Специальное стекло и стеклокерамика
Описание

По вопросам продаж и поддержки обращайтесь:

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Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
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Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
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Красноярск (391)204-63-61
Курск (4712)77-13-04
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Пенза (8412)22-31-16
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Симферополь (3652)67-13-56
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Ставрополь (8652)20-65-13
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Сыктывкар (8212)25-95-17
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Тольятти (8482)63-91-07
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Тула (4872)33-79-87
Тюмень (3452)66-21-18
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Улан-Удэ (3012)59-97-51
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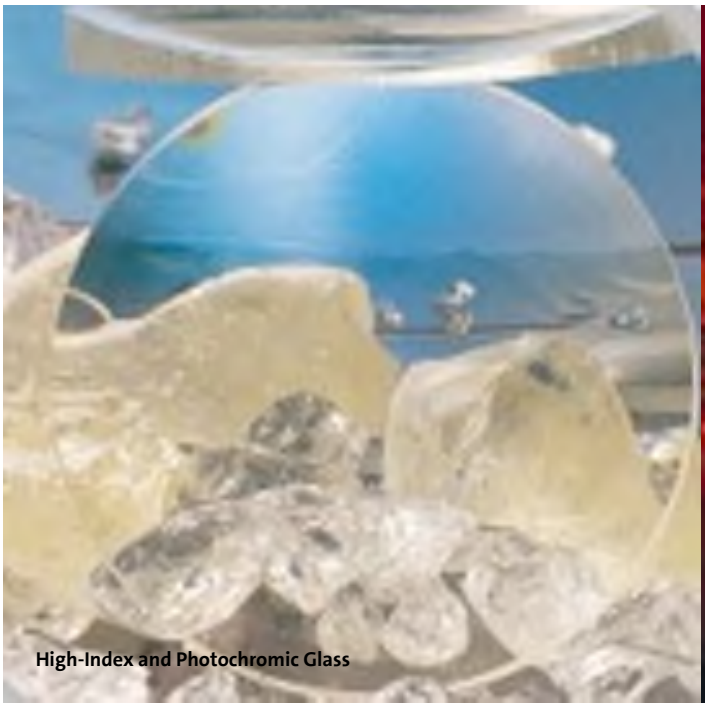
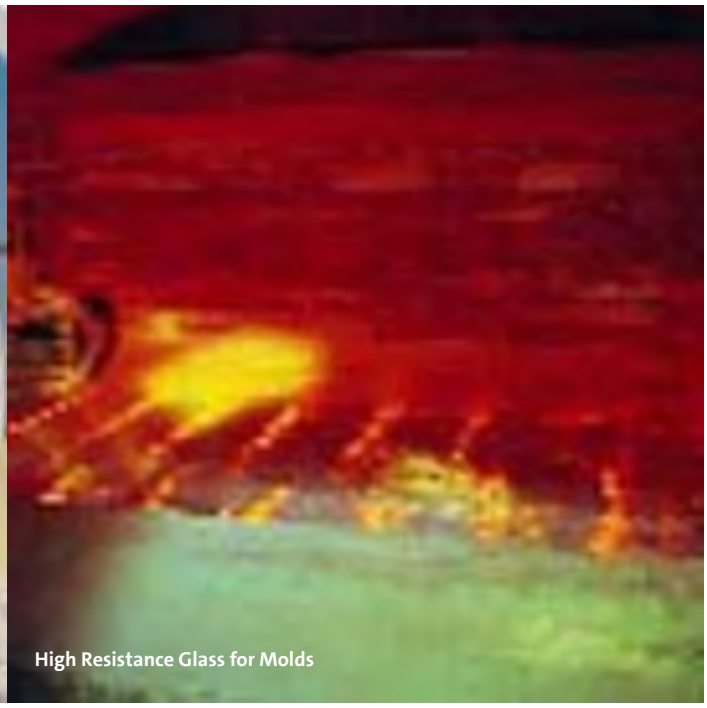
Corning has a long history of providing a range of high-quality ophthalmic glass solutions.

Corning is a leading supplier of customer-driven solutions and technologically advanced materials for ophthalmic market. Leveraging our revolutionary invention of the glass photochromic lens in the 1960s, we use our many years of experience in the ophthalmic field to propose a range of solutions for ophthalmic applications.

Glass Solutions



High-Index and Photochromic Glass



High Resistance Glass for Molds

High-index glass blanks

From 1.6 (also in photochromic material, gray, and brown) to 1.9, Corning offers a range of high-refractive index materials for thinner, lighter lenses of top optical quality.

High-index glass lenses are the market reference for lens thinness, combining visual acuity and aesthetics. Designed to offer the world's highest Abbe values, index for index, our complex compositions (we use up to a dozen different ingredients for some of our grades) are rigorously researched, and produced in ISO 9001-certified facilities, assuring consistent quality, ease of processing, and anti-reflective (AR) compatibility.

