

Pioneer

TECHNICAL DATA SHEET

VERSION A2.0 | 01/10/23



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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

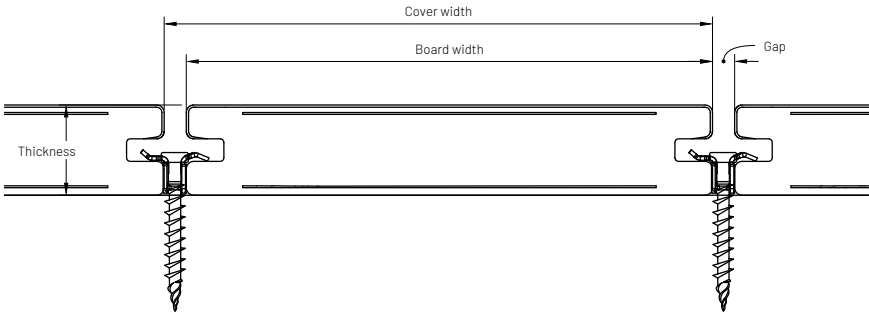
General material properties

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

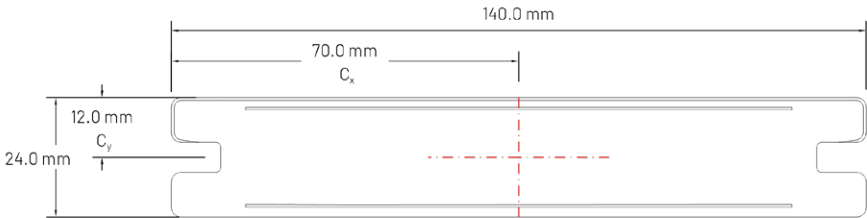
Material specific mechanical properties

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

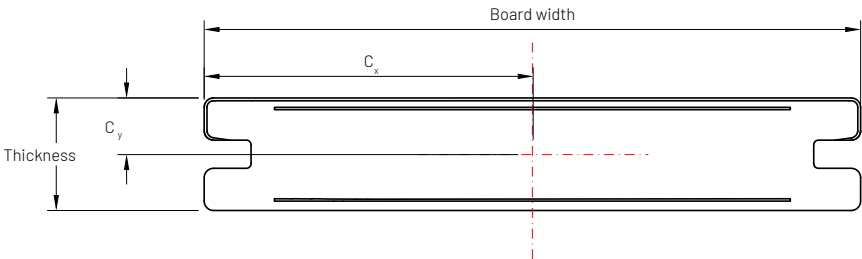
Material properties can vary as a result of long-term weathering. To estimate this impact on the material's flexural properties, the product is subjected to various weathering effects and the performance with and without weathering is compared. The overall end-use adjustment factor is selected based 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, AC174, 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 Tone

| 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 | | | |

ApexPlus

| 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 tone technology was tested. Report can be found, here . |
| | | 10 min | 500 mm | | |
| | Flame spread (Fs) | 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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Contact information

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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 |

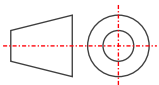


| Sectional properties in typical orientation | |
|---|-----------|
| I_x (mm ⁴) | 101 499 |
| I_y (mm ⁴) | 4 615 773 |
| C_x (mm) | 72.4 |
| C_y (mm) | 10.2 |
| S_x (mm ³) | 9 936 |
| S_y (mm ³) | 63 713 |

