

Carboline System Guide for the Power Industry

New Construction / Maintenance	Surface Preparation (SSPC)	1 st Coat	Mils (Microns)	2 nd Coat	Mils (Microns)	3 rd Coat	Mils (Microns)
Structural Steel, Piping, and Equipment <i>Exterior Applications</i>				Applications <i>Structural steel, inlet air ducts, pipe racks, piping, valves, ladders, handrails, pumps, motors, storage tank exteriors, compressors, up to 250 F.</i>			
New	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Carboguard 893 Series or Carboguard 888 <i>Epoxy</i>	4-6 (100-150)	Carbothane 134 Series <i>Polyurethane</i>	2-2 ½ (50-62)
New	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Carbothane 133 HB <i>Urethane</i>	3-5 (75-125)		
New	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Carbocrylic 3359 DTM <i>Water borne Acrylic</i>	3-5 (75-125)		
New	SP 6	Carbozinc 859 <i>Organic Zinc</i>	3-5 (75-125)	Carboguard 893 Series or Carboguard 888 <i>Epoxy</i>	4-6 (100-150)	Carbothane 134 Series <i>Polyurethane</i>	2-2 ½ (50-62)
New	SP 6	Carbozinc 859 <i>Organic Zinc</i>	3-5 (75-125)	Carbothane 133 HB <i>Urethane</i>	3-5 (75-125)		
New	SP 6	Carboguard 893 Series <i>Epoxy</i>	4-6 (100-150)	Carbothane 133 HB <i>Urethane</i>	3-5 (75-125)		
New	SP 6	Carbozinc 859 <i>Organic Zinc</i>	3-5 (75-125)	Carboxane 2000 <i>Hybrid Siloxane</i>	3-7 (75-175)		
Maintenance (Severe Exposure)	SP 3	Carbomastic 15 or Carbomastic 615HS (spot) <i>Surface Tolerant Epoxy</i>	4-6 (100-150)	Carboxane 2000 <i>Hybrid Siloxane</i>	3-7 (75-175)		
Maintenance (Severe Exposure)	SP 3	Carbomastic 15 or Carbomastic 615HS (spot) <i>Surface Tolerant Epoxy</i>	4-6 (100-150)	Carboguard 890 <i>Epoxy</i>	4-6 (100-150)	Carbothane 134 Series <i>Polyurethane</i>	2-2 ½ (50-62)
Maintenance (Moderate Exposure)	SP 3	Carbomastic 15 or Carbomastic 615HS (spot) <i>Surface Tolerant Epoxy</i>	5-7 (125-175)	Carbothane 133 HB <i>Urethane</i>	3-5 (75-125)		
Maintenance (Overcoat)	SP 3	Rustbond Penetrating Sealer <i>Epoxy</i>	1-2 (25-50)	Carbomastic 615HS (spot) <i>Surface Tolerant Epoxy</i>	4-6 (100-150)	Carbothane 133 HB <i>Polyurethane</i>	3-5 (75-125)
Structural Steel, Piping, and Equipment <i>Interior Applications</i>				Applications <i>Structural steel, turbines, piping, pumps, motors, electrical equipment</i>			
New	SP 6	Carbocoat 115 <i>Alkyd</i>	2-3 (50-75)	Carbocoat 139 <i>Urethane Alkyd</i>	2-3 (50-75)		
New	SP 6	Carboguard 893 or 888 <i>Epoxy</i>	4-6 (100-150)	Carboguard 890 <i>Epoxy</i>	3-5 (75-125)		
New/Maintenance	SP 6	Carboguard 890 <i>Epoxy</i>	4-6 (100-150)				
Maintenance	SP3	Carbocrylic 3359 DTM <i>Water borne Acrylic</i>	3-5 (75-125)				
Maintenance	SP3	Carbocoat 150 <i>Alkyd</i>	2-3 (50-75)	Carbocoat 139 <i>Urethane Alkyd</i>	2-3 (50-75)		
High Temperature Applications 250-400F				Applications <i>HRSg steel, stacks, piping, ductwork</i>			
New	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)				
New	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Thermaline 4900 Series <i>Modified Silicone</i>	1-1.5 (25-37.5)		
New (HRSg roof)	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Phenoline 187 <i>Phenolic Epoxy</i>	4-6 (100-150)		
Maintenance	SP 3	Carbozinc 859 or Ganic Zinc	2-2.5 (50-62.5)	Thermaline 4900 Series <i>Modified Silicone</i>	1-1.5 (25-37.5)		

