Carboline System Guide: Chemical/Petrochemical Industry

EXTERNAL COATINGS

New Construction / Maintenance	Surface Preparation (SSPC)	1st Coat	Mils (Microns)	2nd Coat	Mils (Microns)	3rd Coat	Mils (Microns)
Structural Steel, Piping, and Equipment - Carbon Steel				**Applications** *Pipe Racks, Reactors, Process Vessel Exteriors, Columns, Drums, Storage Tanks, compressors, And other equipment operating up to 250°F (121°C)*			
New (Severe)	SP 6	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboxane 2000 *Hybrid Siloxane*	3-7 (75-175)		
New (Severe)	SP 10	Carbozinc 11 Series *Inorganic Zinc*	2-3 (50-75)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carbothane 134 Series *Polyurethane*	2 – 3 (50-75)
New (Severe)	SP 10	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carbothane 134 Series *Polyurethane*	2 - 3 (50-75)
New (Severe)	SP 10	Carbozinc 11 Series *Inorganic Zinc*	2-3 (50-75)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carboguard 890 *Epoxy*	4-6 (100-150)
New (Severe)	SP 10	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carboguard 890 *Epoxy*	4-6 (100-150)
New (Moderate – Severe)	SP 6	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboguard 890 *Epoxy Mastic*	4-6 (100-150)		
Maintenance (Moderate - Severe)	SP 3	Carbomastic 15 or 15 FC (spot) *Surface Tolerant Epoxy*	4-6 (100-150)	Carboxane 2000 *Hybrid Siloxane*	3-7 (75-175)		
Maintenance (Moderate - Severe)	SP 6 (spot) SP 7 SP 2 / SP 3	Carbomastic 15 or 15 FC (spot) *Surface Tolerant Epoxy*	4-6 (100-150)	Carboguard 800 Series *Epoxy*	4-6 (100-150)		
Maintenance (Moderate)	SP 6 (spot) SP 7	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carbothane 134 HG *Polyurethane*	3-5 (75-125)
Maintenance (Moderate)	SP 6 (spot) SP 7 SP 2 / SP 3	Carbomastic 15 or 15 FC (spot) *Surface Tolerant Epoxy*	5-7 (125-175)	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carbothane 134 HG *Polyurethane*	3-5 (75-125)
Maintenance (Moderate)	SP 6 (spot) SP 7 SP 2 / SP 3	Rustbond Penetrating Sealer Epoxy	1-2 (25-50)	Carbomastic 15 (spot) Surface Tolerant Epoxy	5-7 (125-175)	Carboguard 890 *Epoxy*	4-6 (100-150)
Maintenance (Moderate)	SP 6 (spot) SP 7	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carboguard 890 *Epoxy*	4-6 (100-150)		
Piping and Equipment to 450°F/232°C – Steel				**Applications** *Piping, heaters, furnaces, boilers, stacks, columns, drums, Vessels, heat exchangers, mufflers, valves and pumps and Equipment operating at 250-450°F (121-232°C)*			
New or Maintenance	SP 10	Carbozinc 11 Series *Inorganic Zinc*	2-3 (50-75)	Thermaline 4900 *Silicone Acrylic*	1 ½ -2 (38-50)		
Piping and Equipment to 1000°F/538°C – Steel				**Applications** *Piping, heaters, furnaces, boilers, stacks, columns, drums, Vessels, heat exchangers, mufflers, valves and pumps and equipment operating at 450-1000°F (232-538°C)*			
New or Maintenance	SP 10	Carbozinc 11 Series *Inorganic Zinc*	2-3 (50-75)	Thermaline 4700 *Silicone*	1 ½ -2 (38-50)		
Insulated Piping and Equipment to 425°F/218°C – Steel				**Applications** *Insulated piping and equipment operating up to 425°F (218°C)*			
New or Maintenance	SP 10	Thermaline 450 *Novolac Epoxy*	4–6 (100-150)	Thermaline 450 *Novolac Epoxy*	4–6 (100-150)		