| Drawing title | |
|---|--|
| STFM101A - Grooved deck board - Pioneer | |

| File name | |
|---|--|
| 2023-10-12 - Pioneer TDS - profile drawings | |

| File details | |
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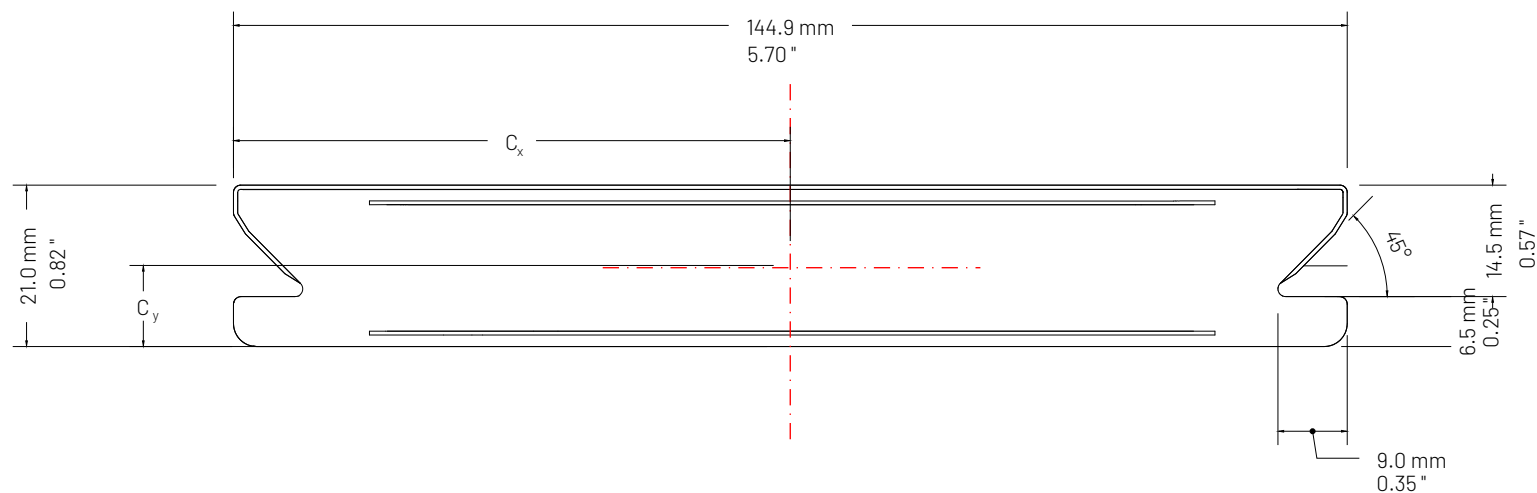


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| Drawing number | 01 |
| Date | October 26, 2023 |
| Page | N/a |
| Scale | NTS |

Unless otherwise specified all dimensions are in millimeters.

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Pioneer



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

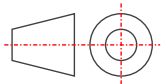


| Sectional properties in typical orientation | |
|---|-----------|
| I_x (mm ⁴) | 171 787 |
| I_y (mm ⁴) | 5 663 635 |
| C_x (mm) | 70.6 |
| C_y (mm) | 12.4 |
| S_x (mm ³) | 13 878 |
| S_y (mm ³) | 80 277 |

Drawing title
STFM102A - Square edge deck board - Pioneer

File name
2023-10-12 - Pioneer TDS - profile drawings

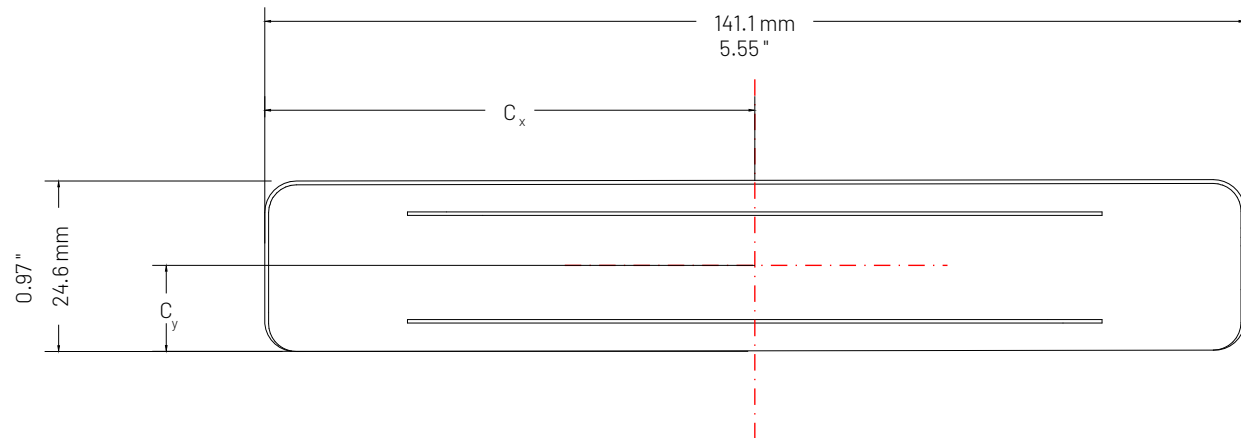
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| Scale | NTS |

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Pioneer

| Profile properties | |
|-----------------------------------|----------|
| Product code | STFM103A |
| Sectional area (mm ²) | 3 264 |
| Approximate mass (kg/m) | 2.4 |



| Sectional properties in typical orientation | |
|---|-----------|
| I _x (mm ⁴) | 159 826 |
| I _y (mm ⁴) | 5 061 233 |
| C _x (mm) | 70.0 |
| C _y (mm) | 12.0 |
| S _x (mm ³) | 13 293 |
| S _y (mm ³) | 72 303 |