Furthermore, our 1.8 and 1.9 index glasses are repressed, a unique capacity improvement feature which translates into short delivery deadlines and speed-to-market for our customers.

1.6 INDEX
For slight to medium correction. The reduction in thickness is noticeable and brings with it a general performance improvement.

1.7 INDEX
For medium to strong correction. The reduction in thickness brings an immediate improvement in appearance and visual comfort.

1.8 INDEX
For very strong correction. This lens eliminates the problem of unacceptably thick lenses.

1.9 INDEX
The high-tech lens of the Corning range - the thinnest mineral lens in the world.

Photochromic glass blanks

Since we first commercialized photochromic eyeglass lens materials in 1968, under the Photogray® brand, our company's dedication to this market has never stopped, resulting in a wide variety of glass photochromic lenses available worldwide.

Color consistency is a must; any slight difference in color or in darkening/fading speed from one lens to another would be unacceptable. Thanks to a perfectly mastered process in our ophthalmic glass plant, more particularly during photochromic activation at the annealing stage, as well as to thorough Quality Control, Corning guarantees color consistency, batch after batch.

CORNING PHOTOCHROMIC GLASS RANGE

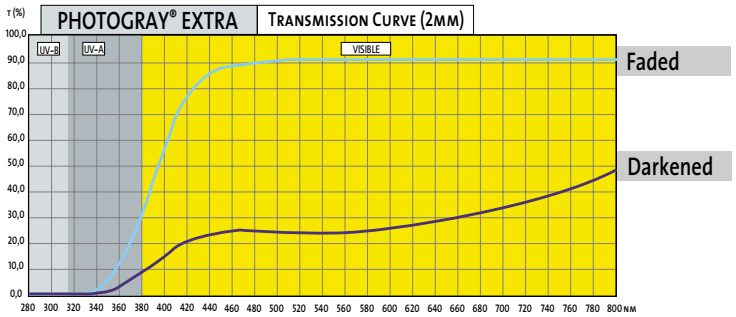
All our products are compatible with anti-reflective (AR) treatment.

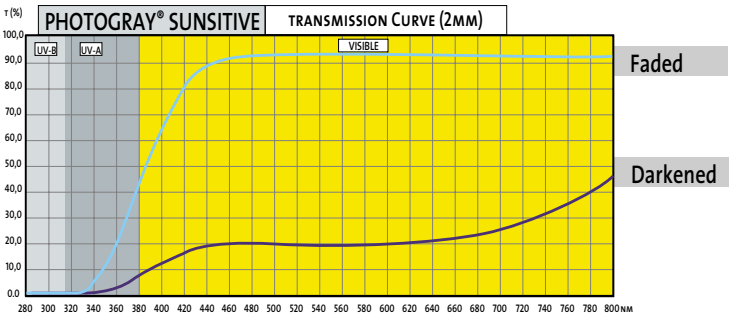
PHOTOGRAY® EXTRA
PHOTOBROWN® EXTRA

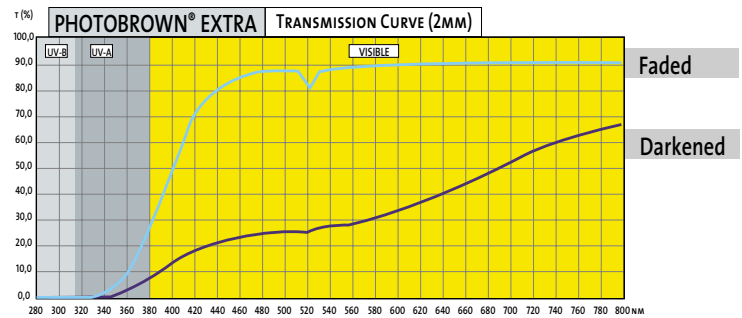
- World's classic best-seller.
- Multi-purpose photochromics.
- Ultra-wide power/parameter range.
- Ideal both for work and outdoor lens wear.
- Recommended for all lens types and designs.

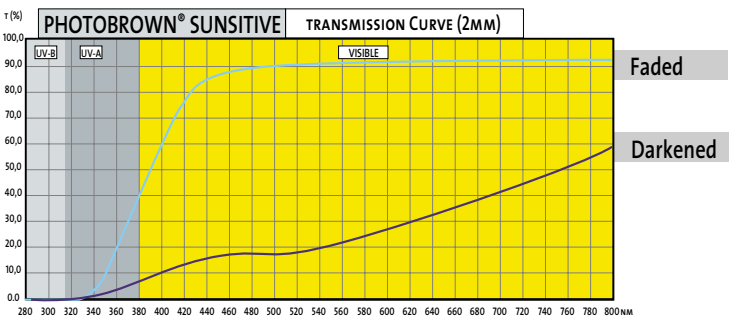
PHOTOGRAY® / PHOTOBROWN® SUNSITIVE

- Glasses that darken farther.
- Faster darkening at any temperature.
- Ideal for hot climates, strong sunlight.
- Specifically designed for single vision lenses.









