PRODUCT DATA
CERAL 34 / CERAL 114
TECHNICAL BULLETIN

TECHNICAL DATA Bulletin 34-114 - Revision: 02/07/13

Purpose		Primarily as a corrosion and oxidation resistant coating for steel parts operating to approximately 1100˚F (593˚C).
Pigment		Aluminum Powder 40 – 46 wt%
Density		Not less than 13.2 lb/US gallon (1582 kg/m3) when tested IAW ASTM D 792
Method of Application		Spray
Cleanup		Water
Shelf Life		6 months when stored between 45˚ F. and 85˚ F. (7 to 29˚C).

DESCRIPTION

CERAL 34 and CERAL 114 are part of the CeralUSA Ceramic Aluminum product line. They are inorganic aluminum coatings consisting of very fine aluminum powder suspended in a chromate/phosphate binder. They may be used alone or as a base coat for a duplex coating system. They are normally applied by spray techniques although brushing and dipping are possible. Sprayed components are dried and furnace cured in order to fuse the binder and form a homogenous coating. The coating is designed to be sacrificial in corrosive and galvanic operating environments and to protect the substrate from erosion. It is an overlay coating relying on physical and chemical bonding for adhesion. There is no metallurgical bond, allowing the coating to be easily stripped without degradation of the substrate. The electrical conductivity of the coating makes it sacrificial and promotes the corrosion of the active coating layer. Aluminum is a common sacrificial metal with respect to Iron. A seal coat may be applied to these coatings for the purpose of both improving corrosion resistance and extending the life of the coating. See "Ceral 50, 350/1 Technical Bulletin". The seal coat also serves to render the surface smoother and, at the same time, fills in the microscopic surface voids created by the dispersed aluminum particle distribution. The seal coat is binder rich and may be pigmented to impart color to the overall coating. The resultant binary coating is

resistant to hydraulic fluids, fuel, and hot water and is highly resistant to thermal shock and impact damage.

APPLICATION METHODOLOGY

Components requiring coating should be prepared and coated as follows:

1. Cleaning
All surfaces to be coated must be clean and free of grease. Use a locally available degreasing agent for this purpose. Pay particular attention to any areas that have been Fluorescent Penetrant Inspected as any remaining penetrant will result in spalling of the coating.

2. Drying
All surfaces to be coated must be dry. After cleaning, and prior to blasting, it is recommended that the parts be dried for a minimum of 30 minutes at a temperature between 200°F. and 275°F. An air recirculating oven should be used wherever possible.

3. Masking for Blasting
Before blasting, all surfaces not requiring coating should be masked using tape or other suitable masking material.

4. Surface Roughening by Blasting
All surfaces requiring coating must be roughened. The recommended method is by dry blasting with 220 mesh silicon carbide at a pressure between 30 and 40 psi and a standoff distance of 4 to 6 inches. Do not dwell in one area while blasting and carefully observe the condition of the blast media for degradation. Spent blast media contains a high proportion of fine particles that can become embedded into softer substrates. The elapsed time between blasting and coating should not exceed 8 hours.

NOTE: Blasted components should be handled only while wearing clean, lint free gloves.

5. Removal of Masking
All remnants of masking, including any tape residue, must be removed prior to coating. Repeat operations #1 and #2, as necessary, to ensure a clean, degreased surface.

5.1 Optional Ultrasonic Cleaning
If available, components to be coated may be ultrasonically cleaned after removal of the masking. After ultrasonic cleaning for a minimum of three minutes, the surfaces to be coated may be rinsed with Acetone and allowed to air dry.

NOTE: Blasted components should be handled only while wearing clean, lint free gloves.

COATING APPLICATION

6. Base Coat Preparation
Ceramic Aluminum Coatings are supplied in the ready-to-use condition, however they are heavily pigmented and consequently the aluminum particles have a tendency to settle out and agglomerate during shipping, storage, and any period exceeding two hours during a working day.

