Pioneer

TECHNICAL DATA SHEET

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Contents

Pioneer reinforce foamed mineral-PVC decking

Pioneer composite brings to market a photorealistic print technology which creates the most natural looking composite finish available in the Eva-Last range.

Product name: Pioneer reinforced foamed mineral-PVC decking

Product use: Primarily used in decking, fascia, and similar applications

Material: Glass fiber reinforced mineral and PVC composite

Material description: Co-extruded profiles with PMMA cap around a foamed mineral-polymer composite core

Document guide

Eva-Last strives to evaluate their products in depth and present the technical and safety information available in a manner that assists with the application thereof. If additional data or information is required, please do not hesitate to contact us at **rad@eva-last.com**.

In an attempt to simplify the information, similar data is loosely grouped into the categories summarised below. This document is ordered according to these categories and the applicable page number for the start of each section captured in the Table of contents above.

- Material composition
- Physical properties
- Mechanical properties
- Thermal properties
- Fire reaction properties
- Weathering properties
- Surface properties

The material compositions section captures a summary of the product make-up from the Material Safety Data Sheet (MSDS). A link to the MSDS is provided for additional detail. Summaries of chemical compliance data available are also collected in this section.

The physical properties section provides a summary of available profiles and general material properties such as density, water absorption, etc. Additional profile information can be obtained from drawings in the appropriate Appendix. Where possible, material properties that can be assigned to more specific categories are moved to the relevant section.

The mechanical properties section captures data related to the product's reaction to various load conditions. The section is broadly assembled into the below categories. Additional profile and sectional information are captured by the drawings in the appropriate Appendix.

- Material specific mechanical properties
- Profile specific mechanical properties
- Sectional properties

Product properties such as the expansion coefficient, thermal resistance, etc. are captured, where applicable, in the thermal properties section.

Information regarding the product's reaction to fire is captured in the fire reaction properties section.

Test data relating to the acoustic performance of the product is summarised in the acoustic properties section.

Information on the products resistance to mould, termites, etc. is collected in the biodegradation properties section.

The surface properties section summarises information regarding the finish or texture of the product. Test data on aspects such as slip resistance (where applicable) is captured in this section.

Where the products form part of a system and, as a result, utilise other components, an additional section to capture useful data regarding these components has been added to this document.

Where information is not yet available, has been omitted. In the cases where information can be substituted or supplemented with alternative data (based on similar compositions, etc.), an attempt to do so is made. Where this is the case, it is highlighted. Please make use of the data accordingly. For any additional information regarding this, please feel free to contact **rad@eva-last.com**.

Ensure the product and application thereof is suitable, rational, and compliant with any applicable regulations or standards. Wherever necessary, consult a suitably qualified professional. For information about the installation and use of the product, please see the applicable Installation Guide (IG). For additional material safety and handling information, please refer to the applicable MSDS. For any further information, please contact **rad@eva-last.com**.

Material composition

The following table is a simplified material composition for the Pioneer material technology. For more information regarding the composition, safety, and handling of the material, please see the Pioneer MSDS. Please also refer to the safety section and the Safe Working Procedure (SWP) in the IG (Installation Guide) for additional information related to the safe use of these products. To confirm which substances are compatible, or incompatible, with the product, please refer to **Appendix B**.

Component	Substance	Mass (%)
Core	Poly chloroethylene (PVC)	50%
	Calcium carbonate	30%
	Acrylonitrile-butyl acrylate-styrene copolymer	10%
	Glass fiber	1%
Additional additives	Other	9%
Cap	PMMA	

Physical properties

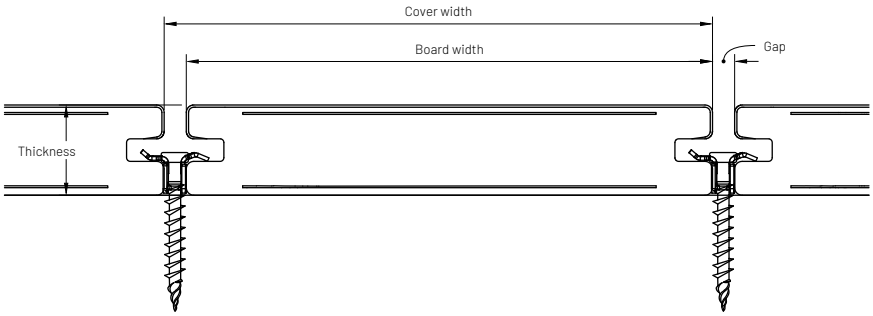
General material properties

Typical properties of the Apex Plus material technology are captured below as an indication of the expected behaviour of the Pioneer material.

Properties	Results	Test Method	Information
Density	650 to 760 kg/m^3 (40.58 to 47.45 lb/ft^3)	ASTM D2395	Results are based on Apex Plus materials.

Profile properties

The following table is a summary of the currently available profiles, please see **Appendix A** for profile drawings.



Profile ID	Application type	Board width (mm)(in)	Thickness (mm)(in)	Mass per meter (kg/m)(lb/ft)	Cover width [1] (mm)(in)	Coverage [2] (m/m^2)(ft/ft^2)	Coverage mass [3] (kg/m^2)(lb/ft^2)
STFM101A	Deck board	145.0 (5.71)	21.0 (0.83)	2.2 (1.48)	151.0 (5.95)	6.7 (2.04)	14.1 (2.89)
STFM102A	Deck board	141.0 (5.55)	24.5 (0.97)	2.6 (1.75)	147.0 (5.79)	6.8 (2.07)	17.6 (3.61)
STFM103A	Deck board	141.0 (5.55)	24.5 (0.97)	2.5 (1.68)	147.0 (5.79)	6.8 (2.07)	16.6 (3.40)
STFM104A	Deck board	145.0 (5.71)	21.3 (0.84)	2.3 (1.55)	151.0 (5.95)	6.6 (2.02)	15.5 (3.18)
STFM105A	Deck board	190.0 (7.49)	21.0 (0.83)	3.1 (2.09)	196.0 (7.72)	5.1 (1.56)	15.8 (3.24)
STFM106A*	Deck board	190.0 (7.49)	21.0 (0.83)	3.1 (2.09)	196.0 (7.72)	5.1 (1.56)	15.8 (3.24)
STFM106	Fascia board	151.0 (5.95)	12.5 (0.49)	1.4 (0.94)	157.0 (6.18)	6.4 (1.95)	9.9 (2.03)

[1] Coverage width = Board width + an assumed typical gap of 6 mm.