Technology you can trust™

CORNING
PHOTOCHROMIC GLASS RANGE

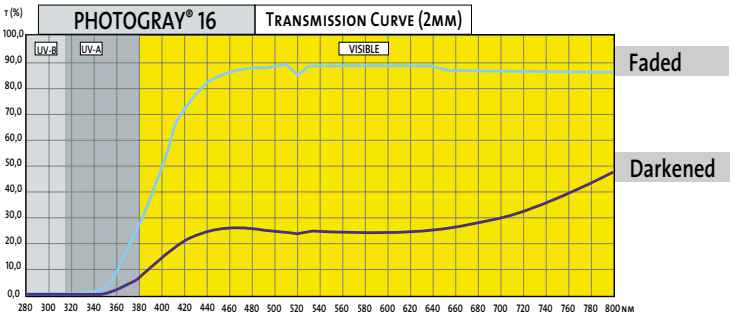
All our products are compatible with anti-reflective (AR) treatment.

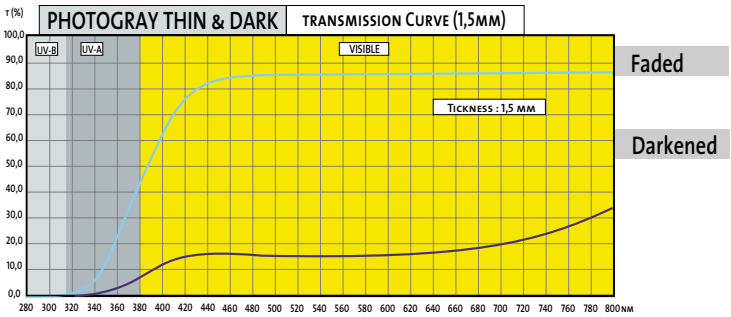
PHOTOGRAY® 16 – PHOTOBROWN® 16/45

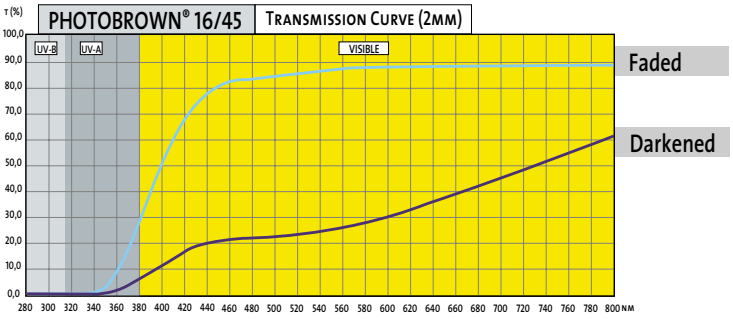
- High index and photochromic benefits combined.
- Thin lenses plus sun protection.
- Specially recommended for progressive and aspherics.

PHOTOGRAY® THIN AND DARK

- Chemtemperability improved.
- Can be polished to 1.5 mm thickness.
- Very dark even for thin lenses.
- Darkest photochromic material.







Technology you can trust™

Our high-performance glass composition provides geometric precision and high durability for glass molds and glass blanks.

High-Resistance Glass for Molds

Corning's QE glass blanks for molds feature a high-performance glass composition, specially designed for plastic lens manufacturers who expect both geometric precision and high durability.

QE glass is reliable, quality consistent, and suited to all types of lenses, plastic materials, and curing processes.

It can be chemically strenghtened through an ion-exchange process to bring exceptional mechanical properties (strong compression and penetration depth for enhanced breakage and scratch resistance). Its chemical properties (resistance to water, acid and alkali) ensure mold integrity for hundreds of casting-cleaning loops.

Product Specifications

The mechanical and chemical properties that create the strength, versatility, and consistency of our advanced glass.

Technical Data	QE Glass
Density (g/cm^3)	2.62
Youngs' modulus E (kg/mm^2)	69.3
Torsion modulus G (kg/mm^2)	28.1
Poisson coefficient μ	0.231
Knoop hardness Hk 100 (kg/mm^2)	499
Softening temperature T1 (°C)	735
Water durabity (class)	HGB3
Penetration depth (μm)	90°
Compression (PSI)	53000*
Acid durability (class)	3*
Alkali durability (class)	A2*

*Measured after chemical tempering, using the following parameters: 16 hours at 450 °C, $^3KNO_3$ bath^2

Tinted Glass Products

A Basic Definition and a Bit of History

As everyone knows, sunglasses are made with darkened, usually tinted glass lenses to filter the quantity of light reaching the eyes. Their purpose is mainly to eliminate ultraviolet (UV) rays, to reduce direct light to the desired level of comfort and to eliminate or decrease glare.

