DrJ ENGINEERING
6300 Enterprise Lane | Madison, WI 53719 | drjengineering.org

December 13, 2023

Re: Strongwell: Listing and TER 2009-02 [1, 2, 3]

To whom it may concern:

The attached Listing and Technical Evaluation Report™ has been created by DrJ Engineering on behalf of Strongwell under a Virginia professional engineering accepted engineering practice review and its ANSI National Accreditation Board (ANAB) ISO/IEC 17065 product certification process. This work has been performed pursuant to our scope of work areas of expertise.

DrJ's procedures are fully compliant with the ISO/IEC 17065 certification requirements and DrJ's ANAB accredited scope[4] of expertise.

Please contact us if we can help further in any way.

Respectfully yours,

Larry Wainright
Vice President Product Certification
608-310-6742

Ryan Dexter, P.E.
Vice President
608-310-6744

12/13/2023

COMMONWEALTH OF VIRGINIA
RYAN J. DEXTER
Lic. No. 048372
PROFESSIONAL ENGINEER

This TER is reviewed and sealed by Ryan Dexter, P.E. of DrJ Engineering, LLC, as a specialty or delegated engineer. The scope of engineering work with respect to this TER is for the engineering analysis provided herein, supported by proprietary intellectual property and other substantiating data. No representation extending beyond this analysis is expressed or implied. Information or data that becomes available at a later date may justify modifications to this TER.

[1] A Registered Design Professional (RDP) is an approved source and is "approved" when a professional engineer is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the legislature via its professional engineering regulations.

[2] Capitalized terms are defined in the building code, reference standards, TPI 1, the NDS, AISI S202, professional engineering law, Appendix A: Definitions/Commentary, and the National Building Code of Canada. Otherwise, terms not defined shall have ordinarily accepted meanings as the context implies.

[3] The scope of work contained herein is limited to the specific engineering and/or code compliance analysis undertaken in this research report, which is also known as a duly authenticated report. This work has been prepared by an Approved Agency and Approved Source, who is an RDP. No representation or warranty is expressed or implied by this duly authenticated report. beyond the scope of work performed. Information, data, and/or analysis that becomes available in the future may justify modifications to this research report.

[4] Accredited Certification Body Scope Comparison-Construction

Listing and Technical Evaluation Report™

Report No: 2009-02

Issue Date: December 2, 2021

Revision Date: November 27, 2023

Subject to Renewal: January 1, 2025

STRONGIRT® and STRONGIRT® ULTRA Properties

Trade Secret Report Holder:

Strongwell®

Phone: 279-645-8000 Website: www.strongwell.com or www.strongirt.com

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 52 00 – Plastic Structural Assemblies

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 24 00 - Exterior Insulation and Finish Systems

1 Innovative Products Evaluated[i]

1.1 STRONGIRT® and STRONGIRT® ULTRA

2 Product Description and Materials

2.1 The innovative products evaluated in this report are shown in **Figure 1**.

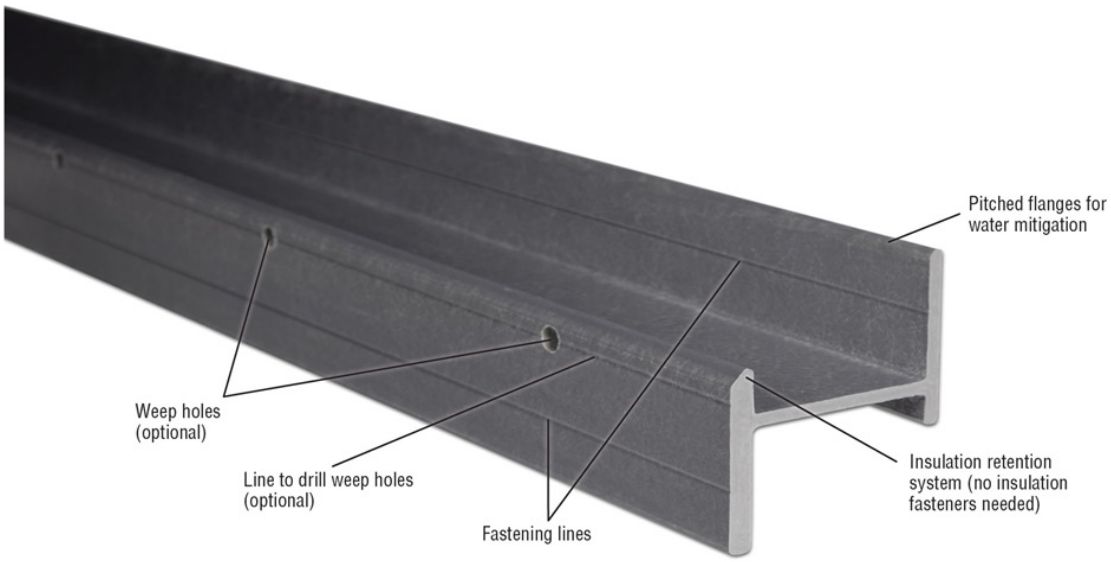

Figure 1. STRONGIRT® and STRONGIRT® ULTRA

2.2 *Material*

2.2.1 STRONGIRT® and STRONGIRT® ULTRA are cladding attachment systems made from pultruded fiber-reinforced polymer (FRP).

