Ceilcote 6640AR Ceilcrete System Application Guidelines

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The International Paint Application Guidelines have been produced and revised in line with the Worldwide Protective Linings Product Range. The purpose of the guidelines is to ensure that the product, as applied, provides the required level of durability.

Successful in-service performance of a lining system depends upon both the correct choice of product(s) and the adoption of the correct guidelines for surface preparation and paint application.

The responsibilities for achieving the specific standards outlined, and for carrying out surface preparation and lining application, rest with the Contracting Company. Under no circumstances do these responsibilities rest with International Paint. We will generally provide for the presence of a Technical Service Representative at key stages during the performance of the contract. The role of the International Paint Technical Service Representative is advisory only unless otherwise specified in the terms and conditions of the contract. The information contained herein presents guidelines for the application of Ceilcote 6640AR Ceilcrete to correctly prepared surfaces.

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1. SURFACE PREPARATION

In common with most protective linings systems, the performance level of Ceilcote 6640AR Ceilcrete is ultimately determined by degree of surface preparation. The higher the degree of surface preparation achieved, the greater the long-term performance.

For optimum performance, all surfaces to be coated should be clean, dry and free from contamination including dirt, salts, oil and grease.

1.1 Steel

Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:2000. Where necessary, remove weld spatter, smooth weld seams and treat sharp edges or other fabrication faults. Reference to ISO 8501-3 grade 3 and/or NACE RP0178 grade C is recommended. In cases where the substrate is corroded or pitted, it may be necessary to fresh water wash the areas after abrasive blasting, then re-blast, in order to ensure complete removal of soluble corrosion products. The maximum allowed total soluble salt contamination on the steel before application of the Ceilcote 6640AR Ceilcrete system is 5µg/cm² (2µg/cm² if in immersion service above 120°F).

All steel surfaces to be coated should be correctly prepared prior to application of the lining system. The preferred method of preparation is abrasive blast cleaning to Sa2½ (ISO 8501-1:2007) or SSPC SP10 or NACE #2.

Compressed air used for blasting must be clean, oil free and dry.

Abrasives used for blasting must be dry and free from dirt, oil, and grease and suitable for producing the standard of cleanliness and profile specified. The required amplitude of the blast profile depends upon the type of lining to be applied. Measurement on site should be by profile gauge or other mutually acceptable instrument. A minimum sharp surface profile of 75µm (3 mils) is recommended.

1.2 Concrete

New concrete shall be properly cured or sealed with Intercrete prior to the application of the Ceilcote system. Refer to the relevant Intercrete product data sheet.

Laitance and efflorescence shall be removed by blasting to produce a surface profile of CSP4 to CSP 6 as per ICRI Guideline No. 310.2R-2013. The surface tensile strength (ASTM 4541) of the concrete, as prepared, should be minimum 2MPa (300 psi). The presence of oil, grease and release agents in concrete may cause loss of lining adhesion.

Concrete surface dryness should be verified by the plastic sheet test ASTM D4263 or other agreed method.

It is recommended to follow the detailed Concrete Surface Preparation Guideline.

2. SYSTEM SPECIFICATION

2.1 Typical Ceilcote 6640AR Ceilcrete System Specification

Layer	Description	Product	Hardener	Dry Film Thickness (DFT)	
				µm	Mils
1	Primer	Ceilcote 380	Ceilcote #2	75	3
2	Basecoat	Ceilcote 380 + S1 Powder	Ceilcote #2	1500	60
3	Mat Reinforcement	Ceilcote FG mat saturated with Ceilcote 380	Ceilcote #2	800	32
4	Topcoat	Ceilcote 380 + S-9AR Powder*	Ceilcote #2	1500	60

Mix ratio of Ceilcote 380 : Hardener #2 - 51:1 by volume (2.5 oz. of Hardener #2 per gallon of Ceilcote 380 Part A)

2.2 Practical Usage Rates

Layer	Description	Components		Guideline Practical Coverage Rate	
				m² / Litre	Square foot / US gallon
1.	Primer	Ceilcote 380	Concrete	5	200
			Steel	6.5	275
2.	Basecoat	Ceilcote 380		1	40
		Ceilcote S1 Powder		9.3m² (100 sq.ft.) per 22.65kg (50 lb.) bag	
3.	Reinforcement Mat	Ceilcote 380		1.2	50
		Ceilcote FG Mat (450 gram/m² - 1.5 oz.)		Allow 10% extra area for cutting and overlaps	
4.	Topcoat	Ceilcote 380		1	40
		Ceilcote S-9AR Powder*		7.4m² (80 sq.ft.) per 22.65kg (50 lb.) bag	

