

## SPECIFICATIONS SECTION 13

### ADHERED PVC SWIMMING POOL LINING SYSTEM

#### PART 1 GENERAL

**1.01** The following base bid is for a **15 year warranted**, UV and Chemical Stabilized 60 mil thick (70 mil with embossing) polyester scrim reinforced, PVC pool renovation membrane with special components providing maximal UV and chlorine resistance, with acrylic stain guard topcoat and is based upon a performance specification. This specification is presented to establish a minimum level of material quality and to define the installation technique, material quality and experience levels required to perform the required work and is not designed to restrict in any way equal competitive bids. It is assumed that all products bid will be in literal compliance with the product and installation specifications in this specification. It is the purchasing agencies' intention to consider any other alternate; non stain guard coated, non printed, standard 10 year warranty reinforced PVC systems designed and proven in renovating commercial pool facilities only as a deductive alternate bid. Alternate systems other than those specified or pre-approved ten days prior to bid must be bid as a deductive alternate to the base bid employing the specified system.

**1.02** The individual components and installation criteria described below consists of a complete polyester webbing reinforced PVC membrane lining to be installed in accordance with these specifications and drawings. Material rolls of reinforced PVC membrane shall be custom fit and fuse welded together using Leister hot air hand welders and machine welders (or approved equal). Termination of the PVC system shall occur as shown on the project drawings. Upon completion, the pool lining system shall provide a waterproof lining of the existing pool over the poly felt complete with all necessary hardware, fittings, attachments, flanges, gaskets and all appropriate pool markings as required by applicable state pool codes. All existing pool markings inside the liner zone shall be replaced with full markings in accordance with state code.

**1.03**

NOTE: PRIOR APPROVAL OF A SPECIFIC PVC MATERIAL DOES NOT ALLOW THE INSTALLING CONTRACTOR TO DEVIATE IN ANY MANNER FROM THE SPECIFIED INSTALLATION METHODS AS OUTLINED IN THESE SPECIFICATIONS NOR DOES IT CONSTITUTE ACCEPTANCE OF ANY DEVIATION FROM THIS LEVEL OF QUALITY OR WARRANTY REQUIREMENTS.

#### **1.02 SUBMITTALS**

A.) Shop Drawings: Show fabrication and connection details for all connections to existing pool structure.

B.) Provide standard catalogue sheets and installation instructions for each item specified.

C.) Provide 2' x 2' samples of PVC Membrane for testing purposes if required, 10.5 oz felt, PVC coated Stainless Steel, countersunk fastener to be employed at flanges, and marking samples and a 1'x 1' sample of the adhesive attaching the PVC to the Felt under layer. Also supply 4 - 2" x 2" PVC to Felt samples for water testing of adhesive bond. Adhesive must hold felt to PVC to felt after a 24 hour water immersion test.

D.) Provide written documentation of project foreman certification.

E.) Contract Closeout Submittals:

1) Provide Care and Maintenance Guide.

2) Provide copy of the supplier's 15-year PVC material warranty. Warranty should completely cover the material against leakage, delaminating, bubbling, pitting, shearing, tearing, cracking or crazing or any material workmanship or defects. The warranty must include the above plus include a 15-year weld warranty on all PVC welding including targets, racing lanes and markings. In the event of failure of the lining system the bidder shall repair or replace the damaged section.

**1.03 QUALITY ASSURANCE**

A.) Pool material supplier and the actual pool membrane manufacturer shall have both been engaged in the manufacture of PVC membranes for use in Swimming Pools for a minimum of Ten Years. Manufacturer shall employ only 100% virgin vinyl throughout the manufacturing process. All PVC membrane components shall be from the same manufacturer to assure compatibility of components and weld ability over time. Products manufactured using recycled materials shall not be allowed.

B.) Contractor must demonstrate a minimum of 15 pools of similar size installed by its staff-utilizing site built PVC reinforced PVC membrane materials.

C.) The foreman provided by the installer shall be certified competent in installing PVC membrane materials by the membrane supplier and shall have a minimum of two years experience welding PVC membranes for pool applications.

