COATINGS ON GLASS pdf

1: Cleaning shower glass made easy - EnduroShield Glass Treatment

This chapter outlines the uses of glass from ancient to modern times, and also comments on the use and production of film deposition and coating techniques. Glass is the general term used for a number of special materials of varying composition and properties.

Spray-on liquid glass is about to revolutionize almost everything February 2, by Lin Edwards, Phys. The image shows the SiO2 coating on a filament of a microfibre. The coating is also flexible and breathable, which makes it suitable for use on an enormous array of products. Water or ethanol is added, depending on the type of surface to be coated. There are no additives, and the nano-scale glass coating bonds to the surface because of the quantum forces involved. According to the manufacturers, liquid glass has a long-lasting antibacterial effect because microbes landing on the surface cannot divide or replicate easily. Liquid glass was invented in Turkey and the patent is held by Nanopool, a family-owned German company. Nanopool is already in negotiations in the UK with a number of companies and with the National Health Service, with a view to its widespread adoption. The liquid glass spray produces a water-resistant coating only around nanometers molecules thick. On this nanoscale the glass is highly flexible and breathable. The coating is environmentally harmless and non-toxic, and easy to clean using only water or a simple wipe with a damp cloth. It repels bacteria, water and dirt, and resists heat, UV light and even acids. UK project manager with Nanopool, Neil McClelland, said soon almost every product you purchase will be coated with liquid glass. Food processing companies in Germany have already carried out trials of the spray, and found sterile surfaces that usually needed to be cleaned with strong bleach to keep them sterile needed only a hot water rinse if they were coated with liquid glass. The levels of sterility were higher for the glass-coated surfaces, and the surfaces remained sterile for months. Other organizations, such as a train company and a hotel chain in the UK, and a hamburger chain in Germany, are also testing liquid glass for a wide range of uses. The war graves association in the UK is investigating using the spray to treat stone monuments and grave stones, since trials have shown the coating protects against weathering and graffiti. Trials in Turkey are testing the product on monuments such as the Ataturk Mausoleum in Ankara. The liquid glass coating is breathable, which means it can be used on plants and seeds. Trials in vineyards have found spraying vines increases their resistance to fungal diseases, while other tests have shown sprayed seeds germinate and grow faster than untreated seeds, and coated wood is not attacked by termites. The spray cannot be seen by the naked eye, which means it could also be used to treat clothing and other materials to make them stain-resistant. In the home, spray-on glass would eliminate the need for scrubbing and make most cleaning products obsolete. Since it is available in both water-based and alcohol-based solutions, it can be used in the oven, in bathrooms, tiles, sinks, and almost every other surface in the home, and one spray is said to last a year. Liquid glass spray is perhaps the most important nanotechnology product to emerge to date. Other outlets, such as many supermarkets, may be unwilling to stock the products because they make enormous profits from cleaning products that need to be replaced regularly, and liquid glass would make virtually all of them obsolete.

2: Spray-on liquid glass is about to revolutionize almost everything

Glass surfaces must be dry and free from grease before coating. Wettability measurements can be used to check that the cleaning is thorough and uniform, as a homogenous glass surface has the same water contact angle everywhere.

An individual who spends a huge amount of money to buy a car will definitely want their car to look perfect. Understanding the history of Paint Application in automobiles: A couple of years ago, things were very simple, new cars were being painted on some very basic principles and techniques. Workers used to paint the disassembled chassis and its parts with a brush, just we paint our house with a brush. Several paint coats were applied to a vehicle and it was sold to the customer. Applying paint on a vehicle had several issues: Finishing was not good at all. Uneven surface of paint was a big problem The applied paint was not long lasting and its shine was never any good. The next stop for mankind was to opt Spray Paint, which was much more reliable much accurate than brush paint. The next breakthrough technique, which addressed the quality and durability of paint on automotive was Paint Baking method. In this method, the paint was heated to a certain temperature which increased its shine plus durability. Add to the fact that this technique is still being practiced albeit with new tools, speaks volumes about its effectiveness. Paint booths are used in which built-in heating system automatically maintains temperature. Very fine nozzles are used for painting a vehicle and precise painting job is achieved by the use of Robots. What is Glass Coating? Glass coating is basically a liquid glass made up of Silica and Siloxane. Carnauba Wax â€" Almost everyone knows about Carnauba Wax. But its protection duration is very less, it lasts for a maximum of six to eight weeks. This wax basically bonds a clear coat on the surface of your car with the help of added Polymers in it forming a wax layer, thus adding deep shine and wet look. Paint Sealants â€" Paint sealants are a completely synthetic blend of Polymers that provide long lasting shine and paint protection. It usually lasts for six months, which is also a subject to a multitude of factors, like application method, materials, and care. Why exactly do we need Glass Coating? And where can I get it done? To put it simply, this is where you will have to search for the right people to do this job. Go to the market and do a survey, discuss with different vendors, carefully calibrate your options and whoever convinces you most, just go with it. And I am sure InshaAllah after reading my article you will have an idea of Glass Coating and its process. How is it done? Items Required For Glass Coating. An indoor area with dust free environment Water hose.

