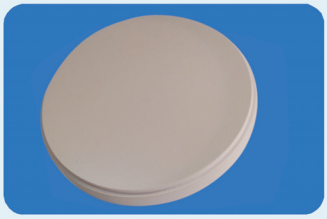
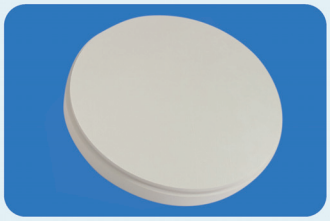
TRILOR®

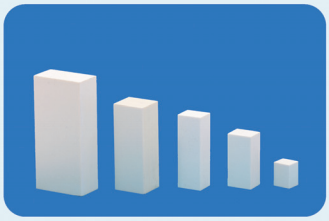
manual

The solution for
a non-metal dentistry

Patented by
bioloren®
metal free dental solutions







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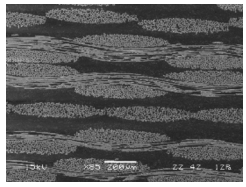
TRILOR

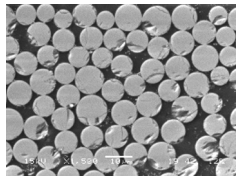
Trilor®: the solution for a non-metal dentistry

1. The Product

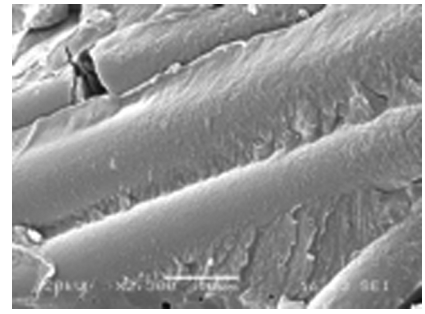
Trilor®, developed by Bioloren Srl, is a new techno-polymer consisting of thermo-setting resin and a multidirectional reinforcement of fibreglass.
Fiber-Reinforced Composite (FRC) composites are the materials used in racing cars, airplanes and many other fields where the demand for high toughness, low weight and great resistance to efforts are essential requirements.



The woven fibre structure reproduces that of the fabric, in a multi-directional configuration, to offer the best performances.



The Matrix/fibre interface is the most critical point of composite structures. Thanks to an extremely precise and reliable industrial production method, Trilor® offers a level of adhesion between the fibres and the resinous matrix, which can greatly amplify the technological characteristics of the material.



2. Physical properties

Tensile Strength	380 Mpa
Flexural Strength	540 Mpa
Tensile Elongation	2%
Flexural Modulus	26 Gpa
Tensile Modulus	26 Gpa
Compressive Strength (perpendicular)	530 MPa
Charpy Impact Strength	300 KJ/cm^2
Rockwell Hardness (scale R)	111 HRR
Barcol Hardness	70
Shore D. Hardness	90
Density	1,8 g/cm^3

3. Characteristics and Advantages

Characteristics	Advantages
Stability of the material	Trilor® is processed 1:1
No sintering – no melting	Trilor® keeps its size, it's stable
Absence of metal and zirconia	Trilor® has no metal, without bimetallism
No corrosion and oxydation	Trilor® is chemically stable
Glass-polymer	Trilor® binds with aesthetic materials
Aesthetics	Trilor® ivory white, ideal support material
Durability	Trilor® is permanent
Bending resistant	Trilor® has 522 MPa and adds resistance
Fatigue resistant	Trilor® after 1,200,000 cycles is stable
Reparability	Trilor® is reparable with composite
Lightness	Trilor® Trilor® weighs 25% less than metal and zirconia
Absorption of liquids	Trilor® has a technology that minimize the absorption of liquids
Time request	Trilor® allows a considerable time saving

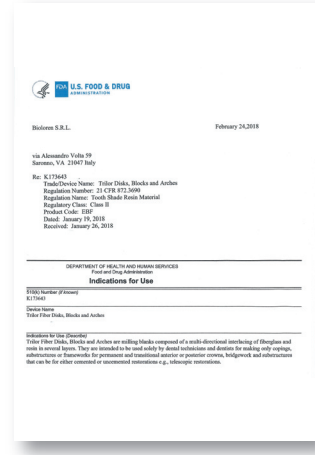
4. Biocompatibility Test

Test	Normativa	Risultato
Genotoxicity Test	ISO 10993-3 e cert. Giapponese	Negative
Citotoxity Test	ISO 10993-5:2009 e 10993-5:2000	Negative
Acute System Toxicity	ISO 10993-11:2006	Negative
Test for Delayed Hypersensitivity	ISO 10993-10:2010	Negative
Animal Skin irritation	ISO 10993-10:2010	Negative
Water Absorption and Solubility Test	ISO 10477-2009	Insoluble
Color Stability at 37 °C for 48 hours of Salin Solution (artificial saliva).	Test interno Bioloren	Stable