[2] Coverage = 1000/Coverage width

[3] Coverage = Coverage x mass per meter.

*Code TBC

Mechanical properties

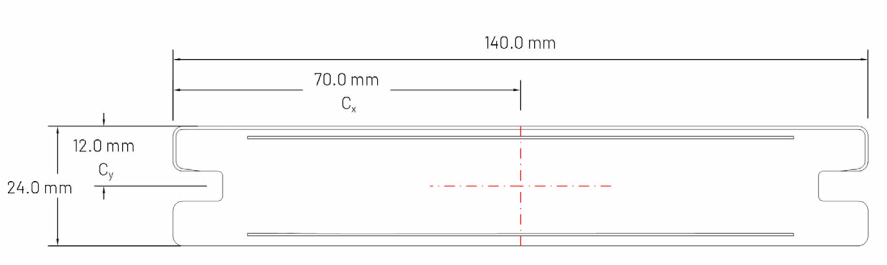
Material specific mechanical properties

All information within this table is currently based on internal laboratory results of Pioneer version 1.0. Where results are supplemented with Apex Plus material technology data this is noted.

Property	Result		Requirement	Test method standard	Information
Surface to core bonding performance in low temperature conditions	267 N (60.03 lbf)		60 N (13.49 lbf)	ISO 24345	Boards were cooled to -5°C and the bond strength tested at a speed of 100 mm per minute.
Surface to core bonding performance at ambient temperatures	217 N (48.79 lbf)		75 N (16.86 lbf)	ISO 24345	Boards were tested at an ambient temperature of 23°C and the bond strength tested at a speed of 100 mm per minute.
Cap shrinkage rate under high temperatures	Left	-0.75%	Less than 1.4%	BS EN 15534-1	The board was heated at temperatures of 100°C for one hour. There were no obvious signs of cap shrinkage, and the length of the substrate was consistent with that of the film.
	Centre	-0.064%			
	Right	-0.87%			
Impact resistance	Pass		No cracks found	BS EN 15534-1	A ball weighing 324g was dropped onto the board from a height of 1 750 mm at ambient temperatures.
Impact resistance at low temperatures	Pass		No cracks found	GB/T 24508	The board were cooled at temperatures of -10°C for two hours. A hammer was dropped for a height of 1 000 mm. No cracks were found in the surface, nor any fractures in the substrate.
Scratch resistance	4 N (0.90 lbf)			FORD FLTM BO 162-01	
Abrasion resistance	Cap wear	5 000 cycles	3 500 cycles	EN 13329	The PMMA cap was subjected to a 0.5 kg rotating abrasive wheel moving at 60 rotations a minute. The cycles were counted until the approximately 0.55 mm layer was completely removed.
	Material loss	0.06g	Less than 0	ISO 7784-1	The PMMA cap was subjected to a rotating abrasive wheel at 100 cycles. The product of the abrasive interaction was then weighed.
Modulus of Elasticity (MOE)	2637 MPa (382 365 lbf/in^2)			BS EN 15534-1	As the modulus of elasticity is a material property as well as a flexural property, the following information has been provided as a summary of the flexural performance tests below. MOE can be dependent on profile. This value is based on Apex Plus GFR results.

Profile flexural performance testing

Flexural properties of polymer composites can be influenced by the profile geometry and span. Typical properties of the Apex Plus material technology are captured below based on internal test results as an indication of the expected behaviour of the Pioneer material. The STTHMZQ103 profile is a 140 mm x 24 mm grooved board. The following sectional properties are provided for reference:



STTHMZQ103 Sectional properties

		Moments of inertia		Centroids		Elastic section modulus	
Mass per meter (kg/m) (lb/ft)	**Area (mm^2) (in^2)**	**Ix (mm^4) (in^4)**	**Iy (mm^4) (in^4)**	**Cx (mm) (in)**	**Cy (mm) (in)**	**Sx (mm^3) (in^3)**	**Sy (mm^3) (in^3)**
2.4 (1.61)	3 234 (5.01)	160 415 (0.39)	4 949 191 (11.89)	70.0 (2.76)	12.0 (0.47)	13 368 (0.82)	70 703 (4.31)

Profile	Span (mm)	Ultimate Load (kN)	Modulus of rupture MOR (MPa)	Modulus of elasticity MOE (MPa)	Test method	Information
STTHMZQ103 3 Point test	300 (11.81)	10.7 (2 405.36)	60.4 (8 758.0)	2 903.3 (420 978.5)	BS EN 15534-1	Internal reports have provided the flexural performance of STTHMZQ103 profiles at varying spans. Further testing is underway for Pioneer materials.
	400 (15.75)	8.5 (1 910 .80)	63.6 (9 222.0)	2 629.5 (381 277.5)		
	500 (19.69)	7.4 (1 663.52)	69.5 (10 077.5)	2 702.6 (391 877.0)		
STTHMZQ103 4 Point test	300 (11.81)	17.2 (3 866.56)	64.6 (9 367.0)	2 670.1 (287 164.5)		
	400 (15.75)	12.8 (2 877.44)	63.9 (9 265.5)	2 569.0 (372 505.0)		
	500 (19.69)	8.6 (1 933.28)	53.7 (7 786.5)	2 342.3 (339 633.5)		

Material weathering factor

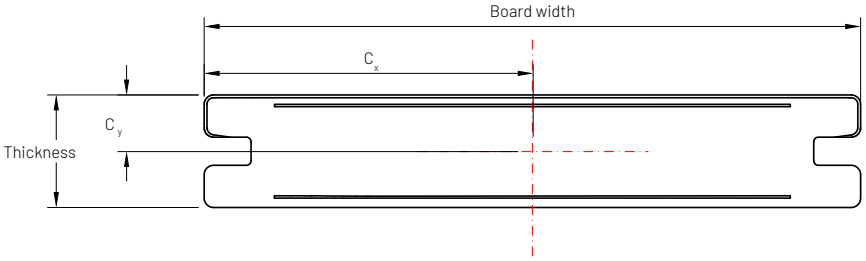
Material properties can vary as a result of long-term weathering. To estimate this impact on the material's flexural properties, the product is subjected to various weathering effects and the performance with and without weathering is compared. The overall end-use adjustment factor is selected based on the weathering effect that has the most impact on the material.