COATINGS ON GLASS pdf

3: Anti-reflective coating - Wikipedia

Powder coating on glass is a specialized procedure related to traditional powder coating, which is the technique of applying electrostatically charged, dry powdered particles of pigment and resin to a solid item's surface.

Cleaning Preparation[edit] Powder coating on glass requires specialized equipment. The biggest challenge is getting the powder to adhere to the glass surface since there is no natural electrostatic attraction like there is with different metals. A clean glass subsurface that will not interfere with the process is essential before beginning the powder coating procedure. Proper temperature control is critical from the very beginning, including during the preparation stage. Certain temperature ranges are recommended, but they are proprietary at the moment to companies who have pioneered the technique. The Coating Process[edit] After cleaning, an opaque base coat of powder is applied to the glass substrate as the initial, most important layer of UV protection. Once the powder attracts, the product is heated to activate the process of gelling, which secures the adhesive bond. It is crucial to control the amount of powder that goes on to the surface. With too little, the coating becomes transparent and the protection is diminished. Too much can create a dripping effect or disperse uneven amounts, leading to one side of the glass container being heavier than the other. In the case of powder coating nail polish and other cosmetics bottles, experienced powder coaters typically use a highly chemical-resistant form of powder, which makes it impervious to the aggressive chemicals inherent with polish and primer. As more heat is applied, the powder coater adds the top coat, which flows together with the base coat. Oven curing follows, and the two coats become one, locking themselves together and encapsulating the bottle or container as a singular protective casing. Not only should this process effectively block out UV rays, but the molecular structure of the powder should provide added chip resistance and scratch resistance to the bottle. Generally speaking, the transfer of powdered paint to a glass substrate can be broken into four specific phases. Assuming the object is properly cleaned, this includes: Coverage for Different Shapes and Dimensions[edit] It is possible to powder coat a wide variety of glass forms and dimensions, including cylindrical, oval and square shapes, to name just a few. Care must be given toward achieving even coverage,[tone] which is accomplished through proper heat control and powder application. Colors and Textures[edit] Glass will accept an almost limitless number of powder coated colors. Professionals in this field have been able to achieve satisfactory silk screen printing and pad printing on the powder coated glass substrate, including in the case of difficult cylindrical shapes. Glass items compatible with powder coating include bottles and containers, decorative pieces, dinnerware, picture frames and more. Powder Coating as Green Technology[edit] Powder coating is considered to be an environmentally-friendly application. Unlike solvent-based wet paint systems, the process uses no volatile organic compounds VOCs. In addition, there is no release of chemicals into the air through evaporation, and over-sprayed powder is recoverable and easily and safely disposable.

4: Eyeglass Lens Coatings: Anti-Reflective, Scratch Resistant, Anti-Fog

--Glass Technology "This is an important review and compendium covering the wide ranging techniques available for the production, evaluation as well as the design of all types of thin films on glass surfaces.

