Purpose:

The S-5 Clamp listings in this bulletin are qualified as mechanical anchors "without consideration of frictional resistance produced by the effects of gravity" to standing seam metal roof systems as required per Section 13.4 of ASCE 7-16. They are not friction clips. The loads imposed on the S-5 Clamps will be transferred to the roof panels and their attachment. The criteria are established by TECSI's Technical Evaluation Report No. 001019, dated 6/8/2018.

Conditions of Approval:

1. Deviation of test results shall be as specified. As a minimum, a series of three identical tests shall be performed for each combination of variables that affect the performance of the screw or connection, as applicable, provided deviation of any individual test result from the average value does not exceed ±15 percent. If such a deviation from the average value exceeds ±15 percent, more tests of the same kind shall be conducted until the deviation of any individual test result from the average value obtained from all the tests does not exceed ±15 percent, or until at least three additional tests have been conducted. No test results shall be eliminated unless a rationale for its exclusion can be given. The average value of all tests made shall be regarded as the ultimate load capacity for the series of the tests.

2. A mechanical anchor shall be as specified. "Any S-5 Clamp that has a maximum pull force in the normal to seam direction for a single setscrew greater than 2 x 438 lbs (876 lbs) can conservatively be defined as a mechanical device rather than a friction device."

3. Failure mode of clamps as tested shall not include:

   a. "Dis-engagement of the clamp from panel seam" in parallel testing with an "A" designation as specified in test report.

   b. "Separation of the clamp from the seam" in perpendicular testing with an "A" designation as specified in test report.

   Clamps with these failure modes shall be disqualified from this listing specific to the panel and clamp information.

4. Where a S-5 Mini type is not tested for parallel ultimate load, the ultimate load of this anchor shall be based on 50 percent of the S-5 Standard type of exact model.

5. Where a S-5 Standard type is not tested for perpendicular ultimate load, the ultimate

load of this anchor shall be based on 100 percent of the S-5 Mini type of exact model.

6. S-5 Clamp installation on a batten cap roofing panel shall not qualify as a mechanical connection. See Figure A.

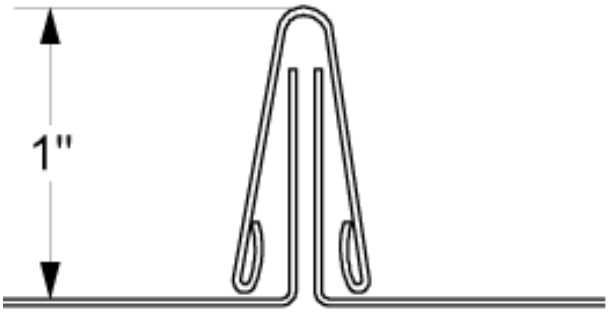

Figure A
Batten Cap Roofing Panel Example

Design Requirements:

1. Anchor capacities are derived from the ultimate load capacities of Table A with a safety factor of 4. These ultimate load capacities are based on test results of a specific anchor type on a specific metal roof (manufacturer, profile, and gauge). The computed anchor capacities shall be compared with allowable stress design per Section 2.4 of ASCE7-16. The demand/capacity ratio shall be equal to or less than 1.

2. The components of solar panel array (rails, clips, fasteners, etc.) and its attachment to the metal roof shall be detailed on the plans and structural calculations provided for justification. Product information of S-5 Clamp (type, model number, etc.) and required installation torque (Table B) shall be specified on the plans along with standing seam metal roof panel information.

3. Note on plans that "periodic special inspection of clamp installation per torque requirement of Table B by a Los Angeles County registered special inspector certified in the field of structural steel bolting and welding is required."

4. S-5 Clamp application is limited to a maximum roof slope of 12:12 since anchors are not intended for vertical installation and therefore, should never be relied upon to sustain 100 percent of gravity loads.

5. The overall performance of the roof structure shall be verified by a registered design professional to conform with the Building Code.

