



STANDING SEAM METAL ROOFING

Presented by MBCI



Credit: 1 AIA LU/HSW

AIA course number: SSRLU2B





Credit earned on completion of this course will be reported to AIA CES for AIA members.

To receive a certificate of completion you must complete and pass the 10-question quiz following this presentation with an 80% or higher, then a certificate of completion will be available for immediate download.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

~~Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.~~

LEARNING OBJECTIVES

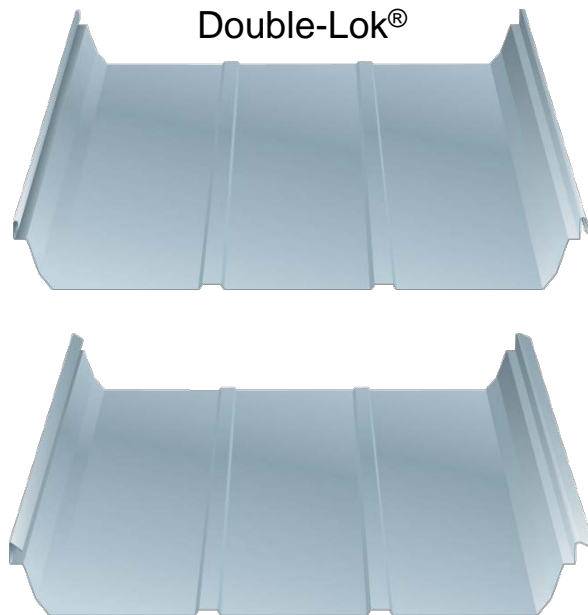
After this course, you should be able to:

1. Understand the differences in application parameters for various standing seam metal roofing systems.
2. Understand wind uplift testing as prescribed by Underwriters Laboratories and ASTM E1592.
3. Recognize complicated design details that should be carefully specified and reviewed when using metal roofing.
4. Comprehend available warranties and be able to select the appropriate one for a project.

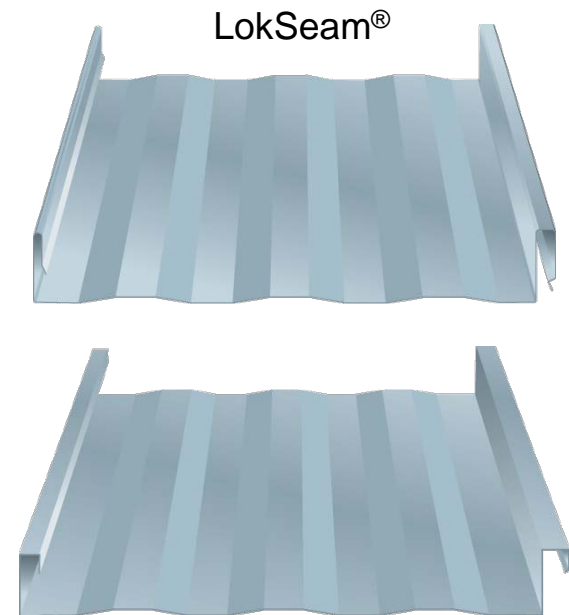
STANDING SEAM PROFILES

- Utilitarian or Architectural in Nature
- Numerous Widths and Profiles
- Varying Seam Joinery – Snap or Field Seamed

TRAPEZOIDAL RIB

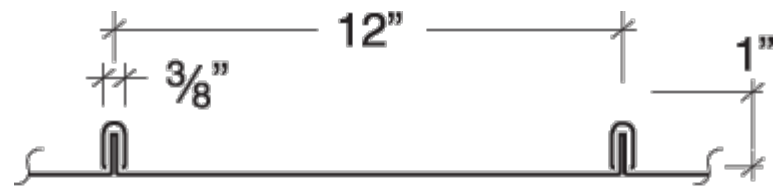
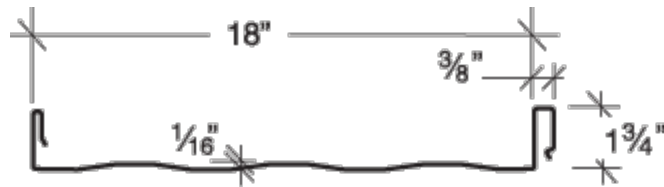


VERTICAL RIB



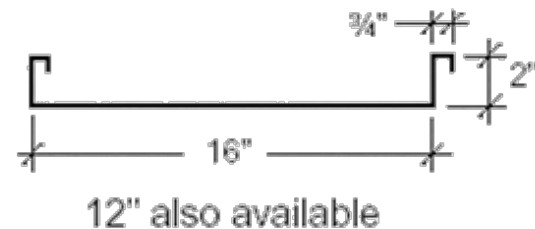
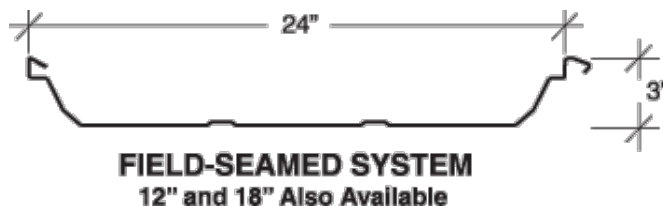
STANDING SEAM – WATER SHEDDING (HYDROKINETIC)

- Many different seam designs and panel widths
- Many, but not all, are architectural in nature
- Minimum roof pitch varies by panel and manufacturer
- Some systems are structural. Others may require a solid deck
- Some systems may require a waterproof underlayment
- Many systems lay flat to deck, causing inconsistencies in the deck to telegraph through the panels
- Always consult manufacturer for proper application parameters



STANDING SEAM – WATER BARRIER (HYDROSTATIC)

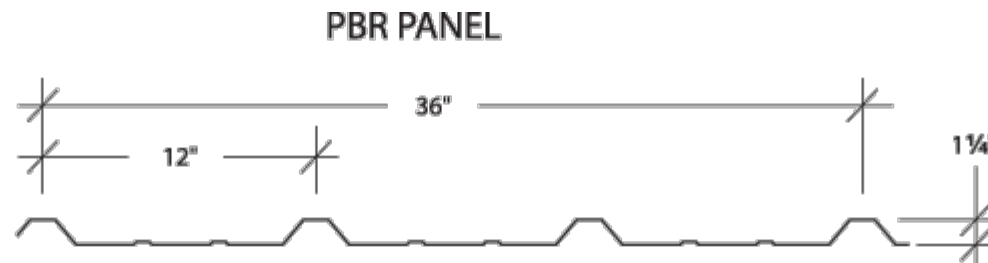
- Generally have structural capacity
- Often mechanically field seamed
- May provide greater wind uplift resistance
- Critical trim design
- Testing specified – ASTM E2140 or FM 4471, Appendix G



DESIGN & TESTING

Evolution of Panel Design

- Through-Fastened Panel Systems Designed From Section Properties (Panels Do Not Change Shape Under Load)