New Construction / Maintenance	Surface Preparation (SSPC)	1 st Coat	Mils (Microns)	2 nd Coat	Mils (Microns)	3 rd Coat	Mils (Microns)
Insulated Piping and Equipment to 425°F/218°C – Steel							
				Applications <i>Insulated piping and equipment operating up to 425°F (218°C)</i>			
New or Maintenance	SP 10	Thermaline 450 <i>Novolac Epoxy</i>	4-6 (100-150)	Thermaline 450 <i>Novolac Epoxy</i>	4-6 (100-150)		
High Temperature Applications 40-1200F							
				Applications <i>Stacks, piping</i>			
New (to 750F)	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)				
New (400 to 1000F)	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Thermaline 4700 Alum <i>Silicone</i>	1-1.5 (25-37.5)		
New (600-900F)	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Thermaline 4700 Series Colors	1-1.5 (25-37.5)		
Maintenance (400 to 800F)	SP 3	Thermaline 2977 <i>Zinc filled silicone</i>	2-2.5 (50-62.5)	Thermaline 4700 Series <i>Silicone</i>	1-1.5 (25-37.5)		
Concrete Walls / Floors							
				Applications <i>Block and poured walls, turbine decks, locker rooms, warehouses</i>			
Masonry Walls	Clean	Sanitile 500 <i>Waterborne epoxy filler</i>	5-10 (125-250)	Sanitile 555 <i>Waterborne epoxy</i>	4-6 (100-150)		
Walls and floors	Etch floors	Carboguard 501 or 510 <i>Epoxy</i>	Fill voids	Carboguard 1340 <i>Epoxy Sealer</i>	3-4 (75-100)	Sanitile 655 <i>Epoxy</i>	4-6 (100-150)
Floors	Blast	Semstone 110 <i>Epoxy Primer</i>	3-5 (75-125)	Sanitile 945 <i>Epoxy</i>	20-40 (500-1000)		
Chemical/ Water Exposure –Concrete							
				Applications <i>Sumps, trenches, chemical containments, and floors in demineralization and cooling water treatment areas, cooling tower basins, neutralization pits</i>			
Caustic, acid containments	Blast	Semstone 110 <i>Epoxy Primer</i>	3-4 (75-100)	Semstone 145 AFC <i>Novolac aggregate filled</i>	60 (1500)		
Caustic, acid sumps, trenches, and neutralization pits	Blast	Semstone 110 <i>Epoxy Primer</i>	3-4 (75-100)	Semstone 145 AFRC <i>Novolac aggregate filled reinforced</i>	125 (3125)		
Cooling Tower Basin, wet fly ash storage	Blast	Carboguard 954HB or Polibrid 671 <i>Epoxy</i>	4-6 (100-150)	Polibrid 705 <i>Urethane Elastomer</i>	50-80 (1250-2000)		
Battery Room, Lab Floor	Blast	Semstone 110 <i>Epoxy Primer</i>	3-4 (75-100)	Semstone 140 <i>Epoxy</i>	30-40 (750-1000)		
Floors outside chemical containment	Blast	Semstone 110 Primer <i>Epoxy Primer</i>	3-4 (75-100)	Semstone 140 AFC <i>Epoxy aggregate filled</i>	60 (1500)		
Hypochlorate Containment	Blast	Semstone 110 <i>Epoxy Primer</i>	3-4 (75-100)	Semstone 870 AFRC <i>Vinyl ester aggregate filled reinforced</i>	125 (3125)		
Chemical / Water Exposure – Steel							
<i>(All tank lining recommendations must be confirmed through Carbolite/Plasite technical service.)</i>				Applications <i>Demineralized, raw potable water, fuel oil, caustic, acid, and neutralization tanks; water boxes, circulating water piping / penstocks, dam gates, screens, traveling screens, coal and fly ash silos, lime slurry and gypsum tanks; stack and FGD system interiors</i>			
98% sulfuric acid immersion	SP 5	Plasite 9085 <i>novolac</i>	6-7 (150-175)	Plasite 9085 <i>Novolac</i>	6-7 (150-175)		
50% caustic immersion	SP 5	Plasite 9081 <i>Epoxy</i>	6-7 (150-175)	Plasite 9081 <i>Epoxy</i>	6-7 (150-175)		
Diesel Fuel immersion	SP 10	Phenoline 187 <i>Phenolic Epoxy</i>	5-6 (125-150)	Phenoline 187 <i>Phenolic Epoxy</i>	5-6 (125-150)		
Fuel Oil immersion	SP 10	Plasite 9060 <i>Epoxy</i>	6-7 (150-175)	Plasite 9060 <i>Epoxy</i>	6-7 (150-175)		
Demineralized Water >130F	SP 5	Plasite 7159 <i>Epoxy</i>	6-7 (150-175)	Plasite 7159 <i>Epoxy</i>	6-7 (150-175)		
Demineralized water < 130F	SP 5	Carboguard 891 or Plasite 9133 <i>Epoxy</i>	6-7 (150-175)	Carboguard 891 or Plasite 9133 <i>Epoxy</i>	6-7 (150-175)		
Raw or fire water	SP 5	Carboguard 891 or Plasite 7122 <i>Epoxy</i>	6-7 (150-175)	Carboguard 891 or Plasite 7122 <i>Epoxy</i>	6-7 (150-175)		