2.2.2 STRONGIRT® and STRONGIRT® ULTRA are used when cladding is installed over insulation, as shown in **Figure 2**.

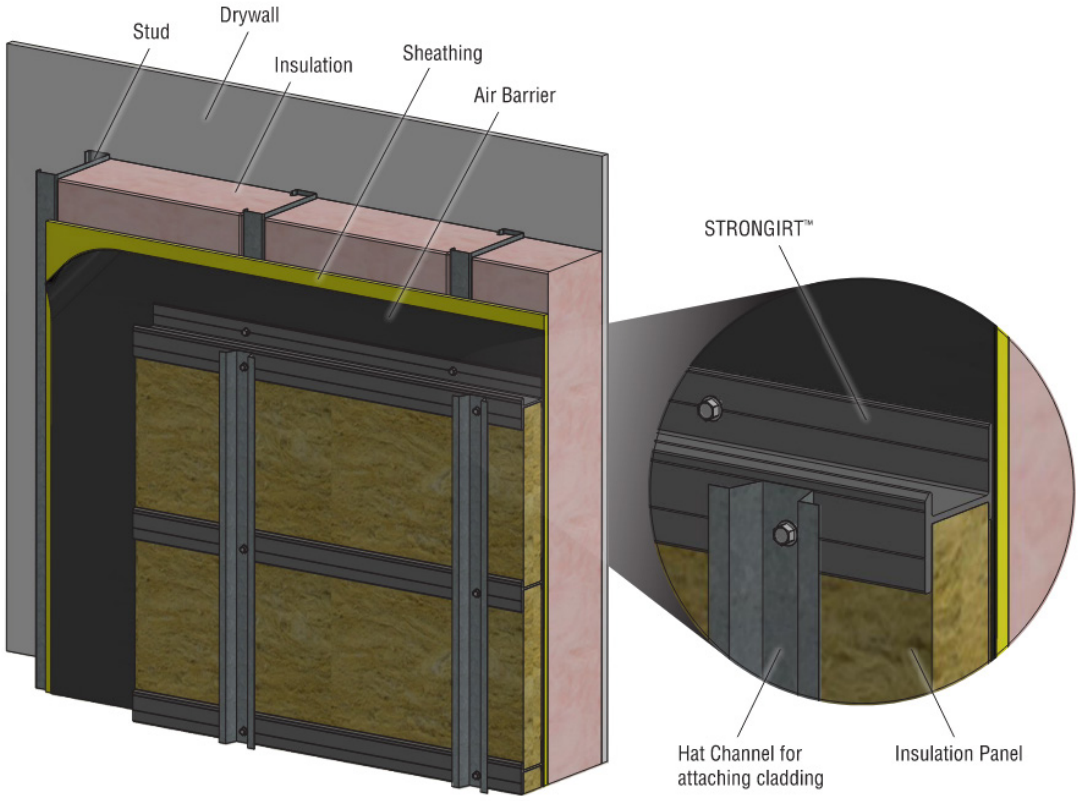

Figure 2. Application of STRONGIRT® and STRONGIRT® ULTRA in Wall Assembly

2.3 *Product Availability*

2.3.1 STRONGIRT®

2.3.1.1 Depth: 1.5", 2", 2.5", 3", 3.5", 4", 4.5", 5", 5.5", and 6"

2.3.1.2 Standard Length: 20'

2.3.1.3 Web Thickness/Wall Side Flange Thickness: 0.15"

2.3.1.4 Cladding Side Flange Thickness: 0.25"

2.3.2 STRONGIRT® ULTRA

2.3.2.1 Depth: 5", 5.5", 6", and 8"

2.3.2.2 Standard Length: 20'

2.3.2.3 Web Thickness/Wall Side Flange Thickness: 0.25"

2.3.2.4 Cladding Side Flange Thickness: 0.25"

2.3.3 See Section **9.4** for flange references.

2.3.4 Contact the manufacturer for other sizes than those listed in Section **2.3**.

2.4 **NOTE:** The remainder of this document will refer to all sizes of STRONGIRT® and STRONGIRT® ULTRA as STRONGIRT®.

2.5 As needed, review material properties for design in Section **6** and to regulatory evaluation in Section **8**.

3 Definitions

3.1 New Materials[ii] are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[iii] The design strengths and permissible stresses shall be established by tests[iv] and/or engineering analysis.[v]

3.2 Duly Authenticated Reports[vi] and Research Reports[vii] are test reports and related engineering evaluations, which are written by an approved agency[viii] and/or an approved source.[ix]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[x]

3.3 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is "approved" when a professional engineer (i.e., Registered Design Professional [RDP]) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[xi]

3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[xii] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[xiii] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[xiv] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[xv]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[xvi] Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[xvii]

3.9 Approval equity is a fundamental commercial and legal principle.[xviii]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[xix]

4.1 *Standards*

4.1.1 *ASTM D198: Standard Test Methods of Static Tests of Lumber in Structural Sizes*

4.1.2 *ASTM D638: Standard Test Method for Tensile Properties of Plastics*

4.1.3 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*

4.1.4 *ASTM D2344: Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates*

4.1.5 *ASTM D4385: Standard Practice for Classifying Visual Defects in Thermosetting Reinforced Plastic Pultruded Products*

4.1.6 *ASTM D4762: Standard Guide for Testing Polymer Matrix Composite Materials*

4.1.7 *ASTM D5961: Standard Test Method for Bearing Response of Polymer Matrix Composite Laminates*

4.1.8 *ASTM D7332: Standard Test Method for Measuring the Fastener Pull-Through Resistance of a Fiber-Reinforced Polymer Matrix Composite*

4.1.9 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*

4.1.10 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.1.11 *ASTM E1530: Standard Test Method for Evaluating the Resistance to Thermal Transmission by the Guarded Heat Flow Meter Technique*

4.1.12 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

4.2.3 *IECC – 15, 18, 21: International Energy Conservation Code®*

4.2.4 *FBC-B—20, 23: Florida Building Code – Building*[xx]

4.2.5 *FBC-R—20, 23: Florida Building Code – Residential*[xxi]

5 Listed[xxii]

5.1 A nationally recognized testing laboratory such as CBI, states that the materials, designs, methods of construction, and/or equipment have met nationally recognized standards and/or have been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General*

6.1.1 STRONGIRT® can be installed over substrates including cold-formed steel, masonry, or concrete.

6.1.2 STRONGIRT® is used in buildings constructed in accordance with IBC/IRC requirements for Type I-V construction.

6.1.3 STRONGIRT® provides the following when used to attach exterior cladding to the building envelope:

6.1.3.1 Transverse load resistance

6.1.3.2 Thermal resistance, providing a thermal break between the cladding and wall framing

6.1.3.3 Gravity load resistance for the weight of cladding materials

6.2 *Material Properties*

6.2.1 STRONGIRT® has the material properties provided in **Table 1**.

Table 1. Material Properties

Product	Allowable Shear Strength (psi)	Allowable Bearing Strength (psi)	Allowable Screw Withdrawal[1] (lb)	Allowable Head Pullover[2] (lb)
STRONGIRT®	1,330	9,100	215	175

SI: 1 lb = 4.45 N, 1 psi = 0.00689 MPa

1. Applies to any hex head #14 fastener with a head of 0.484" or larger in the cladding side flange (0.25" Flange).
2. Tested in accordance with ASTM E72.

6.3 *Cladding Allowable Loading*

6.3.1 STRONGIRT® can be installed vertically or horizontally on the exterior side of stud-framed walls and fastened at 16", 24", 36", or 48" o.c.

6.3.2 Allowable wind loads for both brittle and flexible claddings based on cladding weight without washers and with washers are provided in **Table 2**.

6.3.3 Information on the screws used during testing can be found in **Appendix B**.

Table 2. Allowable Wind Load of STRONGIRT® and STRONGIRT® ULTRA With and Without Washers for Brittle and Flexible Cladding[1,2,3,5]

STRONGIRT® Span (Stud Spacing) (in)	STRONGIRT® Spacing[4] (in)	Allowable Wind Load (psf)				
		STRONGIRT®				STRONGIRT® Ultra
		Without Washers[6]	With Washers[7,8]			Without Washers[9]
		All	≤ 5"	5.5"	6"	5", 5.5", 6", & 8"
16	16	98	165	150	139	190
	24	66	110	100	92	126
	36	44	73	67	62	84
	48	33	55	50	46	63
24	16	66	110	100	92	126
	24	44	73	67	62	84
	36	29	49	45	41	56
	48	22	37	33	31	42
36	16	44	73	67	62	84
	24	29	49	45	41	56
	36	19	33	30	27	37
	48	15	24	22	21	28
48	16	33	55	50	46	63
	24	22	37	33	31	42
	36	15	24	22	21	28
	48	-	18	17	15	21

