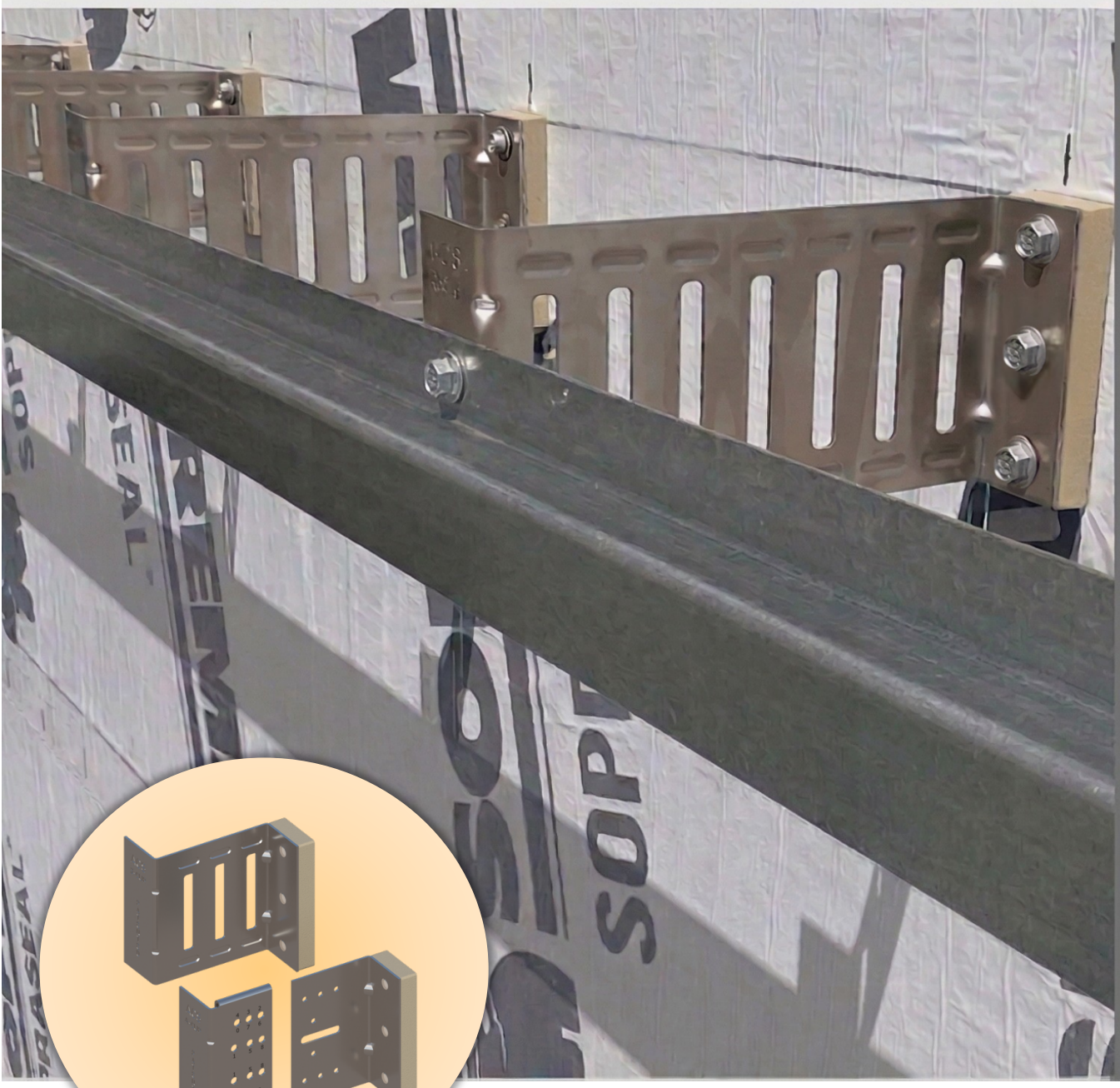
STRUCTURAL DESIGN GUIDE

ACS A-Clip® | ACS S-Clip®

COMPLÉMENTS
ACCESSORY PRODUCTS



SOPREMA

ACS
Composite Systems Inc.