New Construction / Maintenance	Surface Preparation (SSPC)	1st Coat	Mils (Microns)	2nd Coat	Mils (Microns)	3rd Coat	Mils (Microns)
Walkways – Steel		**Applications**	*For non-slip, mix #47 additive into the 1209 prior to application*				
New	SP 10	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboguard 1209 *Flake Glass Epoxy*	10-14 (250-350)	Carbothane 134 Series *Polyurethane* (Optional)	2-2 ½ (50-62)
Maintenance	SP 6 (spot) SP 7	Carboguard 800 Series *Epoxy*	4-6 (100-150)	Carboguard 1209 *Flake Glass Epoxy*	10-14 (250-350)	Carbothane 134 Series *Polyurethane* (Optional)	2-2 ½ (50-62)
Over-coating Galvanized Steel		**Applications**	*Over-coating galvanized steel or other surfaces to provide color coordination and UV protection. May be used on stainless, bronze, brass, fiberglass, etc.*				
New or Maintenance	SP 1	Carboguard 888 *Epoxy*	3-5 (75-125)	Carbothane 134 Series *Polyurethane*	2-3 (50-75)		
New or Maintenance	SP 7	Rustbond or Rustbond FC Penetrating Sealer *100% Solids Epoxy Sealer*	1-2 (25-50)	Carbothane 134 Series *Polyurethane*	2-3 (50-75)		
Floating Roof of Storage Tanks – Steel		**Applications**	*Exterior surface of the floating roof on storage tanks where standing water is present.*				
New or Maintenance	SP 6	Carbozinc 859 *Organic Zinc*	3-5 (75-125)	Carboguard 890 or Carboguard 890 LT *Epoxy*	4-6 (100-150)	Carboguard 890 or Carboguard 890 LT *Epoxy*	4-6 (100-150)
New or Maintenance	SP 6 SP 2 / SP 3	Carbomastic 15 *Surface Tolerant Epoxy*	4-6 (100-150)	Carbomastic 15 *Surface Tolerant Epoxy*	4-6 (100-150)	Carboguard 890 or Carboguard 890 LT *Epoxy*	4-6 (100-150)
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	CTU 1 *Coal Tar Urethane*	20-35 (500-875)				
New or Maintenance	SP 10	Plasite 4550 S *100% Solids Novolac Epoxy*	20-30 (500-750)				
Fireproofing – Carbon Steel		**Applications**	*Structural steel, control buildings, etc.*				
Up to 4 Hrs. UL 1709 Rating	SP 10	Carbozinc 11 Series *Inorganic Zinc*	2-3 (50-75)	Pyrocrete 241 *Cementitious*	As Required	Carboguard 1340* *Epoxy sealer* Followed by… Carbothane 133 HB *Polyurethane*	1-2 (25-50) / 3-5 (75-125)

Linings for Storage Tanks and Vessels

All tank lining recommendations must be reconfirmed through Carboline/Plasite Technical Service Department.

Service Conditions	Generic Type	Product	Coats	Mils (µm) Total
SOLVENT Storage	Flake Pigment Vinyl Ester	**Plasite 4100**	1	35-45 (875-1125)
	Flake Pigment Vinyl Ester	**Plasite 4310**	1	35-45 (875-1125)
ACID, OXIDIZER, ALKALI Storage	Flake Pigment Vinyl Ester	**Plasite 4100**	1	35-45 (875-1125)
	Flake Pigment Vinyl Ester	**Plasite 4300**	1	35-45 (875-1125)
	Novolac Epoxy	**Plasite 4550 or 4550-S**	1	40-50 (1000-1250)
AMINE Storage	Flake Pigment Vinyl Ester	**Plasite 4310**	1	35-45 (875-1125)
	Epoxy Novolac	**Plasite 9085**	2-3	12-15 (300-375)
BRINE Storage	Epoxy Phenolic	**Plasite 7122**	2	12-14 (300-350)
	Epoxy Phenolic	**Plasite 7156**	2	10-12 (250-300)
	Epoxy Polyamine	**Plasite 9057**	3	12-16 (300-400)
PROCESS WATER Storage	Epoxy Phenolic	**Plasite 7122**	2	12-14 (300-350)
	Epoxy Phenolic	**Plasite 7156**	2	10-12 (250-300)
	Epoxy Polyamine	**Plasite 9057**	2	10-14 (250-350))
	Epoxy	**Plasite 4500**	1	40-50 (1000-1250)
EVAPORATORS	Epoxy	**Plasite 4500 or 4500-S**	1	40-50 (1000-1250)
	Novolac Epoxy	**Plasite 4550 or 4550-S**	1	40-50 (1000-1250)
	Epoxy Phenolic	**Plasite 7122**	2	12-14 (300-350)
SCRUBBERS	Flake Pigment Vinyl Ester	**Plasite 4300**	1	35-45 (875-1125)
	Epoxy Phenolic	**Plasite 7156**	2	10-12 (250-300)
	Epoxy	**Plasite 9570**	2	12-15 (300-375)
REACTORS	Epoxy Phenolic	**Plasite 7156**	2	10-12 (250-300)
	Epoxy Polyamine	**Plasite 7159**	2	10-12 (250-300)
	Epoxy	**Plasite 9570**	2	12-15 (300-375)
HEAT EXCHANGERS / TUBE BUNDLES	Epoxy Phenolic	**Plasite 7122**	2	12-14 (300-350)
	Epoxy Phenolic	**Plasite 7156**	2	10-12 (250-300)