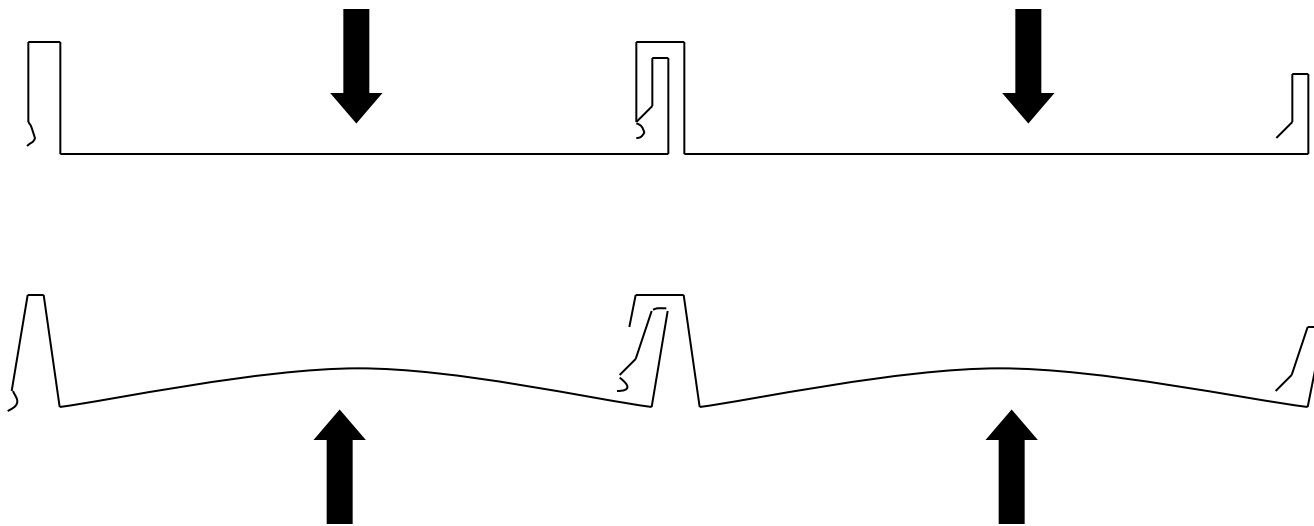
SECTION PROPERTIES								
PANEL GAUGE	F _y (KSI)	WEIGHT (PSF)	NEGATIVE BENDING			POSITIVE BENDING		
			I _{xe} (IN.4/FT.)	S _{xe} (IN.3/FT.)	Maxo (KIP-IN.)	I _{xe} (IN.4/FT.)	S _{xe} (IN.3/FT.)	Maxo (KIP-IN.)
29	60 *	0.75	0.0219	0.0357	1.2835	0.0242	0.0234	0.8423
26	60 *	0.94	0.0302	0.0511	1.8366	0.0369	0.0372	1.3373
24	50	1.14	0.0404	0.0733	2.1953	0.0506	0.0521	1.5594
22	50	1.44	0.0544	0.1042	3.1201	0.0709	0.0749	2.2427

* F_y is 80-ksi reduced to 60-ksi in accordance with the 2001 edition of the North American Specification For Design Of Cold-Formed Steel Structural Members - A2.3.2.

DESIGN & TESTING

Evolution of Panel Design

- Standing Seam Roof Systems Designed From ASTM E1592 Testing (Panels Change Shape Under Uplift)





DESIGN & TESTING

UL 580 Test (Class 30, 60 or 90)

- Includes deck/roof assembly – not just panels alone
- Test specimen allows for perimeter fastening
- Field or roof and product comparison test only
- Test does not simulate real conditions
- Test does not provide maximum load capability

DESIGN & TESTING

UL 580 Test Chamber



DESIGN & TESTING





DESIGN & TESTING

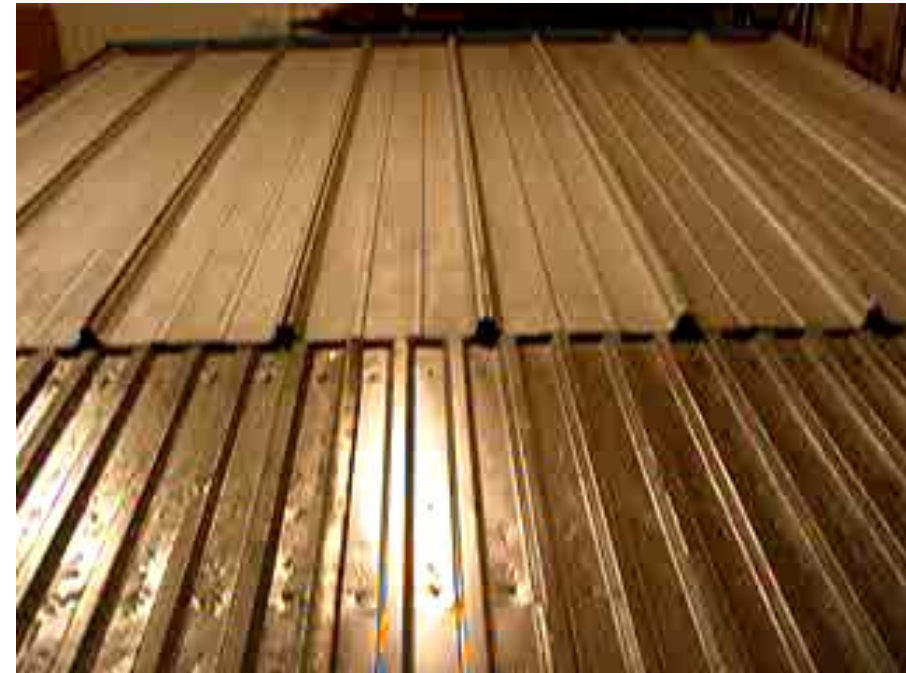
ASTM E-1592

- Panel Length Based on Number And Length of Clip Spacings
- Panel End(s) Fastened based on Panel Length
- Evaluates Panels and Clips, But Not Attachment to Substructure
- Tests to Ultimate Failure
- Safety factor is determined by number of tests performed

