

# **CSI Master Format Written Performance Specification for New Myrtha Pool Installations**

**2018**



SECTION 13100 – PREFABRICATED MYRTHA SWIMMING POOL

Rev. Date: January 01, 2018

PART 1 - GENERAL

1.00 DEFINITION

- A. Myrtha Pool: A Myrtha Pool is a custom manufactured product based around the proprietary process of hot calendaring rigid PVC sheets to modular stainless steel self supporting panels.

1.01 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide pool manufacturer's standard and/or custom components and assemblies integrated into a complete system that forms a pool capable of withstanding imposed structural loads, thermally imposed movement, and deterioration from pool chemicals, ultraviolet radiation, weather, site, seismic and service conditions at a minimum as specified in this Article.
- B. Structural Performance: Provide wall panels, structural supports, structural connections capable of withstanding the effects of soil (backfill) pressures, hydrostatic loads and resulting stresses within the limits of the design without leakage and under the specified conditions. Under said stresses the maximum allowable horizontal deflection will be 1/250 of the height of the structure, not to exceed 4mm.
- C. Penetration for wall and floor Systems: Provide wall and floor assemblies manufactured and installed with no water leakages through the system. PVC shall be continuous across connections between wall panels, between wall panels and floor membrane, and across joints between sections of floor membrane.
- D. Sustainable Criteria: Show proof of reduced carbon footprint by a minimum of 30% below conventional construction methodologies; as well as repeatable verification of receiving LEED Certification Gold Level or higher.
- E. Structural Performance: Components shall be structurally independent and capable of withstanding the most extreme seismic conditions prescribed in the current building code; as well as being capable of overcoming limited differential settlement due to deficient soil characteristics.

1.02 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who has specialized experience in erecting and installing work similar in material, design, and extent to that indicated for this project and who is acceptable to manufacturer by having the following characteristics:
1. Has successfully completed five (5) projects similar in type.
  2. Has successfully completed the manufacturer's annual training program referred to as "Pool Academy".
    - a. Exception: In lieu of the required number of projects, installer may engage one or more manufacturer-endorsed master installers with a minimum completion of 20 successful projects similar in type.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing pools similar to those indicated for this Project and with a record of successful in-service performance.
1. **ISO Registration:** Firm shall provide ISO 9001 certificate or provide the following:

- a. Evidence of successful-audited QA/QC program.
  - b. Test results in accordance with Section 2.04 "TOLERANCES & QUALITY CONTROL"
  - c. Design of all specific components in relation to each other shall be completed in a three dimensional integrated modeling software to ensure to system coordination with the pool and / or building components.
2. Has successfully manufactured a minimum of 30 projects with a minimum of 50 bodies of water which have been installed within the past 5 (five) years that are similar to the proposed project.
- C. Source Limitations: Obtain all prefabricated pool systems through one source from a single manufacturer.

### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Deliver components and other manufactured items so as not to be damaged or deformed. Package small components together in crates or containers to prevent loss of small items. Package hazardous and/or sensitive materials together and clearly labeled to indicate use of caution or extra attention is required. Finished panels shall be covered with continuously applied adhesive-fixed protective layer to prevent damage to panel surface. Bundle and secure components to prevent scattering and damage to other materials during shipment.
- B. Storage:
- 1. All pool components shall be stored and staged with sufficient site safety and security to ensure damage or losses from vandalism, theft, and weather do not occur. Stack non-structural materials on platforms or pallets, covered with tarpaulins or other suitable weather tight and ventilated covering. Store underlayment and boxed items to ensure dryness. Do not store any plastic components in contact with other materials that might cause staining, denting, or other surface damage, or in direct sunlight.
  - 2. Store hazardous materials as follows:
    - a. Store in a climate controlled environment within temperature ranges specified by product manufacturer.
    - b. Keep out of direct sunlight.
    - c. Store away from open flame or sources of heat.
    - d. Comply with applicable safety regulations governing hazardous material storage and handling.
- C. Handling: Unload, store, and erect manufactured pool components to prevent bending, warping, twisting, and surface damage.

