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international
Issue 4

Gauges for African Coatings

Steve Pollard from Elcometer's Technical Support department was in South Africa recently for the *Coatings for Africa* Conference, which took place in the Drakensberg.

He found time for a demonstration of Elcometer's latest instruments to members of the South African Paint Manufacturers' Association (SAPMA) as well as BAMR's distributors in Johannesburg and Durban. Elcometer recently donated gauges to students at SAPITI, so he visited to answer any queries relating to their use.

The exhibition at the Coatings for Africa Conference was a great opportunity for Elcometer and BAMR to showcase the latest products. It was also a great chance to network with customers and companies in this important industry.

"The week was a great success for all concerned and we hope to make this a bi-annual event", said BAMR's Graham Dük.

Marine Inspection Kit

Marine coating inspection uses a certain set of gauges, determined by the International Maritime Organisation's (IMO) Performance Standard for Protective Coatings (PSPC) for ballast tanks. Now, you can now buy all of them in one go.

Top Marine Inspection Kit

Elcometer's Marine Inspection Kit comprises all the gauges required to work to the PSPC in one carry case. It includes a surface profile gauge, dust test, cleanliness standards, salt meter and climatic tests.

Also included is an Elcometer 456 coating thickness gauge; the version that provides instant pass-fail results using the PSPC 90/10 Rule *(see right)*.

The climatic, profile and thickness measurements are transferable from the gauge to a computer for archiving, which is a requirement of the PSPC.

So, if you are painting or inspecting ships, you must get one of these kits. Part number for the Top kit is YKITMARINE-1T.

First to coat IMO ship

The first vessel to be built in full compliance to the new IMO regulation is being built in Korea for Chandris Hellas. It will have paint-maker PPG's SigmaPrime™ 700 coatings applied. These coatings have received type-approval certificates.

The IMO PSPC calls for shipyards, coatings manufacturers, ship owners and classification societies to ensure protective coatings systems for sea-water ballast tanks are specified, qualified, applied and verified throughout the ship's construction. This should extend service life.

PPG is the first paint company to supply type-approved paint for ballast tanks. They are supporting the IMO's initiative to increase and extend the safety of ships at sea with high performance coating systems carefully applied to the metalwork.

Marine coating products are a part of the extensive range of products from PPG, which also supplies to the automotive and construction markets.

FROM www.ppg.com

product of the month

Elcometer 456 incorporates the PSPC 90/10 rule

The International Marine Organisation (IMO) has developed a new regulation to define the target life of a protective coating in salt-water ballast tanks. The new Elcometer 456 is the first coating thickness gauge to provide Coating Inspectors with an immediate Pass/Fail result as readings are taken.

The Performance Standard for Protective Coatings (PSPC) stipulates that the target life should be a minimum of 15 years for all new ships above 500gwt. It requires a structured approach to coating thickness measurement known as the PSPC 90/10 Rule.

The rule is this "NDFT is the nominal dry film thickness, 90/10 practice means that at least 90% of all thickness measurements shall be greater than or equal to NDFT and none of the remaining 10% shall be less than 0.9 x NDFT".

The new Elcometer 456 is the only coating thickness gauge to use the PSPC 90/10 rule, as the readings are being taken. The gauge also displays the percentage of readings above the NDFT value and the percentage of readings below that, down to 0.9 x NDFT.

All new Elcometer 456 gauges (Basic, Standard & Top Models) shipped after 4th April 2008 include this new feature at no extra cost. For further information, visit www.elcometer.com or BAMR on sales@bamr.co.za

A change for the better?

The coatings industry has been slow to embrace the new generation of coating technologies, despite various pressures, but this may be about to change.

An example is 100%-solids UV-curable coatings. They provide the inherent advantages of reduced production time as well as a decrease in polluting emissions and hazardous waste. The coating plant can be smaller and a more durable product may result.

But such potential improvements have not been enough to overcome the inertia of the manufacturing community or to promote change. Today's high energy prices, though, may be the push needed to force the coatings industry and its customers to change.

