



**Your Best Pool Liner Solution**



**Technical Pamphlet**

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Haogenplast Ltd.





Valued Customer,

**Haogenplast** is a global leader in the development, manufacture and supply of premium quality PVC products. I'd like to thank you personally for your interest in our products.

Since the Company's establishment in 1952, we have earned a solid reputation for our extensive experience and knowledge in the areas of PVC calendaring, lamination, and printing services.

Our vision is based on the four cornerstones of our business: **Quality assurance, development of superior solutions for niche requirements, flexibility towards our markets' needs, and warm relationships with our all of our business partners (customers, suppliers).**

At **Haogenplast**, we continually look to the future. As our base of satisfied and returning customers continues to grow steadily, we are investing significant resources to increase our capacity, quality and capabilities in all areas. In 2013, we introduced a new lamination unit to the line, and in 2015 a new calendaring unit was added. With a dedicated, well-equipped, in-house R&D department committed to the development of new, cutting-edge products, our team of keen scientists work to develop the newest generation of exceptional, innovative products that are designed to meet all of your needs.

We believe in business excellence and in providing our customers with superior products and exceptional service. We are confident in our knowledge, our capacity for creativity and ingenuity, and our ability to expand our product range and service flexibility to provide you, our valued customers, with the best solutions available on the market today. So go ahead and challenge us with your specific product requirements – you'll simply discover what we already know: We have the best solution for you, and we truly appreciate your business.

Sincerely,



Oren Zveda  
Chief Executive Officer  
Haogenplast Ltd.



## PROFLEX SWIMMING POOL LINERS

**Haogenplast** is one of the world's leading manufacturers and suppliers of superior, award-winning PVC Swimming Pool Liners, renowned for both unsurpassed quality and a wide range of advanced features.

A variety of decorative films, all easy to clean and smooth to the touch, are available in a wide range of contemporary designs and colors with high print quality and a superior finish.

**Haogenplast's** four specialized pool liner products meet the Standard Specifications (NF 5 54-803-2,) EN 15836-2-2011, and are available in the following classifications:

- **Unicolor** - A solid-color pool liner comprised of two layers for a high level of protection against environmental exposure
- **Unicolor with lacquer** - A unicolor pool liner with a lacquer coating that offers a strong barrier against UV exposure, plasticizer loss, microbial damage, and resistance to stains such as suntan oils, calcium deposits, and organic materials
- **Printed** - A high-quality pool liner available in wide variety attractive colors and prints
- **Anti-slip** - An innovative pool liner with heavy-duty anti-slip properties

Our **PROFLEX** Liners will transform your pool – providing a new and improved look, a more comfortable feel, better and long-lasting protection from the elements, lower maintenance requirements, fewer issues and, most importantly, peace of mind. Coupled with our commitment towards the customer's needs, budget and schedule, we offer our customers a winning combination that's hard to beat.

## PACKAGING – WEIGHTS AND SIZES

### 1 standard roll (printed or solid)

- **Length:** 25 r m
- **Width:** 165 cms for printed ,and 165 cms or 205 cms for solid liners.
- **Thickness:** availably in 1.5 mm or 1.20 mm
- **Weight for thickness of 1.5 mm 1 sqm – 1850 gr.**
- **Packaging:** 1 pallet – 12 rolls
- **Packaging** - one 20 f container - 10 to 12 pallets.

### 1 standard anti slip roll

- **Length:** 10 r m
- **Width:** 1.65 cms
- **Thickness:** 1.5 mm
- **Sold by single roll**

### Liquid PVC

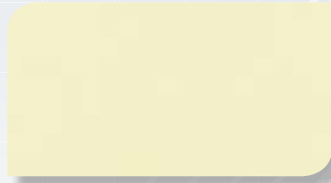
- **1 can:** 0.26 gallon / 1 liter



# Proflex Colors



2028



3152



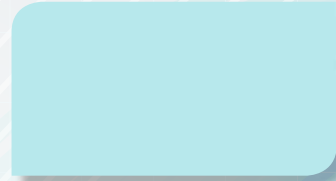
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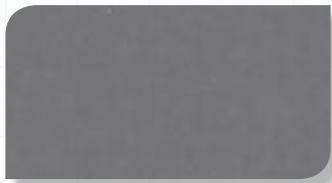
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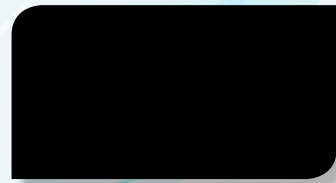
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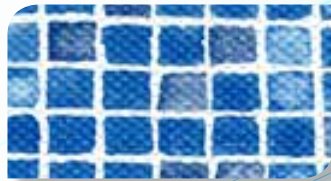
9135



9902



Anti Slip 3144



Anti Slip Mosaic



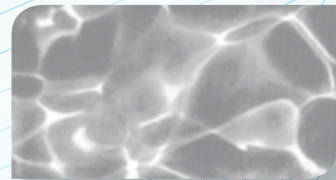
Anti Slip 8273a



Blue Marine 8287



Galit 3



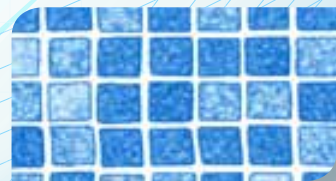
Galit 5



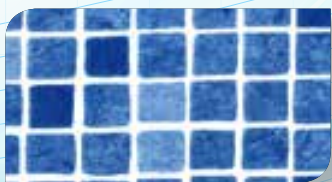
Granit 1



Granit 2



Mosaic 3



Pacific 1



Snapir 3



Snapir 5



Snapir 6



Snapir Gold

# 10 Reasons to Choose PROFLEX Swimming Pool Liners by Haogenplast

1. **Excellent Resistance to Microbial Growth**
2. **U.V Stability & Color-Fastness**
3. **Hot-Air Welding Strength**
4. **Excellent Abrasion Resistance**
5. **Resistance to Super-Chlorination**
6. **Superior Lacquered Liners**
7. **Liquid PVC (Membrane Seal) – New and Improved**
8. **ElvaFlex - Extreme Lifespan & Durability to Chemicals**
9. **Superior Quality Assurance Processes**
10. **Haogenplast Certifications**

## I. Excellent Resistance to Microbial Growth

PROFLEX Liners are designed and manufactured to be long-lasting and durable. This means they need to be resilient against a variety of tough conditions. One such condition is exposure to microorganisms.

PROFLEX Liners' effectively inhibits growth on the liner surface of microorganisms, such as the algae, mold and mildew often prevalent in pool systems. Laboratory tests\* show that Haogenplast's PROFLEX Liners exhibit superior resistance (absence of pink stains) to microbial attack.

