

SECTION 07 72 53

SNOW GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Snow guards for metal roofs.
 - 2. [Non-penetrating] [Face fastened] attachment system.

1.2 RELATED SECTIONS

- A. Division 01: Administrative, procedural, and temporary work requirements apply to this section.
- B. Section 07 41 13 - Metal Roof Panels
- C. Section 07 61 00 - Sheet Metal Roofing
- D. Section 07 62 00 – Sheet Metal Flashing and Trim
- E. Section 07 72 55 - Roof Accessory Attachment System.
- F. Section 13 34 19 – Metal Building Systems

1.3 REFERENCES

- A. Aluminum Association (AA) - Aluminum Standards and Data, 2003 Edition.
- B. ASTM International (ASTM):
 - 1. A484/A484M-16 – Standard Specifications for General Requirements for Stainless Steel Bars, Billets, and Forgings.
 - 2. A554-16 – Standard Specification for Welded Stainless Steel Mechanical Tubing
 - 3. A555/A555M-16 – Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods
 - 4. B85-03 - Standard Specification for Aluminum-Alloy Die Castings.
 - 5. B221-04a - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 6. F836M-02 (2015) – Standard Specification for Style 1 Stainless Steel Metric Nuts (Metric).
 - 7. F880-12 – Standard Specification for Stainless Steel Socket, Square Head, and Slotted Headless-Set Screws

1.4 SUBMITTALS

- A. Action Submittal:
 - 1. Shop Drawings: Include roof plans showing locations of snow guards on roof and attachment details and spacing, signed and sealed by a professional engineer.
 - 2. Product Data:
 - a. Product description.
 - b. Construction details.
 - c. Material descriptions.
 - d. Individual component dimensions.
 - e. Finishes.

- f. Installation instructions.
- 3. Samples:
 - a. Clamp samples.
 - b. 12-inch long cross member samples including all associated hardware.
- B. Informational Submittals:
 - 1. Include calculation of number and location of snow guards based on designed roof snow load, roof slope, roof type, components, spacings and finish.
 - 2. Test results: Results of product tensile load testing, issued by a recognized independent testing laboratory, showing ultimate load-to-failure value of attachment.
- C. Closeout Submittals:
 - 1. Certification: Installer's certification that snow guard system was installed in accordance with manufacturer's instructions and approved Shop Drawings.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer to specialize in production of Snow Guard Products of the type specified with a minimum of 20 years documented experience.
- B. Installer Qualifications: Installer to specialize in metal roof installation and installation of Snow Guard Products with a minimum of 5 years documented experience.
- C. Mockup:
 - 1. Size: Minimum [8] [___] feet long.
 - 2. Show: Snow guard attachment, cross members, and accessories.
 - 3. Locate [where directed.] [____.]
 - 4. Approved mockup may remain as part of the Work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver components to jobsite properly packaged to provide protection during transport, delivery and handling.
- B. Store products in manufacturer's original labeled and unopened packaging in a clean and dry location, protected from potential damage, until ready for application.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Attachment system to provide attachment to standing seam metal roofs:
 - 1. With only minor dimpling of panel seams.
 - 2. Without penetrations through roof seams or panels.
 - 3. Without use of sealers or adhesives.
 - 4. Without voiding roof warranty.
- B. Performance Requirements: Provide snow guards to withstand exposure to the weather and environmental elements, and resist design forces without failure due to defective manufacture.
 - 1. Loading: Design snow guard system to resist minimum in-service vector load of [___] pounds per linear foot of eave.
 - 2. Factor of safety: Utilize a factor of safety \geq [2] [____] to determine allowable loads from ultimate tested clamp tensile load values.
 - 3. Source Limitation: Provide snow guard system as designed and tested by the manufacturer as a complete system. Install components by the same manufacturer.

2.2 MANUFACTURER

- A. Acceptable Manufacturer: S-5! Metal Roof Innovations, Ltd., 8655 Table Butte Road, Colorado Springs, CO. 80908; Tel: 888-825-3432; Fax: 719-495-0045; Email: support@s-5.com; Web: www.s-5.com
- B. Substitutions: Not permitted.