Most conventional coatings require a considerable energy input to achieve cure. Traditional liquid coating processes must drive off organic solvents. Waterbourne coatings need time, space and ventilation to dry. They can also cause flash rusting. Their hardness, abrasion resistance, corrosion resistance and adhesion are often less than that of conventional liquid coatings or powders. Even powder coating requires energy, to raise the temperature of a mass of metal for 20 minutes at a time.

In contrast, 100%-solids UV-curable coatings cure very quickly, usually in seconds, saving energy. With faster production, reduced space requirements and environmental advantages, such coatings have become an attractive alternative.

FROM www.ecologycoatings.com

Quicker cure brings savings

Relatively simple process changes to a paint line, coupled with the use of reactive-cure coatings, can increase manufacturing volumes and improve production efficiency.

Environmentally, reactive-cure coatings minimise volatile organic compounds (VOCs) and reduce curing costs, compared to single-component material. Certain reactive-cure coatings can even be applied in one-third of the traditional time, significantly enhancing production efficiency and increasing throughput. A higher-quality more durable finish can often be achieved, too.

Some new equipment is needed for this type of coating. To avoid wasteful hand mixing, an electronic proportioning system will eliminate a significant amount of labour, energy and waste from the painting process. The material is mixed near the spray gun as it is needed and only a little more of it than is necessary. With an investment in this new equipment, payback is often achieved within two years or less.

Two-part coatings typically cure faster than single-component materials and at lower temperatures than baked products. They spend a shorter time in the oven or air-drying and don't have to be fully cured when removed from the drying area. When using a wet-on-wet system, going straight from the primer coat to topcoat can eliminate one step of the curing cycle. And if you use electronic proportioning, you can formulate the coating to cure in as little as 30 minutes.

A change to reactive-cure could bring significant savings!

FROM www.valsparglobal.com/corp.

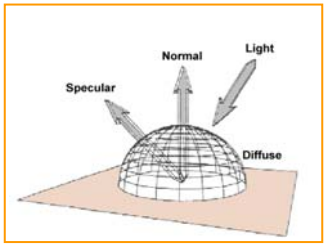
Keeping an eye on shade

Furniture in public buildings fits into the same context as the internal surfaces. That context is subject to laws preventing discrimination against people with a disability; particularly those who cannot see surfaces in colour but in shades of light and dark. Architects and designers of spaces such as libraries, offices, shopping malls, airports, etc must provide a colour scheme that is suitable for the majority of the public and manufacturers must provide the fixtures and fittings that will fit in with this.

Contrast in colour schemes is (or will be) a legal requirement in many countries (e.g. UK Building Regulations, Part M and BS 8300). The visual difference between two surfaces or features must be at least 20 units of Light Reflectance Value (LRV). This measure of shade uses the CIE chromaticity coordinate Y, which ranges from black with 0% to pure white with 100%.

Standard paint colours (eg BS 4800) have known LRVs from which an architect can choose. Regardless of the colour chosen for a wall or ceiling, the shade of that colour is important here and it can vary locally.

Others use LRV too, such as furniture and door manufacturers (EN 13271). They state the shade of their desktops or door handles to help others ensure sufficient contrast. Even carpet makers need to declare LRV since large areas of carpet are used in offices and hotels. The designer needs to know this value for a particular scheme.



There are two ways of reflecting light, diffuse reflectance and specular reflectance. The latter is known as 'gloss' and represents the action of a mirror. Large spaces such as offices tend to avoid high gloss surfaces because light can beam into people's eyes, causing fatigue or annoyance. The diffuse action spreads light in a hemisphere and helps illuminate a wider space away from the source, say a window, as opposed to shining in one direction. For this reason, most large surfaces will have a matt or flat finish. However, it is the lightness or darkness (shade) of this coating that is important here, compared to that of adjacent surfaces.

Unfortunately, the virtual reality of an architect's drawing does not always materialise with real coatings on real surfaces. This is one good reason why measurement is necessary.

The shade of a plain flat surface can be measured by a reflectometer using a parallel beam of light illuminating a sample at 45 degrees. Observing the intensity of the light coming off in the normal (0 degrees) direction tells us the amount of diffuse reflectance. An integrating sphere instrument can also be used. A number of readings with the reflectometer shining from different directions can be averaged to get a similar result as the sphere in most cases. The biggest difference is on a surface with high gloss; the sphere shows a higher reading unless the specular gloss is deliberately excluded (SPEX setting).