The photos below confirm the test results: PROFLEX liners show a complete absence of the pink stains caused by microbial attack, compared to clearly evident staining on the untreated liners. Samples included new liners and those that sustained 'outdoor & UV-accelerated wear'.

Strong pink stains  
(originally grey liner)

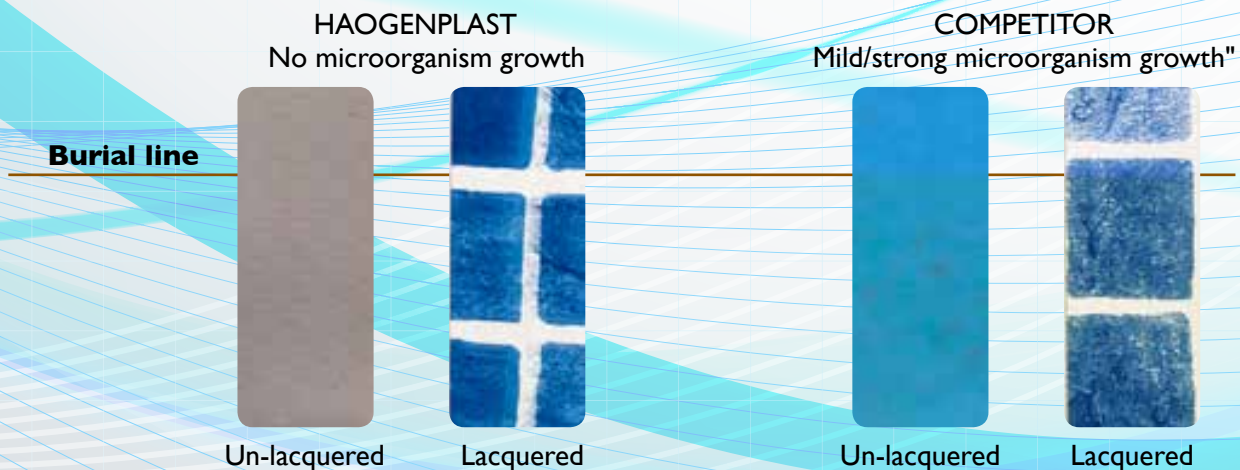


No pink stains



Burial tests were used to simulate the superior resistance of PROFLEX liners under long-term exposure to microbes. In these tests, both lacquered and un-lacquered PROFLEX Liners showed superior performance when compared to their European competitors:

### Burial Test Results:



\*Tests were in accordance with accepted testing standards EN 4892-3 Method A and EN 15836 EN ISO 846 Method D

## 2. U.V Stability & Color-Fastness

Our **PROFLEX** Liners have been developed to withstand the elements over time. In General, PVC lining material loses elasticity with prolonged exposure to the outdoors and to UV rays. This loses elasticity and color shade with prolonged may eventually lead to cracks, which then affect the sealing properties of the lining. It's the kind of challenge our R&D scientists relish as they strive to design and create products that defy this weathering process. To that end, the **PROFLEX** Liners are an unmitigated success.

In color-fastness tests\* where printed sample liners undergo Temperature/Humidity/UV-accelerated aging to simulate prolonged exposure to the elements, **our PROFLEX Liners consistently outperformed the European competitor, showing little loss or change in color fastness over time, where the leading competitor showed significant loss of color. In fact, our PROFLEX liners' color persisted more than 2.5 times longer than that of the competitor's product tested.**



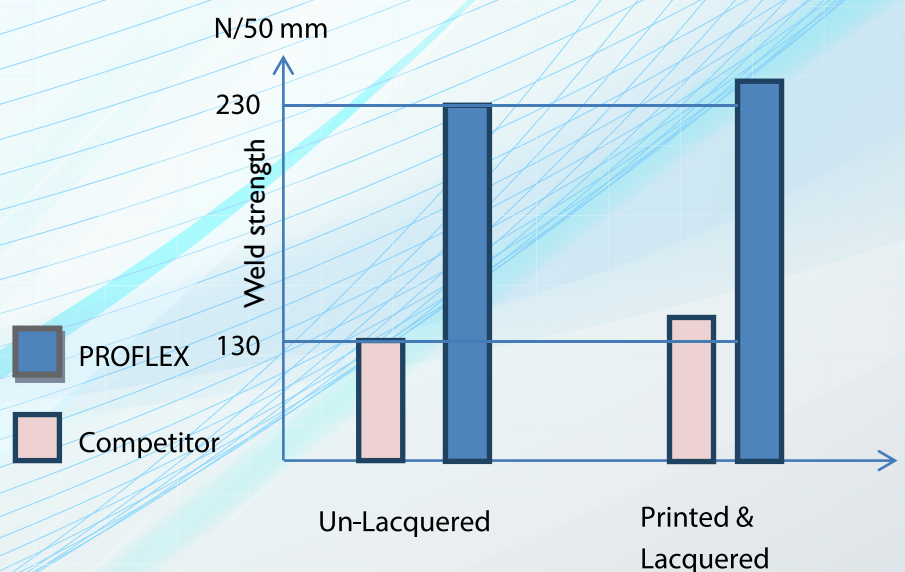
\*Tests were performed in accordance with ASTM G 53

## 3. Hot-Air Welding Strength

**PROFLEX** Liners, both lacquered and un-lacquered, demonstrate exceptional hot-air welding strength when compared to our European competitors. Our tests\* indicate that **PROFLEX** liners have a peel resistance that far surpasses that of our competition.



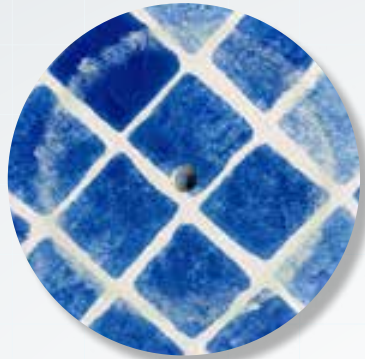
Peel Resistance Test in progress



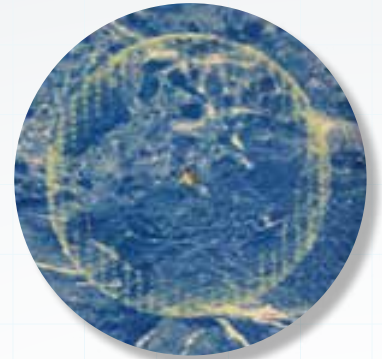
## 4. Excellent Abrasion Resistance

**PROFLEX** Liners are designed to provide a long-lasting solution for your pool. High resistance to abrasions means our liners remain intact, without the appearance of flaws that may eventually compromise the integrity of the product, and their surfaces stay smooth and pleasant to the touch, and maintain their easy-to-clean properties. **The PROFLEX Liner meets or exceeds the abrasion resistance performance of its European competitors, based on the tests performed\*.**

**Haogenplast**  
1500 abrasion cycles -  
mild effect on print



**EU competitor**  
1500 abrasion cycles -  
strong effect on print



\* Tested in accordance with Test Standard EN ISO 5470-1.

