

Technical Data and Application Guide

Abcite® X60



Product description

Abcite® X60 is a single layer, primer-free, halogen free, high strength adhesive thermoplastic powder coating which provides best in class and highly durable corrosion protection to steel and other metals in the most severe conditions.

Abcite® X60 features a unique set of properties: tough, flexible, and highly adhesive to metal substrates, it is also highly resistant to long-term outdoor exposure, as well as to alkaline and acid chemical attack.

Its hardness, abrasion and impact resistance, combined with its flexibility complete the Abcite® X60 coating characteristics achieving an unmatched performance.

Abcite® X60 is designed for coating metal parts by electrostatic spraying or hot flocking.

Typical applications

Abcite® X60 performs exceptionally well in extremely corrosive and abrasive marine, offshore and industrial environments. It enables maintenance-free, durable exterior use in applications such as offshore structures, street furniture and water industry pipes, valves and fittings.

Product range

Abcite® X60 is available in the following colors* :

Neutral, Blue (RAL 5012, 5017), Green (RAL 6005), Grey (RAL 7001, 7016), Black (RAL 9005) and White (RAL 9016)

Other colors are available upon request.

Standard packaging : 20 kg cardboard box with inner plastic bag.

* RAL references provided are the closest match but may slightly differ from the finished coating.

Product certifications

Corrosion protection :

- ISO 12944 part 6, corrosivity categories C5-M High and Im3 High
- ISO 20340 (offshore environments), category C5-M

Drinking water* :

- | | | | |
|-------------|---|------------------|--------------------------|
| • Australia | AS/NZS 4020, AS/NZS 4158 | • New Zealand | AS/NZS 4020, AS/NZS 4158 |
| • Belgium | Hydrocheck | • United Kingdom | WRAS |
| • France | Attestation de Conformité Sanitaire (ACS) | • USA | NSF/ANSI Standard 61 |
| • Germany | KTW and DVGW | | |

Food contact* : Compliant with EU regulation No. 10/2011 and FDA CFR Title 21

* Certificates valid for certain colors. Please contact your Axalta Coating Systems representative for additional information.

Storage

Abcite® X60 should be stored in a cool (<50°C) and dry space, out of direct sunlight exposure. The product should be used within 5 years after the production date.

Agglomerates may form during transportation and storage. This reversible phenomenon is not a sign of poor quality but may occur in case of specific environmental conditions causing compaction. The powder can easily be brought back to its original state through sieving.

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General properties	Measure	Unit	Standard and test conditions	
Maximum particle size	150	µm	ISO 8130-1	
Bulk density	0.33	g.cm ⁻³	ASTM D1895 (Method A)	
Specific gravity	0.94	g.cm ⁻³	ISO 1183	
Melt flow index	25	g/10min	ISO 1133 (190°C, 2.16kg)	
Gloss 60°	60-80	%	ISO 2813	
Thermal properties				
Melting temperature	90	°C	ISO 3146	
Vicat softening temperature	63	°C	ISO 306	
Maximum continuous temperature	75	°C	Test Axalta	
Thermal conductivity	0.25	W.m ⁻¹ .K ⁻¹	ASTM E1530	
Flammability rating	V-0		UL 94	
Mechanical Properties				
Abrasion resistance (Taber)	12	mg (weight loss)	ISO 9352 (CS-10, 1000g)	
Adhesion	>8 (100% Y)	MPa	ISO 4624 (20mm dolly)	
Hardness	60	Shore D	ASTM D2240	
Impact resistance	>18.2	J	ASTM D2794 (1.5mm steel; ball diameter : 15.9mm)	
Tensile strain at break	460	%	ISO 527	
Tensile strength	23	MPa	ISO 527	
Electrical properties				
Dielectric strength	48	kV.mm ⁻¹	ASTM D149	
Volume resistivity	2.10 ¹⁸	Ω.cm	ASTM D257	
Properties under accelerated aging				
Salt spray resistance	2000h	0	mm (steel substrate corrosion)	ISO 9227 (NSS, with scribe)
	3500h	<1		
UV stability*	2000h	No damage		ISO 4892-3†
* Color and gloss deviation is color-dependent and available upon request				
† UVB-313 lamp, cycles: 8h at 60°C (black panel) and 0.71 W/m ² /nm (at 310nm), then 4h at 50°C with condensation.				
Chemical resistance*		20°C	60°C	ISO 2812 and ISO 4628
	Acids	Excellent	Excellent	
	Alkalis	Excellent	Excellent	
	Fuels	Good	Poor	
	Solvents	Good	Not recommended	
* A specific chemical resistance test is recommended before any industrial application.				
These tests were performed using Abcite® X60 Neutral, with degreased, grit-blasted steel panels coated by dipping in a fluidized bed (thickness 500 ± 100µm), or with injected samples. The results may vary for other Abcite® X60 colors, other substrate types or a different coating thickness.				