But most of us are less familiar with the motivations of those who pioneered this concept two centuries ago. At a time when no one had heard about damaging UVs and everyone was naturally adapting to strong summer light with hats or visors, the aim of tinted glasses was initially to correct vision impairment (better techniques were soon developed), and later on to protect patients who had developed an abnormal sensitivity to light due to specific diseases. Not too surprisingly, the extended use of tinted glass by a much larger share of the world population came around the 1920s, from the fashionable imitation of movie stars who had to protect their eyes from extremely bright lights on the sets (*bright lighting was used to make up for the low sensitivity of the first black & white films*).

Not forgetting other occasional use, like hiding our emotions or physical defects, avoiding eye contact, or going unnoticed, we nowadays add outdoor eye comfort, style, and fashion benefits to the protection of our eyes from excessive ultraviolet radiation, which can lead to various diseases such as photokeratitis or cataract, as reiterated by health care professionals.

Tinted glass and technologies

Glass lens being naturally scratch resistant, it offers an impressive acuity and optical clarity. Glass lens remains the most efficient choice to address the premium Sunglass market.

Tinted Glass

Depending on the color, the lens will eliminate specific wavelengths (some frequencies or wavelengths can blur vision, and others, like green, can enhance contrast). For example, while gray and brown are the most widely-sold multi-purpose tints, yellow is used in snow glasses to enhance sharpness/details on ski slopes. Similarly, purple and rose tints may offer more contrast in a green or blue environment, useful for hunting or water skiing.

Lens Color	Properties
Transparent (UV filter but no tint)	Protects from UV/spatter/wind/dust/insects
Gray	Neutral, all-purpose tint which does not enhance contrast or distort colors Offers good protection against glare Good choice for driving and general use
Green	Excellent visual acuity - good contrast enhancer Minimal color distortion, reinforces natural green Reduces glare
Brown	Warm, popular, multi-purpose tint Minimal color distortion - reduces glare - enhances contrast and clarity Absorbs higher frequency colors, such as blue Useful in aquatic environment (best for fishing) and under hazy sky

Amber/Yellow	Best contrast enhancement in faint to moderate light (ideal for skiing under cloudy sky) Color distortion Improves depth perception (ideal for golfing)

Photochromic tinted glass

These lenses incorporate photochromic molecules which undergo a reversible chemical process when exposed to UV rays. This change of shape (gain/loss of an electron for silver atoms in photochromic glass) results in the absorption of visible light, causing the lenses to darken. These tinted glasses will darken when exposed to UVs and fade back indoors – ideal for changing environments.

Other treatments

Finally, apart from the usual anti-reflective (AR) treatment, tinted glasses can also be coated with a complementary waterproof treatment (also active against condensation and stains) as well as with a very thin reflective coating (mirror effect), sometimes with a gradient effect so that added reflectivity/protection occurs on the upper half of the lens while better visibility is reserved for the lower half (ideal for driving in a sunny environment – reading the dashboard).

Protection standards

As tinted glass should protect the retina from intense sunlight, improve perception, and reduce eye fatigue overall, the standards below have been designed for patients to know precisely which level of protection and visibility they are buying (based on regulated labelling, similar to UV filters in cosmetics).

On the manufacturers' side, knowing the exact specifications of the standards allows not only full compliance with the rules, but also the creation of a range of products which will best address different categories and market expectations.

Three regulatory standards coexist worldwide, which specify the detailed safety and performance requirements (including the expected physical properties) for non-prescription sunglasses and fashion eyewear in order to obtain a specific lens category (cat)/classification:

RANGE OF LUMINOUS TRANSMITTANCE (from over... to...)	SUITABLE LIGHT CONDITIONS	LENS CATEGORY AS-1067	DESCRIPTION AS-1067
80 to 100 %	Indoor	0	Fashion spectacles - not tinted glass Very low sunglare reduction Some UV protection
43 to 80 %	Limited sunlight	1	Fashion spectacles - not tinted glass Limited sunglare reduction Some UV protection
18 to 43 %	Moderate sunlight	2	Tinted glass Medium sunglare reduction Good UV protection
8 to 18 %	Strong sunlight	3	Tinted glass High sunglare reduction Good UV protection
3 to 8 %	Extreme sunlight – not suited to driving	4	Tinted glass – special purpose Very high sunglare reduction Good UV protection

RANGE OF LUMINOUS TRANSMITTANCE	DESCRIPTION ANSI-Z80.3
Greater than 40 %	Cosmetic lens or shield, Light
8 to 40 %	General purpose lens or shield, Medium to dark
3 to 8 %	Special purpose lens or shield, Very dark
Up to 3 %	Special purpose lens or shield, Strongly colored

Comments

Choosing a lens category should take into account the local intensity of light, how sensitive the tinted glass wearer is to glare, and the need for UV protection (especially at high altitudes).