DESIGN & TESTING



DESIGN & TESTING

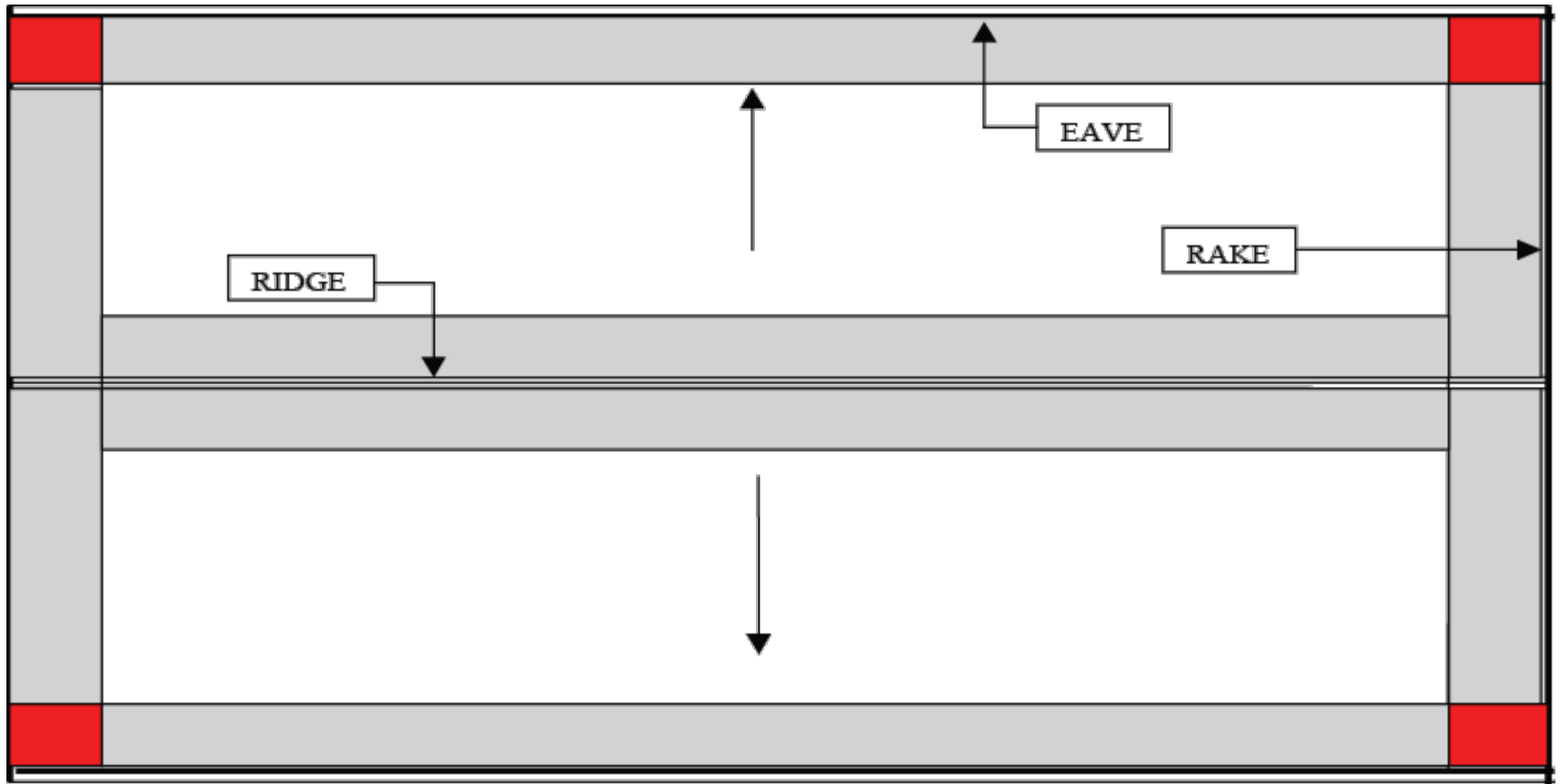


How the broad flat of the panels react to the applied uplift load



University of Florida testing of wind uplift

ROOF ZONING



ZONE I

ZONE II

ZONE III



SPECIAL DETAILS

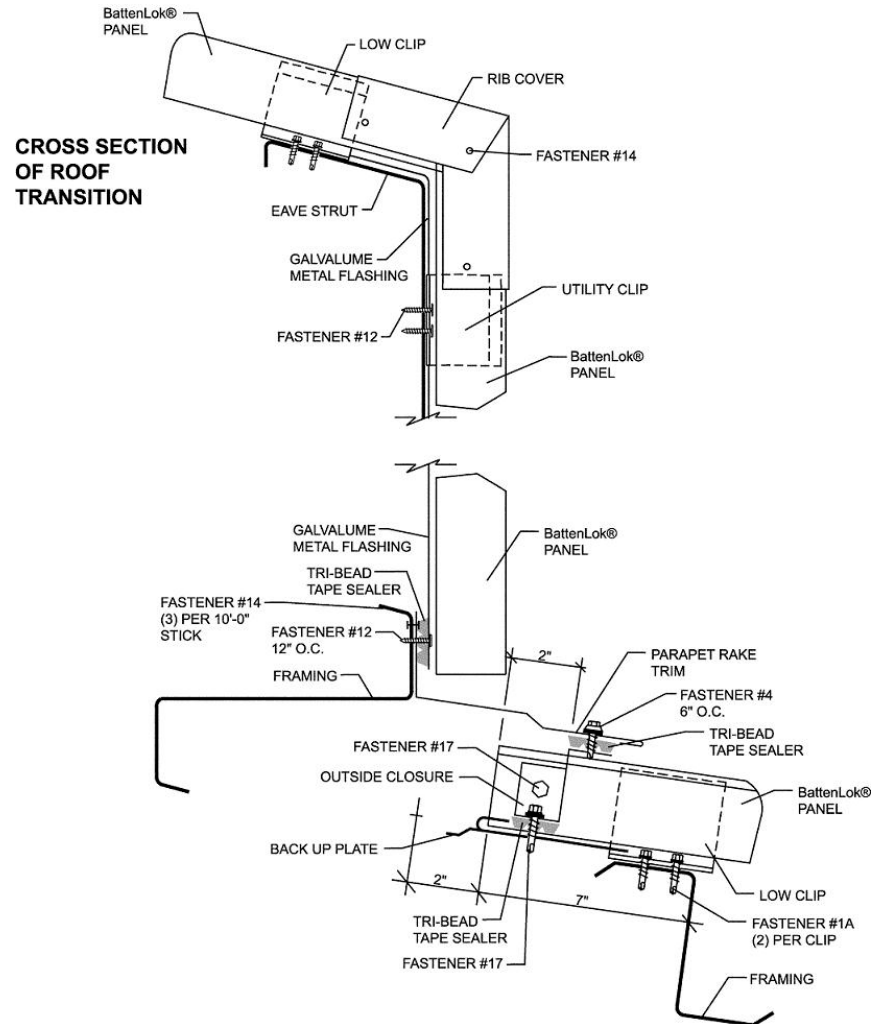
Design Conditions that Require Special Attention

- Roof Transitions
- Dead Valleys
- Dormers
- Eave Offsets
- Ridge Offsets
- Crickets

