Application Procedures
For
ChemLINE 2400/31

Heat Cured – High Temperature, Abrasion Resistant Protective Coating

“Performance Without Compromise”

ADVANCED POLYMER COATINGS

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1.0 ***SCOPE***

1.1 *ChemLINE 2400/31* is a forced heat cured protective lining for metallic surfaces, such as steel and stainless steel surfaces, etc. The application procedures described herein provide the best available information regarding the application of this product for the purpose of ensuring the best possible results when using *ChemLINE 2400/31*.

1.2 The contractor shall arrange for a pre-job conference at the job site so that all parties involved, including the coating supplier and coating contractor are familiar with the entire project, including all specifications, safety codes and jobsite conditions.

1.3 All materials shall be delivered to the jobsite in their original, unopened containers.

1.4 Materials shall be stored in an approved location. Storage areas shall be kept clean and free of fire hazard. Oil rags, waste paper or other fire hazards shall be removed and disposed of in accordance with the applicable regulations at the end of each workday.

1.5 The coating contractor/applicator shall be experienced in the application of industrial coatings.

1.6 Application and surface preparation standards shall comply with the requirements of the Steel Structures Painting Council's Painting Manual, Volume 1, Good Painting Practices. The engineer shall be consulted regarding any situations not covered by the reference standards or this specification.

1.7 The coating contractor/applicator shall not deviate from these application procedures. The contractor/applicator shall sign a form acknowledging that the Application Procedures have been read and understood (see Appendix A). In addition, the contractor/applicator shall have a copy of the application procedures on the jobsite at all times.

1.8 The painting contractor shall furnish workers who perform quality work and who are experienced and knowledgeable in the surface preparation and application of high performance industrial coatings. The painting contractor shall list five (5) similar projects, which have been blasted and coated by the personnel, which the contractor proposes to employ for this project. Paint application procedures shall conform to the standards of craftsmanship discussed in the Steel Structures Painting Council's Painting Manual, Volume 1, Good Painting Practice. These techniques include, but are not limited to, multiple passes of the spray gun, with each pass overlapped 50% and "crosshatching" successive coats of paint. The painting contractor shall use properly functioning equipment capable of performing the tasks required herein. That is, compressors shall b capable of providing a minimum of 100 psi at the blast nozzle(s) and shall provide clean air that is free of oil and moisture through the required oil and moisture traps. Paint spray rigs shall have properly functioning regulators and pressure gauges and clean fluid lines which have not previously been used, i.e. new hoses and tips.

1.9 Application of the first coat must be made as soon as possible after completion of blasting, i.e., before any surface discoloration reappears.

1.10 Contractor shall ensure proper ventilation of the workplaces and furnish proper safety equipment and clothing for each worker using *ChemLINE 2400/31* products. The contractor is also responsible for providing all necessary equipment and scaffolding for surface preparation, application of coating material and removal of dirt, debris and spent abrasives. The contractor or subcontractor is also responsible for supplying all necessary heating equipment.

1.11 This specification is for use on carbon steel; however, ChemLINE 2400/31 can be applied to other metals, alloys and concrete surfaces. Contact Advanced Polymer Coatings for details on preparing and coating other metals, alloys and concrete surfaces.

1.12 The theoretical coverage of *ChemLINE 2400/31* is 1,428 sq.ft./gallon/mil (35 m^2/liter/mil) on a smooth surface. *ChemLINE 2400/31* has a recommended DFT of 16-18 mils (400-450 microns); therefore, at this thickness the theoretical coverage would be 80-90 sq.ft./gallon.

However, some coating loss would be expected depending on the type of substrate, surface profile, substrate configuration, environmental conditions, operator technique and method of application. For example, using a 20% loss factor, the practical coverage would be 64 -72 sq.ft./gallon at 16-18 DFT (400-450 microns).

2.0 *APPLICABLE DOCUMENTS*

2.1 The most recent copies of these documents should be used:

ASTM D4417 "Standard Test Method for Field Measurements of Surface Profile of Blast Cleaned Steel"

ASTM E376 "Measuring Coating Thickness by Magnetic-Field or Eddy Current (Electromagnetic) Test Methods"

ASTM D1186 "Method for Nondestructive Measurement of Dry Film Thickness of Non-Magnetic Coatings Applied to a Ferrous Base "

ASTM D1400 "Method for Nondestructive Measurement of Dry Film Thickness of Non-Magnetic Coatings Applied to a Nonferrous Metal Base"

NACE RPO 178 "Surface Finish Requirements" Weld Seams

NACE RPO 188 "Discontinuity (Holiday) Testing of Protective Coatings"

ASTM D512 "Test Methods for Chloride Ions in Water"

SSPC PA2 "Measurement of Dry Coating Thickness with Magnetic Gages"

3.0 *SURFACE PREPARATION FOR STEEL AND STAINLESS STEEL SURFACES*

3.1 Equipment. The contractor will supply the necessary abrasive blasting equipment, air compressors, abrasive vacuum suckers, dehumidifiers, and other tools in order to carry out the accepted work efficiently under all conditions.

