

When “self cleaning” glass was introduced in 2001 as “mankind’s greatest invention since the wheel”, expectations that could not possibly be met were created at each step of the architectural glass supply chain – specifier, glass processor, fabricator, installer, building owner/ developer and occupants. This situation caused dissatisfaction around the world and damaged the markets for surface treatments applied on a glass float line.

A similar situation is now happening with liquid-applied glass surface treatments (GSTs) used off-line. Some suppliers create expectations that cannot be met by making misrepresentations such as “permanent, once-only application” when, in fact, their GST can be removed easily by rubbing, pressure washing or normal weathering.

Some suppliers fail to provide basic commercial and technical information necessary for specifiers and glass and glazing companies to make informed choices. This means that reality checks cannot be carried out and, as a result, a GST may be selected which is not fit for its intended purpose.

Often suppliers of GSTs create serious health and safety risks by stating that a product is safe to apply when it is hazardous. They fail to provide Safety Data Sheets (SDSs), a legal requirement, for customers to carry out risk assessments.

Worldwide there are only five basic technologies for liquid-applied glass surface treatments (GSTs), but more than 170 brands have entered the market during the past 14 years. Many of these brands have come and gone, costing many companies money and creating serious risks to lives and property.

Why are there so few technologies but so many brands? Why have so many brands been unsuccessful? Why are so many risks being created by suppliers?

THE SIMPLE ANSWERS

The answers are simple, says Stephen Byers, Managing Director of Ritec International Limited, London (www.ritec.co.uk). Firstly, liquid-applied GSTs appear very similar, if not identical, at the time of application. They are transparent, very thin and highly water-repellent, forming countless droplets when sprayed with water.



On Day One, GSTs may appear identical in water repellency but have major differences in health & safety, performance and durability

It is therefore difficult, if not impossible, for users to know the differences on Day One. This situation makes it easy for suppliers, who may or may not know any better, to make false or misleading claims about performance, durability and suitability.

These and other risks can be avoided if suppliers of GSTs would simply provide relevant information to prospective customers at the time decisions are being made and stop making false claims that create expectations that cannot be met. Most brands of liquid-applied glass surface treatments, especially those within the category known as ‘sol-gel’ (see below), are:

- manufactured by companies with little, if any, control over product distribution or marketing claims;
- marketed with little or no track records under actual field conditions;
- distributed by companies several steps down the supply chain with little or no knowledge of the technology.

Whether a supplier knows the truth or not, false or misleading statements can create serious risks at every step in the supply chain. Such claims can be at many levels – commercial, technical, application and health and safety – placing companies, their workers and property at risk.



To reduce or eliminate such risks, there are simple ways of setting the record straight as outlined in this article.

SETTING THE RECORD STRAIGHT

To help set the record straight about “self cleaning” glass, USGlass magazine published articles challenging this claim by pointing out that all GSTs require some maintenance and announcing they would only use the general description of “low maintenance”. In the UK, the Glass and Glazing Federation (GGF) published a data sheet clarifying situations where this technology is fit for purpose and where it is not.

As a result of these and other initiatives, manufacturers of “self cleaning” glass revised many of their product descriptions and marketing claims. By this time, however, fundamental damage had been done which resulted in a steady decline in the global market demand for this type of glass surface technology.

In the meantime, the market demand for liquid-applied GSTs has been expanding around the world because of an ever-increasing awareness of the need to prevent or cure the causes of Problem Glass – any glass that has lost, or is likely to lose, its original light transmission, clarity and cleanability.

This situation is very positive and beneficial, except for the fact that some GST suppliers place glass and glazing companies at risk by failing to assist them in making informed choices. In many cases, the user of a GST learns crucial information such as the type of technology, health and safety, performance and durability after a product is selected and used – when it is too late or costly to rectify any faults.

LIQUID-APPLIED GST TECHNOLOGIES – FIVE GENERAL CATEGORIES

It is important for specifiers and users of GSTs to know the general category of technology because this determines important factors such as:

- health and safety classifications
- method(s) of application
- performance under actual field conditions
- durability
- fitness for purpose.

Each category of technology has its own levels of resistance to abrasion, weathering and corrosion under actual field conditions. Because a GST is fit for purpose under one set of field conditions, such as hot and dry, does not mean it is suitable for other conditions such as cold and wet.

The five main categories of technology for liquid-applied GSTs are:

- 1) Polymeric resin – multi-molecular, strongest chemical bond
- 2) Reactive silicone fluids – mono-molecular, weak chemical bond
- 3) Bi-functional silane coatings
- 4) UV-cured silane coatings
- 5) Hybrid organic-inorganic coatings - based on silanes and a ‘sol-gel’ process.

Categories 2) through 5) above are all classified as hazardous because they have low flash points, which means ‘highly flammable’. If atomised or misted, they can create tiny ‘nanoparticles’ which may become explosive and can cause serious respiratory and other health problems. The polymeric resin, category 1), is Ritec ClearShield® which is the only liquid-applied GST not classified as hazardous.

