

# Grünau KBS Coating

A tough, permanent, non-intumescent  
fire protective coating for  
electrical cables and penetration seals



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**Fire Protection**





## General Information

Grünau KBS Coating is a water-based, ablative fire protective coating, especially developed for the fire protection of grouped or bundled electrical cables and for penetration seals.

The main function of Grünau KBS Coating is to prevent flame propagation along vertical and horizontal cable ways. Grünau KBS Coating will also delay short circuit, whereby circuit integrity depends on the distance of the cables from fire and the incurred temperature. Grünau KBS Coating is easily applied by conventional methods such as spray and brush, as well as by hand (see application data). Grünau KBS Coating is also available free of halogen – named Grünau KBS Coating CLF.

Grünau KBS Coating has been tested to all recognized international standards and is used worldwide, from the arctic circle to the tropics. Its effectiveness has been proven in several documented cases of actual fires. Grünau KBS Coating is produced only by Grünau Illertissen GmbH maintaining a quality system which fulfils the requirements of DIN EN ISO 9001.

Grünau KBS Coating is also an integral part of the Grünau KBS Panel Seal ABL. Here it is used as coating for the mineral wool panels and the sealing of the penetrating cables and other utilities. For use of Grünau KBS Coating in the installation of Grünau KBS Panel Seal ABL please see separate brochure.

### How does an ablative coating work?

Grünau KBS Coating protects electrical cables through ablation as opposed to insulation. Energy is consumed or generated to change any material from one condition or state to another.

Processes consuming energy are called "endothermic". Some materials need large amounts of energy to decompose or "break down". A good ablative composition requires a maximum of energy to decompose. Grünau KBS Coating when exposed to fire starts to ablate by chemical and physical reactions, for instance evaporation, chemical cracking, melting – all this is consuming energy (heat) while keeping the cable relatively cool (for a certain length of time, as the process is self-sacrificial).

The gases and vapours generated during the ablative process push oxygen away from the surface, dilute flammable gases preventing them from burning and interrupt the "chain reaction" of fire chemically. After decomposition of all organic components, a solid structure of inorganic components remains offering further protection by insulation.

### Grünau KBS Coating ...

- ... lasts for the lifetime of cables
- ... does not derate electrical cables



## Special Features

### Fire protection

Grünau KBS Coating prevents flame propagation on cables, thus keeping a cable fire localized to its source, even if some minor damage to the most exposed cables may be sustained.

According to studies by the British CEBG, a fire on vertical cable ways can spread 20 m per minute. Flame spread on KBS-coated vertical cables in the 40-minute IEC 332-3 test has been restricted to less than 10 cm (see list of international test results).

Grünau KBS Coating has a LOI value of 100 (Limiting Oxygen Index).

### What is a LOI value of 100?

The Limiting Oxygen Index value test, in accordance with ASTM D 2863, determines the percentage of oxygen in a nitrogen/oxygen mixture at which a material sustains burning on its own. In this test, which determines the burning characteristics of all plastic materials, the sample is secured in a glass cylinder – containing a definite gas flow of  $O_2/N_2$  mixture – and ignited with a gas flame. Then the gas flame is removed and the sample is observed for continued burning. Soft PVC, as used for cable jackets, continues to burn at a low 25 – 30% oxygen content. Teflon, however, sustains burning only at a high 90-95% oxygen content.

Grünau KBS Coating has a LOI of 100, which means, it does not burn in a 100% oxygen environment.

### Ampacity

Grünau KBS Coating does not affect the current carrying capacity of electrical cables. The FM test states «no derating required» (see list on page 5).

### Why no derating when cables are coated with Grünau KBS Coating?

Grünau KBS Coating protects electrical cables through ablation and not through insulation. It is dense and thermally conductive during normal cable operating temperatures. Its thermal conductivity is better than that of PVC. The coating increases the circumference (= surface) of the cable or cable bundle. The surface area is further increased by the comparative roughness of the coating (radiator effect). This enlarged surface allows more heat to dissipate. The cable temperature, therefore, does not increase.

### Prevention of poisonous and corrosive gases and smoke

By preventing the fire from spreading and eventually involving all cables, Grünau KBS Coating also prevents the development of the dreaded HCl from PVC cables as well as the dense black smoke and poisonous gases developing from all types of cables.