INTRODUCTION

This structural design guide is intended to aid with properly specifying the attachment and spacing of the patented ACS Thermal Clips for supporting exterior cladding assemblies and is to be used in conjunction with Morrison Hershfield's (MH) thermal analysis reports or SOPREMA'S BUILD BETTER guide for energy-related objectives in building codes.

The ACS Thermal clips are stainless steel z-clips that are components of a combination exterior thermal break and may be used in rain-screen cladding systems. The clips are typically attached via self-drilling/self-tapping screws through exterior drywall to exterior steel stud framing and have an ACS Thermal Pad™ thermal break between the clip and the drywall. Other applications may include attaching the clips to wood framing, to concrete construction, or to structural steel framing.

Typically, the outstanding leg of the clip would support a continuous z-girt spanning either vertically or horizontally between clips; this continuous z-girt would receive the specified cladding product.

The ACS A-Clip is designed to be adjustable, allowing the installer to create an accurate plane for receiving the specified cladding. Most cladding systems have little tolerance for uneven support, requiring either very accurate structural framing, or extensive shimming by the cladding contractor. With the A-Clip, after attaching the inner leg to the building, the outer leg is slid over the inner leg, to the desired plane, and then fixed by installing two screws through both the inner and outer webs.

The ACS S-Clip is a fixed (non-adjustable) z-clip thermally similar to the A-Clip but may be used where construction tolerances are small enough in the wall plane to not be an issue for the proposed cladding assembly.

STRUCTURAL CONCEPT

Structurally, the clips resist gravity load (cladding assembly self-weight), and transverse loads (wind/seismic). Clip length, spacing, and attachment to the substructure is determined based on the combination of thermal and structural requirements of the assembly.

Gravity load creates both a rotational force and a direct shear in each clip, while wind/seismic forces create a direct tension (or compression) force through each clip. The gravity rotational force is resisted by screw tension in the upper attachment screw and the lower compression region of the clip for the rotational force, and by both screws in direct shear/bearing in the case of direct shear, while wind/seismic forces are resisted by direct screw tension.

While the ACS Thermal Pad™ thermal break between the z-clip and the structure is a minimally compressive material when correctly installed, the overall system installation guidelines have been limited by permissible strain in the ACS Thermal Pad™/clip rotation. Clip spacing is also limited by attachment screw capacity, steel clip capacity, and A-Clip/U-Clip adjustment termination screw capacity (see below for full definitions). These values were calculated and subsequently verified by an independent testing lab with the following tests:

Independent Testing (Test reports available for download from ACS site):

- ICC-ES AC359, *Acceptance Criteria for Exterior Wall Coverings of Steel-Backed Veneer Panels Attached to Walls Utilizing Steel Framing and Brackets,* Approved October 2008 – Section 3.8.2 *Gravity Loads*

- ASTM E330/E330M-14, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

- *6 in. and 10 in. ACS Thermal Clips – Stress-Strain Load Testing to Failure*. Intertek Test Report dated 2024 01 22

The following structural design information is provided as a convenience for the user to determine the general suitability of the clips as part of an overall cladding system. Fastener values are based on one manufacturer's test data and are representative of that manufacturer's fasteners, steel section used, and test apparatus. These values may not be applicable for other screw manufacturers, or to different structural support members.

Due to the number of variables inherent in the design of exterior cladding, structural review of cladding installations is required on any project. These variables include, but are not limited to, building height, building exposure, design wind pressure, cladding weight, cladding flexibility/brittleness, cladding fastening requirements, cladding assembly depth, substructure construction tolerances, and substructure material type. As a result of the large number of variables involved with cladding design, a project structural engineer (independent of ACS) is required to review and provide the necessary design/assurance that the overall system is structurally acceptable.

Additionally, cladding which is inherently prone to cracking such as stucco or some types of stone veneer, may require more onerous structural constraints or safety factors over and above those indicated here to reduce the probability of cracking during the design life of the wall assembly.

RECOMMENDED CLIP SPACING

Tabulated spacing indicated is based on least of:

- Maximum 1/8" (3.2 mm) deflection due to cladding gravity load (equivalent to 20 lbs of cladding weight on nominal 11" wall assembly depth)
- ASD screw pullout/tension, shear/bearing, and combined tension/shear interaction (FS = 3)
- For adjustable (A-Clip): adjustment screws (2 - #12-14 x ¾" TEKS, Vallow = 2 x 184 = 368 lbs)
- Other limiting conditions such as, but not limited to: sub-structure girt strength/deflection, cladding span/connections to sub-girt assembly, and all load-path screw connections.