The Elcometer 6014 Shade and Opacity meter and the Elcometer 6075 Spectrophotometer can be used for LRV measurements.

concrete inspection

Keep the shop dry

When you have a car park above a shop, you need some way of avoiding water seeping through the ceiling below. When it is a swimming pool above a supermarket, you want to be very sure the water does not leak out through gaps or cracks in the concrete structure.

Elcometer 266 with second handgrip and right-angle electrode confirms there are no holes in the waterproof membrane

For such a situation in South Africa, a waterproof membrane was specified. A polyurea product (from Nukote Coating Systems) was spray-applied as a 1.5mm layer to the concrete tank. However, because there must be no pinholes in this membrane, it had to be tested after it was fully cured.

TESTING FOR PINHOLES

The membrane is a non-conductive layer. To test for holes in it using a high-voltage probe requires a conductive substrate. Fortunately, concrete is sufficiently conductive for this, especially when it contains metal reinforcement bars (rebars).

An exposed rebar or even a masonry nail hammered into the concrete will provide a good connection for the return lead of the Holiday Detector. To prove everything works, apply the probe with say 3-5kV to the uncoated concrete and listen for the signal. Keep moving away from the connection point to find the limit of the range especially on very dry concrete.

The high voltage of the probe will cause a spark to the substrate wherever there is a hole in the coating. The current in the spark triggers the alarm. This is a benefit when the spark is hidden. Where the coating is very thin, a tiny hole will be burnt through this weak spot but these holes can then be patched.

ELCOMETER 266

The South Africans chose the new Elcometer 266 to test for these holes. They fitted a 1m extension to the probe handle, and used a 250mm right angle brush probe for small areas and a 500mm brush for quickly testing large areas. This makes the whole probe two-handed and so much easier to control.

Re-certified green

Elcometer Limited in Manchester, England, have successfully completed the re-certification audit of their ISO 14001 Environmental Management System.

As a result, a new certificate has been issued. It covers from the 1st of November 2008 until the end of October 2011. Meanwhile, our current certificate remains valid.

The audit confirms Elcometer has systems in place to correctly handle the wide variety of used materials for disposal and it takes this responsibility seriously.

A scan of the ISO 14001 certificate is on Elcometer's website and the new one will appear in October.

standards news

IMO Resolution MSC.215

Performance Standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-skin spaces of bulk carriers.

The coating standards section (4) of this summarises the required Design of the coating system. Primary Surface Preparation (PSP) and Secondary Surface Preparation. It also mentions the environmental conditions and how to test the thickness of the coating.

PSP requires a clean surface to Sa2½ with profile between 30-75 microns and its temperature not less than 3°C above the dewpoint. The density of water-soluble salts allowed on the surface should be equivalent to less than 50mg/m^2 of sodium chloride.

Secondary preparation requires a profile of 30-75 microns, a Dust Quality rating of “1” and less than 50mg/m^2 of salts on the surface.

When the coating is measured, the 90/10 rule should be applied. This means that no more than 10% of all the readings are below the nominal dry film thickness value (320 microns of epoxy).

ASTM D 3359-07

Measuring adhesion by tape test

A note has been added to the latest version of this standard, that the test for assessing the adhesion of a coating on a metal substrate is unsatisfactory for softer substrates such as plastic or wood.

In ASTM D 3359, the coating is first cut into small squares. Then adhesive tape is applied and quickly removed, attempting to detach the squares. However, when performed on softer substrates, there is a lack of reproducibility.

When this test was published in 1974, few plastics were being coated. But these days, more are and ASTM D 3359 has come to be used to test the adhesion on them.

The view of the experts in the standards committee is that this test is unsatisfactory for measuring adhesion performance in this case and that such use is beyond the scope of D 3359 test method. The test was designed for ductile coatings on metal substrates. It was not for often-brittle coatings on much softer plastic substrates.

Although this test appears to be similar to ISO 2409, it is NOT technically equivalent. The scope of the ISO test does include soft substrates such as wood and plastic. So take care which method you use.

More comments please

There has been a noticeable drop in customers’ comments to March 2003 levels. Improvements to the despatch area in the factory and product awareness training have reduced the number of mistakes we make.