## 5. Resistance to Super-Chlorination

While super-chlorination is an important part of swimming pool maintenance in which the addition of excess amounts of chlorine is done in a short period of time to the swimming pool water. These high chlorine levels can damage liner surfaces, decreasing their protective properties and significantly impacting their color. Our **PROFLEX** Liners have been developed and manufactured to be highly resistant to super-chlorination, thereby maintaining their high quality performance over a much longer timeframe, compared with competitors' liners.

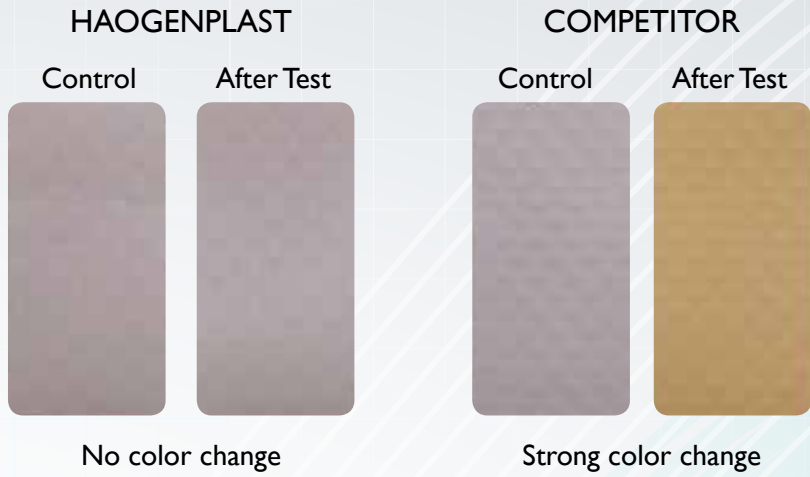
The tests presented below\* clearly show that **Haogenplast's PROFLEX** Liners are superior in their resistance to super-chlorination in all colors, and demonstrate outstanding performance for light gray color products compared with similar products by our competitors.

### Chlorination Test I: Uni-color Liners

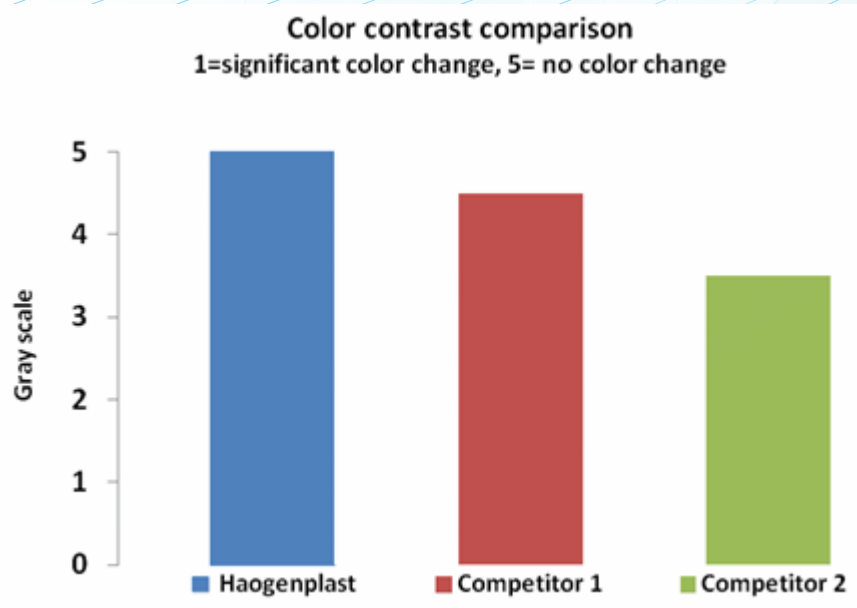
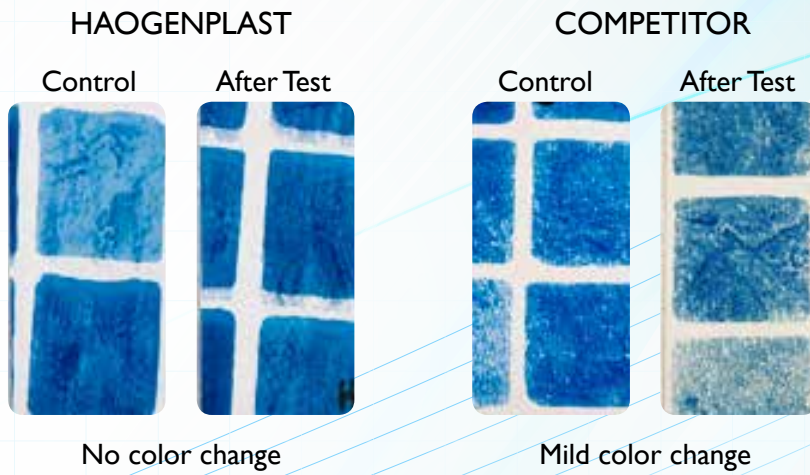
	HAOGENPLAST		COMPETITOR	
	Control	After Test	Control	After Test
Blue				
Light Blue				
Gray				
Light Gray				
Sand				



## Chlorination Test 2: Light Gray Liners



## Chlorination Test 3: Printed Liners



excellent resistance to chlorination compared to competitors

\* Tests were performed in accordance with Testing Standard BS EN 15836-2:2010 Annex C