Charts Represent Wall Assembly Depth, which is defined as the distance from face of support wall/contact of ACS U-Clip to Center of Gravity (C.O.G.) of cladding *(*cladding C.O.G. is Typically ½ cladding product depth).

Wall Assembly Depth = [Clip Depth] + [Sub-Girt(s) Depth] + [Outer Girt to Cladding C.O.G.]

Example:

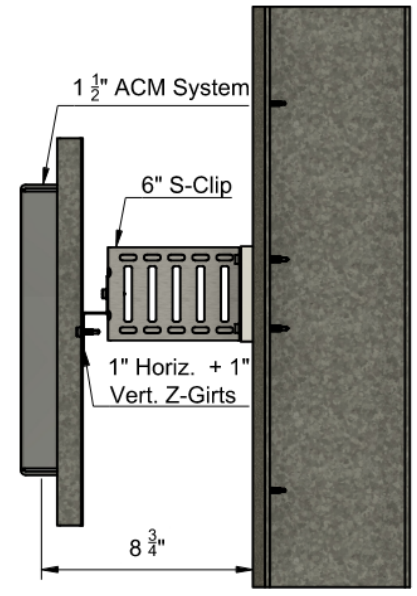
6" ACS Thermal Clip

2x – 1" z-girts (vertical & horizontal girts)

1 ½" Composite Panel System

Total Wall Assembly Depth = (6") + (2 x 1") + (0.5 x 1 ½") = 8 ¾"

Use 9" Wall Assembly Chart



LOAD TABLES

Concrete
2x Simpson TITEN®

Steel Stud
18ga - **2x** ACS-HWH MD2
20ga - **3x** ACS-HWH MD2

STEEL STUD/CONCRETE WALL SUBSTRUCTURE

(Up to 40psf Specified Wind)

The tables below for up to 40 psf wind load require the following:

- Assemblies to 18-Gauge Studs require 2 – ¼"-14 (#2 drill point) screws, installed in the outermost holes in the clip flange, omitting the center hole screw
- Assemblies to 20-Gauge Studs require 3 – ¼"-14 (#2 drill point) screws
- Assemblies to Concrete Walls require or 2 – ¼" TITEN® concrete screws, installed in the outermost holes in the clip flange, omitting the center hole screw
- Attachment to 18-ga. or 20 ga. steel studs – screw length must penetrate beyond the metal structure a minimum of 3 pitches of thread
- Attachment to 4000 psi (28 MPa) concrete – based on Simpson Strong-Tie TITEN® Stainless Steel Screws, ¼" dia. x min. 1 ½" embed - typically require 2 ¼" (or longer) fasteners

12" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	43	29	
5	41	27	38	26	
6	34	23	34	23	
7	29	19	29	19	
8	25	17	25	17	
10	20	14	20	14	
15	14	9	14	9	

10" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	48	32	
5	48	32	43	28	
6	41	27	38	26	
7	35	23	35	23	
8	30	20	30	20	
10	24	16	24	16	
15	16	11	16	11	

Steel Stud/Concrete Wall Substructure - Up to 40 psf Specified Wind

9" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	48	32	
5	48	32	45	30	
6	45	30	41	27	
7	39	26	37	25	
8	34	23	34	23	
10	27	18	27	18	
15	18	12	18	12	

8" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	48	32	
5	48	32	48	32	
6	48	32	43	29	
7	43	29	40	27	
8	38	25	37	25	
10	30	20	30	20	
15	20	14	20	14	

7" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	48	32	
5	48	32	48	32	
6	48	32	46	31	
7	48	32	43	29	
8	43	29	40	27	
10	35	23	35	23	
15	23	15	23	15	

Steel Stud/Concrete Wall Substructure - Up to 40 psf Specified Wind

6" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		Vertical Clip Spacing (inches)
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	
4	48	32	48	32	
5	48	32	48	32	
6	48	32	48	32	
7	48	32	46	31	
8	48	32	43	29	
10	41	27	38	26	
15	27	18	27	18	

5" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		Vertical Clip Spacing (inches)
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	
4	48	32	48	32	
5	48	32	48	32	
6	48	32	48	32	
7	48	32	48	32	
8	48	32	48	32	
10	48	32	43	28	
15	32	22	32	22	

4" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		Vertical Clip Spacing (inches)
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	
4	48	32	48	32	
5	48	32	48	32	
6	48	32	48	32	
7	48	32	48	32	
8	48	32	48	32	
10	48	32	48	32	
15	41	27	38	26	

Steel Stud/Concrete Wall Substructure - Up to 40 psf Specified Wind

3" Wall Assembly

Cladding Weight (psf)	18 Ga. Steel Studs/Concrete (2 Screws)		20 Ga. Steel Studs (3 Screws)		
	16" Horizontal	24" Horizontal	16" Horizontal	24" Horizontal	
3	48	32	48	32	Vertical Clip Spacing (inches)
4	48	32	48	32	
5	48	32	48	32	
6	48	32	47	32	
7	48	32	46	30	
8	48	32	44	29	
10	48	32	41	28	
15	48	32	36	24	

Vertical Z-Girt Detail

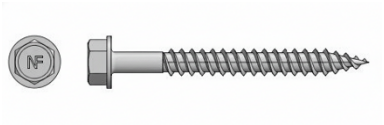
Horizontal Z-Girt Detail

WOOD STUD SUBSTRUCTURE

(Up to 40 psf Specified Wind)

Attachment Spacing (HORIZONTAL x VERTICAL) of ACS U-Clips based on:

- Up to 40 psf specified wind
- All assemblies require **3x** *ACS-MT screws (#14-10 x 2 ½" Hex Washer Head Carbon Steel NZF 3000 Leland Master Gripper®)* with at least 1 ½" penetration into studs.
- Installation should be as per manufacturer's recommendations for installation.
- Wood species (DF/SPF) attachments have the same spacing, with most assemblies being deflection limited, not fastener capacity limited.



Wood Stud
3x
ACS-MT

12" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	41	27	
6	34	23	
7	29	19	
8	25	17	
10	20	14	
15	14	9	

10" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	48	32	
6	41	27	
7	35	23	
8	30	20	
10	24	16	
15	16	11	

Wood Stud Substructure – up to 40 psf Specified Wind

9" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	48	32	
6	45	30	
7	39	26	
8	34	23	
10	27	18	
15	18	12	

8" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	48	32	
6	48	32	
7	43	29	
8	38	25	
10	30	20	
15	20	14	

7" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	48	32	
6	48	32	
7	48	32	
8	43	29	
10	35	23	
15	23	15	

Wood Stud Substructure – up to 40 psf Specified Wind

6" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	
3	48	32	Vertical Clip Spacing (inches)
4	48	32	
5	48	32	
6	48	32	
7	48	32	
8	48	32	
10	41	27	
15	27	18	

5" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	
3	48	32	Vertical Clip Spacing (inches)
4	48	32	
5	48	32	
6	48	32	
7	48	32	
8	48	32	
10	48	32	
15	32	22	

4" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	
3	48	32	Vertical Clip Spacing (inches)
4	48	32	
5	48	32	
6	48	32	
7	48	32	
8	48	32	
10	48	32	
15	41	27	

Wood Stud Substructure – up to 40 psf Specified Wind

3" Wall Assembly

Cladding Weight (psf)	Douglas Fir (DF) / Spruce-Pine-Fir (SPF)		
	16" (Horizontal)	24" (Horizontal)	Vertical Clip Spacing (inches)
3	48	32	
4	48	32	
5	48	32	
6	48	32	
7	48	32	
8	48	32	
10	48	32	
15	48	32	

Vertical Z-Girt Detail

Horizontal Z-Girt Detail

FASTENER DATA

STEEL STUD SUPPORT SCREWS

ACS-HWH MD2 *(¼" x 2 ½" Hex Washer Head #2 Drill Point Carbon Steel NZF 3000 Leland Master Driller®)*			
Stud Gauge	**20**	**18**	**16**
Nominal Thickness (in)	0.0346	0.0451	0.0566
Allowable Tensile (lbs)	133	211	285
Ultimate Shear (lbs)	930	1442	2100
Allowable Shear (lbs)	271	403	566