### 1.04 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit according to manufacturer's written instructions and warranty requirements. Various phases of installation may have differing requirements.
- B. Field Measurements: Prior to commencement of installation, site conditions shall be approved in writing by installation contractor as specified in Part 3 "Installation". As projects may be phased, installation contractor shall only approve those portions of the project ready for pool installation.
- C. Concrete Surfaces: Shall be within design tolerances and have at a minimum a broom finish. At all times concrete floor shall be protected from oil, paint, solvents, etc. Installation contractor and manufacturer shall be notified in writing if such items do come in contact with concrete floor. These items shall be remedied as required by manufacturer at Contractor's expense.

#### 1.05 WARRANTY

- A. Special Warranty on Prefabricated Pool System: Written warranty, executed by manufacturer agreeing to repair or replace pool system components provided by manufacturer that have failed and/or directly result in leakage of the pool. The manufacturer and / or their authorized distributors warrant that the provided materials will be free of defects when used and maintained in accordance with Seller's recommendations. Warranty is further limited to include material replacement only and does not cover water, chemicals or labor. Further requirements of the warranty are contained within the Certificate of Guarantee provided by A&T Europe SpA.
  - 1. Warranty Period: Water-tightness and structural integrity twenty five and ten years from date of Substantial Completion, respectively. Plastic grill structural integrity one year from date of Substantial Completion, (see manufactures warranty).

### PART 2 - COMPONENTS

#### 2.00 STRUCTURAL ELEMENTS

- A. Primary components (wall panels and gutters) shall be fabricated by cold working from AISI 441 stainless steel sheet or standard shapes.
  - 1. Wall Panels: Panels fabricated from cold-worked PVC laminated steel (14ga (2mm) steel sheet minimum). Panel construction shall provide for flanged-bolted connections with compatible steel with no through-panel fasteners below tile line. Flange bolt spacing shall not exceed 6" without utilizing flange stiffening element. Wall panels will have a protective plastic film on the interior face (water side) of the panel that will be removed during the installation process, before the pool is filled with water. Wall panels will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.
  - 2. Gutter: Channels fabricated from cold-worked PVC laminated steel (14ga (1.5mm) steel sheet minimum). Gutter construction shall provide for flanged-bolted connections with compatible steel between gutter segments. Gutter splice plates are not permitted. Gutters/gutter supports for tile finished gutters shall be constructed with permanent adjustment system to level gutter at skim line prior to installation of tile (floating of tile on gutter or adjustment of coping over 1/8" to obtain level skim is not permitted). Gutters will have a protective plastic film on the interior face (water side) of the gutter that will be removed during the installation process, before the pool is filled with water.

Gutters will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.

- B. Secondary components (base frames, panel supports, buttresses, gutter supports, concrete anchors, and miscellaneous hardware) shall be grade AISI 470, A2 or ANSI 316 stainless steel (minimum) and may be fabricated by hot-working as required.
1. Base Frames: 'C'-shaped sections fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Frame construction shall ensure tight horizontal tolerance and allow for vertical adjustment to compensate for variations in finished concrete.
  2. Panel Supports: Panel supports fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Flanges, connection plates, and stiffening elements shall be fabricated by cold-working (no steel welding is permitted).
  3. Buttresses: Structural braces fabricated from 14ga (2mm) steel sheet minimum. In lieu of fabrication from cold-worked sheet, buttresses may be fabricated from hot or cold formed standard angle, c, zee or other standard section provided all additional flanges, connection plates, and stiffening elements are fabricated by cold-working (no steel welding is permitted).
  4. Gutter Supports: Brackets fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Gutter supports shall be fabricated integrally with panel supports or separately provided gutter support construction provides for bolted connection to panel supports.
  5. Gutter Drain Flanges: Flanges fabricated from hot or cold formed steel. Flanges may be secured to gutter or gutter drain manifold by steel welding. Flanges shall be fabricated to connect to standard PVC flanges. Gutter drains placed in accordance with the architects drawings. No flanges in the gutters is permitted; this would obstruct the free flowing of water into the drain.
  6. Structural Accessories: Anchors, Rods, Bolts, Nuts, and Washers shall be Grade AISI A2 stainless steel minimum.
  7. Raw Steel Components: Hand Rails, Grab Rails, Risers, etc. that are exposed to water directly will be ANSI 316 minimum.
  8. Chemical Anchor capsules shall be in accordance with ASTM E 1512.
- C. PVC-Coated Stainless Steel Plate shall be constructed from PVC coated stainless steel sheet (or blanks) manufactured by hot calendaring PVC to the stainless steel sheet. The bonded PVC shall withstand tensile (de-lamination) force of 27 lbs (120 N) on a sample if 1" at 180° angle de-lamination.
- D. Fabricate elements to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