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Surface preparation

Abcite® X60 protective coating is primarily used on steel, and it is also suited for aluminum, copper and other metals. In order to achieve its optimum performance level, Abcite® X60 requires careful preparation of the metal surface :

1. **Check the finish** of the parts. Sharp edges, corners and ridges must be avoided. Weld seams should be smooth and without porosity.
2. **Clean** the substrate (using a solvent or an aqueous detergent solution) to remove grease and dirt.
3. **Grit blast** to roughen the metal surface and remove any rust or contaminant. Carefully control this step to achieve a surface cleanliness level Sa2½ or Sa3, and a surface roughness *Rt* of 80µm and *Rz* of 60µm. Choose a hard, angular grit (carbon or stainless steel), with a size of 0.5mm or larger. Regularly check the grit and replace if not clean or worn out.
4. **Blow** any dust off the surface. Ensure that the compressed air used for cleaning is free of moisture, oil or any other contamination.

A single layer of Abcite® X60 applied on carbon steel prepared following these 4 steps will protect it from corrosion in **offshore conditions** (ISO 20340) and for **more than 15 years in C5-M and Im3** environments, the most severe corrosivity categories defined in ISO 12944-6.

No primer or chemical surface treatment is required in order to achieve Abcite® X60 highest corrosion protection level. Nevertheless, if a chemical treatment has been applied on the grit blasted metal surface, Abcite® X60 can also be used.

Hot-dip galvanized steel substrates must be sweep blasted and free of zinc oxide and dust when coated with Abcite® X60.

Facility recommendations for optimal performance

Oven :

- The oven used for preheating must be able to heat up to at least **250°C**, with even and precise control.
- Convection ovens (electrical and gas without direct flame), and radiation ovens (IR, induction, etc.) can be used. Gas IR ovens and gas ovens with direct flame may cause steel and coating oxidation.
- Any variation between the temperature set point and the actual oven temperature must be known.
- As a best practice, test parts should be used to check the metal surface **heating and cooling curve** before production runs.
- The **transfer time** between the preheating oven and the spraying booth should be as short as possible. For example a large 6mm thick steel beam preheated at 250°C has a cooling rate of 15°C/min.

Spray equipment :

- **Corona and triboelectric** charging guns can be used to spray Abcite® X60.
- The **compressed air supply must be filtered** to remove any trace of moisture, oil, or other contaminants.
- It is advised to use a spraying system able to reach a **high powder flow**. The powder flow rate is mainly dependent on the pumping system and powder feed design.
- For a given system, the flow rate can be optimized by using large hose diameters and limited hose lengths.
- A good practice is to aim for 1 spraying gun for every 4 m² area to coat, each gun reaching a powder output of at least 300 g/min.

Before using this product, please read carefully the product safety data sheet, available from your Axalta Coating Systems representative.

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Preheating and post-heating

Preheating the substrate to a temperature between 200 and 280°C (depending on the geometry) is strongly recommended in order to improve adhesion of Abcite® X60.

Preheating parameters have to be adjusted for each part, taking into account the metal type and thickness, as well as the part size and geometry. The table below provides basic setting guidance for steel parts.

The metal surface temperature before spraying should be carefully controlled with a contact probe.

Preheating guidelines :

Steel thickness	2-3mm	4-5mm	6-10mm
Oven temperature (minimum)	260 – 300°C	220 – 260°C	200 – 240°C
Part preheating time	12 – 24 min	24 – 36 min	36 – 60 min

Optional post-heating :

Depending on the part to be coated, on the thickness target, and on the preheating parameters, a post-heating may be necessary to **smoothen** the Abcite® X60 coating surface.