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Unless otherwise noted, STRONGIRT® and STRONGIRT® Ultra meet the deflection limits of IBC Table 1604.3 for Exterior walls with plaster or stucco finishes (L/360). L is defined as the girt span between fasteners along the length of the girt when installed in either horizontal or vertical orientation.
2. Deflection limits are based on ASCE 7-22 Components and Cladding loads multiplied by 0.42.
3. Specific project application and details, such as the connection design or substrate strength, may limit the allowable loads further.
4. Defined as the girt span between fasteners along the length of the girt.
5. Screws required for connection of cladding to STRONGIRT® With and Without Washers.
   a. Fully threaded #14 Hex Head self-drilling screws with a major diameter of 0.244 inches, a root diameter of 0.190 inches, a minimum head diameter of 0.485 inches, and a thread count of 15 threads per inch.
6. Analysis is for STRONGIRT® only; it does not include insulation or STRONGIRT® ULTRA. STRONGIRT® can be installed either horizontally or vertically on the wall. Applies to 1.5", 2", 2.5", 3", 3.5", 4", 4.5", 5", 5.5", and 6" girts installed without washers.
7. Analysis is for STRONGIRT® only; it does not include insulation or STRONGIRT® ULTRA. STRONGIRT® can be installed either horizontally or vertically on the wall. Applies to 1.5", 2", 2.5", 3", 3.5", 4", 4.5", 5", 5.5", and 6" girts installed with fender washers on each fastener. Minimum #14 hex head fasteners with 0.485" head diameter are required.
8. The washer used must be equal to or better than as specified herein: Minimum galvanized washers with inner diameter of 5/16", outer diameter of 11/4", and a thickness of 0.047" are required.
9. 1.5" STRONGIRT® with washers meets the deflection limit of L/240 in accordance with IBC Table 1604.3. All other sizes meet the deflection limit of L/360.
10. Analysis is for STRONGIRT® ULTRA only; it does not include insulation or STRONGIRT®. STRONGIRT® ULTRA can be installed either horizontally or vertically on the wall. Applies to 5" ULTRA, 5.5" ULTRA, 6" ULTRA, and 8" ULTRA girts installed without washers.

6.4 *Allowable Negative Wind Pressure for STRONGIRT® and STRONGIRT® ULTRA Attachment to Soffits to Support Cladding*

6.4.1 An example of attachment to soffits is shown in **Figure 3**.

6.4.2 Allowable negative wind pressures for various claddings are shown in **Table 3** and **Table 4**.

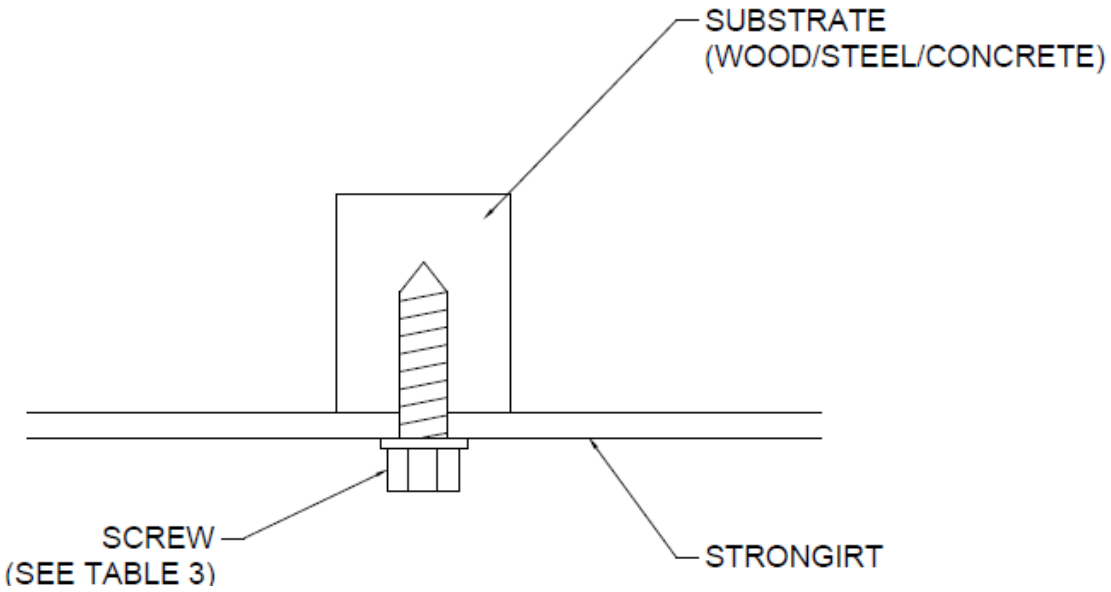

Figure 3. Diagram Depicting How STRONGIRT® and STRONGIRT® ULTRA Are Attached to Soffits

Table 3. Allowable Negative Wind Pressure for STRONGIRT® Attachment to Soffits to Support Cladding

STRONGIRT® Spacing (in.)	Fastener Spacing along STRONGIRT® (in.)	Allowable Wind Pressure (PSF)[1,2,3]					
		Substrate / Fastener					
		Concrete / 1/4" Tapcon Screw	20-Gauge Steel / #14 Self-Tapping Screw	Wood / #12 Wood Screw	Concrete / 1/4" Tapcon Screw	20 Gauge Steel / #14 Self-Tapping Screw	Wood / #12 Wood Screw
		Cladding Weight[4]					
		5	5	5	10	10	10
16	16	54	54	54	49	49	49
	24	34	34	34	29	29	29
	36	21	21	21	16	16	16
	48	14	14	14	-	-	-
24	16	34	34	34	29	29	29
	24	21	21	21	16	16	16
	36	12	12	12	-	-	-
	48	-	-	-	-	-	-
36	16	21	21	21	16	16	16
	24	12	12	12	-	-	-
	36	-	-	-	-	-	-
	48	-	-	-	-	-	-
48	16	14	14	14	-	-	-
	24	-	-	-	-	-	-
	36	-	-	-	-	-	-
	48	-	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Blank table entry indicates an allowable pressure less than the minimum Allowable Stress Design Components and Cladding (ASD C&C) design pressure of 10 psf.
2. Allowable wind pressures are ASD pressures.
3. Required fasteners for Soffit connections:
   a. Concrete: Tapcon® 1/4" diameter, exterior rated hex washer head concrete screws with minimum 1" embedment into 3,000 psi concrete. Minimum fastener length of 1 1/4".
   b. Steel: 1/4" Teks® hex washer head self-tapping screws installed in steel framing having a minimum tensile capacity of 45 ksi. Minimum penetration of three (3) threads beyond the back face of the main member.
   c. Wood: #12 diameter (0.216") wood screws with 1 1/4" minimum embedment into SG=0.42 wood framing. Head diameter shall be 0.485" minimum or screw shall be installed with fender washers with minimum 0.485" diameter and minimum 0.047" thickness.
4. Cladding weight includes the weight of the Strongirt®.

Table 4. Allowable Negative Wind Pressure for STRONGIRT® ULTRA Attachment to Soffits to Support Cladding

STRONGIRT® ULTRA Spacing (in.)	Fastener Spacing along STRONGIRT® ULTRA (in.)	Allowable Wind Pressure (PSF)[1,2,3]					
		Substrate / Fastener					
		Concrete / 1/4" Tapcon Screw	20-Gauge Steel /#14 Self-Tapping Screw	Wood / #12 Wood Screw	Concrete / 1/4" Tapcon Screw	20-Gauge Steel /#14 Self-Tapping Screw	Wood / #12 Wood Screw
		Cladding Weight[4]					
		5	5	5	5	5	5
16	16	93	59	93	88	54	88
	24	60	38	60	55	33	55
	36	38	23	38	33	18	33
	48	27	16	27	22	11	22
24	16	60	38	60	55	33	55
	24	38	23	38	33	18	33
	36	24	14	24	19	-	19
	48	16	-	16	11	-	11
36	16	38	23	38	33	18	33
	24	24	14	24	19	-	19
	36	14	-	14	-	-	-
	48	-	-	-	-	-	-
48	16	27	16	27	22	11	22
	24	16	-	16	11	-	11
	36	-	-	-	-	-	-
	48	-	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Blank table entry indicates an allowable pressure less than the minimum ASD C&C design pressure of 10 psf.
2. Allowable wind pressures are ASD pressures.
3. Required fasteners for Soffit connections
   a. Concrete: Tapcon® 1/4" diameter, exterior rated hex washer head concrete screws with minimum 1" embedment into 3,000 psi concrete. Minimum fastener length of 1 1/4".
   b. Steel: 1/4" Teks® hex washer head self-tapping screws installed in steel framing having a minimum tensile capacity of 45 ksi. Minimum penetration of three (3) threads beyond the back face of the main member.
   c. Wood: #12 diameter (0.216") wood screws with 1 1/4" minimum embedment into SG=0.42 wood framing. Head diameter shall be 0.485" minimum or screw shall be installed with fender washers with minimum 0.485" diameter and minimum 0.047" thickness.
4. Cladding weight includes the weight of the STRONGIRT® ULTRA.