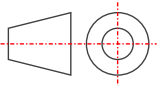
Drawing title

STFM103A - Grooved deck board - Pioneer

File name

2023-10-12 - Pioneer TDS - profile drawings

File details

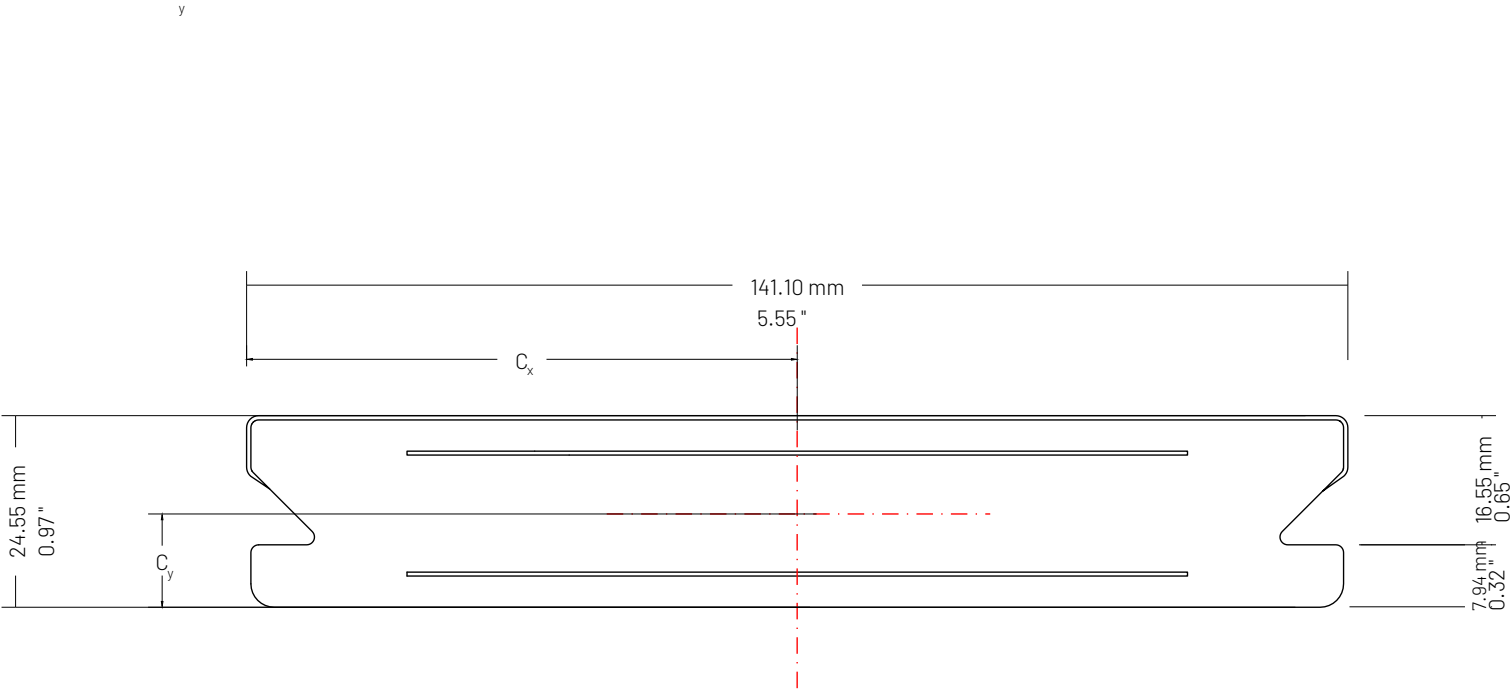


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|----------------|------------------|
| Drawing number | 01 |
| Date | October 26, 2023 |
| Page | N/a |
| Scale | NTS |

Unless otherwise specified all dimensions are in millimeters.

