

# **Scientific Product Information**

## **Merón**

**Thinflowing glass ionomer luting cement for crowns, bridges,  
inlays, onlays, pins, posts, etc.  
(Merón Mixing Capsule, Merón Handmix and Aqua Merón)**

** RESEARCH & DEVELOPMENT**

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For more than 20 years glass ionomer cements have been used in dentistry as filling, lining and luting cements. The material advantages of glass ionomer cements are mainly their biocompatibility, their fluoride release for caries prevention and their good adhesion to hard dental tissue. The first experimental glass ionomer cement was developed and used as a luting cement. The ideal material properties of a luting cement were outlined by McLean and Wilson et al. [1]

- ◆ good flowability
- ◆ low film thickness
- ◆ user-friendly working and setting times
- ◆ low solubility and good acid resistance
- ◆ high compressive and tensile strength
- ◆ good adhesion to dentine and enamel
- ◆ cariostatic properties
- ◆ pulp-friendliness
- ◆ translucency
- ◆ radiopacity

From this list of requirements it may be gathered that the development is multi-faceted and seemingly difficult. Yet, VOCO Research and Development managed to develop a glass ionomer luting cement which meets the above requirements in any regard. The VOCO glass ionomer cement Merón is a thin-flowing glass ionomer luting cement for crowns, bridges, inlays, onlays, pins and posts and more. For easy handling without any additional equipment, VOCO developed the luting cement Merón as a capsule material. The following chapters present the different variations, properties and application advantages of the luting cement Merón in detail.

### 1. Indications

Merón is indicated for the luting of crowns, bridges, inlays, onlays, pins and posts, orthodontic bands and faceting material.

### 2. Merón Mixing Capsule

After intensive development efforts VOCO research managed to use a new capsule technology also for glass ionomer luting cements. The combination of an innovative capsule and a specifically adjusted type of glass leads to a universal and safe glass ionomer luting material. The luting cement Merón in capsules allows the user to obtain a perfectly mixed cement in a matter of seconds.

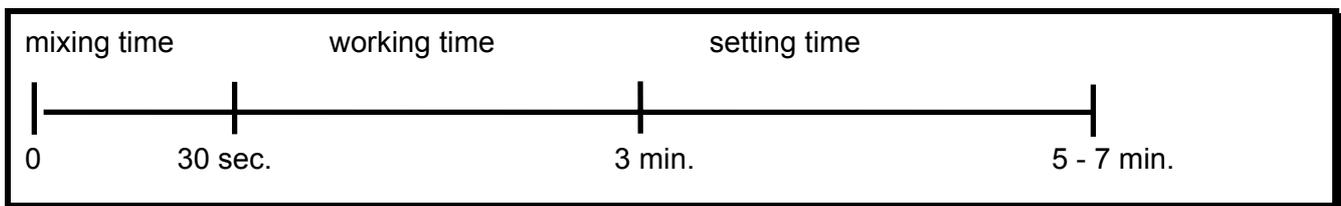
The user-friendly handling of the capsule system saves time and avoids dosing and mixing errors. Additional equipment, such as an activator etc. is not required.

The capsule is activated by turning the screw cap clockwise. After a mixing time of approximately 10 seconds in a conventional high-frequency mixer (4.200 - 4.500 rpm) the bottom cap of the capsule is carefully removed and the material can be taken out with ease. After mixing, Merón has a homogeneous and flowable consistency. Removing the cement from the capsule can be simply and securely done with the spatula enclosed in the pack. Because of the user-friendly design of the capsule Merón can be completely taken out of the capsule in one move.

Merlon is a glass ionomer luting cement which consists of a powder of specially molten fluoro aluminum silicates and a liquid. In Merlon, the usual acid components of glass ionomer cements are added to the powder. In all three variations - capsule, handmix and Aqua Merlon - this predosed adding of polyacids to the powder prevents an overacidification of the cement during application. Thus, pulp reactions unpleasant for the patient are avoided. At the same time the optimizing of the cement components reduces the setting time to a more practical span. Merlon has a soft-elastic setting phase which allows the user to remove excess material conveniently, especially from interdental spaces. The differences between Merlon and Aqua Merlon is that Aqua Merlon contains all active ingredients in the powder component and needs only water for mixing. Thus, the preservative agents of the liquid can be omitted.

In the handmix version Merlon has a mixing ratio powder to liquid of 3:1, Aqua Merlon is mixed in a ratio powder to water 3, 3-3, 8:1. The working and setting times are displayed in picture one.

