VITROGLAZE

Technical Data Sheet

09/09/09

Description: Protective, non-stick coating for vitreous and glass surfaces.

Intended use: For the treatment of glass, tiles, porcelain, marble, terrazzo and granite. Repels water, dirt, oil. Protects from chemical erosion, soap scum & limescale buildup.

Features: Nano technology non stick invisible coating. Will last up to 10 years. Keeps glass surfaces looking like new. Cuts cleaning time by up to 90%. Maintains clarity of glass. Can be applied in situ. No specific after care requirements.

Limitations: Will protect the current state of the glass/substrate, therefore glass must be precleaned with Vitroglaze Precleaner (for new glass) or cut back with Cyndan Creme Cleanser (for old glass) before treating.

Sizes: 1lt, 5lt, 20lt, 205lt.

Dilution: Ready to use solution.

Coverage: Approximately 100sqm / litre

Drying time: Will dry clear and transparent in 1-2 hours @ 25ºC.

Typical Physical Properties:

Appearance & Odour	Clear, colourless liquid. Mild alcohol odour.
Melting/Softening Point	No specific data. Liquid at normal temperatures.
Boiling Point & Vapour Pressure	81ºC at 100kPa.
Volatile Materials	>80%
Flashpoint	12ºC (Abel)
Flammability limits	Upper Value: 19% ; Lower Value: 3.3%
Vapour Pressure	0.66kPa at 20ºC
Viscosity	1.12mPa.s at 20ºC
Specific Gravity	0.824
Solubility in Water	Completely soluble
Corrosiveness	Not corrosive
Shelf Life	3 years after manufacture date.

Identification:

UN No.	1170
Dangerous Goods Class	Class 3 Flammable Liquids
Hazchem Code	2[Y]E
Sub Risk Class	Non Allocated
Packaging Group	II
Poison Schedule	Not Scheduled

UV-A stability: No macroscopical change of appearance upon accelerated 2000h exposition (irradiation at 300 - 425nm)

Thermal stability: Excellent performance up to 300ºC over extended periods.

Chemical resistance: No degradation upon interaction with strong acids and alkaline environment.

Optical appearance: Invisible, homogenous, nano-scale thickness.

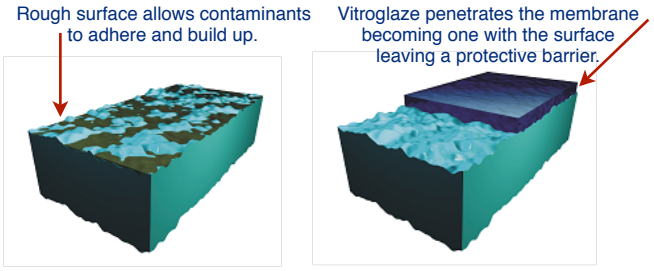
Application instructions: See Vitroglaze application video and manual for application instructions.