3.2 The compressed oil-free air used for abrasive blasting shall be cooled after compression and shall not have a higher temperature, volume and humidity, than the air fed into the tanks by the dehumidifiers. A "Blotter Test" shall be performed periodically to confirm that the air is free from oil.

3.3 Prior to blasting, remove all weld spatter. Grind sharp edges to a minimum 1/8-inch (0.3 cm) radius and grind welds flat. "Skip" welds should be seal welded. No weld undercutting is acceptable. All weld undercuts shall be filled with weld metal.

3.4 All surfaces to be coated shall be cleaned prior to abrasive blasting:

3.4.1 For surfaces contaminated with grease and oils, degrease surface prior to abrasive blasting with a commercial degreaser, alkaline solution or with a hydro-blast at 5,000 psi (34.5 MPa) containing a degreasing solution which will remove dirt, oil and grease per SSPC-SP1.

3.4.2 Testing for surface contamination on blasted surfaces shall be accomplished using a "Bresler Sampler Kit" or SCAT kit in order to determine the amount of total soluble salts and surface Ph. The acceptable level of chloride contamination is 5 micrograms/cm^2. The acceptable surface Ph is 7. If after testing, the chloride level exceed the acceptable level, all contaminated surfaces shall be pressure washed with "Chlor-Rid" or with clean, warm water, (distilled or demineralized water is preferred) and retested. Hydrocarbon contamination will be checked by SSPC-SP1 procedures. There should be no hydrocarbon contamination on the surface. When the chloride level , Ph and hydrocarbon levels are acceptable, the washed area shall be reblasted.

NOTE -- Check surfaces for soluble salt contamination before blasting. A commercial blast (SSPC-SP6) followed by surface contamination testing may be appropriate.

3.5 After cleaning, the surface shall be abrasively blasted to SSPC-SP10 (NACE #2, SA2.5) near white metal finish with 3-4 mil profile using clean, sharp angular abrasives, e.g., Garnet Abrasive (24 grit or larger), 1240 Black Beauty 1240, G-14 steel grit or 8-20 silica sand.

NOTE -- ***A garnet abrasive (24 grit or larger) is recommended for stainless steels. Steel grit may embed or contaminate stainless steel surfaces. Other abrasives do not possess adequate hardness and tend to round-off peaks in the surface profile***

CAUTION - ***Stainless steel will harden during abrasive blasting. Producing desired profiles can be difficult when reblasting is required***.

NOTE -- Always Use Oil-Free Air Supply for Blasting (See Appendix B).

3.6 Surfaces of heavily corroded steel with grooving and pitting should be opened up and sharp edges removed by using a mixture of medium and coarse angular abrasive grit (e.g., 12-40 mesh steel grit). This will allow for easier coverage and penetration when spraying or rolling.

3.7 The abrasively blasted surface shall result in an anchor pattern of 3-4 mils (75-100 microns) minimum for steel and for stainless steel as determined by one of the following methods:

A) Testex Press-O-Film Replica Tape (X-coarse)

B) SSPC Keane-Tator Surface Profile Comparator

Details for making surface roughness measurements are provided in ASTM D4417.

3.8 After abrasive blasting, the surface shall be vacuumed with a bristle nozzle to remove all dust, grit and embedded abrasive. In addition, the surface shall be tested again for soluble salt contamination (see Section 11.2.1).

3.9 Relative humidity during blasting operations must be less than 50% and the substrate surface temperature must be at least 5^{o}F (3^{o}C) above the dew point and rising.

Note: ***Never touch blast cleaned surfaces with bare hands because salts and oils can be deposited on the surface, which will adversely affect coating adhesion. Always wear clean gloves and protective footwear when walking on or touching blast cleaned surfaces.***

3.10 SURFACE CLEANING

Suitable industrial-type vacuum cleaners with rotary brush heads are to be provided and used for removing residual grit and dust from internal surfaces after blasting and prior to coating. Particular attention is to be given to removal of grit and dust in pitted and horizontal areas. Tank shall be free of dust and contamination prior to coating.