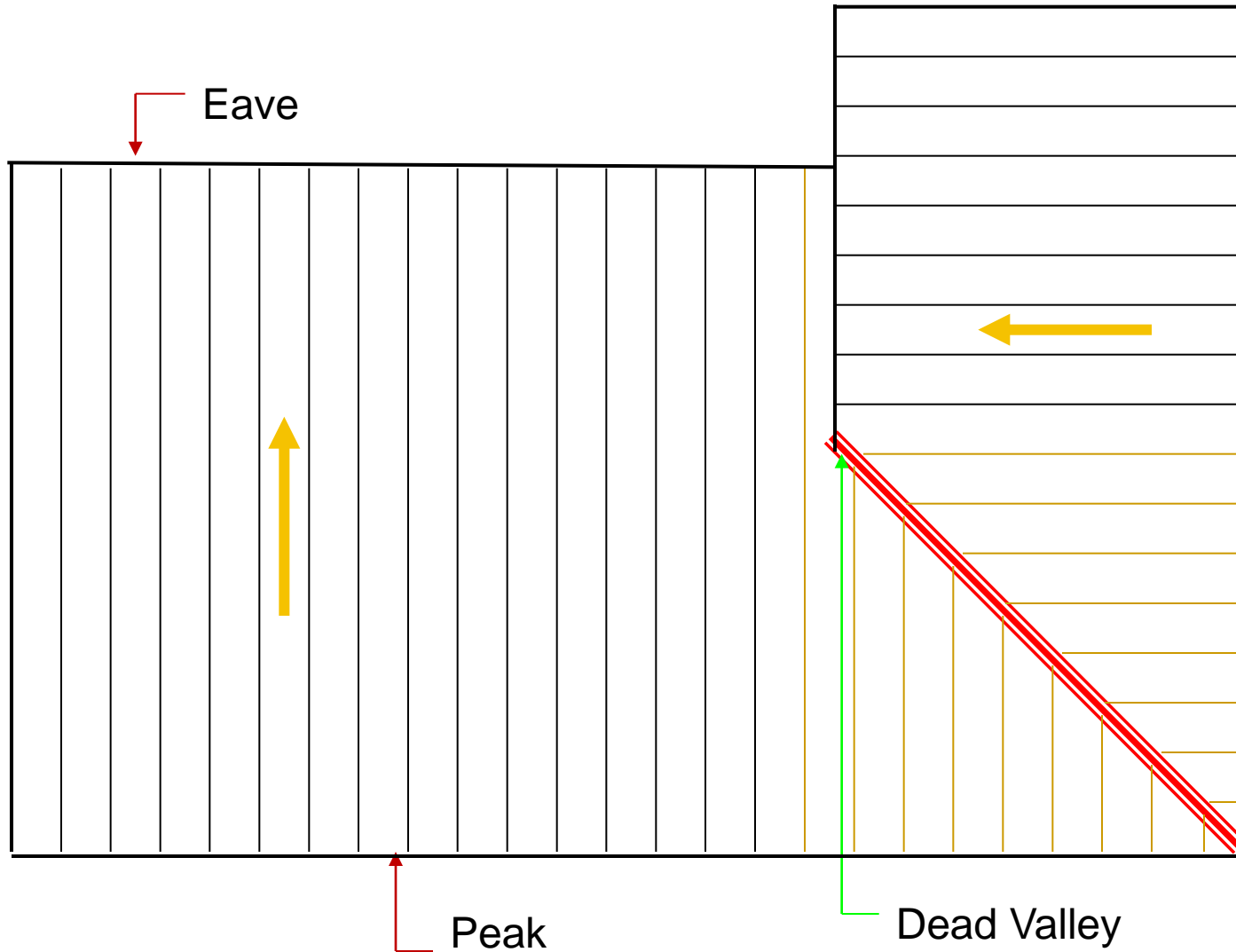
ROOF TRANSITIONS



ROOF TRANSITION



DEAD VALLEYS



DEAD VALLEYS





DEAD VALLEYS

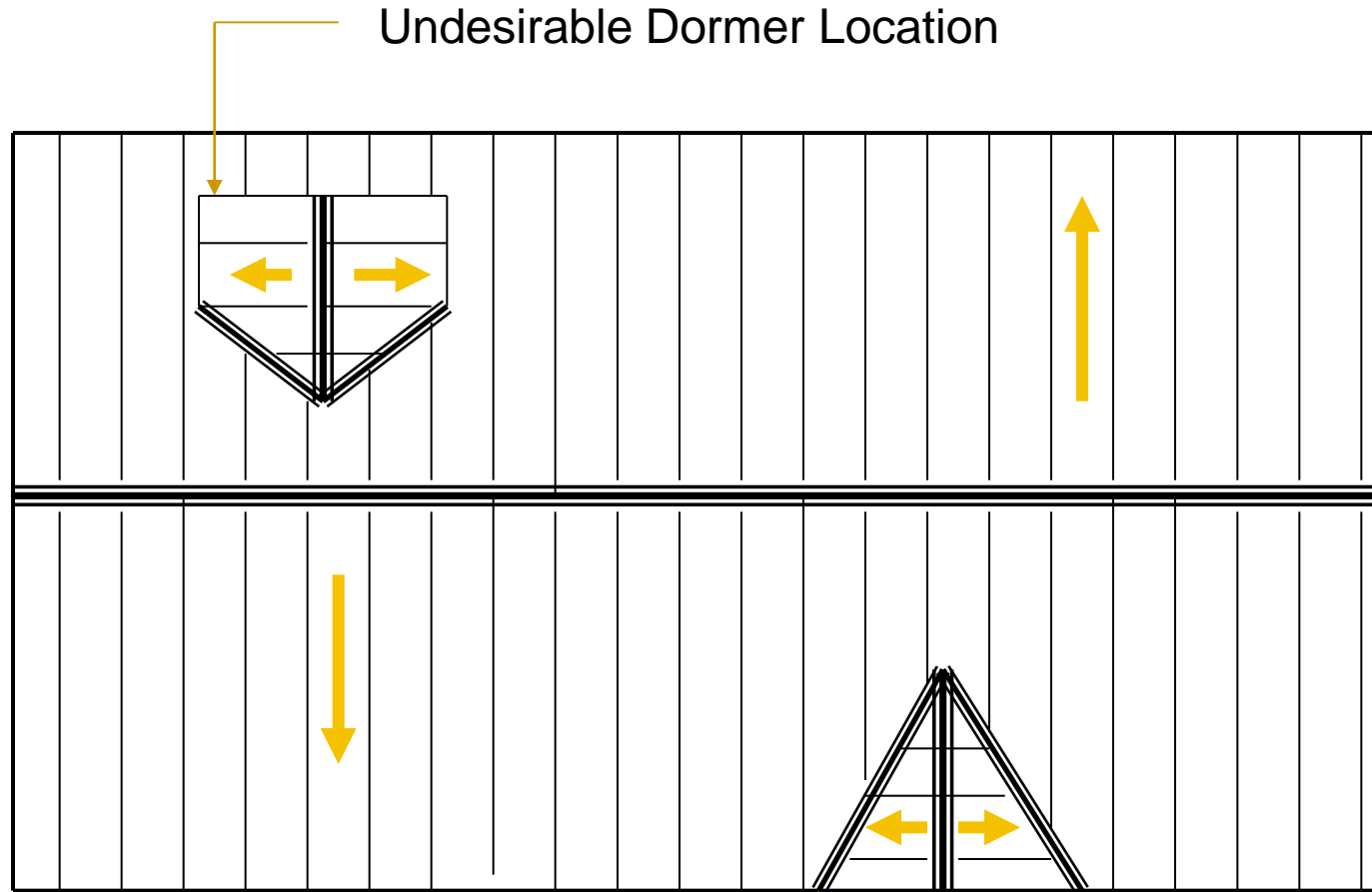




DEAD VALLEYS



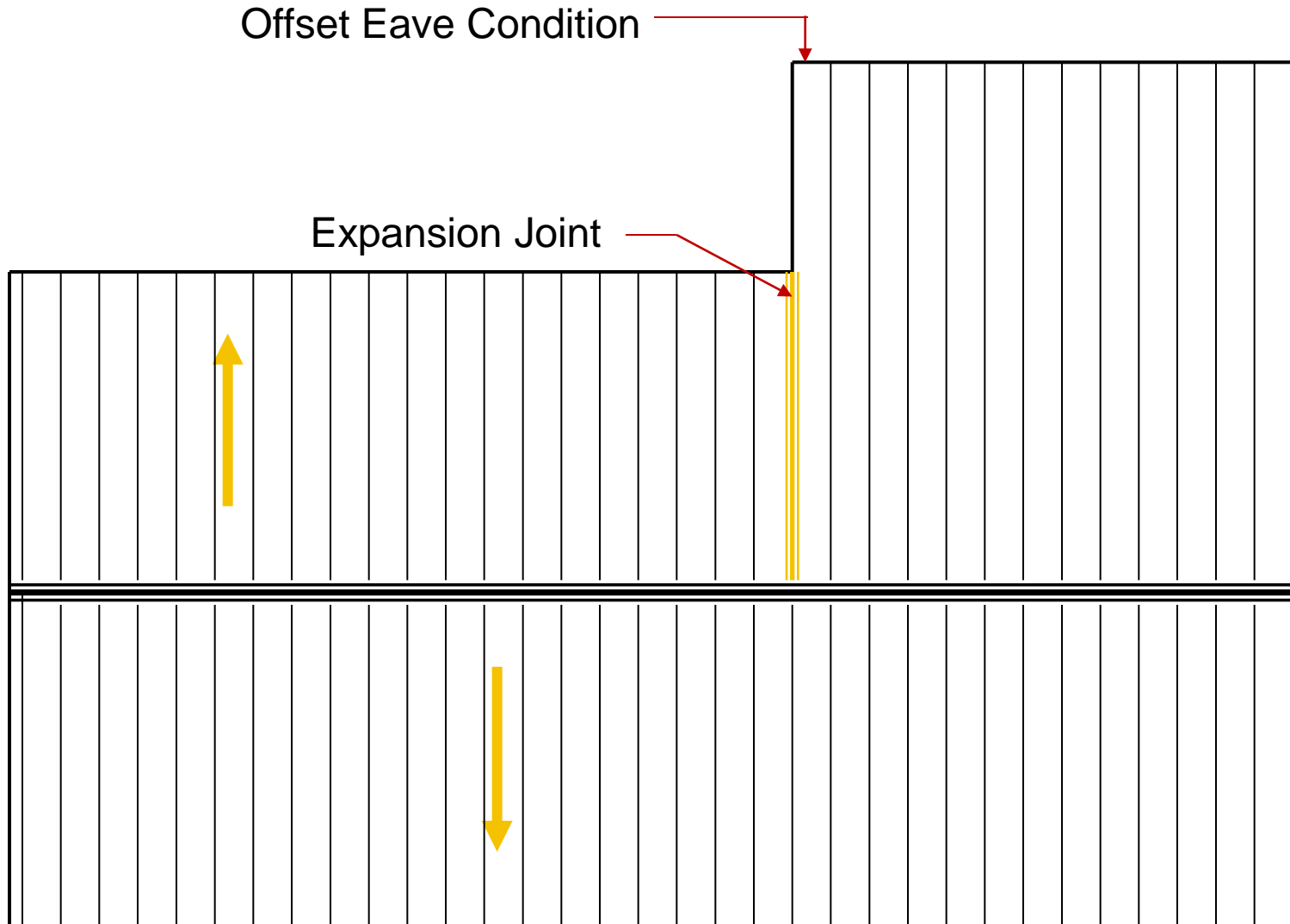
ROOF DORMERS



