

Textile Architecture



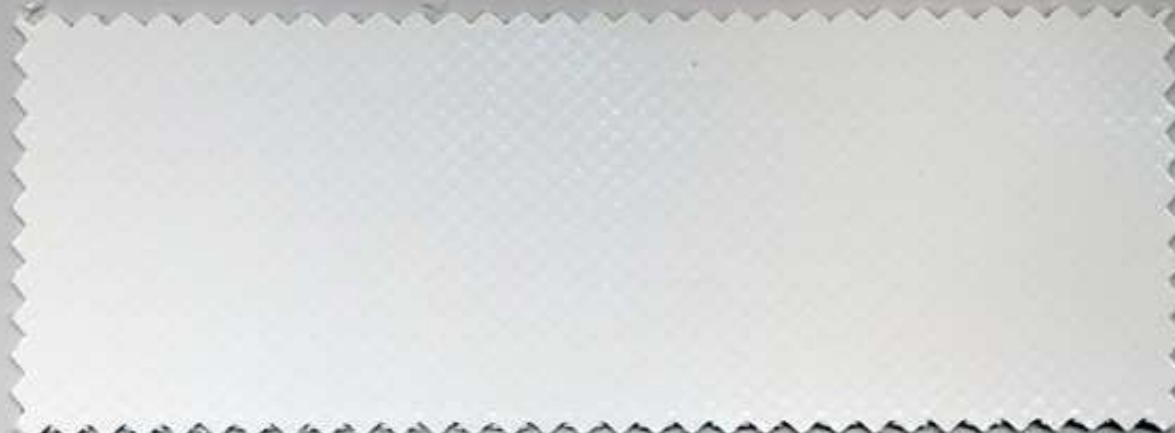
www.ferrari-architecture.com

PRECONSTRAINT®


1002S2 • 1202S2 • 1302S2 • 1502S2 • back

FERRARI
architecture







1002-8626S2 back PVDF



1202-8636S2 back PVDF



1302-8626S2 back PVDF



1502-8626S2 back PVDF

Standard stock production = Précontraint® Blanc ref. 8626S2 or 8636S2.

Production on request = Précontraint® 502 colour range.

Adjustments of welding parameters are necessary compared to previous Formula S.

Lightweight and 100% recyclable, Ferrari® Préconstraint® composite membranes provide architectural structures with exceptional mechanical and aesthetic durability based on their Formula S2 surface treatment.

■ Formula S2: optimised surface treatment



Centre Point - Qatar

Founded upon 20 years of experience in formulating textile surface treatments, Ferrari® has developed the improved Formula S2 which optimises the aesthetic performance of the calibrated PVDF (polyvinylidene fluoride) alloys whilst maintaining the fabrics welding characteristics.

Formula S2 delivers the perfect balance between long term dirt resistance and ease of fabrication, representing a financial challenge and technical requirement that are essential to the recognition of tensile structures.

■ Durability & homogeneous aesthetics

Coefficient of Friction (COF)

With a lower COF, the Formula S2 surface treatment minimises the retention of airborne dirt and pollution leading to improvements in cleanability. This reduction in dirt adherence prolongs the lifespan of the fabric and results in a more uniform aesthetic.

The COF is simply quantified by the weight required to initiate the movement of an object in contact with the fabric surface. The lower the weight required to initiate the movement suggests a slipperier surface i.e. a lower COF.

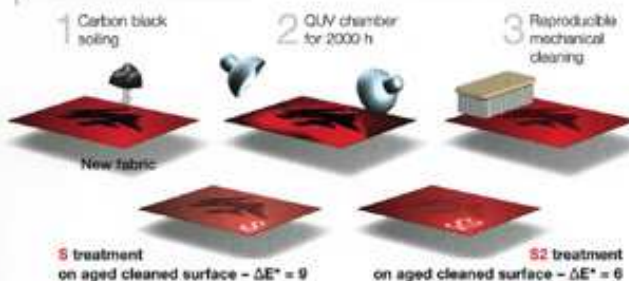


Test developed by the Ferrari® testing laboratory

Formula S2: +40% slipping effect

Less dirt and pollution retention = **easier, more efficient cleaning overtime**

Easy maintenance



ΔE^* : In colorimetric space, a colour is expressed as $\text{F}^*L^*a^*$ along 3 axes: L^* = clarity; a^* = red/green axis; b^* = yellow/blue axis

A colour change is expressed by varying each of these $\text{F}^*L^*a^*$ axes (coordinates)

ΔE^* is the colorimetric distance between a sample and a reference: the higher its value, the more distant the compared colours are.