D.) The bidder or shall provide enclosed with the bid a full listing of any and all lawsuits from any venue in the United States from any prior customers in which they have been sued by clients. This list is to be notarized and shall list all litigation initiated by clients against the contractor regardless of whether such claims have been settled. Additionally, all bidders shall provide a full written release issued to the bidding agency allowing the bidding agency to discuss prior service and handling of warranty obligations with any prior clients regardless of any prior agreements to limit such discussions.

E.) Pre-Award Material Chlorine Testing. A 2' x 2' sample of the actual material to be employed on the subject project shall be provided for the purpose of testing prior to project award. Sample shall be subjected to a 24-hour chemical resistance test simulating extreme exposure to 100% powdered trichlor chlorine. A small 3" x 3" sample of all products submitted in accordance with these bid instructions shall be placed in a shallow plastic container with water and a ½ teaspoon of 100% trichlor in powder form shall be applied to the surface of each material and left undisturbed for a period of 24 hours. Fading, material condition and durability of the samples shall be evaluated by the owner and shall be used in final evaluations. A sample of actual materials employed on the project may also be tested to confirm the material quality of products actually employed.

F.) Post Installation UV Testing. An important consideration of this proposal is extreme ultra-violet resistance of the primary PVC lining material. The owner may elect to conduct a special UV test on the PVC membrane material actually employed on the project. This material will be subjected to a 4,000-hour Zenon Bulb UV durability accelerated weathering test. If the test results (which will be conducted in an independent lab) demonstrate that the material has been significantly negatively impacted (faded, checked, discolored, burned or deteriorated in any way) by this 4,000 hour Zenon Bulb accelerated weathering test, then the membrane system provider and installer hereby agree to either; replace the liner system with a material that does meet the rigors of the above tests that is acceptable to the owner or to provide a cash payment equaling 50% of the PVC liner portion of the bid on this project. The opinion of the independent testing lab shall prevail and be binding in the event of a dispute in regards to this issue.

G.) Bidders shall initial each item, execute and return the enclosed PVC Liner Bidder Certification and Representation Sheet. Failure to include this sheet properly executed shall invalidate the bid.

**1.04 DELIVERY, STORAGE AND HANDLING**

All materials required for the completion of this project shall be delivered to the project site in a manner designed to prevent damage. No hooks or forks shall be used for unloading. The contractor shall perform unloading of all materials. Materials shall be stored in a flat, dry area in a manner that will not damage them. All materials provided are to be new and in unopened packaging.

**1.05 PROJECT SITE CONDITIONS**

The contractor to a level in accordance with the supplier’s requirements shall prepare project site. All burrs and rough edges shall be ground smooth or covered, pits and voids shall be filled with a vinyl concrete patch compound. All working cracks, expansion joints or voids shall be isolated from the 10.5 oz poly felt layer above by the installation of rigid stainless or plastic strips. All oil and tar must be removed from the pool or covered with appropriate isolation materials.

**1.06 WARRANTY**

The flexible PVC membrane system shall be warranted by the supplier for workmanship, materials, and shall be specifically warranted to not delaminate, pit, crack, require additional sealing, tear, or become structurally unsuitable for it’s intended purpose for a period of 15 (fifteen) years. Additionally, the contractor shall warrant against delaminating at all heat welds at seams and racing lanes for a period of 15 (fifteen) years. In the event the material should become unusable during this period, the manufacturer and installer agree to repair or replace the defective sections.

**PART II PRODUCTS**

**2.01 MANUFACTURERS**

The material manufacturer shall have been engaged in the formulation and manufacture of reinforced PVC membranes for use in commercial pools for greater than 10 years.

**2.02 MATERIALS**

All individual components utilized to renovate the project pool shall be completely compatible with the pool environment and shall be supplied by one supplier as a system to assure compatibility and to assure a single source of responsibility. All PVC membrane components shall be from the same manufacturer to assure identical formulations, weld compatibility, and to ascertain identical product molecular weights. An approximately .3-mil coating of stain guard acrylic top coating shall be factory applied as a topcoat to reduce soiling in the field and to make the liner easier to clean.

Material shall possess an embossed standard slip resistance throughout the pool to provide slip resistance to pool bathers or as required by the owner, and an extra aggressive slip resistant material on steps, gutters and at zero depth entry areas to 2’ deep.

Material Specifications shall be provided meeting or exceeding the following Physical Properties of the specified system.