Undesirable Dormer Location

Desirable Dormer Location

OFFSET EAVE CONDITIONS



OFFSET EAVE CONDITIONS





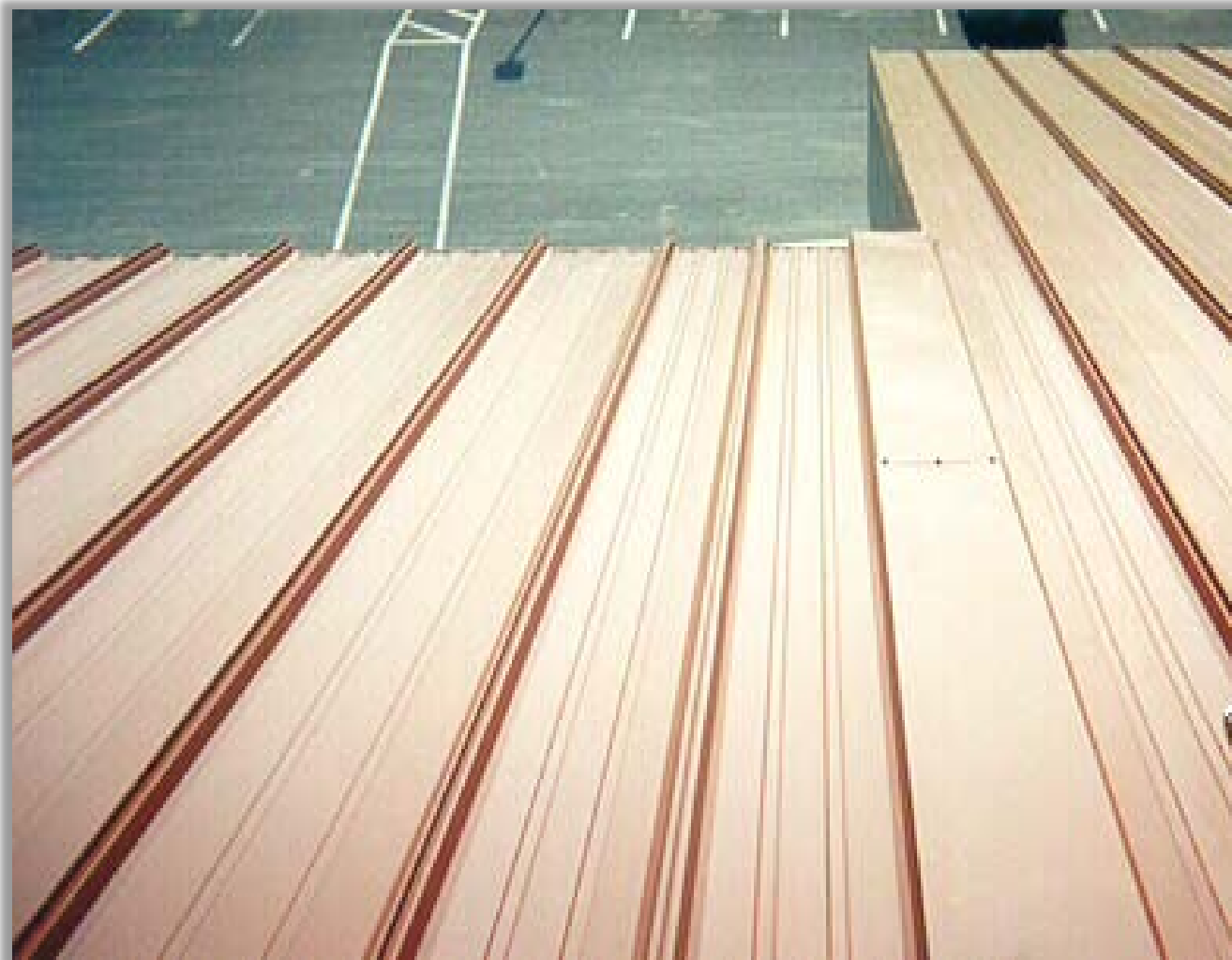
OFFSET EAVE CONDITIONS



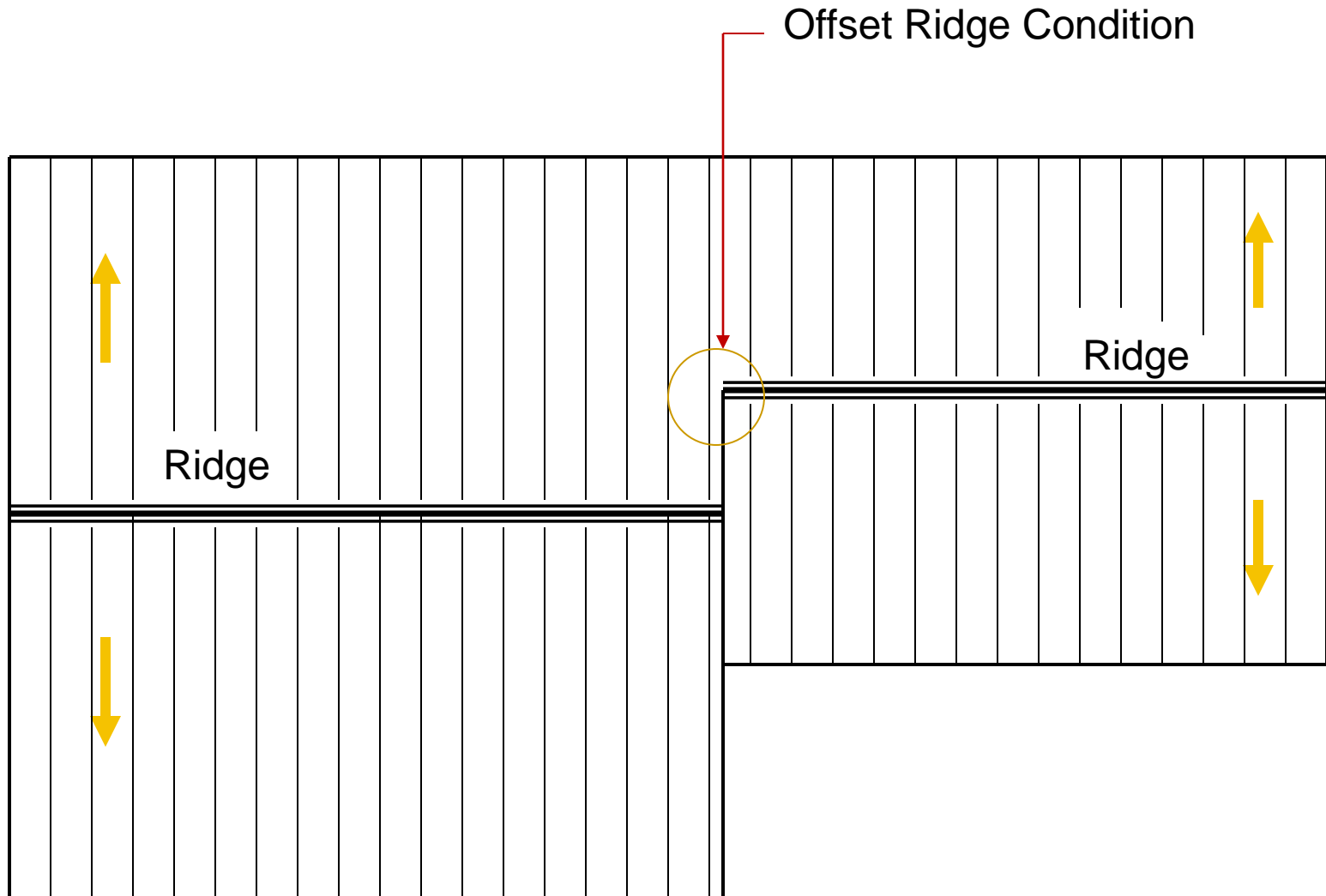
OFFSET EAVE CONDITIONS