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| Profile properties | |
|-----------------------------------|----------|
| Product code | STFM104A |
| Sectional area (mm ²) | 2930 |
| Approximate mass (kg/m) | 2.3 |



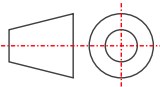
| Sectional properties in typical orientation | |
|---|-----------|
| I _x (mm ⁴) | 106 068 |
| I _y (mm ⁴) | 4 881 116 |
| C _x (mm) | 73.4 |
| C _y (mm) | 10.4 |
| S _x (mm ³) | 10 212 |
| S _y (mm ³) | 66 476 |
| Drawing title | |

STFM104A - Starter board

File name

2023-10-12 - Pioneer TDS - profile drawings

File details

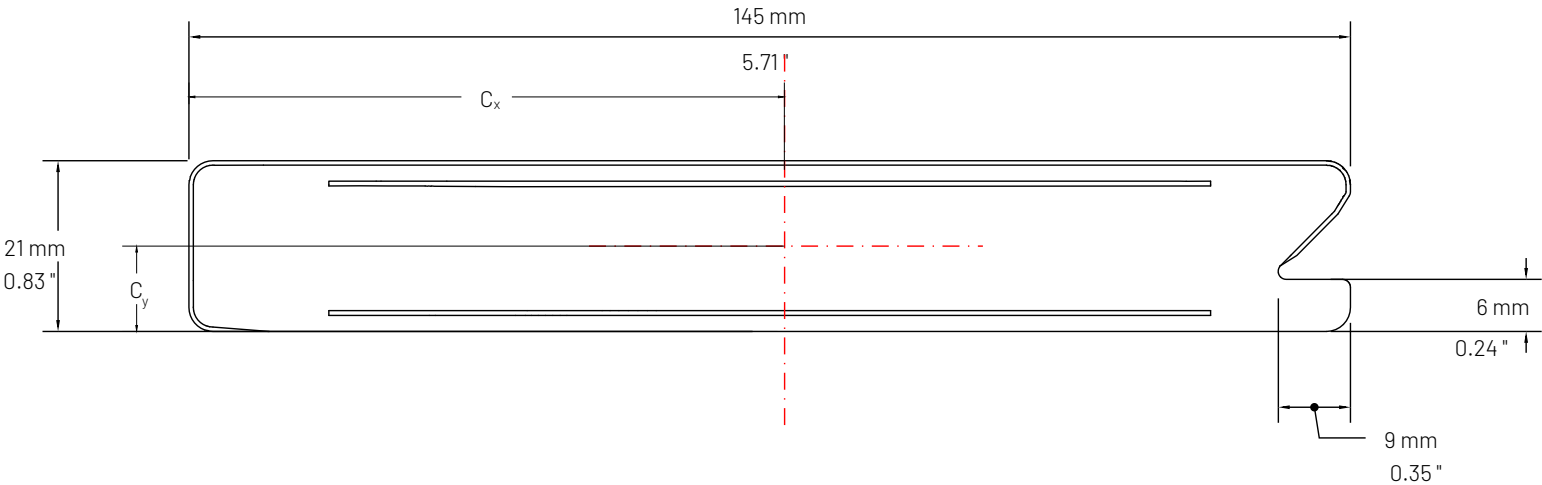


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| Date | October 26, 2023 |
| Page | N/a |
| Scale | NTS |

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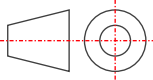
| Profile properties | |
|-----------------------------------|----------|
| Product code | STFM105A |
| Sectional area (mm ²) | 3 885 |
| Approximate mass (kg/m) | 3.1 |



| Sectional properties in typical orientation | |
|---|------------|
| I _x (mm ⁴) | 145 270 |
| I _y (mm ⁴) | 11 116 873 |
| C _x (mm) | 95.0 |
| C _y (mm) | 10.5 |
| S _x (mm ³) | 13 813 |
| S _y (mm ³) | 117 019 |
| Drawing title | |
| STFM105A - Grooved deck board 190 mm | |

| File name | |
|---|--|
| 2023-10-12 - Pioneer TDS - profile drawings | |

| File details | |
|--------------|--|
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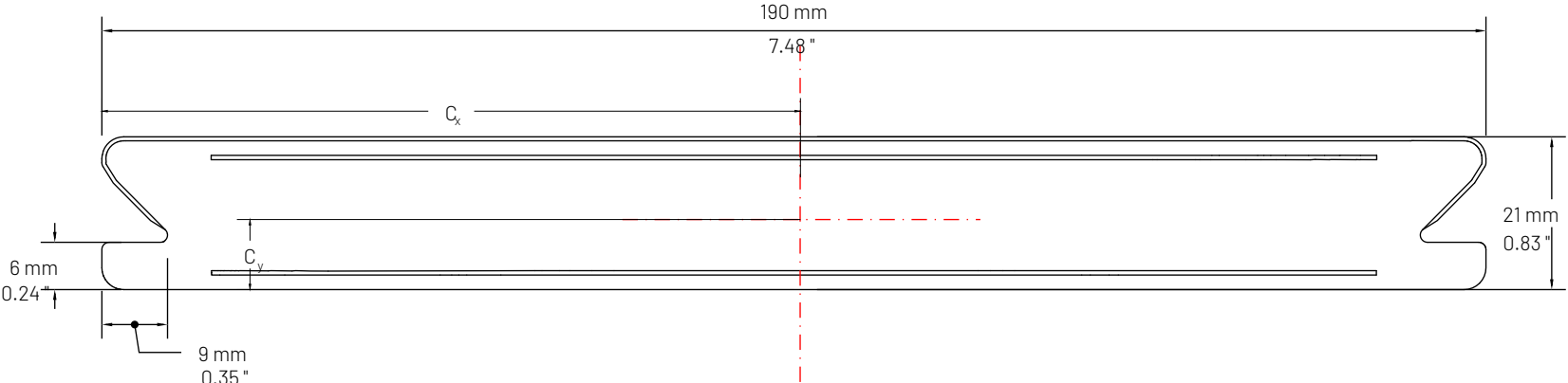