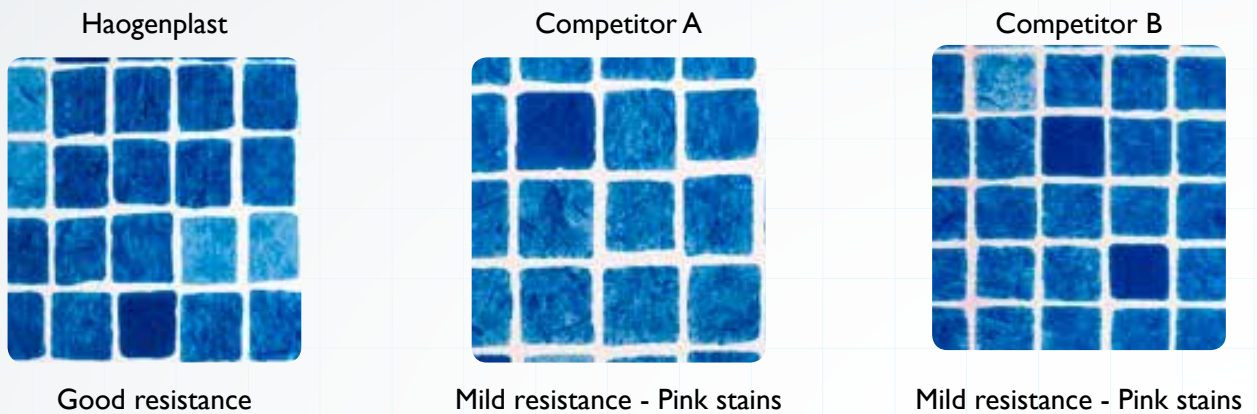
## 6. Superior Lacquered Liners

The **PROFLEX** Lacquered liners offer extra protection over un-lacquered liners in terms of microbial attack, outdoor & UV protection and stain resistance. These lacquered liners are especially suited for commercial pools with very high usage, higher chemical load, and more frequent cleaning, as well as in very hot and humid climates where weathering is accelerated. Owners of custom-built or higher-end pools often choose this product to safeguard their investment by extending the lifetime of their pool.

When tested for resistance to staining agents\*, **Haogenplast's PROFLEX** printed and lacquered liners demonstrated superior stain resistance and clean-up properties, even against strong staining agents, when compared with competitors.

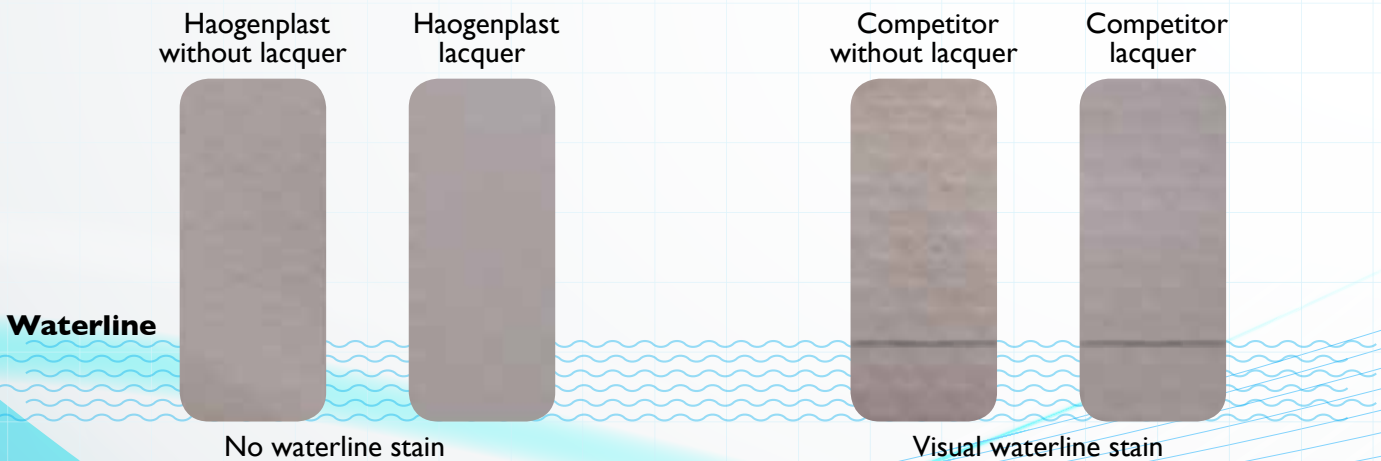
In outdoor weathering tests\*\*, **Haogenplast's PROFLEX** unicolor lacquered liners outshined their competitors in terms of weather and stain resistance.

### Test 1 resistance to staining agents



\*Tests were performed in accordance with test standard EN 1586 Annex D

### Test 2 resistances to waterline staining



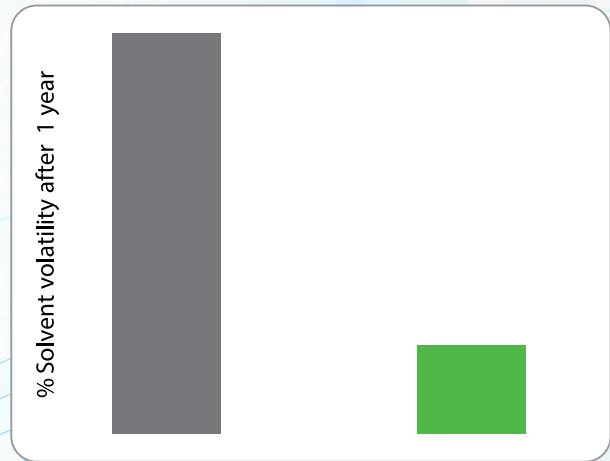
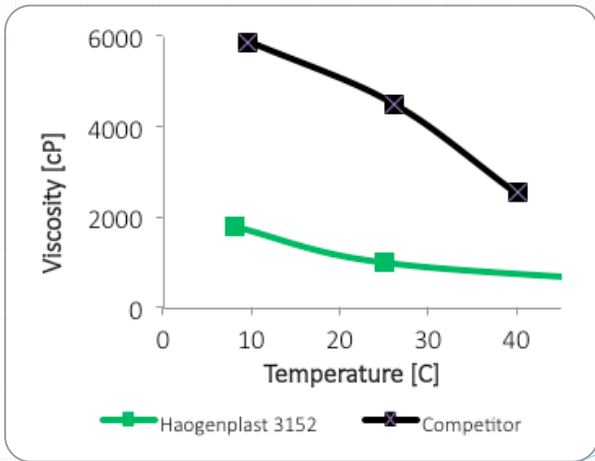
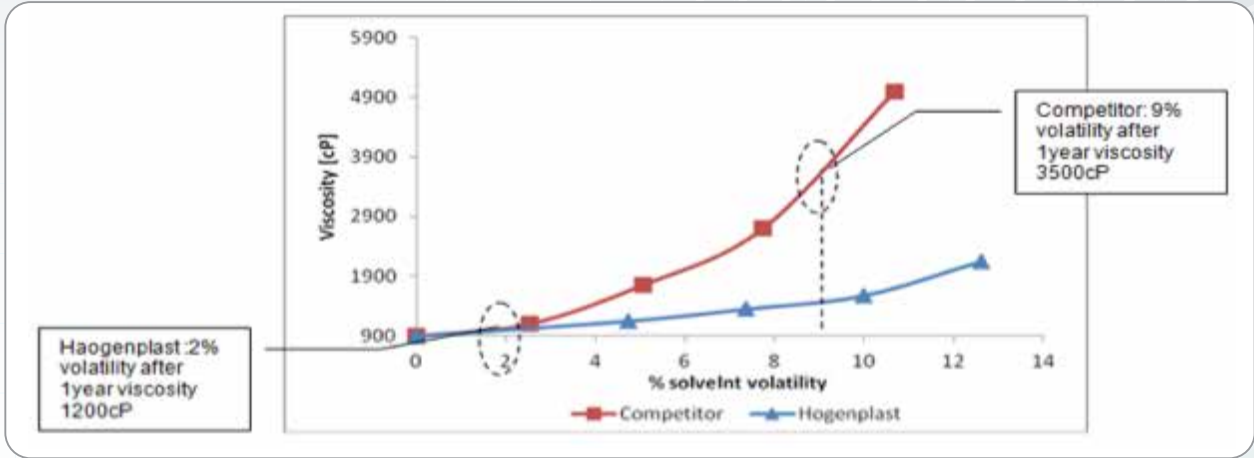
## 7. Liquid PVC (Membrane Seal) – New and Improved