The highest categories (cat 4 or less than 8% transmission for both European and Australian standards) being devoted to specific applications (such as mountaineering or protection of hypersensitive eyes), they are not suited to driving, an aspect which international standards also take into account (traffic signal vision tests data).

Regulators are actively working on a new, global standard.

Corning has chosen to offer only medium or high levels of protection, thus not to address category 0 or 1 tinted glass.

Corning Specialty Glass offers a wide variety of glass solutions, including tinted lenses, photochromics, and transparent UV filter glass lenses for the manufacturing of polarized tinted glass. Our products, which you will find in some of the world's leading tinted glass brands, comply with all international standards and beyond.

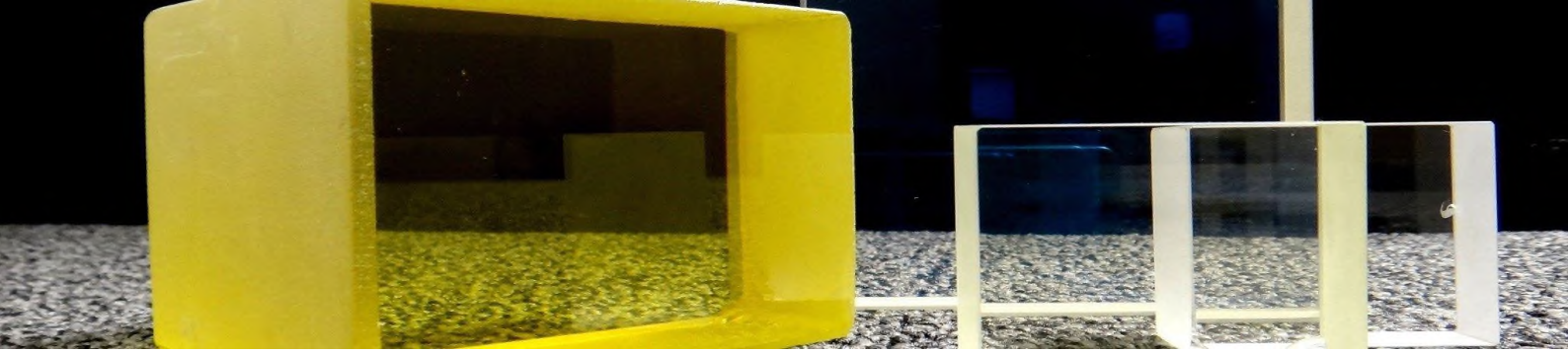
Sunglass Portfolio

	Glass Code	T%	Cat	Color trend	UV cut off	Applications	Availability
Fix Tint							
GX15	82515	15.0%	3	Green/Gray	100% @ 380 nm	Regular Sunglass	from stock
BX15	82523	14.5%	3	Brown	100% @ 380 nm	Regular Sunglass	from stock
GX17	82524	17.0%	3	Green/ Gray	100% @ 380 nm	Regular Sunglass	from stock
BX17	82525	16.0%	3	Brown	100% @ 380 nm	Regular Sunglass	from stock
Dichrofil	82520	29.0%	2	Light Green	100% @ 380 nm	Specific Infra Red cut off (780 - 2000 nm) < 2 %	On demand
LXP Green	8049	15.0%	3	Green/Green	100% @ 380 nm	Specific Infra Red cut off (780 - 2000 nm) < 1 %	On demand
Fumo	8219	14.6%	3	Gray/Green	100% @ 380 nm	Specific Infra Red cut off (780 - 2000 nm) < 7 %	On demand
Fix Tint & 400 UV Cut Off							
G50	8020	49.6%	1	Light Green/Gray	100% @ 400 nm	For polarized wafer or for gradient coating	from stock
B50	8021	53.6%	1	Light Brown	100% @ 400 nm	For polarized wafer or for gradient coating	from stock
UVDG37	80188	37.0%	2	Light Gray/Blue	100% @ 400 nm	For polarized wafer or for gradient coating	On demand
White Crowns							
Unicrown	8214	91.5%	0	Clear	100% @ 315 nm	For polarized wafer or for gradient coating	On demand
UV Clear	8010	91.0%	0	Clear	100% @ 400 nm	For polarized wafer or for gradient coating	from stock