COATING ADHESION PRINCIPLES

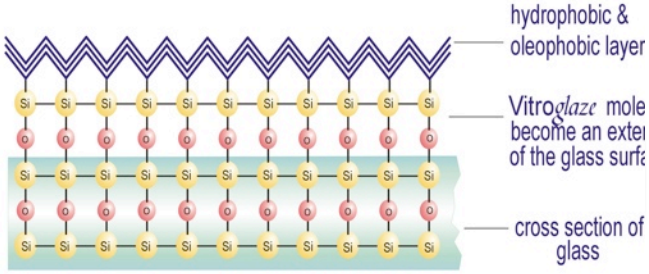
ABSTRACT

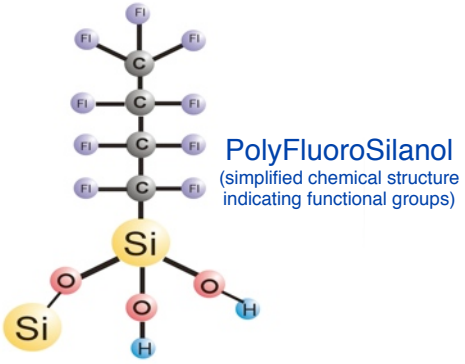
Organic-inorganic (hybrid) reagents can be formed from various combinations of metal and silicon alkoxides to create a nanoscale admixture of inorganic-oxides that can covalently bond to silica, metal, ceramic and stone substrates. The process of bonding (adhesion) at the nanoscale level is made possible by the sol-gel method. Adhesion generally occurs when the substrate and the coating are held together by interfacial molecular contact in such a way that a unit is formed. Adhesion is a complex phenomenon related to physical effects and chemical reactions at the interface. Adhesive forces are set up as the coating is applied to the substrate and during curing or drying. The magnitude of these forces will depend on the nature of the surface and the binder used in the coating. VITROglaze bonds onto silane (glass) surfaces both mechanically and chemically. In doing so it modifies the physical and chemical properties of the surface.

THE MECHANICAL THEORY



This mechanism of coating action occurs when the silane surface upon which VITROglaze is spread contains pores, holes, crevices, and voids into which VITROglaze solidifies. In this manner it acts as a mechanical anchor. Adhesion of VITROglaze to old and weathered glass as well as to sand blasted glass is increased (as against new float glass) by this mechanical mechanism. Surface roughness affects the interfacial area between the VITROglaze and the glass substrate. Because the forces required to remove coatings is related to the geometric surface area, whereas the forces holding the coating on to the substrate are in part, related to the actual interfacial contact area, increasing the surface area will increase the difficulty of removing the VITROglaze coating. The VITROglaze Pre Cleaner, which is an integral part of the application on float glass, will remove surface contamination by microscopically etching the glass surface, leaving no residue upon evaporation. This also goes to preparing the surface for better mechanical adhesion as a result of the increased topographical surface area afforded by the etching process. Generally with other NON nanoscale coatings, as the viscosity and coating stiffness increase and as the coating adhesion to the glass develops, substantial stress is accumulated and retained in the dry film. Under the fixed application parameters of wet and dry film thickness, the film thickness on top of the hills will be less than in the valleys, thus creating variable physical properties. The VITROglaze coating is not subjected to these types of forces due to the fact that it is about 600nm thick. The resultant non-uniform film with high levels of internal stress will enter the service environment where it will be further subjected to solvent attack from repair coatings or weathering, often pushing such coatings beyond their capacity for stress. Cracking or delaminating or other evidence of lost coating integrity will be the result.





THE CHEMICAL BOND THEORY

The formation of covalent chemical bonds across the interface takes place between VITROglaze and the silane surface. This type of bonding is the strongest and most durable. As is the case, it is requisite that there be mutually reactive and identical chemical functional groups between the coating and the substrate. Therefore contaminated or impure (dirty) surfaces will produce chemical bonds of inferior strength with the coating. Chemically, VITROglaze is generically defined as an organoflurosilane. Industrially organosilane analogues are widely used as primers on glass fibres to promote the adhesion between the resin and the glass in fibreglass-reinforced plastics. Essentially during application, silanol groups are produced which then react with the silanol groups on the glass surface and form extremely strong ether linkages.