Typical properties of the Apex material technology are captured below as an indication of the expected behaviour of the Pioneer material. It is anticipated that the glass fiber reinforcing sheets of the Pioneer material technology would improve the performance of the high temperature effect results below.

Weathering effect	MOR (%)	MOE (%)	Adjustment factor	Test method	Information
High temperature effect	18%	24%	0.76	ASTM D7032 – 17, ASTM D2565, and ASTM D790	To confirm compliance with ICC-ES, AC 174, Apex materials were evaluated for a decking application to determine what affect temperature, moisture and UV exposure had on the flexural performance of the material in accordance with the test methods listed. The end use adjustment factor is based on the effect with the most impact. The results of which can be located within the issued CCR report, **here**.
Low temperature effect	-26%	-14%	1.00		
Moisture effect	-3%	4%	0.96		
UV effect	-6%	1%	1.00		
Freeze-thaw effect	1%	13%	0.97		
Overall end-use adjustment factor			0.76		

Sectional properties

The following table provides a sectional property summary of the currently available Pioneer profiles in their typical board orientation.
Please see **Appendix A** for profile drawings and further information.



		Profile details			Moments of inertia		Centroid		Elastic sectional modulus	
Profile ID	Application	Width (mm)	Thickness (mm)	Area (mm^2)	I_x (mm^4)	I_y (mm^4)	C_x (mm)	C_y (mm)	S_x (mm^3)	S_y (mm^3)
STFM101A	Decking	144.9 (5.70)	21.0 (0.83)	2 843 (4.41)	101 499 (0.24)	4 615 773 (11.09)	72.4 (2.85)	10.2 (0.40)	9 936 (0.61)	63 713 (3.89)
STFM102A	Decking	141.1 (5.56)	24.5 (0.97)	3 447 (5.34)	171 787 (0.41)	5 663 635 (13.61)	70.6 (2.78)	12.4 (0.49)	13 878 (0.85)	80 277 (4.90)
STFM103A	Decking	141.1 (5.56)	24.5 (0.97)	3 264 (5.06)	159 826 (0.38)	5 061 233 (12.16)	70.0 (2.76)	12.0 (0.47)	13 293 (0.81)	72 303 (4.41)
STFM104A	Deck board	145 (5.71)	21.3 (0.83)	3 885 (6.02)	145 270 (0.35)	11 116 873 (26.71)	95 (3.74)	10.5 (0.41)	13 813 (0.84)	117 019 (7.14)
STFM105A	Deck board	190 (7.48)	21 (0.82)	2 930 (4.54)	106 068 (0.26)	4 881 116 (11.73)	73.4 (2.89)	10.4 (0.41)	10 212 (0.62)	66 476 (4.06)
STFM107A*	Deck board	190 (7.48)	21 (0.82)	3 934 (6.09)	145 570 (0.35)	11 519 988 (27.68)	96.1 (3.78)	10.5 (0.41)	13 853 (0.85)	119 838 (7.31)
STFM106	Fascia [1]	151.0 (5.95)	12.5 (0.49)	1 879 (2.91)	3 513 737 (8.44)	24 405 (0.06)	6.3 (0.25)	75.6 (2.98)	46 505 (2.84)	3 887 (0.24)

Thermal properties

Typical properties of the Apex Plus material technology are captured below as an indication of the expected behaviour of the Pioneer material.

Properties	Results	Test method	Information
Coefficient of thermal expansion (CTE)	35.0 x 10^{-6} mm/mm.°C	ASTM D696-16	Results are based on Apex Plus materials.

Fire reaction properties

Typical properties of Apex and Apex Plus material technologies are captured below as an indication of the expected behaviour of the Pioneer material.

Apex single cap

Standard	Properties	Result	Requirement	Test Method	Information
EN 13501	Critical heat flux	11 kW/m^2	Greater than 8.0 kW/m^2	EN 9239 and ISO 11925	Test was conducted on Apex material in a decking application. Profile STPVB103 was tested with a single cap layer. The report can be found **here**.
	Smoke production	254.0 %.min	Less than 750 %.min		
	Flame spread (Fs)	Yes	Less than 150 mm in 20 seconds.		
	Class	Bfl – s1			

Apex plus

Standard	Properties	Result	Requirement	Test Method	Information
EN 13501	Class	Efl	Less than 150 mm in 20 seconds.	EN 9239 and ISO 11925	Test was conducted on Apex plus STTHMZQ128 material in a decking application. See link **here**.

Apex dual tone

Standard	Properties	Result	Requirement	Test Method	Information
ICC-ES AC 174	Flame spread index (FSI)	35	Less than 200	ASTM E84	Test was conducted on Apex deck boards with a dual cap technology. The results of which can be located within the issued CCR report, **here**.
	Smoke development index	1 300	Less than 450		

Standard	Properties	Result		Requirement	Test Method	Information
EN 13501	Smoke production	728 %.min		Less than 750 %.min	EN 9239 and ISO 11925	Test was conducted on Apex material in a decking application. Dual cap technology was tested. Report can be found, **here**.
	Flame spread (Fs)	10 min	500 mm	Less than 150 mm in 20 seconds.		
		20 min	660 mm			
		30 min	760 mm			
	Critical heat flux	1.8 kW/m^2		Greater than 3.0 kW/m^2		
	Heat flux (HF)	10 min	3.8 kW/m^2			
		20 min	2.4 kW/m^2			
		30 min	1.8 kW/m^2			
	Maximum light attenuation	92%				
	Class	Efl – s1				

WUI	Effective net peak release rate	147.8 kW/m^2	269 kW/m^2	SFM 12-7A-4A Decking	Effective net peak heat release rate of less than or equal to 269 kW/m^2.
	Sustained flaming	Pass	40 min		Sustained flaming or glowing combustion of any kind of at the conclusion of the 400-minute observation period was not present.
	Absence of falling particles	Pass	No falling particles		Absence of falling particles that are still burning when reaching the burner or floor
	Classification	Pass			STTHM103 Grooved, Half capped profile. Link can be found, **here**.

