

**SELECTION & SPECIFICATION DATA**

<b>Generic Type</b>	A two component, 100% solids epoxy based intumescent coating.
<b>Description</b>	Pyroclad X1 is designed to provide jet fire and hydrocarbon fire protection for structural elements, beams, columns, bulkheads, underdecks and risers. Pyroclad X1 is suitable for applications in the industrial, petrochemical, oil and gas, offshore and refining industries.
<b>Features</b>	<ul style="list-style-type: none"> <li>• Full jet fire certification in accordance with ISO 22899</li> <li>• Excellent hydrocarbon pool fire protection (ISO 834/BS-476)</li> <li>• LR, DNV &amp; ABS certification</li> <li>• Successfully passed Norsok M-501 System 5A environmental test program without a topcoat</li> <li>• Superior weathering resistance</li> <li>• Very low moisture absorption</li> <li>• Explosion resistance</li> <li>• Extremely durable, impact resistant finish</li> <li>• High film build properties</li> <li>• Low flame spread and smoke development</li> </ul>
<b>Color</b>	Part A: Light Gray Part B: Dark Gray Mixed: Gray
<b>Finish</b>	Textured  Aesthetics can be improved by trowel and back rolling.
<b>Primer</b>	Pyroclad X1 must be applied over a recommended approved primer or primer system. If the steel has already been coated with an existing primer, refer to Carboline Fireproofing Technical Service for advice before applying Pyroclad X1. Contact Carboline Fireproofing Technical Service for a complete list of approved primers.
<b>Film Build</b>	5-6 mm (200-240 mils) per coat (typical)
<b>Solids Content</b>	By Volume 100%
<b>Spray Applied Density</b>	1.03 - 1.10 g/cm <sup>3</sup> (recommended for 100% solids plural application) The spray applied density of epoxy intumescent materials can vary depending on the application method and parameters.
<b>VOC Values</b>	<b>As Supplied</b> : 17 g/l (0.14 lbs/gal)
<b>Mesh</b>	Carboline's High Temp Mesh or metal mesh should be installed in accordance with the appropriate design. The application details and mesh placement are dependent upon the design, steel size, project requirements, etc. Application details for mesh installation are outlined in the Pyroclad X1 Application Manual (latest revision).  Contact Carboline Fireproofing Technical Service for specific design details.
<b>Limitations</b>	Not recommended for steelwork subject to long-term surface temperatures over 80°C (176°F) in normal use.
<b>Topcoats</b>	Pyroclad X1 must be applied to the specified DFT and reach proper cure before applying a topcoat. The choice of topcoat will depend on project requirements. Contact Carboline Fireproofing Technical Service for a complete list of approved topcoats.

## SUBSTRATES & SURFACE PREPARATION

**General** | Remove all oil or grease from the surface to be coated using Thinner #2 or Carboline Surface Cleaner #3.

**Steel** | Steel preparation before application of approved primer should meet SSPC-SP6 for onshore service and SSPC-SP10 for offshore service.

**Galvanized Steel** | Contact Carboline Fireproofing Technical Service for advice.

**Non-Ferrous Metals** | Contact Carboline Fireproofing Technical Service for advice.

## PERFORMANCE DATA

Test Method	Results
ASTM C117 Thermal Conductivity @ 21°C (70°F)	1.5 Btu-in/hrft <sup>2</sup> °F
ASTM D2240 Shore D Hardness	70
ASTM D256 Izod Impact Strength	0.20 ft-lb/inch
ASTM D4541 Adhesion/Cohesion	12.7 MPa (1,840 psi) (average)
ASTM D638 Tensile Strength	10.0 MPa (1,450 psi)
ASTM D695 Compressive Strength	25.3 MPa (3,670 psi)
ASTM D790 Flexural Strength	27.0 MPa (3,920 psi)
ASTM E1269-11 Specific Heat @ 21°C (70°F)	1.28 J/g°C
ASTM E228 Coefficient of Thermal Expansion	33 x 10 <sup>-6</sup> in/in°F
ASTM E84 Flame Spread	20 (Class 1 / Class A)
ASTM E84 Smoke Development	65 (Class 1 / Class A)
Explosion Resistance	4 Bar
NFPA 58 Annex H Hose Stream Resistance	Pass
NORSOK M-501 System 5A Moisture Absorption	0.2% (untopcoated)

All values derived under controlled laboratory conditions.