PVDF is insensitive to UV. This intrinsic property is optimised in the new Formula S2 alloy formulation to minimise surface deterioration.

Artificial soiling tests on S2 membrane combined with accelerated ageing reveal that this surface can be very efficiently cleaned to ensure a 30% reduction in Delta E (ΔE) compared with the previous Formula S.

Formula S2: - 30% ΔE . This surface finish minimises pollutant adherence and preserves long-term colour stability and uniformity. It specifically enhances cleaning performance.

The exclusive **Ferrari® Précontraint®** technology



The worldwide patented Ferrari® Précontraint® technology places the base-cloth textile under bi-directional tension during the complete manufacturing process.



Précontraint® textiles respect the weft yarn direction, which remains identical from batch to batch.



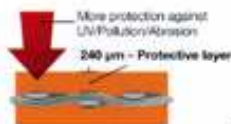
Conventional coated fabrics exhibit considerable deformation in the weft yarns and greater variance between product batches.



Précontraint® textiles have very low crimp or surface "waviness" in both warp and weft directions resulting in a far smoother surface.



High levels of crimp found in conventional coated fabrics result in a more uneven surface appearance and texture.



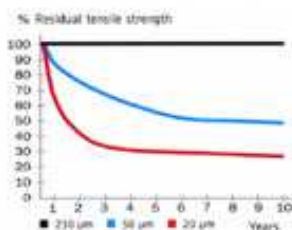
Précontraint® 702 - 750 g/m²



Conventional coated textile - Type I - 700 g/m²

Proven longevity

The thicker surface coating of Précontraint® textiles provides greater protection to the base cloth and much higher mechanical resistance characteristics overtime – critical to the lifespan of your installations.



An independent ENKA study conducted annually over 10 years in Florida USA compared the residual strength of 3 fabrics with differing coating thicknesses exposed to normal conditions. The graph dramatically demonstrates the benefits of thicker coatings on the residual strength of the fabric.



Airbus hangar - 1982
Germany - Précontraint® 1302
Tensile resistance after 22 years:
Warp 97% - Weft 84%



Exhibition hall - 1982
Port-Gentil, Gabon - Précontraint® 1302
Tensile resistance after 18 years:
Warp 86% - Weft 76%



Warehouse - 1989
France - Précontraint® 832
Tensile resistance after 20 years:
Warp 91% - Weft 86%



School covered playground - 1994
New Zealand - Précontraint® 702
Tensile resistance after 14 years:
Warp 96% - Weft 98%

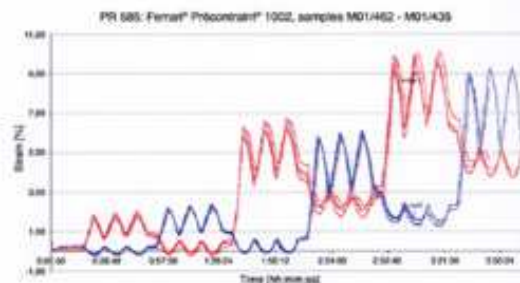
Controlled consistency

Bi-axial elongation tests confirm the membrane's dimensional behaviour, which must be reproducible for every batch. This material uniformity ensures design accuracy and installation reliability.

Bi-axial tests on 4 different production batches (Précontraint® 1002 fabric). Performed by dynamics and optical laboratory (Laboratorium für Dynamik und Optik) - Stuttgart.

"Results are virtually 100% the same for the different batches. We therefore conclude that this material is very uniform".

Dr. ing. habil. Rainer Blum



Limited creep



Ferrari® Précontraint® technology ensures significant reduction in the creep phenomenon, which is 3 to 4 times higher for conventional fabrics.

Elongation in the weft direction under a 200 daN/m load over a period of 100 hours. Then residual elongation without load.

■ Design with Ferrari® Sketch

Ferrari® has commissioned expert engineers to develop a Google® Sketch up plug-in: **Ferrari® Sketch**.

Made freely available to professionals and students, this program is uniquely dedicated to tensile structures form finding.



> Download from
www.ferrari-architecture.com



Feria San Marcos AGC - Mexico

■ Natural light and thermal performance



Select City Walk, Atrium - India

Précontraint® textile membranes contribute to building thermal comfort while favouring an optimised transmission of natural light.