3.11 DEHUMIDIFICATION EQUIPMENT / VENTILATION

Adequate dehumidification equipment / ventilation is to be maintained at all times in the tanks during the blasting, coating application and the curing of the lining. The dehumidification equipment/ventilation should be of sufficient capacity and properly installed to maintain the SSPC-SP10 (NACE #2, SA2.5) near white metal blast specification within the entire tank while the tank is blasted and lined in its entirety. Further, the equipment must have the drying capacity to keep the relative humidity at 50% or lower during abrasive blasting and 65% during coating application. The volume of the dehumidification air shall always exceed the volume of the extraction air (ventilation fan) in order to maintain a positive balance of air to prevent humid and unfiltered air from entering and contaminating the tank. This equipment must remain erect and

functioning until all coating applications and "touch-up" of the lining system is completed and accepted by the APC Technical Service department and Owner's Representatives, respectively.

Humidity; During Blasting	50% or lower
Humidity; During Coating Operations	65% or lower
Substrate Temperature; range	10º to 40ºC
Substrate Temperature; minimum	3ºC (5ºF) above the dew point

Environmental conditions shall be measured and recorded by the Contractor and Technical Service department (the inspector shall record environmental data on appropriate log sheet, a minimum of every four (4) hours in tanks where work is in progress unless weather conditions dictate more frequent measurements. The adequate ventilation is to be maintained at all times in the tanks to be lined.

Note: Minimum ventilation is 10 air exchanges per hour in a 1000 sq.ft. tank and 4 air exchanges per hour for tanks of 20,000 sq.ft. and above. For tanks between these values, the requirements for air exchanges should vary correspondingly.

Ventilation is to be a minimum capacity to maintain a clear atmosphere within the tanks during both blasting and coating operations. During application tanks must be sufficiently ventilated to maintain the atmosphere within the tank below 10% of the lower explosive limit. Baghouses or other dust collection equipment must be used to conform to environmental regulations. Ventilation shall be continued until final cure is achieved.

4.0 *MATERIAL STAGING AND CURING TIME*

4.1 General Notes Prior to Coating

4.1.1 Post Abrasive Blasting Inspection. Prior to applying the first coat of the system, the surface shall be inspected for corrosion pitting. The Owner's Representative in consultation with the APC Technical Servcie department will determine if the pitted areas require welding or pit filling with *ChemLINE 2400/31*.

4.1.2 If the pitted area requires welding, the pitted surface will be marked and the pits will be welded and then smoothly ground to **the** adjacent steel area. The repaired areas shall be abrasively blasted to a SSPC-SP5 (Sa 3) at the same time when blasting the balance of the tank.

4.1.3 If the pitted area requires "pit filling" the following shall be done prior to application of the first coat; apply with a brush a thin coat (approximately 3-4 mils [75-100 microns] DFT) *ChemLINE 2400/31*, thinned 5% with Toluene/Xylene, to corroded, pitted surfaces and welding seams with pinholes.

4.2 STRIPE COATS

4.2.1 The main reason for stripe coating is to induce maximum coating adhesion in the most critical areas, to fill in the surface discontinuities by moving the brush in a back and forth or twisting motion. Stripe coats may be applied prior to the first coat or in between the first and second full coats. Any deviation from this practice must be approved by APC Technical Service department in writing and Owner Representative.

4.2.2 Stripe coats shall be applied using a suitable clean, natural bristled brush to all edges, welds, lighting holes, drain holes, angle bars, pitted areas, and otherwise irregular shapes, and other hard to reach areas.

Note: Do not apply stripe coats at a wet film thickness greater than 4-5 mils (100-125 microns).

Note: Contractor shall order coating material in one gallon or one quart sizes for stripe coating. *Always mix complete kits and at no time shall kits be broken down or split to make smaller portions.*

4.3 COATING SEQUENCE

4.3.1 Apply *ChemLINE 2400/31* to all tank surfaces.

4.3.1.1 The first full coat of *ChemLINE 2400/31 {Red}* shall be applied at a wet film thickness of 9-10 mils (225-250 microns) to yield a dry film thickness of 8-9 mils (200-225 microns).. Make frequent wet film thickness measurements during the coating operation to ensure that the proper dry film thickness is achieved. The maximum dry film thickness for the first coat shall not in any place exceed 12 mils (300 microns). The minimum dry film thickness shall not be less than 7 mils (200 microns) on the first coat.

4.3.1.2 Allow the first coat to reach the "B" stage before applying the stripe coat. The "B" stage is reached when the coating is firm-to-the-touch and has just lost its tackiness (i.e., coating is soluble when exposed to solvent); at this stage the solvent has evaporated from the coating. *ChemLINE 2400/31* will "B" stage by introducing forced warm air at 120°-175°F (49-80°C) into the tank. Depending on atmospheric conditions and airflow, "B" stage should be reached in 4-12 hours. (**NOTE**: Substrate temperature should not exceed 175°F (80°C)). Before advancing the "B" stage, allow the solvent to flash from the coating for 1-2 hours. It is important to ensure good airflow across the coating in order to remove solvent prior to forced air "B" staging. Care must be exercised when accelerating the "B" stage so the coating is not over-cured prior to application of subsequent coats.