5. Mechanical Tests

FatigueTest	University of Siena
Flexural Test and Hardness Test (Barcol)	ISO 14125:2000
Fracture Toughness	ISO 6972:2008 University of Siena

6. 6. Certificates



Trilor® owns the European CE, FDA USA and ANVISA Brazil certifications as permanent prosthetic material.

7. Intended uses

Trilor® MFRC: fibre-reinforced composite) represents the new generation of complex polymers that can be used by the most up-to-date milling machines **for prosthetics, permanent and non-prosthetic substructures.**

Trilor® is compatible with all CAD and CAM software and is available in the forms suitable for all milling machines present in the dental market (grinding and milling).

Applications of Trilor®

Fixed Prosthesis:

- Cappe e ponti sia anteriori che posteriori.
- Hoods and bridges both front and rear.
- Telescopic crowns (primary and secondary)
- Bridges for permanent and provisional restorations, cemented and non-cemented (screwed)
- Adhesive fastening systems both lingual and palatal (ex: Maryland)

Removable prosthesis on implants:

- Reinforcing bars for screwed removable dentures
- Toronto bars
- Screwed sub-structures and coupling superstructures

Partial removable dentures:

- Reinforcement structures (nets and plates)

Orthodontics:

- Adhesive fixing elements
- anchoring structures for adhesive fixed orthodontics
- Connection frames (orthodontics with bone screws)
- Orthodontic retainers

8. How to use

Trilor® from Bioloren is produced in all shapes that the current 3, 4 and 5 axis machines use through milling or grinding. The protocol of use is comparable to the conventional system of operation: digitization of the model and the necessary information, design of the structure to the CAD and milling (or grinding) of the structure through the machines (CAM).

The milling is runnable with water cooling (recommended) and dry.

For the **milling**, it is advisable to use cutters of extra hard material (tungsten carbide) or coated with diamond treatments, with diameters from 0, 6mm to 3mm, with variable speed according to the diameter (from 28000 to 12000 rpm) with feeds on the Z axis of 0.05/0.04 (equal to about 20 mm/second).

For **grinding** (CEREC) see the indications of the manufacturer Sirona.

Trilor® of Bioloren is a thermosetting material of high quality and stability, therefore, after the milling, the structures obtained will already have the shapes and the dimensions established without further treatments (e.g. polymerization, sintering, etc.).
NB: For precise results, it is advisable to run the reference models with easy-to-digitalization materials (special plaster for optical scanning) and to use new tools or in excellent working conditions during milling (or grinding).

Trilor worked

9. Preparations

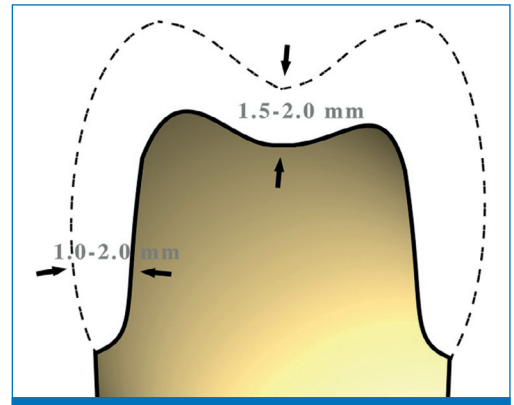
Guidelines for the preparation of natural pillars:

- The ideal finishing line is the chamfer with a thickness of at least 0.8 mm.
- A "knife blade" can be used in accordance with the indications of emergency angle < 12°

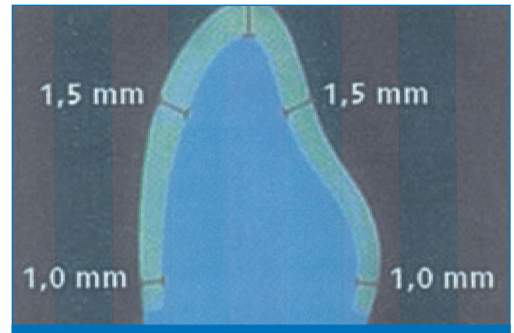
Suggested minimum thicknesses for fixed denture substructures for posterior and anterior teeth.