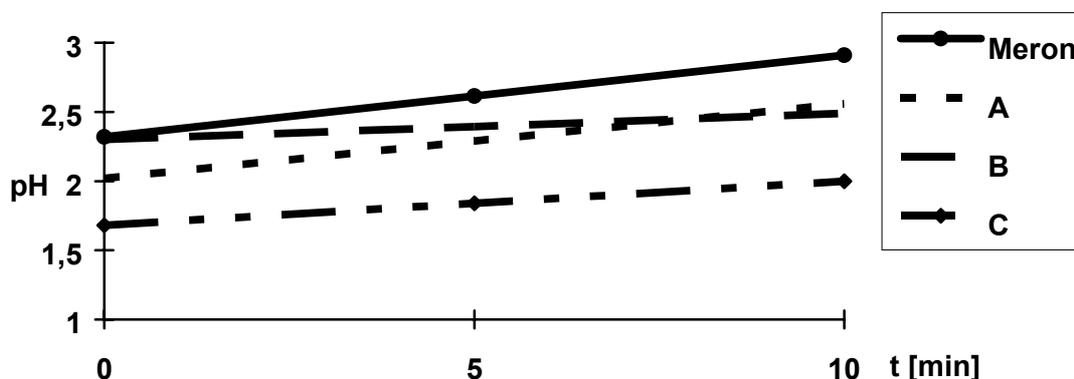
Picture 1: Mixing, working and setting times of Merlon Handmix



### 3. Pulp-friendly material

High compressive strength and low solubility make restorations long-lasting. Patients appreciate a long-lasting but also a patient-friendly setting of the cement intraorally. Merlon is characterized by a low acidity and a minimal temperature increase during the setting process. While the layer for temperature increase is rather thin in luting cements, the development of VOCO glass ionomer cements still paid attention to keep the temperature of the setting process at 37°C maximum. The addition of polyacids to the powder component ensures exact dosage of the cement mixing ratio. These predosed acid components also prevent any pulp reaction typically caused by overacidification, as observed mainly with phosphate cements. The reduced acidity of the polyacrylic acid is another guarantee for a pulp-friendly application of Merlon, as demonstrated in picture 2.

Picture 2: Acidity of glass ionomer cements during the setting process.



Compared to phosphate cement Merlon is an extremely pulp-friendly luting material. The phosphoric acid in phosphate cements is a stronger acid than polyacrylic acid. The smaller phosphate ion can move relatively freely and penetrate deeply into the dentine tubules. The larger acrylate ion is a longer chain and is anchored in the molecular matrix so that the strain on the pulp is reduced.

### 4. Physical properties

**Table 1:** Technical data of the luting cement Merlon

Working time	3	min.
Setting time (intraorally)	3-5	min.
Compressive strength	110	Mpa
Film thickness (capsule/handmix)	15/20	µm
Water solubility (24h)	0,3-0,8	%
Dentine adhesion (shear test)	5-6	Mpa
Radiopacity (capsule)	>200	% Al
Mixing ratio (handmix)	3,0:1	w/w
Powder : liquid		

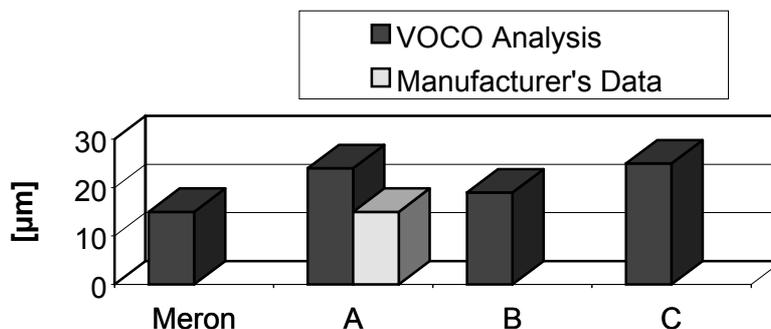
**Table 2:** Comparison of physical properties of glass ionomer luting cements

	Merlon	A	B	C
Dentine adhesion [MPa]	5-6			
Compressive strength [MPa]	110	122,4	119,8	105,1
Radiopacity (% Al)	>200			
Film thickness (µm)	15	2419	25	
Solubility (%)		0,3	0,150,2	0,5

\*partially values from [2]

#### 4.1 Consistency and film thickness

The luting cement Merlon is thin-flowing and can be applied in thin layers. The luting cement can be applied either to the restorative piece or to the tooth: in either case a tight and compressive adhesion is offered. Merlon is distributed optimally in the small gap between tooth and restorative piece and flows into the tiniest space. Merlon's consistency allows it to even be distributed with a brush. The microfine powder of Merlon ensures an extremely low film thickness of 15 µm. Thus, an accurate fit and correct occlusion are guaranteed.

