Bringing you value and support

BAUSCH + LOMB

Boston®

Materials

Bausch + Lomb, Boston® Materials

Adding Value.

Expand the custom contact lens business through product, services, technology

- GP materials
- Soft lens materials
- Licensing of designs
- Educational resources
- Regulatory knowledge
- Industry support
- Strength of B+L and Boston brand to consumers and eye care professionals

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Material matters!

Global Leader for Decades

Boston® GP materials

- US indication of ocular surface disease and dry eye
- Customized buttons
- Supported by guarantee
- Hologram stickers available

Soft lens materials

Hydra PEG coating

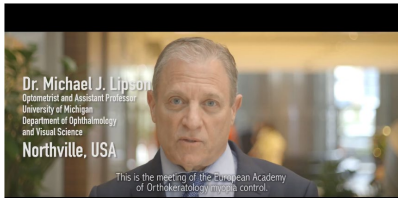
Educational Resources

Educational guides

- Scleral Lens Guide
- Keratoconus Guide
- Presbyopia Guide
- Multiple Languages
- Online and printed formats

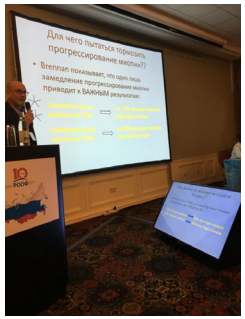
Online Tools:

- Fitting videos
- Webinars



Conferences and Workshops

- Expert speakers



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Timeline of Boston® Materials

1983: Boston™ II silicone acrylate material is introduced.
1983: Boston™ solutions are introduced in the United States.
1984: Boston™ IV silicone acrylate material is introduced.
1986: Polymer Technology Corporation introduces its first fluoro silicone acrylate material, Boston™ Equalens™.
1991: Boston™ Equalens™ II fluoro silicone acrylate lens material is introduced.
1994: Boston 7™ AERCOR™ low silicon/high stability fluoro silicone acrylate lens material is introduced.
1995: Boston ES™ with AERCOR™ architecture is introduced.
1997: Boston XO™ with high Dk/high stability is introduced.
1998: Boston EO™ with AERCOR™ architecture is introduced.
2005: Bausch & Lomb Vision Shaping Treatment VST™ is introduced for overnight orthokeratology (U.S. market only).
2006: Plasma treatment is FDA approved for all Boston materials.
2007: Boston XO_2™, a hyper-Dk material, is introduced.
2008: Guide to Keratoconus and Guide to Scleral Lenses v 1.0 introduced
2013: Scleral Fitting Video series launched
2014: Guide to Scleral Lenses v2.0 introduced
2017: Boston XO and XO_2™ US indication for ocular surface disease and dry eye
2018: HydraPeg Coating Licensing Agreement on Boston ES, EO, XO and XO_2

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Boston® Materials
Introduction to Gas Permeable Materials

Bausch + Lomb Boston's commitment to the field of GP contact lens research:

- improve the comfort,
- physiology,
- and safety of GP lens wear.

The following section contains a basic explanation of corneal physiology and a description of various physical characteristics of gas permeable contact lens materials.

This information permits the fitter to select the appropriate gas permeable lens material for each wearer.

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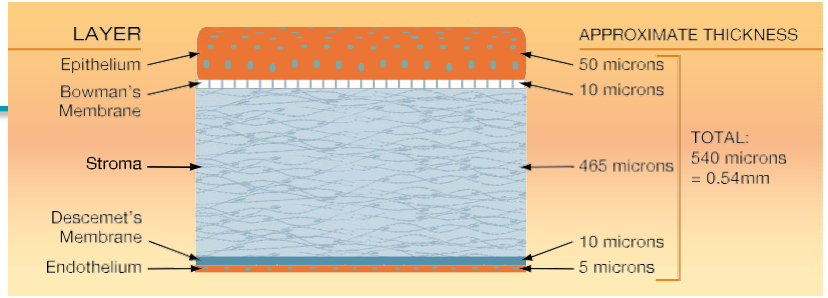
Corneal Physiology



The cornea has 5 layers. They contribute to corneal strength and function.

One of the most important of these corneal layers is the endothelium.

Functions of the endothelium:

- Permeability barrier, allowing the diffusion of nutrients to the cornea.
- Pump mechanism regulates water to maintain the cornea in a partially hydrated state.

Endothelial cells have limited (if any) capacity to regenerate.

Changes in endothelial morphology can occur for example from:

- trauma,
- inflammation,
- long-term oxygen deprivation (hypoxia) as seen in wearers of PMMA.

It is for these reasons that GP lens permeability plays an important role in corneal physiology.

Boston® Materials
Physical Properties of GP Materials

Oxygen

Dk: This term is used to denote the oxygen permeability of rigid and soft contact lens materials.
"**D**" = inherent ability of the material to allow oxygen to diffuse through;
"**k**" = degree to which oxygen is solubilized within or on the material, since water plays some role in absorbing and assisting in the transport of oxygen.

Several methods to measure permeability.

- **Gas-to-gas method** uses a wafer of lens material or a lens affixed to a graduated capillary tube. This allows the volume of oxygen to be measured as it passes through the test material.
- **ISO/Fatt method** uses a wafer or lens affixed to the end of an oxygen probe. The probe is then immersed in a liquid medium. The amount of oxygen that is able to flow through the lens material is then measured. ISO/Fatt is the method used to determine the Dk of Boston materials.