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| Drawing number | 01 |
| Date | October 26, 2023 |
| Page | N/a |
| Scale | NTS |

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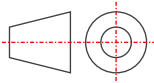
| Profile properties | |
|-------------------------|-----------------|
| Product code | STFM107A |
| Sectional area (mm²) | 3 934 |
| Approximate mass (kg/m) | 3.1 |



| Sectional properties in typical orientation | |
|---|------------|
| I _x (mm ⁴) | 145 570 |
| I _y (mm ⁴) | 11 519 998 |
| C _x (mm) | 96.1 |
| C _y (mm) | 10.5 |
| S _x (mm ³) | 13 853 |
| S _y (mm ³) | 119 838 |
| Drawing title | |
| STFM107A - Starter board 190 mm | |

| File name | |
|---|--|
| 2023-10-12 - Pioneer TDS - profile drawings | |

| File details | |
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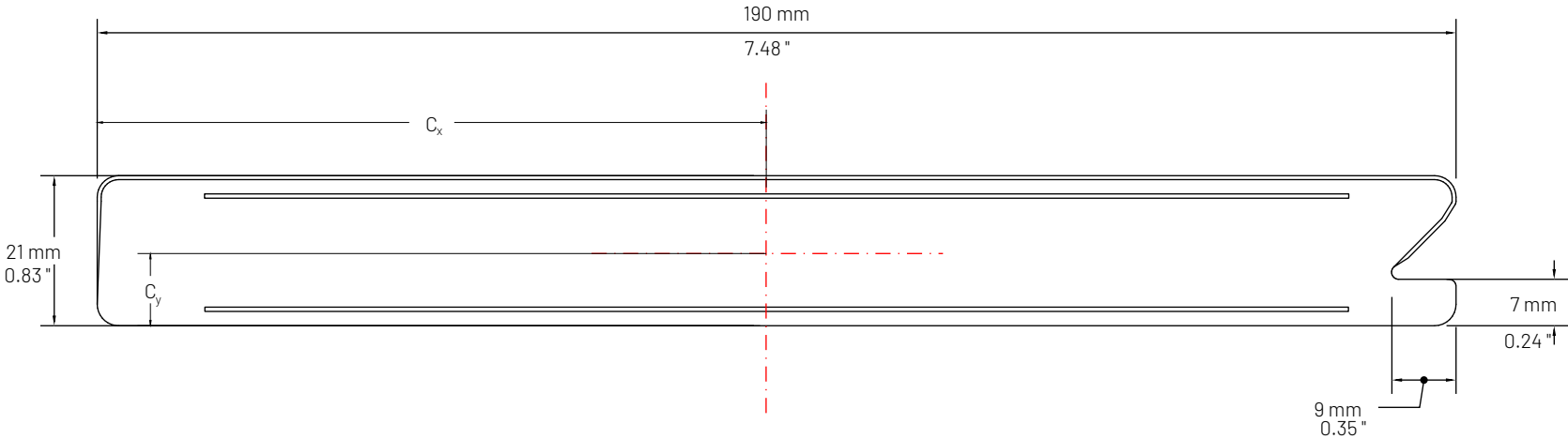


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| Date | October 26, 2023 |
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| Scale | NTS |

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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 ₆ H ₄ O 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 ₂ NNH 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 ₄ H ₆ O 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 ₅ H 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 ₅ H ₅ N) | B |
| Pyrogalllic 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 |
| Sulfonyl 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 (C ₁₀ H ₁₆) | A |
| Urea | A |
| Urine | A |
| Varnish | A |
| Vegetable Juice | A |
| Vinegar | B |