The majority of false and misleading claims are currently being made by suppliers of hybrid organic-inorganic coatings known as “Sol-gel”. The basic technology has been around for many years but was adapted in Germany for use on metals at the Institute of New Materials (INM), which is associated with the University

of Saarbrücken. Later some companies started using it on glass with mixed results.

The Sol-gel process bonds organic and inorganic nanoparticles, using a coupling or cross-linking agent, to form a two-layered composite coating on the glass surface. Usually the inorganic material, typically a polysiloxane, bonds to the substrate and the organic material, which varies depending on desired properties, forms the top layer. These types of products normally require application of high heat or rubbing evenly onto the surface with moderate pressure to properly cure.

Sol-gel coatings are available as finished products from manufacturers or blenders in Germany, and some products may originate in China. Concentrates are also available from these sources for blending with solvent and packaging.

Because of the ready availability of finished products and concentrates, several blenders and a number of distributors have become involved. During the past 14 years, more than 170 brands of glass surface treatments have entered the market, and most of these were re-brands of Sol-gel coatings manufactured by a third party or mixed from concentrate by a blender.

The majority of sol-gel coatings for glass on the market today are either –

- a) re-brands of products bought by a distributor from a manufacturer or
- b) blended from concentrate supplied by the manufacturer.

Either way, the distributor does not control the technology or have access to the basic know-how. The distributor may have little, if any, in-depth knowledge of the technicalities. As a result, product blenders and distributors may have little knowledge of the technology because they are part of a long supply chain. The technology developers and basic manufacturers may have little, if any, control over technical or marketing claims. Unfortunately, this situation allows blenders and distributors to create their own claims, which they are now doing.

All of the technologies shown above have similar characteristics of transparency and high water-repellence. This is where the similarities

end, because each category of technology has its own performance, durability and suitability.

THREE CATEGORIES OF RISK CREATED BY MISREPRESENTATIONS

In many cases unachievable expectations are created when suppliers take out of context descriptions of the original technology developers. This creates three categories of risk:

1. Commercial and Technical

Some suppliers of GSTs are taking out of context descriptions of the original technology developers, such as:

- references to an industry standard as if the supplier meets these requirements – when the standard applies to totally different types of products and are therefore not relevant;
- ‘once only application’ originally meant a single instead of double initial application – not that you never have to make a re-application as claimed by some suppliers.

2. Health and Safety

Some suppliers claim their GST to be safe when, in fact, it is classified as hazardous. They minimise the risks and fail to point out that strict health and safety regulations must be followed at all stages of transportation, storage, use and disposal – otherwise financial and criminal penalties may apply.

Most GSTs have low flash points, meaning ‘highly flammable’ and their vapours may form explosive mixtures with air. The actual risks during application in a factory depend on various factors, but mainly on the actual method of application – manual (standard), spray or mist.

The greatest risks are created when application is by atomising or misting, which creates countless tiny droplets of ten (10) microns or less in diameter. These tiny droplets of hazardous solvent with very small particles of nanomaterials can create a multitude of risks to health and safety of applicators and others in the area.

3. Performance and Durability

Some suppliers claim their GST:

- can be applied anywhere in a factory or on-site, when the GST is based on a reactive silicone fluid which can easily migrate to

Lab tests alone cannot predict performance or durability



other areas and may detrimentally affect the adhesion of sealants, adhesives, paint and other materials, risking both performance and durability.

- is ‘permanent’, indicating that it ‘lasts forever’, but the original statement was ‘permanente chemische Bindung eingehen’ which simply referred to covalent bonding which is the strongest type of chemical attachment.

Regardless of the type of bonding, however, nothing in life lasts forever because chemical bonds can be broken by elements such as weathering, chemical attack and abrasion.



- is covered by a '10 year warranty' based on laboratory tests alone. This claim is used despite the fact that no lab test, or combination of tests, can predict performance or durability under the many variables of actual field conditions – as verified by numerous independent testing organisations and the Glass and Glazing Federation (GGF).

