

UVEKOL® FR

Technical Data Sheet

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GENERAL DESCRIPTION

UVEKOL® FR (*) is a ready-for-use acrylic resin for the lamination of glass. It is cured under UV light for 20 minutes.

UVEKOL® FR was developed to confer safety impact resistance to fire resistant borosilicate glass.

UVEKOL® FR is halogen-free.

PHYSICAL PROPERTIES

Typical values:

refractive Index - 25°C	-	1.4597
colour Lovibond	Apha	< 50
dynamic viscosity, cone & plate - 25°C	mPa.s	30
density – 23°C	g / cm ³	1.06
Shore A hardness after 15" - 21°C	-	30
shrinkage during polymerization	%	10

(*) The ® indicates a Registered Trademark in the United States. The mark may also be registered, the subject of an application for registration or a trademark in other countries.

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APPLICATION PROCEDURE

The glass lamination process using UVEKOL® FR is simple and does not require heating or pressure.

The glass panes to be laminated are cleaned and joined together with a double-sided adhesive tape, leaving a small opening for filling.

UVEKOL® FR is pumped into the cavity between the panes, then cured in an UV oven for 20 minutes (standard time for most laminating applications using UVEKOL® FR).

Detailed information about the application procedure can be found in the UVEKOL® USER GUIDE – INSTRUCTIONS FOR THE PRODUCTION OF LAMINATED GLAZING UNITS.

Formula to be used to calculate the required quantity (volume) of UVEKOL® FR to be injected is:

$$\text{LENGTH (cm)} * \text{WIDTH (cm)} * \text{THICKNESS OF TAPE (cm)} * 1.10 = \text{VOLUME (ml)}$$

LENGTH (cm) = total length of the pane – 2 x tape width (standard tape = 6 mm)

WIDTH (cm) = total width of the pane – 2 x tape width (standard tape = 6 mm)

The factor of 1.10 compensates for the shrinkage of the resin during cure.

Whenever quantity in weight has to be considered, take into consideration the density of UVEKOL® FR is 1.06, slightly higher than that of the standard grades. When using above formula for the required quantity in weight, the volume (ml) has to be multiplied by 1.06 (density).

UVEKOL® FR should not be used with UVEKOL® MB concentrated colour pastes.

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HEAT AND FIRE RESISTANCE OF UVEKOL® FR BASED GLASS LAMINATES

UVEKOL® FR was developed to confer safety impact resistance to fire resistant borosilicate glass.

UVEKOL® FR laminates have successfully been tested in fire tests according to EN1363.

UVEKOL® FR is halogen-free.

IMPACT PROPERTIES OF UVEKOL® FR BASED GLASS LAMINATES

Thanks to the use of appropriate acrylated oligomers, UVEKOL® FR interlayers confer a high level of impact resistance.

As a consequence, UVEKOL® FR in a 5 / 1 / 4** and 5 / 1 / 5 composition passes the pendulum test according to the EN12600 for the highest class 1B1.

1 = highest drop height class at which the product either did not break or broke in accordance with EN12600 4a) or 4b)

class 1 material passes at drop heights 190 mm, 450 mm and 1 200 mm

B = mode of breakage typical of laminated glass

1 = highest drop height class at which the product either did not break or when broken, broke in accordance with EN12600 4a).

The most commonly used tests for safety performance are pendulum tests.

In this approach, a soft body impactor (bag, tyres) is swung from a standardized drop height against a vertically positioned test panel.

The test simulates a person slipping and falling against a safety glass: a balustrade, banister or facade.

** 5 / 1 / 4 = 5 mm glass, 1 mm interlayer, 4 mm glass

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AGEING OF UVEKOL® FR BASED GLASS LAMINATES

UVEKOL® FR laminates resist heat, UV light and humidity. They have been tested under accelerated conditions. Some of the most relevant data are summarized below:

RESISTANCE	TEST	STANDARD	PERFORMANCE
HEAT	temperature stability test oven ageing – 60 °C	-	5 / 1 / 4 laminate after 1 100 hours: $\Delta E = 0.5$ (°) no defects (delaminations, other)
	resistance to temperature changes – Klima test cycles between -30 °C and +80 °C	DIN 52344	100 cycles no defects (delaminations, others)
HEAT + MOISTURE	durability test = high temperature test (hot boiling test)	EN 12543-4	4 / 1 / 4 laminate 2 mm white border no defects
	Q-panel ageing – 351 nm continuous UV irradiation	ASTM G53	4 / 1 / 4 laminate, float with ceramic after 1 080 hours: $\Delta E = 0.7$ after 2 350 hours: $\Delta E = 1.5$ no defects

(°) ΔE is a measure for a difference in colour =
colour after ageing minus colour before ageing (in L*, a*, b*)

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PACKAGING

UVEKOL® FR is available in polyethylene drums containing 180 litres, and Schütz containers with 1 000 litres.

Containers when empty are taken back by Schütz (Schütz ticket system).

As density is slightly different (1.06) from that of the standard grades, the weight of the resin is different too:

180 litres correspond to 191 kilos net weight,

1 000 litres correspond to 1 060 kilos weight.

STATUTORY LABELLING

For Statutory Labelling information, please refer to Safety Data Sheet.

TRANSPORT REGULATIONS

Information on transport regulations can be found in the Safety Data Sheet, section 14: transport information.

QUALITY CERTIFICATION

UVEKOL® FR manufacturing is certified ISO 9001 and ISO 14001.

STORAGE AND HANDLING

UVEKOL® FR should be stored in a dry place, away from sources of heat, at a temperature of 15 °C to 30 °C for best performance.

UVEKOL® FR resins have a shelf life of 6 months from the date of manufacture, that can be derived from the batch number.

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