#### 2.01 PVC MEMBRANE

- A. Floor Membrane: PVC floor membrane shall be a fiberglass reinforced PVC geo-membrane (chemically coated fabric) with the following properties:
1. Minimum thickness of 1.5mm in accordance with ASTM D 374.

2. Water absorption by ISO 62 methodology #1 < 1% of mass.
3. Minimum resistance to deformation > 100 lb / inch (900 N / 50 mm).
4. Yield strength > 285 lb / inch (2,500 N / 50 mm)
5. Minimum resistance to tearing of > 100 lb (450 N) in accordance with ASTM D 1004.

## 2.02 ACCESSORIES

- A. Line Anchors: Shall be designed and fabricated to withstand forces specified by floating line manufacturer or by recognized swimming authority. Line anchor construction shall utilize third party bracing elements (not solely supported by wall panel) and/or utilize pool structural system to provide resistance to service forces (line anchors secured only to wall panels are not permitted).
- B. Gutter Mounted Elements: Shall be designed and fabricated to withstand forces specified by accessory manufacturer and/or recognized swimming authority in addition to those service conditions specified by governing code officials. Exposed steel shall be polished stainless steel. All components shall be designed to be flush and there shall be no protrusions of any kind that could potentially produce a tripping hazard
- C. Bottom Drains: Shall be fabricated from cold worked PVC laminated steel (14ga (2mm) minimum) and/or rigid PVC to facilitate PVC membrane welding at drain edges or fabricated from sheet steel having 16ga (2mm) minimum thickness be equipped with a steel flange, counter flange, two gaskets, compatible fasteners designed to prevent seizing. Drains shall be designed and fabricated to facilitate monolithic concrete slab or block-out type installations and concrete bonding. Drains shall be equipped with grounding lugs or holes for connecting grounding wiring. All sumps shall be in conformance with ANSI/APSP-16 2011.
- D. Grab Rail Anchors: Grab rails penetrating PVC shall be anchored with PVC anchors mounted in concrete. Anchors shall be designed and fabricated to withstand required loads and facilitate simple removal and replacement of the grab rail without damage or part replacement. Grab rail and grab rail anchor sizes shall be coordinate to ensure compatibility.
- E. Grab Rails: Shall be fabricated from polished stainless steel having outside diameters as noted on drawings. Grab rail and grab rail anchor sizes shall be coordinate to ensure compatibility.
- F. Gutter Grills: Grills fabricated in multiple-interchangeable segments out of polypropylene. Grills shall be fabricated with buffers or slats parallel to pool edge to limit deck splash-over. Grills shall have an anti-skid surface meeting local code requirements.
- G. Soft-Walk PVC Mesh: PVC mesh [Poly Extruded Matting] is a heat and pressure bonded, non-woven, flexible plastic material with superior tear strength (350psi: ASTM D-624-91), low brittleness in cold weather climates (ASTM D-746-79), significant tensile strength (2190psi: ASTM D-412-92), and contains admixtures to prevent microbial growth.
- H. Track Start Blocks: PVC-U rigid block built around Omega Track Start Platform. Anti-skid surface measuring 74cm by 52 cm. The Omega top has an adjustable fin to allow for more aggressive starts. The block is anchored with a 6 bolt pattern and quick release plate for ease of use. Customizable colors and patterns.

