Technical Data and Application Guide

Abcite® X45

Product description

Abcite® X45 is a single layer, primer-free, halogen-free, high strength adhesive thermoplastic powder coating which provides excellent and durable corrosion protection to steel and other metals.

Abcite® X45 has a low viscosity (high melt flow index), so that it is easily applied as a smooth coating on low heat retention substrates such as aluminum and thin metal parts. It can be applied at lower temperatures compared to other thermoplastic coatings, offering energy saving opportunities.

Abcite® X45 is tough, flexible, and highly adhesive to metal substrates. It has a high resistance to long-term outdoor exposure, as well as to alkaline and acid chemical attack.

Abcite® X45 is designed for coating metal parts by electrostatic spraying or hot flocking.

Typical applications

Abcite® X45 is perfect for coating thin and complex shapes, like metallic mesh structures requiring outstanding corrosion protection, fencing panels, cable trays, and outdoor furniture such as railings, street lighting or fence poles.

Product range

Abcite® X45 is available in the following colors* :
Neutral, 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

Food contact* : Compliant with the 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® X45 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.

Axalta Polymer Powders Switzerland Sarl
Rue St-Joseph 25
CH-1630 Bulle, Switzerland

T +41 26 913 0900
F +41 26 913 0909
polymerpowders.axaltacs.com
axaltacoatingsystems.com

Version 05.05.2015
This document supersedes all previous issues.

Technical Data and Application Guide

Abcite® X45

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	48	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	62	°C	ISO 306
Maximum continuous temperature	75	°C	Test Axalta
Thermal conductivity	0.24	$W.m^{-1}.K^{-1}$	ASTM E1530
Flammability rating	V-0		UL 94
Mechanical Properties			
Abrasion resistance (Taber)	21	mg (weight loss)	ISO 9352 (CS-10, 1000g)
Adhesion	>8 (100% Y)	MPa	ISO 4624 (20mm dolly)
Hardness	55	Shore D	ASTM D2240
Impact resistance	>18.2	J	ASTM D2794 (1.5mm steel; ball diameter : 15.9mm)
Tensile strain at break	540	%	ISO 527
Tensile strength	21	MPa	ISO 527
Electrical properties			
Dielectric strength	44	$kV.mm^{-1}$	ASTM D149
Volume resistivity	2.10^{17}	Ω.cm	ASTM D257
Properties under accelerated aging			
Salt spray resistance	2000h	<2	mm (steel substrate corrosion)	ISO 9227 (NSS, with scribe)
	3000h	<5		
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	
Acids	Excellent	Excellent	ISO 2812 and ISO 4628
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® X45 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® X45 colors, other substrate types or a different coating thickness.

Axalta Polymer Powders Switzerland Sarl
Rue St-Joseph 25
CH-1630 Bulle, Switzerland
T +41 26 913 0900
F +41 26 913 0909
polymerpowders.axaltacs.com
axaltacoatingsystems.com

Version 05.05.2015
This document supersedes all previous issues.

Technical Data and Application Guide

Abcite® X45

Surface preparation

Abcite® X45 protective coating can be used on various metals, including steel, aluminum and copper. In order to achieve its optimum performance level, Abcite® X45 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 60µm and *Rz* of 50µm. 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® X45 applied on carbon steel prepared following these 4 steps will durably protect it from corrosion.

No primer or chemical surface treatment is required in order to achieve Abcite® X45 highest corrosion protection level. Nevertheless, if a chemical treatment has been applied on the grit blasted metal surface, Abcite® X45 can also be used.

Hot-dip galvanized steel substrates must be sweep blasted and free of zinc oxide and dust when coated with Abcite® X45.

Facility recommendations for optimal performance

Oven :

- Metal substrate **preheating is recommended** to achieve the best protective performance. As a best practice, the preheating oven should be able to heat up to at least 200°C for parts with a wall thickness of 4mm or thicker, and 300°C or higher for thin parts such as 1mm wires.
- 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.
- Even and precise oven temperature control should be available and 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® X45.
- 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.

Technical Data and Application Guide

Abcite® X45

Preheating and post-heating

Preheating the substrate to a temperature between 180 and 240°C (depending on the geometry) is strongly recommended in order to improve adhesion of Abcite® X45.

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 plates.

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

Preheating guidelines :

Steel thickness	**1-2mm**	**3-5mm**	**6-10mm**
Oven temperature (minimum)	260 – 320°C	200 – 260°C	180 – 220°C
Part preheating time	10 – 20 min	20 – 40 min	30 – 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® X45 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 160°C.
- Secondly, increase the thickness up to 300µm or more, applying the powder in crossed (bidirectional) passes to ensure uniformity of the coating.

During spraying, Abcite® X45 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 case of potential exposure to severe abrasion or impacts, a coating thickness of **at least 400µm** is advised.

For less aggressive environments, Abcite® X45 should not be used with a film thickness below 250µm.

During the coating process or after quality control, if the Abcite® X45 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® X45 by spraying, sprinkling or patching. See the Abcite® repair guide for more details.

Technical Data and Application Guide

Abcite® X45

Over coating with a thermoset powder

Abcite® X45 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® X45 coating.

For best results, the surface temperature of the Abcite® X45 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® X45 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	Raise the preheating temperature Add or extend a post-heating step at 160-175°C
	Coating too thin	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	Raise the preheating temperature
	Electrostatic charges accumulation	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.

Axalta Polymer Powders Switzerland Sarl
Rue St-Joseph 25
CH-1630 Bulle, Switzerland

T +41 26 913 0900
F +41 26 913 0909
polymerpowders.axaltacs.com
axaltacoatingsystems.com

Version 05.05.2015
This document supersedes all previous issues.