At **Haogenplast**, quality is a principle we strongly embrace. Our new and improved **PROFLEX** liquid PVC formula is even better than before, with increased durability and an extended lifespan, and ensures the following features:

- Stable viscosity over time, with lower solvent volatility.
- Uniform flow properties
- Excellent adhesion & sealing properties
- Proper color match and color stability.
- Re-usable capability of the formula and package

- High U.V. resistance
- Availability of crystal clear liquid PVC

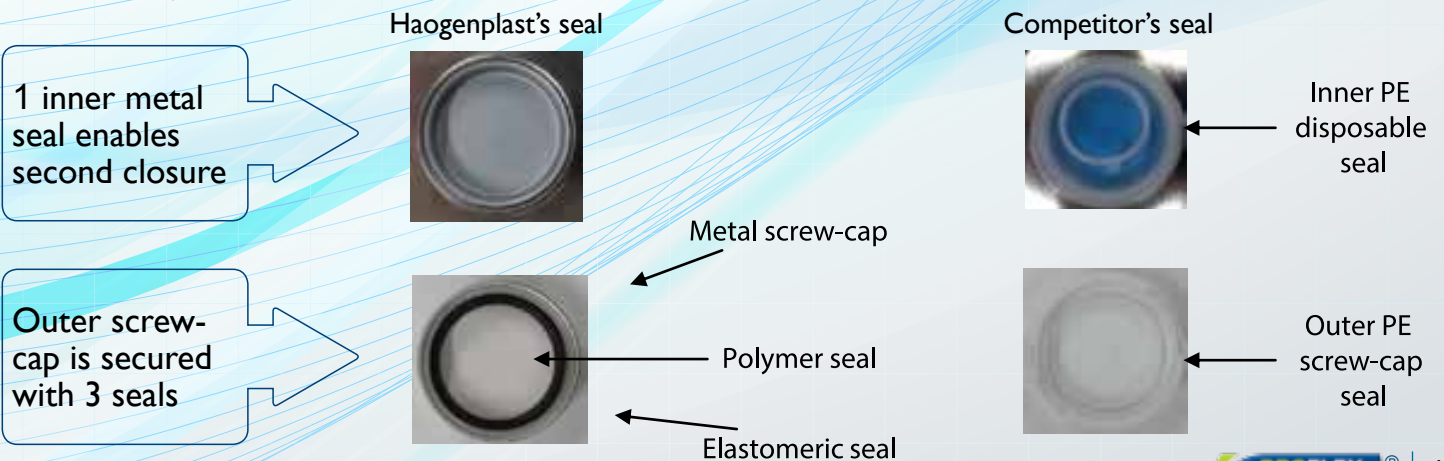
Material tests opposite the competitor demonstrate **PROFLEX's** solvent volatility, unity of flow over time, and temperature sensitivity, as can be seen in the presented data presented below:



**COMPETITOR** significant solvent volatility      **HAOGENPLAST** minor solvent volatility



**Haogenplast's PROFLEX** Liquid PVC comes in specialized metal packaging secured with 4 seals to allow for re-closure. The original properties of the material are retained even after the package has been opened, to provide significantly improved durability and a longer lifespan, compared with that of the competition



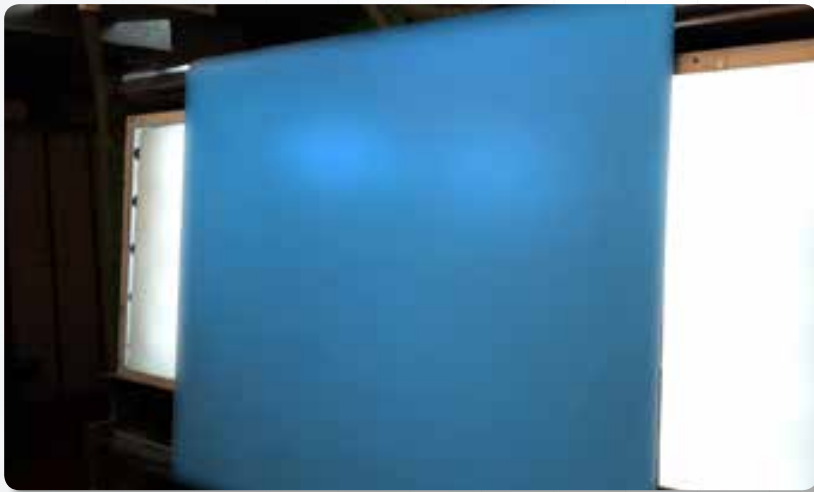
## 8. ElvaFlex - Extreme Lifespan & Durability to Chemicals

As one of Haogenplast's flagship products for over 30 years, ELVAFLEX has recently been adapted for use in swimming pools. The ELVAFLEX Swimming Pool Liner is our ultimate pool liner - unparalleled in terms of quality, durability and material longevity. **Over time, ELVAFLEX outperforms all other PVC liners in the following properties: Resistance to U.V. damage, outdoor and temperature weathering, resistance to microorganism attack, welding properties, material durability, and chemical resistance - especially to oil.** In addition, ELVAFLEX liners comply with all Standards for potable water systems. ELVAFLEX liners are installed in the same manner as all other Haogenplast PROFLEX liners, are currently available in a wide range of unicolors, and come backed by a 20-Year Warranty!