**RenoSys PVC Pool Membrane  
Typical Material Properties  
Infinity Series**

**Description:** Polyester reinforced PVC membrane Pool Renovation Membrane System. Available in two, easy to clean textures. 15-year warranty.

**Compound:** Extended use 50-year life expectancy Maximal UV resistance, chlorine impervious PVC compounded for the pool environment. Product shall be compounded with permanent plasticizers, UV inhibitors, and antifungal agents and .3-mil acrylic soil resistant top coating.

**Reinforcement:** Non-wicking Polyester scrim fabric 1000 Denier yarn 9X9 per inch count.

**Ref #:** #10233 S06760 60mil Pool Membrane (Infinity Series)

Property		Test Method		Result
Thickness				60 mil
Break Strength				
@	Yield (lbs in)	MD	ASTM D638	181
		TD		161
@	Break (lbs in)	MD		117
		TD		85
			ASTM D751	
@	Yield (lbs. in)	MD		418
		TD		328
@	Break	MD		375
		TD		345
Tear Resistance (lbs)		MD	ASTMD1004	25.0
		TD		26.7
Cold Flex Resistance		ASTM D 2136		Pass -50 C
			1/8th " Mandrel	
Dim. Stability		MD	ASTM D1004 (1 hr 100 Deg. C)	-0.6%
%		TD		+0.2%
Specific Gravity		ASTM D 752		1.235
Water Resistance		ASTM D570		+0.5%
%wt. change				
Puncture Resistance (lbs)		ASTM D4833		123
Delam. Resistance		MD		12.0
(lbs. in)				
UV Resistance		ASTM D 43255		100
(% retained after exposure)				100

### 2.03 SYSTEM COMPONENTS

- A.) Pool lining membrane shall be a flexible 60 mil PVC material fully UV stabilized and reinforced with a scrim consisting of a tightly woven polyester 9 x 9 thread spacing per inch, 1,000 denier thread for puncture resistance. The material colors shall be as follows: Color of walls and floor shall be light blue. Floor shall be light blue in color with stain guard acrylic topcoat protective coating and must be formulated using anti-fungal agents and manufactured specifically for use in the commercial swimming pool environment. An acrylic stain guard coating shall be a factory applied. Acrylic top coating is designed to make surface cleaning easier and to minimize soiling. The material shall be applied with the nonskid/textured side out as required by the owner in the floor area and on all gutter and step areas to provide slip resistance. All welds shall be accomplished with hot air welding. No solvent welding of PVC materials shall be allowed on this project. No double stick Mylar tapes are permitted under the liner on this project. Seams shall be tacked, a continuous air entrapment weld shall be applied continuous on all welds, and then a minimum 3/4" wide weld shall be installed. No burning of the material shall be permitted.
- B.) Racing lanes, targets and marking strips shall be provided by the supplier and colored black. All markings shall be as per local pool code requirements.
- C.) An anti microbial product fully compatible with the PVC membrane shall be sprayed or rolled on under the felt material to discourage microbial growth under the system.
- D.) Adhesives that are not weakened when exposed to water immersion and that are fully compatible and suitable for bonding to the PVC material and the felt layer shall be provided that are designed to chemically bond to the PVC material and to fully attach the Geotextile fabric to the pool walls (and floor where required). NOTE: WALLS AND DIVE HOPPER AND THREE FOOT OF PERIMETER SHALL BE AN ADHERED SYSTEM OVER POLY FELT. All poly felt is

to be bonded to the pool. Additionally all PVC material employed on all pool walls and in dive hoppers shall be fully adhered as a condition of these specifications. Any adhesives that are water-soluble shall not be allowed under the scope of these bid documents to prevent the geotextile fabric from shifting under the membrane. PVC adhesive shall be further designed to be resistant to Plasticizer migration. Adhesive on project shall be water impermeable RenoBond or Nordot 34 only. It is the intention of the owner to have the contractor provide a project where the PVC is fully adhered to the felt on all walls and in the dive hopper area as well as around the pool floor perimeter. No tacking of the PVC wall and floor sections to PVC metal strips is intended under this base bid specification. Alternate non-adhered systems may only be bid as a deductive alternate to the base bid.

E.) An under layer of 10.5 oz felt shall be installed fully adhered with the appropriate adhesive throughout the entire pool.