6.5 *Deflection*

6.5.1 Vertical deflection of girt from cladding weight is shown in **Figure 4**.

6.5.2 Vertical deflection applies only to girts installed horizontally.

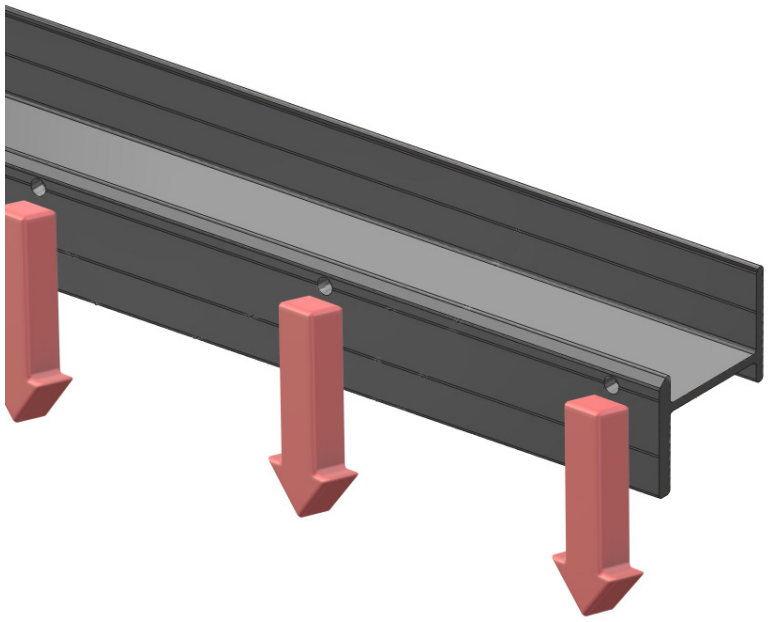

Figure 4. Vertical Deflection of Girt from Cladding Weight

6.5.3 Vertical deflection for girts fastened with and without washers, are provided in **Table 5** and **Table 6**.

Table 5. Vertical Deflection of STRONGIRT® from Cladding Weight

STRONGIRT® Size	STRONGIRT® Spacing (in)	Deflection[1,2,3] (in)					
		Cladding Weight[4,5] (psf)					
		3	5	7	9	11	15
1.5"	16	0.00	0.00	0.00	0.01	0.01	0.01
	24	0.00	0.00	0.01	0.01	0.01	0.02
	36	0.00	0.01	0.01	0.02	0.02	0.04
	48	0.01	0.01	0.02	0.03	0.04	0.06
2"	16	0.00	0.01	0.01	0.02	0.03	0.04
	24	0.01	0.01	0.02	0.03	0.05	0.07
	36	0.01	0.03	0.04	0.06	0.08	0.13
	48	0.02	0.04	0.07	0.10	0.13	-
2.5"	16	0.01	0.02	0.03	0.04	0.05	0.09
	24	0.01	0.03	0.05	0.07	0.10	0.16
	36	0.03	0.06	0.09	0.13	0.18	-
	48	0.04	0.09	0.14	0.21	-	-
3"	16	0.01	0.03	0.05	0.07	0.09	0.15
	24	0.02	0.05	0.09	0.13	0.17	0.27

Table 5. Vertical Deflection of STRONGIRT® from Cladding Weight

STRONGIRT® Size	STRONGIRT® Spacing (in)	Deflection[1,2,3] (in)					
		Cladding Weight[4,5] (psf)					
		3	5	7	9	11	15
	36	0.04	0.10	0.16	0.23	0.31	-
	48	0.07	0.15	0.24	-	-	-
3.5"	16	0.02	0.04	0.07	0.10	0.14	0.22
	24	0.04	0.08	0.13	0.19	0.26	-
	36	0.07	0.14	0.24	0.35	-	-
	48	0.10	0.22	0.37	-	-	-
4"	16	0.03	0.06	0.10	0.15	0.20	0.31
	24	0.05	0.11	0.18	0.27	0.36	-
	36	0.09	0.20	0.34	-	-	-
	48	0.15	0.31	-	-	-	-
4.5"	16	0.04	0.08	0.13	0.19	0.26	0.42
	24	0.07	0.15	0.25	0.36	0.48	-
	36	0.13	0.27	0.45	-	-	-
	48	0.19	0.42	-	-	-	-
5"	16	0.05	0.10	0.17	0.25	0.34	0.54
	24	0.09	0.19	0.31	0.46	-	-
	36	0.16	0.35	-	-	-	-
	48	0.25	0.54	-	-	-	-
5.5"	16	0.06	0.13	0.21	0.31	0.42	-
	24	0.11	0.24	0.39	0.57	-	-
	36	0.20	0.44	-	-	-	-
	48	0.31	-	-	-	-	-
6"	16	0.07	0.16	0.26	0.38	0.51	-
	24	0.13	0.29	0.48	-	-	-
	36	0.25	0.53	-	-	-	-
	48	0.38	-	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Analysis is for STRONGIRT® only; it does not include insulation. Applies to girts installed with and without washers and framing members spaced a maximum of 24" o.c.
2. The vertical deflection caused by flexure of the girt between framing members is negligible. The vertical deflection values in this table represent a deflection of the exterior flange of the girt in relation to the interior flange and is not dependent on framing spacing.
3. Table values represent the deflection induced on the girt at thirty percent (30%) of the Ultimate tested failure load.
4. Cladding weight gravity load is assumed to be acting vertically at the outside edge of the girt at the fastener. Cladding weight listed shall include the weight of any hat channel or furring used.
5. EOR/installer must verify that the deflection limits selected are acceptable for the application. Deflections less than 0.25" are recommended for better in-service performance.

Table 6. Vertical Deflection of STRONGIRT® ULTRA from Cladding Weight

STRONGIRT® Size	STRONGIRT® Spacing (in)	Deflection[1,2,3] (in)					
		Cladding Weight[4,5] (psf)					
		3	5	7	9	11	15
5" ULTRA	16	0.03	0.05	0.07	0.08	0.10	0.14
	24	0.04	0.07	0.10	0.13	0.16	0.22
	36	0.06	0.11	0.15	0.19	0.24	-
	48	0.08	0.14	0.20	0.27	-	-
5.5" ULTRA	16	0.04	0.06	0.08	0.10	0.12	0.17
	24	0.05	0.08	0.12	0.15	0.19	0.26
	36	0.08	0.13	0.18	0.23	0.29	-
	48	0.10	0.17	0.24	-	-	-
6" ULTRA	16	0.04	0.07	0.09	0.12	0.15	0.20
	24	0.06	0.10	0.14	0.18	0.22	0.32
	36	0.09	0.15	0.21	0.28	-	-
	48	0.12	0.20	0.29	-	-	-
8" ULTRA	16	0.07	0.11	0.15	0.20	0.25	0.36
	24	0.10	0.16	0.24	0.31	0.40	-
	36	0.15	0.26	0.38	-	-	-
	48	0.20	0.36	-	-	-	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Analysis is for STRONGIRT® only; it does not include insulation. Applies to girts installed with and without washers and framing members spaced a maximum of 24" o.c.
2. The vertical deflection caused by flexure of the girt between framing members is negligible. The vertical deflection values in this table represent a sagging deflection of the exterior flange of the girt and are not dependent on framing spacing.
3. Table values represent the deflection induced on the girt at 30% of the Ultimate tested failure load.
4. Cladding weight gravity load is assumed to be acting vertically at the outside edge of the girt at the fastener. Cladding weight listed shall include the weight of any hat channel or furring used.
5. EOR/installer must verify that the deflection limits selected are acceptable for the application. Deflections less than 0.25" are recommended for better in-service performance.