* S-10AR powder may also be used at the same coverage rates

2.3 Pot Life, Overcoating Intervals and Cure Times

Pot Life / Working Time

Temperature	Ceilcote 380	Basecoat / Topcoat (Ceilcote 380+powder)
10°C (50°F)	40 minutes	90 minutes
21°C (70°F)	30 minutes	60 minutes
32°C (90°F)	20 minutes	45 minutes

Overcoating

Layer	Description	Temperature	Overcoating Interval	
			Minimum	Maximum
1	Primer *Ceilcote 380*	10°C (50°F)	5 hours	4 weeks
		21°C (70°F)	2 hours	1 week
		32°C (90°F)	1 hour	3 days
2	Basecoat *Ceilcote 380 + S1 Powder*	10°C (50°F)	No minimum*	24 hours
		21°C (70°F)		8 hours
		32°C (90°F)		4 hours
3	Reinforcement Mat *saturated Ceilcote 380*	10°C (50°F)	5 hours	4 weeks
		21°C (70°F)	2 hours	1 week
		32°C (90°F)	1 hour	3 days

***** *Basecoat should be overcoated immediately with the mat layer, but overhead application may be easier after an hour or so.*

When surface temperatures exceed 35ºC (95ºF) or are exposed to direct sunlight, overcoating should take place as soon as the coating may be walked on, to avoid intercoat adhesion issues.

Return to Service

Product	Temperature	Minimum return to service time, after application of topcoat
Ceilcote 6640AR Ceilcrete System	10°C (50°F)	48 hours
	21°C (70°F)	24 hours
	32°C (90°F)	16 hours

2.4 Notes

Specific project requirements will be dependent upon the service end use and operating conditions of the tank or vessel. Always consult International Protective Coatings to confirm that Ceilcote 6640AR Ceilcrete is suitable for contact with the product to be stored.

Refer to the product datasheets for precise overcoating intervals, pot life and curing requirements.

3. ENVIRONMENTAL CONDITIONS FOR APPLICATION

Ceilcote 6640AR Ceilcrete will not cure adequately at ambient temperatures below 5°C (41ºF). For maximum performance the temperature should be greater than 10°C (50ºF).

Linings should only be applied to surfaces which have been maintained in a dry condition with the steel temperature at least 3°C (5ºF) above the dew point for more than one hour (in order to prevent condensation).

The surfaces must be visibly dry and clean at the time of application.

For all application steps, the surface temperature, air temperature and material temperature should be between 10ºC (50ºF) and 40ºC (104ºF). Application should not take place when relative humidity is more than 85% or the surface temperature is less than 3ºC (5ºF) above the dew point. Consult the regional International Paint technical representative for guidance on application to substrates at higher temperatures.

Dehumidification, air conditioning and/or heating equipment may be necessary to control environmental conditions but care should be taken when choosing heating methods, as some heaters can increase the local relative humidity.

For concrete substrates it is recommended to apply the primer when the ambient temperature is dropping and the concrete is out of direct sunlight (later in the day) to avoid bubbles due to concrete “breathing”.

Microclimate should be monitored in between applications. Changes in microclimate may affect overcoating intervals. Additionally, exposure to UV sources will reduce the overcoating interval of the Ceilcote 6640AR Ceilcrete.

The surface(s) must be well ventilated for at least 24 hours after each application.

For concrete substrates please also refer to the Concrete Surface Preparation Guideline.

4. APPLICATION PROCEDURE

Ensure that fresh cans are used after each unit is applied – do not refill the old cans.

4.1 Layer 1 - Primer – Ceilcote 380

Mechanically premix Ceilcote 380 components (Part A and B) individually, prior to mixing together. Mechanically mix the two parts together for one minute to ensure proper dispersion. Apply Ceilcote 380 as a primer using a brush, roller or spray at the specified thickness for steel substrates or to saturate the substrate for concrete substrates.	

When spark testing (high voltage holiday detection) is to be carried out on concrete substrates, use Ceilcote 380 Primer with the addition of C1 Powder (1.9kg per 15 litre / 5.2lb per 5 US Gallon). This should be added to the resin base prior to incorporating the hardener.

To confirm recoatability of the primer, wipe the surface with styrene monomer. If the surface becomes tacky, then it is suitable for overcoating. If the surface does not become tacky, it should be mechanically abraded or abrasive sweep blasted to provide a key for adhesion of subsequent linings.

