB	Average Results (psi) Plywood	Pass/ Fail
Test A (Wet Lumber)	Douglas-fir	*150 psi (1.035 MPa), min. avg.*	426	665	Pass
	Southern Pine		521	662	Pass
Test B (Frozen Lumber)	Douglas-fir	*100 psi (689 MPa), min. avg.*	346	854	Pass
	Southern Pine		369	949	Pass
Test C (Dry Lumber)	Douglas-fir	*150 psi (1.035 MPa), min. avg.*	349	239	Pass
GAP-Filling	Douglas-fir	*100 psi (689 MPa), min. avg.*	1449	147	Pass
Durability (Moisture Resistance)	Douglas-fir	*Min. 22 of 24 specimens shall show no delamination*	0	0	Pass
	Douglas-fir	*150 psi (1.035 MPa), min. avg.*	282	757	Pass
Durability (Oxidation Resistance)	None	*No visible signs of melting after exposure, nor fracture of free film on mandrel bend.*	No melting, nor any fracturing when wrapping the samples around the steel mandrel.		Pass

Product Labeling

Each cylinder shipped of **Voramer ME 3513** that is covered by this **PER** must have a label attached with at least the following information:

1. The Dow Chemical Company Name and Address
2. Date of manufacture or Lot No.
3. Shelf life information
4. This **PER** Number & **ICC Pei** Logo
5. Component name

Acceptable Evaluation Marks

Product Documentation

A Product Evaluation Service Agreement between *Pei* **Evaluation Service®** and The Dow Chemical Company

A Follow-up Inspection Service Agreement between *Progressive Engineering Inc.* and The Dow Chemical Company

ISO 9001:2008 Quality Management System Certificate Registration No. 055759 QM08 - DQS GmbH Accreditation Body - Dated: 11/21/2014

A Technical Data Sheet for **Voramer ME 3513** Adhesive - Form No. 756-09401-01/13

A SDS for **Voramer ME 3513** Isocyanate - Issue Dated: 7/31/2018

Pei Opinion Letter - Justification for An Alternate Material Supplier and Formulation Change for PER-09039 - Dated 7-21-2021.

Pei test report no. 2007-1302 (A) - Evaluation of Sheathing Materials Racking Load - Single Sided Wall Using 1x3 Plates and USG Gypsum and Voramer ME-3805 ISO Adhesive - Dated: 10/1/2007

Pei test report no. 2007-1302 (B) - Evaluation of Sheathing Materials Racking Load - Double Sided Wall Using 1x3 Plates and USG Gypsum and Voramer ME-3805 ISO Adhesive - Dated: 10/8/2007

Pei test report no. 2008-1110 (A) - Evaluation of Sheathing Materials Racking Load - Single Sided Wall Using 1x3 Plates and National Gypsum Company Gypsum and Voramer ME 3513 Adhesive - Dated: 8/26/2008

Pei test report no. 2008-1110 (B) - Evaluation of Sheathing Materials Racking Load - Single Sided Wall Using 1x3 Plates and USG Gypsum and Voramer ME 3513 Adhesive - Dated: 8/27/2008

Pei test report no. 2008-1110 (C) - Evaluation of Sheathing Materials Racking Load - Double Sided Wall Using 1x3 Plates and National Gypsum Company Gypsum and Voramer ME 3513 Adhesive - Dated: 9/9/2008

Pei test report no. 2008-1110 (D) - Evaluation of Sheathing Materials Racking Load - Double Sided Wall Using 1x3 Plates and USG Gypsum and Voramer ME 3513 Adhesive - Dated: 9/3/2008

Pei test report no. 2008-1421 - Adhesive Tests following California CA 25-4 Tests using Voramer ME 3513 Adhesive - Dated:

Pei test report no. 2008-1526 (A) - Evaluation of Sheathing Materials Racking Load - Single Sided Wall Using 1x3 Plates and 5/16" Eagleroc Gypsum and Voramer ME 3513 Adhesive - Dated: 10/30/2008

Pei test report no. 2008-1526 (B) - Evaluation of Sheathing Materials Racking Load - Double Sided Wall Using 1x3 Plates and 5/16" Eagleroc Gypsum and Voramer ME 3513 Adhesive - Dated: 10/29/2008

Pei test report no. 2008-1634 (A) - Evaluation of Sheathing Materials Racking Load - Single Sided Wall Using 1x3 Plates and 1/2" ProRoc Gypsum and Voramer ME 3513 Adhesive - Dated: 10/30/2008

Pei test report no. 2008-1634 (B) - Evaluation of Sheathing Materials Racking Load - Double Sided Wall Using 1x3 Plates and 1/2" ProRoc Gypsum and Voramer ME 3513 Adhesive - Dated: 10/29/2008

Pei test report no. 2009-1424 - ASTM D 5582 Determining Formaldehyde Levels from Adhesive Products using a Desiccator - Dated: 2/10/2010

Pei test report no. 2012-1569 (AA) - ASTM E72 Evaluation of Sheathing Materials - Double Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Horizontal) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 1x3 Frame Plates - Dated: 3/13/2013

Pei test report no. 2012-1569 (R) - ASTM E72 Evaluation of Sheathing Materials - Double Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Horizontal) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 2x3 Frame Plates - Dated: 3/7/2013

Pei test report no. 2012-1569 (W) - ASTM E72 Evaluation of Sheathing Materials - Single Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Horizontal) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 2x3 Frame Plates - Dated: 3/12/2013

Pei test report no. 2014-1223 (A) - ASTM E72 Evaluation of Sheathing Materials - Single Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Vertical) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 1x3 Frame Plates - Dated: 8/27/2014

Pei test report no. 2014-1223 (B) - ASTM E72 Evaluation of Sheathing Materials - Double Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Vertical) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 1x3 Frame Plates - Dated: 8/27/2014

Pei test report no. 2018-6060(A) - ASTM C557 Test on Voramer™ ME 3513 Isocyanate Adhesive - Dated: 8/7/2018

Pei test report no. 2018-6293 - ASTM D3498 Test on Voramer™ ME 3513 Adhesive - Dated: 12/27/2018

Pei test report no. 2021-6126 (A) - ASTM E72 Evaluation of Sheathing Materials - Double Sided Racking Load Using 1/2" SHEETROCK Brand MH UltraLight Panels Tuf-Base (Vertical) using DOW Chemical Voramer ME 3513 One-Part Adhesive and 1x3 Frame Plates - Dated: 8/27/2014