6.5.4 Vertical deflection of unsupported girt end from cladding weight is shown in **Figure 5**. Vertical deflection applies only to girts installed horizontally with a maximum cladding weight of 15 psf. The maximum distance (L) from fastener to unsupported end of girt is limited to 16". Vertical deflection for unsupported (cantilevered) ends of girts fastened with or without washers, meets or exceeds L/600 deflection criteria.

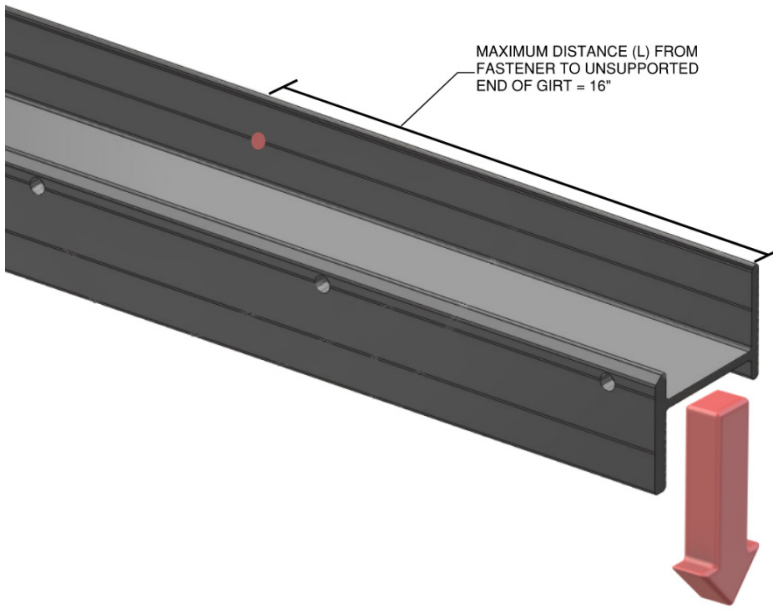

Figure 5. Vertical Deflection of Unsupported Girt End from Cladding Weight

6.6 *Surface Burn Characteristics*

6.6.1 STRONGIRT® assembly with mineral wool insulation has the surface burn characteristics shown in **Table 7** in accordance with IBC Section 2613.5, IBC Section 2603.5.4, and IRC Section R316.3.

Table 7. Surface Burn Characteristics[1]

Product	Flame Spread	Smoke Developed	Classification
STRONGIRT®	≤ 25	≤ 450	Class A
1. STRONGIRT® and mineral wood assembly tested in accordance with ASTM E84.			

6.7 *Vertical and Lateral Fire Propagation*

6.7.1 STRONGIRT® was tested to assess performance of vertical and lateral fire propagation in accordance with NFPA 285 and IBC Section 2613.5 and IBC Section 2603.5.5.

6.7.2 Engineering analysis has been conducted to assess substitution of other products within the approved wall assemblies.

6.7.3 The wall assemblies in **Table 8** are approved for use in buildings of Type I-IV construction.

Table 8. Approved NFPA 285 Wall Assemblies

Wall Component	Materials
Base Wall System Use item 1, 2, or 3.	1. Cast Concrete Walls 2. CMU Concrete Walls 3. 20 gauge (min.) 3 5/8" (min.) steel studs or 2x4 (min.) FRT wood studs spaced 24" o.c. (max.) with 5/8" Type X gypsum wallboard interior
Fire-Stopping in Stud Cavity at Floor Lines Use any item 1-2.	1. 4" (min.), 4 pcf (min.) mineral fiber (mineral wool) installed friction fit or with z-clips 2. FRT lumber fireblocking (1 1/2" thick min.)
Cavity Insulation Use any item 1-4.	1. None 2. Any insulation determined to be noncombustible per ASTM E136 3. Any mineral fiber (faced or unfaced) complying with applicable code 4. Any fiberglass (faced or unfaced) complying with applicable code
Exterior Sheathing	For base wall 3 only – 5/8" (min.) gypsum board sheathing (paper or glass mat faced)
WRB applied to Sheathing Use manufacturer instructions to apply WRB.	Any WRB (only 2" (min.), 4 pcf (min.) mineral wool (unfaced) meeting ASTM E136 covering the WRB
STRONGIRT® with Exterior Insulation	Any STRONGIRT® size listed in Section **2.3** with a minimum thickness of 2". Minimum 2", 4 pcf (min.) mineral wool (unfaced) meeting ASTM E136.
Air Gap	2 5/16" (max.) for ACM cladding. For all other noncombustible claddings, the air gap is not limited.
Exterior Cladding Use any item 1-15.	1. Brick – nominal 4" clay brick or veneer with any air gap behind the brick. Brick ties/anchors 24" o.c. (max.). 2. Stucco – min. ¾" thick exterior cement plaster and lath. A secondary WRB (WRB items above allowed over foam) can be installed between the insulation and lath and must not be full coverage asphalt or butyl based self-adhering membranes, but may be asphalt or butyl based slip sheet (stapled) with no adhesive. 3. Limestone – min. 2" thick 4. Natural stone veneer – min. 2" thick 5. Cast artificial stone – min. 1 1/2" thick complying with ICC-ES AC 51 6. Terracotta cladding – min. 1 1/4" thick 7. Any ACM/MCM that has passed NFPA 285 with mineral wool 8. Autoclaved Aerated Concrete (AAC) panels (min. 1 1/2" thick) 9. Terreal Zephir Evolution Rainscreen System (terra cotta), minimum 9/16" thick 10. Glen-Gery Thin Tech Masonry Veneer (only with optional noncombustible mortar) 11. Glen-Gery Tru-Brix (only with optional noncombustible mortar) 12. Terra Cotta Cladding – any rain-screen terra cotta (min. ½" thick) with ventilated shiplap 13. 1/2" Stucco – any one-coat stucco that meets AC 11 acceptance criteria, is approved for use in Type I-IV construction, has been tested per NFPA 285, or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes. 14. Natural stone veneer – min. 1 1/4" thick using any standard installation technique 15. Any noncombustible rainscreen cladding (per ASTM E136) – mechanically attached (not adhered) with 3/8" panel gaps (max.) to include the following: a. Uninsulated sheet metal building panels including minimum 0.019" aluminum, 0.0149" steel (per code), 0.0216" copper (per code), or zinc (30% thicker than 0.019" aluminum) b. Uninsulated fiber-cement siding (min. 1/4" thick) that meets ASTM E136 c. High-density fiber cement that meets ASTM E136 – 1/4" min. d. Ultra-high performance concrete that meets ASTM E136 – 1/2" min. e. GFRC panels that meet ASTM E136 – 3/8" min. f. Porcelain that meets ASTM E136 – 1/4" min. g. Sintered or engineered stone panels (rainscreen or non-rainscreen) that meet ASTM E136 – 1/4" min.
SI: 1 in = 25.4 mm	

6.8 *Thermal Performance*

6.8.1 STRONGIRT® has the thermal conductivity provided in **Table 9**.

Table 9. Thermal Conductivity[1]

Product	Thermal Conductivity (W/m·K)
STRONGIRT®	0.318

SI: 1 in = 25.4 mm, 1 W/m·K = 0.5782 Btu/hr·ft·°F

1. STRONGIRT® tested in accordance with ASTM E1530.

6.8.2 The R-values and efficiencies in **Table 10** are for the assembly and are based on the insulation layer only, which includes the insulation and girts. Other building materials used in the exterior wall assembly are not included and should be taken into account by the building designer or registered design professional (RDP).