2.3 BAR/RAIL-TYPE SNOW RETENTION SYSTEMS FOR STANDING SEAM METAL ROOFS

- A. Basis of Design: ColorGard, manufactured by S-5! Metal Roof Innovations, Ltd.
- B. Components:
 - 1. Clamps
 - a. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
 - 1) Model: No. [S-5-U.] [S-5-S.] [S-5-T.] [S-5-Z.] [S-5-E.] [S-5-B.] [S-5-Q.] [S-5-H.] [S-5-K700.] [S-5-H90.] [S-5-N.] [S-5-N 1.5.] [S-5-KHD.] [S-5-V.] [S-5-K Grip.] [S-5-R465.]
 - b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.
 - c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm diameter, hex flange bolt.
 - 2. Brackets:
 - a. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - 1) Model: No. [VersaBracket 47.] [VersaBracket 67.] [CorruBracket.].
 - b. Screws for attachment of brackets to roof: Type best suited to application: Metal to metal applications: 1/4-14 self drilling point, 2 inch (50.8 mm) length, 3/8 inch (9.525 mm) hex washer head, Zinc/Aluminum cap. Metal to wood applications: 1/4-14 type 17 AB milled point, 2 inch (50.8 mm) length, 3/8 inch (9.525 mm) hex washer head, Zinc/Aluminum cap.
 - 3. Cross Members:
 - a. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - b. Receptacle in face to receive color-matched metal strips.
 - c. Provide splice connectors ensuring alignment and structural continuity at end joints.
 - 4. Color Strips: Same material and finish as roof panels; obtained from roof panel manufacturer.
 - 5. Snow and Ice Clips:
 - a. Aluminum, with rubber foot, minimum 3 inches (76.2 mm) wide.
 - 1) Model: SnoClip II or SnapClip II for standing seam heights 1 inch (25.4mm) to 1.5 inch (38.1 mm).
 - 2) Model: SnoClip III or SnapClip III for standing seam heights 1.5 inch (38.1 mm) to 3.25 inch (82.55 mm).

2.4 1 INCH (25.4 MM) PIPE-TYPE SNOW RETENTION SYSTEMS FOR STANDING SEAM METAL ROOFS

Include the following for roofs using S-5! non-penetrating attachment clamps. Do not use S-5! Standard Clamps for the attachment of DualGard with the exception of the S-5-KHD.

- A. Basis of Design: DualGard, manufactured by S-5! Metal Roof Innovations, Ltd.
- B. Components:
 - 2. Clamps
 - a. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
 - 1) Model: No. [S-5-U Mini.] [S-5-S Mini.] [S-5-T Mini.] [S-5-Z Mini.] [S-5-E Mini.] [S-5-B Mini.] [S-5-Q Mini.] [S-5-H Mini.] [S-5-H90 Mini.] [S-5-N Mini.] [S-5-N 1.5 Mini.] [S-5-KHD.] [S-5-V Mini.] [S-5-K Grip Mini.] [S-5-R465 Mini.]
 - b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.

- c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm diameter, hex flange bolt.

2. Pipe Brackets:

- c. Manufactured from 5000 Series alloy and temper aluminum conforming to ASTM B221 and AA Aluminum Standards and Data.

3. Pipe Couplings (Splices):

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.

4. Pipes (Cross Members):

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - 1) Model: DualPipe

5. Pipe Collar:

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and data, with ¼-20 x 3/8 inch (9.525 mm) stainless steel set screw.
 - 1) Model: DualCollar

Snow and ice clips are required for standing seam roofs with seam heights of 2 inches (50.8 mm) or more and are optional for seam heights less than 2 inches (50.8 mm).

6. Snow and Ice Clips:

- a. Aluminum, with rubber foot, minimum 3 inches (76.2 mm) wide.
 - 1) Model: DualClip II for standing seam heights 1 inch (25.4 mm) to 1.5 inch (38.1 mm).
 - 2) Model: DualClip III for standing seam heights 1.75 inch (44.45 mm) to 3.25 inch (82.55 mm).