Because of this, the coating MUST be thoroughly mixed before use. It is not recommended that the initial mix be done using any kind of a paint shaker as this can cause degradation of the aluminum particles. A stirrer is recommended for initial mixing. The product should be stirred in the original container for a minimum of 30 minutes prior to initial use. After initial mixing, it is permissible to maintain the dispersal of the aluminum particles by periodically shaking the spray gun reservoir. An

alternative method to ensure dispersion of the aluminum particles is to place the original container on a rolling machine (see www.ceralusa.com) for 60 minutes.

7. Masking for Coating
All surfaces not requiring coating should be masked using tape or other suitable masking material.

8. Applying the Base Coat
Blow the surfaces to be coated using line pressure filtered and dry compressed air. Most industrial facilities' shop air is sufficient for this purpose. A uniform coat should be applied as detailed below. Ensure the coating is wet and does not exhibit a sandy structure.

Apply the base coat using standard paint spray gun equipment, preferably a gravity fed type, at a gun pressure of 40 - 50 psi. Always maintain a spray distance between 6 to 8 inches and always spray perpendicularly to the surface being coated. For intricate areas, or for touch up purposes, an airbrush may be used. The use of pressure pots is also acceptable provided that the agitation system in the pressure pot remains on at all times during spraying and during any dormant periods.

Ceramic Aluminum Coatings are aqueous, inorganic materials with a relatively low viscosity, making its characteristics similar to that of water when being applied to a surface. Consequently, excess material will cause runs during application and mud cracking during drying.

NOTE: It is highly recommended that a spray booth equipped with environmental controls be used to apply the coating. The preferred environment is relative humidity (RH) between 45% and 65% and temperature between 65° F. and 75° F. Application outside of the preferred environment may contribute to runs (RH > 65%) or powdery surface (RH < 45%). The ideal situation would be to control both the RH and temperature within the tightest tolerance the spray booth is provisioned to maintain in order to produce the most consistent coating quality on a day-to-day basis.

9. Thickness Control
Unless otherwise instructed, the final coating thickness should be between 0.0006" and 0.0012" inches. Depending upon the component to be coated, the desired thickness may be achieved by applying multiple coats. Each separate coat should be fully dried, cured, and blasted before applying a successive coat. Measure coating thickness and, if required, apply a second coat.

NOTE: An ultrasonic device such as an Elcometer® or Fischerscope® is ideal for measuring the coating thickness.

Class 1:
Dry: Allow to dry at ambient temperature for 30 minutes minimum and until the coating has undergone a color change from green to light grey.

Bake: Bake for 30 - 45 minutes between 150° F. and 200° F., preferably in an air recirculating oven.

Cure: Cure for 30 minutes, minimum, between 625° F. and 675° F. in an air recirculating oven. If a component's substrate material condition disallows heating to 625° F., any time / temperature combination extrapolated from the curve presented in Figure 1 may be used to achieve the same result.

Class 1 coated parts require no intermediate or post curing operation. Blasting of a Class 1

coating is only required between the application of successive coats.

9.1. Blasting
Blasting, if required, is to be accomplished using 220 grit SiC at 15 - 25 psi and a nozzle distance between 4 - 6 inches. Care must be taken to avoid removing the coating during this operation.

Class 2: In addition to the steps outlined for Class 1, Class 2 coatings require post-curing in order to achieve full electrical conductivity. The coating will become electrically conductive when exposed to any time / temperature combination extrapolated from the curve presented in Figure 2. This constitutes an additional thermal cycle after the initial Class 1 curing cycle. Such components need not be removed from the furnace between the Class 1 cure and this additional thermal cycle.

Class 3: In addition to the steps outlined for Class 1, Class 3 coatings require a mechanical or brush burnishing prior to application of the final coat. Burnishing may be accomplished by abrading the surface by wire brush, glass bead peening, vibratory finishing, abrasive pads or wet peening.

Class 4:
In addition to the steps outlined for Class 1, Class 4 coatings require a mechanical or brush burnishing after the application of the final coat. As in a Class 3 coating, this operation should be performed after each successive layer of coating has been cured as per a Class 1 coating.