Water-repellent coating automobile glass, spectacle lenses, shower walls Shatter protection Graffiti protection Preparing the coating Glass surfaces must be dry and free from grease before coating. Wettability measurements can be used to check that the cleaning is thorough and uniform, as a homogenous glass surface has the same water contact angle everywhere. Our mobile measuring equipment enables glass surfaces of any size to be tested non-destructively. The surface free energy of glass surface and coating should be such that interactions between the phases ensure good wetting and adhesion. For this purpose, the glass can be accurately characterized using a contact angle measuring instrument, and the coating using a tensiometer. Good wetting can be expected if the surface tension of the coating is less than the surface free energy of the glass. The ratio of polar and non-polar dispersive interaction fractions of the surface tension of the two phases is decisive for the adhesion of the coating. The more similar the pro-rata polarities, the better the coating adheres. The following process often lends itself to ensuring the quality of glass surfaces during production: Suitable limiting values are first determined in the laboratory using our stationary contact angle measuring instruments, and adherence to these is then checked on site using our mobile instrument Mobile Surface Analyzer â€” MSA. Assessing the coating The uniformity, long-term stability and coating effect achieved can be checked after coating by means of non-destructive contact angle measurement. After cleaning, a uniformly coated glass surface should have the same contact angle everywhere. The long-term stability of the coating can be determined with the help of loading tests, for example in the case of automobile glass by measuring after a different number of screen wiping operations. If the coating is stable, the contact angle will not change even after many cycles. Measuring the roll-off angle is also informative. This can be determined with the help of our tilting table. In the case of hydrophobic or nano-coated, self-cleaning glass surfaces, the drop starts to move at a very small tilt angle. Why test inks cannot tell the full truth about surface free energy The SFE is determined for 16 materials and plasma treated polymers. The differences â€” which are quite large in some cases â€” are explainable considering that ink tests do not take the polar part of SFE into account. In-line process control with MobileDrop: A small contact angle with water is an indication that the glass has been successfully degreased. Optimization of antigraffiti coatings based on silicon-hybrid systems An anti-graffiti coating consisting of polysiloxane and PTFE displays a decreasing surface energy and polarity with increasing PTFE fraction, therewith an increasing degree of hydrophobia. Thus, contact angle measuring technique helps finding the right mixture.

COATINGS ON GLASS pdf

5: IMI | Applications | Glass Coatings

Surface Coatings Because changing the basic composition in a glass tank to produce body coloured glass products i s a lengthy and large scale operation, modified properties are produced from basic clear glass by surface coatings applied during manufacture on-line or subsequently off-line.

But what exactly is low-e glass? How does it work? Emissivity is the ability of a material to radiate energy. When heat or light energyâ€”typically from the sun or HVAC systemâ€”is absorbed by glass it is either shifted away by air movement or re-radiated by the glass surface. In general, highly reflective materials have a low emissivity, and dull darker colored materials have a high emissivity. All materials, including windows, re-radiate heat in the form of long-wave infrared energy depending on the emissivity and temperature of their surfaces. Radiant energy is one of the important ways heat transfer occurs with windows. Therefore, having low-e glass ultimately can improve the insulation of a home from external temperatures in any climate. To reduce the emissivity of glass, low-e coatings have been developed to minimize the amount of ultraviolet and infrared light that can pass through glass without compromising the amount of visible light that is transmitted. There are two different types of low-e coatings: The low-e coating is usually placed on one of the inside glass pane surfaces of the insulating unit. Homeowners can test for the low-e coating in a window by doing the following: Hold a lit match or a pen light up in front of the window. In a double pane insulating glass unit, four reflections of the flame or light or two per lite of glass present will appear due to the four glass surfaces of the insulating glass unit. If the window contains low-e glass, one of the images will be a different color than the rest of the images. If the window does not have low-e glass, the four reflected images will be the same color. These tools provide step-by-step decision-making support for determining the most energy efficient window for a given residential building. Need more glass information? Visit the Architectural Glass Education Center. To learn more, visit the Vitro Architectural Glass Education Center , where you can find videos, articles, definitions, frequently asked questions, infographics and short slide presentations that offer engaging, easy to understand information about designing, specifying and building with commercial glass.

