

Carlisle's TPO Very Severe Hail (VSH) Approved Systems

As the industry leader in warranted commercial roofing systems, Carlisle SynTec Systems takes pride in its tradition of providing unique solutions for rooftop challenges. Carlisle offers a variety of roofing membranes including TPO, which is renowned for its industry-leading OctaGuard XT weathering package for enhanced long-term weathering and high reflectivity. Carlisle continues to shape the evolution of the commercial roofing industry by offering world-class TPO system solutions that are Very Severe Hail (VSH) approved.

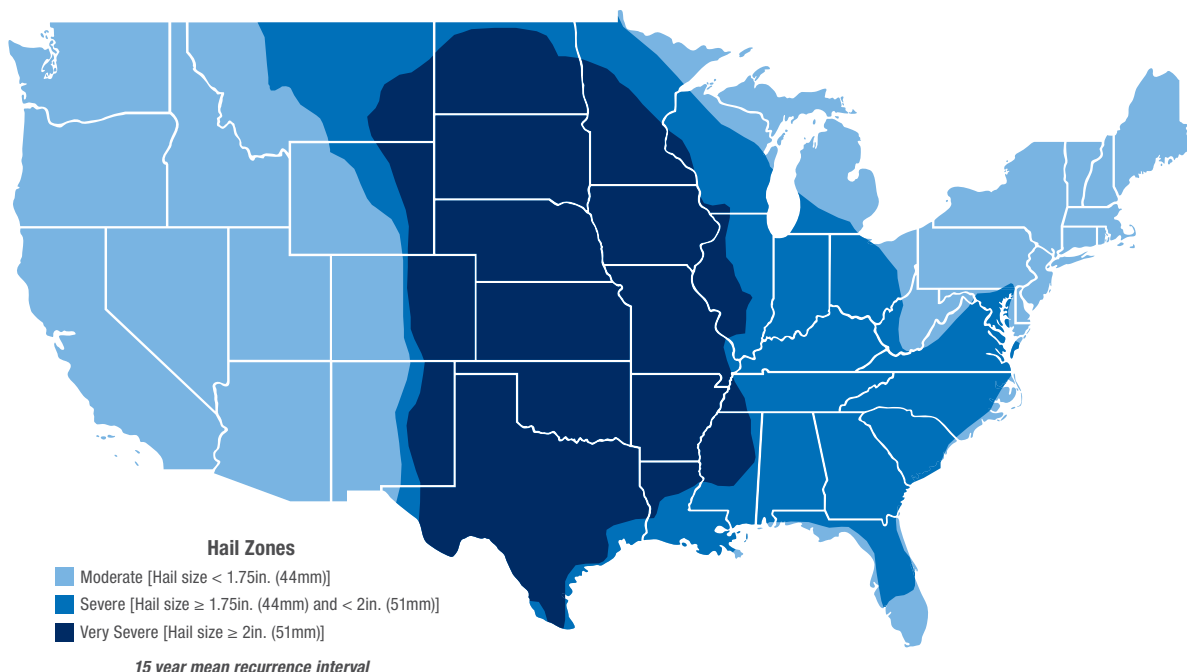
SEVERE HAIL (SH) VS. VERY SEVERE HAIL (VSH)

Historically, the Factory Mutual (FM) Severe Hail (SH) designation has been the most stringent hail approval in roofing. The test consists of a 2-inch steel ball dropped almost 18 feet, with virtually any rigid insulation board with a single-ply membrane resulting in an approval. In 2017, Factory Mutual introduced the Very Severe Hail (VSH) approval, consisting of a 2-inch diameter ice ball shot out of a pressurized air cannon. The ice ball impacts the membrane and substrate at approximately 110 miles per hour, resulting in four times the energy impact as SH testing.

Hail Rating	Impact Medium	Method	Impact Energy
SH Severe Hail	2"-Diameter Steel Ball	17' 9½" Height Gravity Drop	14 ft-lb (19 J)
VSH Very Severe Hail	2"-Diameter Ice Ball	160 Feet/Second Shot Velocity	58 ft-lb (79 J)

FACTORY MUTUAL'S HAIL ZONE MAP


VSH requirements now include parts of 19 states as designated by Factory Mutual. VSH requirements can also appear in specifications outside of these states.