SEALING

If required by specification, or desired to improve corrosion protection and/or surface finish, Ceral 50 or Ceral 350/1 may be applied at this time. See "Ceral 50, 350/1 Technical Bulletin".

REWORK OR REMOVAL OF COATINGS

Uncured coatings may be removed from a component by running it under clean, warm tap water, after which it should be thoroughly dried and recoated. The water should not however be dumped down a common sewer but should rather be collected for disposal in accordance with local regulations or sent through a water treatment system.

Cured coatings may be removed for rework by blasting with silicon carbide and recoating after all of the previous coating has been removed.

If deemed appropriate, the coating may also be chemically stripped in a NaOH (Sodium Hydroxide) solution. If using this option, ensure that the component substrate and any brazed joints or other coatings are not sensitive to attack by strong alkaline solutions. Rinse the component thoroughly in warm water after chemical stripping.

Touching up small areas of a component is not generally recommended and should be avoided if possible. If touch-up does become necessary, then it should only be done on a fully cured part. The component surface surrounding the area requiring touch-up should be masked off and then the prescribed coating application techniques used to recoat the offending area.

EQUIPMENT CONSIDERATIONS

All spray equipment may easily be cleaned with water. The water should not however be dumped down a common sewer but should rather be collected for disposal in accordance

with local regulations or sent through a water treatment system.

Spray booths should ideally be of the environment controlled enclosure type (see www.ceralusa.com) but if such equipment is not available, then always use a disposable dry filter system and change the filter at regular intervals. Always bag the discarded filter. Never allow the powder in a filter to be exposed to any flammable liquid such as paint thinners.

Spray booths should always be well ventilated.

SAFETY

Operators should wear rubber gloves when handling coated parts, whether cured or uncured. When spraying, operators should always wear a suitable respirator.

CERAL 34 and CERAL 114 contain trace levels of Hexavalent Chrome. Operators should always wash their hands thoroughly before eating after handling components, spray equipment and such.

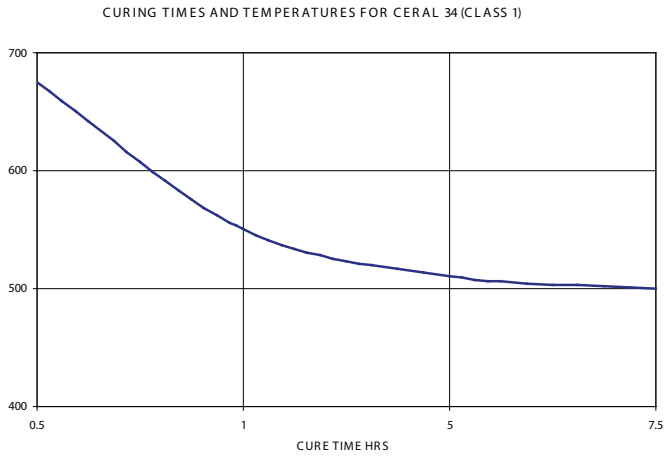

Figure 1: Class 1 Cure Time / Temperature

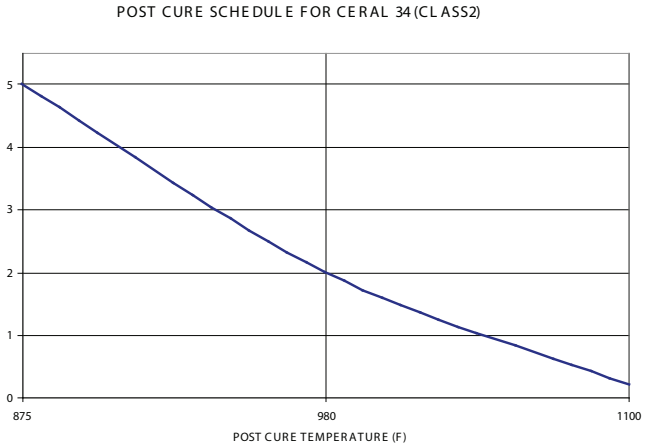

Figure 2: Class 2 Post Cure Time / Temperature