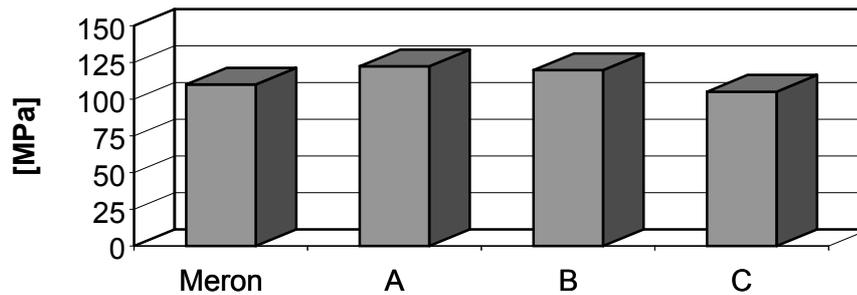
**Picture 3:** Film thickness of glass ionomer luting cements according to ISO 9917/EN 29917

#### 4.2 Adhesion

Because of its „similarity“ to tooth substance the luting cement Merlon provides tight adhesion to tooth substance. The adhesion of glass polyalkenoate cements such as Merlon is built up chemically through intermolecular forces to the hard dental tissue. The thin luting film has a good adhesive as well as cohesive bonding strength. The composition of polymers, combined with the newly developed glass material, also ensures a durable and high adhesion to fixed restorative pieces.

#### 4.3 Compressive strength

**Picture 4:** Compressive strength of glass ionomer cements  
Data partially from [2]



Compressive strength is a measure of the hardness of a material and according to ISO 9917/EN 29917 the only relevant hardness parameter for luting cement. A minimum compressive strength of 70 MPa is required. When fixing restorative pieces the luting cement has to replace missing hard dental tissue in gaps or rough or uneven tooth surfaces or abfractions. Merlon shows a compressive strength significantly higher than the ISO standard, in order to withstand all forces in the mouth as a quasi „restorative“ material.

## 5. Biocompatibility and caries prevention

As a glass ionomer luting cement Merlon is a material with a therapeutic and prophylactic effect. The adhesion to tooth substance offers an excellent and durable marginal seal. The formation of secondary caries is reduced since the continuous fluoride release has a caries-preventive effect on the hard dental tissue bordering on the restorative material. In earlier studies the biocompatibility of glass ionomer cements was already established without doubt [3].

## 6. Toxicological properties

All active ingredients are well-known substances of glass polyalkenoate cements and are monographed in various compositions [cf e.g. 4]. The monographies show their toxicological irrelevance for the indicated fields of application. In addition, there are no indications of carcinogenicity, mutagenicity or teratogenicity for the listed components [cf also 5].

## 7. Experience report

In a study of the St. Petersburg Institute of Dental Therapy and Education for practitioners Merlon was tested as a luting cement. The results of the study can be summarized as follows: the glass ionomer cement Merlon is easy to mix, is simple to handle, sets in the defined timespan, adheres to hard dental tissue and fixed restorative material without fault. Toxic or allergic reactions were not observed. The above institute allows to recommend the glass ionomer cement Merlon for a broad application in therapy.

## 8. Summary

The systematic combination of an innovative capsule technology and a special glass ionomer development ensures the following advantages of the luting cement Merlon

- ◆ very low film thickness for accurate fit
- ◆ high adhesion to dentine and enamel
- ◆ high adhesion to fixed restorative materials
- ◆ durable and patient-friendly luting
- ◆ continuous fluoride release for caries prevention
- ◆ biocompatible
- ◆ pulp-friendly, no overacidification possible

and additionally the advantages of the Merlon Mixing Capsule

- ◆ simplified handling
- ◆ no additional equipment necessary (no activator)
- ◆ no dosing and mixing errors
- ◆ radiopaque

## 9. Literature

- [1] McLean, J. W., Wilson, A. D.; The clinical development of the glass-ionomer cement; Aust. Dent. J. 22, 120 (1977)
- [2] Cattani-Lorente, M-A. et al.; Early strength of glass ionomer cements; Dent Mater 9, 57 (1993)
- [3] McLean, J. W., Wilson, A. D.; Glasionomerzemente; Quintessenz Verlags-GmbH 1988
- [4] Monographien; Glaspolyalkenoat-Zement; Bundesanzeiger 202 vom 27.10.1990, VI n/50-54
- [5] Li, Y. et al.; Evaluation of mutagenicity of restorative dental materials; J. Dent. Res. 69, 1188 (1990)