

Power

System Guide



Atmospheric Exposures

Clean to Bare Steel Substrates

PREP	PRIMER	PRIMER DESCRIPTION	MID-COAT	MID-COAT DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION
Structural Steel, Piping, and Equipment – Carbon Steel						
Applications – Structural steel, inlet air ducts, pipe racks, piping, valves, ladders, handrails, pumps, motors, storage tank exteriors, process vessels, compressors, and other equipment operating up to 250°F (121°C)						
SP 6	Carbozinc 11 Series -or- Carbozinc 858 or 859 Series	Inorganic zinc primer for maximum corrosion protection -or- Organic zinc for quick topcoating and additional chemical resistance	Carboguard 890 Series -or- Carboguard 690 -or- Carboguard 60	High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy -or- Epoxy polyamide for general purpose	Carbothane 134 Series -or- Carbothane 133 Series -or- Carboxane 2000 Series	High gloss weatherable acrylic urethane -or- Satin finish; high build urethane hybrid -or- Ultra-weatherable siloxane
SP 3	Carbomastic 15 Series -or- Carbomastic 94 -or- Carbomastic 615	Aluminum surface tolerant epoxy -or- Surface tolerant mastic in colors -or- Inert-flake filled, moisture tolerant, low temp cure epoxy	Carboguard 890 Series -or- Carboguard 690 -or- Carboguard 60	High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy -or- Epoxy polyamide for general purpose	Carbothane 134 Series -or- Carbothane 133 Series -or- Carboxane 2000 Series	High gloss weatherable acrylic urethane -or- Satin finish; high build urethane hybrid -or- Ultra-weatherable siloxane

Systems over Existing Coatings*

PREP	OVERCOAT SEALER	OVERCOAT DESCRIPTION	SPOT PRIMER	SPOT PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION
Structural Steel, Piping, and Equipment – Carbon Steel						
Applications – Structural steel, inlet air ducts, pipe racks, piping, valves, ladders, handrails, pumps, motors, storage tank exteriors, process vessels, compressors, and other equipment operating up to 250°F (121°C)						
SP 1 and/or SP 7	Rustbond Series	Penetrating epoxy sealer	Carbomastic 15 Series -or- Carboguard 60 -or- Carbomastic 615	Aluminum surface tolerant epoxy -or- Epoxy polyamide for general purpose -or- Surface tolerant epoxy phenalkamine	Carbothane 134 Series -or- Carbothane 133 Series -or- Carboxane 2000 Series	High gloss weatherable acrylic urethane -or- Satin finish; high build urethane hybrid -or- Ultra-weatherable siloxane

*Always determine suitability for overcoating prior to application (see Notes section).

Atmospheric Exposures

High Heat Applications

PREP	PRIMER	PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION	OPTIONAL THIRD COAT	THIRD COAT DESCRIPTION
Uninsulated Piping and Equipment – Steel operating to 300°F (148°C)						
Applications – Piping, heaters, furnaces, boilers, stacks, columns, drums, vessels, heat exchangers, mufflers, HRSG steel, valves and pumps and equipment operating up to 300°F (148°C)						
SP 3	Carbomastic 15 Series	Aluminum surface tolerant epoxy	Carbomastic 15 Series	Aluminum surface tolerant epoxy		
SP 10	Carbozinc 859 Series -or- Carboguard 890 Series -or- Carboguard 690	Organic zinc for quick topcoating and additional chemical resistance -or- High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy	Carboguard 890 Series -or- Carboguard 690	High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy		
Uninsulated Piping and Equipment – Steel operating to 450°F (232°C)						
Applications – Piping, heaters, furnaces, boilers, stacks, columns, drums, vessels, heat exchangers, mufflers, HRSG steel, valves and pumps and equipment operating up to 250-450°F (121-232°C).						
SP 10	Carbozinc 11 Series	Inorganic zinc primer for maximum corrosion protection	Thermaline 4000 -or- Thermaline 4900 Series	Inorganic silicate; no heat cure requirement -or- Silicone acrylic	Thermaline 4000 -or- Thermaline 4900 Series	Inorganic silicate; no heat cure requirement -or- Silicone acrylic
Uninsulated Piping and Equipment – Steel operating up to 1000°F (538°C)						
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).						
SP 10	Carbozinc 11 Series	Inorganic zinc primer for maximum corrosion protection	Thermaline 4000 -or- Thermaline 4700 Series	Inorganic silicate; no heat cure requirement -or- Silicone	Thermaline 4000 -or- Thermaline 4700 Series	Inorganic silicate; no heat cure requirement -or- Silicone