In the use on implant pillars (abutments) the ´ required height is >4 mm to ensure a good connection quality between the parts. Trilor® can be exposed to oral fluids (high biocompatibility).

NB: The instructions given are guidelines that are derived from a careful research on the materials used.



spessore chamfer



spessori medi

preparazione chamfer

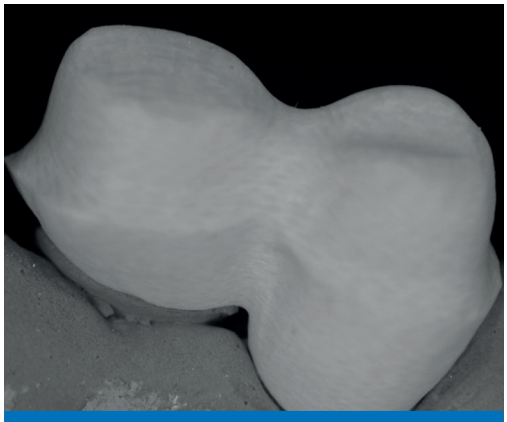
struttura

General instructions for the preparation of fixed prosthesis structures (3d-CAD digital Design):

The substructures in Trilor® for the fixed prosthesis, if a CAD program is used, must be realized element by element, reproducing the anatomies and the shapes most suitable for that type of structure, considering in the drawing the thicknesses and the sections to guarantee the mechanical strength and to improve the aesthetic results after the cover.

- The structures must always have chamfers and rounded corners.
- The vertical (axial) angle of end preparation must be > 4 °
- The passages of the axial or incisive surfaces must be rounded
- The geometry of the structures: balanced and uniformly milled.
- The design of transient lines between emergency profiles and connectors must provide continuity in the Interproximal zones.

anatomia della sottostruttura



sottostrutture

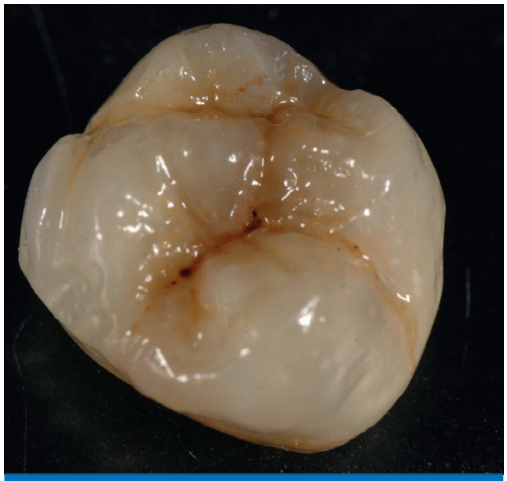
Shape and size of the connectors:

Round and cross connectors with section 7 to 12mm ^{2}. This area must be defined in relation to the number of intermediate elements.
In the case of cantilever, with the size of a molar, the connector must be at least 7mm^2.

Cuspidal support to the covering material and shape of the occlusal surface:

The management of the minimum thickness is facilitated by the properties of connection with the material of aesthetic coating: 0,5mm in the axial profile is an extreme limit, instead 0,3mm represents a possible thickness on the closing line.
However, in addition to the intrinsic numerical value, the adhesion quality between the structure and the ESO-structure of the aesthetic coating becomes crucial for the static and dynamic behavior of the complex composite structure.
The **resinous matrix** of the Trilor® creates a bond with the coating of the aesthetic material able to make the sandwich more powerful than the two separate structures (synergic effect).
CAD-CAM production provides clinically acceptable marginal precision of 50/100 microns.
Trilor® requires an **internal passive space** of not less than 50 microns for cementation material.

adesione tra composito e Trilor



Trilor® coated with composite

Indications for the preparation of bar structures (3d-CAD digital Drawing):

The section of the bars in Trilor® must have a surface of at least 7mm² and it is advisable to carry the larger section on the horizontal axis.

bar

Trilor® bars have the possibility to accommodate inside screwed or cemented mechanical anchors, such as balls and links, which provide the anchoring base for superstructures in Trilor®, hosting the relative females.

This combined solution is best for the respect of osteo-integration of the implant pillar.
In case of use of metallic links it is advisable to consolidate Trilor®, by making a surface pre-treatment on metals (sandblasting and silanisation) and having an axial bonding surface of not less than 4mm². Achieve the union through composite cementation.
The union between the Trilor® substructure and the aesthetic/functional part of the prosthesis takes place with a chemical bond. The steps are: a) cleaning of the surfaces (sandblasting and air jets), b) light curing or with injectable muffle.

