Versiline CUI 56990

Introduction

Versiline CUI 56990 is a single-pack inert multi-polymeric matrix (IMPM) specialty coating system designed to provide corrosion protection of piping and hot process equipment etc. The coating film is fibre reinforced, and MIO pigmented to provide excellent crack resistance and corrosion protection over a wide range of temperatures, from -196°C to 650°C when cured.

Safety

Use adequate personal safety equipment and follow sound procedures. Apply only in well-ventilated areas. Observe safety labels on packaging and paint containers and consult Hempel's Safety Data Sheets for the products to be applied. For application on hot substrate be especially aware of the risk of fire or explosion.

Scope

Additional to the general skills of the training applicator there are some certain aspects to be aware of in order to obtain the best result. This Guideline covers special issues to be aware of when applying Versiline CUI 56990.

Specification

Versiline CUI 56990 is recommended for insulated service at temperatures above 204°C (400°F). If uninsulated or at lower temperatures other solutions can be considered. Depending on the required protection typical specifications are 2 layers with DFT ranging from 100 to 150µm/layer.
Besides the standard shades (10710, 15730) Versiline CUI 56990 comes a special aluminium shade 19360. This shade is intended only as the last layer in systems where an aluminium finish is desired. It should be noted that the aluminium finish 19360 is slower to develop hardness and should not be overcoated with itself in shade 19360 due to increased risk of defect.

Surface preparation

Additional guidance can be found in Hempel technical guideline "Surface preparation new building".

Soluble salts
Water soluble salts shall be removed if the concentration is above 50 mg/m^2.
For application on hot surfaces, it is impossible to check for salt levels. In such cases clean very thoroughly with high pressure fresh water.

Overcoating inorganic zinc silicate
For surfaces applied with intact inorganic zinc-containing coatings such as zinc silicates, all zinc salts and other contaminants shall be removed by a suitable method. The degree of cure of the zinc silicate shall be minimum rating 4-5 when tested in accordance with ASTM D4752.

Old steel
All existing coating materials are to be completely removed where required. Refer to Hempel Technical Guideline "Surface preparation Repair".

For overlap onto other coating products please consult your local Hempel representative. Compatibility between Versiline CUI 56990 and other coatings should be validated by a suitable field adhesion trial such as ISO 16276-2. Minimum acceptance criteria shall be rating 0-2.

It should be noted that existing coating materials may have different maximum temperature resistance than Versiline CUI 56990. Where the temperature resistance of these materials is insufficient then they should be completely removed.

Application

Mixing
Versiline CUI 56990 is a single component product and therefore has an unlimited pot life. The product is heavily pigmented and tends to settle during storage.

In case of settling the paint needs to be mixed properly before use to a uniform consistency. The best way to do this is to shake the product using a mechanical shaker.

If a mechanical shaker is not available pour the paint into a larger mixing bucket. Be sure that all paint, both the liquid part and the heavy settled part is poured/scraped from the Versiline CUI 56990 cans into the mixing bucket. The paint shall then be stirred mechanically. The paint must appear homogeneous and free of lumps.

Avoid incorporating air into the paint by over-agitation.

Application
Additional guidance can be found in Hempel technical guidelines “Spray application” and “Brush and Roller”.

Versiline CUI 56990 should preferably be applied by airless spray equipment. Stripe coating and minor repairs **can** be applied by brush / roller.

During application, mixing should be carried out from time to time to secure a uniform consistency of the paint. Leaving the can open for longer time does not influence the curing properties of Versiline CUI 56990, however to avoid solvent evaporation, it is recommendable to cover the can or mixing bucket.

It is very important to use nozzles of the correct size, i.e., not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be maintained.
The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of sagging, cracking and solvent retention.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

All places difficult to cover properly by spray application (e.g., edges, boltholes, brackets, pipe hangers and other fittings etc) should be stripe coated twice by brushing immediately before the spray application. The first stripe coat is applied before the first full coat and second stripe coat before second full coat. The second stripe coat with brush can be replaced with spray application with a small narrow nozzle, but any imperfections within the steel will still require brush application.
For very hot surfaces, stripe coating by brushing is to be avoided.

Overcoating procedure
When overcoating zinc silicates with Versiline CUI 56990 a mist coat application approach might be necessary in order to reduce the risk of popping due to the porous nature of the zinc silicates.

When overcoating Versiline CUI 56990 with itself it may under certain application conditions exhibit zinc silicate behaviour resulting in popping and subsequent pin holes in the coating surface. If popping is observed during application, preventive measures are

- Ensure that the specified WFT is strictly observed, particularly during application of the first coat.
- Application should be carried out in multiple thin passes. This can be done with thin (50µ DFT) “Wet on Wet” coats with the following Overcoat Interval (OI).

Surface temperature:	**20°C/68°F**	**40°C/104°F**
Minimum	20 minutes	5 minutes
Maximum	Extended	Not relevant

- Thin the second coat of Versiline CUI 56990 by no more than 10-15%. Ensure that the WFT is strictly observed. Drying times may need to be adjusted accordingly.