## 2.03 TOLERANCES QUALITY CONTROL

- A. Manufacturer shall present certificate of ISO 9001 registration or the following:
1. Manufacturer will employ an independent testing agency chosen by Contractor to perform source quality-control testing and special inspections, and to prepare test reports.
    - a. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
    - b. Manufacturer shall allow testing agency access to places where structural/primary components are being fabricated or produced, and cooperate with testing agency and provide samples of materials as may be requested for additional testing and evaluation.
  2. Manufacturer shall correct deficiencies in or remove and replace primary components that inspections and test reports indicate do not comply with requirements.
  3. All manufacturing shall be done to millimetric precision with a net result of -0.000 meters +0.001 meters dimensionally
  4. All recirculation components (i.e. – gutter drop-outs, inlets, etc.) shall be designed using static computational fluid dynamics models to ensure appropriate dispersion of chemicals. In addition, the model shall demonstrate no significant disturbance to the swimmers in the active lanes for competitive pools.

## PART 3 - INSTALLATION

### 3.01 PREPARATION

- A. Site Conditions: Installation contractor shall confirm in writing suitability of project site to proceed with installation.
1. Field Measurements: Construction of the pool foundation and floor shall be coordinated and confirmed upon completion. A final survey will be conducted by installation contractor. A drawing and/or report of their findings shall be submitted for review. Deficiencies in any of the areas listed below shall be identified along with other applicable information. The installation contractor along with the manufacturer shall note in writing any possible recommendations for correction of deficient conditions and advise of possible delays and additional costs that may result as soon as possible, specifically considering the following:
    - a. World and relative placement of pool foundation
    - b. Horizontal line
    - c. Elevation
    - d. Concrete finish

### 3.02 TANK INSTALLATION

- A. Install pool system according to manufacturer's written instructions and installation drawings.
- B. All mud and dirt shall be swept or washed from concrete floor. In addition, oil paint and solvents shall be cleaned and surfaces treated to prevent contact with PVC components.
- C. Install grounding for steel components according to applicable articles and governing codes.

- D. Prior to component installation, all primary components shall be inspected for damage or defect. Do not install damaged or defective components. Notify pool manufacturer immediately of any damaged or defective components.
- E. Do not field cut, drill, or alter primary members without written approval from pool system manufacturer.
- F. Set primary and secondary components in locations and to elevations indicated and according to manufacturer's written specification. Maintain structural stability of pool during installation.
- G. Ensure all basic recommended manufacturer's torque requirements for bolted hardware and connections are followed during manufacturing process.

### 3.03 WATERPROOFING

- A. General: Install uniform-watertight PVC seals.
  - 1. Wall panel sealing shall be performed according to manufacturer's written instructions.
  - 2. Mechanical (welded PVC) and chemical seals shall be applied within temperature and climatic ranges specified by manufacturer.
- B. Mechanical Seals:
  - 1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent.
  - 2. Welded components to the panel will be applied in a manor to ensure good bond, free of exposed scorching, and free of substrate blisters and wrinkles.
  - 3. "Hot Welding" shall be performed using manufacturer's approved components and procedures.
- C. Chemical Seals:
  - 1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent.
  - 2. Avoid application of harsh chemicals and primers on exposed-finished PVC.
  - 3. Apply liquid PVC in thin layers to prevent forming of bubbles in curing PVC. Seal layers shall be free of such bubbles.
  - 4. Install PVC rigid profiles at all panel joints utilizing manufacturer's approved "Cold Welding" techniques.