4.3.2 Apply one stripe coat of *ChemLINE 2400/31 {Gray}* to areas as noted in Section 4.2.

4.3.3 In general, allow the stripe coat to dry until it has become firm to the touch. On vertical and overhead surfaces, subsequent coats can be applied when the coating has lost its tackiness. On floors that require foot traffic in order to apply subsequent coats, the coating must be hard, i.e., one cannot damage coating when walking on it. Time varies on the ambient or forced air temperatures.

4.3.4 Applicator shall wear protective footwear before stepping onto the coating, e.g. cover shoes with protective booties or similar.

4.3.5 Apply a second stripe coat of *ChemLINE 2400/31 {Red}* to selected areas as required.

4.3.6 Apply a second full coat of *ChemLINE 2400/31 {Gray}* at a wet film thickness of 9-10 mils (225-250 microns) to yield a dry film thickness of 8-9 mils (200-225 microns). The maximum dry film thickness shall not in any place exceed 22 mils (550 microns) for both areas. The minimum dry film thickness shall not be less than 14 mils (375 microns).

4.3.7 After the complete *ChemLINE 2400/31* coating system has been applied, blow warm air 100°-110°F [38°-44°C] into the tank for a minimum of two hours. Temperature can be then be raised to 120°-175°F (49°-80°C) in order to accelerate "B" stage. Check coating frequently.

Note: Do not over cure coating at this stage.

4.3.8 After lining has reached the "B" stage (i.e. one is able to walk on the coating without causing damage), holiday (pinhole/spark) testing can be performed using a Tinker and Rasor High Voltage Holiday Detector set at 3,000 volts (or equal equipment). Details on holiday (pinhole/spark) detection can be found in NACE RPO 188.

4.3.8.1 Initial holiday (pinhole/spark) testing can be conducted at 3,000 volts (but no higher than 5,000 volts). Subsequent testing should be conducted at 100 volts per mil of coating thickness (approx. 1400 volts).

Note: A wet sponge type tester is NOT ALLOWED to be used at this stage. Coating is not completely post cured and wet sponge testing will damage coating.

4.4 MIXING

- Mechanically agitate (e.g., with Jiffy® blade) component "A" (resin) until color and consistency is uniform (usually 1-2 minutes).

- Slowly add component "B" (catalyst) and mix thoroughly for approximately 3-5 minutes. Do not overwork, especially when the resin, catalyst and ambient temperatures are greater than 85°F (29°C).
- If thinning is required, slowly add Toluene/Xylene and continue mixing until the thinner is thoroughly mixed (approximately 2-3 minutes). Do not use more than 1 quart (946 ml) of Toluene/Xylene per 5 gallons (19 liters) of resin. Thinning beyond what is specified herein must be approved by APC.
- After mixing, pour *ChemLINE 2400/31* through a 60 mesh screen into a clean container to remove any large particles.
- The area where mixing is to be performed shall be protected from rain, kept clean, and free of debris at all times. All empty drums shall be stacked in designated areas, and it is the contractor or inspector's responsibility to record the number of drums used and the associated lot numbers for both resin and catalyst for each coat in each tank.
- Resin and catalyst shall be stored inside a "climate controlled" container for minimum of 48 hours prior to mixing and application in order to attain a coating temperature of 70°-75°F.

4.5 THINNING

ChemLINE 2400/31 coatings may require thinning for spray applications. Thin *ChemLINE 2400/31* with Toluene/Xylene only, no other solvents are acceptable.

Do not add more than 1 quart (946 ml) to a 5-gallon (19 liter) kit or 6.5 oz. (190 ml) to a 1-gallon (4 liter) kit.

In general, no thinning is required for roll or brush applications; however, some thinning may be required for stripe coating of previously corroded areas or irregular surfaces.

NOTE - Toluene and Xylene are moderately toxic, flammable liquid. It is important to remember when using any solvent or thinner that adequate ventilation is required, no one should smoke and all individuals using these materials should use a respirator, face shield and wear proper protective clothing.

4.6 SCREENING

Pour mixed coating through a 60 mesh screen into a clean pail, to remove any large particles and use a filter on the pump suction.

4.7 POT LIFE

The Pot Life of *ChemLINE 2400/31* is approximately 120 minutes at 75°F. – shorter at higher temperatures.