Weathering

The environment to which materials are exposed influences how quickly the material will weather (or deteriorate). This includes degradation factors like UV exposure, oxidation or contact with organisms within the environment such as termites or mould.

Colour fade

Materials are susceptible to colour change over time due to weathering. **ΔE** denotes the colour difference between an original sample and a tested sample after exposure to UV light. **ΔE** is measured on a scale of 1 to 100 and provides a metric to understand how the human eye perceives colour change.

Standard	Hours	Colour	ΔE	Test method	Information
ASTM	1 000	X20001 – GFN (Grey Fraxinus)	0.89	ASTM G154	The colour change would be perceptible at a glance.
	2 000		1.89		
	3 000		2.53		
	4 000		3.21		
	1 000	W2002ECN-Y (Exotic canary wood)	0.93		The colour change would be perceptible at a glance.
	2 000		1.95		
	3 000		2.67		
	4 000		3.39		

Biodegradation

Materials exposed to organisms such as termites or mould can degrade as a result.

Decay resistance

Mould resistance does not apply to products without significant cellulose materials within the composition.

Termite resistance

Termite resistance does not apply to products without significant cellulose materials within the composition.

Surface properties

Slip resistance

Various test standards are available to estimate the slip resistance and grade the product accordingly. A common test method utilised by the industry is the pendulum test. There are primarily two slider types used. Slider 55 consists of a relatively softer rubber and is used to simulate bare foot interactions with the product. Slider 96 consists of a relatively harder rubber and is used to simulate shod/shoes interactions with the product. The results can be used to generate a slip resistance value (SRV) that can be utilised to estimate slip resistance classes based on existing correlations. The tables below provide a classification system according to **Appendix A** of AS 4586 and the internal test results of existing Pioneer surfaces at the time.

Class	Pendulum SRV	
	Slider 55 (barefoot)	Slider 96 (shod)
P5	>44	>54
P4	40 to 44	45 to 54
P3	35 to 39	35 to 44
P2	20 to 34	25 to 34
P1	<20	12 to 24
P0		<12

Finish	SRV	Class	Test method	Information
Matt texture	40	P4	CEN/TS 15676	Tests were conducted using slider 55 with wet conditions. It is assumed that these profiles will have better slip resistance when dry.
Matt B texture	55	P5		

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Appendix A
Profiles details

Profile properties	
Product code	**STFM101A**
Sectional area (mm^2)	2 843
Approximate mass (kg/m)	2.1

Sectional properties in typical orientation	
I_x(mm^4)	101 499
I_y(mm^4)	4 615 773
C_x(mm)	72.4
C_y(mm)	10.2
S_x(mm^3)	9 936
S_y(mm^3)	63 713

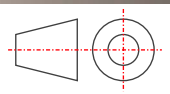
Drawing title

STFM101A - Grooved deck board - Pioneer

File name

2023-10-12 - Pioneer TDS - profile drawings

File details



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Date	October 26, 2023
Page	N/a
Scale	NTS

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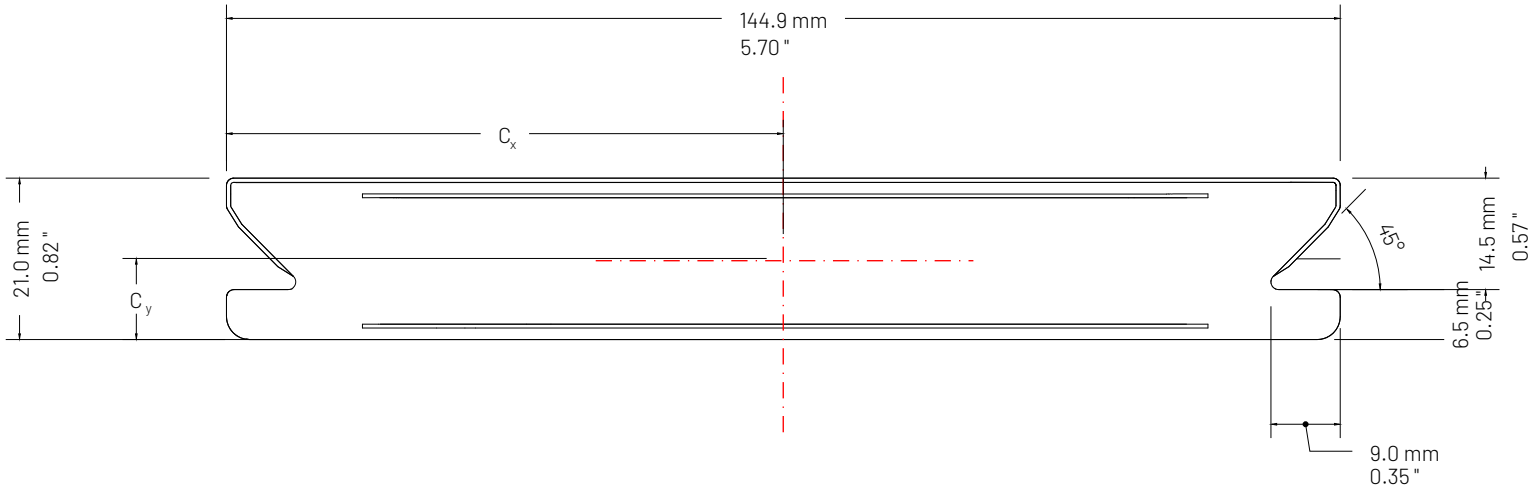


Profile properties	
Product code	**STFM102A**
Sectional area (mm^2)	3 447
Approximate mass (kg/m)	2.6