Boston® Materials
Physical Properties of GP Materials

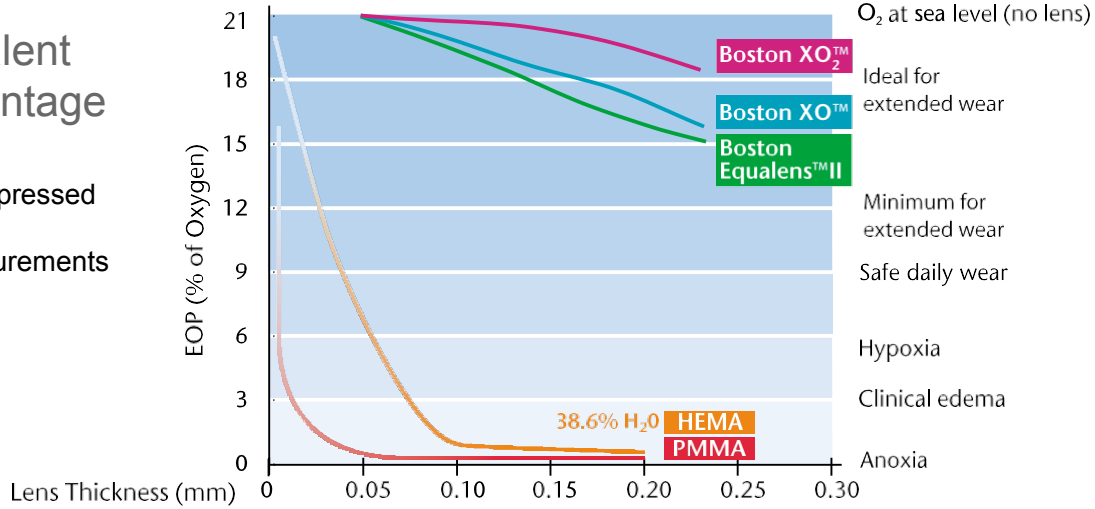
Oxygen

Dk/t: Refers to the transmissibility of a material when it is made into either a plus or minus lens; “t” represents the thickness of a given lens. The significance of this measurement is that the amount of oxygen transmitted can vary depending on the thickness.

EOP: This is perhaps a more meaningful and clinically important value, since it represents the actual amount of oxygen that passes through the lens and reaches the cornea. This measurement takes into account the total lens (material and design).

EOP - Equivalent oxygen percentage

(ISO/Fatt method expressed in cgs units.
EOP and Dk/t measurements are approximate.
Data on file.)



Boston® Materials
Physical Properties of GP Materials

Wetting angle

Wetting angle is often used as a predictor of the on-eye wetting characteristic of a GP contact lens material.

In theory, a low contact angle equates to good lens surface wetting.

The standard test methods for measuring the contact angle of contact lens materials are defined in ANSI Z80.20-2004 as the sessile drop method and the captive bubble method.

	PMMA	Boston™ II	Boston ES™	Boston™ IV	Boston™ Equalens™	Boston EO™	Boston™ Equalens™ II	Boston XO™	Boston XO_2™
Captive Bubble*	60°	20°	52°	17°	30°	49°	30°	49°	38°

* Data on file

Boston® Materials
Physical Properties of GP Materials

Wetting angle

S**essile drop method** measures the angle of contact between a liquid and solid when a drop of standard saline solution is placed on a contact lens surface in air.

C**aptive bubble method** measures the angle of contact between a gas bubble and a polymer surface when a bubble of air floats up against the underside of a flat polymer surface in standard saline solution. In 1978, the CLMA adopted this method as their standard for determining wetting angles on GP materials.

Wilhelmy plate method wetting angles are not measured directly, but are calculated from force measurements as a function of immersion depth of the lens material in saline solution. Two contact angles, an advancing and a receding angle, for a single lens material can be easily determined.

The difference between these two angles is called the contact angle hysteresis. The receding angle measured by the Wilhelmy plate method has been found to be similar to the contact angle measured by the captive bubble technique. But, both angles are needed to completely describe the wetting properties dynamically.

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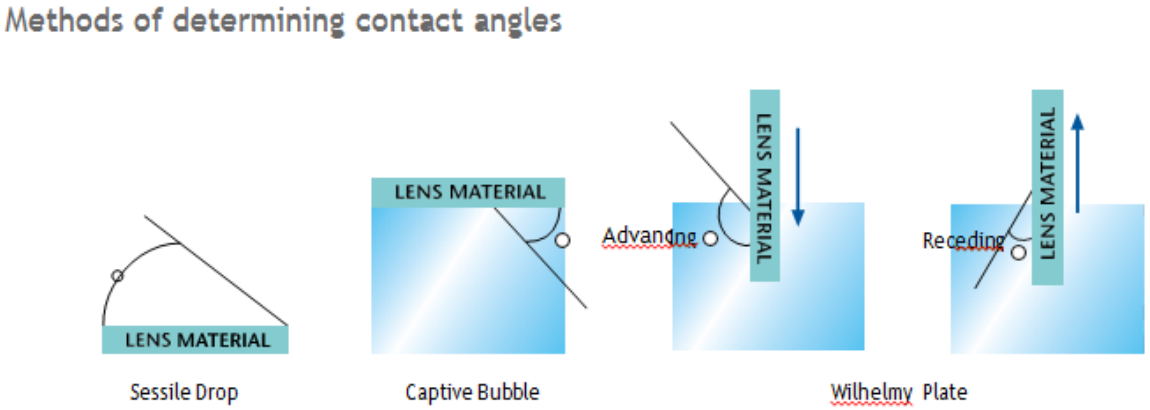
Physical Properties of GP Materials

Wetting angle



A word of caution must be raised when attempting to use any of these contact angle methods to predict actual on-eye wetting characteristic of a GP lens. The human tear film contains components (mucin, lipid, lactoferrin, lysozyme, etc.) that significantly contribute to on-eye contact lens wettability.

The drop of conditioning solution applied to a lens is quickly replaced by tear fluid upon insertion of the lens in the eye. Tear components can vary significantly from person to person.

Boston® Materials
Physical Properties of GP Materials

Hardness

Hardness is generally measured in one of two ways, either by the **Rockwell R Hardness method** or the **Shore D Hardness method**.

Both methods measure the relative resistance of a GP material to indentation and provide an empirical hardness value intended primarily for quality control purposes.

No simple correlation exists between hardness determined by either of these two methods and the fundamental properties of the material being tested.