OFFSET EAVE CONDITIONS

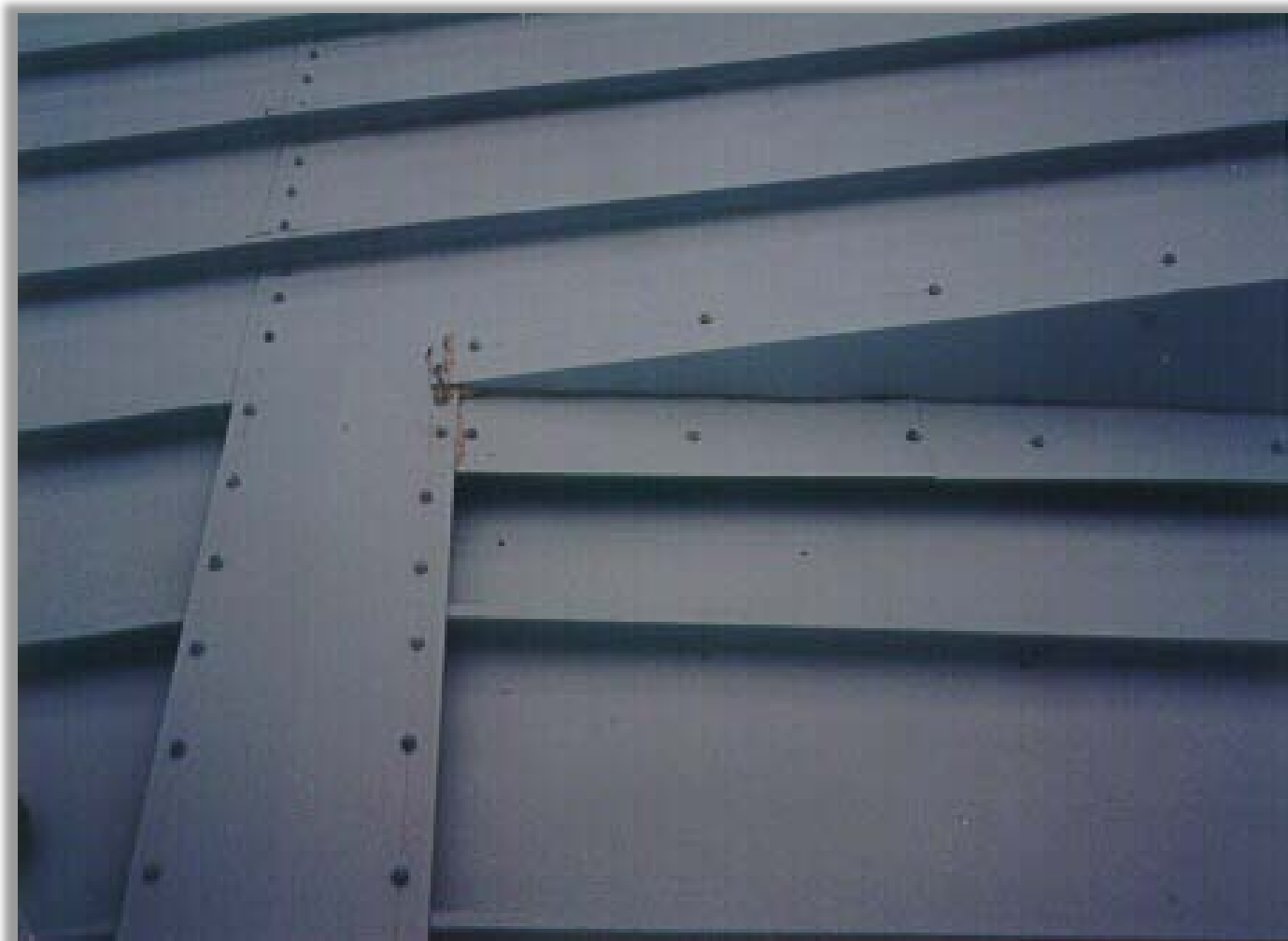


OFFSET EAVE CONDITIONS

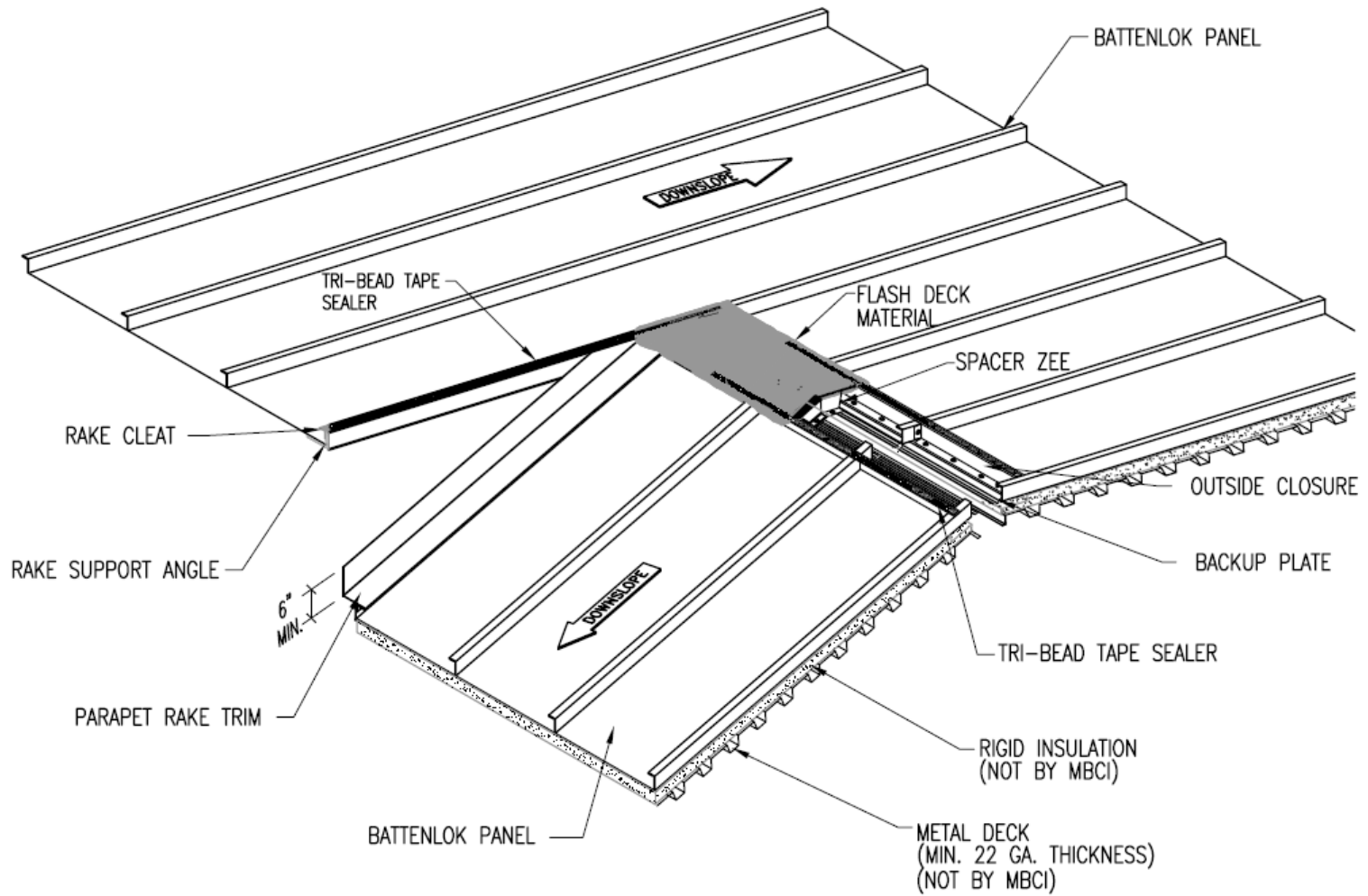




OFFSET RIDGE CONDITIONS



OFFSET RIDGE CONDITIONS





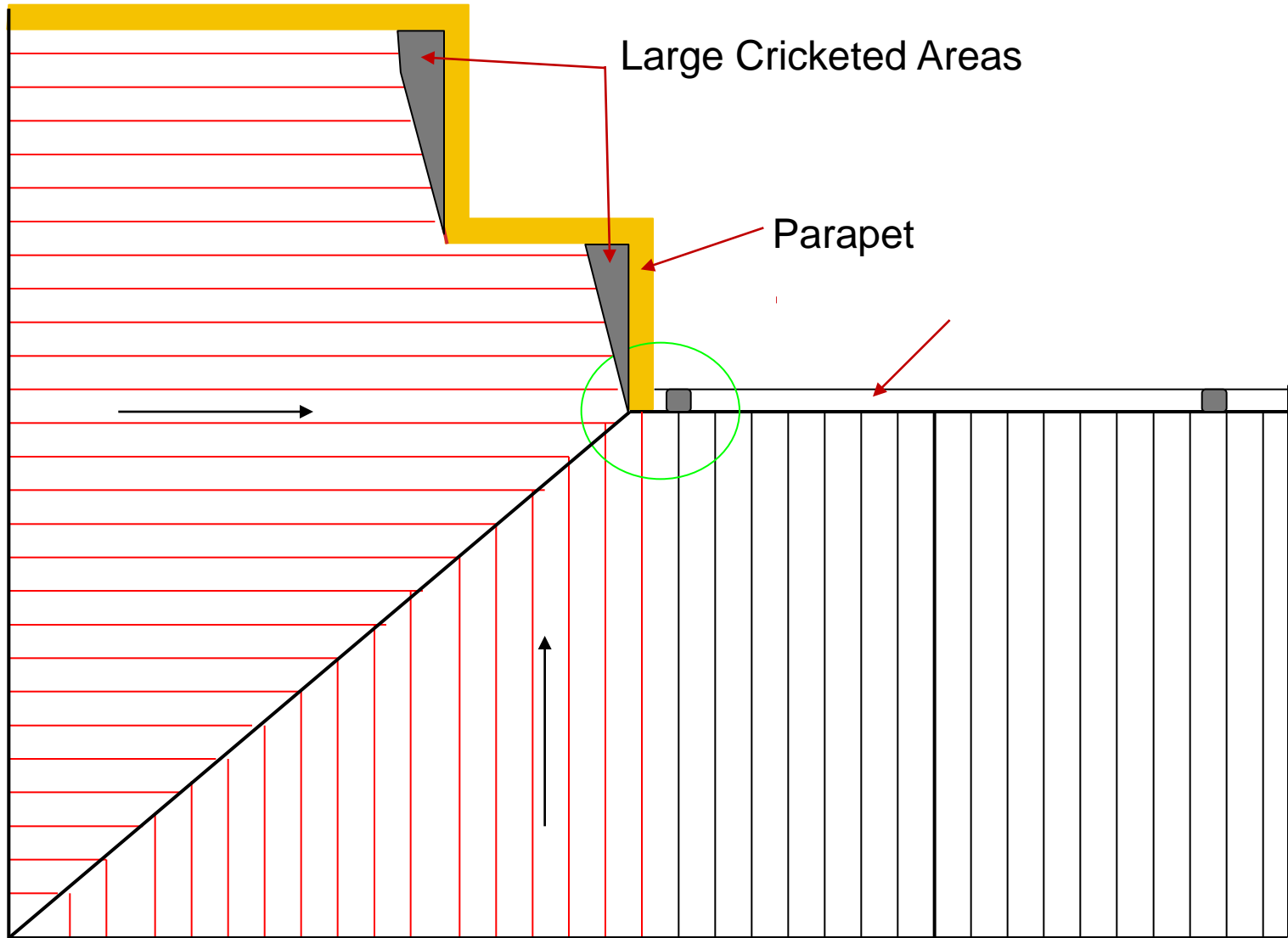
OFFSET RIDGE CONDITIONS