### 3.04 PVC MEMBRANE INSTALLATION

- A. Install membrane according to manufacturer's written instructions and installation drawings.
- B. Prior to permanent fixing or welding, PVC membrane shall be inspected for visible defects or blemishes. Do not install damaged or defective membrane. Notify pool manufacturer immediately of any damaged or defective membrane.



- C. PVC membrane shall be stretched both longitudinally and transversely to prevent wrinkles from forming. Wrinkled PVC membrane shall be removed and replaced.
- D. Seams:
  - 1. All seams in membrane and connections between membrane and wall panels shall be heat continuously welded a minimum of 38mm (1½"). Heat welding devices explicitly designed for PVC membrane welding shall be utilized for welding. Welds shall be spot checked per manufacturer's written instruction prior to final seam sealing.
  - 2. PVC weld seams shall not extend into flanged accessory connections. Utilize secondary PVC section to provide uniform surface for flanged connections.
  - 3. Exposed PVC membrane edges shall be sealed with liquid PVC or by heat sealing according to manufacturer's written instructions.

### 3.05 ACCESSORIES INSTALLATION

- A. General: Install accessories according to accessory manufacturer and pool manufacturer's written instructions and installation drawings and install grounding for steel accessories according to applicable articles and governing codes.

### 3.06 ERECTION AND LOCATION TOLERANCES

- A. Horizontal Line: Face of pool at pool edge shall remain within +/- 1/8" of designed dimensions.
- B. Structure Elevation: Elevation of wall system below tile or coping shall remain within +/- 1/8" of required elevation to achieve finished pool water level.
- C. Finished Skim Elevation: Finished elevation of skimming tile or coping shall remain within +/- 3/32" of specified pool water level.

END OF SECTION 13100





*Rely on it.*

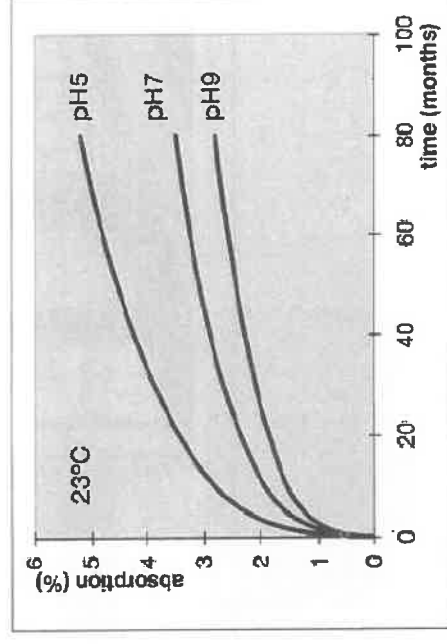
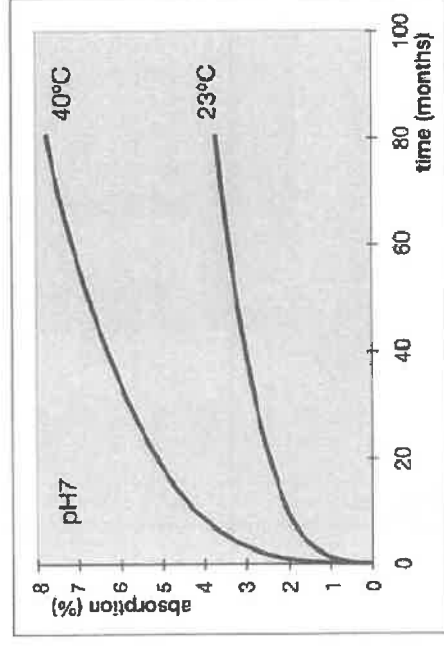


**MYRTHA EVOLUTION, a glass fibre reinforced swimming pool membrane**

innovative | highly valued | cooperative | open-minded

## Humidity absorption

Plasticized polyvinyl chloride (PVCp) absorbs humidity, which explains why a swimming pool membrane has the tendency to expand. This will depend largely on the water treatment conditions (pH, chlorine level, temperature,...), as shown in the graphs below. In extreme cases, humidity absorption as high as 30% of the weight of the membrane has been measured. This corresponds with about 10% linear expansion for an unreinforced PVCp liner or about 1% linear expansion for a polyester mesh reinforced membrane.