To better understand the resistance of a GP material to mechanical wear and tear, modulus and toughness should be measured

	PMMA	Boston™ II	Boston ES™	Boston™ IV	Boston™ Equalens™	Boston EO™	Boston™ Equalens™ II	Boston XO™	Boston XO_2™
Rockwell R*	124	119	118	117	117	114	114	112	100
Shore D*	91	85	85	84	82	83	81	81	78

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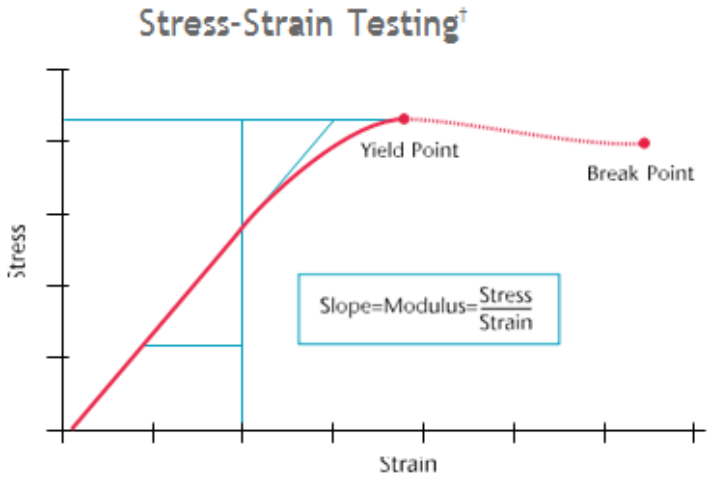
Physical Properties of GP Materials

Modulus

(MPa): (Flexural Modulus)

A force (stress) is applied to a lens causing the lens to deform (strain). This deformation is measured until breakage occurs or until the deformation reaches some predetermined point.

The flexural modulus is the ratio of the stress to strain and is a measure of how well a material resists deformation.



This quality relates to the stiffness of the plastic and affects its ability to “mask” astigmatism.

This is also an important factor in determining lens design and thickness.

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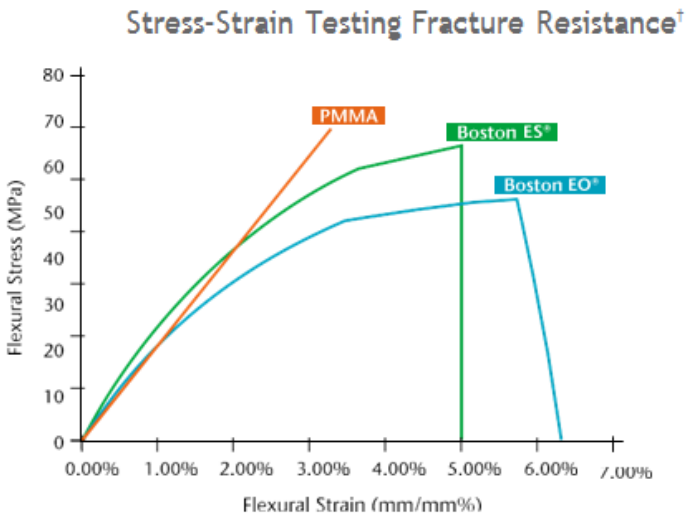
Physical Properties of GP Materials

Toughness

(MNm/m3): (Toughness)

In this test, the lens material sample is flexed until it breaks or reaches some predetermined deformation point. The energy that a lens can absorb before it reaches this point is the toughness of the material.

In GPs, this quality relates to lens handling and durability.



	PMMA	Boston™ II	Boston ES™	Boston™ IV	Boston™ Equalens™	Boston EO™	Boston™ Equalens™ II	Boston XO™	Boston XO2™
Modulus*	2432	1800	1900	1600	1600	1600	1300	1500	1160
Toughness*	2.5	3.0	3.4	2.8	2.8	2.6	0.8	2.6	2.7

* Data on file

† ISO/Fatt method expressed in cgs units. EOP and Dk/t measurements are approximate. Data on file

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Physical Properties of GP Materials

Ultraviolet Absorber

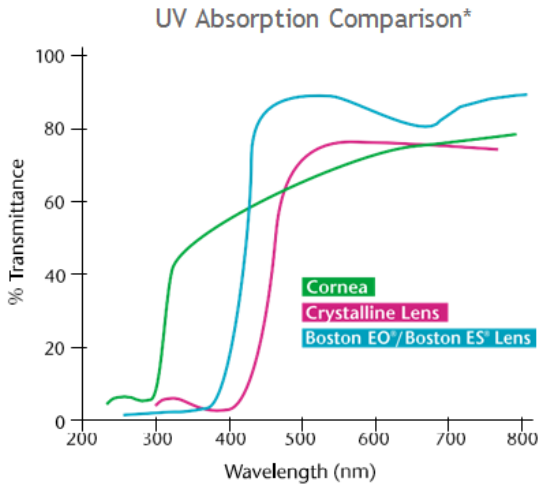
Ultraviolet radiation (UVR) is found adjacent to visible light on the electromagnetic spectrum. UVR is emitted in a range of wavelengths and measured in nanometers (one billionth of a meter).
The shortest wavelength contains the most powerful energy and is most harmful.

UVR begins at approximately 100 nm and extends to 400 nm and is split into:

1. **UVC** rays (100–200 nm) are absorbed by earth's atmosphere.
2. **UVB** (280 nm–315 nm) pass through cloud cover that cause tanning and sunburn.
3. **UVA** (316 nm–380 nm) rays are nearest to the visible light spectrum and least dangerous of the three wavelengths.

Use of UVR absorbers in contact lenses reduces the amount of UV radiation that reaches the underlying structures of the eye (cornea, crystalline lens, retina, etc.), but does not offer total protection.

Protective eyewear (sunglasses, goggles, etc.) is still recommended for maximum protection.



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Physical Properties of GP Materials

Ultraviolet Absorber

The presence of UVR absorbers in GP contact lenses may cause fluorescein pattern detail to be less visible when viewed with the customary white light and cobalt blue filter.

A simple method for enhancing fluorescein pattern viewing is to add a #12 yellow Wratten filter over the front of the slit lamp objectives.

Slit lamp filter kits are available from Bausch + Lomb.