New / Maintenance	Surface Preparation (SSPC)	1 st Coat	Mils (Microns)	2 nd Coat	Mils (Microns)	3 rd Coat	Mils (Microns)
Chemical / Water Exposure – Steel <i>(All tank lining recommendations must be confirmed through Carboline/Plasite technical service.)</i>				Applications Demineralized, raw potable water, fuel oil, caustic, acid, and neutralization tanks; water boxes, circulating water piping / penstocks, dam gates, screens, traveling screens, coal and fly ash silos, lime slurry and gypsum tanks; stack and FGD system interiors			
Circulating water, screens	SP10	Bitumastic 300M Coal Tar Epoxy	16 (400)				
Water boxes, circulating water piping, penstocks, dam gates	SP10	Polibrid 705 Urethane elastomer	30-60 (750-1500)				
Circulating water piping	SP10	Phenoline 309 Epoxy	25-40 (625-1000)				
Neutralization tanks	SP5	Plasite 4100 or 4300 Vinyl Ester	18-22 (450-550)	Plasite 4100 or 4300 Vinyl Ester	18-22 (450-550)		
Fly ash, coal silos	SP10	Polibrid 705 Urethane elastomer	30-60 (750-1500)				
Flyash, coal silos	SP5	Plasite 7122TFE Epoxy	6-7 (150-175)	Plasite 7122TFE Epoxy	6-7 (150-175)		
Lime Slurry	SP5	Plasite 7122HAR Epoxy	6-7 (150-175)	Plasite 7122HAR Epoxy	6-7 (150-175)		
Lime Slurry	SP5	Plasite 4110 Vinyl Ester	18-22 (450-550)	Plasite 4110 Vinyl Ester	18-22 (150-175)		
Gypsum	SP5	Plasite 4550 S Novolac Epoxy	40-80 (1000-2000)				
FGD ducts, stack interiors	SP5	Plasite 4100 or 4300 Vinyl Ester	18-22 (450-550)	Plasite 4100 or 4300 Vinyl Ester	18-22 (450-550)		
Structural steel in coal and fly ash handling areas	SP6	Plasite 4500 S Epoxy	20-30 (500-750)				
Steel subject to occasional splash	SP6	Carboguard 890 Epoxy	5-8 (125-200)				
Galvanized Steel				Applications Galvanized ducts and cable trays			
New or Maintenance	SP1, SP 2	Galoseal WB Water borne acrylic	2-3 (50-75)	Carbocrylic 3359 DTM	3-4 (75-100)		
New or Maintenance (Chemical exposure)	SP1, SP2	Galoseal WB Waterborne acrylic	2-3 (50-75)	Carboguard 890 Epoxy	3-5 (75-125)		
New or Maintenance	SP 6	Rustbond Penetrating Sealer Epoxy Sealer	1-2 (25-50)	Carbothane 133 HB Urethane	3-5 (75-125)		
Transmission towers, substation structural steel	SP1,SP2	Carbocoat 2600 Long oil Alkyd	4-8 (100-200)				
Transmission towers	SP1. SP2	Carbocoat 2900 Alkyd	2-3 (50-75)	Carbocoat 2901 Alkyd	2-3 (50-75)		
Buried Piping – Steel				Applications External surface of buried pipelines, valves, manifolds, girth weld repair, etc.			
New or Maintenance	SP 6 SP 2 / SP 3	Bitumastic 50 Coal Tar Mastic	12-18 (300-450)				
New or Maintenance	SP 10	Bitumastic 300 M Coal Tar Epoxy	10-16 (250-400)				
New or Maintenance	SP 10	Plasite 4550 S 100% Solids Novolac Epoxy	20-30 (500-750)				