COATINGS ON GLASS pdf

6: Understanding Low-e Glass | Vitro Residential Glass

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Surface Coatings Because changing the basic composition in a glass tank to produce body coloured glass products i s a lengthy and large scale operation, modified properties are produced from basic clear glass by surface coatings applied during manufacture on-line or subsequently off-line. The application of coatings, by dipping panes into chemical solutions, drying and firing, or by evaporation of metals on to glass surfaces under conditions of vacuum, has been known for many years, but in the last decade application by magnetron sputtering of materials has come to the forefront. This process is capable of giving a wide range of coatings of different colours, reflectivities and thermal properties. In magnetron sputtering, the material to be sputtered is made the cathode of an electrical circuit at volts Click here to view the image above in a separate window. Argon gas is introduced into a vacuum chamber, and a glow discharge plasma occurs. Electrons are removed from the argon and leave positively charged ions. These ions are attracted to, and impact with, the target cathode. They have very high momentum and eject atoms of the cathodic material which recondense on the glass below. Fine tuning enables uniform coatings to be laid on large substrates. Panes x mm can be sputter coated at a rate of one every 60 seconds or so. Virtually any non-magnetic metal or alloy can be sputtered. If argon is in the chamber, a metallic coating results; if oxygen or nitrogen, the result is an oxide or a nitride. A large number of designed coatings is available. Light transmission depends on the nature and thickness of coating. Colour depends on coating thickness material and configuration. The product ranges are under continuous development. They may still be considered as basic products, and size and tolerance constraints are similar to those for clear float glass. Surface coatings, either for solar control purposes or for reduced emissivity a property to improve thermal insulation , are called pyrolitic coatings because they are generally applied to the hot glass during its passage through the annealing lehr. They involve the thermal decomposition of gases, liquids or powders sprayed on to the glass to form a metal oxide layer which fuses to the surface. On-line coatings have advantages of hardness and durability over off-line coatings and are suitable for bending and toughening. They tend to be limited in variety of colour. The use of dielectric coatings, which produce interference effects, allows higher light transmission with increased selectivity; the range of colours is also increased. It is not possible to toughen or bend most off-line coated glass; such work must be carried out before coating. It is possible to combine coatings in double glazed and laminated products. This deposit is usually protected by a layer of copper which in turn is protected by a paint backing. The silver gives the mirror its reflective properties. Nippon Sheet Glass Co. Head Office - Mita Minato-ku Tokyo.

7: Coating of glass

This is the second, revised edition of a book that has already proved invaluable to a wide range of readers. Written by a scientist for scientists and technical people, it goes beyond the subject matter indicated by the title, filling the gap which previously existed in the available technical literature.

Lens coatings can enhance the durability, performance and appearance of your eyeglass lenses. This is true whether you wear single vision , bifocal or progressive lenses. If you are thinking about purchasing new eyeglasses , here are lens coatings and treatments you should consider. Anti-Reflective Coating Anti-reflective coating also called AR coating or anti-glare coating is a microscopically thin multilayer coating that eliminates reflections from the front and back surface of eyeglass lenses. By doing so, AR coating makes your lenses nearly invisible so people can focus on your eyes, not distracting reflections from your eyeglasses. An anti-scratch coating can lengthen the life of your lenses, while hydrophobic coatings keep rain, snow and fog at bay. Anti-reflective coating also eliminates glare caused by light reflecting from your lenses. With reflections eliminated, lenses with AR coating provide better vision for night driving and more comfortable vision for reading and computer use. AR