Boston® Materials
Physical Properties of GP Materials

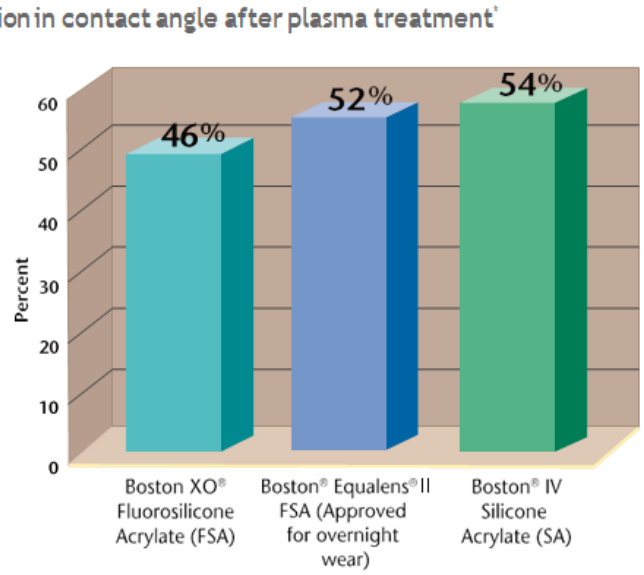
Plasma Treatment

Plasma Treatment is an exciting advancement in the manufacture of GP lenses made with Boston materials. Lenses are placed in a specialized vacuum chamber and bombarded with oxygen ions through the use of a radio frequency generator. The optimized process effectively removes any remaining residuals from the lens manufacturing process from the surface of the lens without changing the bulk material properties.

This process dramatically reduces the wetting angle of the lenses and may improve their comfort for the wearer.

It is important to remember that Boston materials are inherently wettable and do not require plasma treatment to make them wettable.

Therfore, we do not expect Boston plasma treated lenses to become non-wetting after prolonged use and/or time.



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The Boston™ lens materials have undergone an evolutionary process that includes the following developments:

- **Increased oxygen** while maintaining good wetting and deposit resistance
- **Increased stability** and durability without compromising corneal physiology
- **Improved lens machining** qualities and yields, without sacrificing clinical performance

A significant advancement in Fluoro Silicone Acrylate (FSA) technology occurred with the introduction of the AERCOR™ chemical architecture. This unique polymer chemistry permits to maintain and increase oxygen delivery while reducing silicon.

Two of these products are Boston EO™ and Boston ES™.

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Boston ES, Boston EO

In **Boston ES** and **Boston EO**, the majority of the oxygen permeability is already guaranteed by the oxygen-permeable polymer matrix **Aercor**. As a result, the proportion of silicone and fluorine is much lower than with many other materials.

Not only the oxygen permeability is crucial for the suitability of a lens material for certain fitting cases. Also surface wettability, flexibility, stability, refractive index and specific gravity play an important role.

Boston® Materials
Recommendation Overview

Application/Usage	Boston ES™ AERCOR™ Chemistry	Boston EO™ AERCOR™ Chemistry	Boston XO™ Second Generation FSA*	Boston XO$_2$™ Third Generation FSA*
Daily wear	Excellent	Excellent	Excellent	Excellent
Planned replacement	Not recommended	Not recommended	Excellent	Excellent
Thin designs	Excellent	Excellent	Not recommended	Not recommended
Ultrathin designs	Excellent	Not recommended	Not recommended	Not recommended
Toric designs	Excellent (Hyperopic toric)	Excellent	Excellent (Hyperopic toric)	Excellent
Presbyopic designs	Excellent	Excellent	Excellent	Excellent
Corneal rehabilitation (post PMMA wear)	Excellent	Good	Good	Good
GPC rehabilitation	Excellent	Excellent	Excellent	Excellent
Keratoconus	Excellent	Excellent	Excellent	Excellent
Aphakia	Fair	Good	Excellent	Excellent
Post corneal surgery fitting	Excellent	Excellent	Excellent	Excellent
High oxygen demand corneas	Fair	Excellent	Excellent	Excellent
Dry eye	Excellent	Excellent	Excellent	Excellent

* Fluoro Silicone Acrylate

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Boston® Materials

Boston™ II Material

Material Generic Name:	itafocon A
Material Type:	Silicone acrylate
Indications:	• Myopia • Hyperopia • Astigmatism • Keratoconus
Button Diameter	12.7 mm
Modality:	Daily wear
Special Applications:*	• Toric (front, back, bi-toric) designs • Identified lipid depositors • Habitual lens breakage
Special Attributes:*	• Fitting characteristics similar to PMMA • Handling tint: blue

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
12	10-12%	1.471	1.13	119	85	1800 MPa	3.0MNm/m^3	none

* Data on file

† in cgs units

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Boston ES™ Material

Particularly favorable mechanical properties due to the **Aercor** polymer matrix and the very low silicone content.
Lenses from Boston ES are therefore, as far as technically possible, made **very thin**. In the weak minus range, a **reduction in thickness of 30% is achieved**.

Material Generic Name:	enflufocon A	
Material Type:	AERCOR™ fluoro silicone acrylate	
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia	• Keratoconus • Post surgical • Irregular corneal conditions • Presbyopia
Button Diameter	12.7 mm	
Modality:	Daily wear	
Special Applications:*	• Toric (front, back, bi-toric) designs • Aspheric designs • Presbyopic designs (multifocal/bifocal) • Keratoconus designs	• Thin designs (0.12mm @ 3.00 D) • Ultra thin designs (0.10mm @ 3.00 D) • GPC (rehabilitation) • Wetting/lens depositing problems or lens breakage problems
Special Attributes:*	• Exceptional durability and modulus • Exceptional wetting and deposit resistance	• Handling tints: blue, ice blue, green, brown, gray, clear
AERCOR™ Chemical Architecture:	• Low silicon content • Oxygen-permeable "foundation"	• Oxygen-permeable crosslinking

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
18	5-7%	1.443	1.22	118	85	1900 MPa	3.4 MNm/m³	with/without (blue only)

* Data on file
† in cgs units

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Boston® Materials

Boston™ IV Material

Material Generic Name:	itafocon B
Material Type:	Silicone acrylate
Indications:	• Myopia • Hyperopia • Astigmatism • Keratoconus • Presbyopia
Button Diameter	12.7 mm
Modality:	Daily wear
Special Applications:*	• Toric (front, back, bi-toric) • Identified lipid depositors • Rehabilitation of PMMA wearers
Special Attributes:*	• Fitting characteristics similar to Boston II • Handling tint: blue