Sectional properties in typical orientation	
I_x(mm^4)	171 787
I_y(mm^4)	5 663 635
C_x(mm)	70.6
C_y(mm)	12.4
S_x(mm^3)	13 878
S_y(mm^3)	80 277

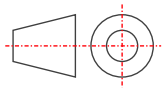
Drawing title

STFM102A - Square edge deck board - Pioneer

File name

2023-10-12 - Pioneer TDS - profile drawings

File details



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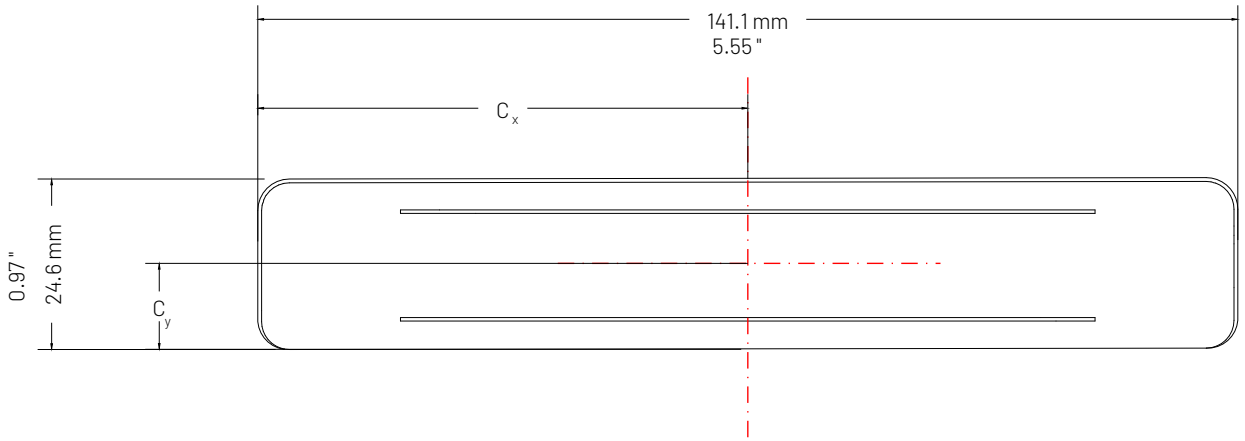


Profile properties

Product code	**STFM103A**
Sectional area (mm²)	3 264
Approximate mass (kg/m)	2.4

Sectional properties in typical orientation

I_x(mm⁴)	159 826
I_y(mm⁴)	5 061 233
C_x(mm)	70.0
C_y(mm)	12.0
S_x(mm³)	13 293
S_y(mm³)	72 303

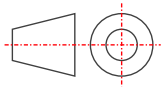
Drawing title

STFM103A - Grooved deck board - Pioneer

File name

2023-10-12 - Pioneer TDS - profile drawings

File details



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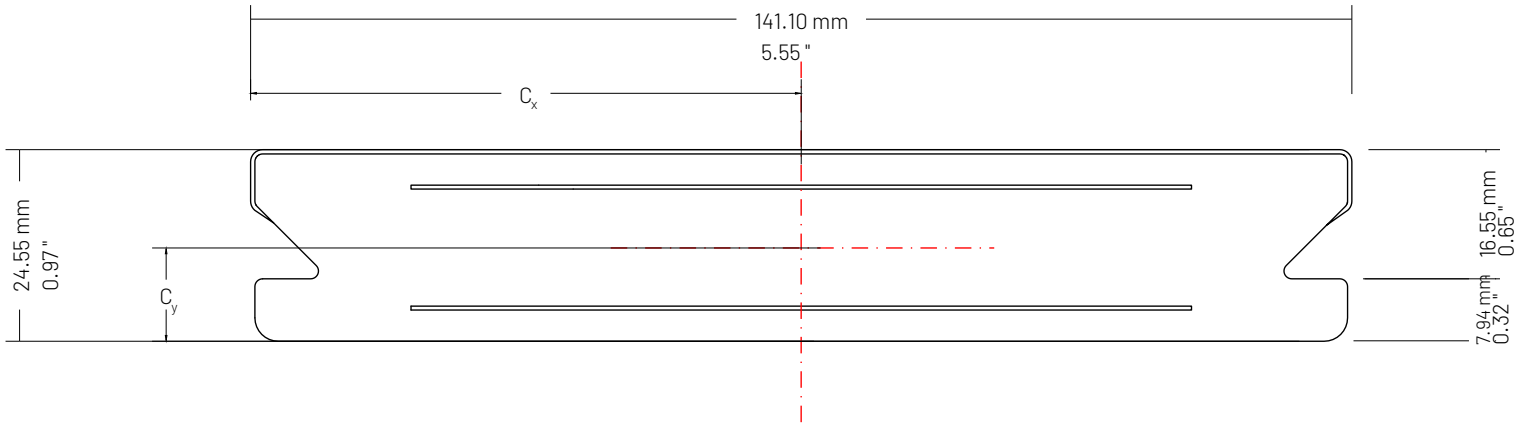


Profile properties	
Product code	**STFM106**
Sectional area (mm²)	1 879
Approximate mass (kg/m)	1.4

Sectional properties in typical orientation	
I_x (mm⁴)	3 513 737
I_y (mm⁴)	24 405
C_x (mm)	6.3
C_y (mm)	75.6
S_x (mm³)	46 505
S_y (mm³)	3 887