Table 10. Thermal Performance of Insulation[3] Installed with STRONGIRT®[1,2]

STRONGIRT® Spacing (in)	STRONGIRT® Size and Exterior Insulation Thickness (in)	Nominal (without STRONGIRT®)	Effective[3] (with STRONGIRT®)		Efficiency[4]
		Insulation R-Value (hr·ft²·°F/Btu)	Assembly R-Value (hr·ft²·°F/Btu)	Assembly U-Factor (Btu/hr·ft²·°F)	
16	1.5	6.5	6.0	0.167	92.6%
	2.0	8.6	8.0	0.126	92.6%
	2.5	10.8	10.0	0.100	92.6%
	3.0	12.9	11.9	0.084	92.6%
	3.5	15.1	13.9	0.072	92.6%
	4.0	17.2	15.9	0.063	92.6%
	4.5	19.4	17.9	0.056	92.6%
	5.0	21.5	19.9	0.050	92.6%
	5.5	23.7	21.9	0.046	92.6%
	6.0	25.8	23.9	0.042	92.6%
24	1.5	6.5	6.1	0.163	95.0%
	2.0	8.6	8.2	0.122	95.0%
	2.5	10.8	10.2	0.098	95.0%
	3.0	12.9	12.3	0.082	95.0%
	3.5	15.1	14.3	0.070	95.0%
	4.0	17.2	16.3	0.061	95.0%
	4.5	19.4	18.4	0.054	95.0%

Table 10. Thermal Performance of Insulation[3] Installed with STRONGIRT®[1,2]

STRONGIRT® Spacing (in)	STRONGIRT® Size and Exterior Insulation Thickness (in)	Nominal (without STRONGIRT®)	Effective[3] (with STRONGIRT®)		Efficiency[4]
		Insulation R-Value (hr·ft²·°F/Btu)	Assembly R-Value (hr·ft²·°F/Btu)	Assembly U-Factor (Btu/hr·ft²·°F)	
	5.0	21.5	20.4	0.049	95.0%
	5.5	23.7	22.5	0.045	95.0%
	6.0	25.8	24.5	0.041	95.0%
36	1.5	6.5	6.2	0.161	96.6%
	2.0	8.6	8.3	0.120	96.6%
	2.5	10.8	10.4	0.096	96.6%
	3.0	12.9	12.5	0.080	96.6%
	3.5	15.1	14.5	0.069	96.6%
	4.0	17.2	16.6	0.060	96.6%
	4.5	19.4	18.7	0.054	96.6%
	5.0	21.5	20.8	0.048	96.6%
	5.5	23.7	22.8	0.044	96.6%
	6.0	25.8	24.9	0.040	96.6%
48	1.5	6.5	6.3	0.159	97.4%
	2.0	8.6	8.4	0.119	97.4%
	2.5	10.8	10.5	0.095	97.4%
	3.0	12.9	12.6	0.080	97.4%
	3.5	15.1	14.7	0.068	97.4%
	4.0	17.2	16.8	0.060	97.4%
	4.5	19.4	18.9	0.053	97.4%
	5.0	21.5	20.9	0.048	97.4%
	5.5	23.7	23.0	0.043	97.4%
	6.0	25.8	25.1	0.040	97.4%

SI: 1 in = 25.4 mm

1. Calculated values are based on STRONGIRT® webs and insulation only using the parallel path method. The STRONGIRT® flanges were ignored as they extend beyond the front and back of the insulation panel. The assembly R-value is based on one linear foot of STRONGIRT® and one square foot of insulation along the length of the girt.
2. Fasteners excluded from the calculation.
3. The R-value of the insulation used in the calculations is 4.3 hr·ft²·°F/Btu·in. Any insulation with an equal or greater R-value may be used.
4. Computed by dividing the effective R-value of the wall assembly by the nominal R-value of the assembly.

6.8.3 The R-values and efficiencies in **Table 11** are for the assembly and are based on the insulation layer only, which includes the insulation and girts. Other building materials used in the exterior wall assembly are not included and should be taken into account by the building designer or registered design professional (RDP).

Table 11. Thermal Performance of Insulation[3] Installed with STRONGIRT® ULTRA[1,2]

STRONGIRT® Spacing (in)	STRONGIRT® Size and Exterior Insulation Thickness (in)	Nominal (without STRONGIRT®)	Effective[3] (with STRONGIRT®)		Efficiency[4]
		Insulation R-Value ($hr \cdot ft^2 \cdot °F/Btu$)	Assembly R-Value ($hr \cdot ft^2 \cdot °F/Btu$)	Assembly U-Factor[1] ($Btu/hr \cdot ft^2 \cdot °F$)	
16	5	21.5	19.0	0.053	88.3%
	5.5	23.7	20.9	0.048	88.3%
	6	25.8	22.8	0.044	88.3%
	8	34.4	30.4	0.033	88.3%
24	5	21.5	19.8	0.051	91.9%
	5.5	23.7	21.7	0.046	91.9%
	6	25.8	23.7	0.042	91.9%
	8	34.4	31.6	0.032	91.9%
36	5	21.5	20.3	0.049	94.4%
	5.5	23.7	22.3	0.045	94.4%
	6	25.8	24.4	0.041	94.4%
	8	34.4	32.5	0.031	94.4%
48	5	21.5	20.6	0.049	95.8%
	5.5	23.7	22.6	0.044	95.8%
	6	25.8	24.7	0.040	95.8%
	8	34.4	32.9	0.030	95.8%

SI: 1" = 25.4 mm

1. Calculated values are based on STRONGIRT® webs and insulation only using the parallel path method. The STRONGIRT® flanges were ignored as they extend beyond the front and back of the insulation panel. The assembly R-value is based on one (1) linear foot of STRONGIRT® and one square foot of insulation along the length of the girt.
2. Fasteners excluded from the calculation.
3. The R-value of the insulation used in the calculations is 4.3 $hr \cdot ft^2 \cdot °F/Btu \cdot in$. Any insulation with an equal or greater R-value may be used.
4. Computed by dividing the effective R-value of the wall assembly by the nominal R-value of the assembly.

6.9 Where the application falls outside of the performance evaluation, conditions of use, and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

7 Certified Performance[xxiii]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[xxiv]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[xxv]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 STRONGIRT® and STRONGIRT® ULTRA comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Structural performance under transverse load conditions for wind loading in accordance with IBC Section 1609, specifically IBC Section 1609.4.3.

8.1.2 Allowable wind pressure resistance in accordance with IBC Section 1603.1.4.

8.1.3 Performance for use in exterior walls of buildings of any height and of Type I-V construction in accordance with IBC Section 2603.5 and IRC Section R316.5.12.