Various fabric combinations can be effectively compared using **Textherm®** software, based on specific constraints in given geographical areas. This software for preliminary calculation of air conditioning units allows to assess the benefits of each solution.

■ Environmental commitment

Lightweight and durable, Précontraint® textiles are also 100% recyclable through **Texyloop®** technology, a Ferrari® exclusive patented process.

Ferrari® has become a supplier of new textiles featuring new materials with high recycled content and lower environmental impacts.

Ferrari® makes available Life Cycle Analyses for Précontraint® references, which have been conducted in compliance with ISO 14040 standard. These permit evaluation of the environmental impacts of the textile throughout each phase of its life cycle.

www.texyloop.com

TEXYLOOP®
A SOLUTION FOR THE FUTURE



Canberra swimming pool - Australia
Removal of membrane installed in 1988
Fabric re-installation in 2009. Recycling in 2010.

■ Technical features **PRECONTRAINT®**

1002S2-1202S2-1302S2-1502S2-169



Dimensional stability



Long life



UV resistance



Flame retardant



Easy maintenance



12 year warranty (upon request)



100% recyclable textile

Textile Architecture

PRECONTRAIN[®]

1002S2-1202S2-1302S2-1502S2-150

Technical properties	Preconstraint [®] 1002 S2 back PVDF	Preconstraint [®] 1202 S2 back PVDF	Preconstraint [®] 1302 S2 back PVDF	Preconstraint [®] 1502 S2 back PVDF	Standards
Yarn	1100 Dtex PES HT	1100/1670 Dtex PES HT	1100/2200 Dtex PES HT	1670/2200 Dtex PES HT	
Weight	1050 g/m ²	1050 g/m ² (1250 g/m ² *)	1350 g/m ²	1500 g/m ²	EN ISO 2286-2
Width	180 cm	267 cm	180 cm	180 cm	(-1mm/+1mm)
Tensile strength (warp/weft)	420/400 daN/ 5 cm	560/560 daN/ 5 cm	800/700 daN/ 5 cm	1000/800 daN/ 5 cm	EN ISO 1421
Tear strength (warp/weft)	55/50 daN	80/65 daN	120/110 daN	160/140 daN	DN 53.363
Adhesion	12 daN/ 5 cm	12 daN/ 5 cm	13 daN/ 5 cm	15 daN/ 5 cm	EN ISO 2411
Flame retardancy	M2 NF P 92-507 • B1 DIN 4102-1 BS 7837 • M2 UNE 23.727 Test 2 NFPA 701 • CSFM T19 ASTM E84 • Class C / ASTM E 108 B-s2,d0 EN13501-1	B1 DIN 4102-1 • BS 7837 CSFM T 19 • SITAC/SIS 650062 Test 2 NFPA 701	B1 DIN 4102-1 • BS 7837 CSFM T 19 Test 2 NFPA 701 B1 ONCRM B 3800-1 C-s2,d0 EN 13501-1	B1 DIN 4102-1 • BS 7837 SITAC/SINTEF/ETA/SIS 650082 Test 2 NFPA 701 • CSFM T 19	
Euroclass	B-s2,d0 EN13501-1	B-s2,d0 EN13501-1	C-s2,d0 EN 13501-1	C-s2,d0 EN 13501-1	
Surface treatment	Formula S2 : 2 nd generation calibrated PVDF alloy				
Back side treatment	Weldable PVDF (for a better resistance to pollution of the back side of the fabric)				
Product application	Temporary or permanent modular structures				

The PVDF back treatment derives from this excellent anti-ageing fluoropolymer and, without the need to modify the textile fabrication method, achieves superior aesthetic results for all relevant Ferrari[®] fabrics.
The technical data above are averaged values with a +/- 5% tolerance.