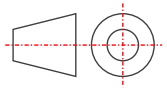
Drawing title

STFM106 - Fascia board - Timber structure - Pioneer

File name

2023-10-12 - Pioneer TDS - profile drawings

File details

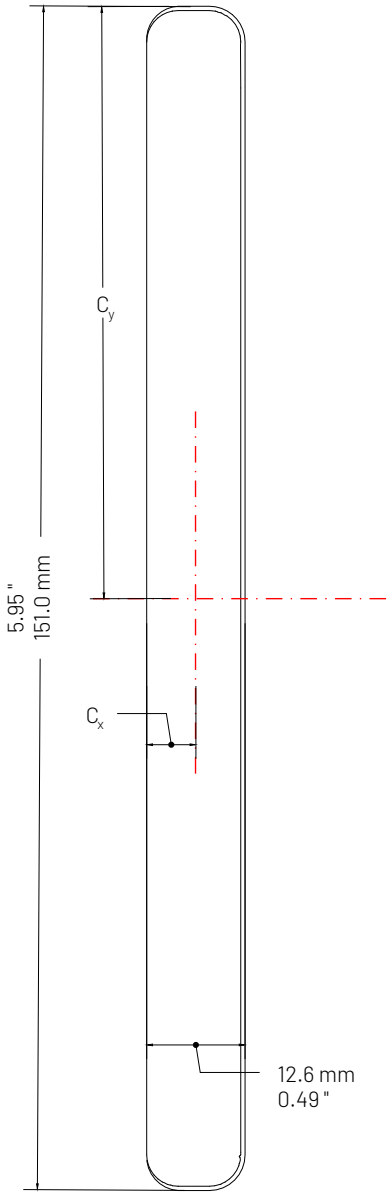


Drawing number	01
Date	October 26, 2023
Page	N/a
Scale	NTS

Unless otherwise specified all dimensions are in millimeters.

Issued for information. See supporting documentation for disclaimers and details.

Pioneer



Appendix B

Chemical compatibility

The following information provides a list of substances that may negatively impact the PMMA cap material of Pioneer. Below is an extensive (not complete) list of common substances and solutions known to influence the surface of PMMA cap of Pioneer. The table provided is referenced from the Industrial Specialties MFG. and IS med specialties (ISM) and provided for ease of reference.

It is important to check material compatibility when choosing chemicals that the product may encounter, as they may prematurely degrade the product, these may include ingredients in cleaning products, pool additives and even oils and saps from local vegetation.

Key to General Chemical Resistance – All data is based on ambient or room temperature conditions, about 64°F (18°C) to 73°F (23°C)

A = Excellent - resistance to substances.
B = Good - minor effect, slight corrosion or discoloration.
C = Fair - moderate effect, not recommended.
D = Severe effect - not recommended for any use.

It is the sole responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Material compatibility, product ratings and application details should be considered in the selection. (Hydrogen Peroxide Material Compatibility Chart - Industrial Spec) Improper selection or use of products described herein can cause personal injury or product damage.

Acetal (POM) Chemical Compatibility Chart

Version 28-Oct-2022

Chemical	Effect
Acetaldehyde	A
Acetamide	A
Acetate Solvents	A
Acetic Acid	D
Acetic Acid, 20%	C
Acetic Acid, 80%	D
Acetic Acid, Glacial	D
Acetic Anhydride	D
Acetone	A
Acetyl Chloride, dry	D
Acetylene	A
Alcohols: Amyl	A
Alcohols: Benzyl	A
Alcohols: Butyl	A
Alcohols: Diacetone	A
Alcohols: Ethyl	A
Alcohols: Hexyl	A
Alcohols: Isobutyl	A
Alcohols: Isopropyl	A
Alcohols: Methyl	A
Alcohols: Octyl	A
Alcohols: Propyl (1-Propanol)	A
Aluminum chloride, 20%	C
Aluminum Fluoride	C
Aluminum Hydroxide	A
Aluminum Nitrate	B

Chemical	Effect
Aluminum Potassium Sulfate, 10%	C
Aluminum Potassium Sulfate, 100%	C
Aluminum Sulfate, 10%	B
Alums	C
Amines	D
Ammonia, 10% (Ammonium Hydroxide)	C
Ammonia, 10%	D
Ammonia, anhydrous	D
Ammonia, liquid	D
Ammonia Nitrate	C
Ammonium Acetate	C
Ammonium Bifluoride	D
Ammonium Carbonate	D
Ammonium Caseinate	D
Ammonium Chloride, 10%	B
Ammonium Hydroxide	D
Ammonium Nitrate, 10%	A
Ammonium Oxalate	B
Ammonium Persulfate	D
Ammonium Phosphate, Dibasic	B
Ammonium Phosphate, Monobasic	B
Ammonium Phosphate, Tribasic	B
Ammonium Sulfate	B
Ammonium Sulfite	D
Ammonium Thiosulfate	B
Amyl Acetate	B

Chemical	Effect
Amyl Alcohol	A
Amyl Chloride	A
Aniline	A
Aniline Oil	D
Anise Oil	D
Antifreeze	D
Aqua Regia (80% HCl, 20% HNO_3)	D
Aromatic Hydrocarbons	A
Arsenic Acid	D
Asphalt	B
Barium Carbonate	A
Barium Chloride	A
Barium Cyanide	B
Barium Hydroxide	D
Barium Nitrate	B
Barium Sulfate	B
Barium Sulfide	A
Bay Oil	D
Beer	A
Beet Sugar Liquids	B
Benzaldehyde	A
Benzene	A
Benzene Sulfonic Acid	C
Benzoic Acid	B
Benzol	A
Benzyl Chloride	A
Bone Oil	D
Borax (Sodium Borate)	B
Boric Acid, 10%	A
Brewery Slop	B
Bromine Gas	D
Butadiene	A
Butane Gas	A
Butanol (Butyl Alcohol)	A
Butter	A
Buttermilk	A
Butylene	A
Butyl Acetate	A
Butyl Amine	C
Butyl Ether	D
Butyric Acid, 20%	A
Calcium Bisulfide	D
Calcium Bisulfite	D
Calcium Carbonate (Chalk) $CaCO_3$	A