Worker Protection and Insulation Needs

PREP	PRIMER	DESCRIPTION	INSULATIVE COATING	DESCRIPTION	THIRD COAT	DESCRIPTION
Uninsulated Piping and Equipment – Steel operating to 350°F (176°C)						
Applications – Piping, heaters, furnaces, boilers, stacks, columns, drums, vessels, heat exchangers, mufflers, valves, pumps and equipment operating up to 350°F (176°C)						
SP 10	Carbozinc 11 Series -or- Carbozinc 859 Series	Inorganic zinc primer -or- Organic zinc primer	Carbotherm 3300 -or- Carbotherm 551	Insulative acrylic coating -or- Insulative waterborne epoxy	Carbocrylic 3359 Series	Weatherable acrylic finish

Under Insulation

PREP	PRIMER	PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION	DESCRIPTION
Insulated Piping and Equipment – Steel operating up to 300°F (148°C)					
Applications – Insulated piping and equipment operating at elevated temperatures.					
SP 3	Carbomastic 15 Series	Aluminum surface tolerant epoxy	Carbomastic 15 Series	Aluminum surface tolerant epoxy	
SP 10	Carboguard 890 Series -or- Carboguard 690	High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy	Carboguard 890 Series -or- Carboguard 690	High chemical resistant epoxy -or- Moisture tolerant, low temp cure epoxy	
Insulated Piping and Equipment – Steel operating above 300°F to 1200°F (148°C to 649°C)					
Applications – Insulated piping and equipment operating at elevated temperatures.					
SP 10	Thermaline 450 EP	Epoxy phenolic; amine cured	Thermaline 450 EP	Epoxy phenolic, amine cured	Good to 400°F (204°C) continuous
SP 10	Thermaline 450	Glass-flake epoxy novolac			Single coat; good to 450°F (232°C) non-continuous
SP 10	Thermoline 4001	MIO reinforced polymer	Thermoline 4001	MIO reinforced polymer	Good to 1200°F (649°C) continuous

Fireproofing

RATING	PRIMER COAT	PRIMER DESCRIPTION	2ND COAT	2ND COAT DESCRIPTION	FINISH COAT	FINISH DESCRIPTION
Fireproofing – Steel						
Applications – Structural steel, decks, bulkheads, vessel supports, living quarters, control buildings.						
Up to 3 hours UL 263	Carbocoat 150 UP	Latex based or alkyd primer	Firefilm III	Water-based Intumescent fireproofing	Carbothane 133 Series	High gloss weatherable acrylic urethane
Up to 4 hours UL 1709	Carboguard 890	Chemically resistant epoxy primer	Pyrocrete 241 Series	Cementitious, durable fireproofing	Carboguard 1340 and Carbothane 133 HB	Epoxy sealer and High build satin urethane
Up to 4 hours UL 1709	Carboguard 893	Chemically resistant epoxy primer	Thermo-Lag 3000	Epoxy based intumescent fireproofing	Carboguard 1340 and Carbothane 133 HB	Epoxy sealer and High build satin urethane
Cable and Cable Tray Protection						
Applications – Electrical cables and cable tray raceways.						
Factory Mutual Certification	Intumastic 285	Water-based intumescent cable mastic				