7. End Caps:

- a. Rubber or metal, black or color-matched.

2.5 2 INCH (50.8 MM) PIPE-TYPE SNOW RETENTION SYSTEMS FOR STANDING SEAM METAL ROOFS

A. Basis of Design: X-Gard 1.0 and 2.0, manufactured by S-5! Metal Roof Innovations, Ltd.

B. Components:

1. Clamps:

- a. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
 - 1) Model: No. [S-5-U.] [S-5-S.] [S-5-T.] [S-5-Z.] [S-5-E.] [S-5-B.] [S-5-Q.] [S-5-H.] [S-5-K700.] [S-5-H90.] [S-5-N.] [S-5-N 1.5.] [S-5-KHD.] [S-5-V.] [S-5-K Grip.] [S-5-R465.]
- b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.
- c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm diameter, hex flange bolt.

2. Pipe Brackets:

- a. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data or cast aluminum.
 - 1) Model: X-Gard Bracket 1.0 for single pipe cross member.
 - 2) Model: X-Gard Bracket 2.0 for double pipe cross member.

3. Pipes (Cross Members):

- b. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - 1) Model: NEX 2.0 Pipe, or
 - 2) Optional 1.9 inch (48.26 mm) Round Pipe.

4. Pipe Connector (Splice)

- a. Manufactured from 6000 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - 1) Model: NEX 2.0 Splice.

5. Ice and Snow Clips:

- a. Aluminum, minimum 3 inches (76.2 mm) wide.
 - 1) Model: X-Clip II for standing seam heights 1 inch (25.4 mm) to 1.5 inch (38.1 mm).
 - 2) Model: X-Clip III for standing seam heights 1.75 inch (38.1 mm) to 3.25 inch (82.55 mm).

2.5 FENCE-TYPE SNOW RETENTION SYSTEMS FOR STANDING SEAM METAL ROOFS

A. Basis of Design: SnoRail and SnoFence, manufactured by S-5! Metal Roof Innovations, Ltd.

1. Clamps:

- a. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
 - 1) Clamp model: No. S-5-A and S-5-AE.
 - 2) Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.

1. Clamps:

- b. Manufactured from red brass, Copper UNS Alloy No. C23000.
 - 1) Clamp model: No. S-5-B B and S-5-BE.
 - 2) Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch (9.525 mm) diameter, with round nose point.

2. Cross Members [and Posts]:

- a. Manufactured from Type 300 Series stainless steel conforming to ASTM A581/A581M or ASTM A 582.
- b. Provide coupler ensuring alignment and structural continuity at end joints.

2. Cross Members [and Posts]:

- c. Manufactured from brass 360 round rod, half hard temper conforming to ASTM B16.
- d. Provide coupler ensuring alignment and structural continuity at end joints.

3. Ice and Snow Clips:

- a. Aluminum, with rubber foot, minimum 3 inches (76.2 mm) wide.
 - 1) Model: SnoClip II for standing seam heights 1 inch (25.4 mm) to 1.5 inch (38.1 mm).
 - 2) Model: SnoClip III for standing seam heights 1.75 inch (38.1 mm) to 3.25 inch (82.55 mm).

2.6 PIPE-TYPE SNOW RETENTION SYSTEMS FOR EXPOSED FASTENED ROOFS

A. Basis of Design: VersaGard, manufactured by S-5! Metal Roof Innovations, Ltd.

1. Bracket:

- a. Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 and to AA Aluminum Standards and Data.
 - 1) Model: VersaGard.
- b. Screws for attachment of brackets to roof: Type best suited to application: Metal to metal applications: ¼-14 self drilling point, 2 inch (50.8 mm) length, 3/8 inch (9.525 mm) hex washer head, Zinc/Aluminum cap. Metal to wood applications: ¼-14 type 17 AB milled point, 2 inch (50.8 mm) length, 3/8 inch (9.525 mm) hex washer head, Zinc/Aluminum cap.

2. Pipes (Cross Members):

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.

1) Model: DualPipe

3. Pipe Couplings (Splices):

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.