Photochromic glass is available on demand

RX mineral Sunglass is not available

							Convex curve		Concave curve		% of transmittance	
	GLASS CODE	NAME	Designation	Corning Ref	Unit Weight in grams	Description	Diopter n=1.523	Radius (mm)	Diopter n=1.523	Radius (mm)	Thickness	T%
TINTED GLASS	82515	GX15	60 B25 CT28	965715	20.20	MP 60,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00	1.9	12.5
			60 B6 CT28	965201	20.20	MP 60,0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
			60 B6 CT28	965223	20.20	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			65 B25 CT28	965692	23.70	MP 65,0+250-250E 28 P6167	2.5	209.00	2.5	209.00		
			65 B4 CT28	965833	23.70	MP 65,0+ 400- 400E 28 P6167	4.00	130.75	4.00	130.75		
			65 B6 CT28	965202	23.65	MP 65,0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
			65 B9 CT30	963926	25.30	MP 65,0+ 883- 883E 30 P6167	8.83	59.23	8.83	59.23		
			70 B6 CT28	965294	27.50	MP 70,0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
			70 B9 CT30	963322	29.35	MP 70,0+ 883- 883E 30 P6167	8.83	59.23	8.83	59.23		
	82524	GX17	60 B25 CT28	965716	19.9	MP 60,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00	1.9	17
			60 B6 CT28	965972	19.90	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			65 B25 CT28	965693	23.30	MP 65.0+250-250E 28 P6167	2.5	209.00	2.5	209.00		
			65 B6 CT28	965500	23.30	MP 65.0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
			70 B6 CT28	965655	27.00	MP 70,0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
	82523	BX15	60 B6 CT28	965971	20.20	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	1.9	14.5
			60 B6 CT30	965488	21.65	MP 60,0+ 592- 592E 30 P6167	5.92	88.34	5.92	88.34		
			65 B25 CT28	965732	23.70	MP 65,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00		
			65 B6 CT30	965425	25.40	MP 65,0+ 592- 592E 30 P6167	5.92	88.34	5.92	88.34		
			65 B9 CT30	965489	25.35	MP 65,0+ 883- 883E 30 P6167	8.83	59.23	8.83	59.23		
			70 B6 CT30	965490	29.40	MP 70,0+ 592- 592E 30 P6167	5.92	88.34	5.92	88.34		
			70 B9 CT30	965491	29.45	MP 70,0+ 883- 883E 30 P6167	8.83	59.23	8.83	59.23		
	82525	BX17	60 B6 CT28	965973	20.20	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	1.9	16
			65 B6 CT28	965515	23.70	MP 65.0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
			70 B6 CT28	965718	27.50	MP 70,0+ 592- 592E 28 P6167	5.92	88.34	5.92	88.34		
	82520	DICHROFIL	60 B6 CT28	965970	20.3	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	2	29
			65 B6 CT30	965275	25.5	MP 65,0+ 592- 592E 30 P6167	5.92	88.34	5.92	88.34		
			70 B6 CT30	965276	29.5	MP 70,0+ 592- 592E 30 P6167	5.92	88.34	5.92	88.34		
CLEAR GLASS	8020	G50	60 B6 CT28	965967	19.60	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	1.9	49.6
			65 B6 CT28	965510	22.90	MP 65,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			70 B6 CT28	965678	24.80	MP 70,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
	8021	B50	60 B6 CT28	965968	19.60	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	1.9	53.6
			65 B25 CT28	965733	23.00	MP 65,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00		
			65 B6 CT28	965511	22.90	MP 65,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			70 B6 CT28	965679	26.60	MP 70,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
	8010	UV Clear S	60 B25 CT28	965717	19.60	MP 60,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00	2	91
			60 B6 CT28	965966	19.60	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			65 B25 CT28	965694	23.00	MP 65,0+ 250- 250E 28 P6167	2.5	209.00	2.5	209.00		
			65 B6 CT28	965162	22.90	MP 65,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			65 B9 CT30	956649	24.55	MP 65,0+ 900- 900E 30 P6167	9.00	58.11	9.00	58.11		
			70 B6 CT28	940729	26.60	MP 70,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17		
			70 B9 CT30	965114	28.45	MP 70,0+ 900- 900E 30 P6167	9.00	58.11	9.00	58.11		
	80188	UVDG37	60 B6 CT28	965969	19.60	MP 60,0+ 600- 600E 28 P6167	6.00	87.17	6.00	87.17	2	37
			65 B6 CT30	965296	24.55	MP 65,0+ 600- 600E 30 P6167	6.00	87.17	6.00	87.17		
			70 B6 CT30	965265	28.50	MP 70,0+ 600- 600E 30 P6167	6.00	87.17	6.00	87.17		
			70 B9 CT30	965266	28.45	MP 70,0+ 900- 900E 30 P6167	9.00	58.11	9.00	58.11		



High quality, optimum radiation shielding solutions for more than 60 years

Corning is a world leader of radiation shielding glass solutions for medical, nuclear and industrial applications. In partnership with strategic distributors, equipment manufacturers and shielding specialists around the world, Corning has developed a comprehensive radiation protection range, with global production capabilities, to complement its renowned protective glass solutions. Corning portfolio is growing thanks to Sovis offering bringing expert framed solutions to be installed in medical, industrial, as well as tough radioactive environment.