## Thermal dilatation

A material will also expand when it is heated.

$$\Delta L = L_0 \times \alpha \times \Delta T$$

$\Delta L$  = linear expansion (mm)

$L_0$  = original length (m)

$\alpha$  = linear expansion coefficient (glass : 0.01 PVCp, PET : 0.17)

$\Delta T$  = temperature change (°C)

Exemple :

for a temperature increase of 10°C, 10 metres of membrane will expand :

1 mm if reinforced with glass fibre mesh

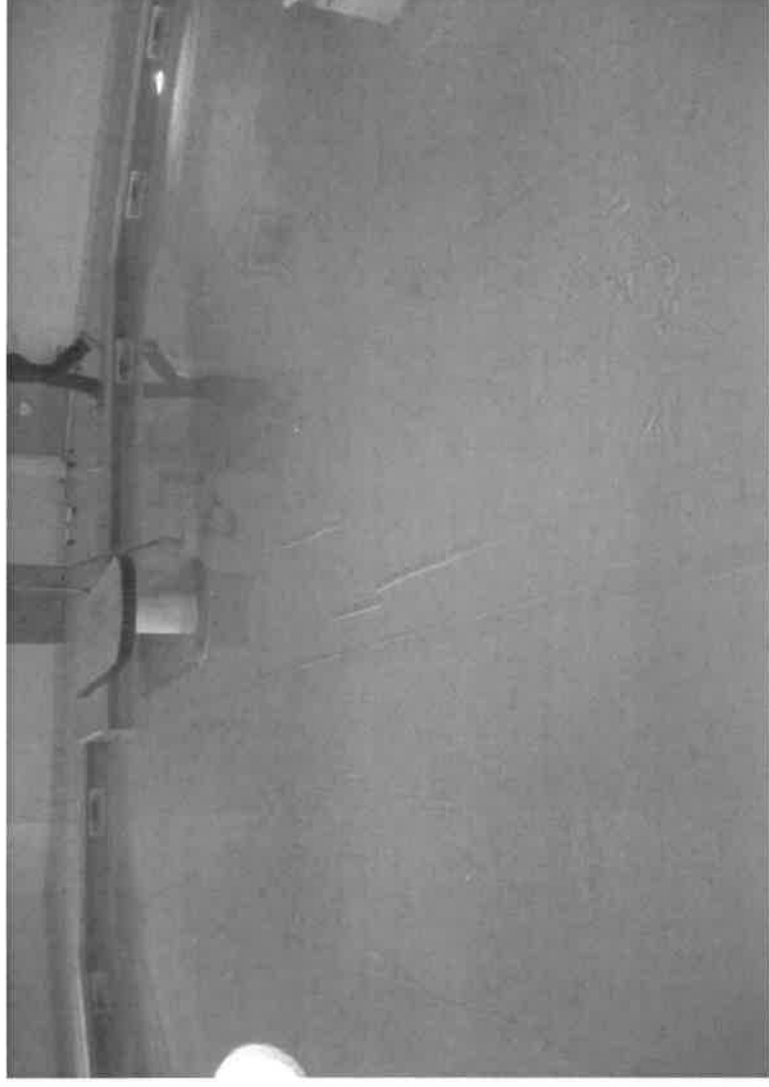
17 mm if reinforced with PET mesh

## Folds

PVCp will also gradually lose some of its plasticizer, which partially compensates for the tendency to expand. Still, the general tendency is that the swimming pool membrane will want to expand.