Concrete Flooring and Secondary Containment

PREP	PRIMER	PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION	OPTIONAL TOPCOAT	OPTIONAL TOPCOAT DESCRIPTION
Floors – Concrete						
Applications – Control rooms, aisleways, corridors, mechanical rooms, turbine decks, shower rooms, locker rooms, battery room, laboratory, warehouses.						
SSPC SP 13 NACE 6	Carboguard 1340 WB	Water borne epoxy concrete sealer	Sanitile 555	High performance water-based epoxy	Sanitile 555	Thin-film floor for light traffic use
SSPC SP 13 NACE 6	Semstone 110	High build epoxy concrete sealer	Sanitile 945 SL	Self-leveling, chemical resistant epoxy	Sanitile 945 SL	Self-leveling floor for light to moderate duty use
SSPC SP 13 NACE 6	Carboguard 1340 WB	Water borne epoxy concrete sealer	Sanitile 985 PA	High solids polyaspartic	Sanitile 985 PA	High solids polyaspartic
Secondary Containment – Concrete						
Applications – Containment areas for acid/caustic storage, fuel storage, aggressive chemical storage, wastewater containment, sumps, trenches, demin and cooling water treatment area, cooling tower basins, neutralization pits.						
ASTM D4259	Semstone 110	High build epoxy Concrete sealer	Semstone 140 (AFRC) -or- Semstone 145 (AFRC) -or- Semstone 870 (AFRC)	Chemically resistant epoxy -or- Extreme performance epoxy-novolac -or- Vinyl-ester for hypochlorite exposure		Chemical resistant linings with optional aggregate-filled and/or reinforcement options for severe abuse/heavy duty service
ASTM D4259	Carboguard 1340 WB	Water-based epoxy primer/sealer for concrete	Reactamine ET	Elastomeric polyurea		High abrasion resistant, 350% elongation membrane to bridge cracks for cooling water basin and others

Interior Walls

Concrete, Concrete Masonry Units, and Drywall

SUBSTRATE	PRIMER	PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION	OPTIONAL THIRD COAT	THIRD COAT DESCRIPTION
Poured Concrete, Concrete Masonry Units, Drywall – Occasional to Frequent Washdown						
Applications – Hallways, shower rooms, control rooms, storage rooms, etc.						
Drywall	Sanitile 120	Drywall sealer	Sanitile 155 -or- Sanitile 555	Satin acrylic finish -or- High performance water-based epoxy	Sanitile 155 -or- Sanitile 555	Satin acrylic finish -or- High performance water-based epoxy
Concrete or CMU	Sanitile 100 -or- Sanitile 500	Water-based acrylic block filler -or- Water-based epoxy block filler	Sanitile 155 -or- Sanitile 555	Satin acrylic finish -or- High performance water-based epoxy	Sanitile 155 -or- Sanitile 555	Satin acrylic finish -or- High performance water-based epoxy

Specialty Applications

PREP	PRIMER	PRIMER DESCRIPTION	TOPCOAT	TOPCOAT DESCRIPTION	OPTIONAL THIRD COAT	THIRD COAT DESCRIPTION
Galvanized Steel – Structural, Ductwork, Cable Trays						
Applications – Over-coating galvanized steel or other surfaces to provide color coordination and UV protection may also be used on stainless, bronze, brass, fiberglass						
SP 1 -or- SP 7	Galoseal WB -or- Carboguard 60	Acrylic bonding primer for SP1 prep -or- Epoxy polyamide for general purpose for SP7 prep	Carbocrylic 3359 -or- Carbothane 134 Series -or- Carbothane 133 Series	Industrial, weatherable acrylic finish -or- High gloss weatherable acrylic urethane -or- Satin finish; high build urethane hybrid		
Galvanized Steel – Transmission Towers and Substations						
Applications – Over-coating weathered galvanized steel or other surfaces to provide color coordination and UV protection						
SP 1	Carbocoat 2600	Metallic-filled long-oil alkyd for transmission towers				
SP 1	Carbocoat 2900 Primer	Epoxy ester alkyd primer for substations	Carbocoat 2901	Metallic-filled epoxy ester		
SP 1	Carbocoat 2900 Primer	Epoxy ester alkyd primer for substations	Carbocoat 2900 Primer	Epoxy ester alkyd primer	Carbocoat 30	Weatherable silicone (30%)-modified alkyd finish
Interior Steel – (less than 200°F, 93°C)						
Applications – Structural steel. Turbines, piping, pumps, motors, electrical equipment						
SP 3	Carboguard 890 Series -or- Carbomastic 94	High chemical resistant epoxy -or- Surface tolerant mastic in colors	Carboguard 890 Series -or- Carbomastic 94	High chemical resistant epoxy -or- Surface tolerant mastic in colors		
SP 3	Carbocoat 8215	Direct-to-metal, fast dry alkyd	Carbocoat 8215	Direct-to-metal, fast dry alkyd		
Buried Piping – Steel						
Applications – External surface of buried pipelines, valves, manifolds, girth weld repair, etc.						
SP 10	Bitumastic 300M -or- Polyclad 975 -or- Polyclad 975 H	High build, epoxy coal-tar -or- Hybrid epoxy pipeline coating -or- Hand applied hybrid epoxy pipeline coating				