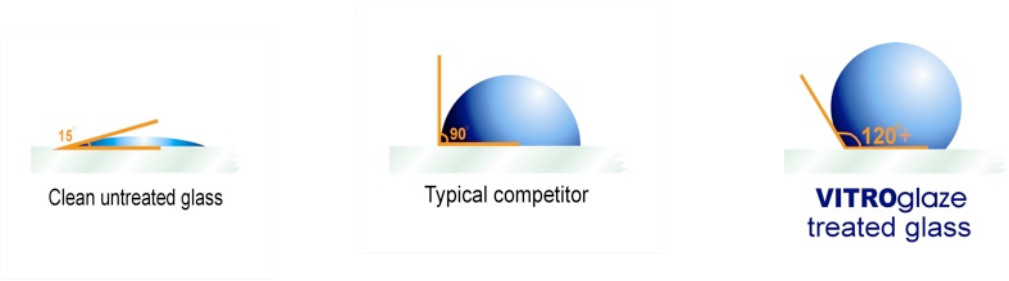
MECHANICS OF ADHESION DEVELOPMENT

When two dissimilar materials are brought into intimate contact, a new interface is formed at the expense of the two free surfaces in air. The nature of the interaction at the interface determines the strength of the bond, which forms between the coating and the substrate. The extent of these interactions is greatly determined by the wet ability of one phase by the other. In the case of coatings that are applied in liquid state, mobility of the coating phase is also of great help. Wetting, therefore, may be viewed as intimate contact between a coating and a substrate. In addition to initial wetting, in order for adhesion to remain between the substrate and the coating, it is important that intimate wetting and bonds remain intact after the coating has solidified. VITROglaze solidifies as a result of the evaporation of the ethyl alcohol solvent and a chemical cross-linking of the solute.

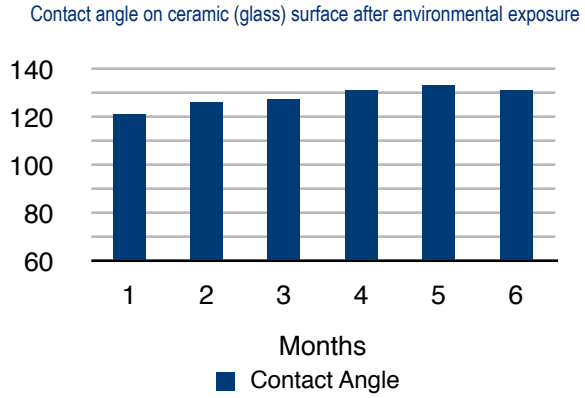
CONTACT ANGLE:

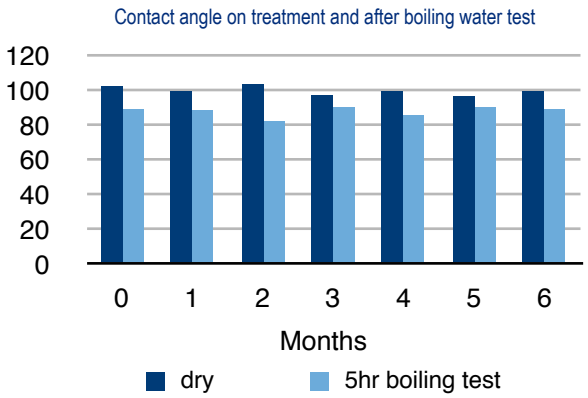
WETT-ABILITY AND SURFACE ENERGETICS

Wetting is a necessary criterion for adhesion. Mechanisms of adhesion are only operational if and only if, effective wetting is present between the coating and the substrate. For this reason VITROglaze applied onto a glass surface must be adequately spread or smeared consistently before the solvent evaporates off. The wetting of that glass surface can be described in thermodynamic terms. The surface tension of the VITROglaze in its liquid state and the surface energetic of both the glass substrate and the solid coating are important parameters that can influence the strength of the interfacial bond and adhesion development. The degree to which VITROglaze wets a glass surface is measured by the contact angle.



Stability testing of Vitroglaze coating on enamel





Warranty:

Cyndan Chemicals warrants that for a period of 24 months from the date of manufacture or for the duration of the published shelf life, whichever is less, that at the time of shipment, the product is free of manufacturing defects and conforms to published specifications in force on the date of acceptance by “the company” of the order. Cyndan Chemicals shall only be held liable under this warranty if the material has been stored, used and applied in accordance with Cyndan’s instructions in the products technical data sheet.

Commercial Applications:

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