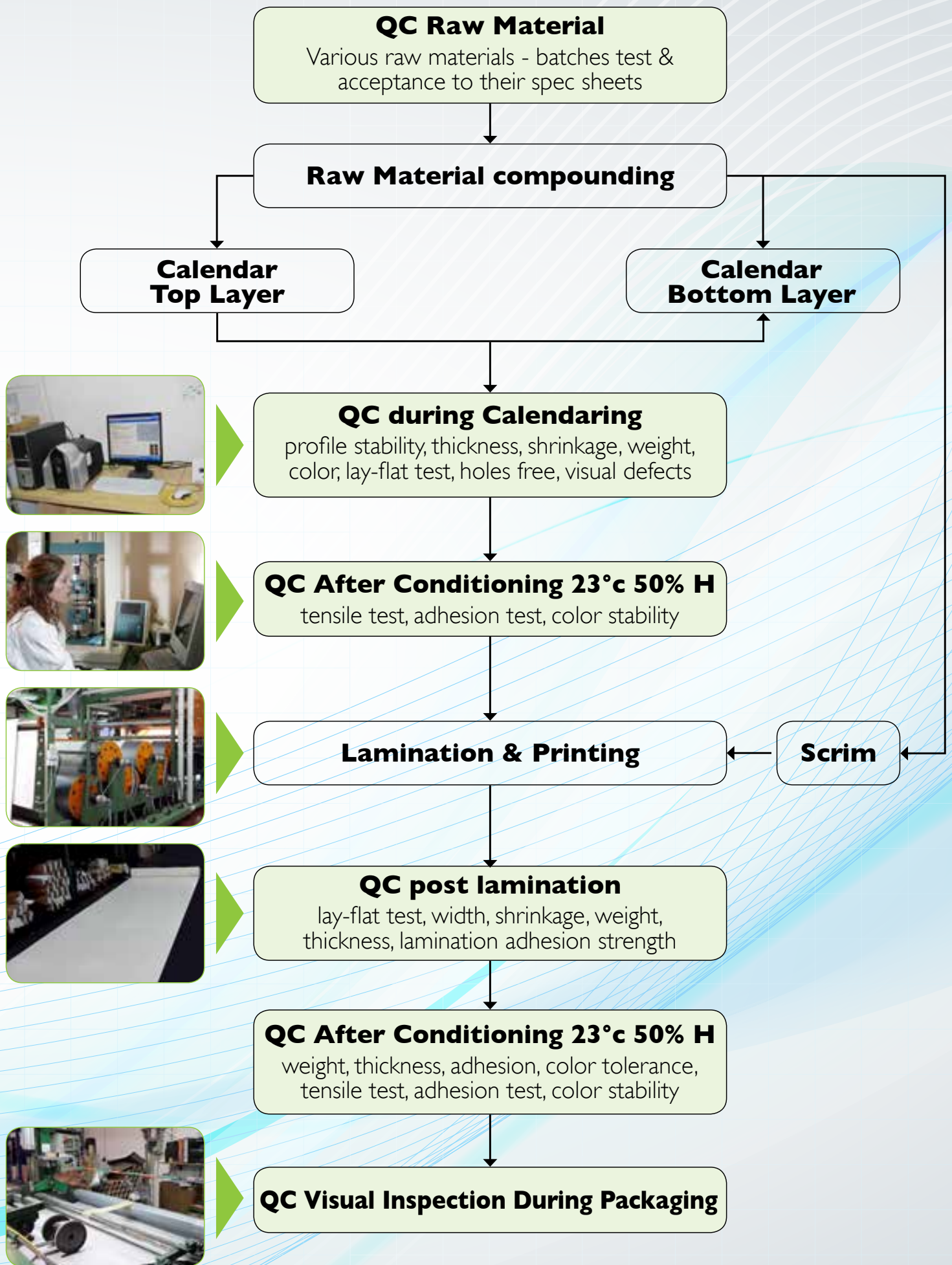
ELVAFLEX is the ultimate solution for those customers who insist on having a liner that, with proper care and maintenance, will last practically the lifetime of their pool.

## 9. Superior Quality Assurance Processes

Haogenplast applies a stringent quality control methodology throughout its production line, at all three control levels: Operator, Engineer and Management, and includes product inspections, in-line and end-of-line material parameter testing, statistical process controls for smooth operation and minimum product variability, as well as continuous improvement and cost reduction activities. Our PROFLEX Liners consistently exceed the highest quality requirements of the industry, and provide the best solution for our valued customers.

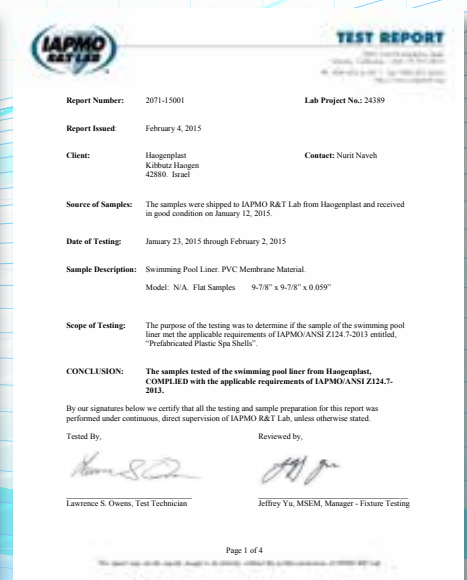
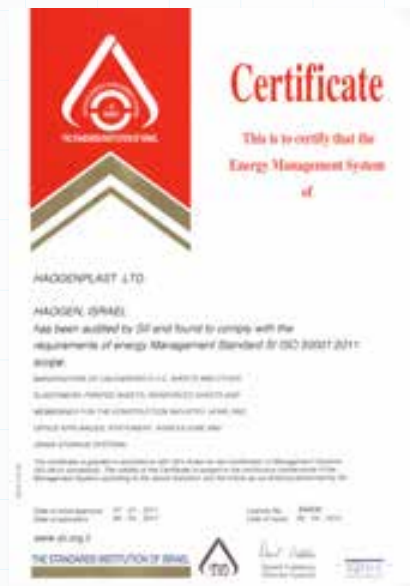


# PRODUCTION – FLOW CHART



# 10. Haogenplast Certifications

Haogenplast products comply with the most stringent international quality standards: ISO 9001 (2008), ISO 14001, OHSAS 18001, ISO 50001, B.B.A., CE, ISI, CSTB, FM & ANSI



## Ganei Tikva Water Park Slides

- White Membrane
- Installed 6 years ago
- The membranes were welded and glued to the slide



## Olympic-sized Pool: Wingate National Sports Institute

Wingate College, a university institution for outstanding athletes and the residence place of the Israeli Olympic Committee .

Cement pool 12.5 x 50 meters. color – blue (8044).

The pool was built 10 years earlier for an international water polo competition. The project schedule was tight, yet the membranes were installed within a week despite the engineering complexity.