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
19	14–16%	1.469	1.10	117	84	1600 MPa	2.8 MNm/m^3	none

* Data on file

† in cgs units

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Materials

Boston® Materials

Boston™ Equalens™ Material

Material Generic Name:	itafluorofocon A
Material Type:	Fluoro silicone acrylate
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia • Presbyopia
Button Diameter	12.7 mm
Modality:	• Daily wear • Flexible wear • Extended wear
Special Applications:*	• Variable wearing schedules (FW) • Post-corneal surgery fitting • Handling tint: blue
Special Attributes:*	• Fluorinated polymer for improved oxygen delivery • Contains UV absorber

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
47	13-15%	1.439	1.19	117	82	1600 MPa	2.8 MNm/m^3	with only

* Data on file

† in cgs units

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Materials

Boston® Materials

Boston EO™ Material

Material Generic Name:	enflufocon B	
Material Type:	AERCOR™ fluoro silicone acrylate	
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia	• Keratoconus • Post surgical • Irregular corneal conditions • Presbyopia
Button Diameter	12.7 mm	
Modality:	Daily wear	
Special Applications:*	• Hyperopic toric designs • Keratoconus • Presbyopic designs (multifocal/bifocal)	• Thin designs (0.12mm @ 3.00 D) • Corneas with high oxygen demand • GPC rehabilitation • Corneal rehabilitation (after stabilization)
Special Attributes:*	• Fitting/manufacturing characteristics similar to Boston ES • Excellent wetting/deposit resistance	• Handling tints: blue, ice blue, green, brown, gray, ice green, electric blue
AERCOR™ Chemical Architecture:	• Low silicon content • Oxygen-permeable "foundation"	• Oxygen-permeable crosslinking

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
58	5-7%	1.429	1.23	114	83	1600 MPa	2.6 MNm/m^3	with/without

* Data on file

† in cgs units

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Materials

Boston® Materials

Boston™ Equalens™ II Material

Material Generic Name:	oprifocon A	
Material Type:	Fluoro silicone acrylate	
Indications:	• Myopia • Hyperopia • Astigmatism	• Aphakia • Post surgical • Presbyopia
Button Diameters	12.7 mm, 27 mm	
Modality:	• Daily wear • Flexible wear	• Extended wear
Special Applications:*	• Corneas with high oxygen demand • Orthokeratology (ortho-k) • Presbyopic designs (multifocal/bifocal)	• Post-corneal surgical fitting • Scleral lens designs
Special Attributes:*	• High oxygen delivery	• Handling tints: blue, clear, green

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
85	9-10%	1.423	1.24	114	81	1300 MPa	0.8 MNm/m^3	with/without

* Data on file

† in cgs units

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Materials

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Boston XO™ Material

Material Generic Name:	hexafocon A	
Material Type:	Fluoro silicone acrylate	
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia	• Keratoconus • Post surgical • Irregular corneal conditions • Presbyopia
Button Diameters	12.7mm, 17mm, 21mm, 26mm	
Modality:	Daily wear	
Special Applications:*	• Post-corneal surgery fitting • Planned replacement programs • Presbyopic designs (multifocal/bifocal) • Corneas with high oxygen demand	• Orthokeratology (ortho-k) • Scleral designs • Large diameter lenses for non-diseased eyes
Special Attributes:*	• High oxygen delivery • Stability equaling that of lower Dk materials	• Handling tints: ice blue, violet, blue, green, clear

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
100	8-9%	1.415	1.27	112	81	1500 MPa	2.6 MNm/m^3	with/without

* Data on file

† in cgs units

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Boston XO2 ™ Material

Very high DK value of 141 when a high degree of oxygen permeability matters. Then balance with other material properties (refractive index, specific gravity, stability). Especially in plus range, the specific weight of XO² is advantageous. It is 1.19 and therefore belongs to the lighter materials. In case of large diameter lenses and OrthoK, the focus is clearly on oxygen permeability.

Material Generic Name:	hexafocon B	
Material Type:	Fluoro silicone acrylate	
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia	• Keratoconus • Post surgical • Irregular corneal conditions • Presbyopia
Button Diameters	12.7mm, 17mm, 21mm, 26mm	
Modality:	Daily wear	
Special Applications:*	• Post-corneal surgery fitting • Planned replacement programs • Presbyopic designs (multifocal/bifocal) • Corneas with high oxygen demand	• Orthokeratology (ortho-k) • Scleral designs • Large diameter lenses for non-diseased eyes
Special Attributes:*	• Hyper-transmissability • Stability equaling that of lower Dk materials	• Handling tints: ice blue, violet, blue, green

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness	UV Absorber
141	12-13%	1.424	1.19	100	78	1160 MPa	2.7 MNm/m³	with/without

* Data on file

† in cgs units

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Quantum™ I Material

Material Generic Name:	siflufocon A
Material Type:	Fluoro silicone acrylate
Indications:	• Myopia • Hyperopia • Astigmatism
Button Diameter	12.7 mm
Modality:	• Daily Wear • Flexible Wear
Special Applications:*	• Presbyopic designs (multifocal/bifocal) • Toric lens designs
Special Attributes:*	• Handling tints (I) - ice blue

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness (MN m/m³)	UV Absorber
33	7-8%	1.428	1.25	114	84	1730 MPa	2.2	without

† in cgs units

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Materials

Boston® Materials

Quantum™ II Material

Material Generic Name:	hexafocon A
Material Type:	Fluoro silicone acrylate
Indications:	• Myopia • Hyperopia • Astigmatism • Aphakia
Button Diameter	12.7 mm
Modality:	• Daily Wear • Flexible Wear • Extended Wear
Special Applications:*	• Post-corneal surgery fitting • Presbyopic designs • Corneas with high oxygen demand • Orthokeratology (ortho-k)
Special Attributes:*	• Exceptional material stability • Excellent oxygen for all wearing schedules (19% EOP) • Excellent wetting/deposit resistance • Handling tints (1) - ice blue