4.2 Layer 2 - Ceilcote 6640AR Basecoat

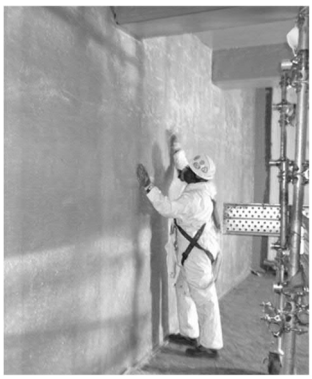
Application of Ceilcote 6640AR Basecoat should be made in accordance with the primer overcoating window information in section 2. Mechanically premix Ceilcote 380 components individually, prior to blending together. Mechanically mix the two parts together for one minute to ensure proper dispersion. To achieve desired viscosity and texture of basecoat, slowly add, in small amounts, Ceilcote S-1 Powder. More powder may be added if necessary but care should be taken as a small amount will have a significant effect on the mix. To test texture before all powder is added, use a trowel and dip into the mix and see if material will stay on the trowel about 13mm (1/2 inch) thick when held vertically. Ensure that the sides of the container are scraped to ensure full incorporation of all components. Use within 15-30 minutes after adding hardener.	

Apply the base coat at the recommended thickness with a steel trowel for large areas or brush for small complex areas. Do not overwork the product (do not repeatedly pass the trowel over the product) as this is will draw the resins to the surface creating a “sticky” surface. Do not be overly concerned by slight unevenness or low ridges left by the edge of the trowel – these can be pressed down by the mat in the next layer. Follow standard procedures for all corners, free edges and terminations of the screed.	

4.3 Layer 3 - Ceilcote Reinforcement Mat

<u>Cutting and Placement</u> Measure the area to be coated and pre-cut an appropriate sized area of glass mat. The size of the mat will vary with application process. Allow extra for overlap areas. The glass mat is best cut with scissors. Press the reinforcing mat onto the base coat while it is still soft, leaving no wrinkles or hollows. This may be done with gloved hands, a dry wall paper brush or a paint roller. It is necessary to be especially careful to press the glass mat firmly into corners. Overlap each strip by 25mm (1 inch) over preceding strips. Press the mat carefully into all corners. When the mat is being placed overhead, allow the base coat to get a little firm, but not hard, before saturating the mat. Follow standard procedures for all free edges and terminations of the mat.	

<u>Saturating</u> Saturating should be done immediately and before the basecoat layer has hardened. Saturate with Ceilcote 380 by roller as needed. Over saturation can be identified when the resin ponds on the mat and must be avoided.	

A ribbed roller is required to remove entrapped air and help lay fibres down. Mat overlap areas: the top lap of mat should be lifted so that saturating liquid can be applied to the bottom layer. The top layer is then pressed on the bottom layer and saturated.	 Ribbed roller
Inspecting the mat Prior to application of the next coat, the reinforcement should be examined for air pockets and areas that are not saturated. These areas, as a minimum, must be cut out and patch repaired. All protrusions, laps, etc should be smoothed with a sander or grinder.	

4.4 Layer 4 – Ceilcote 6640AR Topcoat

Apply Ceilcote 6640AR Topcoat onto the saturated mat layer once the mat layer is hard dry and within the overcoating window of Ceilcote 380. Mix and apply the Topcoat as in Layer 2 (Basecoat), using S-9AR or S-10AR Powder in place of S-1 Powder. When application is completed, immediately use a short nap roller or brush wetted with styrene smoothing liquid to smooth lightly and create a smooth, sealed surface.	

5. TECHNICAL INSPECTION

Project control by regular inspection and agreement on future action is vital to a successful lining project, and in maximising the potential of a lining system.

All parties involved in the lining work must agree an inspection procedure prior to work commencing, this should outline how and when both work and inspection will be undertaken.

When hard dry, the dry film thickness on steel substrates may be measured by all interested parties to confirm compliance with the specification. Any areas of under thickness are to be brought up to the minimum thickness specified. This must be carried out within the overcoating intervals specified for the product.

On completion of installation, the final lining should be inspected using a suitable procedure to verify average lining thickness. Following testing, any defective area should be repaired in accordance with the guidelines outlined in this document.

All thicknesses are to be checked by the linings inspector on site. Inspection equipment for measurement of profile depth, humidity, wet and dry film thickness, etc., should be within calibration limits.