Table A
Ultimate Load Capacity

Panel Information	Clamp Information	Parallel Ultimate Load (lbs)	Parallel Test Report	Perpendicular Ultimate Load (lbs)	Perpendicular Test Report
A.B. Martin, AB Seam, 24ga Steel	S-5-S (115 in. lbs./ 13 n.m.)	1679	17E0510-2	1195 [3]	2006-083
ASC Building Products, Skyline, 26 ga	S-5-N	1155	1406099-1	716 [1]	
ASC Building Products, Skyline, 26 ga	S-5-N Mini	578 [2]		716 [3]	3110354-3
ASC Building Products, Span Lok Hp 22ga Steel	S-5-U	1813 [3]	0806-00085-2	3092 [1]	-
ASC Building Products, Span Lok Hp 22ga Steel	S-5-U Mini 6061 T6 Al (115 in. lbs./ 13 n.m.)	906 [2]	-	3092	0812-00302-2
Berridge, Berridge Cee-Lock, 24 ga Steel	S-5-Z Mini (115 in. lbs./13 n.m.)	1280	2112-012-Rev1	964	2112-012-Rev1
Delta, Mechanical Lock (Single Fold), 0.019" Steel	S-5-S, 6061 T6 Al (115 in lbs./ 13 n.m.) Fab #S08-A-0-C	1202	1511050 - 6	875 [1]	1511050 - 6
Delta, Mechanical Lock (Single Fold), 0.019" Steel	S-5-S Mini, 6061 T6 Al (115 in lbs./ 13 n.m.) Fab #S08-A-0-C	601 [2]	1511050 - 6	875	1511050 - 6
McElroy Metal, Inc. 2" Maxima (Single Fold), 22 ga Steel	S-5-U, 6061 T6 Al (150 in. lbs./17 n.m.) Fab #U11-A-0-A	1567	1012-00254	1502 [1]	--
McElroy Metal, Inc. 2" Maxima (Single Fold), 22 ga Steel	S-5-U Mini, 6061 T6 Al (150 in. lbs./17 n.m.) Fab #U11-A-1-A	784 [2]	--	1502	1010-00071-2
McElroy Metal, Inc. 2" Maxima (Single Fold), 24 ga Steel	S-5-U, 6061 T6 Al (115 in. lbs./13 n.m.) Fab #U11-A-0-A	1312	1012-00254	2174[1]	
McElroy Metal, Inc. 2" Maxima	S-5-U Mini, 6061 T6 Al (115 in.	656[2]		2174	1012-00254

(Single Fold), 24 ga Steel	lbs./13 n.m.) Fab #U11-A-1-A				
Metal Sales, Image II, 24 ga steel	S-5-N Mini (115 in. lbs./13 n.m.) Fab #NG73-A-1-A, #NG73-A-0-A	1064	2103-313	1577	MET-071019-1 RP1
Metal Sales, Vertical Seam, 22 ga steel	S-5-S (150 in lb / 17 Nm)	2073 [3]	17L0103-1	1570 [3]	17L0103-1
Metal Sales, Vertical Seam, 22 ga steel	S-5-S Mini (150 in lb / 17 Nm)	1593	17L0103-1	1232	17L0103-1
Morin, SLR, 22 ga Steel	S-5-U Mini	1251	--	2682	3110354-6
Morin, SLR 24 ga steel	S-5-U Mini	982	--	1896	3110354-6
Morin, SWL 22 ga steel	S-5-S Mini	1154	--	1465	3110354-6
Morin, SLR, 22 ga Steel	S-5-U	2501	1406099-6	2682	--
Morin, SLR 24 ga steel	S-5-U	1964	1406099-6	1896	--
Morin, SWL 22 ga steel	S-5-S	2308	1406099-6	1465	--

Note:

1. Perpendicular ultimate load is derived from S-5 Mini load tests per item #5 of Conditions of Approval
2. Parallel ultimate load based is derived from S-5 Standard load tests per item #4 of Conditions of Approval
3. Deviation from the average value exceeds ±15 percent per item #1 of Conditions of Approval. Use lowest tested ultimate load capacity, not average for design.

Inspection Requirements:

1. Collect special inspection report for S-5 Clamp installation.

2. Clamp installation shall be torqued in accordance with Table B.

Table B
Required Clamp Torque Force

Specified Torque	Inch Pounds	Foot Pounds	Nm
22ga steel	160–180	13–15	18–20
All other metals and thinner gauges of steel	130–150	11–12.5	15–17

Supersedes RB12 dated 12-09-21