8.1.4 Performance in accordance with ASTM E84 for flame spread and smoke development ratings in accordance with IBC Section 2613.5, IBC Section 2603.5.4, and IRC Section R316.3.

8.1.5 Performance of vertical and lateral fire propagation in accordance with NFPA 285, IBC Section 2613.5, and IBC Section 2603.5.5.

8.1.6 Thermal resistance performance in accordance with IECC Section C402.

8.2 Any building code, regulation, and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this report were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[xxvi] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

8.4 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 *Installation Procedure*

9.3.1 Inspect the substrate for the readiness to install girts.

9.3.2 Inspect STRONGIRT® for any quality issues per ASTM D4385 prior to installation.

9.3.3 If required, STRONGIRT® may be cut to length or predrilled using traditional tools.

9.3.3.1 It is recommended to use carbide/diamond gritted saw blades and drill bits.

9.3.4 Fasten any optional flashing or STRONGIRT® J-section to the substrate per the installation plan. See the Strongwell® product catalog for STRONGIRT® J-section installation information, when used.

9.3.5 Place the insulation in between the flanges of STRONGIRT® and ensure it is properly fitted into place and secured.

9.3.6 Place the next level of STRONGIRT® over the insulation, level it, and make sure that the insulation is fully engaged within the bottom flanges of the STRONGIRT® before fastening to the substrate.

9.3.7 Repeat this pattern to continue the installation of STRONGIRT® per the installation plan with proper terminations at the opening and top wall conditions.

9.3.7.1 Details of termination conditions shall be in accordance with the approved construction drawings.

9.4 Regular STRONGIRT® parts have a thin flange (0.15") on the wall side and a thick flange (0.25") on the cladding side. STRONGIRT® ULTRA has flanges of the same thickness (0.25") on both the wall side and the cladding side.

9.4.1 Thin flanges connect to the wall-side substrate and thick flanges connect to the cladding.

9.4.2 STRONGIRT® includes a debossed line on both flanges to identify a safe distance to screw the girt to the substrate and the cladding, as shown in **Figure 6**.

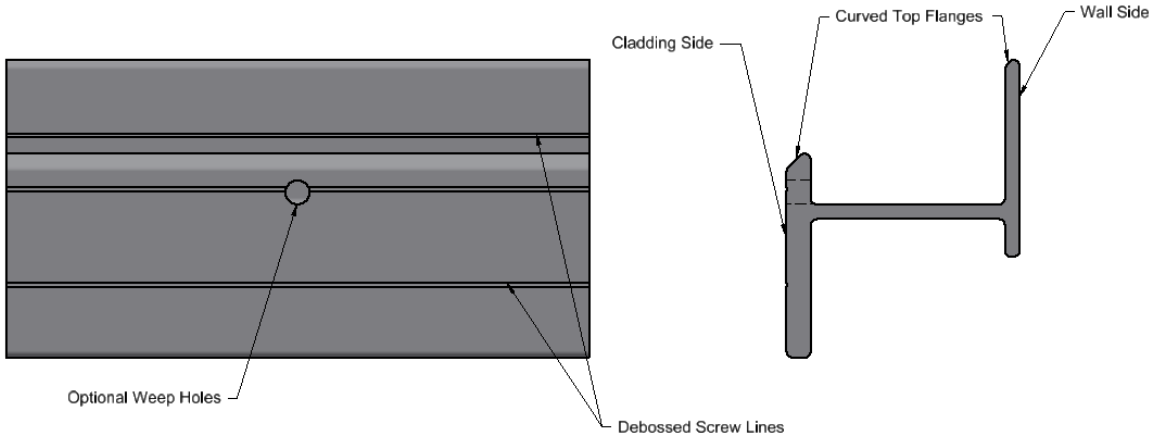

Figure 6. STRONGIRT® Orientation for Installation

9.4.3 All screws must be fastened along the debossed screw lines to maintain an adequate edge distance from the center of the screw to the edge of the girt.

9.4.4 A minimum end distance of four (4) times the diameter of the screw is recommended.

9.5 The top of the flanges are curved to allow rainwater to flow away from the wall and insulation.

9.5.1 Cladding flanges have the option of weep holes to drain moisture further.

9.5.2 When installing STRONGIRT® ULTRA, the flanges' curved tops denote which of the two flanges is the wall side flange and which is the cladding side flange (both are 0.25" thick).

9.6 STRONGIRT® can be installed horizontally or vertically on a wall to support the cladding and accommodate the insulation between flanges.

9.7 Minimum #14 self-drilling screws are required at 16" - 24" on center based on allowable load requirements determined by the engineer of record (EOR).

9.8 STRONGIRT® shall be fastened on both of its ends to the substrate.

9.8.1 Where necessary, the maximum allowable cantilever span is 16" (see **Figure 7**). See Section **6.5.4** for more information.

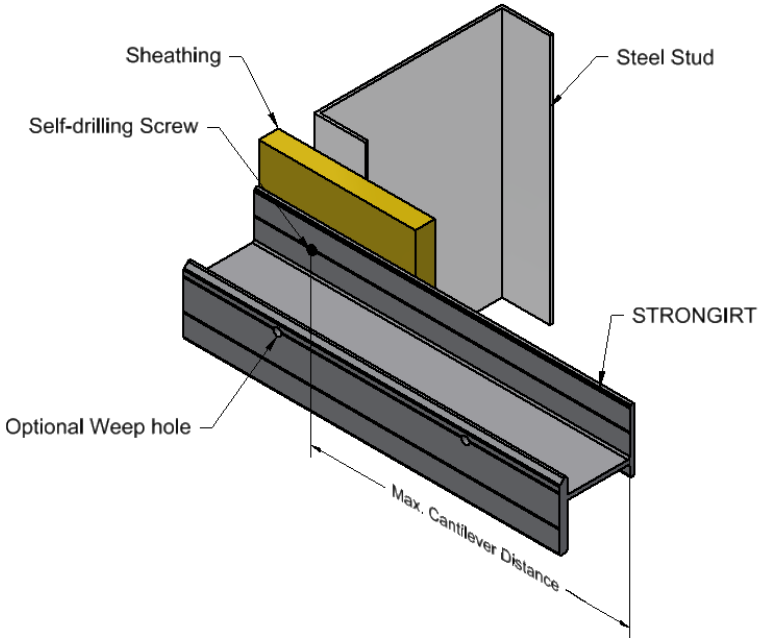

Figure 7. Maximum Allowable Cantilever Distance for STRONGIRT®

9.9 If STRONGIRT® must be attached to a masonry substrate, threaded concrete fasteners shall be used.

9.10 STRONGIRT® shall be installed with a 1/4" - 1/2" gap between girt ends to allow for any thermal cycling

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Tensile strength testing in accordance with ASTM D638 per ASTM D4762

10.1.2 Shear strength testing in accordance with ASTM D2344 per ASTM D4762

10.1.3 Bearing strength testing in accordance with ASTM D5961 per ASTM D4762

10.1.4 Head pull through testing in accordance with ASTM D7332 per ASTM D4762

10.1.5 Screw pullout testing in accordance with ASTM D1761

10.1.6 Transverse load resistance testing in accordance with ASTM E72

10.1.7 Gravity load resistance testing in accordance with ASTM D198 and ASTM D1761

10.1.8 Transverse and lateral combined load resistance testing in accordance with ASTM E72, ASTM D198 and ASTM D1761

10.1.9 Surface burn characteristics in accordance with ASTM E84

10.1.10 Vertical and lateral fire propagation testing in accordance with NFPA 285

10.1.11 Thermal resistance testing in accordance with ASTM E1530

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[xxvii]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for STRONGIRT® and STRONGIRT® ULTRA on the DrJ Certification website.