Chemical	Effect
Calcium Chlorate	A
Calcium Chloride, 10%	D
Calcium Hydroxide (Lye), 10%	D
Calcium Hypochlorite	D
Calcium Nitrate	D
Calcium Oxide (Unslaked Lime) CaO	A
Calcium Sulfate, 10%	D
Calgon	A
Cane Juice	A
Carbolic Acid (Phenol)	D
Carbon Bisulfide	A
Carbon Dioxide, dry	A
Carbon Dioxide, wet	A
Carbon Disulfide	A
Carbon Monoxide Gas	A
Carbon Tetrachloride, wet	A
Carbonated Water (carbonic acid)	A
Carbonic Acid (carbonated water)	B
Castor Oil	A
Catsup	B
Chloric Acid	D
Chlorine, anhydrous liquid	A
Chlorine Gas, dry 10%	D
Chlorine Water (5-10 ppm)	D
Chloroacetic Acid	D
Chlorobenzene (mono)	D
Chlorobromomethane	B
Chloroform	A
Chlorosulfonic Acid	D
Chocolate Syrup	A
Chromic Acid, 5%	D
Chromic Acid, 10%	D
Chromic Acid, 30%	D
Chromic Acid, 50%	D
Cider	A
Cinnamon Oil	D
Citric Acid, aqueous 10%	B
Citric Oils	D
Citrus Oil or Terpene (d-Limonene)	D
Clorox® Bleach	D
Coconut Oil	A
Coffee	A
Copper Chloride	A
Copper cyanide	A

Chemical	Effect
Copper Fluoroborate	B
Copper Nitrate	A
Copper Sulfate, 5%	D
Copper Sulfate, over 5%	D
Cream	A
Creosote Oil	D
Cresols	D
Cresylic Acid	D
Cyanic Acid	D
Cyclohexane	A
Cyclohexanone	A
Detergents	A
Diacetone Alcohol	A
Dichlorobenzene	B
Dichloroethane	A
Diesel Fuel	A
Diethyl Ether	A
Diethylamine	B
Diethylene Glycol	A
Dimethyl Aniline	D
Dimethylformamide	D
Diphenyl Oxide	D
Dyes	C
Epsom Salts (magnesium sulfate)	B
Ethane	A
Ethanol (ethyl alcohol)	A
Ethanolamine	D
Ether	A
Ethyl Acetate	A
Ethyl Benzoate	A
Ethyl Chloride	A
Ethyl Ether	A
Ethylene Chloride	A
Ethylene Chlorohydrin	D
Ethyl Diamine	D
Ethylene Dichloride	B
Ethylene Glycol	B
Ethylene Oxide Gas (EtO), dry 3%	D
Fatty Acids	A
Ferric Chloride, 10%	D
Ferric Nitrate	D
Ferric Sulfate	D
Ferrous Chloride	D
Ferrous Sulfate	D

Chemical	Effect
Fluobric Acid	A
Fluorine Gas	D
Fluosilicic Acid, 20%	B
Fluosilicic Acid, 100%	A
Formaldehyde, 40%	A
Formaldehyde, 100%	A
Formic Acid (methanoic acid), 10%	A
Freon 11	D
Freon 12	B
Freon 22	A
Freon TF	A
Fruit Juices	D
Fuel Oils	A
Furan Resin	D
Furfural (ant oil) $C_5H_4O_2$	A
Gasoline, high aromatic	B
Gasoline, leaded	A
Gasoline, unleaded	A
Gelatin	B
Ginger Oil	A
Glucose	A
Glue, PVA (polyvinyl acetate)	A
Glycerin	A
Glycolic Acid	A
Gold Monocyanide	A
Grape Juice	A
Grease	D
Heptane	A
Hexane	A
Hexyl Alcohol	A
Honey	A
Hydraulic Oil, petroleum based	B
Hydraulic Oil, synthetic	B
Hydrazine (Diamine) H_2NNH_2	B
Hydrobromic Acid, 20%	C
Hydrobromic Acid, 100%	D
Hydrochloric Acid, 20%	C
Hydrochloric Acid, 37%	C
Hydrochloric Acid, 100%	C
Hydrocyanic Acid	A
Hydrocyanic Acid Gas, 10%	C
Hydrofluoric Acid, 20%	D
Hydrofluoric Acid, 50%	D
Hydrofluoric Acid, 75%	D

Chemical	Effect
Hydrofluoric Acid, 100%	D
Hydrofluosilicic Acid, 20%	B
Hydrofluosilicic Acid, 100%	A
Hydrogen Peroxide, 10%	D
Hydrogen Peroxide, 30%	D
Hydrogen Peroxide, 50%	D
Hydrogen Peroxide, 100%	D
Hydrogen Sulfide, aqueous	C
Hydrogen Sulfide, dry	A
Hydroquinone	A
Hydroxyacetic Acid, 70%	A
Ink	B
Iodine	D
Iodine, in alcohol	D
Isopropyl Acetate	D
Isopropyl Ether	D
Jet Fuel (JP3, JP4, JP5)	A
Kerosene	A
Ketones	D
Lacquer Thinners	D
Lacquers	D
Lactic Acid	B
Lard	A
Latex	B
Lead Acetate	B
Lead Sulfamate	A
Lemon Oil	D
Ligroin	B
Lime (CaO)	B
Linoleic Acid	B
Linseed Oil	A
Lithium Chloride	A
Lubricants	A
Lye (Ca (OH)2, calcium hydroxide)	D
Lye (KOH, potassium hydroxide)	A
Lye (NaOH, sodium hydroxide)	C
Magnesium Carbonate	A
Magnesium Chloride, 10%	B
Magnesium Hydroxide, 10%	A
Magnesium Nitrate	A
Magnesium Oxide	A
Magnesium Sulfate (Epsom salts)	B
Maleic Acid	A
Maleic Anhydride	D

Chemical	Effect
Malic Acid (Apple Acid) $C_4H_6O_5$	A
Manganese Sulfate	A
Mash	A
Mayonnaise	A
Melamine	A
Mercuric chloride, dilute	B
Mercury	A
Methane Gas	A
Methanol (methyl alcohol)	A
Methyl Acetate	B
Methyl Acetone (mixture)	D
Methyl Acrylate	B
Methyl Alcohol, 10%	A
Methyl Bromide	D
Methyl Butyl Ketone	D
Methyl Cellosolve	D
Methyl Chloride	B
Methyl Dichloride	D
Methyl Ethyl Ketone (MEK, Butanone)	C
Methyl Ethyl Ketone Peroxide (MEKP)	D
Methyl Isobutyl Ketone	D
Methyl Isopropyl Ketone	A
Methyl Methacrylate	D
Methylamine	D
Methylene Chloride	B
Milk	A
Mineral Spirits	A
Molasses	A
Monochloroacetic Acid	D
Monoethanol Amine	D
Motor Oil	B
Mustard	C
Naphtha	A
Naphthalene	A
Natural Gas	B
Nickel Chloride	A
Nickel Sulfate	A
Nitrating Acid (H2SO4), over 15%	D
Nitric Acid, 5-10%	D
Nitric Acid, 20%	D
Nitric Acid, 50%	D
Nitric Acid, concentrated	D
Nitrobenzene	C
Nitromethane	A