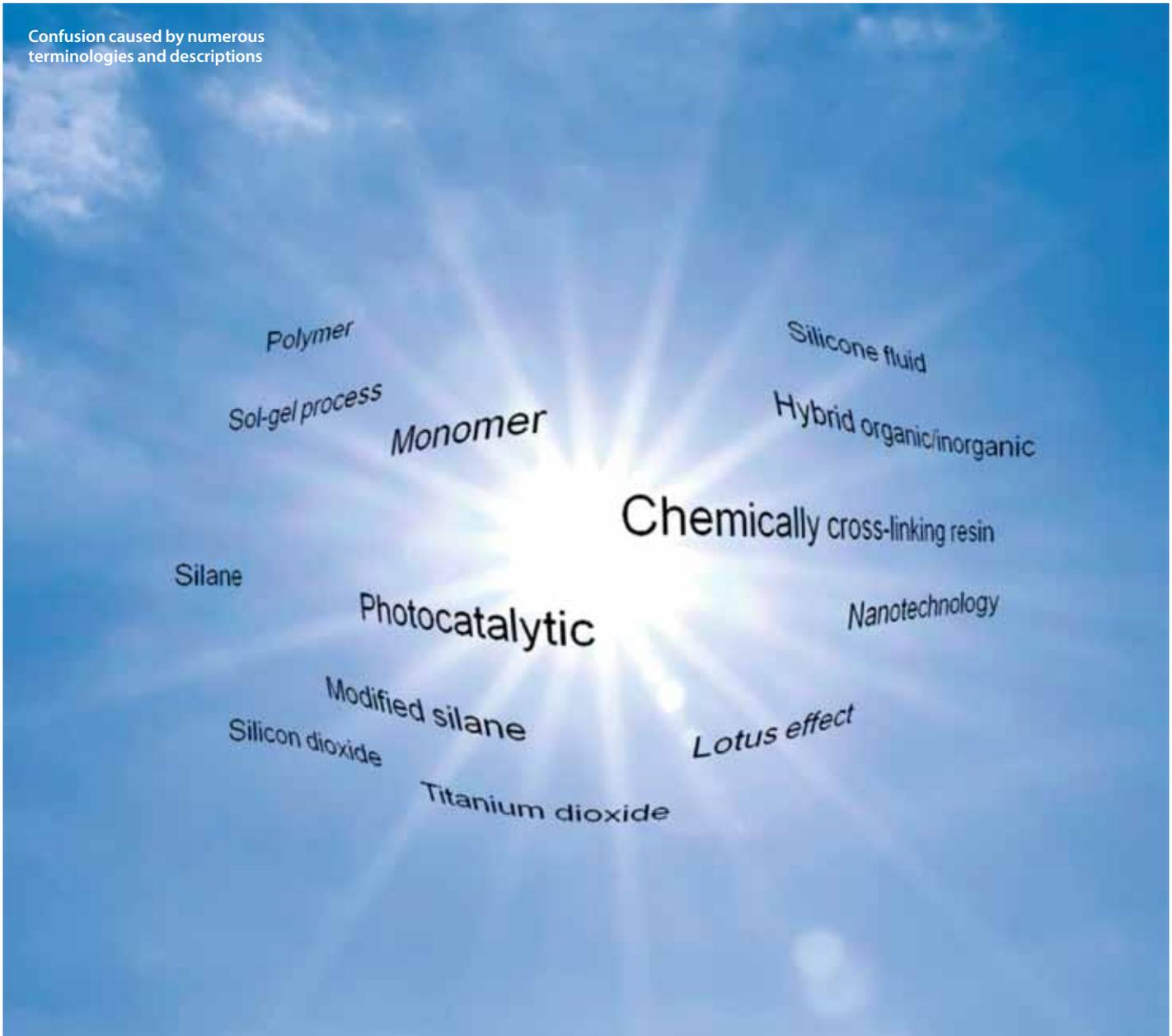
GUIDELINES FOR MITIGATING THE RISKS

To help mitigate the risks caused by situations such as those described above, five important factors should be taken into consideration by suppliers of liquid-applied GSTs and their prospective customers:

1. Health and safety – risks to persons and properties may occur and penalties can be imposed if regulations apply but are not met during transport, storage, application and disposal.
2. Fitness for purpose – due diligence should be carried out to ensure that a product is suitable for its intended use.
3. Performance and durability – determine if claims are supported by evidence under the actual conditions for each intended application or use.
4. Shelf life – this may have a detrimental effect on performance and durability of products whose shelf life begins at the time of manufacture and not when their containers are opened.
5. Other requirements for specific applications or uses – such as use with rubber suction lifters or resistance to pressure washing.

Following the general guidelines outlined above should help in reducing the risks of selecting a product that is not suitable for its intended use, has the potential to be improperly applied or may be based on false claims or unrealistic expectations.

Confusion caused by numerous terminologies and descriptions



THE GLASS SURFACE TREATMENT (GST) CHALLENGE

It is important to note that Ritec does not question the Sol-gel coating technology itself, only suppliers making misrepresentations to gain business. The Sol-gel technology has many valid and useful applications, provided it is applied by the correct methods, cured properly and marketed according to its known strengths and limitations.

Too often a GST supplier fails to make prospective customers aware of the inherent differences, or the supplier is several steps down the supply chain and does not know the facts himself. Either way, this can place glass and glazing companies at serious risk.

Some GST suppliers take advantage of the difficulty, if not impossibility, of telling the differences between liquid-applied GST's at the time of application. All of these products are transparent and water-repellent when applied. They all produce round droplets when sprayed with water.

Also, suppliers often increase the risks by basing marketing and technical claims on water droplet/contact angle and other laboratory tests. Numerous independent testing organisations verify that lab tests alone cannot predict performance or durability.

By the time these facts become known to the company applying a GST, it may be too late or

costly to rectify any faults. The consequences may detrimentally affect not only the GST applicator but also their dealers and end users.

Ritec considers it an obligation, as market pioneer and leader for durable, "non-stick" glass surface protection starting in 1982, to challenge companies promoting technologies with incorrect claims and misleading statements – especially when the supplier is several steps down the supply chain.

Ritec feels a duty to protect markets developed and grown by Ritec for more than 30 years – especially when misrepresentations create high risks of damage.