Toronto bars:

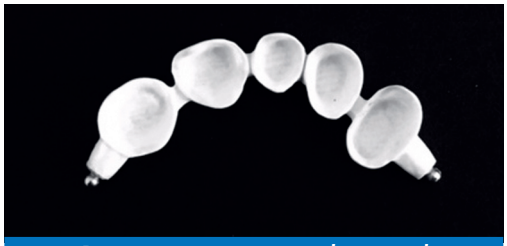
The Toronto bar structures with Trilor® provide a valuable mechanical and aesthetic support.
Many authors have shown that the use of bars on implants with semi-rigid materials reduces the bone retraction in time, unlike the metal bars that are too rigid, which do not allow a physiological dispersion of the occlusal forces, therefore less stress it is transmitted from implants to the bone that needs to be reformed. Trilor® is a semi-rigid fibrous material with a modulus of elasticity similar to that of bone.

Toronto structure

It is advisable to realize 3d projects that respect the rules of thickness reduction as suggested for fixed dentures. The chemical compatibility between Trilor® and, for example, PMMA allows to reconstruct the gingival flanges without any difficulty or risk in adhesion. Pink Trilor® is useful in this case.

Partial removable dentures:

With Trilor®, it is possible to create partial removable structures with hooks (skeletin) or similar structures with the inclusion of preformed anchoring mechanical parts (e.g. ball anchors).
The Union of Trilor® with the necessary functional parts, allows an optimum result both aesthetically and for lightness and, above all, metal-free.



Primary structure with mesial and distal attacks

Partial structure with attacks

IIn these cases, the total biocompatibility of Trilor® guarantees the absolute chemical inactivity with large areas of contact on the buccal mucosa.

Orthodontics

The creation of micro-invasive reinforcement structures for the lingual or palatal blockage of unstable dental elements, finds in Trilor® an excellent material of construction with Cad Cam techniques.

Frequently in orthodontics it is necessary to realize more or less complex structural elements to accommodate or to guide the dynamics of movement of the teeth. In these cases Trilor® proves to be an excellent material for these structures, with lightness, mechanical resistance and little invasiveness.

Trilor®, with its mechanical characteristics, is ideal for the realization of tracts or rods of conjunction in advanced orthodontic treatments, where bone screws are used for anchoring the devices.

The biocompatibility and resistance characteristics of the Trilor® allow the realization of plates of release or of muscular relaxation (bite), with a low weight and with a high stability.

10. Finishing the structures

The finishing of the Trilor® surfaces must be carried out with tools (cutters) which allow to obtain uniformly polished surfaces. We recommend instruments normally used for PMMA surfaces.

The polishing of exposed areas must be done with silicone tools (rubbers) such as those used for composites and diamond paste with brush.

11. Preventive safety measures

During the eventual milling of the structures in Trilor® (finishing) wear protective gloves and mask and use a suction system..

12. Cosmetic cover (general instructions)

The Trilor® structures are ideal for supporting aesthetic materials such as composite, acrylic resin, lithium disilicate, cosmetic ceramics and zirconia.

Some of these materials do not have a chemical affinity with Trilor® due to the lack of a glassy component, which does not allow the use of direct adhesion methods. To cover the structures in Trilor® with ceramic materials we recommend over-bonding and cementation, using techniques and protocols subject to **temperatures never exceeding 150 ° C.**

If it is chosen to reconstruct the dental anatomies using composite materials, follow the indications for specific use of the materials for bridges and crowns.

How to combine aesthetics and function on the structures made in Trilor®:

Acrylic resin (PMMA).

- Sandblast the Trilor® using disposable aluminum dioxide from 50 to 110 micron at 2 bar.
- Clean with air blows (dry, oil-free).
- Treat with silane and allow to evaporate for a few minutes (3/5).
- Apply the acrylic resin directly to the Trilor®, performing the operative protocol indicated by the Manufacturer of the aesthetic material.

Zirconium coating

Zirconium coating

Crown in composite

Composite (stratified)

Several advantages in the use of composites:

- Better aesthetics and stability over time.
- Possibility to repair any fracture of the aesthetic material
- Better absorption of the occlusal forces

The composite coating can be made with a layer technique or a mittle pressing.