Note: Shear & Tension values have been limited to:

1) Manufacturer Test Values to CSA S136/AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members K2.1.2. Tests for Special Cases with Calculated Safety Factors, or
2) CSA S136/AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members, J4.3 Shear and J4.4 Tension in Screw Connections with FS=3

Fastener installation to meet the requirements of the Manufacturer & the referenced Code(s)

CONCRETE WALL SUPPORT SCREWS

SIMPSON Strong-Tie TITEN® 410 Stainless Steel *(¼" x 2 ¼" Hex Washer Head Simpson TITEN® TTN25214HSS 410 S/S)*		
1 ½" EMBEDMENT		
Concrete Strength (psi)	**2500**	**4000**
Concrete Tensile Capacity (lbs)	1040	1760
Allowable Tension (lbs)	260	440
Concrete Shear Capacity (lbs)	810	810
Allowable Shear (lbs)	200	200

Only applicable for attachment to concrete walls.

NOT for CMU Block Walls

Note: Based on 2023 Simpson Strong-Tie Anchoring, Fastening, Restoration and Strengthening Systems for Concrete & Masonry, Uncracked Concrete, Non-Seismic Design, No Supplementary Reinforcement, Greater Than Critical Edge Distance/Spacing

WOOD STUD SUPPORT SCREWS

ACS-MT (#14-10 x 2 ½" Hex Washer Head Carbon Steel NZF 3000 Leland Master Gripper®)	
1 ½" EMBEDMENT	
Wood Species	SPF / DF
Allowable Tension (lbs)	232
Allowable Shear (lbs)	304

Note: Tension & Shear values are calculated based on Manufacturer Test Data to CSA S136/AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members K2.1.2. Tests for Special Cases with Calculated Safety Factors

Fastener installation to meet the requirements of the Manufacturer & CSA O86 Engineering Design in Wood

KOLOT STRUCTURAL ENGINEERING LTD.

09 April 2026

ACS Composite Systems Inc.
35 – 7450 Butler Road
Sooke, BC V9Z 1N1

Dear ACS Composite Systems-

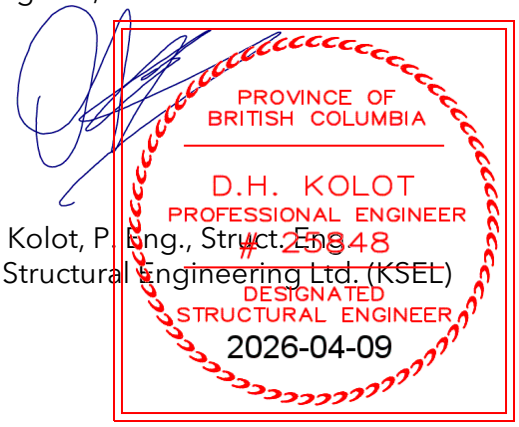
KSEL is pleased to provide the attached ACS Structural Design Guide. This document relates to the ACS Thermal Clips (A-Clips & S-Clips) installed on steel stud walls, concrete walls, and wood stud walls.

The thermal clip design has been based on a combination of analytical design, structural verification from an accredited third-party testing agency, as well as manufacturer data for fasteners for the above-mentioned structural backup assemblies.

It should be noted that due to the complexity of cladding/sub-girt types, local/national building codes, wind/seismic loads due to building location, shape, and size, the design of the complete wall assembly is outside the scope of this structural manual. Each project generally requires a cladding specialty engineer (structural engineer) independent of ACS and KSEL, competent in the design of cladding/wall assemblies, and registered in the region that the cladding assembly is to be installed.

ACS Thermal Clips must be installed in accordance with this Structural Design Guide and any amendments hereto. Failure to do so could lead to failure of the clips and/or damage to or loss of support of the cladding and, furthermore, would render void any warranty and liability of ACS or KSEL, including any liability for resulting loss, damage, or costs. Thus, it is very important for the installation to be carried out in accordance with the specifications and instructions herein and with reliance upon an independent project structural engineer as noted in the said Guide.

Best regards,



Doug Kolot, P. Eng., Struct. Eng.
Kolot Structural Engineering Ltd. (KSEL)