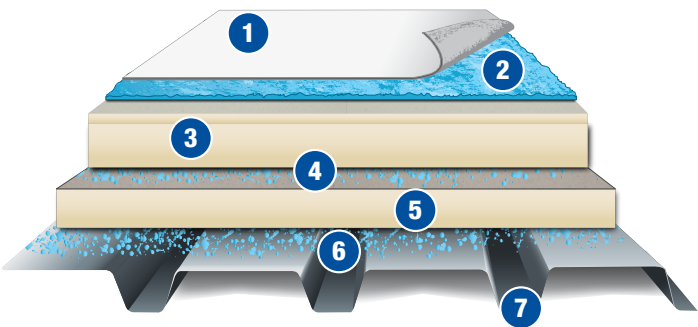
UNDERSTANDING VSH APPROVED SYSTEMS

Cover boards are an essential part of a VSH single-ply system. Carlisle's commitment to innovation has allowed common rooftop cover boards such as gypsum and HD polyiso to gain approval under these extreme testing standards. Carlisle now offers a wide variety of VSH solutions. SecurShield® HD Composite, the industry's first all-polyiso solution, consists of a ½" HD polyiso cover board laminated to a rigid polyiso panel, making it easy to use and cost effective. EcoStorm VSH™ offers a solution sourced from post-industrial and post-consumer waste streams with a compressive strength of nearly 4,000 psi. DensDeck® StormX™ and DEXcell FA VSH® are reinforced gypsum panels that are extremely durable. StormBase® provides an easy-to-use composite combining the traditional strength and performance of OSB factory-bonded to polyiso insulation.

Cover board attachment is a critical step in any VSH approved system. See the chart and schematics below for clarification.

VSH Approvals		60 mil Sure-Weld TPO and 80-mil Sure-Weld EXTRA TPO			
Membrane Attachment	Roller or Spray Applied Bonding Adhesive				
Cover Board	Securshield HD Composite-Sure-Weld EXTRA only	StormBase Composite	EcoStorm VSH	DensDeck StormX	
Cover Board Attachment	Flexible FAST				
VSH Approvals		115-and 135-mil FleeceBACK TPO			
Membrane Attachment	Full Spray/4" Beads				
Cover Board	SecurShield HD Composite*	StormBase Composite*	EcoStorm VSH	DensDeck StormX	DEXcell VSH
Cover Board Attachment	Flexible FAST	Flexible FAST or Plates and Fasteners	Flexible FAST or Plates and Fasteners	Flexible FAST or Plates and Fasteners	Flexible FAST or Plates and Fasteners
VSH Approvals		Sure-Weld FleeceBACK RL (.060" & .080")		<div>Scan here for our full listing of VSH approvals.</div> 	
Membrane Attachment	Hook and loop				
Cover Board	2" min. HD Composite Rapidlock				
Cover Board Attachment	Flexible FAST				

SURE-WELD® FLEECEBACK® TPO



- 1

Sure-Weld FleeceBACK TPO 115- or 135-mils
- 2

Flexible FAST Full Spray
- 3

SecurShield HD Composite
- 4

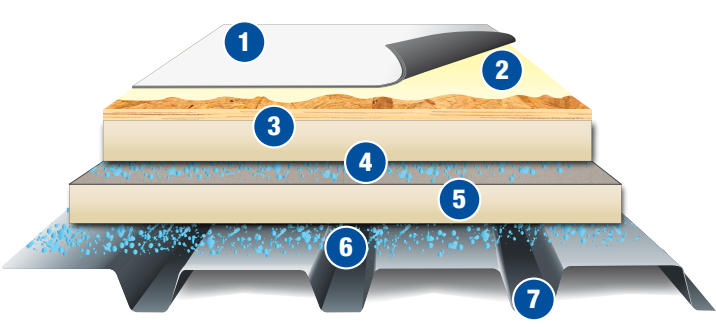
Flexible FAST Rig Splatter
- 5

2.6" InsulBase
- 6

Flexible FAST Rig Splatter
- 7

Steel Deck

SURE-WELD TPO



- 1

Sure-Weld TPO 60-mil
- 2

Bonding Adhesive
- 3

StormBase Composite
- 4

Flexible FAST Rig Splatter
- 5

2.6" InsulBase
- 6

Flexible FAST Rig Splatter
- 7

Steel Deck