- Sandblast The Trilor® using disposable aluminum dioxide at 110 microns at 2 bar.
- Clean with air blows (dry, oil-free).
- Treat with silane and allow to evaporate for a few minutes (3/5). Then apply the bonding of the composite you intend to use.
- Follow the procedures for the use ´ indicated by the composite Manufacturer.

Lithium-Disilicate.

La ricostruzione di parti estetico-funzionali in disilicato di litio, su strutture realizzate in Trilor® si effettua attraverso la realizzazione di elementi (corone o faccette), che vengono "solidarizzate" alla struttura di supporto (Trilor®) attraverso cementazione adesiva.

- Sandblast the structure in Trilor® using disposable aluminum dioxide at 110 micron and 2 bar pressure.
- Clean with air blows (dry, oil-free).
- Apply silane to the surface of the Trilor®. Allow to evaporate for a few minutes (3-5).
- The lithium-disilicate surface that will be in contact with the Trilor® (inside) must be sandblasted using aluminium dioxide from 50 to 110 microns and 2 bars of pressure.
- Use 5% hydrogenated gel for 20 seconds and clean with water for 3 minutes in the ultrasonic bath.
- Apply silane in the lithium disilicate crown and proceed with cementation as indicated by the manufacturer of the resin cement in use.
- Photos at the SEM highlight the perfect union of Trilor® with the lithium disilicate.

Zirconia

The reconstruction of aesthetic-functional parts in lithium disilicate, on structures made in Trilor®, is carried out through the realization of elements (crowns or veneers) that are "solidarized" to the support structure (Trilor®) through adhesive cementation.

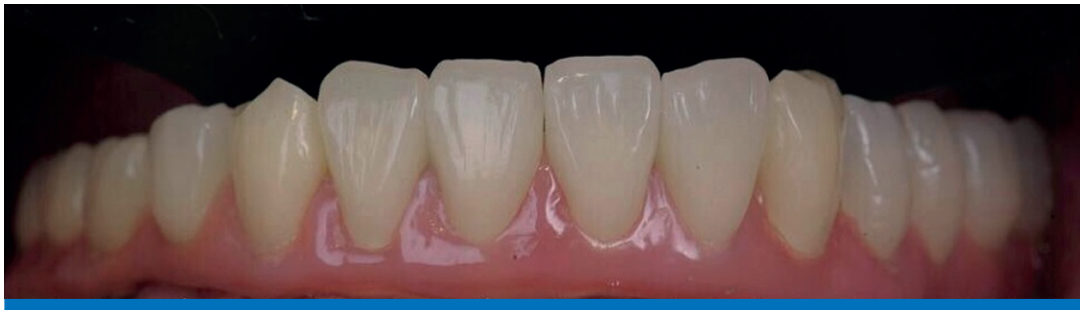
Even in the presence of cosmetic restorations that sometimes concern entire posterior quadrants or entire frontal zirconium groups, it is advisable to use single cemented crowns. The use of extended zirconium solutions (multi-elements) on a less rigid material and with a very different elastic modulus, such as Trilor®, may cause rupture or separation of the zirconium cover.

Cerec

In the case of use of feldspathic ceramics (CEREC) gluing is complete for the high vitreous content and the final aesthetic result is excellent and with high resistance.

13. Disinfection

After any treatment or processing, the prosthetic structure must be cleaned and disinfected according to the national guidelines before being placed "in situ".



disilicato

14. Cementation of the restorations in Trilor®

Proceed with the sanding of the internal surfaces of the structure with Aluminium dioxide from 50 to 100 micron, air pressure from 2 to 2.5 bar. Clean with air. Do not contaminate the sanded surface.

Use a Primer between the structure in Trilor® and the tooth stump or the metal implant component (abutment).

All adhesive cementation is suitable for Trilor®.

15. Removal of restorations.

Be careful when removing fixed restorations. Avoid the leverage in thinner parts, such as connectors.

16. Side effects

No undesirable side effects are known if the Trilor® material is used as indicated.

It is recommended to keep trilor protected from intense light and contaminants.

17. Contraindications to use

- Insufficient oral hygiene.
- Direct application of ceramics (high temperature process).
- Insufficient space available (ex: use of Ti-base Link too Low: < 4 mm).

18. Questions and Answers (FAQ)

a) What are the differences between the Trilor® and the other Metalfree materials on the market?