Additional information

Coating thickness at the top of the yarns	350 µ	270 µ	300 µ	300 µ		
Total thickness	0,78 mm	0,78 mm	1,02 mm	1,14 mm		
White index	82 %	82 %	82 %	82 %	ICC International Color Commission	
Optical solar properties**	ASHRAE 74 1988	ISO EN 410	ASHRAE 74 1988	ISO EN 410	ASHRAE 74 1988	ISO EN 410
Solar Transmission	Ts 6 %	Ts 6 %	Ts 7 %	Ts 6 %	Ts 5 %	Ts 4,5 %
Solar Reflection	Rs 78 %	Rs 80 %	Rs 77 %	Rs 80 %	Rs 78 %	Rs 78 %
Solar Absorption	As 16 %	As 14 %	As 16 %	As 14 %	As 17 %	As 17 %
Solar factor	Fs (g) 12 %	Fs (g) 10 %	Fs (g) 13 %	Fs (g) 10 %	Fs (g) 11 %	Fs (g) 8,5 %
Transmission of Visible light	Tv 4 %	Tv 4 %	Tv 4,5 %	Tv 4,5 %	Tv 3 %	Tv 2,5 %
Reflection of Visible light	Rv 88 %	Rv 88 %	Rv 88 %	Rv 88 %	Rv 86 %	Rv 89 %
UV transmission	T-UV 0%	T-UV 0%	T-UV 0%	T-UV 0%	T-UV 0%	T-UV 0%
Global thermal conductivity / single membrane						
vertical position	U= 5,6 W/m ² /°C	U= 5,6 W/m ² /°C	U= 5,6 W/m ² /°C	U= 5,6 W/m ² /°C	U= 5,6 W/m ² /°C	U= 5,6 W/m ² /°C
horizontal position	U= 6,4 W/m ² /°C	U= 6,4 W/m ² /°C	U= 6,4 W/m ² /°C	U= 6,4 W/m ² /°C	U= 6,4 W/m ² /°C	U= 6,4 W/m ² /°C
Global thermal conductivity / double membrane						
vertical position	U= 2,9 W/m ² /°C	U= 2,9 W/m ² /°C	U= 2,9 W/m ² /°C	U= 2,9 W/m ² /°C	U= 2,9 W/m ² /°C	U= 2,9 W/m ² /°C
horizontal position	U= 3,1 W/m ² /°C	U= 3,1 W/m ² /°C	U= 3,1 W/m ² /°C	U= 3,1 W/m ² /°C	U= 3,1 W/m ² /°C	U= 3,1 W/m ² /°C
Acoustical weakening index	Rw: 15 dBA	Rw: 15 dBA	Rw: 16 dBA	Rw: 16 dBA	Rw: 17 dBA	Rw: 17 dBA
Extreme working temperatures	-30°C/+70°C	-30°C/+70°C	-30°C/+70°C	-30°C/+70°C	-30°C/+70°C	-30°C/+70°C
Quality management system						ISO 9001

* M2 classification is only available on request. Special production at 1250 g/m² - ** Value for white 862652 or 863652 only.

The above data was obtained by calculation through simulations of average conditions of use, these values must be considered as considered as an approximation.

The buyer of our products is fully responsible for their application and their transformation according to the standards, use and customs and safety rules of the countries where they are used.

The buyer of our products is responsible for their implementation and installation according to the standards, use and customs and safety rules of the countries where they are used.

The values mentioned above are the results of tests performed in conformity with the use and customs in terms of studies they are given as an indication in order to allow our customers to make the best use of our products.

Our products are subject to evolutions due to technical progress; we remain entitled to modify the characteristics of our products at any time.

The buyer of our products is responsible to check that the above data is still valid at time of fabrication.

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A dynamic 3D platform integrating different architectural solutions.

A solar protection / textile architecture / interior architecture / textile façade area and an area reserved for professionals to download technical documentation and installation photographs.

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Specification department

The Ferrari[®] specification service is available to inform you, advise you and suggest innovative solutions for your specific requirements.

To detail your project, fill in a form under:
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FERRARI

EUROPE

FERRARI SA
La Tour du Pin - FRANCE
Tel: +33 (0)4 74 97 41 33

STAMODIO AG
Egliseu - SWITZERLAND
Tel: +41 (0)44 868 26 26

NORTH AMERICA

FERRARI TEXTILES CORP.
Florida - USA
Tel: +1 954 942 3490

LATIN AMERICA

FERRARI LATINOAMERICA S.A.
Santiago - CHILE
São Paulo - BRAZIL
Mexico - MEXICO
Tel: +56 (2) 269 0019
Tel: +55 (11) 3262 3405
Tel: +52 (56) 5525 2900

MIDDLE EAST

FERRARI DUBAI
Dubai - U.A.E
Tel: +971 4 884 5504

ASIA - PACIFIC

FERRARI HONG-KONG LTD
Tel: +852 3622 1340
FERRARI JAPAN Tokyo
Tel: +81(0)3447 24 93 00

CHINA

FERRARI CHINA
Shanghai
Tel: +86 21 6211 4936