coating is highly recommended for all eyeglass lenses, but particularly for polycarbonate and high-index lenses , which reflect more light than regular glass or plastic lenses if anti-reflective coating is not applied. Also, aspheric lenses , which have flatter curves than regular lenses, often cause more noticeable reflections, so AR coating is highly recommended for these lenses, too. And AR coating is beneficial when applied to the back surface of sunglasses to eliminate "bounce-back" reflections when you are facing away from the sun. For the best possible comfort in all lighting conditions, eye care professionals usually recommend applying anti-reflective coating to photochromic lenses. AR coating improves light transmission through the lenses for night driving and helps photochromic lenses reduce glare in bright sunlight. However, lenses that are treated front and back with a clear, scratch-resistant coating have a much harder surface that is more resistant to scratching, whether from dropping your glasses on the floor or occasionally cleaning them with a paper towel. Today, most eyeglass lenses, including high-index lenses and lenses made of polycarbonate and Trivex , have a built-in scratch-resistant coating. Since scratch-resistant coatings are sometimes optional, make sure your optician knows that you want your eyeglass lenses to include hard coating for extra durability. Also, ask about the warranty on eyeglass lenses that are treated with scratch-resistant coating versus those without the coating. To keep your glasses looking new, store them in a cushioned case when not in use, and clean your lenses with a microfiber cloth and the cleaning solution your optician recommends. Also, be wary of products that promise to repair scratched lenses. These products may fill in the scratches, but it is impossible for them to make the scratches disappear so the lenses look new again. Anti-Fog Coating If you live in a cold climate, nothing is more frustrating than having your eyeglasses fog up when you come in from the cold. This also can be a safety issue, since it limits your ability to see until the fog clears. Lens fogging can be especially dangerous for police officers and other first responders to emergency situations. At least one eyeglass lens coating company Opticote has created a permanent coating designed to eliminate this problem. The factory-applied coating â€" called Fog Free â€" eliminates the condensation of moisture on lenses that causes fogging. So your lenses and vision stay clear when you make the transition from a cold environment to a warm one. It may also keep your lenses from fogging up during sports and other times you are hot and perspiring. Fog Free can be applied to plastic, polycarbonate and other eyeglass lenses, including high-index lenses and Transitions photochromic lenses. The anti-fog coating is applied to the lenses before they are cut to fit into your frame at the optical lab. Ask your optical retailer about pricing and availability. Another option in anti-fog lens technology is Optifog lenses Essilor. The anti-fogging property of Optifog lenses is activated by applying a drop of Optifog Activator to each side of the lens, then wiping the lens with a microfiber cloth to thoroughly spread the liquid across the entire lens surface. This treatment keeps the lenses fog-free for up to one week, according to Essilor. Lens fogging is caused by tiny water droplets that form by condensation on the surface of eyeglass lenses when the lenses are significantly cooler than the surrounding air temperature. Optifog works by uniformly spreading these water droplets across the lens surface so they become invisible, Essilor says. Ultraviolet Treatment Another beneficial lens treatment is an invisible dye that blocks ultraviolet UV light. Overexposure to ultraviolet light is thought to be a cause of cataracts , retinal damage and other eye problems. Regular plastic eyeglass lenses block most UV light, but adding a UV-blocking dye boosts UV protection to percent for added safety. Other eyeglass lens materials, including polycarbonate and most high-index plastics, have percent UV protection built-in, so an extra lens treatment is not required for these lenses. Heiting has more than 25 years of experience as an eye care provider, health educator and consultant to the eyewear industry. His special interests include contact lenses, nutrition and preventive vision care. Page updated August Like This Page?