Applications

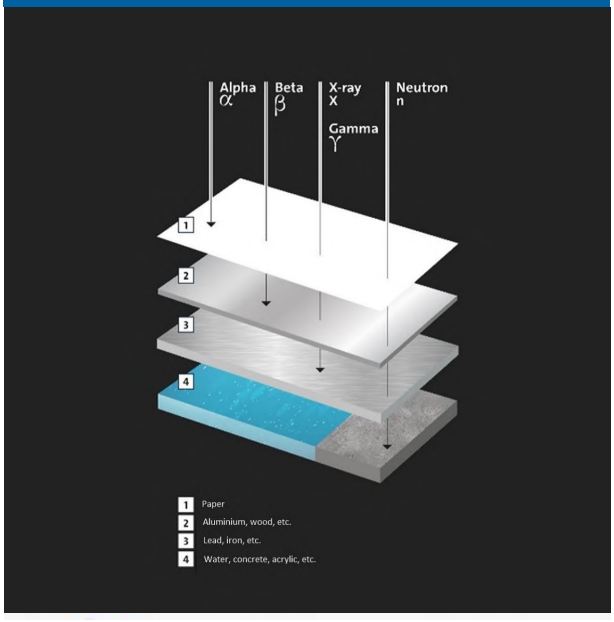
Radiation Shielding Glass Applications

Why use radiation shielding glass?

Wherever X-ray and gamma ray technologies are used, radiation shielding glass can protect people against ionizing radiation (interventional cardiology, CT scans, radiation therapy, etc).

Medical, Technical, and Industrial Applications:

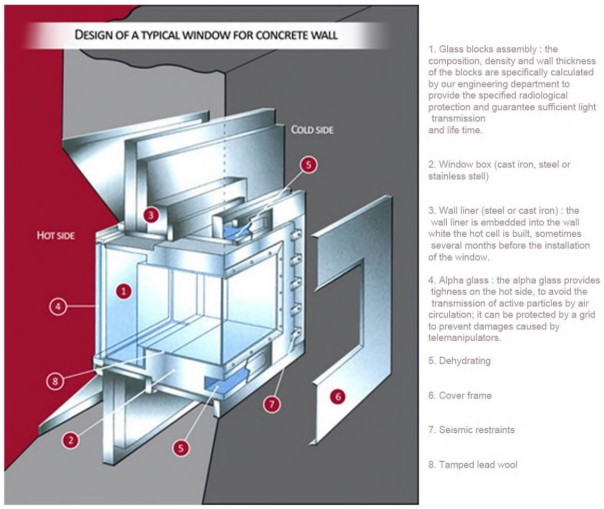
- Fixed windows in hospitals or smaller practices
- Mobile panels and fixed barriers in hospitals or smaller practices
- Research laboratories
- Industrial scanners and non-destructive testing



Types of Radiation and Penetration

FDA Compliant

Corning is the first radiation shielding glass manufacturer on the market to provide their customers and end-customers with full compliance and traceability adhering to U.S. Food and Drug Administration (FDA) regulations.
This compliance demonstrates Corning's commitment to support public health, safety, and security through high-quality radiation shielding glass products.
Corning® Med-X® Glass, Corning® Med-Gamma® Glass, and Corning® Med-X® LT Glass are proudly **manufactured in France.**
Corning has also implemented since September 2022 the UDI requirements. UDI is a Unique Device Identification code assigned to medical devices by the labeler/manufacturer of the device.



Radiation Resistant Glass Applications

Why use radiation resistant glass ?

In space, medicine, the nuclear industry and a range of scientific sectors, optical glass may be exposed to high-energy radiation such as gamma, electron, proton and neutron radiation. This radiation changes the transmittance of optical glass which will impact the viewing comfort of operators while handling radioactive materials. Corning developed a full range of radiation resistant glass including non-browning glass stabilized with cerium, to ensure protection, operating comfort, and safety of people working in hazardous environment.

Nuclear Power Plants, Waste treatment, and Nuclear laboratories to protect people from Low and High radioactivity