Chemical	Effect
Octyl Alcohol	A
Oils: Aniline	D
Oils: Anise	D
Oils: Bay	D
Oils: Bone	D
Oils: Castor	A
Oils: Cinnamon	D
Oils: Citric	A
Oils: Coconut	A
Oils: Cod Liver	B
Oils: Corn	A
Oils: Cottonseed	A
Oils: Creosote	D
Oils: Diesel Fuel (20, 30, 40, 50)	D
Oils: Fuel (1, 2, 3, 5A, 5B, 6)	D
Oils: Ginger	A
Oils: Hydraulic Oil, petroleum	B
Oils: Hydraulic Oil, synthetic	B
Oils: Lemon	D
Oils: Linseed	A
Oils: Mineral	A
Oils: Olive	A
Oils: Orange	D
Oils: Palm	A
Oils: Peanut	A
Oils: Peppermint	D
Oils: Pine	A
Oils: Rapeseed	A
Oils: Sesame Seed	D
Oils: Silicone	A
Oils: Soybean	A
Oils: Tanning	D
Oils: Transformer	A
Oils: Turbine	A
Oleic Acid	A
Oleum, 25%	D
Oleum, 100%	D
Olive Oil	A
Orange Oil	D
Oxalic Acid, cold 10%	B
Ozone Gas	C
Palm Oil	A
Palmitic Acid	A
Paraffin	A

Chemical	Effect
Peanut Oil	A
Pentane (amyl hydride) C_5H_{12}	B
Peppermint Oil	D
Peracetic Acid (Peroxyacetic Acid)	D
Perchloric Acid	C
Peroxyacetic Acid (Peracetic Acid)	D
Petroleum	B
Phenol, 10%	B
Phenol (Carbolic Acid)	D
Phosphoric Acid, >40%	D
Phosphoric Acid, crude	D
Phosphoric Acid, S40%	D
Phosphoric Acid Anhydride	D
Phosphorus	B
Photographic Developer	D
Photographic Solutions	D
Phthalic Acid	C
Phthalic Anhydride	C
Picric Acid	A
Pine Oil	A
Potash (potassium carbonate)	
Potassium Bicarbonate	C
Potassium Bromide	A
Potassium Chlorate	B
Potassium Chloride, up to 30%	A
Potassium Chloride	A
Potassium Chromate	C
Potassium Cyanide Solutions	C
Potassium Dichromate	A
Potassium Ferrocyanide	B
Potassium Hydroxide (caustic potash)	A
Potassium Nitrate, 10%	A
Potassium Nitrite	A
Potassium Permanganate	A
Potassium Sulfate	B
Propane, liquefied	A
Propylene (propene, methyl ethylene)	A
Propylene Glycol	B
Pyridine (C_5H_5N)	B
Pyrogallic Acid	D
Rapeseed Oil	A
Rosins	B
Rum	A
Rust Inhibitors	A

Chemical	Effect
Salad Dressings	A
Salicylic Acid	D
Salt Brine (NaCl saturated)	A
Sea Water	A
Sesame Seed Oil	D
Shellac, bleached	A
Shellac, orange	A
Silicone	A
Silver Bromide	C
Silver Nitrate	A
Soap Solutions	A
Soda Ash (sodium carbonate)	A
Sodium Acetate	B
Sodium Aluminate	B
Sodium Bicarbonate (Baking Soda)	A
Sodium Bisulfate, 10%	B
Sodium Bisulfite	C
Sodium Bromide	A
Sodium Carbonate	A
Sodium Chlorate	A
Sodium Chloride	A
Sodium Cyanide	A
Sodium Ferrocyanide	A
Sodium Hydroxide, 20%	A
Sodium Hydroxide, 50%	A
Sodium Hydroxide, 80%	D
Sodium Hypochlorite, <20%	D
Sodium Hypochlorite, 100%	D
Sodium Metaphosphate	B
Sodium Metasilicate	D
Sodium Nitrate	A
Sodium Perborate	B
Sodium Peroxide	D
Sodium Polyphosphate	B
Sodium Silicate (water glass)	C
Sodium Sulfate (salt cake, thenardite)	B
Sodium Sulfide	B
Sodium Sulfite	A
Sodium Thiosulfate (hypo)	C
Sorghum	A
Soy Sauce	A
Stannic Chloride	C
Stannic Fluoborate	C
Starch	A

Chemical	Effect
Stearic Acid	A
Stoddard's Solvent	A
Styrene (Vinylbenzene) $C_6H_5CHCH_2$	A
Sugar Liquids	A
Sulfite Liquors	D
Sulfur Chloride	D
Sulfur Dioxide	B
Sulfur Dioxide Gas, dry	B
Sulfur Dioxide Gas, wet	B
Sulfur Trioxide, dry	D
Sulfuric Acid, <10%	D
Sulfuric Acid, 10-75%	D
Sulfuric Acid, 75-100%	D
Sulfuric Acid, cold concentrated	D
Sulfurous Acid, 10%	C
Sulfuryl Chloride	A
Tallow	A
Tannic Acid, 10%	B
Tanning Liquors	B
Tanning Oil	D
Tetrachloroethane	A
Tetrachloroethylene	A
Tetrahydrofuran	A
Toluene (Toluol)	C
Tomato Juice	B
Transformer Oil	A
Trichloroethane	A
Trichloroethylene	D
Trichloropropane	A
Tricresyl Phosphate	C
Triethylamine	D
Trisodium Phosphate	A
Turpentine (C0H16)	A
Urea	A
Urine	A
Varnish	A
Vegetable Juice	A
Vinegar	B