Linings for Storage Tanks and Vessels

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

SERVICE CONDITIONS		GENERIC TYPE	PRODUCT	# OF COATS	Mils (µm) TOTAL
98% Sulfuric Acid		Epoxy Novolac	Plasite 4550	1	40-50 (1000-1250)
		Epoxy Novolac	Plasite 4550 S	1	40-50 (1000-1250)
50% Caustic (Sodium Hydroxide)		Epoxy	Phenoline 353	2	12-15 (300-375)
		100% Solids Epoxy Novolac	Plasite 4550 Series	1	25-30 (625-750)
Fly Ash or Coal Silos		100% Solids Elastomeric Polyurethane Hybrid	Reactamine 760	1	30-40 (750-1000)
Neutralization Tanks	More caustic	Flake Pigment Vinyl Ester	Plasite 4100	2	35-45 (875-1125)
	More acidic	Flake Pigment Vinyl Ester	Plasite 4300	2	35-45 (875-1125)
Water Storage or Exposure	Demin water up to 210°F	Epoxy Phenolic	Plasite 7159	2	10-12 (250-300)
	Demin water less than 150°F	Cycloaliphatic Epoxy	Plasite 9133	2	12-15 (300-375)
	Raw water	Epoxy	Carboguard 891 HS	2	12-15 (300-375)
	Circulating water; water screens	Coal-tar Epoxy	Bitumastic 300M	1-2	24 (600)
	Water boxes, circulating water pipe, penstocks, dam gates	Epoxy -or- Polyurethane Hybrid	Plasite 4500 Series -or- Reactamine 760	1 -or- 1	40-50 (1000-1250) -or- 30-40 (750-1000)
Lime Slurry Tanks		High Abrasion Resistant Epoxy Phenolic	Plasite 7122 VAR	2	12-14 (300-350)
		High Abrasion Resistant Vinyl Ester	Plasite 4110	2	35-45 (875-1125)
Gypsum Tanks		Epoxy Novolac	Plasite 4550 Series	2	40-80 (1000-2000)
Absorber Towers (Scrubbers) Outlet Ductwork and Stacks		Abrasion-Resistant Flake Pigment Vinyl Ester	Plasite 4310	2	35-45 (875-1125)
Diesel Fuel, Oil, Gasoline Storage		Cycloaliphatic Amine Epoxy	Phenoline 385	2	12-14 (300-350)
		Epoxy Phenalkamine	Phenoline 341	1	12-14 (300-350)
		Epoxy	Plasite 4500 Series	1	25-30 (625-750)

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 WB: A water-based inorganic zinc with a VOC of zero.
2. Carbothane 134 Series include several choices of high gloss acrylic urethanes to meet your needs:
 - > Carbothane 134 HG: Superior performance polyurethane exceeding the requirements of SSPC Paint 36 Level 3.
 - > Carbothane 134 VOC: Same performance as 134 HG but with a VOC limit of <200 g/l.
 - > Carbothane 134 MC: Same performance as 134 HG but with a VOC limit of <100 g/l.
 - > Carbothane 134 WB: A water-borne urethane exceeding the requirements of SSPC Paint 36; Level 3 and VOC <100 g/l.
3. Carbothane 133 Series may be used in lieu of 134 Series when a satin finish and higher film build characteristics are desired. Carbothane 133 Series includes 133 HB, 133 VOC, 133 MC, 133 LH and 133 LV used where VOC regulations dictate.
4. Thermaline 4900 VOC and Thermaline 4700 VOC may be substituted for Thermaline 4900 and Thermaline 4700, respectively, as local VOC regulations dictate.
5. Heavily pitted steel can make coating application more complicated. Please consult your Carboline Sales Representative for specific advice.
6. The application technique of stripe coating edges and weld lines will improve coating system performance.
7. Surface Cleaner 3 is a water based cleaner that is effective in cleaning and degreasing surfaces prior to painting.
8. 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.
9. Plasite 4500 Series and 4550 Series includes versions that can be sprayed using standard airless equipment or plural-component equipment. Always check with Carboline's Technical Service Department for the most appropriate version for the specific application.



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