COATINGS ON GLASS pdf

8: KercoatÂ® protective coating for returnable glass bottles by Arkema

Emissivity and Glass Emissivity: The relative power of a surface to absorb and emit heat by radiation. Glass: High emissivity surface - Efficient heat absorption and radiation.

Applications[edit] Anti-reflective coatings are often used in camera lenses, giving lens elements distinctive colours. Anti-reflective coatings are used in a wide variety of applications where light passes through an optical surface, and low loss or low reflection is desired. Examples include anti-glare coatings on corrective lenses and camera lens elements, and antireflective coatings on solar cells. Such lenses are often said to reduce glare , but the reduction is very slight. Antireflective ophthalmic lenses should not be confused with polarized lenses , which decrease by absorption the visible glare of sun reflected off surfaces such as sand, water, and roads. The term "antireflective" relates to the reflection from the surface of the lens itself, not the origin of the light that reaches the lens. Many anti-reflection lenses include an additional coating that repels water and grease , making them easier to keep clean. Anti-reflection coatings are particularly suited to high- index lenses, as these reflect more light without the coating than a lower-index lens a consequence of the Fresnel equations. It is also generally easier and cheaper to coat high index lenses. Photolithography[edit] Antireflective coatings are often used in microelectronic photolithography to help reduce image distortions associated with reflections off the surface of the substrate. Different types of antireflective coatings are applied either before or after the photoresist , and help reduce standing waves , thin-film interference , and specular reflections. The optical glass available at the time tended to develop a tarnish on its surface with age, due to chemical reactions with the environment. Rayleigh tested some old, slightly tarnished pieces of glass, and found to his surprise that they transmitted more light than new, clean pieces. The tarnish replaces the air-glass interface with two interfaces: Because the tarnish has a refractive index between those of glass and air, each of these interfaces exhibits less reflection than the air-glass interface did. In fact, the total of the two reflections is less than that of the "naked" air-glass interface, as can be calculated from the Fresnel equations. One approach is to use graded-index GRIN anti-reflective coatings, that is, ones with nearly continuously varying index of refraction. Reflectance is also decreased for wavelengths in a broad band around the center. A layer of thickness equal to a quarter of some design wavelength is called a "quarter-wave layer". The most common type of optical glass is crown glass , which has an index of refraction of about 1. An optimal single-layer coating would have to be made of a material with an index of about 1. Unfortunately, there are no solid materials with such a low refractive index. The closest materials with good physical properties for a coating are magnesium fluoride , MgF2 with an index of 1. MgF2 coatings perform much better on higher-index glasses, especially those with index of refraction close to 1. MgF2 coatings are commonly used because they are cheap, and when they are designed for a wavelength in the middle of the visible band , they give reasonably good anti-reflection over the entire band. Researchers have produced films of mesoporous silica nanoparticles with refractive indices as low as 1. Coatings that give very low reflectivity over a broad band of frequencies can also be made, although these are complex and relatively expensive. Absorbing[edit] An additional category of anti-reflection coatings is the so-called "absorbing ARC". These coatings are useful in situations where high transmission through a surface is unimportant or undesirable, but low reflectivity is required. They can produce very low reflectance with few layers, and can often be produced more cheaply, or at greater scale, than standard non-absorbing AR coatings. See, for example, US Patent 5,, Absorbing ARCs often make use of unusual optical properties exhibited in compound thin films produced by sputter deposition. For example, titanium nitride and niobium nitride are used in absorbing ARCs. These can be useful in applications requiring contrast enhancement or as a replacement for tinted glass for example, in a CRT display. This allows the moth to see well in the dark, without reflections to give its location away to predators. Practical anti-reflective films have been made by humans using this effect; [10] this is a form of biomimicry. Such structures are also used in photonic devices, for example, moth-eye structures grown from tungsten oxide and iron oxide can be used as photoelectrodes for splitting water to produce hydrogen. Light reflected from the surface after the polarizer is transformed into the opposite "handedness". This light cannot pass back through the circular polarizer because its chirality has changed e. Thick-film effects arise because of the difference in the index of refraction between the layers above and below the coating or film ; in the simplest case, these three layers are the air, the coating, and the glass. Thick-film coatings do not depend on how thick the coating is, so long as the coating is much thicker than a wavelength of light. Thin-film effects arise when the thickness of the coating is approximately the same as a quarter or a half a wavelength of light. In this case, the reflections of a steady source of light can be made to add destructively and hence reduce reflections by a separate mechanism. In addition to depending very much on the thickness of the film and the wavelength of light, thin-film coatings depend on the angle at which the light strikes the coated surface. Reflection[edit] Whenever a ray of light moves from one medium to another for example, when light enters a sheet of glass after travelling through air , some portion of the light is reflected from the surface known as the interface between the two media. This can be observed when looking through a window , for instance, where a weak reflection from the front and back surfaces of the window glass can be seen. The strength of the reflection depends on the ratio of the refractive indices of the two media, as well as the angle of the surface to the beam of light. The exact value can be calculated using the Fresnel equations. When the light meets the interface at normal incidence perpendicularly to the surface , the intensity of light reflected is given by the reflection coefficient, or reflectance, R:

9: Coatings on Glass - H. Pulker, H.K. Pulker - Google Books

Therefore, having low-e glass ultimately can improve the insulation of a home from external temperatures in any climate. To reduce the emissivity of glass, low-e coatings have been developed to minimize the amount of ultraviolet and infrared light that can pass through glass without compromising the amount of visible light that is transmitted.