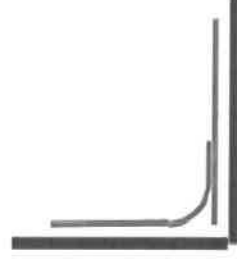
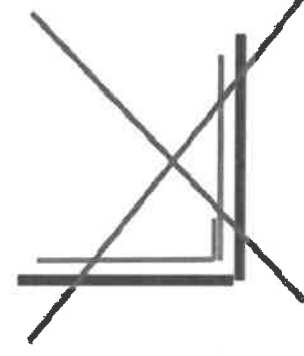
In a normal situation, the enormous weight of the pool water will keep the membrane on its place.

If however there is an infiltration of (ground)water behind the membrane, then it is likely that the membrane will slip over the pool floor and form some folds.



## Underdimensioning

For relatively small swimming pools, the membrane can be slightly underdimensioned by making curves in stead of following the structure in the angles and corners (see pictures below).



For bigger pools, the effect of underdimensioning in the angles and corners, is rather limited.

Sometimes infiltration of some water behind the membrane is difficult to avoid. Then it becomes crucial to dispose of a swimming pool membrane with a high resistance against expansion.

## Glass fibre reinforcement



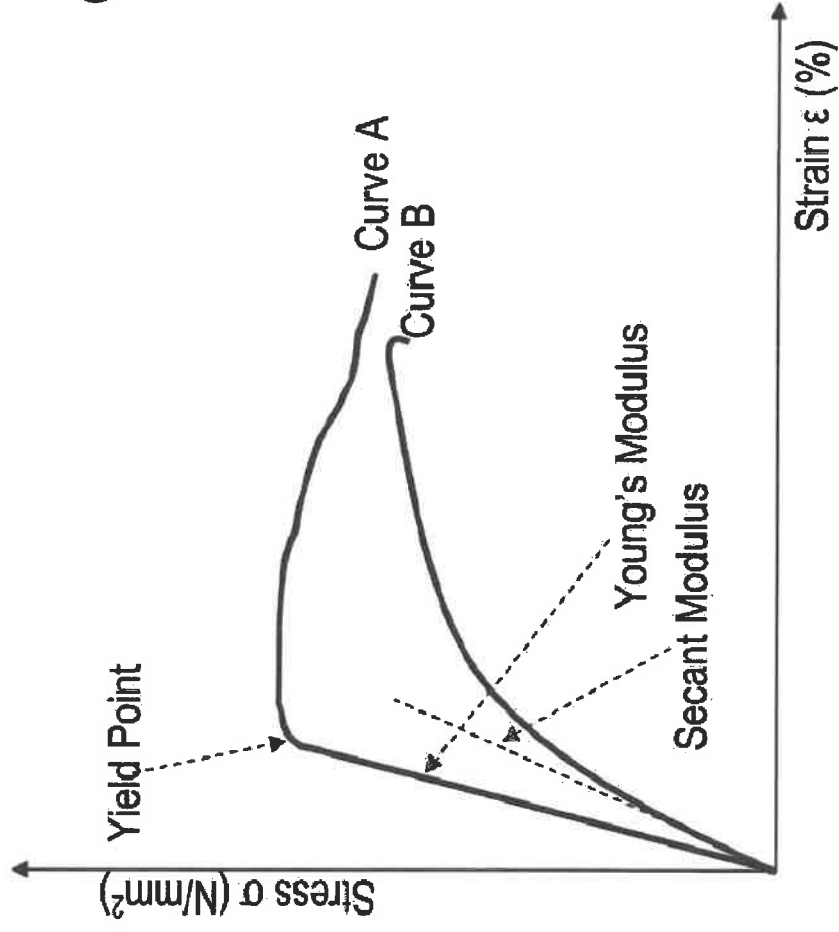
- The thermal expansion coefficient is 17 times lower for glass than for plastics
- The 1-2% Secant Modulus (Young's modulus) is 6 times higher for glass than for polyester