## MIXING & THINNING

**Mixer** | Use 1/2" electric or air driven drill with a slotted paddle mixer (300 rpm under load).

**Mixing** | Pyroclad X1 is supplied in 40 kg (88 lbs.) full kits and 20 kg (44 lbs.) half kits. Full kits shall be used for plural applications and half kits are available trowel applications for easier mixing and to eliminate the need for splitting kits. The individual components must be preheated to 38°C (100°F) for 24 hours prior to use. Both components must be pre-mixed separately before introduction into the plural equipment. Mix components separately with slotted paddle mixing blade until even consistency is achieved.  
 If applying by trowel, the individual components must also be preheated to 38°C (100°F) for 24 hours prior to use. The material shall be thinned up to 5% by volume. Mix equal volumes of solvent into both components and pre-mix separately prior to combining together. After the solvent has been fully incorporated into both parts, the material is then combined together and mixed until an even consistency and color are achieved. Refer to the Pyroclad X1 Application Manual.

**Thinning** | Only use Carboline approved thinners for pre-mix and trowel applications. Thin with Carboline's Thinner #221 (Thinner #31), Plasite Thinner #19 or approved equal. Thin up to 5% solvent by volume. Any other thinners must be approved by Carboline in writing prior to use.

**Ratio** | 1:1 (by volume)

## MIXING & THINNING

<b>Working Time at 75° F (24° C)</b>	45 minutes for trowel. Working time is not applicable for plural applications because the material is mixed at the mixing block just prior to whip hose and spray gun. For batch mix and trowel applications, the working time may be reduced depending on environmental conditions. Refer to the Pyroclad X1 Application Manual.
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## APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

<b>General</b>	Only use plural component spray equipment specifically designed for epoxy based intumescent fireproofing. All equipment must be approved by Carboline prior to use. Approved plural component spray systems and mixing equipment can be obtained from: <b>WIWA LP Custom Airless Spray Systems (Lahnau, Germany / Alger, OH, USA)</b> or an equivalent equipment supplier.
<b>Plural Component Airless Spray</b>	Use a WIWA Duomix 333 PFP Plural Component Application System or equivalent. Refer to the Pyroclad X1 Application Manual.
<b>Trowel</b>	For small areas only. Material must be thinned up to 5% by volume. For trowel application refer to the Pyroclad X1 Application Manual.
<b>Spray Gun</b>	WIWA 500 PFP with WIWA tip adapter or equivalent.
<b>Gun Swivel</b>	WIWA 34.5 MPa (5,000 psi) or equivalent with 12.7 mm x 9.5 mm (1/2" x 3/8") orifice
<b>Spray Tips</b>	0.029" - 0.035" (RAC non diffuser tips and housing)
<b>Fan Size</b>	152 mm - 254 mm (6"-10") (depending on section being sprayed).
<b>Static Mixer</b>	Standard Static 12 turn, 19 mm (3/4") I.D.
<b>Material Hose</b>	30 m (100') heated hose bundle, with 19 mm (3/4") I.D. and 19 mm (3/4") I.D. mixer manifold (minimum)
<b>Whip Hose</b>	6 m (20') with 12.7 mm (1/2") I.D. minimum
<b>Compressor</b>	Be certain that the air supply is a minimum of 185 cfm @ 100 psi (6.9 kPa). Air volume and pressure required will depend on equipment used.  Note: WIWA is a registered trademark of the Wilhelm Wagner GmbH & Co. KG

## APPLICATION PROCEDURES

<b>General</b>	<p>Pre-cut all mesh before beginning application. Contact Carboline Technical Service or refer to the Pyroclad X1 Application Manual for High Temp Mesh and metal mesh design details. All mesh must be kept clean and dry.</p> <p>Prior to spraying, the Pyroclad X1 must be preheated to a minimum of 38°C (100°F). For plural applications, perform at least two ratio checks per day and also after any equipment maintenance.</p> <p>Apply Pyroclad X1 to point of mesh placement. Allow material to gel before installing mesh and backrolling. Apply pre-cut mesh into wet coating using trowels and/or solvent resistant mohair rollers. Use Carboline's Thinner #221 (Thinner #31), Plasite Thinner #19 or Carboline approved equivalent to mist down rollers to prevent them from sticking to the material. Allow material to cure sufficiently to support the weight of subsequent coats. Continue building material to specified thickness. Use solvent moistened rollers to back roll material after each subsequent coat to improve finish and level surface. Lighter coats will achieve a smoother finish. Contact Carboline Technical Service or refer to the Pyroclad X1 Application Manual for more detailed information.</p>
<b>Application Rates</b>	<p>Typical thickness per coat is 2-6 mm (80-240 mils). Multiple coats can be applied per day. The optimum way to apply Pyroclad X1 is in a "wet on wet" application and recoated within 24 hours to prevent any chance for contamination between coats.</p>
<b>Wet Film Thickness</b>	<p>Frequent thickness measurements with a wet film gauge are recommended during the application process to ensure uniform thickness.</p>
<b>Dry Film Thickness</b>	<p>Final thickness shall be measured using an electronic dry film thickness gauge. For method of thickness determination and tolerances refer to: NORSOK Standard M-501 and AWCI Technical Manual 12-B (Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire Resistive Materials).</p>