Service Conditions		Generic Type	Product	Coats	Mils (µm) Total
Fuel, Oil, Gasoline Storage	Meets Mil-C-4556E	Epoxy	**Plasite 9060**	2	12-14 (300-350)
		Epoxy Phenolic	**Phenoline 187 Primer & Finish**	2	8-12 (200-300)
		Epoxy Phenolic	**Plasite 7122**	2	12-14 (300-350)
		Low Temp Cure Epoxy	**Plasite 9057**	2	12-16 (300-400)
		100% Solids Novolac Epoxy	**Plasite 4550 or 4550 S**	1	20-30 (500-750)
Ethanol, Gasoline + Ethanol	Meets Mil-C-4556E	Epoxy	**Plasite 9060**	2	12-14 (300-350)
		100% Solids Novolac Epoxy	**Plasite 4550 or 4550 S**	1	20-30 (500-750)
		Glass Flake Epoxy Novolac	**Phenoline 1205**	2	16-20 (400-500)
Waste and Potable Water Storage (NSF Approved)	130°F (55°C)	Epoxy	**Plasite 9133**	2	8-12 (200-300)
		Epoxy	**Carboguard 891**	2	8-12 (200-300)
Glass Fiber Reinforced Laminate System	Holding Primer	Epoxy Polyamide	**Plasite 7133**		
	Pit Filler / Self Leveling	Epoxy	**Semstone 140 SL**		
	Glass Laminate	¾ oz. chopped strand fiberglass mat embedded into 140 SL.			
	Seal Coat	100% Solids Novolac Epoxy	**Plasite 4550 or 4550 S**	1	20-30 (500-750)

NOTES:

1. Plasite 7133 or Carboguard 888 may be used as a holding primer
2. Carboguard 501 may be used to seal seams, caulk joints, and cove areas as needed
3. Plasite 7122 is available in a High Abrasion Resistant (HAR) version.

Notes:

1. 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)
    - Carbozinc 11 FG: An economical inorganic zinc silicate designed for easy application.
2. 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.
    - Carboguard 890 EF: Provides a longer recoat window. Consistent appearance throughout product lifetime.
3. Carbothane 134 Series include a choice of two polyurethane topcoats to meet your needs:
    - Carbothane 134 SG: An economical topcoat meeting the requirements of SSPC Paint 36 Level 1.
    - Carbothane 134 HG: Superior performance polyurethane exceeding the requirements of SSPC Paint 36 Level 3.
4. Carbothane 133 VOC for Carbothane 133 HB as local VOC regulations dictate. Carbothane 133 HB may be used in lieu of 134 Series when a satin finish and higher film build characteristics are desired.
5. Thermaline 4900 VOC and Thermaline 4700 VOC may be substituted for Thermaline 4900 and Thermaline 4700, respectively, as local VOC regulations dictate.
6. Carboguard 890 may be used as an epoxy topcoat in lieu of polyurethane where additional corrosion protection is more critical than appearance.
7. 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 panting.
8. Carbozinc 859 can provide superior performance as a maintenance primer. Please consult your Carboline Sales Representative to discuss your specific application.
9. In maintenance painting, some coats may be eliminated depending on the condition of the existing paint system. Please consult your Carboline Sales Representative.
10. Heavily pitted steel can make coating application more complicated. Please consult your Carboline Sales Representative for specific advice.
11. The application technique of stripe coating edges and weld lines will improve coating system performance.
12. Surface Cleaner 3 is a water based, biodegradable cleaner that is effective in cleaning an degreasing surfaces prior to painting.
13. 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.
14. For Fireproofing Systems, other primers than those listed may be acceptable. Consult your Carboline Sales Representative for specific advice.