But we still need to hear from you, to improve the rest of our service. So, we ask Distributors and customers to continue reporting to us through the comments system. It really does help us continue to improve our systems so everybody benefits.

Please ask the Sales Team for a Comments form.

applications: architectural aluminium

In this series of articles, we look at specific applications, answer some of the most commonly asked questions and provide practical advice. This time, we look at coated aluminium and the Qualicoat system.

Qualicoat is a quality label for paint, lacquer and powder coatings applied to aluminium for architectural applications. Its requirements are set out in a specification, which is now it is 11th edition. Its aim is to establish the minimum standard that plant installations, coating materials and finished products must meet.

Railings and window frames of powder coated aluminium

This quality system clearly demonstrates the range of tests and procedures that are relevant to coating aluminium. Some or all of these tests could be useful to similar coating plants even if the company is not seeking the Qualicoat license.

Section 6.3 of the Qualicoat specification covers the Quality control of finished products. As Elcometer offers gauges and test equipment for most of these, here is a brief description of what is involved and what to use.

The Gloss test (ISO 2813) on finished products must be performed at least once every shift for each colour applied and the results must be recorded. The measurements must be with a 60-degree system so the Elcometer 406 can be used for this test.

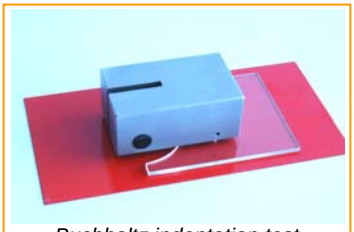
Coating thickness (EN ISO 2360) must be measured according to a sampling plan and recorded. A minimum thickness value is specified and nothing less than 80% of this is allowed. The Elcometer 415 or 456N are suitable gauges for this measurement.

Elcometer 415 for thickness of powder coatings

The Adhesion test (EN ISO 2409) on flat sample panels must be repeated at least once every shift for each colour applied. This test is with 1, 2 or 3mm spaced cutters, depending on the thickness of the coating. It leaves the coating cut up into a lattice of small squares to which adhesive tape 25mm wide is applied. When the tape is quickly removed, no squares must come off. The choice of instrument is either the Elcometer 107 or 1542.

Indentation (EN ISO 2815) is tested according to Buchholtz. It can be done on the same panels as used for the adhesion test (above) using an

Elcometer 3095. The larger the indentation from its sharp wheel, the softer the coating is. This test shows up inadequate curing (if the process is too cool or too quick).



Buchholtz indentation test

The Cupping test (EN ISO 1520) is performed on flat sample panels every shift and for each colour. The round tool of an Elcometer 1620 pushes the metal in by 3 or 5mm. The coating here must not crack or detach. For type 2 powders, adhesive tape from the adhesion test (above) is applied to the coated side and after 1 minute it is pulled off quickly at right angles to the panel. Ideally, no coating should detach.

Elcometer 1620 Cupping tester

The Bend test (EN ISO 1519) shows the ability of the coating to stretch when the substrate is bent. The test is performed on flat panels using 5 or 8mm cylindrical mandrels and repeated every shift for each colour. There must be no sign of cracking or detachment of the coating from the metal substrate. Choose the Elcometer 1500 kit for this test. Class 2 powders need the adhesive tape test (as above) to follow bending.

Cylindrical mandrel bend test kit

The Impact test (EN ISO 6272, ASTM D 2794) uses a 15.9mm impactor to deliver either 2.5Nm of energy (1kg weight dropping 25.5cm) to a sample of Class 1 powder or 1.5Nm (1kg dropping 15.3cm) to a Class 2 powder. Elcometer's 1615 with Kit B is used for this Qualicoat test. The adhesive tape test (above) follows for Class 2 and Class 3 powders to see how loose the broken coating is.

Falling-weight impact tester

CONCLUSION

This is only a brief description of the tests specified by Qualicoat for use in a coating plant. There is more to be done to comply with Qualicoat, such as sampling plans and records.

To read more about the quality control, labelling and other requirements you should visit www.qualicoat.net.

Should you require any further information on testing industrial coatings or if there is a subject you would like to see mentioned in Elconews e-zine, please mail us: editor@elcometer.com.