In order to avoid any risk of Abcite® dripping during post-heating, it is recommended to use a **maximum oven temperature of 175°C**, for 5 to 20 minutes.

Electrostatic spraying

Common corona or triboelectric charging spray guns can be used with various nozzles. The compressed air supply must be filtered to remove any trace of moisture, oil, or other contaminants. Start with following settings:

- Voltage 60kV, decrease if back ionization is observed when the coating thickness is increasing
- No current limitation, maximum powder output

It is advised to focus **first on coating the coolest and/or thinnest areas** of the part, and then finish with the thickest areas, which retain heat for a longer time :

- First, apply a thin layer over the entire surface before the metal surface temperature drops below 180°C.
- Secondly, increase the thickness up to 400µm or more, applying the powder in crossed (bidirectional) passes to ensure uniformity of the coating.

During spraying, Abcite® X60 particles melt on the preheated metal surface into a continuous coating. **No curing or cross-linking** occurs. Once the powder has melted into a smooth and uniform coating, no further heating is needed.

If natural cooling is considered too slow, cooling of coated parts can be forced using **air or water-quenching**. Water-quenching when the coating temperature is above 150°C may result in surface finish alteration without any effect on performance. Coated parts can be safely handled when the Abcite® surface temperature is below 50°C.

Coating thickness

In order to ensure continued protection of the substrate in offshore environments or in corrosion conditions C5-M or Im3, or in case of potential exposure to severe abrasion or impacts, a coating thickness of **at least 400µm** is advised.

For less aggressive environments, Abcite® X60 should not be used with a film thickness below 250µm.

During the coating process or after quality control, if the Abcite® X60 film is too thin, it can be corrected by placing the part in a post-heating oven (not longer than 5 minutes at maximum 175°C), then spraying more powder on the melt coating surface.

Coating of contact points or hook marks

If needed, locally heat any uncoated area of the part with a hot air gun and apply Abcite® X60 by spraying, sprinkling or patching. See the Abcite® repair guide for more details.

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Over coating with a thermoset powder

Abcite® X60 corrosion protection, flexibility and toughness can be combined with the full range of colors, glosses and textures given by Alesta® powder coatings. This is achieved by spraying the Alesta® topcoat directly after application, or later on the re-heated Abcite® X60 coating.

For best results, the surface temperature of the Abcite® X60 coating should be between 120 and 140°C when the thermoset powder coating is applied. This will enable a high interlayer adhesion while avoiding an excessive topcoat thickness. The voltage should be set at 30kV or lower in order to avoid back ionization.

The curing oven temperature should be set at a maximum temperature of 190°C.

Coated part controls

It is recommended to perform a high voltage porosity test (1kV per 100µm) according to ISO 29601 in order to confirm the absence of defects in the coating and good substrate protection.

A qualitative adhesion test is advised. With a sharp blade, cut 2 parallel lines through the Abcite® X60 coating, 1 cm apart and 3 cm long. Join the 2 lines with a 45° cut and attempt to delaminate the corners. Alternatively, a dolly pull-off test (ISO 4624) can be performed. No delamination between the coating and the substrate should be observed.

Troubleshooting

Symptom	Potential cause	Corrective action
Irregular coating Orange peel Pinholes	Insufficient heat Coating too thin	Raise the preheating temperature Add or extend a post-heating step at 160-175°C Increase the coating thickness
Abcite® dripping Poor edge coverage Formation of fisheyes (craters)	Substrate and/or oven too hot	Reduce or avoid the post-heating If the issue is observed without post-heating, reduce the preheating temperature and/or time
Stains or fisheyes	Contamination on the substrate or in the compressed air	Check the degreasing step and the compressed air filter efficiency. Strictly avoid silicone-based lubricants in the application area
Coating thickness variation or difficult to increase	Insufficient heat Electrostatic charges accumulation	Raise the preheating temperature Progressively decrease the spraying voltage while applying the powder
Damaged coating	Poor finish of the part or the welds, edges too sharp, inadequate application parameters, damage caused during transport or installation	Repair following the Abcite® repair guide, available from your Axalta Coating Systems representative.

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