Overcoating intervals for 150µ DFT

Surface temperature:	**20°C/68°F**	**200°C/392°F**
Minimum	6 hours	15 minutes
Maximum	Extended	Not relevant

The Aluminium shade (19360) of the product should only be used as a single coat topcoat for shade requirements. It should not be applied in multiple coats.

Versiline CUI 56990 should never be overcoated with chemically curing products such as epoxies, polyurethanes or humidity curing silicones (e.g. Hempel's Silicone Aluminium 56913/4). If specific colours are required Versiline CUI 56990 can be overcoated with

- Hempel's Silicone Aluminium 56910
- Hempel's Silicone Acrylic 56940
- Hempel's Silicone Topcoat 56900

Where Versiline CUI 56990 is only used for atmospheric use, it is recommended to be top coated with one of the above noted products to increase weathering protection.

Hot substrate
Versiline CUI 56990 can be applied on hot surfaces up to 200˚C/392°F by spray application only. For more details see Hempel's Technical Guideline "Application on hot substrate".

Drying & curing

Versiline CUI 56990 dries physically at ambient temperatures into a continuous coating that delivers barrier anticorrosive protection for mild to medium atmospheric and CUI service. The product can achieve hard dry in 2 hours and can be overcoated as quickly as 6 hours at 20°C.

At higher temperatures, above 200°C (392°F), cross-link formation (chemical curing) imparts further thermal resistance to the coating, allowing continuous temperature exposures up to 650°C without cracking or degradation in mild to severe atmospheric and CUI service.

However, until the product has undergone cross linking at elevated temperature it exhibits thermoplastic softening in the temperature range approximately 80-200°C and will reduce in mechanical strength. When the temperature is above or below this temperature range the mechanical strength is recovered. Exposure to 200°C for 24 hours will cure the product generating cross linking and permanent hardness, such that the coating no longer exhibits thermoplastic softening when the temperature is subsequently lowered.

For processes where the temperature does not exceed 200°C and where coating hardness is critical, Hempaprime CUI 275 epoxy coating is a cost-efficient alternative that provides equally outstanding corrosion protection.

Heat curing

Versiline CUI 56990 undergoes crosslinking when it is heated, and this enhance the barrier protection of the product. The first time the coating film is exposed to temperature above 100C it should essentially be dry. This means that if the film has been exposed to significant amounts of water it is recommended to heat gradually and drive out water before rising temp above 100C.

Moisture in the coating can cause blistering defects at thermoplastic range if temperature of item is not regulated during steam out procedure or start-up of operations. To ensure moisture correctly evaporates from coating system without causing defect please follow the example procedure below: -

- Heating item to 90^0C and hold for 3 hours (more time may be required for clad items).
- Continue to heat up to high temperature for example 180 ^{0}C. Temperature can be raised above 200^0C for 24 hours (or 250^0C for 5hrs) to cure the product if required.
- If temperature is released, ensure item is not exposed to excessive condensation, running or pooling water before taking back up to operating temperature.

Weathering exposure

Versiline 56990 once dried can be exposed to exterior mild to medium exposure conditions. In practical terms this means, that the surface shall be protected against longer periods of heavy rainfall, snow and very high humidity, as well as running, pooling or standing water, either by coverage or by drainage. Once insulated and clad the coated surface should also be protected from pooling or standing water until cured.

Handling

Care should be taken when handling coated sections as the coating can be prone to damage, even when it is fully dried. It is recommended to allow 24 hours after application of final coat before moving or shipping. Special care when handling, especially for in-shop or off-site application, can minimise the extend of repair required afterwards. Lifting devices should be of suitable material to lessen the extent of damage. The area of contact with supporting trestles shall be limited to the minimum, preferably with “sharp” contact points, to reduce the area of damage.

Quality control

Dry film thickness control can be carried out as soon as the surface is sufficiently hard, and this may depend upon climatic conditions as well as ventilation. The measurement must be carried out using a suitable electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate appropriate to the gauge probe type being used.

Due to the nature of Versiline CUI 56990 Hempel does not recommend holiday detection using electrical methods such as ISO 29601, NACE SP0188, and ASTM D 5162. Instead. Hempel recommends thorough quality control and inspection throughout the application process. In particular measurements of film thickness and visual inspection after 1 week.

Pull-off test is not recommended to evaluate adhesion of coating products of the type: inert multi-polymeric matrix. Instead, Hempel recommends X-cut according to ASTM 3359 Method A or ISO 16276-2.

This document is intended for professional use and provides generic advice in respect of the subject matter only. It is not intended to be used as a comprehensive guide. The buyer/applicator should always read the relevant Product Data Sheet (“**PDS**”) and Safety Data Sheet (“**SDS**”) relating to the Products ordered which are available for download on www.hempel.com. If in doubt, please contact your local Hempel representative for further advice. To the extent relevant, the disclaimer set out in the relevant PDS(s) applies to this document.