### Mechanical resistance

Grünau KBS Coating is tough enough to sustain physical abuse such as walking on coated cable trays.

### Human health compatibility

Grünau KBS Coating is in no way affecting the human health system, it is non-toxic, solvent free, phosphate-free and does not contain asbestos or any other substance identified as being cancerogenic. Grünau KBS Coating is practically odourless and does not affect the human skin.

### Weather and water resistance

Grünau KBS Coating is permanent protection under all weather and climate conditions. A fifteen-years outdoor test, documented by the Institute for Fire Protection of TU Brunswick/Germany, found Grünau KBS Coating still performing the same as freshly produced material. Here cables had been exposed from highest summer heat to snow and ice in winter, part of their length being constantly immersed in water.

### Chemical compatibility

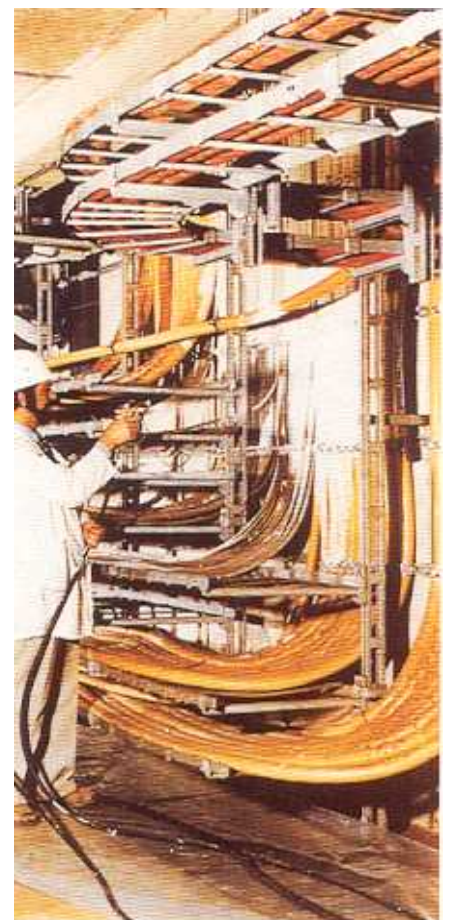
Grünau KBS Coating has been tested for compatibility with close to 90 chemicals and has been found to be unaffected by those most frequently found in industrial installation such as Diesel fuel, ethylene glycol, fuel oil, lubricating oil, turbine oil and many others.

### Flexibility

Grünau KBS Coating is highly flexible (see technical data).

### Endurance/lifetime

Grünau KBS Coating lasts for the lifetime of cables.



*Spraying Grünau KBS Coating*

## Application/Technical Data

### Application to cables

#### Surface preparation

A thorough cleaning of cables is not required. However, oil or grease should be removed with dry rags (no solvent). Using a broom or vacuum cleaner to remove heavy layers of dust is sufficient.

#### Spray

Application by spray is done in the conventional way by spraying crosswise. The white of the coating should well cover the colour of the cable jacket. The wet thickness of the coating must be at least 2.5 mm. For getting at hard-to-get-at places, use extension nozzle. Where cables are close to a wall, stuff mineral wool between cables and wall and coat over. Generally the required thickness may be applied in one coat. However, where new vertical cables are to be coated, it is recommended to apply first a thin "fog coat" and let it dry, then apply final coat.

#### Hand

Large diameter single cables or bundles may be coated by hand. Again, a thin coat should be allowed to dry before the rest is applied, using both hands like an extruder. To achieve a smooth, even finish, use a wet brush.

#### Recommended coating thickness on cables:

Wet approx. 2.5 mm – resulting in approx. 1.6 mm dry coating

#### Coverage at recommended thickness:

Approx. 3.0 kg/m<sup>2</sup> for level surface. For grouped cables or cables in trays allow 30% more material considering the curved surfaces.

### Application to mineral wool panels

This may be done by spray or trowel. If the latter method is preferred, a large steel trowel, such as used for levelling concrete surfaces, should be used. For the Grünau KBS Panel Seal ABL approx. 2.0 kg/m<sup>2</sup> will achieve the required approx. 1.3 mm dry thickness.