Glass is one of the most popular and versatile building materials used today, due in part to its constantly improving solar and thermal performance. One way this performance is achieved is through the use of passive and solar control low-e coatings. So, what is low-e glass? In this section, we provide you with an in-depth overview of coatings. Ultraviolet UV light, visible light and infrared IR light all occupy different parts of the solar spectrum â€” the differences between the three are determined by their wavelengths. Ultraviolet light, which is what causes interior materials such as fabrics and wall coverings to fade, has wavelengths of nanometers when reporting glass performance. Visible light occupies the part of the spectrum between wavelengths from about nanometers. Infrared light or heat energy is transmitted as heat into a building, and begins at wavelengths of nanometers. Solar infrared is commonly referred to as short-wave infrared energy, while heat radiating off of warm objects has higher wavelengths than the sun and referred to as long-wave infrared. Low-E coatings have been developed to minimize the amount of ultraviolet and infrared light that can pass through glass without compromising the amount of visible light that is transmitted. When heat or light energy is absorbed by glass, it is either shifted away by moving air or re-radiated by the glass surface. The ability of a material to radiate energy is known as emissivity. In general, highly reflective materials have a low emissivity and dull darker colored materials have a high emissivity. All materials, including windows, radiate heat in the form of long-wave, infrared energy depending on the emissivity and temperature of their surfaces. Radiant energy is one of the important ways heat transfer occurs with windows. For example, uncoated glass has an emissivity of. This is where low emissivity or low-e glass coatings come into play. Low-E glass has a microscopically thin, transparent coatingâ€”it is much thinner than a human hairâ€—that reflects long-wave infrared energy or heat. When the interior heat energy tries to escape to the colder outside during the winter, the low-e coating reflects the heat back to the inside, reducing the radiant heat loss through the glass. The reverse happens during the summer. To use a simple analogy, low-e glass works the same way as a thermos. A thermos has a silver lining, which reflects the temperature of the drink it contains. The temperature is maintained because of the constant reflection that occurs, as well as the insulating benefits that the air space provides between the inner and outer shells of the thermos, similar to an insulating glass unit. Since low-e glass is comprised of extremely thin layers of silver or other low emissivity materials, the same theory applies. The silver low-e coating reflects the interior temperatures back inside, keeping the room warm or cold. Solar control low-e coatings are designed to limit the amount of solar heat that passes into a home or building for the purpose of keeping buildings cooler and reducing energy consumption related to air conditioning. Finally, the glass is cut into stock sheets of various sizes for shipment to fabricators. Because of the historic evolution of these coating technologies, passive low-e coatings are sometimes associated with the pyrolytic process and solar control low-e coatings with MSVD, however, this is no longer entirely accurate. In addition, performance varies widely from product to product and manufacturer to manufacturer see table below , but performance data tables are readily available and several online tools can be used to compare all low-e coatings on the market. Coating Location In a standard double panel IG there are four potential surfaces to which coatings can be applied: Passive low-e coatings function best when on the third or fourth surface furthest away from the sun , while solar control low-e coatings function best when on the lite closest to the sun, typically the second surface. Low-e Coating Performance Measures Low-e coatings are applied to the various surfaces of insulating glass units. Whether a low-e coating is considered passive or solar control, they offer improvements in performance values. The following are used to measure the effectiveness of glass with low-e coatings: U-Value is the rating given to a window based on how much heat loss it allows. Visible Light Transmittance is a measure of how much light passes through a window. When thinking of window designs: However, low-e coatings play an equally important role and significantly affect the overall performance of a window and the total heating, lighting, and cooling costs of a building.

COATINGS ON GLASS pdf

Rule generalization and optionality in language change Economic consequences of Zionism Balance work and life Sea hawk of the Confederacy Kids Book Of Basketball From landscapes to lots Help for dBASE IV users and would-be users Hampi tourist guide map Linear integrated circuits by roy choudhary fourth edition Chilled Wine and Assorted Desserts Servsafe manager 6th edition book Uncle Jacks fiddlin around The Bandits Lady The Chelidonium complex Benefits of becoming a seeker Conclusions Sarah Gilmore. Recipe for Success in Network Marketing Language, Communication, Literacy: Pathologies Treatments, An Issue of Pediatric Clinics (The Clinics: In Criterion for Tune Gilbert strangs linear algebra and its applications 4th edition Sculpture of Jose De Creeft Conspiracy X: Nemesis Works by Roland Penrose CCH Toolkit Tax Guide 2006 (CCH Business Owners Toolkit series) The lady and the tiger short story Overview of the rest of the book Genealogical sketch of the Lamb family How can I get back to living my life? One hundred percent American Enzymes the fountain of life Postal Route Gazetteer Part 1 New York State 1839 (Postilion Series of Primary Source Volume 6) Atheist Heroes and Heroines (American Atheist Radio Series) Martin Luther (1483-1546 : Reformation I Intellectual Property Law in the Peoples Republic of China Mr. Kidd on Western civilization. Builds a logical interrelationship among supported assertions, documents The Kennedy Literature Practical Professional Cookery Revised Green in the city Project report on floating wind turbine