Measurement of dry film thickness is described in ISO Standard 2808:2007 - Method 6A or SSPC PA2 Level 3. Any substandard areas are to be rectified.

'Spark' testing (holiday testing) will detect cracks, holidays and thin spots within a lining and should be carried out in accordance with NACE SP0188. Due to the destructive nature of the test, spark testing should only be done once, prior to the actual use of the lining under projected service conditions and at the recommended voltages, 100 volts per 25µm (1 mil) is recommended.

6. REPAIR PROCEDURES

These repair procedures are recommended for damages either at the initial lining stage or where breakdown of lining has occurred during service.

Minor Repairs
Minor repairs are areas damaged either at the initial lining stage or caused during service, of an area up to approximately 40 square inches. The principal requirements are:

The area to be repaired must be fresh water washed and dry.
Remove any corrosion and linings back to a firm tight edge by means of either:

- vacuum blasting or a Bristle Blaster® (to achieve a profile of 75µm)
- For areas less than 2 sq. cm., hand tools, i.e. disc sander and grinder may be used (to a standard of SSPC SP11 with a profile of 40-50µm (1.6-2 mils)).

Apply the paint system in accordance with AkzoNobel recommendations. If small areas are involved and application is by brush, several coats may be required to achieve the correct dry film thickness.

Touch up of damage caused during de-staging is to be done by brush with Ceilcote 380 basecoat to a minimum dry film thickness of 1500 microns (60 mils).

Any repair area more extensive than this should be treated as for new surfaces; i.e. re-blast to the specified standard and apply the full specification.

7. HEALTH AND SAFETY

7.1 Introduction

Some coatings contain volatile flammable organic solvents which can form explosive mixtures with air. Safety precautions must be taken whilst applying this type of coating in enclosed areas. Detailed attention must be given to the following points:

- Danger of explosion or fire
- Provision of a suitable breathing environment for workers.
- Prevention of skin irritation problems.
- Use of paints which have been specially formulated for use in tanks.

7.2 Danger of Explosion or Fire

The key factors in preventing an explosion or fire are adequate ventilation and elimination of naked flames, sparks and any ignition sources.

Any organic solvent-based coating could, merely by the normal process of drying, give off sufficient solvent vapour to produce an explosive mixture in an enclosed area when the vapour concentration reaches or exceeds 1% by volume in air. However, at 1% the solvents in the coatings produce an intolerably unpleasant odour, (often with irritating skin effects) and smarting of the eyes. These symptoms must be taken as a warning sign that better ventilation is needed. 0.1% solvent vapour in air is normally recommended to give a tenfold safety margin and at this concentration, no explosion can occur and no operator effects should be noticed.

7.3 Elimination of Ignition Sources

Safety is the overriding consideration with this type of coating work, and the Site Safety Department must be made fully aware of all aspects of the operation.

- Welding, cutting or grinding in the immediate vicinity should be forbidden until paint fumes are totally dispersed.
- Lights, including hand torches, must be certified by the manufacturer as flash proof and suitable for use in solvent laden atmospheres.
- Smoking must be prohibited in the area or near to extraction systems.
- No electrical junction boxes should be allowed in the area where application is carried out.
- Airless spray equipment must be earthed (because of the danger of static electricity build-up)
- Mobile telephones, electrical cameras, and any equipment that is not intrinsically safe, must not be used in the area or near to extraction systems.

7.4 Solvent Vapour and Paint Mists - Protection of Painting Personnel

No ventilation system can reduce solvent vapour levels to below the Occupational Exposure Limit for solvents whilst coating is in operation. Painters should, therefore, wear air fed hoods or pressure fed masks with additional eye protection. (Please note: air fed hoods which provide a curtain of air across the visor are available. These help to prevent settlement of spray mist on the visor). Normal protective clothing must be worn, e.g. overalls, gloves, and suitable footwear of non-spark type.

7.5 Skin Irritation

If proper protective clothing has been worn, e.g. overalls, gloves, air fed hood etc., no discomfort should be experienced from skin irritation. Any small areas not protected by clothing, e.g. wrists or neck, can be treated with a non-greasy barrier cream. (Petroleum jelly is not recommended as this can assist the transport of solvents into the skin).

Any areas of skin accidentally contaminated with paint must be thoroughly washed with soap and water. A skin conditioner that is designed to replace the natural oils in the skin can be used.

Note

1. The preceding safety information is given for guidance only.

2. It is imperative that, prior to the commencement of any tank coating project, local Regulations regarding Health and Safety be consulted.

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