Fire Rating	Surface Preparation (SSPC)	1 st Coat	Mils (Microns)	2 nd Coat	Mils (Microns)	3 rd Coat	Mils (Microns)
Fireproofing – Carbon Steel <i>Applications</i> Structural steel, decks, bulkheads, vessel supports, living quarters, control buildings, etc.							
Up to 4 Hrs. UL 1709 Rating	SP 10	Carbozinc 888 <i>Epoxy</i>	3-5 (75-125)	Nullifire System E <i>Intumescent Epoxy</i>	As Required	Carbothane 134 Series <i>Polyurethane</i>	2-2 ½ (50-62)
Up to 4 Hrs. UL 1709 Rating	SP 10	Carbozinc 11 Series <i>Inorganic Zinc</i>	2-3 (50-75)	Pyrocrete 241 <i>Cementitious</i>	As Required	Carboguard 1340* <i>Epoxy sealer</i> Followed by...	1-2 (25-50)
						Carbothane 133 HB <i>Polyurethane</i>	3-5 (75-125)

Notes:

- Carbozinc 11 Series consists of four inorganic zinc products designed to meet every need:
 - Carbozinc 11: Standard high performance inorganic zinc silicate.
 - Carbozinc 11 VOC: High performance inorganic zinc silicate designed to meet local VOC limits of 3.2 lbs./gal. (389 g/l)
 - Carbozinc 11 HS: High performance inorganic zinc silicate designed to meet local VOC limits of 2.4 lbs./gal. (288 g/l)
- Carboguard 800 Series Epoxies are designed to meet your needs:
 - Carboguard 893: High solids epoxy primer or intermediate that provides excellent corrosion protection.
 - Carboguard 893 SG: Economical epoxy primer / intermediate that provides excellent corrosion protection with an extended re-coat window.
 - Carboguard 888: Low temperature cure epoxy that provides excellent corrosion protection with an extended re-coat window.
 - Carboguard 890: High solids epoxy providing excellent corrosion protection as a primer, intermediate, or topcoat.
 - Carboguard 890 LT: Low temperature cure, high solids epoxy providing excellent corrosion protection as a primer, intermediate, or topcoat.
- Carbothane 134 Series include a choice of two polyurethane topcoats to meet your needs:
 - Carbothane 134 HB: A high build, high gloss polyurethane.
 - Carbothane 134 HG: Superior performance polyurethane exceeding the requirements of SSPC Paint 36 Level 3.
- Carbothane 133 VOC for Carbothane 133 HB as local VOC regulations dictate.
- Thermaline 4900 VOC and Thermaline 4700 VOC may be substituted for Thermaline 4900 and Thermaline 4700, respectively, as local VOC regulations dictate.
- Carboguard 890 may be used as an epoxy topcoat in lieu of polyurethane where additional corrosion protection is more critical than appearance.
- Rustbond Penetrating Sealer may be used as a primer/sealer overcoat over existing, aged paints (with appropriate topcoats) in many maintenance applications as an economical approach to maintenance painting.
- Carbozinc 859 can provide superior performance as a maintenance primer. Please consult your Carboline Sales Representative to discuss your specific application.
- In maintenance painting, some coats may be eliminated depending on the condition of the existing paint system. Please consult your Carboline Sales Representative.
- Heavily pitted steel can make coating application more complicated. Please consult your Carboline Sales Representative for specific advice.
- The application technique of stripe coating edges and weld lines will improve coating system performance.
- Where superior abrasion resistance is required on deck surfaces, prime edges with 893 and apply a full coat of Carboguard 1207 with reduced silica content. A topcoat of 134 Series polyurethane may be added for color and protection. Consult your Carboline Sales Representative for special application procedures.
- Carbothane 133 HB may be used in lieu of 134 Series when a satin finish and higher film build characteristics are desired.
- Carboxane 2000 may be used in lieu of Carbothane 133 HB or 134 Series when an ultra-durable performance topcoat is desired.
- Surface Cleaner 3 is a water based, biodegradable cleaner that is effective in cleaning an degreasing surfaces prior to painting.
- Where surface preparation designations of SSPC SP 10, SP 6, SP 7, SP 3, and SP 2 are used the ISO designations of Sa 2 ½, Sa 2, Sa 1, St 3, and St 2 (respectively) are also applicable.
- For Fireproofing Systems, other primers than those listed may be acceptable. Consult your Carboline Sales Representative for specific advice.

