

**TPO Membrane Fastening Criteria (All Warranties)
for Mechanically Fastening Roofing Systems
22 GA. Steel Deck or Structural Concrete Only**

Table II

Caution: Projects with 25 or 30 year warranties an additional perimeter sheet is required beyond those listed in the table below. Projects with 25 or 30 year warranties the use of 12' wide sheets is **NOT PERMITTED**

Peak Gust Wind Speed Warranty	Max. Building Height	Min. Number of Perimeter Sheets			Field* Membrane Width	Perimeter* Sheet Width	Fastening Density* (Field & Perimeter Sheets)
		Local Wind Speed					
		Up to 110 MPH	110-120 MPH	120 MPH or Greater			
55 MPH	Up to 60'	1	2	3	12' or 10'	6'	12" O.C.
					8'	4'	12" O.C.
	61' to 100'	2	2	3	10'	6'	** See Note
					8'	4'	12" O.C.
72 MPH	Up to 60'	2	2	3	12' or 10'	6'	12" O.C.
					8'	4'	12" O.C.
	61' to 100'	3	4	4	10'	6'	** See Note
					8'	4'	12" O.C.
80 MPH	Up to 60'	3	3	4	10'	6'	** See Note
					8'	4'	12" O.C.
	61' to 100'	3	4	4	10'	6'	** See Note
					8'	4'	12" O.C.
90 MPH	Up to 60'	3	4	4	10'	6'	** See Note
					8'	4'	12" O.C.
	61' to 100'	4	5	5	10'	6'	** See Note
					8'	4'	12" O.C.

*Using HP-X™ Fasteners for steel decks and HD 14-10 or CD-10 for structural concrete decks.

** Structural Concrete Decks use 12" O.C. spacing utilizing HD 14-10 or CD-10. Steel Decks use 6" O.C. utilizing HP-X Fasteners. Steel Decks use 12" O.C. spacing utilizing HP-Xtra Fasteners.

Table I

**Mechanically Fastened or Adhered Membrane Systems
Warranty Options (9)**

Warranty Duration	Thermoplastic Membranes (Sure-Weld TPO / Sure-Flex PVC)								
	Warranty Wind Speed Coverage						Minimum Membrane Thickness (2)	Additional Membrane Coverage	
	55, 72, 80 or 90 mph		100 mph		110 to 120 mph			Additional Puncture	Hail
	Adhered	Mech. Fastened	Adhered	Mech. Fastened	Adhered	Mech. Fastened			
5, 10, or 15 year	√(3)	√	√	N/A(1)	√	N/A	Sure-Weld 45-mil OR Sure-Flex 50-mil (6)	See Below	See Below
20 year	√	√	√	N/A	√	N/A	Sure-Weld 60-mil (4) OR Sure-Flex 60 mil (6)(7)	See Below	See Below
25 year (9)	√	√	√	N/A	N/A	N/A	Sure-Weld 80-mil (5) OR Sure-Flex 80-mil (6)(8)	See Below	See Below
30 year (9)	√	√	√	N/A	N/A	N/A	Sure-Weld 80-mil (5) OR Sure-Flex KEE 80-mil	See Below	See Below

Notes:

N/A = Not Acceptable

√ = Acceptable

- (1) Contact Carlisle for specific requirements.
- (2) All "T-Joints" must be overlaid with appropriate flashing material when using 60 or 80-mil membrane.
- (3) Water based adhesive may be used for projects with 15 year maximum warranty and wind speed coverage up to 55 mph.
- (4) Spectro-Weld OR Sure-Weld SAT TPO 60-mil membranes may be used in lieu of Sure-Weld 60-mil membrane.
- (5) Spectro-Weld 80-mil membrane can be used in lieu of Sure-Weld 80-mil membrane.
- (6) Sure-Flex FRS membrane can be used in lieu of Sure-Flex Polyester reinforced membrane for Adhered Roofing Systems Only.
- (7) Sure-Flex KEE 50-mil membrane can be used in lieu of Sure-Flex 60-mil membrane for Warranties Up to 20 Year.
- (8) Sure-Flex KEE 60-mil membrane can be used in lieu of Sure-Flex 80-mil membrane for Warranties Up to 25 Year.
- (9) Enhancements may be required for certain flashing details. Published details must be referenced for applicable requirements.

Sure-Weld TPO Membrane

Hail

- 1" Dia. Hail Coverage requires a minimum of 60-mil TPO Adhered to cover board.
- 2" Dia. Hail Coverage requires 80-mil TPO Adhered to cover board.

Additional Design Requirement:

- Cover board (SecurShield HD, SecurShield HD Plus, DensDeck Prime, or Securock – Adhered Only).

Puncture

- Minimum 80-mil TPO Adhered or Mechanically Fastened.

Sure-Flex PVC Membrane

Hail

- No Coverage available.

Puncture

- Minimum 60-mil PVC with Polyester Reinforcement.

**PVC Membrane Fastening Criteria (All Warranties)
for Mechanically Fastening Roofing Systems
22 GA. Steel Deck or Structural Concrete Only**

Table III

Caution: Projects with 25 or 30 year warranties an additional perimeter sheet is required beyond those listed in the table below.

Peak Gust Wind Speed Warranty	Max. Building Height	Min. Number of Perimeter Sheets			Field* Membrane Width	Perimeter* Sheet Width	Fastening Density* (Field & Perimeter Sheets)
		Local Wind Speed					
		Up to 110 MPH	110-120 MPH	120 MPH or Greater			
55 MPH	Up to 60'	1	2	3	10'	5'	12" O.C.
					81"	40.5"	12" O.C.
	61' to 100'	2	2	3	10'	5'	** See Note
					81"	40.5"	12" O.C.
72 MPH	Up to 60'	2	2	3	10'	5'	12" O.C.
					81"	40.5"	12" O.C.
	61' to 100'	3	4	4	10'	5'	** See Note
					81"	40.5"	12" O.C.
80 MPH	Up to 60'	3	3	4	10'	5'	12" O.C.
					81"	40.5"	12" O.C.
	61' to 100'	3	4	4	10'	5'	** See Note
					81"	40.5"	12" O.C.
90 MPH	Up to 60'	3	4	4	10'	5'	6" O.C.
					81"	40.5"	12" O.C.
	61' to 100'	4	5	5	10'	5'	** See Note
					81"	40.5"	12" O.C.

*Using HP-X Fasteners for steel decks and HD 14-10 or CD-10 for structural concrete decks.

** Structural Concrete Decks use 12" O.C. spacing utilizing HD 14-10 or CD-10. Steel Decks use 6" O.C. utilizing HP-X Fasteners. Steel Decks use 12" O.C. spacing utilizing HP-Xtra Fasteners.

**TPO Membrane Fastening Criteria (Up to 20 year Warranty)
for Mechanically Fastening Roofing Systems
Wood Decks**

Table IV

Peak Gust Wind Speed Warranty	Deck Type	Projected Pull-Out Values	Min. Number of Perimeter Sheets		Field Membrane Width	Perimeter Sheet Width	Fastening Density (Field & Perimeter Sheets)
			Local Wind Speed				
			Up to 100 MPH	100 MPH to 110 MPH (Max.)			
55 MPH	7/16" OSB*	210 lbs	2	3	10'	6'	9" O.C.
			2	3	8'	4'	12" O.C.
	15/32" 3-Ply Plywood	240 lbs	2	3	8'	4'	12" O.C.
	15/32" 5-Ply Plywood	530 lbs	1	1	10'	6'	12" O.C.
	5/8" OSB*	310 lbs	2	3	10'	6'	12" O.C.
			2	3	8'	4'	12" O.C.
72 MPH	15/32" 3-Ply Plywood	240 lbs	2	3	8'	4'	12" O.C.
	15/32" 5-Ply Plywood	530 lbs	1	1	10'	6'	12" O.C.
	5/8" OSB*	310 lbs	2	3	10'	6'	12" O.C.
			2	3	8'	4'	12" O.C.

*Maximum duration for OSB NOT to exceed 20 Years.

**PVC Membrane Fastening Criteria (Up to 20 year Warranty)
for Mechanically Fastening Roofing Systems
Wood Decks**

Table V

Peak Gust Wind Speed Warranty	Deck Type	Projected Pull-Out Values	Min. Number of Perimeter Sheets		Field Membrane Width	Perimeter Sheet Width	Fastening Density (Field & Perimeter Sheets)
			Local Wind Speed				
			Up to 100 MPH	100 MPH to 110 MPH (Max.)			
55 MPH	7/16" OSB*	210 lbs	2	3	10'	5'	9" O.C.
			2	3	81"	40.5"	12" O.C.
	15/32" 3-Ply Plywood	240 lbs	2	3	81"	40.5"	12" O.C.
	15/32" 5-Ply Plywood	530 lbs	1	1	10'	5'	12" O.C.
	5/8" OSB*	310 lbs	2	3	10'	5'	12" O.C.
			2	3	81"	40.5"	12" O.C.
72 MPH	15/32" 3-Ply Plywood	240 lbs	2	3	81"	40.5"	12" O.C.
	15/32" 5-Ply Plywood	530 lbs	1	1	10'	5'	12" O.C.
	5/8" OSB*	310 lbs	2	3	10'	5'	12" O.C.
			2	3	81"	40.5"	12" O.C.

*Maximum duration for OSB NOT to exceed 20 Years.

TPO Membrane Fastening Criteria
Up to 20 Yr Warranty for Mechanically Fastening Roofing Systems
Lightweight Insulating Concrete over Steel / Gypsum / Cementitious Wood Fiber

Table VI

Peak Gust Wind Speed Warranty	Building Height 50' Max.	Min. Number of Perimeter Sheets			Field Membrane Width	Perimeter Sheet Width	Fastening Density (Field & Perimeter Sheets)
		Local Wind Speed					
	Deck Type	Up to 110 MPH	110 MPH to 120 MPH	120 MPH or Greater			
55 MPH	Lightweight Concrete over Steel Deck	2	3 (1)	N/A	12'	6'	12" O.C.
		1	2	4	10'	6'	12" O.C.(2)
		1	2	3	8'	4'	12" O.C.(3)
	Gypsum Deck or Cementitious Wood Fiber	2 (3)	3	N/A	10'	6'	9" O.C.
		2 (3)	3	4 (4)	8'	4'	12" O.C.

N/A is Not Acceptable

- (1) Fastening Density must be secured 6" O.C.
- (2) For Buildings 51' to 75' with 10' field sheets – Fastening Density must be increased to 9" O.C.
- (3) Acceptable for Buildings up to 75' in height.
- (4) Fastening Density must be increased to 9" O.C.

Additional Design Considerations (Up to 20 YR Warranty)

- 1-Membrane configuration and fastening density in Table above is based on HP-X Fasteners penetrating metal pan below Lightweight Insulating Concrete and for Polymer Gyptec Fasteners engaging into Gypsum and Cementitious Fiber Decks.
- 2-See Design Reference DR-06-11 "Withdrawal Resistance Criteria" for more information.

PVC Membrane Fastening Criteria
Table VII Up to 20 Warranty for Mechanically Fastening Roofing Systems
Lightweight Insulating Concrete over Steel / Gypsum / Cementitious Wood Fiber

Peak Gust Wind Speed Warranty	Building Height 50' Max.	Min. Number of Perimeter Sheets			Field Membrane Width	Perimeter Sheet Width	Fastening Density (Field & Perimeter Sheets)
		Local Wind Speed					
	Deck Type	Up to 110 MPH	110 MPH to 120 MPH	120 MPH or Greater			
55 MPH	Lightweight Concrete over Steel Deck	1	2	4	10'	5'	12" O.C.(1)
		2	3	4	81"(3)	40.5"	12" O.C.(2)
	Gypsum Deck or Cementitious Wood Fiber	2	3	N/A	10'	5' or 6'	9" O.C.
		2	3	4	81"	4'	12" O.C.

N/A is Not Acceptable

- (1) For Buildings 51' to 75' with 10' field sheets – Fastening Density must be increased to 9" O.C. for field and perimeter sheets.
- (2) Fasteners may be spaced at 18" O.C. in the field for buildings Up to 50' in height, Up to 110 MPH.
- (3) Building Height may be Up to 75' in height.

Additional Design Considerations (Up to 20 YR Warranty)

- 1- Membrane configuration and fastening density in Table above is based on HP-X Fasteners penetrating metal pan below Lightweight Insulating Concrete and for Polymer Gyptec Fasteners engaging into Gypsum and Cementitious Fiber Decks.
- 2-See Design Reference DR-06-11 "Withdrawal Resistance Criteria" for more information.