4. Pipe Collar:

- a. Manufactured from 6005a-T61 Series alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and data, with ¼-20 x 3/8 inch (9.525 mm) stainless steel set screw.
 - 1) Model: DualCollar

4. Snow and Ice Clips:

- a. Aluminum, with rubber foot, minimum 3 inches (76.2 mm) wide.
 - 1) Model: DualClip II

5. End Caps:

- a. Rubber or metal, black or color-matched.

PART 3- EXECUTION

3.1 EXAMINATION

Prior to beginning installation, verify that:

1. Panel seaming is complete.
2. Panel attachment is sufficient to withstand loads applied by snow guard system.
3. Installation will not impeded roof drainage.

Prior to beginning installation, verify that:

1. Roof attachment is sufficient to withstand loads applied by snow guard system.
2. Installation will not impede roof drainage.

3.2 PREPARATION

- A. Clean areas to receive attachments; remove loose and foreign matter that could interfere with installation or performance.

3.3 INSTALLATION

- A. Install system in accordance with manufacturer's instructions and approved Shop Drawings.

- B. ColorGard Snow Retention System:

1. Place clamps at maximum 32 inches (812.6 mm) on center or as required by in-service loads.
2. Place clamps in straight, aligned rows using a string line.
3. Place both set screws on same side of clamp.
4. Tighten set screws to manufacturer's recommended torque. Test set screw torque using calibrated torque wrench.
5. Insert color-matched metal strips into cross members, staggering strips to cover cross member joints.
6. Attach cross members to clamps; tighten bolts to manufacturer's recommended torque.
7. Install splice connectors at cross member end joints.

8. Do not cantilever cross members more than 4 inches (101.6 mm) beyond last clamp at ends.
9. Install [one SnoClip or SnapClip] [two SnoClips or SnapClips] per panel between panel seams.
 - b. SnoClips: slide onto cross member before securing cross member to clamps
 - c. SnapClips: Secure [SnapClip II] [SnapClip III] to back side of cross member using stainless steel #10 x ½ inch (12.7 mm) screw

1. Place brackets at maximum 32 inches (812.6 mm) on center or as required by in-service loads.
2. Clean roof area to receive bracket. Remove protective seal on butyl tape
3. Place brackets in straight rows along underlying substrate using a string line.
4. Insert color-matched metal strips into cross members.
5. Place brackets at spot of attachment and fasten with screws best suited for type of attachment
6. Attach cross members to brackets using self drilling screws.
7. Install splice connectors at cross member end joints.
8. Do not cantilever cross members more than 4 inches (101.6 mm) beyond last bracket at ends.
9. Install SnoClips or SnapClips at spacings indicated on Shop Drawings.
 - d. SnoClips: slide onto cross member before securing cross member to clamps
 - e. SnapClips: Secure [SnapClip II] [SnapClip III] to back side of cross member using stainless steel #10 x ½ inch (12.7 mm) screw (provided).

C. DualGard Snow Retention System:

1. Pre-assemble one S-5! Mini clamp to each pipe bracket assuring the set screws are facing the correct side of the standing seam they will be applied to. Attach S-5! Mini clamps to pipe brackets on what will become the upslope side of the assembly. Hand tighten M8 bolt fastening S-5! Mini clamp to pipe bracket. Pre-load set screws into clamps.
2. Insert pipes into pre-assembled upslope pipe bracket and S-5! Mini clamp assemblies. Insert a pipe collar inside last bracket of either end of the run as pipe is inserted into brackets.
3. Place downslope clamps on standing seams at maximum 48 inches (1219 mm) on center or as required by in-service loads.
4. Place downslope clamps in straight, aligned rows using a string line.
5. Some clamps are directional. Reference installation instructions for the specific clamp used to assure they are oriented correctly.
6. Tighten downslope clamp set screws to manufacturers recommended torque. Test set screw torque using calibrated torque wrench.
7. Attach pre-assembled upslope row of S-5! Mini clamps with attached pipe brackets and pipes aligning with downslope clamps. Tighten M8 bolt to fasten pre-assembly on downslope clamps to recommended torque of 156 inch pounds (13 foot pounds) (17.63 Newton meters)

8. Tighten upslope clamp set screws to standing seams to manufacturers recommended torque. Test set screw torque using calibrated torque wrench. Then, tighten M8 bolt on upslope clamps to recommended torque of 156 inch pounds. (13 foot pounds) (17.63 Newton meters)
9. Install pipe coupling at adjoining pipe end joints. Insert coupling halfway into pipe that will be joined to next pipe in the run.
10. Cut extended end of pipe at end of run. Do not cantilever pipes more than 4 inches (101.6 mm) beyond last clamp and bracket at ends.
11. Apply end cap to each pipe.