4.8 SPRAY EQUIPMENT

Coating pumps should be 45:1 or higher, 3 gpm minimum, air operated and have air line filters and oil and moisture extractors. #50-#60 mesh in-line filter on discharge side of pump must be used. A #50-#60 mesh filter to be located between gun and whip hose. A filter on the siphon line is recommended. The air input line should be ½ inch (1.25 cm) I.D. minimum. It is suggested that airless tip size from .017-.023 inch (0.4 –0.6 mm) and a minimum of 3/8 inch (0.95 cm) ID fluid hose with a ¼ inch (0.63) ID 1.5 meter whip be used. In addition, a minimum 100-psi pressure at the airless spray pump and fluid hose length of a maximum of 30 meters should also be used. Only properly overhauled and cleaned spray pumps and spray guns will be allowed.

New hoses shall be used for the spray application of the *ChemLINE 2400/31*.

Each pump shall be fitted with an air pressure gauge and a reduction valve so air pressure can be adjusted to the correct level.

Note: Pump shall be located at closest area to tank in order to provide the shortest hose length possible.

NOTE - It is extremely important to remove water and oil from the air supply. Oil and water spots on the substrate surface can cause premature failure of the coating or lining. Therefore, the compressed air must be checked regularly for oil and water contamination. A recommended procedure is outlined in Appendix B.

4.9 APPLICATION REQUIREMENTS OF *CHEMLINE 2400/31*

4.9.1 Extraction Ventilation. Extraction ventilation shall be erect at all times from the time the coating application starts, until the coating is finally cured. The capacity shall be enough to keep the condition inside the tank below 10% LEL at all time but never higher than the capacity of the dehumidifier.

The extraction hose/s shall be erected to draw the contaminated air from the lower farthest portions of the tank to ensure proper removal of the air/solvent vapors. The DH shall be supplied to the upper and farthest portions in a way to ensure maximum air velocity near to the surface of the applied coating.

4.9.2 Environmental Conditions during Entire Coating Process. The relative humidity inside the tanks shall never exceed 50%. The coating cannot be applied unless the steel temperature is more than 3°C (5°F) above the dew point of the surface. The surface temperature is to be 60°F or above.

4.9.3 Space heaters. If the steel surface temperature is less than specified above, space heaters shall be installed to ensure that the proper conditions are kept at all times inside the tanks. Only LP or natural gas combustion type heaters with indirect heated air supply are permitted. Electrically heated units are preferred. No gas or diesel heaters are allowed. The warm air shall be supplied to the lower regions of the tank.

5.0 *REPAIRS AND TOUCH-UPS*

5.1 Prior to heat curing. The coating shall be sufficiently hard so one is able to walk on it before repairs are made. Make repairs and touch ups with *ChemLINE 2400/31*. Use supplied quarts, pints or half-pint kits for this purpose.

5.1.1 Obvious defects and pinholes identified by spark testing can be repaired prior to heat curing with minimum surface preparation. Open pinholes by hand using a small diameter drill bit (about 3/31" diameter). It is not necessary to enlarge pinholes such that bare substrate is exposed. If repairs are made in less than 24 hours, clean area to be touched-up with a clean cloth slightly dampened with clean solvent. Apply coating using a small, clean, stiff bristle brush. Work coating into the opened pinhole using the end of the brush in a twisting and dabbing motion. Lightly brush material over pinhole and a minimum of one inch around the repair site. Coating should be applied thick but not so thick that sags or runs are produced.

NOTE -- Preheat "drilled-out" hole with hot air gun before application of the coating.

5.1.2 Repairs made after the coating has passed the recoat window require the area around the opened pinhole to be roughened by hand using 50-80 grit abrasive paper before cleaning with solvent.

5.1.3 Spark test patched areas at 1,500-2,000 volts (minimum 100 volts per mil) after heat curing. If pinholes are found, follow touch-up procedures outlined in Section 5.2.

5.2 After heat curing. The following procedures shall be followed when making repairs or touch-ups after the coating has been heat cured.

5.2.1 Open pinholes by hand using a small diameter drill bit (about 3/31" diameter). It is not necessary to enlarge pinhole such that bare substrate is exposed. Clean area to be touched-up with a clean cloth slightly dampened with clean solvent. Roughen area at least 1-2 inches around pinhole by hand using 50-80 grit abrasive paper. Heat area to be repaired with a hot air gun for 2-3 minutes. Apply coating using a small, clean, stiff bristle brush. Work coating into the opened pinhole using the end of the brush in a twisting and dabbing motion. Lightly brush material over pinhole and a minimum of one inch around the repair site. Coating should be applied thick but not so thick that sags or runs are produced. Heat patched area with hot

air gun until coating is hard and has changed colors. Spark test at 1,000-2,000 volts to confirm pinhole has been properly repaired.

