

# Coating

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

**NOW FIRE  
RATES CABLE**

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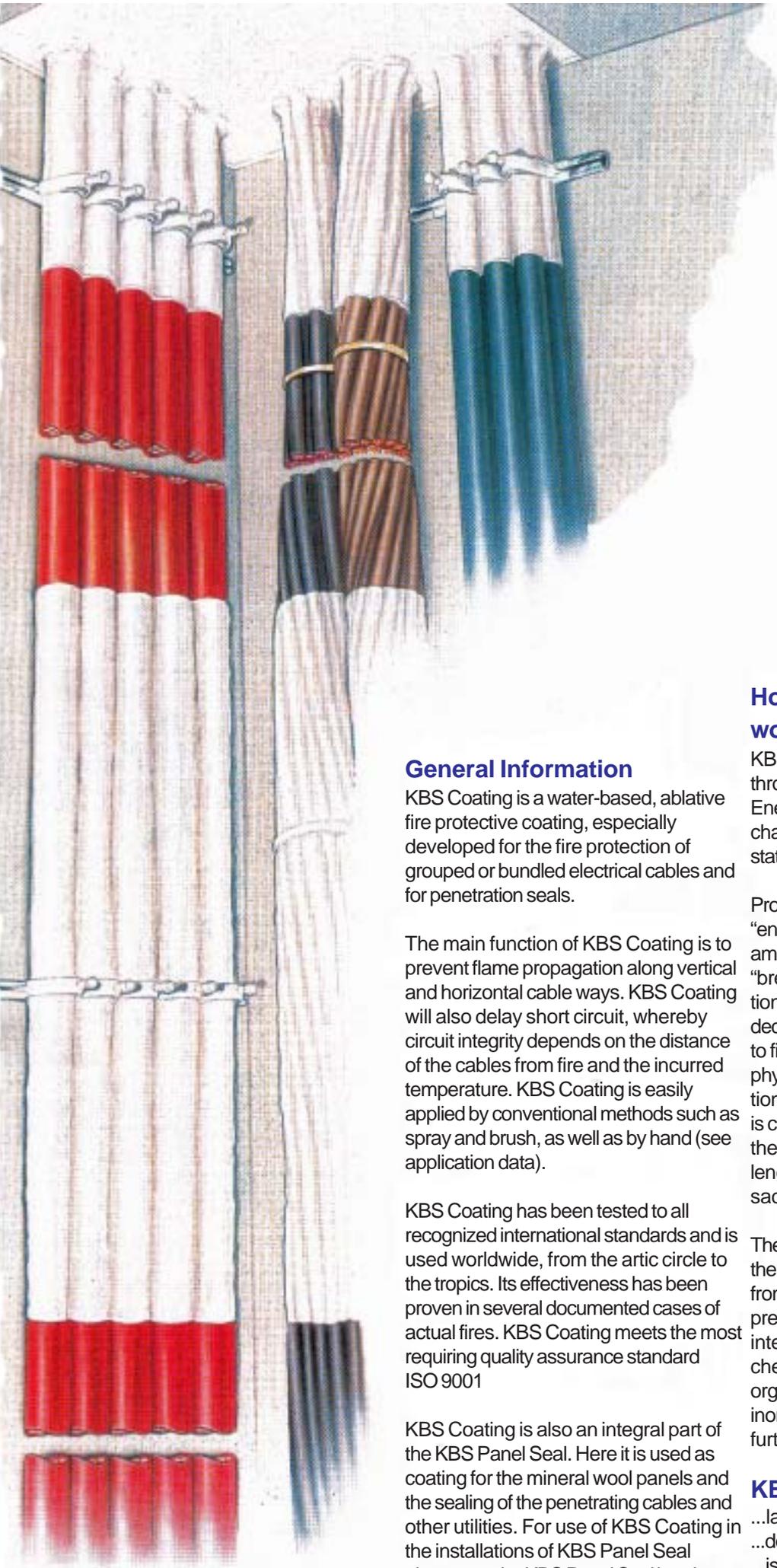
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### General Information

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

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. KBS Coating meets the most requiring quality assurance standard ISO 9001

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

### How does an ablative coating work?

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. 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.

### KBS Coating...

- ...lasts for the lifetime of cables
- ...does not derate electrical cables
- ...is totally weather and water resistant

## Fire protection

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 CEGB, 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).

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 and burns 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<sup>2</sup>/N<sup>2</sup> mixture – 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.

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

## Ampacity

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 KBS Coating?

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, KBS Coating also serves to prevent the development of the dreaded HCl from PVC cables as well as the dense black smoke and poisonous gases emitted from all types of burning cables.

## Mechanical Resistance

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

## Human health compatibility

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 carcinogenic. KBS Coating is practically odourless and does not affect the human skin.

## Weather and water resistance

KBS coating is permanent protection under all weather and climate conditions. A fifteen-year outdoor test, documented by the University of Braunschweig, found KBS Coating is still performing the same as freshly produced material. Here cables had been exposed from highest summer heat to snow and ice, part of their length being constantly immersed in water.