11 Findings

11.1 As outlined in Section **6**, STRONGIRT® and STRONGIRT® ULTRA have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, STRONGIRT® and STRONGIRT® ULTRA shall be approved for the following applications:

11.2.1 Performance under transverse load conditions for wind loading in accordance with IBC Section 1609, specifically IBC Section 1609.4.3

11.2.2 Performance for use in exterior walls of buildings of any height and of Type I-V construction in accordance with IBC Section 2603.5 and IRC Section R316.5.12

11.2.3 Performance in accordance with ASTM E84 for flame spread and smoke development ratings in accordance with IBC Section 2613.5, IBC Section 2603.5.4, and IRC Section R316.3

11.2.4 Performance in accordance with NFPA 285 for vertical and lateral fire propagation in accordance with IBC Section 2613.5 and IBC Section 2603.5.5 when used with the assemblies listed in **Table 8**

11.2.5 Thermal resistance performance in accordance with IECC Section C402

11.3 Unless exempt by state statute, when STRONGIRT® and STRONGIRT® ULTRA are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Strongwell.

11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[xxviii] are similar) in pertinent part states:

> **104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.

11.6 **Approved**:[xxix] Building regulations require that the building official shall accept duly authenticated reports.[xxx]

11.6.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.[xxxi]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in Section **6**.

12.2 As defined in Section **6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.3 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

12.3.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.3.2 This report and the installation instructions shall be submitted at the time of permit application.

12.3.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.3.4 At a minimum, these innovative products shall be installed per Section **9** of this report.

12.3.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.3.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.

12.3.7 The application of these innovative products in the context of this report, is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

12.4 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

12.5 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.6 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 The innovative products listed in Section **1.1** are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at www.strongwell.com or www.strongirt.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 STRONGIRT® and STRONGIRT® ULTRA are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product, or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance Innovation,

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and

1.1.3 Benefit consumers through lower prices, better quality and greater choice.

1.2 **Adopted Legislation**: The following local, state and federal regulations affirmatively authorize these innovative products to be approved by AHJs, delegates of building departments and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to "protect economic freedom and opportunity by promoting free and fair competition in the marketplace."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[xxxii] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[xxxiii] and/or a $5,000,000 fine or 3 times the value of[xxxiv] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[xxxv] that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[xxxvi]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation has been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[xxxvii]

1.3 **Approved**[xxxviii] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[xxxix] The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[xl]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[xli] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[xlii] (i.e., ANAB, International Accreditation Forum (IAF), etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.7 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods;

1.7.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.7.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.7.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,

1.7.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or

1.7.5 A statewide product approval issued by the Florida Building Commission.

1.8 The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642) and as a Florida Registered Engineer (i.e., ANE13741).

1.9 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.10 **Approved by New Jersey**: Pursuant to the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[xliii] it states: "*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*".[xliv] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.10.1 **Approvals**: Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.

1.10.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.10.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC) and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.10.2 The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*".

1.11 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[xlv] and Part 3280,[xlvi] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.11.1 "*All construction methods shall be in conformance with accepted engineering practices*"

1.11.2 "*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.*"

1.11.3 "*The design stresses of all materials shall conform to accepted engineering practice.*"

1.12 **Approval by US, Local and State Jurisdictions in Genera**l: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.12.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[xlvii]

1.12.2 For innovative alternatives and/or methods of construction, the building official shall accept duly authenticated reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[xlviii]

1.12.2.1 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.

1.12.2.2 An approved source is "approved" when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[xlix]

1.12.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[l]

1.13 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.13.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.13.2 **Approved**: The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services and/or methods of construction.

1.13.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[li]

1.13.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[lii]

1.14 Approval equity is a fundamental commercial and legal principle.[liii]

Appendix B

1 Screw Information

1.1 Screws required for connection of cladding to STRONGIRT® with and without washers:

1.1.1 Fully threaded #14 Hex Head self-drilling screws with a major diameter of 0.244 inches, a root diameter of 0.190 inches, a minimum head diameter of 0.485 inches, and a thread count of 15 threads per inch.

1.2 Screws for attaching STRONGIRT® and STRONGIRT® ULTRA to soffits

1.2.1 Concrete: Tapcon® 1/4" diameter, exterior rated hex washer head concrete screws with minimum 1" embedment into 3,000 psi concrete. Minimum fastener length of 1 1/4".

1.2.2 Steel: 1/4″ Teks® hex washer head self-tapping screws installed in steel framing having a minimum tensile capacity of 45 ksi. Minimum penetration of three (3) threads beyond the back face of the main member.

1.2.3 Wood: #12 diameter (0.216") wood screws with 1 1/4" minimum embedment into SG=0.42 wood framing. Head diameter shall be 0.485" minimum or screw shall be installed with fender washers with minimum 0.485" diameter and minimum 0.047" thickness.

Issue Date: December 2, 2021
Subject to Renewal: January 1, 2025

FBC Supplement to Report Number: 2009-02

REPORT HOLDER: Strongwell

1 Evaluation Subject

1.1 STRONGIRT® and STRONGIRT® ULTRA

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show STRONGIRT® and STRONGIRT® ULTRA, recognized in Report Number: 2009-02 have also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

2.2.1 *FBC-B—20, 23: Florida Building Code – Building*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential*

3 Conclusions

3.1 STRONGIRT® and STRONGIRT® ULTRA, described in Report Number: 2009-02, complies with the FBC-B and FBC-R, and are subject to the conditions of use described in this supplement.

3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this TER, they are listed here:

3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.

3.2.2 FBC-R Section R104 and Section R109 are reserved.

4 Conditions of Use

4.1 STRONGIRT® and STRONGIRT® ULTRA, described in Report Number: 2009-02, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number: 2009-02.

4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.

Notes

[i] For more information, visit drjcertification.org or call us at 608-310-6748.

[ii] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

[iii] Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

[iv] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

[v] The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

[vi] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

[vii] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[viii] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

[ix] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

[x] https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

[xi] https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

[xii] https://www.cbitest.com/accreditation/

[xiii] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

[xiv] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

[xv] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

[xvi] https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

[xvii] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[xviii] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

[xix] Unless otherwise noted, all references in this report are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

[xx] All references to the FBC-B are the same as the 2021 IBC, respectively, unless otherwise noted in the supplement at the end of this document.

[xxi] All references to the FBC-R are the same as the 2021 IRC, respectively, unless otherwise noted in the supplement at the end of this document.

[xxii] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

[xxiii] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

[xxiv] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[xxv] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[xxvi] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

[xxvii] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

[xxviii] 2018 IFC Section 104.9

[xxix] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[xxx] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

[xxxi] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[xxxii] http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

[xxxiii] https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

[xxxiv] https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

[xxxv] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

[xxxvi] IBC 2021, Section 1706.1 Conformance to Standards

[xxxvii] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

[xxxviii] See Section **11.6** for the distilled building code definition of **Approved**.

[xxxix] Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

[xl] https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

[xli] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

[xlii] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

[xliii] https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

[xliv] https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

[xlv] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

[xlvi] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[xlvii] IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

[xlviii] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

[xlix] https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

[l] IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

[li] https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

[lii] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[liii] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission