

Question & Answer #4



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PIER 4 PHASE 2 RECONFIGURATION PROJECT NO. 091251 | CONTRACT NO. 070136

1. BIDDER QUESTION

Specification 26.01.26 1.04.A Testing Firm QA Is it the intent to have a NETA Certified Testing Company perform third party testing? If so, please review and revise.

https://neta.netaworld.org/netassa/censsacustlkup.result_page

RESPONSE

1.04A: Yes. Refer to Addendum #4

Specification 26 01 26, 1.04.A, is revised to read "...for electrical product testing, and shall be accredited by the InterNational Electrical Testing Association (NETA)."

2. BIDDER QUESTION

Specification 26.01.26 1.04.B Testing Firm QA Please review and revise Spec section A. An electrical testing company or firm that is Washington State Dept of Labor and Industries (Accredited) cannot have a NETA Certified Supervising Technician.

<http://www.lni.wa.gov/TradesLicensing/Electrical/Install/ProdTest/default.asp>

RESPONSE

Companies listed on the Washington State L&I website's accredited Product Testing Laboratories list may also be accredited by InterNational Electrical Testing Association (NETA). The Port is not aware of any conditions or restrictions that would exclude a NETA Accredited Company from also being accredited by the State.

3. BIDDER QUESTION

Specification 26.05.13 Do you want the Power Monitoring Equipment Tested? Suggest adding verbiage that points back to testing spec and clarify the testing spec responsibility.

RESPONSE

Per specification 26 09 13, paragraph 1.05.B, the Metering System (MS) components included within the switchgear equipment lineup shall be factory installed, wired, and tested prior to shipment to the job site. Per paragraph 1.02.A, the Power Monitoring Equipment is included in the "definition" of the Metering System, therefore the Power Monitoring Equipment shall be tested as per 1.05.B. Additionally, please note that per paragraph 3.01.B the field metering interconnection wiring is by the Contractor, per paragraph 1.02.A, the Contractor is to test a complete system (as described in Part 2), and per paragraph 3.02.B, the Start-up shall include a complete working demonstration of the metering system.

4. BIDDER QUESTION

Specification 33.77.00 Section 1.05 Does the Port of Tacoma want a Factory Acceptance Testing Report or perform Factory Witness Inspection? Suggest adding verbiage to the spec. It's best to send a design engineer to verify the equipment designed at the factory to ensure equipment sent to the site is not defective.

RESPONSE

Refer to Addendum #4

See revisions to Section 33 77 00 for the requirements to submit the factory test results for the switchgear. At this time the Port does not plan on witnessing the factory tests of the switchgear.

5. BIDDER QUESTION

Reference – Lateral Slip Clip Reference bid drawing S28.2 for clip details and S28.1 for system clarification. We need to ask:

- a. What is the expected force to be induced by the seismic event between piers?
- b. What is the actual displacement the engineer expects between the two piers during a seismic event?

RESPONSE

The lateral slip clips are intended to allow the rail to bend and displace laterally (transverse to the crane rail) during an OLE level seismic event while restraining the crane rail vertically during normal crane operations.

- a. The piers are separated by isolation joints to allow the piers to respond independently during a seismic event. No load is induced from one pier to the other during a seismic event. The lateral slip clips allow the crane rail to deflect laterally under an OLE seismic event without imposing any lateral load into the lateral slip clips. For seismic events that exceed the OLE event, localized damage to include repairing or replacing crane rail clips is acceptable.
- b. Per Detail 1 "Partial Plan at Crane Rail Isolation Joint" on Sheet S28.1, the lateral slip clips and tapered rail expansion joint shall allow up to 1 1/8" of transverse crane rail displacement, and up to 4 1/2" of longitudinal crane rail displacement, respectively. The relative displacement between the piers in an OLE event is expected to be 4.3" transverse to the rail, and 3.0" longitudinally.

6. BIDDER QUESTION

On drawing E8.2, wire note "FOB41 ", there is not a note indicating that fiber optic is installed in the conduit. Please let us know if this is the case of if there needs to be some fiber optic cable installed in the conduit? This is only one example of where this happens. Please advise?

RESPONSE

Refer to Addendum #4, sheet E8.2 for adding fiber optic cables to conduits, and sheet E6.7 for adding splice closures in the crane vaults.

7. BIDDER QUESTION

We are unable to determine from the specifications or drawings E6.2, E6.3 or E6.4 if rebar is required in the duct banks. Please clarify.

RESPONSE

Rebar is not required in the ductbanks.

8. BIDDER QUESTION

We need to know the maximum allowable soil bearing pressure, to determine the size of bearing slabs each vault requires? Please advise.

RESPONSE

The allowable soil bearing capacity is specified as 2,000 PSF for sanitary sewage vaults and storm drainage vaults per spec section 33 30 00, paragraph 1.04.A.1.c, and section 33 40 00, paragraph 1.04.A.1.c, respectively.

See Addendum No. 04 for addition of allowable soil bearing capacity of 2,000 PSF to spec section 33 71 19 ELECTRICAL UNDERGROUND DUCTS AND MANHOLES, paragraph 2.05.

9. BIDDER QUESTION

The drawings don't show racking in the power and communication vaults. Is racking required in all of the vault or just the vaults with cabling?

RESPONSE

Yes racking is required for all vaults per sheet E6.21, Section A. Refer to Specification 33 71 19, 2.06.F, for quantity of stanchions on each length of wall. Refer to 2.06.D for the cable rack inserts, and 2.06.G for cable rack details in the manholes/vaults.

10. BIDDER QUESTION

Pier 3 project had non-metallic vault racking. Is there a specification for the vault racking?

RESPONSE

Refer to Specification 33 71 19, 2.06.G for the non-metallic cable racks to be provided in the manholes/vaults.

11. BIDDER QUESTION

Are all of the subcontractors required to have longshore insurance?

RESPONSE

See Addendum No. 04, Section 00 73 16 Insurance Requirements

12. BIDDER QUESTION

The drawings don't show conduit and wire for the wiring between the 1200A switch and the 1200A crane switchgear on sheet E5.1 or the conduit and wiring schedules. The gear manufacture for the Pier 3 project said that the switch and the crane switchgear could not be bussed or cabled between the two section due to the required arc flash rating. PVRSC conduit was installed underground between the two sections. What size conduit and wiring is required between the sections?

RESPONSE

Refer to Addendum #4, for revisions to sheets E3.6 and E8.2, and to Section 33 77 00, paragraphs 1.02.B and 2.09.B to provide conduit and cable between the 1200A (15KV) main switch and the switchgear in lieu of bussing.

13. BIDDER QUESTION

Are the electrical contractors required to be on the Tacoma Power's approved list to install Tacoma Power's conduit, vaults, grounding etc.?

RESPONSE

Yes, the electrical contractor must be on Tacoma Power's approved list to install the work for Tacoma Power per Specification 26 05 00, 1.03.D, and as noted in the notes on the drawings (see Key Note #1 on sheet E3.1 for example).

14. BIDDER QUESTION

US fender testing requirement: The standard in the industry is testing at the manufacturers facilities under the supervision of an independent third party and sometimes the client. This method will reduce the potential delays due to a failed fender by months, since the fender can be removed and a new fender can be produced immediately and tested accordingly. It also reduces testing costs considerably. Also, we supplied the first phase fenders and there was no US testing requirement, we tested in-house and the owners were quite satisfied. We recommend to open the specs for this procedure.

RESPONSE

The requirement in section 35 59 13, paragraph 1.04.D.3 for performance testing of fenders to be conducted in the United States by an agency independent to the manufacturer will not be waived.

15. BIDDER QUESTION

We would like to provide a substitution request for the use of our PVC membrane roofing for Section 07 54 19.

RESPONSE

See Addendum No. 04 - Soprema is an acceptable manufacturer (Attachment A).

16. BIDDER QUESTION

Per Sheet E3.6, Key Note 2: "Contractor as part of the shop drawings shall provide concrete pad submittal that has been designed and stamped by the structural engineer".

You use the word "the" structural engineer, which is KPFF. Is this part of your costs/fees already included in the Port's and KPFF agreement? Or do I need to include costs for this design?

RESPONSE

See Addendum No. 4 for revision to Sheet E3.6, Key Note 2X

Per Section 33 77 00, paragraph 1.03.A, Contractor shall provide building concrete foundation/slab drawings prepared by a Washington State licensed professional structural engineer and submit drawings to the Engineer for review. These costs shall be included in the contractor's bid.

17. BIDDER QUESTION

1) Dwg E8.1 (& E3.3 – E3.6) shows conduits for CP-27 thru CP-58 each with 3 phase and a neutral cable (4#1/0) and a #10 ground. Dwg E6.7 shows the cables terminating at the 4 crane vaults on 3) 2 way junctions. What is the 4th cable for and where does it terminate? Is the #10 ground wire adequate for this run? Is the Port/others providing all cables and terminations from the 2 way junctions to the cranes? Advise

RESPONSE

Dwg. E8.1: The quantity of conductors noted as 3/1/1, sizes 0/0/10, Type 15kV/600V, represents 3#1/0 15kV cables, 1#1/0 Gnd. 600V, and 1 #10 Gnd (for crane ground check) 600V. Yes, the #10 ground wire is adequate for this run.

Per the above answer, the #1/0 ground wire terminates at the ground bus in the crane vault. The fifth cable (#10 ground check) is spliced to the ground check cable routed in the cable from the crane.

Yes the Port/others are providing under a separate contract, all cables and terminations from the 2 way junctions to the cranes.

18. BIDDER QUESTION

Is the bid opening going to be extended?

RESPONSE

At this time we do not anticipate extending bid opening.

19. BIDDER QUESTION

There appears to be missing pages for the substation structure, please advise.

RESPONSE

See Addendum No. 04, revision to sheet E3.6, Key Note #2 regarding the PDSE.

See Specification 33 77 00, paragraph 2.04 for requirements for the Power Distribution Switchgear Enclosure (PDSE) structure that houses the electrical switchgear.

20. BIDDER QUESTION

Can the Port please provide the existing and design surfaces in an electronic CAD format?

RESPONSE

CAD files will not be provided for bidding purposes. The unit price bid items identify quantities of dredging and the specifications identify the field engineering requirements that will be accomplished before during and after completion of various dredging and slope protection items to validate quantities.

21. BIDDER QUESTION

For the Responsibility Criteria Form (and attachments) that are due within 24 hours of receipt of the "Low Responsive Bidder Selection Notification" – is this something the low bidder would receive on bid day?

RESPONSE

The Port's process is to open bids and at bid opening, announce the apparent low bidder based on the read base bid amounts. Immediately following bid opening, the Port will go back and enter all information into our bid tab prepared for this bid and verify the base bid amount read at bid opening with the unit prices listed on the bid form. The Port will also verify other responsiveness information (review the bid bond, verify the individual who signed the form is authorized, etc – as listed in 00 21 00) and then publish the bid tab – typically by the following morning at the latest. Immediately following the publication of the bid tab, the Port will prepare and send out to the apparent low bidder the Low Responsive Bidder Selection Notification requesting the responsibility information be submitted to the Port within 24 hours.

ATTACHMENTS:

ATTACHMENT A - Question No. 15 Substitution Requests

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS
SECTION 00 43 25 - SUBSTITUTION REQUEST FORM - DURING BIDDING

Project Title Pier 4 Phase 2 Reconfiguration - Port of Tacoma **Project No.** _____
Submitted By: Kelly Bryant **Contract No.** _____
Prime/Sub/Supplier: Manufacture **Date:** 5/2/16

Specification Title: _____ **Section No.** 07 54 19
Description: Polyvinyl Chloride PVC **Paragraph:** 2.1A
Membrane Roofing **Page No.** 115

Proposed Substitution: Soprema, Inc. Sentinel PVC Membrane
Trade Name: Sentinel **Model No.:** _____
Manufacturer: Soprema, Inc.
Address: 310 Quadral Dr. Wadsworth, OH **Phone No.:** 425-305-9069

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted By: Kelly Bryant, RRO
Signed By: _____ **Firm:** Soprema, Inc.
Address: 310 Quadral Dr.
Wadsworth, OH 44281
Telephone: 425-305-9069 **Email:** kbryant@soprema.us

Supporting Data Attached:

☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other _____

ENGINEER'S REVIEW AND ACTION

- ☒ Substitution approved
☐ Substitution approved as noted
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Mark Kunkel **Date:** 5/4/16

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL P150 HFB is a high performance, polyester reinforced, thermoplastic polyvinyl chloride (PVC) roof membrane, specially designed to provide unmatched flexibility and long-term performance. SENTINEL membranes provide the proven fire and chemical resistance of PVC along with superior weldability, making it easy to conform to complex geometries. SENTINEL P150 HFB incorporates a 300 gram fleece-backed underside and is available in an ENERGY STAR® approved white as well as a variety of colors, including gray and tan.

STORAGE

Store rolls in a clean, dry location and cover as necessary to protect rolls from environmental damage such as extreme cold, heat, or moisture. Monitor varying environmental conditions during storage, handling and application of SENTINEL P150 HFB.

APPLICATION

SENTINEL P150 HFB can be installed in mechanically attached or fully adhered systems. For fully adhered systems, SENTINEL H2O or SENTINEL FB Bonding adhesives are approved. Please refer to the specific adhesive data sheet for application guidelines. For mechanically attached systems, please consult your SOPREMA representative for specific fastening patterns. All laps must be heat-welded to ensure a water tight seal. Any field cut seams require using SENTINEL Cut Edge Sealant.

APPLICATION



MECHANICALLY FASTENED



FULLY ADHERED

COOL ROOF RATING

PRODUCT	SOLAR REFLECTANCE		THERMAL EMITTANCE		SRI	
	0.79 initial	Pending 3 year	0.87 initial	Pending 3 year	98 initial	Pending 3 year
SENTINEL P150 HFB	0.79 initial	Pending 3 year	0.87 initial	Pending 3 year	98 initial	Pending 3 year

QUICK FACTS

ROLL WIDTH (ft)	ROLL LENGTH (ft)	COVERAGE (ft²)	THICKNESS (mils)	ROLL WEIGHT (lb)	ROLLS/PALLET (pallet weight)
5.25 (1.6 m)	100 (30.5 m)	525 (48.8 m²)	60 (1.5 mm)	268 (121.5 kg)	9 (2,462 lb/ 1,117 kg)

* Coverage rate as reported assumes installation using side and end lap recommendations.



TECHNICAL INFORMATION & TESTING

SHEET PROPERTIES	
Reinforcement	Non-woven polyester
Back surfacing	Heavy fleece-backed

DIMENSIONS & MASS		
PROPERTY		TEST METHOD
Thickness, mils (mm)	60 (1.5)	ASTM D4434
Net mass per unit area, lb/100ft ² (g/m ²)	51 (2,492)	ASTM D4434

PHYSICAL PROPERTIES			
PROPERTY	MD	XMD	TEST METHOD
Breaking strength, kN/m (lbf/in)	48 (275)	42 (240)	ASTM D751
Elongation at break, %	25	25	ASTM D751
Seam strength (min 75% of breaking strength)	Pass	Pass	ASTM D751
Low temperature bend, @ -40°F (-40°C)	Pass	Pass	ASTM D2136
Linear dimensional change, %	< 0.1	< 0.1	ASTM D1204
Static puncture resistance, @ ≥ 33 lbf (15 kg) min	Pass	Pass	ASTM D5602
Dynamic puncture resistance, @ 10 J min	Pass	Pass	ASTM D5635

* Data is represented by average values, unless noted otherwise.

TESTING & APPROVALS



SENTINEL®

S BONDING ADHESIVE

SENTINEL®
S BONDING ADHESIVE
PRODUCT # A-101

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL S Bonding Adhesive is a solvent based contact adhesive specially designed for adhering bare backed SENTINEL PVC membranes and flashings to a variety of substrates for horizontal or vertical applications. SENTINEL S is expressly formulated to provide superior bonding strength while meeting all VOC restrictions and regulations.

STORAGE

Product should be stored at temperatures between 60°F (15.6°C) and 80°F (26.7°C) out of direct sunlight. Containers should be stored upright in a dry, protected storage area to comply with site requirements, away from excessive heat and open flames. Take necessary precautions when handling containers to prevent rupturing the containers, or breaking the sealed lids prior to use.

APPLICATION

SENTINEL S Bonding Adhesive is designed for use with SENTINEL bare backed membranes and flashings over approved substrates. Prior to application, stir by hand to ensure a homogenous mixture. Ensure that the substrate is clean, dry and free of any debris, grease or oil. Apply the adhesive to both the substrate and bare backed side of the SENTINEL membrane prior to application using a 3/8" nap, solvent resistant roller. Allow adhesive to partially dry to a tacky feel when touched before bonding membrane to substrate (approx. 5-10 minutes). Install SENTINEL membrane and broom into place. SENTINEL S Bonding Adhesive should be applied when temperature is 40°F (44°F) and rising.



QUICK FACTS

CONTAINER (gal)	COVERAGE RATE sq ft/gal	MIN APPLICATION TEMPERATURE (°F)
5.0 (18.9 L)	60 (1.5 sqm/L)	40 (4.4°C)



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www.soprema.us
310 Quadral Drive, Wadsworth, Ohio 44281
Toll Free: (800) 356-3521 | Tel: (330) 334-0066

TECHNICAL INFORMATION & TESTING

PHYSICAL PROPERTIES	
Weight/gallon (lb)	7.08
Viscosity (cps) (75° F, 20RPM, #3)	1,800-2,400
VOC Content (g/L)	199.4
Total solids (%)	24 ± 1
Color	Natural
Shelf life	1 year, unopened
Dry time (hours)	Up to 1

TESTING & APPROVALS



PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL Walkway Pad protects roof membranes from damage caused by necessary foot traffic or accidental tool drops. This product is compatible with SENTINEL PVC roof membranes and can be applied to new or existing roofs using standard hot air welding equipment.

STORAGE

Store rolls on end and maintain in an upright position to prevent damage. Store rolls in a clean, dry location and cover as necessary to protect rolls from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

Remove any loose debris and clean PVC roof membrane, then allow to dry prior to application of walkway. Roll out and cut desired length up to 10' (3 m) and allow to relax while placing into the desired position. Install SENTINEL Walkway Pad with a continuous weld around the perimeter. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.

QUICK FACTS

WIDTH (in)	LENGTH (ft)	ROLL WEIGHT (lbs)	COLOR
30 (76.2 cm)	50 (15.2 m)	80 (36 kg)	Light gray

PHYSICAL PROPERTIES

PROPERTY	MD	TEST METHOD
Thickness, in (mm)	0.156 (4)	ASTM D412
Tear resistance, lbf/in (kN/m)	200 (35)	ASTM D624
Elongation, %	100	ASTM D412
Dimensional stability, %	0.25 (max change)	ASTM D1204
Accelerated weathering	Pass @ 5,000 hours	ASTM G155

* Data is represented by average values, unless noted otherwise.

SENTINEL®

PVC PIPE FLASHINGS

SENTINEL®
PVC PIPE FLASHINGS

PRODUCT # P601
P602, P603, P604,
P605, P606

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

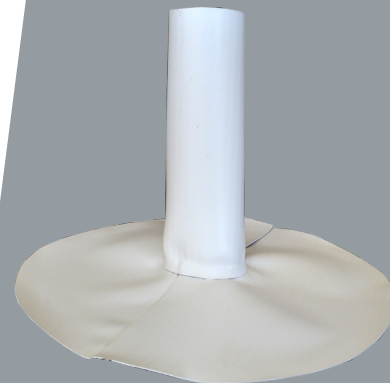
SENTINEL PVC Pipe Flashings are manufactured from fiberglass reinforced PVC membrane and feature a split design to fit around protrusions up to 6 inches (15.2 cm) in diameter.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL PVC Pipe Flashings are hot-air welded to the field membrane. Seal the top of the pipe flashing watertight with mastic and a pipe clamp (included). Refer to SOPREMA's specifications and installation instructions for additional application guidelines.



QUICK FACTS

DIAMETER (in)	HEIGHT (in)	THICKNESS (mils)	PIECES/ CARTON
1 to 6 (2.5 to 15.2 cm)	8 (20 cm)	60 (1.5 mm)	8 pieces

PACKAGING

SKU #	PRODUCT	DESCRIPTION	PACKAGING
P601	SENTINEL PVC Pipe Flashing - 1 in (2.5 cm)	Fits pipes up to 1 in diameter	8 per carton
P602	SENTINEL PVC Pipe Flashing - 2 in (5.1 cm)	Fits pipes 1 in to 2 in diameter	8 per carton
P603	SENTINEL PVC Pipe Flashing - 3 in (7.6 cm)	Fits pipes 2 in to 3 in diameter	8 per carton
P604	SENTINEL PVC Pipe Flashing - 4 in (10.2 cm)	Fits pipes 3 in to 4 in diameter	8 per carton
P605	SENTINEL PVC Pipe Flashing - 5 in (12.7 cm)	Fits pipes 4 in to 5 in diameter	8 per carton
P606	SENTINEL PVC Pipe Flashing - 6 in (15.2 cm)	Fits pipes 5 in to 6 in diameter	8 per carton



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PD10176 - REV. 030315

SENTINEL®

T-JOINT PATCHES

SENTINEL®
PVC T-JOINT PATCHES

PRODUCT # P506

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL T-Joint Patches are made using 60 mil, reinforced SENTINEL P150 membrane. SENTINEL T-Joint Patches are supplied as 4.5 inch diameter circles.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL T-Joint Patches are used to cover T-joints. They can also be used as all-purpose patches wherever needed. They are installed by hot-air welding to the roof membrane. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.

QUICK FACTS

DIAMETER (in)	THICKNESS (mils)	PIECES/ CARTON
4.5 (11.4 cm)	60 (1.5 mm)	100 pieces



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PD10177 - REV. 030315

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL PVC Profile Bars are extruded, pliable PVC bars designed to provide PVC membrane with the appearance of a standing seam metal roof. They are available in white, copper and silver. Each profile is 1.2 inches (31 cm) in height, 1.3 inches in width (1.8 cm) and 9.8 feet in length (3 m). Each profile has a weld base of 1.35 inches (34 mm) to attach the bar to the membrane.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and applications.

APPLICATION

Installation of the SENTINEL PVC Profile bar is done by hot air welding. The profile bar can be installed on both flat and curved surfaces, and can be applied on any slope. When installing the profile bar, tack weld the bar in place to ensure it is straight prior to heat welding the bar in place. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.



QUICK FACTS

WIDTH (in)	HEIGHT (in)	LENGTH (ft)	PIECES/ CARTON
1.38 (3.5 mm)	1.2 (3 cm)	9.84 (3.0 m)	10 pieces

PACKAGING

SKU #	PRODUCT	DESCRIPTION	PACKAGING
P650	SENTINEL PVC Profile Bar (White)	White profile bar	10 bars per carton, 98 ft (30 m) per box
M650	SENTINEL PVC Profile Bar (Copper Art)	Copper profile bar	10 bars per carton, 98 ft (30 m) per box
M651	SENTINEL PVC Profile Bar (Silver Art)	Silver profile bar	10 bars per carton, 98 ft (30 m) per box



PRODUCT DATA SHEET

DESCRIPTION & FEATURES

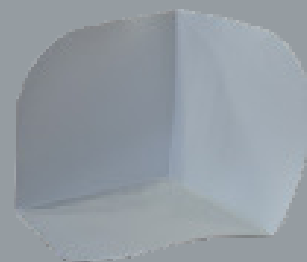
SENTINEL PVC Molded Corners are injection molded, unreinforced flashings that are installed to flash 90-degree inside and outside corners. SENTINEL PVC Molded inside and outside corners are white in color.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL PVC Molded Corners are installed via heat welding. Heat weld each seam using a hot-air welder. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.



QUICK FACTS

WIDTH (in)	LENGTH (in)	HEIGHT (in)	THICKNESS (mils)
6 (15.2 cm)	6 (15.2 cm)	6 (15.2 cm)	85 (2.2 mm)

PACKAGING

SKU #	PRODUCT	DESCRIPTION	PACKAGING
P501	Prefabricated outside corners	For use with white membranes	20 per carton
P502	Prefabricated inside corners	For use with white membranes	20 per carton

SENTINEL®

PVC MOLDED UNIVERSAL CORNER

SENTINEL®
PVC MOLDED
UNIVERSAL CORNER
PRODUCT # P503

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

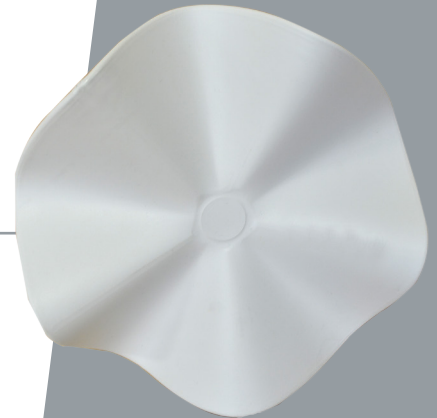
SENTINEL PVC Universal Corners are injection molded, unreinforced flashings that are applied to flash outside corners of varying irregularity or corners where cants may have been installed. SENTINEL PVC Universal Corners are white in color.

STORAGE

All materials must be stored in a dry clean location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL PVC Universal Corners are installed by heat welding. Heat weld each seam to the roof membrane using a hot air welder. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.



QUICK FACTS

DIAMETER (in)	THICKNESS (mils)	PIECES/CARTON
9 (22.9 cm)	85 (2.2 mm)	20 pieces

PACKAGING

SKU #	PRODUCT	DESCRIPTION	PACKAGING
P503	Molded universal corner	For use with white membranes	20 per carton



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PD10175 - REV. 030315

PRODUCT DATA SHEET

DESCRIPTION & FEATURES

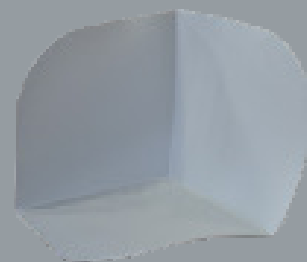
SENTINEL PVC Molded Corners are injection molded, unreinforced flashings that are installed to flash 90-degree inside and outside corners. SENTINEL PVC Molded inside and outside corners are white in color.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL PVC Molded Corners are installed via heat welding. Heat weld each seam using a hot-air welder. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.



QUICK FACTS

WIDTH (in)	LENGTH (in)	HEIGHT (in)	THICKNESS (mils)
6 (15.2 cm)	6 (15.2 cm)	6 (15.2 cm)	85 (2.2 mm)

PACKAGING

SKU #	PRODUCT	DESCRIPTION	PACKAGING
P501	Prefabricated outside corners	For use with white membranes	20 per carton
P502	Prefabricated inside corners	For use with white membranes	20 per carton



PRODUCT DATA SHEET

DESCRIPTION & FEATURES

SENTINEL VCM is a 24 gauge (0.6 mm) galvanized metal sheet with a 20 mil SENTINEL PVC membrane laminated to one side.

STORAGE

All materials must be stored in a clean, dry location and cover as necessary to protect from environmental damage such as extreme cold, heat or moisture. Monitor varying environmental conditions during storage, handling and application.

APPLICATION

SENTINEL VCM can be used to fabricate metal flashings, pitch-pans and edge details. It allows the user to create effective methods in detailing PVC-to-metal transitions. The vinyl coated metal can be used in both mechanically fastened and adhered roofing systems. Refer to SOPREMA's specifications and installation instructions for additional application guidelines.

QUICK FACTS

WIDTH (in)	LENGTH (ft)	SHEETS/ PALLET	STEEL (gauge)
39 (99.1 cm)	9.84 (3 m)	10 sheets	24 (0.6 mm)

SHEET PROPERTIES			
SKU #	PRODUCT	COVERAGE	SHEET WEIGHT
P701	SENTINEL VCM (White)	40 ft² (3.7 m²)	42 lb (19.1 kg)
M701	SENTINEL VCM (Copper Art)	32 ft² (2.97 m²)	34 lb (15.4 kg)
M702	SENTINEL VCM (Silver Art)	32 ft² (2.97 m²)	34 lb (15.4 kg)



LEED Product Sheet

SENTINEL® WHITE PVC



PRODUCT INFORMATION			
LEED CREDIT REFERENCE	PROPERTY	VALUE	COMMENTS
MR 4.1 & MR 4.2	Recycled content	No	Portion of total product weight that is composed of recycled materials
	Percent recycled content	0%	Post-consumer: 0% Pre-consumer: 0%

MR 5.1	Final manufacture	-	-
	Origin	Frosine, Italy & Chignolo, Italy	-

MR 5.2	Extracted or harvested	-	-
	Origin	Italy	-
	Raw material identification	100%	-

EQ 4.1	VOC content	N/A	Adhesive & Sealants
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EQ 4.2	VOC content	N/A	Paints & Coatings
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SS 7.2	Solar Rreflectance Index (SRI)	98	Heat Island Effect - Roof
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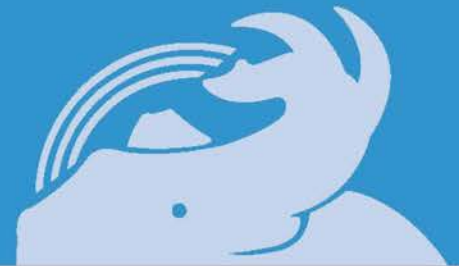
*CRRC Product ID Nos. 0772-0050

Product Data Sheets and MSDS are available at www.soprema.us
Contact Glenn Bestor for more information: (330) 334-0066 x2243



www.soprema.us
310 Quadral Drive, Wadsworth, Ohio 44281
Toll Free: (800) 356-3521 | Tel: (330) 334-0066

LPS10199 - REV. 081715



TECHNICAL BULLETIN No. TB 2014-06

Subject: FIELD UPLIFT PERFORMANCE TESTING

Date: April 20, 2014

AGENCY APPROVALS:

SOPREMA® roof assemblies are tested by independent labs for uplift resistance in accordance with ANSI/FM 4474, FM 4450, FM 4470 and/or UL 1897. The results or ratings are published by the applicable testing lab or approval agency. Where the roof assembly must be “FM Approved,” refer to the SOPREMA roof assemblies listed on FM Global RoofNav.

Since the 1980's, the 5' x 5' negative pressure test and 2' x 2' bonded pull test have been used in the field to quantify uplift resistance of in situ roof assemblies. Currently there are three standards used to evaluate the field uplift performance of roofing systems. These include Florida Building Code TAS 124, ASTM E 907 and FM Global Loss Prevention Data Sheet (LPDS) 1-52. These three test standards vary significantly. Some differences among the standards include, test pressures/loads required, margin of safety, acceptable limits for roof deflection, and more.

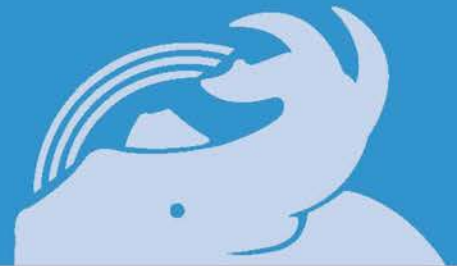
Field uplift testing of roof assemblies has become increasingly common as a quality control measure. Some potential issues with in situ uplift testing include the following:

- Using testing as a means for accepting new roofs when the testing requirements are not known in advance by SOPREMA, the contractor, or the owner.
- Conducting testing without prior notification to SOPREMA on roofs that are to be warranted, or where a warranty is already in place.
- Testing conducted by personnel with insufficient training or credentials, and subsequent unauthorized repairs.
- Findings that are inconclusive and/or not reported in accordance with one of the applicable test standards (TAS 124, ASTM E 907 or FM LPDS 1-52).

Issues and concerns with field uplift testing have been documented in NRCA's Professional Roofing magazine and other industry publications. A roofing industry coalition and Factory Mutual have worked together to revise FM Loss Prevention Data Sheet 1-52 to include alternate quality control methods in lieu of field uplift testing.

The consistency and reliability of field uplift testing remains controversial, and thus field uplift testing for “quality assurance” is not endorsed by industry associations such as NRCA. SOPREMA does also not recommend field uplift testing for “quality assurance” purposes..

In the event field uplift testing is required for new or existing SOPREMA roofs, the field uplift test proposal must be submitted to SOPREMA prior to testing. Upon completion of field uplift testing, the field uplift test report must be submitted to SOPREMA within 30 days of completion.



FIELD UPLIFT TEST PROPOSAL:

A written field uplift test proposal must be provided to SOPREMA not less than seven days prior to the proposed start of testing. This proposal must be submitted to the Technical Services Manager. The following information must be included in the field uplift test proposal:

- Proposed test schedule.
- Name of the testing company, names, credentials and contact information of those conducting the testing.
- Test standard and methods used: e.g., FM 1-52, ASTM E907 or TAS 124.
- The number of tests within each corresponding roof area to be tested.
- Proposed test pressures for the field, perimeter and corner areas with test pressures/calculations sealed by a design professional, or otherwise by the agency determining the test pressures.
- Copy of recommendations, reports and/or letters from FM (or other agency) detailing their test requirements.
- Contact information for the roofing contractor responsible for repairs.
- Proposed repair materials and methods.

FIELD UPLIFT TESTING:

- A SOPREMA technical representative must be present during the testing unless this requirement is waived in writing by SOPREMA.

FIELD UPLIFT TEST REPORTS:

Upon completion of testing, a written field uplift test report must be provided to SOPREMA, directed to the Technical Services Manager. The following information must be covered in the report:

- Reports must be in accordance with test standard's (FM 1-52, ASTM E907 or TAS 124) reporting requirements without deviation.
- Reports must clearly state the cause of each test failure.
- Drawing (roof plan) and photos of each test, failure mode, and test cut repairs.

Any field uplift testing and repairs not conducted in accordance with these requirements may impact the terms and conditions of the SOPREMA warranty.

Parameters	ASTM	Soprema G 150	Sarnafil G 410	Carlisle Sure Flex FRS
Overall mil Thickness	D638 (D751)	60 mil	60 mil	60 mil
Thickness Above Scrim	-- (D7635)	30 mil	30 mil	16 mil
Tensile Strength	D638 (D751)			
Machine Direction		100 lbf/in	1575 psi	1500 psi min/1900 typical
Cross Direction		90 lbf/in	1550 psi	1500 psi min/1900 typical
Elongation at Break, min.	D638 (D751)			
Machine Direction %		260	250	250 min (270 typical)
Cross Direction %		260	220	220 min (250 typical)
Seam Strength, min	D638 (D751)	Pass	Pass	Pass
Retention Properties After Heat Aging	D3045			
Tensile Strength, min	D638 (D751)	Pass	Pass	Pass
Elongation, min	D638 (D751)	Pass	Pass	Pass
Tearing Resistance	D1004	> 17	17.5	10 min (12 typical)
Low Temperature Bend	D2136	Pass	Pass	Pass
Accelerated Weathering Test	G154	5,000 Hours (ongoing)	10,000 Hours	10,000 hours
Cracking		None	None	None
Discoloration		Negligible	Negligible	Negligible
Crazing		None	None	None
Linear Dimensional Change	D1204	<0.04	-0.02	0.1 max (-0.05 typical)
Weight Change After Immersion %	D570	1.8	1.9	3.0 max (0.5 typical)
Static Puncture Resistance, 33 lbf	D5602	Pass	Pass	Pass
Dynamic Puncture Resistance	D5635	Pass	Pass	Pass

SOPREMA

SENTINEL

SYNTHETIC ROOF SOLUTIONS





For over 100 years, SOPREMA has been at the forefront of building envelope protection technologies. SOPREMA offers the most expansive portfolio of building envelope solutions in the market today. From our industry-defining SBS-modified bitumen membrane systems to ALSAN RS rapid-curing liquid applications, SOPREMA takes pride in embracing innovation. Sentinel PVC roof systems continues that innovative tradition.

Since 1970, SOPREMA has manufactured high-performance thermoplastic PVC roof membranes for the varying demands of the construction market. The Sentinel PVC formulation has over 40 years

of performance history in a variety of roofing and waterproofing applications all around the world. From Asia, to the Middle East and Europe to North and South America, Sentinel PVC has been installed on a variety of substrates in a variety of climates, and has weathered the most extreme conditions.

SOPREMA manufactures Sentinel PVC roof systems using a cast process that incorporates four layers of high-quality polymer blend encapsulating proprietary reinforcements. The blend integrates key chemical components specific to the weather resistance of the membrane. While it is widely recognized the polymer plays a vital role in successful performance; the



PROVEN

SOPREMA's Sentinel PVC Systems Proven Global Performance

plasticizers, stabilizers and pigments all have a significant impact on the long term viability of the membrane. From the manufacturing process, to the products that we offer, to the technical and field support we provide; SOPREMA has a passion for building envelope protection.

Sentinel PVC systems provide lasting solutions for new buildings and retrofit projects alike. From systems that stimulate the creative minds of the architect to the durability needs of the building owner; SOPREMA provides system solutions to match vision and long-lasting protection.



Easy to install, flexible and attractive, Sentinel PVC membrane performance waterproofing solutions.

PROVEN PERFORMANCE

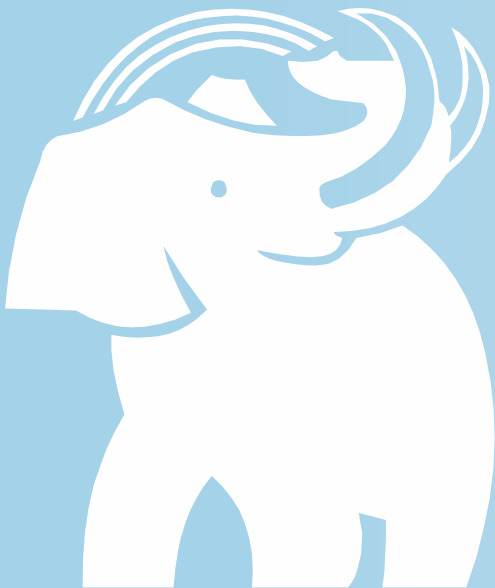
Sentinel synthetic PVC roofing membranes have been in service since 1970. Sentinel PVC membranes offer high UV performance and remain flexible, even at low temperatures. Sentinel PVC membranes also feature hot air welded seams that are stronger than the membrane itself. Once sealed, a monolithic roof membrane is created at the overlap. Sentinel PVC membranes meet or exceed ASTM D 4434 material specification.

VERSATILITY

Sentinel PVC systems are adaptable to the most complex architectural forms and can be installed in all manner of applications, from standard low slope roofs to intricate curved applications and sheer vertical installations.

AESTHETICS

Sentinel PVC systems offer five standard colors, including our Copper Art® and Silver Art® membranes. And our reflective white membranes are rated with the Cool Roof Ratings Council (CRRRC) and are Energy Star approved with an SRI over 0.88.



anes promise durable and high

SAFETY

Sentinel PVC systems utilize no open flames or hot asphalt, making for a safer installation. Sentinel PVC membranes are also fire-resistant and reduce spread-of-flame risks in the event of a catastrophic fire event.

PRODUCTIVITY

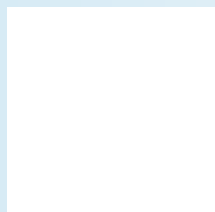
Sentinel PVC systems allow for faster installations when compared to traditional built up or multi-ply systems. Wide membranes mean fewer side laps to address, and prefabricated flashing details assist in the acceleration of the application.

CHEMICAL RESISTANCE

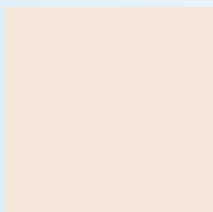
Sentinel PVC systems feature excellent resistance to inorganic chemicals and are not impacted by standing or stagnant water, bacterial growth or root penetration.



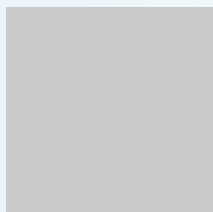
AVAILABLE COLORS



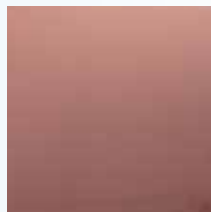
bright white



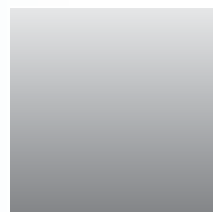
tan



grey



Copper Art®



Silver Art®

COLORS



Sentinel PVC roof systems offer a number of attachment solutions to fit the needs of the building owner.

MECHANICALLY FASTENED

Mechanically fastened Sentinel systems offer a rapid and economical waterproofing option. Fasteners are installed at spaced intervals in the side lap of the membrane and anchored directly into the deck. Adjacent sheets are then overlapped and heat welded over the fasteners, ensuring a completely watertight seal.

ADHERED

Sentinel's bonding adhesive is a contractor-friendly, VOC compliant, low odor formulation adhesive. Simply apply the adhesive with a roller to the substrate and to the membrane surface, allow to flash off and install the membrane. Press the top of the membrane with a stiff push broom immediately after contacting the membrane to the substrate in order to ensure optimal adhesion.

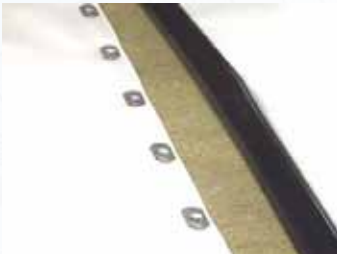
FLEECE BACK

Sentinel PVC membranes are available with a fleece back underside for specifications calling for superior uplift capabilities and for recovery applications.



PRE-FABRICATED FLASHING

Pre-fabricated flashing details and accessories are available, enhancing installation speed while providing peace-of-mind that the installation is watertight.



SENTINEL FASTENERS

All mechanically fastened Sentinel systems feature specially designed fastener plates that ensure superior wind uplift performance.



SENTINEL ADHESIVES

Sentinel Adhesives are environmentally friendly, VOC compliant, low odor adhesives designed to maximize bond strength between the membrane and the substrate. A waterborne version is also available.



HOT AIR WELDING

All Sentinel PVC systems are heat welded in the side and end laps, ensuring a durable and completely watertight seal.

SENTINEL

SOPREMA's Sentinel Copper Art® and Silver Art® systems faithfully replicate the appearance of modern metal roofs. With uniquely blended formulations, steep sloped applications can be covered with thermoplastic membranes to provide the look of a metal roof with the flexible performance of a high-quality vinyl waterproofing protection. When compared to typical standing seam metal roofing systems, Sentinel Copper Art® and Silver Art® systems stop the threat of moisture infiltration at the exposed membrane surface, and are not dependent on the underlayment for moisture protection, as with standing seam metal systems.



COPPER ART®

SINEL

Combining the beauty of traditional materials with modern technology, SOPREMA's innovative metallic PVC membranes - Sentinel Copper Art® and Silver Art® - provide architects, building owners and contractors with unlimited possibilities.



& SILVER ART®

A HISTORY OF INNOVATION



1908

Introduction of first SOPREMA waterproofing membrane



1963

Flexon Italiana established. Produces PVC membrane for agricultural applications



1970

Flexon Italiana becomes FLAG S.p.A. and begins manufacture and marketing of synthetic roof membranes



1979

FLAG S.p.A. begins manufacture of PVC via cast method



1990

FLAG S.p.A. introduces a new generation of synthetic liners in modified polyolefin - FLAGON TPO



1996

In acknowledgement of the firm's technical and organizational innovation, FLAG S.p.A. achieves internationally recognized UNI EN ISO 9001 certification



1997

Flag S.p.A. is recognized as achieving British Board of Agrément (BBA) quality certification approval.



2007

Introduction of COPPER ART® and SILVER ART® metallic PVC roof membranes



2007

FLAG S.p.A. joins SOPREMA Group



2014

SOPREMA PVC roof systems launches in United States as Sentinel PVC roof systems

COMMITMENT

OUR COMMITMENT TO YOU

Customer satisfaction is our number one priority. SOPREMA prides itself on having the most knowledgeable professionals in the industry. SOPREMA strives for excellence in service for every single customer, every time.

VALUES

INTEGRITY and RESPECT

Integrity and respect shall be at the foundation of our relationship with customers, suppliers, colleagues and the community.

COMMITMENT

We are committed to excellence in all undertakings. We shall exercise judgment, professionalism, diligence, personal discipline, perseverance, team spirit and a strong focus on customer satisfaction.

THE ENVIRONMENT

All activities and growth must target sustainable development to minimize the impact on the environment as often as possible.

MISSION

To ensure the growth of the organization by building on:

- Innovation and business opportunities
- The expertise, loyalty, and autonomy of our employees
- Research and development, technical information and support
- The commitment to the production of quality products
- Synergy between all sectors of the organization
- Providing systems and products for building envelope, civil engineering and industrial applications

INNOVATION: THE DRIVING FORCE

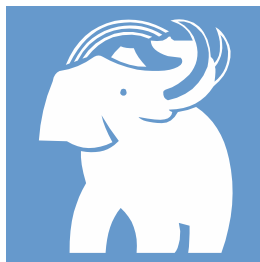
We owe our worldwide success to our daring spirit and commitment to inventiveness - our company has a century-old tradition of promoting new and bold ideas that allow us to move forward. This has been SOPREMA's watchword from the very beginning. The ability to innovate has been elevated to the status of corporate culture and applies to all aspects of our work including people, operations, sales, R&D, and sustainable development.

VALUES

INNOVATIVE BUILDING ENVELOPE SOLUTIONS

ROOFING • WATERPROOFING • WALL SYSTEMS • CIVIL ENGINEERING

SOPREMA offers a comprehensive line of roofing, waterproofing, wall protection and civil engineering solutions, combining superior products and systems with decades of proven performance. Our solutions include industry leading SBS-modified bitumen membranes, polymeric and modified bituminous liquid applied membranes, and synthetic single ply PVC membranes. For applications as diverse as roofing, below grade waterproofing, plaza deck and balcony waterproofing, air and vapor barriers and bridge and parking structures, SOPREMA has the solution. Our relentless pursuit of technological advancement, sustainability and product quality has been known and respected around the world for over 100 years.



Parameters	ASTM	Soprema G 150	Sarnafil G 410	Carlisle Sure Flex FRS
Overall mil Thickness	D638 (D751)	60 mil	60 mil	60 mil
Thickness Above Scrim	-- (D7635)	30 mil	30 mil	16 mil
Tensile Strength	D638 (D751)			
Machine Direction		100 lbf/in	1575 psi	1500 psi min/1900 typical
Cross Direction		90 lbf/in	1550 psi	1500 psi min/1900 typical
Elongation at Break, min.	D638 (D751)			
Machine Direction %		260	250	250 min (270 typical)
Cross Direction %		260	220	220 min (250 typical)
Seam Strength, min	D638 (D751)	Pass	Pass	Pass
Retention Properties After Heat Aging	D3045			
Tensile Strength, min	D638 (D751)	Pass	Pass	Pass
Elongation, min	D638 (D751)	Pass	Pass	Pass
Tearing Resistance	D1004	> 17	17.5	10 min (12 typical)
Low Temperature Bend	D2136	Pass	Pass	Pass
Accelerated Weathering Test	G154	5,000 Hours (ongoing)	10,000 Hours	10,000 hours
Cracking		None	None	None
Discoloration		Negligible	Negligible	Negligible
Crazing		None	None	None
Linear Dimensional Change	D1204	<0.04	-0.02	0.1 max (-0.05 typical)
Weight Change After Immersion %	D570	1.8	1.9	3.0 max (0.5 typical)
Static Puncture Resistance, 33 lbf	D5602	Pass	Pass	Pass
Dynamic Puncture Resistance	D5635	Pass	Pass	Pass

SENTINEL PVC Job References

- Glenside Public Library: Glendale Hts, IL
 - SENTINEL Silver Art HFB – 12,500 square feet
- Martinsville High School: Martinsville, IN
 - SENTIEN G-150 – 86,000 square feet
- Dewberry and Garlington Station: Charleston, SC
 - SENTIENEL P-150 – 25,500 square feet
- 382 Gellerd: Daly City, CA
 - SENTIENEL G-150 – 22,000 square feet
- Ivey Engines: Portland, OR
 - SENTINEL P-150 – 9,700 square feet
- Copley Stoughton: Stoughton, MA
 - SENTINEL P-150 HFB – 23,700 square feet
- Deer Meadow School: Greencastle, IN
 - SENTINEL Copper Art HFB – 66,000 square feet
- Hobs Office Building: Cleveland, OH
 - SENTINEL P-150 – 18,000 square feet
- Martinsville High School: Martinsville, IN
 - SENTINEL P-150 Tan – 80,000 square feet

Soprema Approved WA State Contractors

- | | |
|-------------------------------------|----------------|
| 1. Axiom Construction/ Division 7 | (360) 354-1184 |
| 2. Bosnick Roofing, Inc | (253) 565-4500 |
| 3. Cobra BEC, Inc | (253) 887-1500 |
| 4. Hytech Roofing | (360) 354-4335 |
| 5. Madsen Roofing | (360) 456-2821 |
| 6. McDonald & Wetle Roofing | (253) 589-8999 |
| 7. Queen City Sheet Metal & Roofing | (206) 623-6020 |
| 8. Rainbow Federal | (425) 333-4876 |
| 9. Reidel Roofing | (425) 820-1300 |
| 10. Snyder Roofing | (425) 402-1848 |
| 11. Sound Roof Services | (425) 464-0441 |
| 12. SR Building Services | (425) 558-7770 |
| 13. Stanley Roofing | (425) 483-6666 |
| 14. Tecta America | (206) 522-5436 |
| 15. Wayne's Roofing | (253) 863-4455 |
| 16. Wright Roofing | (253) 472-3321 |