CRICKETS



CRICKETS

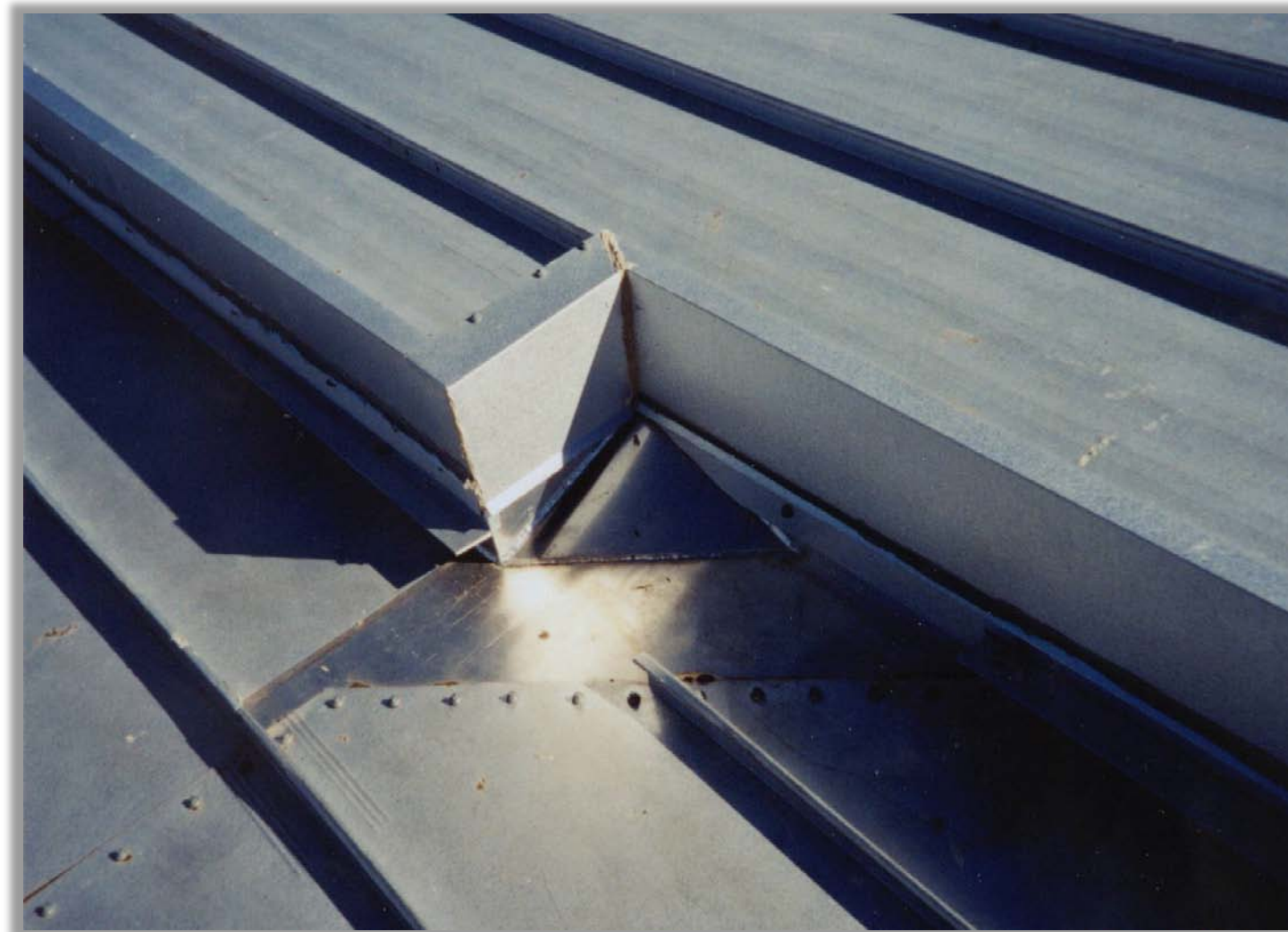


CRICKETS





CRICKETS





ROOF PENETRATIONS

Curbs

- Roofer to Furnish and Install
- Made from Aluminum
- Over/Under, Rib-to-Rib Style
- Provide Clearance at Side and Upslope End