Dk† (ISO/Fatt)	Silicon Content	Refractive Index	Specific Gravity	Rockwell Hardness	Shore D Hardness	Modulus	Toughness (MN m/m³)	UV Absorber
100	8-9%	1.414	1.26	112	81	1415 MPa	2.1	without

† in cgs units

07/11/2019

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Boston® Materials
Material Specifications*

	Boston™ II	Boston ES™	Boston™ IV	Boston™ Equalens™	Boston EO™	Boston™ Equalens™ II	Boston XO™	Boston XO_2™	Quantum I	Quantum II
Permeability (ISO/Fatt) cgs units †	12	18	19	47	58	85	100	141	33	100
Rockwell Hardness	119	118	117	117	114	114	112	100	114	112
Shore D Hardness	85	85	84	82	83	81	81	78	84	81
Refractive Index	1.471	1.443	1.469	1.439	1.429	1.423	1.415	1.424	1.428	1.414
Modulus (MPa)	1800	1900	1600	1600	1600	1300	1500	1160	1730	1420
Toughness (MNm/m^3)	3.0	3.4	2.8	2.8	2.6	0.8	2.6	2.7	2.2	2.1
Silicon Content	10-12%	5-7%	14-16%	13-15%	5-7%	9-10%	8-9%	12-13%	7-8%	8-9%
Wetting Angle (captive bubble)	20°	52°	17°	30°	49°	30°	49°	38°	48°	49°
Dynamic Contact Angle (advanced/receding)	58°/57°	52°/50°	58°/57°	59°/56°	62°/60°	59°/56°	59°/58°	50°/40°	62°/60°	67°/66°
Specific Gravity	1.13	1.22	1.10	1.19	1.23	1.24	1.27	1.19	1.25	1.27

* All data on file

† $x10^{-9} cm^3 O_2 (cm)/[(sec.)(cm^2)(mm\ Hg)]@35°C$

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Boston® Materials
Available Standard Blanks - Overview

Material	Dk (ISO/Fatt)	UV Inhib.	Color	Product No.
Boston II	12	no	blue	1000 B
Boston® IV	19	no	blue	1800 B
Boston ES®	18	yes	blue ice blue green brown gray clear	2200 B 2200 FI 2200 A 2200 E 2200 G 2200 C
	18	no	blue	2211 B
Boston® Equalens®	47	yes	blue	1700 B
Boston® Equalens® II	85	yes	blue	1500 B
	85	no	red yellow	1511 R 1511 Y
Boston® Equalens® II, 27 mm	85	no	clear	1531 C
Boston EO®	58	yes	blue ice blue green ice green brown gray el. Blue	2600 B 2600 FI 2600 A 2600 AI 2600 E 2600 G 2600 D
	58	no	blue brown grey	2611 B 2611 E 2611 G
Boston XO®	100	yes	blue ice blue green violet	2300 B 2300 F 2300 A 2300 V
	100	no	red yellow	2311 R 2311 Y
Boston XO® 17 mm Shouldered	100	yes	ice blue	2317 FS
	100	no	clear	2317 CS
Boston XO® 17 mm pre-cut	100	yes	ice blue clear	23F1708003584 23C1708003584
Boston XO® 18,5 mm Shoulderd	100	yes	ice blue clear	23F1858253585 23C1858253585
Boston XO® 21 mm Shouldered	100	yes	ice blue clear	2321 FS 2321 CS
Boston XO® 26 mm	100	yes	clear	2331 C
Boston XO2®	141	yes	blue ice blue green violet	2400 B 2400 F 2400 A 2400 V
	141	no	blue red yellow	2411 B 2411 R 2411 Y
Boston XO2® 17 mm Shouldered	141	yes	ice blue clear	2417 FS 2417 CS
Boston XO2® 18,5 mm	141	yes	ice blue clear	24F1858253585 24C185253585
Boston XO2® 21 mm Shouldered	141	yes	ice blue clear	2421 FS 2421 CS
Boston XO2® 25 mm	141	yes	clear	2431 C
Boston® Envision base curves	58	yes	blue	7,0-8,3
Boston® Multivision base curves	18	yes	blue	7,0-8,3

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Boston® Materials
Boston®Material characteristics in practice

Boston®Material characteristics	Material		
	Boston Equalens	Boston ES	Boston EO
Selection aid:			
Suitability as standard material when no specific needs to be considered	++	++	+
Suitability for higher diopters considering refraction index, Dk and weight (more than +5.00 and -8.00 dpt)	++	-	0
Suitability for extra thin lens designs	0	++	0
Suitability if patient has difficult tear film conditions	+	++	+
Suitability for patients with increased tear lipids and greasy eyelid edges	+	++	+
For increased protein deposits due to wearing conditions	+	**	+
For daily, very long wearing hours	++	+	++
For occasional overnight wear	+	-	+
Suitability for Keratokonus under consideration of special cornea conditions: high irregularity --> stability of material --> Dk	++	+	++
Technical properties:			
Breakage resisitance	+	++	+
Resistance against signs of wear	+	++	+
Stability along with corneal astigmatism and rotation symmetric lens design	+	+	+
Surface wettability	+	++	+

++ very good
+ good
0 satisfying
- still sufficient
-- not recommended

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Boston® Materials
Enzymatic Cleaning

Boston™ One Step liquid enzymatic cleaner is the easiest way to **remove stubborn protein deposits weekly from GP lenses**. This clear, odorless cleaner works together with the disinfecting step, **right in the lens case**.

The convenience of Boston™ One Step liquid enzymatic cleaner should promote patient **compliance** while increasing lens **wearing comfort** and overall **patient satisfaction** with GP lenses.

Ingredients: A sterile, aqueous, solution containing proteolytic enzyme (subtilisin) as the active ingredient, and glycerol. Preservative-free.

How supplied: 5ml dropper bottle

FEATURES	PROVIDES	CLINICAL ATTRIBUTES*
Cleaning efficacy	• Reduces the adherence of and helps remove deposits from lenses	• Provides clean lenses for clear vision • Delivers initial and long term wearing comfort
Simple, one step process	• Convenience, ease of use • Promotes patient compliance and satisfaction • Eliminates tablets and vials	• Liquid form eliminates dissolving time • Clear odorless formula • Clinically proven safe and effective

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Boston® Materials
Slit Lamp Filter Kit

The presence of UV absorbers in some GP materials may cause fluorescein pattern detail to be less visible when viewed with the white light and cobalt blue filter most common in slit lamps.