Kind of Fiber	Density g/cm <sup>3</sup>	Tensile Strength		Elongation at Break %
		N/110Tex	N/mm <sup>2</sup>	
Polyester Tire Yarn	1.38	91	1150	13
Glass E-glass	2.54	95	2200	4.0
Steel Tire Cord	7.85	34	2400	1.7

(110Tex is 0.11 g/m)



# Stress-strain curve



Curve A : elastic material (glass, steel)

Curve B : plastic material

# MYRTHA EVOLUTION



Reinforcement		PET 3X3 110 Tex	glass mat 110 gr/m <sup>2</sup>	glass grid 3X3 272 Tex
1-2% Secant modulus	EN 12311-2 A	100 N/50 mm	300 N/50 mm	900 N/50 mm
Yield strength md/cd	EN 12311-2 A	1200 N/50mm	700 N/50mm	2500 N/50mm
Elongation at yield	EN 12311-2 A	no yield	2 %	2 %
Elongation at break	EN 12311-2 A	19 %	150 %	150 %
Tear resistance	EN 12310-2	270 N	200 N	450 N
Dimensional stability	EN 1107-2	<0.5 %	< 0.2 %	<0.1 %
Resistance to foldability at low temperature	EN 495-5	-25 ° C	-20 ° C	-20 ° C



## Myrtha Pools USA Inc.

One Sarasota Tower  
2 N. Tamiami Trail, Suite 306  
Sarasota, Florida 34236  
Tel: (941) 955-2591 Fax: (941) 955-0862

July 25<sup>th</sup>, 2013

Re: **Myrtha Pools USA Technical Memorandum**  
Proprietary Evolution Membrane

To Whom It May Concern:

Myrtha Pools USA and our parent company A&T Europe developed our proprietary Evolution membrane with our partner Renolit, the world's leading membrane manufacturer. The system was intended to improve upon the characteristics of the industry leading Alkorplan T-2000 (our previous technology). The result was the most durable membrane available in aquatics. Evolution is reinforced with woven fiberglass and has virtually no stretch and incredible tear resistance. It consists of sandwiched layers of chemically resistant PVC around a fiberglass core. An additional resin layer is applied to the surface and an anti-fungal treatment to the bottom to provide even additional chemical, UV, and fungal resistance. Evolution is not available from any other supplier and can be used exclusively with the Myrtha Pool system.

Standard cleaning procedures for vinyl liners can be applied to all Myrtha components. However, equipment with protruding or sharp metal edges should be avoided; as well as the use of any solvents. Additional information regarding standard procedures for start-up, preventative maintenance and general cleaning can be found in the attached operation and maintenance manual. Myrtha Pools has an industry leading 15 year structural and water tight manufacturer's material warranty and all of our primary surface components are designed to last 20 to 25 years plus in outdoor installations and greater in indoor installations.

I have included the following excerpt from the standard Myrtha Performance Specifications regarding the Evolution membrane to clarify all of the technical characteristics.

### 2.01 PVC MEMBRANE

A. *Floor Membrane: PVC floor membrane shall be a fiberglass reinforced PVC geo-membrane (chemically coated fabric) with the following properties:*

1. *Minimum thickness of 1.5mm in accordance with ASTM D 374.*
2. *Water absorption by ISO 62 methodology #1 < 1% of mass.*
3. *Minimum resistance to deformation > 100 lb / inch (900 N / 50 mm).*
4. *Yield strength > 285 lb / inch (2,500 N / 50 mm)*
5. *Minimum resistance to tearing of > 100 lb (450 N) in accordance with ASTM D 1004*

Should you have any questions related to these remarks, I may be reached by telephone at 941-350-3286 or email at [jireland@myrthapoolsusa.com](mailto:jireland@myrthapoolsusa.com). Thank you very much for your consideration.

Sincerely,

John E. Ireland, PE, LEED AP  
Director of Technical Services

cc: File