## Water slides – Gan Hashlosha, Israel

The membranes were welded from a large number of elements, and was also glued to the slides. The project was carried out 5 years ago



## Fish, shellfish and crabs pools

- Animal imports from outside Europe require quarantine for a limited time in sea-water pools where they undergo a purification process and receive approval to sold on the market.
- Reinforced ELVA membrane to seal 30 fish and shellfish pools (~ 3000 m<sup>2</sup>).
- Thickness: 1.5mm

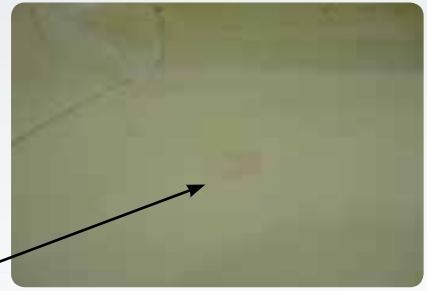


# Trouble-Shooting Questions and Answers

Pool maintenance and water treatment process as key elements for longevity of your pool

## What are pink stains?

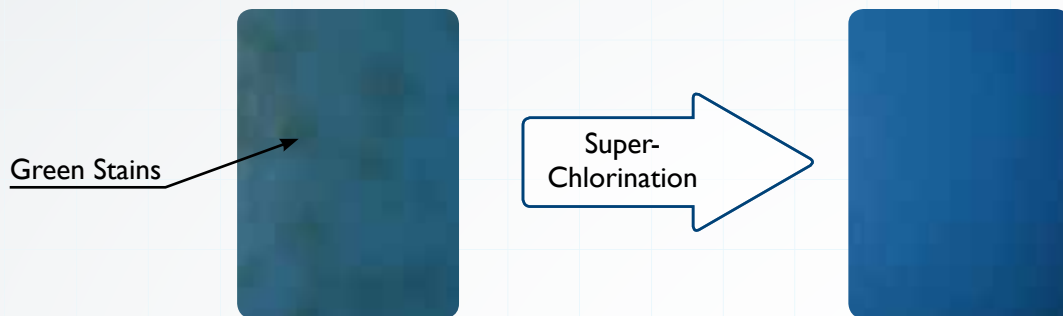
Pink stains, caused by microorganisms, occur in pools that are not treated properly. They may be localized or occur sporadically and are removed by super-chlorination treatment.



Pink Stains

## What causes green stains?

Green spots are generally caused by green algae commonly found in pools. If left untreated, they can rapidly spread along the pool and water surface. Sun and other factors encourage the growth of these algae, but proper water treatment can ensure a clean pool.

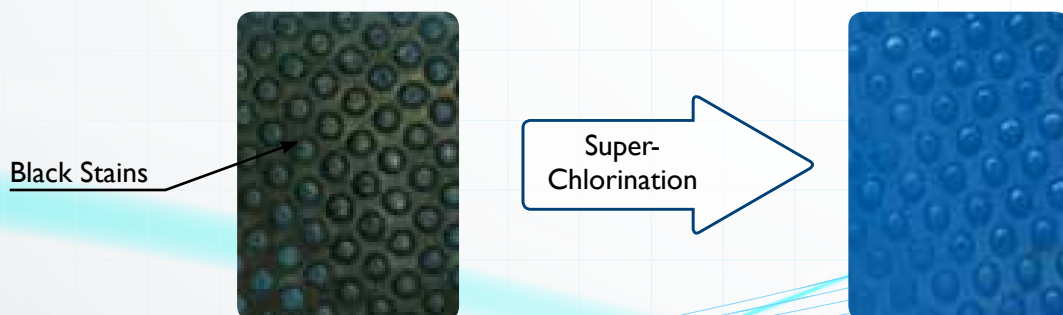


## What is that dirt at the water line?

Water can accumulate dirt particles from air pollution and substances introduced into the pool, such as sunscreen lotion, forming the dirt build-up seen at the water line. This should be removed using special, non-abrasive cleaning agents.

## What are those black stains?

Black stains are usually caused by bacteria that release hydrogen sulfide, which can react with metals in the water to form widespread black stains. The treatment is super-chlorination, similar to that for other stains caused by microorganisms.



## What are white stains?

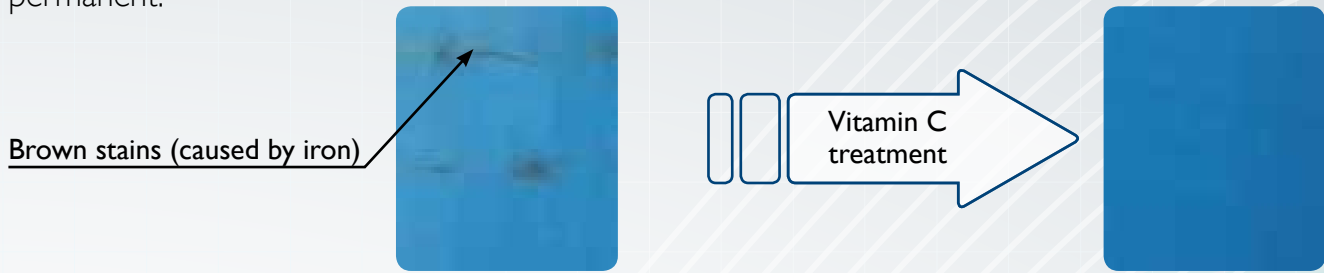
White stains, caused by minerals (calcium carbonate – chalk, or limestone), may be seen at the water line or on the pool bottom. They can be prevented by proper water maintenance, and can be removed by adding special pool-cleaning agents that contain acid (to reduce pH).

## What are those reddish brown/blue/green/teal stains?

All of these stains may be caused by the presence of metals in the water. When the water chemistry is out of balance, the dissolved metal becomes oxidized and settles on the pool floor, causing stains. (Iron – brown; Copper – blue, green, teal or black; Manganese – pink/dark brown/purple). These stains may be identified by gently scratching them with Vitamin C, which will eliminate them. The best method regarding these stains is prevention: First, always maintain proper water balance to prevent metal oxidation and deposition. Second, use metal removers specially designed for pool use to remove dissolved metals from the water. Third, check for and remove any sources of corrosion or



rust (such as pool equipment containing exposed copper or metals). Finally, remove stains promptly using specialized cleaning agents, to prevent them from penetrating the floor surface to become permanent.