NOTE - Preheat "drilled-out" hole with hot air gun before application of the coating.

5.2.2 Large areas that need to be repaired shall be brush blasted using vacuum blasting equipment or adjacent coating must be fully protected to prevent damage from open abrasive blasting. Remove all blasting dust and grit using a vacuum. Wipe down area using a clean cloth slightly dampened with clean solvent. Apply coating by spray, roll or brush application as directed by an APC Technical Service department. Heat patched area with hot air gun, infrared heater or similar until coating is hard and has changed color (substrate temperature in patched area should exceed 200°F [93°C]). Spark test at 1,500-2,000 volts (minimum 100 volts per mil)to confirm pinhole has been properly repaired.

NOTE -- Be sure to remove shiny coating surface at least one inch (2.5 cm) around perimeter of pinhole to be patched by roughening with abrasive paper or carefully with disc sander. This step is necessary because the adhesion of the coating patch is poor to a cured coating.

6.0 *MATERIAL STAGING AND CURING TIME*

6.1 "B" Stage. The "B" stage has been reached when the coating is firm-to-the-touch and has lost its tackiness (but still solvent soluble); at this stage, the solvent has evaporated from the coating and is ready for the second coat or final cure.

NOTE -- Do not over cure coating between coats. This will adversely affect adhesion of subsequent coats.

Recoat Time.

Air Temperature	Overcoat Time (hours)	
	Min.	Max.
100°F (38°C)	16	48
120°F (49°C)	8	36
150°F (66°C)	4	24

The maximum recoat time begins after the "B" stage has been reached. Perform forced heat cure within 48 hours of reaching "B" stage on the final coat.

NOTE - Sufficient airflow across the coating and/or through enclosed spaces is necessary in order to assist in removing solvent from the coating before applying the next coat or performing the final heat cure.

6.2 Cure Schedule. The size of heating equipment and number of heaters is dependent on the size and configuration of the coated item to be cured (consult a heating contractor for more information). Direct or indirect forced air heating or inductive heating is acceptable. Use only propane or methane (natural gas) for direct heating.

NOTE - Do not use kerosene, diesel fuel or heating oils for this purpose.

The final cure shall be performed after completing the high voltage (3,000 volt) holiday test and repairs/ touch-ups have been performed. For elevated temperature cure, increase the substrate temperature by 50°F (28°C) per hour until the final cure (soak) temperature is reached.

The most common soak temperature is 300°F (149°C); at this temperature, the soak time is a minimum of six (6) hours. Contact APC for actual required cure time and temperature based upon conditions of service.

Note: All cure temperatures are Substrate temperatures. Contact APC for required heat cure cycle as required by the conditions of service.

6.3 Recoating. *ChemLINE 2400/31* may be recoated after full cure (hardening). However, the surface must be brush blasted to remove the shiny surface prior to recoating. Surface preparation procedures outlined in Section 3.0 and coating/curing procedures beginning in Section 4.0 shall be followed thereafter.

7.0 *INSPECTION CRITERIA*

7.1 General Information**.** All working operations and areas that are to be inspected by the APC Technical Service department shall be pre-inspected by the contractor to ensure that the work performed conforms to the specifications outlined herein. Substandard work areas shall be corrected prior to requesting inspection by the APC Technical Service department.

7.2 Inspections. The Inspector(s)/Contractor shall record all pertinent information concerning inspections or work performed. Inspections will recorded and kept on the Project Documentation Forms – Appendix C or owner/contractor forms approved by APC Technical Service department. Inspections will be performed after the following operations, however, other inspections may be conducted when requested by either the Owner's representative or the APC Technical Service department.

a) Before blasting
b) After blasting and cleaning
c) After each spray or stripe coat
d) Before final heat curing
e) After final heat curing

7.3 Testing / Quality Acceptance Equipment.

a) Surface contamination testing for chlorides, sulfates, sulfides, etc. will be done using a SCAT kit or a Bresle Sampler Kit as supplied by KTA Tator, Pittsburgh, PA.
b) Surface Profile Gauge
c) Dry film thickness measurements will be taken using an Elektro-Physik Minitest 1001 Gauge with a F1 probe or equal.
d) Testing for pinholes will be done using a Tinker & Rasor, Model AP/W or equal.
e) APC solvent wipe.
f) Hardness test to be done with pencil hardness tester.