F.) PVC coated Stainless Steel metal or as required to make for a satisfactory installation termination. Galvanized PVC coated steel shall not be acceptable for use on this project.

G.) Trim poly felt and compress liner around perimeter as detailed in the accompanying installation details.

H.) Flanges at all penetrations shall be constructed of Type I Exterior grade Hard PVC Sheet and custom fabricated, radiused, and drilled as required for use at all membrane penetrations. Flanges will be custom fabricated to fit as close to existing pool fittings as is practical and possible based on substrate conditions around penetrations. All bolts used to fasten any compression bar shall be countersunk to allow for a flush installation. All metal fasteners employed shall be Stainless steel.

I.) 4" to 6" wide Plastic or Stainless Steel 25 gauge plate shall be installed over all active expansion joints and working cracks. Galv. Steel shall not be acceptable.

J.) Caulking shall be installed where required by installation details, and shall be Novagard Underwater Grade Caulk or prior approved equal. Caulking shall only be used at pool penetrations and terminations and shall not be employed for joining seams.

K.) Membrane supplier shall provide complete care instructions, PVC underwater patch kit, warranty certificate and spare material as might be required. Owner's agent is also to be trained in the proper method of repairing the membrane as a part of this installation.

## **PART III EXECUTION**

### **3.01 EXAMINATION**

Installation crew shall inspect the pool surface at the beginning of the project and shall advise owner as soon as practicable of any existing conditions which might affect the satisfactory installation of the pool membrane lining product.

### **3.02 PREPARATION**

The pool shall be prepared for the installation of the membrane in accordance with the supplier's technical data and these specifications.

### **3.03 INSTALLATION AND APPLICATIONS**

A.) Installation shall be performed by installers certified competent by the supplier whose experience is fully in compliance with the terms of these specifications. The PVC membrane installation shall be completely supported by the structural walls in all respects. The material shall be completely supported by structural walls at all corners and wall/floor junctures before the pool is filled. Due to the inordinate stress induced at seams, and fittings by water pressure stretch fitting- in no case shall gaps, voids or spaces be allowed behind the membrane before water is added.

B.) The installation procedures employed in the execution of this project are to be fully in accordance with the supplier recommendations and current Technical Data. If any terms or conditions of this contract contradict recommended procedures of the manufacturer or supplier, work will be performed in accordance with manufacturers and supplier requirements however

written notice of any variances from these specifications must be provided to the project architect in advance of any actual work performed in the field.

C.) Work is to be performed as follows:

- a) Prepare pool surface as per specifications and suppliers recommendations.
- b) Span any cracks or voids with Stainless Steel sheet 25 ga. or 1/8th inch hard plastic plate and pin in place with appropriate fasteners.
- c) Apply sanitizing agent.
- d) Apply adhesive to pool walls and floors where required and attach 10.5 oz poly felt to all walls and floor. Trim at compression fittings.
- e) Apply poly felt material throughout pool with water insoluble adhesives.
- f) Install Stainless Steel coated PVC Steel where required.
- g) Apply PVC membrane to pool as detailed in the plans and overlap weld (allowing a 2" overlap) with a minimum 3/4" wide weld. All hand welding is to be performed with a Leister hot air welder. No Solvent welding, glue welding or THF Swell agent welding is permitted on this project. No voids at wall/floor junctures shall be permitted in this installation. No double stick tapes are permitted.
- h) Provide PVC markings, targets, racing lanes, logo etc. as required and directed by plans and code. End Targets shall be fully bonded to the wall.
- i) Attach Compression flanges and gaskets as shown on the drawings or in accordance with supplier's recommendations. Bolt spacing shall not be greater than 3" O.C. All fastener heads shall be countersunk.
- j) Prime and caulk the perimeter termination and wherever else required to make for a suitable and proper watertight fitting.
- k) Inspect all seams in the pool with a roofing probe to ascertain that there are no false welds, pinholes or missed areas. Seal all seam edges with edge sealant if required in installation bulletins.
- l) Broom clean pool and surrounding deck area. Remove any marks or dirty spots. Remove all trash and debris to the owners dumpster.
- m) Provide a service and care session of approximately one hour with the owners designated agent. Provide patch kit, care instructions in a written format, plus 100 square feet of color matched patch material.