#### There are two types of Grünau KBS Coating available:

Grünau KBS Coating sprayable and Grünau KBS Coating Brushable

#### Thinning

Grünau KBS Coating has a water base, but thinning for both types of Grünau KBS Coating should not be necessary.

#### Spray equipment

Grünau KBS Coating may be applied with a great variety of spray equipment designed for application of high viscosity materials. Good results have been obtained with the following:

#### Airless spray equipment

Graco Ultra 1500 Mark V

Pressure at gun: 0 – 200 bar

Spray gun orifice: 0.9 – 1.0 mm (preferably reversible tip)

#### Conventional spray equipment

(with pressure pot)

Binks, De Vilbiss Mastic, Wally or SATA

Material pressure: 4 – 5 bar

Pressure at gun: 4 bar

Spray gun orifice:

minimum 3 mm diameter

Material hose: minimum 3/4" diameter

Air supply: compressor capable of delivering 200 l/min. (tank vol. at least 40 l) 6 bar

#### Please note

Air supply, air pressure, diameter of material hose as well as minimum orifice opening **must be adhered to** as recommended. All filters with the equipment must be removed prior to operating with Grünau KBS Coating.

### Technical Data

#### Composition:

Grünau KBS Coating consists of water-based thermoplastic resins, inorganic incombustible fibres, fillers, pigments and various flame retardant chemicals. Grünau KBS Coating is free of asbestos and solvents.

**Colour:** Off-white

**Viscosity:** Approx. 40,000 mPas

**Density:** Approx. .43 g/cm<sup>3</sup>

**pH-value:** Approx. 8.0

**Solids:** Approx. 70%

**Limiting Oxygen Index (LOI):** ≥95

**Toxicity:** Non-toxic

**Storage temperature:** 5 – 30°C, Must be protected from frost!

#### Shelf-life:

In closed original containers at room temperature at least one year

#### Packaging:

Plastic drums of 35, 25 and 7 kg

#### Thinning i.e. cleaning of equipment:

Water

#### Drying time:

Depending on temperature and humidity

To the touch: within 24 hours (20°C/65% RH)

Cured: approx. 3 days (20°C/65% RH)

#### Flexibility:

PVC cables of 12 mm diameter coated with Grünau KBS Coating may be bent to a 3 cm radius without cracking.

#### Thermal conductivity:

$\lambda = 0.69 \text{ W m}^{-1} \cdot \text{K}^{-1}$  at 25°C

#### Specific resistance:

$\rho_p = 1.06 \cdot 10^9 \text{ (Ohm} \cdot \text{cm)}$   
at 23°C / 50% RH

$\rho_p = 4.10 \cdot 10^5 \text{ (Ohm} \cdot \text{cm)}$   
at 23°C / 83% RH

## Selection of International Test Results and Approvals

Country	Type of Test	Standard	Result	Ref. No.
France	Flammability test	Arrêté Ministériel	M1	631
Germany	Qualifying test concerning reduction of fire risks	-	ignition prevented	008
	Current carrying capacity	-	no derating	106B
	Dermatology test	-	no effect	110A/110B
	Ship approval Germanischer Lloyd	SOLAS	-	147
	Flame propagation on coated cables	DIN 4102, p. 1 (B1)	non-propagating	148
	Flame propagation on coated cables	IEC 332-3	passed	169
	Ageing and weathering	-	no damage after 15 years	180
	LOI-determination	ASTM D2863	100	111/180
Great Britain	Flame spread	BS 476, p. 7	class 1	916 A
Norway	Fire spread	NT Fire 004	Class IN 1	710
USA	Ampacity	FM 3971	-	2001
	Current carrying capacity	FM 3971	no derating	2001
	Salt water exposure	FM 3971	-	2001
	Dielectric strength	FM 3971	-	2001 / 2023
	Flammability test	FM 3971	passed	2001 / 2023
	FM approval	FM 3971	-	2001 / 2023

All test reports on request.

The above data, particularly the recommendations for the application and use of our products are based on our knowledge and experience. Due to different materials and conditions of application which are beyond our control we recommend in any case to carry out sufficient tests in order to ensure that our products are suitable for the intended processes and applications. Therefore any liability for such recommendations or any oral advice is expressly excluded unless we have acted wilfully or by gross negligence.