7.4 Acceptance Criteria.

The tanks may be rejected if any of the following occur:

a) Sags and runs
b) Pinholes in film
c) Air bubbles and air bubble craters
d) Dry spray and rough "grainy" finish
e) Low film build per coat
f) Blistering
g) Lifting and peeling
h) Insufficient dehumidification and ventilation
i) Poor cleaning procedures
j) Insufficient cure; or
k) Other causes which the Owner's representative or APC Technical Service department feels compromises the integrity of the coating.

8.0 *COATING INTEGRITY INSPECTION PROCEDURES*

8.1 Holiday (pinhole/spark) Testing. Holiday (pinhole/spark) testing shall be performed using a calibrated Tinker & Rasor Model AP/W Pinhole Detector (or equal). Initial spark testing shall be conducted 3,000 volts. Pinhole testing can be performed as soon as the coating is firm to the touch and solvent is released. If required, repair any damage areas that are observed after tanks have been cured and cleaned as per this specification. Additional spark testing should be performed at 100 volts per mil of coating thickness (1,500-2,000 volts). All testing results should be recorded including repair areas and the results of retesting.

8.2 Dry Film Thickness Criteria. The minimum dry film thickness of the lining system shall not at any spot be less than 14 mils (350 microns). The maximum allowable DFT spot (a spot is defined as an area of 5 sq.ft. (0.5 m^2)) reading should not be higher than 26 mils (650 microns). The average DFT should be 16-18 mils (400-450 microns).

Note: If more than 30% of the tank surface is below the minimum DFT or contains excessive pinholes and the coating is past the recoat interval, re-blast the tank and recoat as determined by APC Technical Service department.

8.3 Dry Film Thickness Readings. The overall condition and appearance of the tank shall determine the required number of dry film thickness readings, and the APC Technical Service department conducting the inspection. "Spot" dry film thickness readings shall be in accordance with SSPC-PA2 Specification. All DFT measurements should be recorded.

8.4 Solvent Testing. A solvent wipe test is used to determine whether the coating is post cured. Soak a clean, white cloth with clean solvent. Rub the same area of the coating 40-50 times in a back and forth motion while applying pressure. If the coating becomes soft and tacky or coating material is transferred to the cloth, the coating is not properly cured. This test should be performed in at least ten different section of the tank.

8.5 Hardness Test. A hardness test will determine whether the coating is post cured. Coating hardness can be tested using a pencil hardness gauge (e.g. Paul N. Gardner Co.). A properly cured coating will have a pencil hardness value of "9H" or greater. If a hardness value of less than "9H" is determined notify APC Technical Service department prior to recuring.

9.0 GENERAL NOTES

9.1 The contractor is to mix the coating (resin and catalyst) in strict accordance with the instructions outlined in this specification.

9.2 The tank coating is to be applied in the sequence outlined in this specification. Recoatibility guidelines are mandatory, and if not adhered to, reblasting of the tank will be required.

9.3 During the application of the coating, open flames, welding, smoking, and the use of spark-producing equipment (such as lights, wiring, motors, etc.) are absolutely prohibited in and around tanks being coated.

9.4 All sprayers and personnel involved in the application of the coating shall use approved fresh air masks and safety suits as specified by APC.

9.5 Areas where the coating has failed due to poor surface preparation, improper application of coating, etc. is to be reblasted and recoated according to specification.

9.6 The contractor is responsible for following the coating manufacturer's material safety data sheet at all times. All safety related rules and requirements that apply to any specific work area shall be adhered to.

9.7 If any modification to this specification is requested it must be sent in writing to APC Technical Service department for approval.

9.8 For final approval and warranty of the project, daily Project Documentation and Inspection reports will be submitted and reviewed by APC Technical Service department and a completion document shall be signed by the Owner's representative and the APC Technical Service department.

10.0 ***SAFETY***

MSDS (Material Safety Data Sheets) must always be read before using products. ***ChemLINE 2400/31*** coating systems are intended for application by experienced, professional personnel. APC can supply technical supervision to help determine that the surface has been properly prepared, the components correctly mixed and the material safely and properly applied.

If *ChemLINE 2400/31* coating materials are to be applied by your own people or a third party contractor, please be sure they are aware of the following safety precautions:

- Exposure to resins and hardeners through direct skin contact and / or inhalation may cause dermatitis reactions in some people. Cleanliness of the skin and clothing is critical and must be of paramount concerns.
- Fumes are flammable and heavier than air. Proper ventilation should be maintained to minimize breathing of concentrated fumes.
- Suitable respirators should be used during application.
- Safety glasses, gloves and suitable protective clothing must be worn at all times during application.
- If contact with hardeners does occur, remove any clothing involved and flush the skin with flowing water. Discard contaminated clothing. Do not attempt to wash and reuse.
- Cleaning solvents are Acetone, Toluene, Xylene.
- Keep open flames and sparks away from the area where materials are being mixed and applied.
- If a rash occurs, remove the individual from the work area and seek a physician's care for dermatitis.
- In case of eye contact, flush with water for at least 20 minutes and consult a physician.
- If swallowed do not induce vomiting and call a physician immediately.
- Apply a skin lotion containing lanolin or another sort of barrier cream to hands, arms and face prior to working with coating.