Ans.: Ans.: Other metal free materials are Peek and the Pekk, both thermoplastics. Although reinforced with glass particles, they have an elastic modulus of less than 4 GPA (the human bone ranges from 20 to 40 GPA, Trilor® has 26 GPA). They have difficulties with adhesion. In order to guarantee sealing, the connectors may not be less than 13 mm ^{2}. They are mainly used as temporary.

Zirconia, although a metal is considered a metal free ceramic material, and is very rigid. With its 220 GPa of elastic modulus, it is often a condition not suitable for absorption of masticatory loads, especially on implant supports. Its processing is burdened by the need for heat treatments for its stability (sintering at high temperatures), by adhesion difficulties with other materials (cementation) and by the absolute absence of repair possibilities, therefore costs and risks .
It has a weight of 4-5 times Trilor®.

b) Is the Trilor® easy to mill?

Ans.: Trilor® works with all milling machines on the market and also with manual micromotors. Being made up of about 74% of glass fibre requires sharp and unworn tools.

CAM software companies, such as Cim System and Hyperdent, have developed specific, updated strategies for the milling of Trilor®, which can be inserted into existing mills with the simple updating of the software already present.

Manufacturers of milling machines such as Yenadent, Roland, VHF and others have added Trilor® to the list of millable materials (automatic strategies).

For the execution with CEREC machines contact Sirona directly.

c) Is Trilor® rebasable and repairable?

Ans.: Trilor® can be rebased with normal composite materials and acrylic resins that bind perfectly to the prepared structure. Even in case of fracture it is possible to repair the structure.

d) Is there an aesthetic Trilor®?

Ans.: Trilor® is not considered an aesthetic covering material because its translucency is not sufficient to guarantee the common aesthetic requirements, but it can still be used for the realization of posterior and functional anatomic prosthetic structures, polishing them with rubber grommets for composites and diamond paste.

19. Available shapes and sizes

Trilor® is available in the following shapes and sizes for use with Cad Cam technologies:

FD S 10 Trilor® disc	Ø 98, 5 mm - H 10 mm
FD S 12 Trilor® disc	Ø 98, 5 mm - H 12 mm
FD S 14 Trilor® disc	Ø 98, 5 mm - H 14 mm
FD S 16 Trilor® disc	Ø 98, 5 mm - H 16 mm
FD S 18 Trilor® disc	Ø 98, 5 mm - H 18 mm
FD S 20 Trilor® disc	Ø 98, 5 mm - H 20 mm
FD S 25 Trilor® disc	Ø 98, 5 mm - H 25 mm
FD A 14 Trilor® disc	Ø 71 mm - H 14 mm
FD A 16 Trilor® disc	Ø 71 mm - H 16 mm
FD A 18 Trilor® disc	Ø 71 mm - H 18 mm
FD A 20 Trilor® disc	Ø 71 mm - H 20 mm
FD A 25 Trilor® disc	Ø 71 mm - H 25 mm
FD Z 14 Trilor® disc	Ø 95 mm - H 14 mm
FD Z 16 Trilor® disc	Ø 95 mm - H 16 mm
FD Z 18 Trilor® disc	Ø 95 mm - H 18 mm
FD Z 20 Trilor® disc	Ø 95 mm - H 20 mm
FD Z 25 Trilor® disc	Ø 95 mm - H 25 mm

Trilor® block	20x19x15 mm
Trilor® block	40x19x15 mm
Trilor® block	55x19x15 mm
Trilor® block	65x25x22 mm
Trilor® block	65x40x22 mm
Trilor® block	85x40x22 mm

OUR COMPANY

BIOLOREN is an innovative Italian company specializing in "Metal free" dental systems.
The company was founded in 1998 and has since focused on the manufacture of cutting-edge dental products.
Over the years the company has earned a considerable reputation as a producer of fiber posts sold in more than 40 countries.
The quality system of BIOLOREN is certified UNI CEI EN ISO 13485. All the products by BIOLOREN are certified CE and many of them also received the prestigious American FDA.
BIOLOREN uses high quality materials and cooperates with important universities both in Italy and abroad.
BIOLOREN offers different product lines:

- Fiber posts
- Fiber ribbons
- Trilor® discs and blocks for CAD/CAM machines and Trilor® Arch for manual use.
- URC Universal resinous Cement + Adhesive system AD+

The products are designed and manufactured by BIOLOREN which owns patents for many of them.
In particular, the research team specializes in the development of fiberglass, carbon and polyethylene products.
BIOLOREN provides metal free solutions to meet the needs of all dentists and dental technicians.
The company distributes worldwide through a network of distributors.

bioloren®
metal free dental solutions

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