To aid in the evaluation of fluorescein pattern, these Wratten #12 filters attach unobtrusively to the front of the slit lamp using a small strip of Velcro (included).

With the filter in place, the green glow of the illuminated fluorescein is enhanced for easier viewing.

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Boston™ Laboratory Lens Cleaner

For laboratory and professional use only
(not approved for patient use).

Boston™ laboratory lens cleaner is a solvent-enhanced formulation that effectively and quickly **removes manufacturing residuals** (pitch, wax, solvent). This cleaner also removes **lipids, body oils, and contaminants (found in personal skin care products) from the surfaces of all GP lenses**.

When used to prepare lenses prior to dispensing, Boston™laboratory lens cleaner helps prevent or **eliminate lens non-wetting and hazy vision** of GP lenses.

FEATURES	PROVIDES	CLINICAL ATTRIBUTES
Combination of powerful surfactants	• Quick, effective, cleaning of lens surfaces	• Clean, comfortable GP lenses • Helps lens surfaces to wet fast and completely
2-propanol 10%	• Thorough removal of manufacturing residuals • Removes stubborn deposits from difficult-to-clean lenses	• Ensures excellent initial wetting and good vision • Helps to resolve heavy deposit and lens contamination problems

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Extended Keratometer Range + Vertex Conversion

Extended Keratometer Range

Extended Keratometer Range with +1.25 D Lens		Extended Keratometer Range with -1.00 D Lens	
Actual Drum Reading	Extended Value	Actual Drum Reading	Extended Value
43.00 D	50.13 D	36.00 D	30.87 D
43.25 D	50.42 D	36.25 D	31.09 D
43.50 D	50.72 D	36.50 D	31.30 D
43.75 D	51.01 D	36.75 D	31.51 D
44.00 D	51.30 D	37.00 D	31.73 D
44.25 D	51.59 D	37.25 D	31.95 D
44.50 D	51.88 D	37.50 D	32.16 D
44.75 D	52.17 D	37.75 D	32.37 D
45.00 D	52.46 D	38.00 D	32.59 D
45.25 D	52.76 D	38.25 D	32.80 D
45.50 D	53.05 D	38.50 D	33.02 D
45.75 D	53.34 D	38.75 D	33.23 D
46.00 D	53.63 D	39.00 D	33.45 D
46.25 D	53.92 D	39.25 D	33.66 D
46.50 D	54.21 D	39.50 D	33.88 D
46.75 D	54.51 D	39.75 D	34.09 D
47.00 D	54.80 D	40.00 D	34.30 D
47.25 D	55.09 D	40.25 D	34.52 D
47.50 D	55.38 D	40.50 D	34.73 D
47.75 D	55.67 D	40.75 D	34.95 D
48.00 D	55.96 D	41.00 D	35.16 D
48.25 D	56.25 D	41.25 D	35.38 D
48.50 D	56.55 D	41.50 D	35.59 D
48.75 D	56.84 D	41.75 D	35.81 D
49.00 D	57.13 D	42.00 D	36.02 D
49.25 D	57.42 D		
49.50 D	57.71 D		
49.75 D	58.00 D		
50.00 D	58.30 D		
50.25 D	58.59 D		
50.50 D	58.88 D		
50.75 D	59.17 D		
51.00 D	59.46 D		
51.25 D	59.75 D		
51.50 D	60.04 D		
51.75 D	60.33 D		
52.00 D	60.63 D		

Vertex* Conversion

–		+
-3.87	4.00	+4.25
-4.00	4.25	+4.50
-4.25	4.50	+4.75
-4.50	4.75	+5.00
-4.75	5.00	+5.25
-5.00	5.25	+5.62
-5.12	5.50	+5.87
-5.37	5.75	+6.12
-5.62	6.00	+6.50
-5.75	6.25	+6.75
-6.00	6.50	+7.00
-6.25	6.75	+7.37
-6.50	7.00	+7.62
-6.62	7.25	+8.00
-6.87	7.50	+8.25
-7.12	7.75	+8.50
-7.25	8.00	+8.87
-7.50	8.25	+9.12
-7.75	8.50	+9.50
-7.87	8.75	+9.75
-8.12	9.00	+10.12
-8.37	9.25	+10.37
-8.50	9.50	+10.75
-8.75	9.75	+11.00
-8.87	10.00	+11.37
-9.37	10.50	+12.00
-9.75	11.00	+12.75
-10.12	11.50	+13.37
-10.50	12.00	+14.00
-10.87	12.50	+14.75
-11.25	13.00	+15.50
-11.62	13.50	+16.12
-12.00	14.00	+16.75
-12.37	14.50	+17.50
-12.75	15.00	+18.25
-13.00	15.50	+19.00
-13.50	16.00	+19.75
-13.75	16.50	+20.50
-14.12	17.00	+21.50
-14.50	17.50	+22.25
-14.75	18.00	+23.00
-15.12	18.50	+23.75
-15.50	19.00	+24.75

* The distance between the lens and the cornea is 12mm.