Important: DO NOT WASH SKIN WITH SOLVENT to remove coating material. Use soap and water only. Reapply skin lotion after washing.

10.1 Required Safety Equipment

While working with coating:

Respiratory Protection: Gas and Vapor Removing Air Purifying Respirator (Cartridge)

Eye Protection: Chemical Goggles or Face Shield

Protective Clothing: Tyvek or Saranex Suit

Protective Gloves: Natural Latex Rubber or Neoprene

While Spraying Coating:

Respiratory Protection: Full face positive pressure demand type (Supplied Air Mask)

Eye Protection: Same as Respiratory Protection above.

Protective Clothing: Saranex Suit or equal

Protective Gloves: Natural Latex Rubber or Neoprene.

Review all information in the Material Safety Data Sheet prior to using the coating materials.

11.0 *DISCLAIMER*

The information set forth herein is manufacturer's recommended application procedures that must be followed as a condition of the manufacturer's Limited Warranty. Following these recommendations creates no new or additional warranties. All technical data, directions and recommendations are based upon manufacturer's test results and experiences under controlled conditions. All information is subject to change based upon manufacturer's ongoing experience. End user and / or applicator should verify that it has the manufacturer's most recent recommendations before ordering or specifying material. All materials and any technical assistance is given subject to manufacturer's General Condition of Sale and Limited Warranty.

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Appendix A

Contractor/Applicator Acknowledgment Sign-Off Sheet

The undersigned hereby acknowledges that he/she has completely read the most current version of the Advanced Polymer Coatings' Application Procedures for ***ChemLINE*** _____; and acknowledges that he/she understands all aspects of these procedures before the start of the coating/lining project located at

_____

_____.

Signature:

_____
Contractor/Applicator Representative (print)

_____ _____
Contractor/Applicator Representative (signature) Date

Contractor/Applicator Information:

_____
Company Name

_____
Address

_____
Address

_____

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Avon, Ohio 44011 U.S.A.
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Toll Free: 800-334-7193
www.adv-polymer.com

Address

_____

Telephone

Appendix B

RECOMMENDED PROCEDURES

Testing for Oil and Water
Contamination in Air Supply

1.0 MATERIALS

Use dry, white absorbent material, e.g., several layers of cheese cloth or a piece of white blotter paper. The cloth or paper should be at least 8"x10" (20 cm x 25 cm) in size.

2.0 PROCEDURES

2.1 Test air supply downstream from oil and water traps (extractors) and as close as possible to the equipment using the air.

2.2 Hold white absorbing material in the air stream for a minimum of two minutes. The test material should be held within 24 inches (61 cm) of the air stream.

2.3 Examine test material immediately for evidence of oil and/or water contamination. Examination should be made visually as well as feeling and smelling the test material.

2.4 Always test prior to using spray, abrasive blasting, power tool and air drying equipment and at least once every four hours during continuous compressor operation. When relative humidity is high, more frequent testing is required. If compressor operation is interrupted for more than five minutes the air supply should be retested.

2.5 Although oil contamination is not a problem for oil-free compressors, they also must be tested for moisture contamination.

NOTE: Compressed air from a contaminated source must never be used to apply a coating or for abrasive blasting, power tool cleaning or forced air drying. All oil and water shall be removed from the system and the air stream retested.

3.0 TROUBLE-SHOOTING

3.1 Oil contamination can usually be attributed to worn equipment, e.g., worn piston rings. Oil or water located in the lines downstream from the extractors may indicate that the traps are not functioning properly. Clogged filters must be replaced and traps bled frequently. If problems persist, larger traps may be needed or the air compressor needs to be replaced.

3.2 The source of water contamination is from the air itself. The amount of moisture in the air is dependent on the ambient air temperature and relative humidity. The saturation point decreases when the air is compressed, which means that more moisture is in the air volume. Most moisture can be removed by the intercooler and aftercooler of the compressor,

while any remaining condensation can be removed by the in-line extractors. If moisture persists check the water traps and if necessary check the intercooler and aftercooler. Make sure cooling water is on and that drains are not clogged. Increasing cooling water flow may improve the efficiency of the intercooler and aftercooler. If moisture problems remain, installation of a larger water trap may be required.