Include the following when applicable. Use one DualClip per panel for panels up to and including 24 inch (609.9 mm) seam spacing and two per panel over 24 inches (609.6 mm).

12. Install [one DualClip] [two DualClips] per panel between panel seams.
 - a. DualClips: Secure [DualClip II] [DualClip III] to back side of cross member using stainless steel #10 x ½ inch (12.7 mm) screw.

D. X-Gard Snow Retention System:

1. Place clamps at maximum 48 inches (1219.2 mm) on center or as required by in-service loads.
2. Place clamps in straight, aligned rows using a string line.
3. Place both set screws on same side of clamp.
4. Tighten set screws to manufacturer's recommended torque. Test set screw torque using calibrated torque wrench.
5. Slide pipe cross member thru [X-Gard 1.0] [X-Gard 2.0].
6. Attach [X-Gard 1.0] [X-Gard 2.0] and cross members to clamps; tighten bolts to manufacturer's recommended torque.
7. Install splice connectors at pipe cross member end joints.
8. Do not cantilever cross members more than 4 inches (101.6 mm) beyond last clamp at ends.
9. Apply end cap to each pipe.
10. Install [one X-Clip III] [two X-Clip III] per panel between panel seams.
11. Secure [one X-Clip III] [two X-Clip III] to pipe using 12-14 x 7/8 inch (22.225 mm) stainless steel self drilling screw (provided).

E. SnoRail and SnoFence Snow Retention Systems

1. Place clamps at maximum 32 inches (812.8 mm) on center or as required by in-service loads.
2. Place clamps in straight, aligned rows.
3. Place both set screws on same side of clamp.
4. Tighten set screws to manufacturer's recommended torque. Test set screw torque using calibrated torque wrench.

5. Use [S-5-AE] [S-5-BE] clamps in lieu of standard clamp at each end of each assembly, and at a frequency and spacing of one for each 50 feet (15.25 m) of assembly.
6. Install SnoPosts vertically in each clamp. Use SnoPost E at all (above) “E” clamp locations.
7. Install cross members through holes in clamps and posts.
8. Install coupler at cross member end joints.
9. Tighten set screws against cross members at all “E” clamp and post locations.
10. Do not cantilever cross members more than 4 inches (101.6 mm) beyond last clamp at ends.

F. 11. Install [one SnoClip] [two SnoClips] per panel between panel seams.
VersaGard Snow Retention Systems

1. Place brackets at maximum 32 inches (812.8 mm) on center or as required by in-service loads.
2. Place brackets in straight, aligned rows using a string line.
3. Clean roof area to receive bracket. Remove protective seal on butyl tape.
4. Place brackets at spot of attachment and fasten with screws best suited for type of attachment.
5. Install pipes through holes in brackets. Insert a pipe collar inside last bracket of either end of the run as pipe is inserted into brackets.
6. Install pipe coupling at adjoining pipe end joints. Insert coupling halfway into pipe that will be joined to next pipe in the run.
7. Cut extended end of pipe at end of run. Do not cantilever pipes more than 4 inches (101.6 mm) beyond last bracket at ends.
8. Apply end cap to each pipe.

Include the following when applicable. Use one DualClip per panel for panels up to and including 24 inch (609.9 mm) seam spacing and two per panel over 24 inches (609.6 mm).

9. Install [one DualClip] [two DualClips] per panel between panel seams.
 - a. DualClips: Secure DualClip II to back side of pipe cross member using stainless steel #10 x ½ inch (12.7 mm) screw.

END OF SECTION