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Diopter to Radius (mm) Conversion

Diopter to Radius Conversion Formula 337.5/D = mm Radius to Diopter Conversion Formula 337.5/mm = D					
Diopter	**Radius**	**Diopter**	**Radius**	**Diopter**	**Radius**
23.00 D	14.67mm	39.00 D	8.65mm	49.00 D	6.89mm
24.00 D	14.06mm	39.25 D	8.60mm	49.25 D	6.85mm
25.00 D	13.50mm	39.50 D	8.54mm	49.50 D	6.82mm
26.00 D	12.98mm	39.75 D	8.49mm	49.75 D	6.78mm
27.00 D	12.50mm	40.00 D	8.44mm	50.00 D	6.75mm
28.00 D	12.05mm	40.25 D	8.39mm	50.25 D	6.72mm
29.00 D	11.63mm	40.50 D	8.33mm	50.50 D	6.68mm
30.00 D	11.25mm	40.75 D	8.28mm	50.75 D	6.65mm
31.00 D	10.88mm	41.00 D	8.23mm	51.00 D	6.62mm
31.25 D	10.80mm	41.25 D	8.18mm	51.25 D	6.58mm
31.50 D	10.71mm	41.50 D	8.13mm	51.50 D	6.55mm
31.75 D	10.63mm	41.75 D	8.08mm	51.75 D	6.52mm
32.00 D	10.54mm	42.00 D	8.04mm	52.00 D	6.49mm
32.25 D	10.46mm	42.25 D	7.99mm	52.25 D	6.45mm
32.50 D	10.38mm	42.50 D	7.94mm	52.50 D	6.42mm
32.75 D	10.30mm	42.75 D	7.89mm	52.75 D	6.39mm
33.00 D	10.22mm	43.00 D	7.85mm	53.00 D	6.36mm
33.25 D	10.15mm	43.25 D	7.80mm	53.25 D	6.34mm
33.50 D	10.07mm	43.50 D	7.76mm	53.50 D	6.31mm
33.75 D	10.00mm	43.75 D	7.71mm	53.75 D	6.28mm
34.00 D	9.92mm	44.00 D	7.67mm	54.00 D	6.25mm
34.25 D	9.85mm	44.25 D	7.63mm	54.25 D	6.22mm
34.50 D	9.78mm	44.50 D	7.58mm	54.50 D	6.19mm
34.75 D	9.71mm	44.75 D	7.54mm	54.75 D	6.16mm
35.00 D	9.64mm	45.00 D	7.50mm	55.00 D	6.13mm
35.25 D	9.57mm	45.25 D	7.46mm	55.25 D	6.10mm
35.50 D	9.50mm	45.50 D	7.42mm	55.50 D	6.08mm
35.75 D	9.44mm	45.75 D	7.38mm	55.75 D	6.05mm
36.00 D	9.37mm	46.00 D	7.34mm	56.00 D	6.03mm
36.25 D	9.31mm	46.25 D	7.30mm	56.25 D	6.00mm
36.50 D	9.24mm	46.50 D	7.26mm	56.50 D	5.97mm
36.75 D	9.18mm	46.75 D	7.22mm	56.75 D	5.95mm
37.00 D	9.12mm	47.00 D	7.18mm	57.00 D	5.93mm
37.25 D	9.06mm	47.25 D	7.14mm	57.25 D	5.90mm
37.50 D	9.00mm	47.50 D	7.11mm	57.50 D	5.88mm
37.75 D	8.94mm	47.75 D	7.07mm	57.75 D	5.85mm
38.00 D	8.88mm	48.00 D	7.03mm	58.00 D	5.83mm
38.25 D	8.82mm	48.25 D	6.99mm	58.25 D	5.80mm
38.50 D	8.76mm	48.50 D	6.96mm	58.50 D	5.77mm
38.75 D	8.70mm	48.75 D	6.92mm	58.75 D	5.75mm

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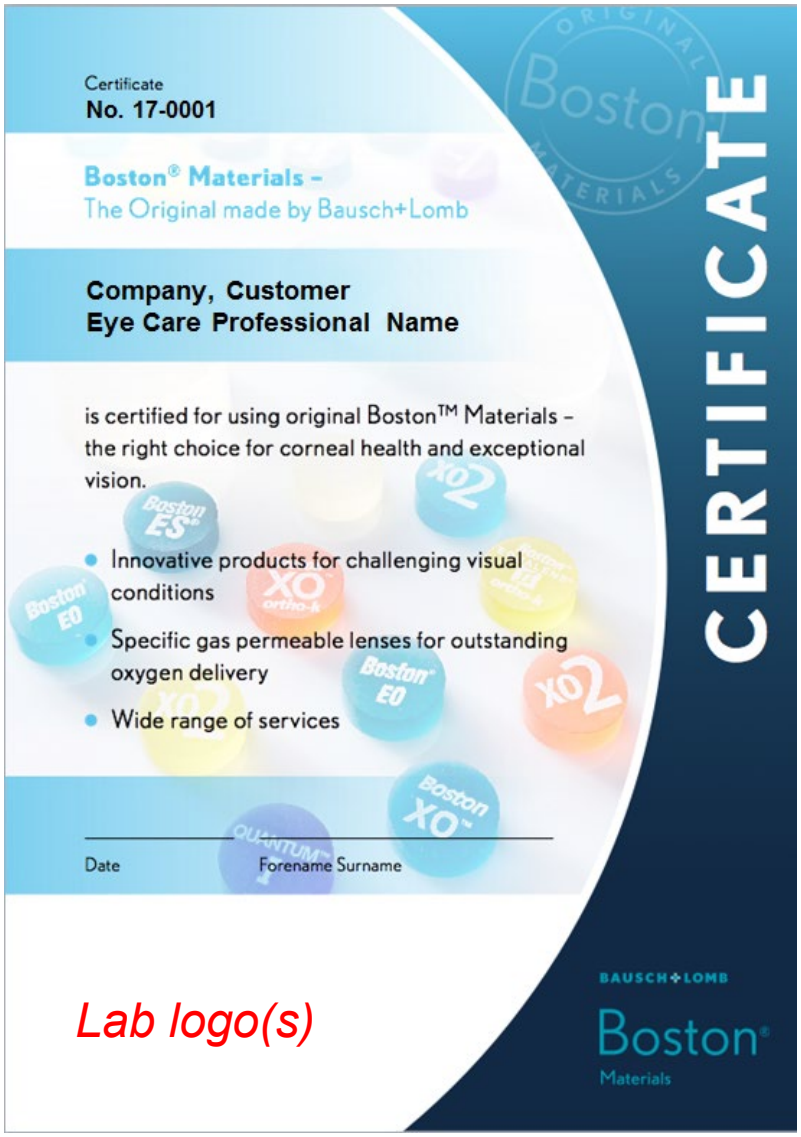
Example of customizable Boston® Materials Certificate
for successfully fitting specialty lenses



Lab logo(s)

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