CURBS





CURBS





CURBS





CURBS



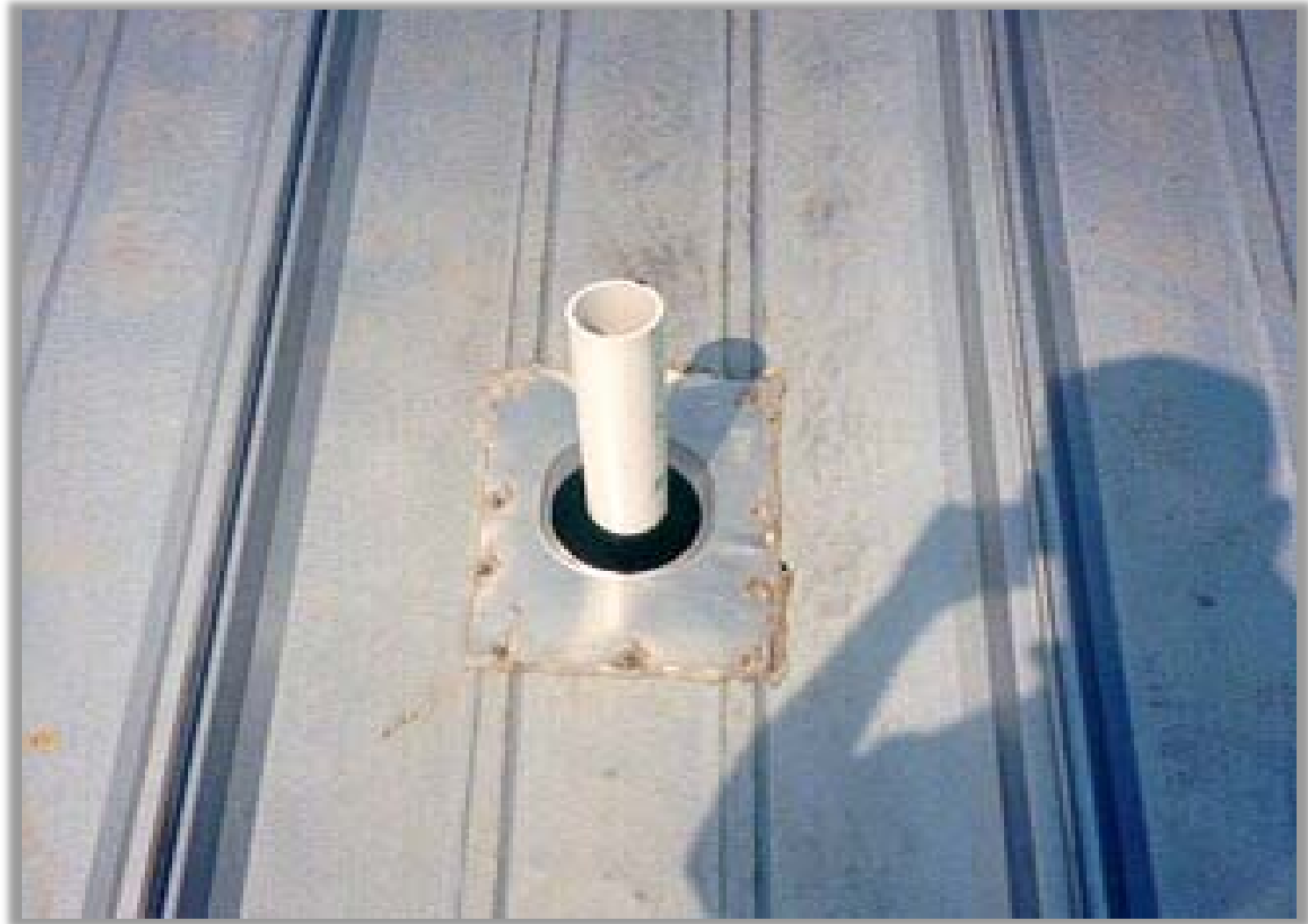
ROOF PENETRATIONS

Pipe Penetrations

- Roofer to Furnish and Install
- Use Rubber Roof Jacks
- Don't Cut Through Panel Seam
- Don't Block Water Flow



PIPE PENETRATIONS





PIPE PENETRATIONS





PIPE PENETRATIONS



PIPE PENETRATIONS



PIPE PENETRATIONS



PIPE PENETRATIONS





WARRANTIES

- Galvalume Substrate
- Finish Warranties
 - Silicone Polyester – 25 years
 - Fluoropolymers – (Kynars) – 25 years
- Weathertightness Warranties
 - Industry Standard
 - “Day One” Responsibility



INDUSTRY STANDARD WARRANTIES

- Installer is responsible for warranty work until roof has been leak-free for 24 consecutive months (Manufacturer has no liability until this occurs)
- Installer is responsible for proper installation of the roof system for the full warranty term
- Most do not require a certified installer to be present during roof installation



“DAY ONE” WARRANTY

- Requires certified installer on job at all times
- Requires minimum of three field inspections during installation by an independent or qualified roof consultant
- Inspection reports determine if action is required early on in the roof application
- Manufacturer is responsible for all warranty work from date of substantial completion



SPECIFICATION LANGUAGE

- The roofing manufacturer shall have the **SOLE AND EXCLUSIVE** obligation for all warranty work commencing on the date of substantial completion
- During the warranty period, the roofing manufacturer shall take appropriate action to cause any non-performing portions of the Roof System to perform their proper functions
- Submit specimen copy of W/T warranty, including evidence of application for warranty and manufacturer's acceptance of the applicator and warranty conditions



UPLIFT TESTING SUMMARY

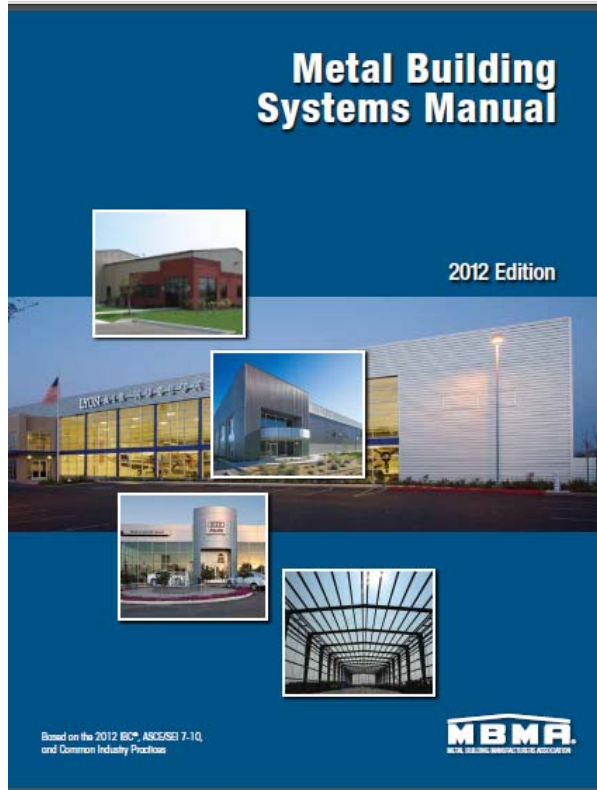
- Do not use section properties to design standing seam roofs for wind uplift
- Use UL 580, Class 90 for product comparison only
- Use ASTM E-1592 to design standing seam roofs for wind uplift



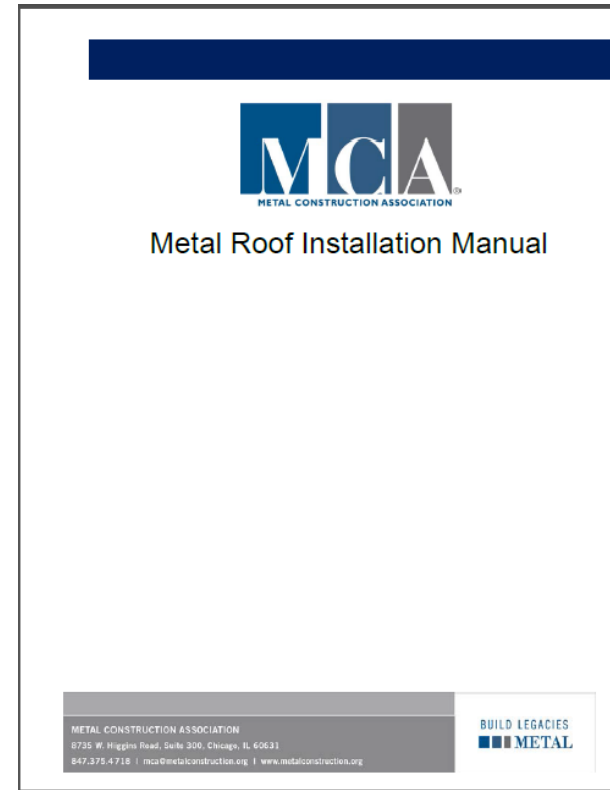
WARRANTY SUMMARY

- Read and become familiar with manufacturer's standard warranty offerings
- If you do specify a "Day One" type warranty, make sure you are getting what you specified
- **Get the Manufacturer involved during the design stage!!**

METAL ROOF SYSTEMS DESIGN MANUAL



www.mbma.com



www.metalconstruction.org

THANK YOU FOR YOUR TIME.

THIS CONCLUDES THE AMERICAN INSTITUTE OF
ARCHITECTS CONTINUING EDUCATION SYSTEMS
COURSE.

QUESTIONS?



OTHER AIA PRESENTATIONS BY MBCI

Find more at mbci.com/metal-institute

- A Review of Metal Panel Warranties (SSRWTW2) – 1 AIA LU
- Insulated Metal Wall and Roof Panels (IMP003) – 1 AIA LU
- Retrofit Roof Systems (NURF-1B) – 1 AIA LU
- The Devil is in the Details (SSRLU3B) – 1 AIA LU