## Chemical compatibility

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 installations such as Diesel fuel, ethylene glycol, fuel oil, lubricating oil, turbine oil and many others.

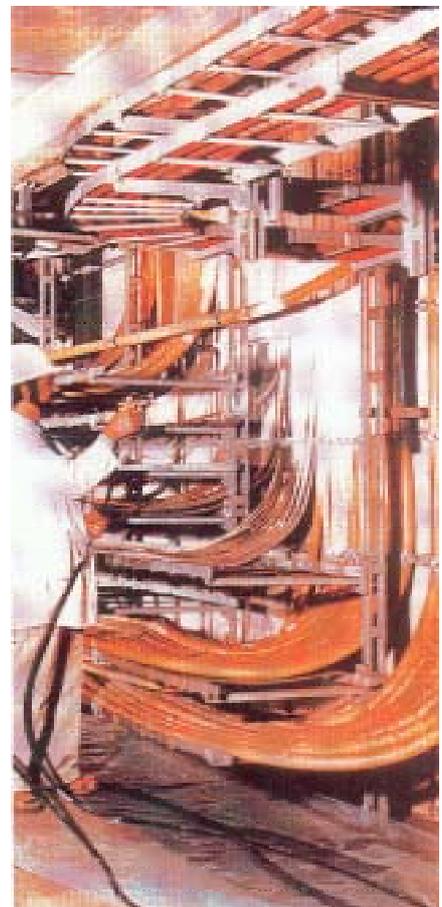
## Flexibility

KBS Coating is highly flexible (see technical data).

## Endurance/ lifetime

KBS Coating lasts for the lifetime of cables.

Spraying KBS Coating



## 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 **on all exposed sides**. For getting at hard-to-get-at places, use an 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 first apply a thin "fog coat" and let it dry, then apply the final coat.

### Brush

Brushing KBS Coating on all cables requires several coats to build up the required thickness. Again, a thin coat applied first and allowed to dry will aid in building up the required thickness.

### 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 is used for levelling concrete surfaces, should be used. For the KBS Panel Seal approx. 3.5 kg per m<sup>2</sup> will achieve the required approx. 1.6 mm dry thickness.

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

KBS Coating sprayable and KBS Coating brushable.

### Thinning

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

### Spray equipment

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  
(preferably reversible tip)

#### Conventional spray equipment

(with pressure pot)  
Binks, De Vilbiss Mastic, Wally or STA  
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 KBS Coating.

## Technical Data

### Composition:

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

**Colour:** Off-white

**Viscosity:** Approx. 30,000 mPas

**Density:** Approx. 1.43 g/ cm<sup>3</sup>

**pH-value:** Approx 7.8

**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 kg 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 KBS Coating may be bent to a 3 cm radius without cracking.

**Thermal conductivity:**

Wavelength ( $\lambda$ ) = 0.69 W W m<sup>-1</sup> . K<sup>-1</sup> at 25°C

**Specific resistance:**

P<sub>p</sub> = 1.06 . 10<sup>9</sup> (Ohm . cm) at 23°C / 50% RH

P<sub>p</sub> = 4.10 . 10<sup>5</sup> (Ohm . cm) at 23°C / 83% RH



Type of test	Standard	Result	Country / Testing Institute	Test Report No.
Flame propagation on coated cables	DIN 4102 p. 1B1	non-propagating	German / state Testing Institute stuttgart	1.6-78394
Flame propagation on coated cables	IEC 332-3	passed	Germany / bayer Fire Technology	33E/93
Flame spread	BS476, p.7	class 1	UK / LPC	FIRTO TE 80961
Fire spread	BS476, p.6	class 0	UK / LPC	FIRTO TE 81506
Flammability test	FM3971	passed	USA / FM Global	J.I.No. 1X8A7.AF/0X3A8.AF
Current carrying capacity	-	no derating	Germany / Allianz Zentrum	ADRG90.05.32/0.1
Current carrying capacity	FM3971	no derating	USA / FM Global	J.I.No. 0X3A8.AF
Dielectric Strength	FM3971	-	USA / FM Global	J.I.No. 1X8A7.AF/0X3A8.AF
Salt water exposure	FM3971	-	USA / FM Global	J.I.No. 0X3A8.AF
FM Approval	FM3971	-	USA / FM Global	J.I.No. 1X8A7.AF/0X3A8.AF
Ageing and weathering	-	no damage for 23 years	German / state Testing Institute Braunschweig	7267/5125
LOI Determination	ASTM D2863	100	German / state Testing Institute Braunschweig	7267/5125
Dermatology test	-	no effect	Germany University of Witten	Rep. 19.5.92
Official approval of State	-	-	Iceland	Reg. No. 511002.01
<b>Bureaus of ship approvals</b>				
lloyd's Register	SOLAS	-	France	Cert. SVG/F92/251
Germanischer lloyd's Register	SOLAS	-	Germany	Cert. No. 35930HH05/85
Det Norske Veritas	SOLAS	-	Germany	Cert. No. F-12276

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.