## APPLICATION CONDITIONS

Condition	Material	Surface	Ambient	Humidity
Minimum	100°F (38°C)	41°F (5°C)	41°F (5°C)	0%
Maximum	140°F (60°C)	125°F (52°C)	110°F (43°C)	85%

Air and substrate temperature must be at least 41°F (5°C) and rising. Steel surface temperature should be a minimum of 5°F (3°C) above the dew point. The surface must be clean, dry and contaminant free prior to applying Pyroclad X1.

## CURING SCHEDULE

Surface Temp.	Handle	Recoat	Topcoat	Touch
50°F (10°C)	18 Hours	1 Hour	12 Hours	2 Hours
77°F (25°C)	12 Hours	1 Hour	6 Hours	1 Hour
95°F (35°C)	6 Hours	30 Minutes	3 Hours	1 Hour

Curing intervals stated above are based on 100% solids plural application. Trowel applications will require longer curing times dependant upon amount of solvent added. Curing times are dependent upon temperature, air movement and humidity. Material can be heated to achieve a quicker recoating and curing schedule. Consult Carboline Fireproofing Technical Service for specific minimum and maximum topcoating details.

## CLEANUP & SAFETY

<b>Cleanup</b>	Always clean all equipment and tools immediately after use with Carboline Thinner #221 (Thinner #31), Plasite Thinner # 19 or Carboline approved equivalent. Flush static mixer, whip hose, gun and tips with hot water or solvent (depending on pump set up) immediately after each use. Break down static mixer, gun and tip assembly and hand clean.
<b>Safety</b>	Follow all safety precautions on the Pyroclad X1 Material Safety Data Sheet.
<b>Overspray</b>	All adjacent and finished surfaces shall be protected from damage and overspray.
<b>Ventilation</b>	In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is cured.

## MAINTENANCE

<b>General</b>	If coating becomes damaged, rebuild required thickness by spray or trowel. When dry, smooth and finish with approved topcoat to match. Damaged areas must be abraded back to a firm edge by sanding or scraping. The topcoat should be abraded back by 25.4 mm (1") from the damaged area. The surface must be clean and dry before re-applying Pyroclad X1. The coating shall then be built back to the original thickness. If the mesh is damaged, it must be cut out and replaced as well. Allow to cure and then overcoat with the specified topcoat or system. Refer to Pyroclad X1 Application Manual.
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## TESTING / CERTIFICATION / LISTING

<b>General</b>	Underwriter's Laboratories, Inc. Intertek Laboratories, Inc. NORSOK M-501 System 5A Rev. 6 Lloyd's Register Det Norske Veritas American Bureau of Shipping
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## PACKAGING, HANDLING & STORAGE

<b>Packaging</b>	Pyroclad X1 is supplied in 40 kg and 20 kg kits. Full kit: 40 kg (88.2 lbs.) Half kit: 20 kg (44.1 lbs.)  This product is filled by weight. Apparent fill volume may vary slightly due to entrained air.
<b>Shelf Life</b>	18 Months  Shelf Life: (actual stated shelf life) when kept at recommended storage conditions and in original unopened containers.
<b>Storage</b>	Store indoors in a dry environment between 0°C - 48°C (32°F - 120°F).
<b>Shipping Weight (Approximate)</b>	Full kit: 43.6 kg (96.2 lbs.) Half kit: 23.6 kg (52.1 lbs.)
<b>Flash Point (Setaflash)</b>	Part A: >200°C (>392°F) Part B: >200°C (>392°F)

# Pyroclad<sup>®</sup> X1

PRODUCT DATA SHEET

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## WARRANTY

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To the best of our knowledge the technical data contained herein is true and accurate on the date of publication and is subject to change without prior notice. User must contact Carboline Company to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance, injuries or damages resulting from use. Carbolines sole obligation, if any, is to replace or refund the purchase price of the Carboline product(s) proven to be defective, at Carbolines option. Carboline shall not be liable for any loss or damage. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARBOLINE, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. All of the trademarks referenced above are the property of Carboline International Corporation unless otherwise indicated.