### How are bleaching stains caused?

Bleaching stains appear as white spots and are generally caused by chemical treatments, where high localized Chlorine concentrations result in bleaching of the liner. These stains are permanent and cannot be removed. To prevent these stains: 1. Always pre-dissolve solid sanitizers, such as chlorine tablets, in the socket of pool water before adding to the pool. 2. Whenever adding chemicals to the water, always add one chemical at a time, and allow it to circulate throughout the pool before adding a second chemical. 3. As a rule, always allow enough time for circulation after adding a chemical - some chemicals may concentrate at the bottom or deep end of the pool and bleach the liner if not allowed to circulate long enough.

### Why is my pool water cloudy?

Cloudy water may indicate that the pH level and water hardness are too high. This condition is not only an esthetic problem but also decreases the free chlorine efficiency and may cause deposits on the pool and equipment (e.g. pipes & chlorination systems). To reduce the water hardness, a special treatment agent containing acid should be used.

### Why am I seeing corrosion on the metal around the pool?

When the pH is too low, corrosion (metal oxidation) occurs on the metal parts of pool equipment and eventually damages it. Maintaining proper water balance will effectively prevent corrosion.

### How do I maintain good water balance?

Regarding water balance, three main parameters are considered:

- **pH value:** Represents the water acidity, where low pH = acidic and high pH = alkaline. Lower pH values can cause metal oxidation and irritate the eyes and skin. Higher pH values can result in metal stains, cloudy water and encourage microbial growth. In a balanced pool the pH value is between 7.2 - 7.8. Add soda ash to raise the water pH level, and acid to reduce it.
- **Free chlorine levels:** Free chlorine prevents microorganism growth & stains. Too high levels can cause corrosion and irritate the eyes and skin, and too low levels may encourage microbial growth. In general, and especially during the summer, levels decrease rapidly due to increased chlorine gas evaporation. In a balanced pool the free chlorine value is between 0.5 - 1.5 ppm. Add chlorinating agent and/or reduce the pH to raise free chlorine levels. If you must reduce the levels, remove the chlorine sources and expose the pool to sunlight. If absolutely necessary, replace some of the pool water (up to ½ the pool volume) to dilute the chlorine.
- **Water hardness:** Hard water contains an excessive amount of calcium in the water that can cause calcium deposits and cloudy water, a decrease in chlorine availability leading to microbial growth, and metal stains. In balanced water the hardness is 100-300ppm. Special test strips are used to determine calcium levels. To lower calcium levels, special agents may be used to sediment the calcium out of the water, which must then be vacuumed off the bottom. Before this treatment,

### What is Super-chlorination?

Super-chlorination, also known as 'pool shocking', is a disinfecting process whereby an excess amount of free chlorine is introduced for a short time to the swimming pool water, where it speeds up chemical reactions and destroys bacteria. Super-chlorination is most commonly used when water has very high micro-organism or other contaminate levels. During the process, the free chlorine level is raised to the level needed to treat the problem, usually 3-5ppm. The process raises the pH, so acid will be needed to reduce levels after treatment. Follow your pool maintenance guidelines to ensure effective treatment.

**Caution: Entrance to the pool is forbidden while super chlorination is taking place.**

## Specifications for Proflex Swimming Pool

according to: AFNOR EN 15836-2 2010-8

Proflex Swimming pool liner consists of flexible PVC reinforced with Polyester scrim (7%)

Properties	Units	Requirements	Test Results	Test Method
Aspect		No visible defect. Color conforms to the reference	No visible defect. Color conforms to the reference	EN 1850-2
Width	mm	Declared value $\pm 5$ mm		EN 1848-2
Length	m	$\geq$ Declared value		EN 1848-2
Weight	g/m <sup>2</sup>	Ms +10% -5%	<b>Printed 1850</b> <b>Uni-color 1890</b>	EN 1849-2
Average thickness	mm	$\pm 5$ %	1.5	EN 1849-2
Individual val. thickness	mm	$\pm 8$ %	1.5	EN 1849-2 c), d)
Flatness	mm	$\leq 10$	0	EN 1848-2
Linearity of the edges	mm	$\leq 30$	0	EN 1848-2
Tensile strength	N/5cm	$\geq 1100$	1200 1150	EN 12311-2 <b>Method A</b>
Elongation	%	Between 15 and 30	16 17	EN 12311-2 <b>Method A</b>
Resistance to De lamination	N/50mm	$\geq 80$	100	EN 12316-2
Welding strength	N/50mm	$\geq 80$	100	EN 12316-2
Tear strength	N MD TD	$\geq 180$	230 240	EN 12310-2 Trapesoid
Water Absorption	%	$\leq 1$	0.37	168 h at 23°C ISO 62 Method A
Dimensional stability	%	$\leq 0.5$	0.3	EN 1107-2
Cold Bending	°C	$\leq -25$	-30	EN 495-5
Resistance to Chemical agents: - Oxidizing		Change of color, gray scale $\geq 3$	4	Deterioration evaluation According to NF T 54-803-2 Appendix C
- Staining		Degree $\geq 4$ (superior) Degree $\geq 2$ (standard)	See table below	Deterioration evaluation according to NF T 54-803-2 Appendix D

## Specifications for Proflex Swimming Pool according to AFNOR

Properties	Units	Requirements	Test Results	Test Method
CaCO <sub>3</sub> Evaluation Level	%	≤ 3	3	NF EN 14902:2005 Appendix A
Abrasion Resistance		No printing changes after 100 cycles		EN ISO 5470-1:1999 5N weight 60 tr/min
Color Difference		ΔE ≤ 1.0 Internal requirement	0.8	
Resistance against slip (for anti-slip)		≥ 24°		Appendix B
Resistance to micro-organism		Δm/m ≤ 5% (std.) Δm/m ≤ 1% (Super.)		ISO 846:1997 Method D
Resistance to Bacteria		No stains		ISO 846:1997 Method C
Resistance to artificial weathering Printed		≥ 3 3000 h (std.) 3000 h (Super)		EN 20105 A02 ISO 4892-2:2006 Method A Cycle 1
Resistance to artificial weathering NON Printed		≥ 3 3000 h (std.) 6000 h (Super)		EN 20105 A02 ISO 4892-2:2006 Method A Cycle 1

### Staining:

Description	Contact time	Requirements	Results		Test Method
			Before abrasion	after abrasion	
Sunflower oil + 10% carbon black paste	24h	Degree ≥ 4 (superior) Degree ≥ 2 (standard)	5	5	Deterioration evaluation according to NF T 54-803-2 Appendix D
Distilled water +2 % iodine	10 min		5	5	
Marker blue	10 min		5	5	
Yellow mustard	16h		4	4	
Sunflower oil +1% eosin Y	10 min		5	5	
Distilled water +0/1% methylene blue	16h		5	5	
Sunflower oil +1% solvent red 27	10 min		4	4	



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