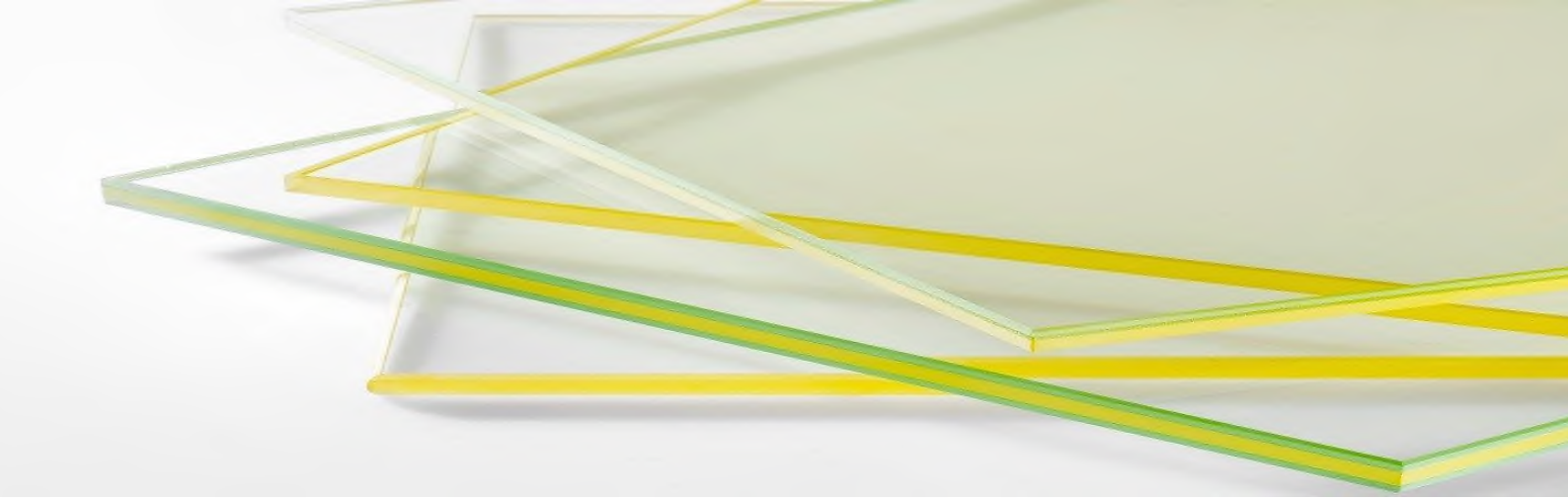
Corning SAS designs, manufactures and supplies radiation shielding windows for :

- Hot cells
- Gloveboxes
- Specific design for tough radioactive environment

Windows allow a visual control of operations conducted on radioactive elements into the hot cells. The wall thickness of one shielding window can reach up to 1.50 meter and the weight exceed 12 tons !

Corning product range includes:

Complete windows "Design by Sovis" embedded into the wall (including wall liner, window frame, alpha glass and protective glass).
Additional features on demand (fire safety, seismic restraints design, …).
Dedicated services such as Engineering and Consulting, Installation & Extraction, Refurbishment, Inspection & Diagnostic.



Corning® Med-X® Glass

Corning® Med-X® Glass provides high-quality, transparent and safe protective shielding against X-ray radiation for medical, technical, and research applications.

The X-ray glass's high lead and barium content, and wide thickness range, provides optimum shielding against radiation from equipment operating in the 80 to 300 kV range.

Our unrivalled, typical dispatch time is 2 weeks.

Product features

Dimensions

Corning is a world leader in Radiation Shielding Glass offering some of the largest glass sizes available, up to 2745 x 1375mm.
- This allows architects to design viewing windows with a wider field of vision to maximize the observation requirements of the diagnostic operators.
- Smaller sizes can be cut to meet most customer requirements.
- All cut edges are ground and finished with safety chamfers.

Application

Corning Med-X Glass is compatible with a large range of installations and other viewing applications such as:

- Viewing windows for X-ray, angiography, CT scans
- Screens for medical diagnostics
- Protection windows/glove boxes in laboratories
- Airport security X-ray screens
- Lenses for safety goggles

ISO standard production

The production of CORNING SAS is strictly controlled and is manufactured in accordance with the Quality Standard ISO 9001, the environmental Standard ISO 14001 and Health & Safety Standard ISO 14045.

Shielding Characteristics

Data provided by the UK Health Protection Agency. N/A = X-Ray transmission below level of detection.

Thickness		Minimum lead equivalence (mm) for stated X-Ray tube voltage							Max. Plate Mass	
mm	inches	80kV	100kV	110kV	150kV	200kV	250kV	300kV	kg/m2	lbs/ft3
4.0-5.5	0.157-0.217	1.4	1.4	1.3	1.2	1.0	1.0	1.0	26.4	5.4
5.0-6.5	0.197-0.256	1.7	1.7	1.7	1.5	1.3	1.3	1.3	31.2	6.4
5.7-7.0	0.224-0.276	1.9	1.9	1.9	1.7	1.5	1.5	1.5	33.6	6.9
7.0-8.5	0.276-0.335	2.3	2.3	2.3	2.1	1.8	1.8	1.8	40.8	8.4
8.5-10.0	0.335-0.394	2.7	2.8	2.9	2.6	2.1	2.1	2.2	48.0	9.8
10.0-12.0	0.394-0.472	3.2	3.2	3.3	2.9	2.5	2.6	2.6	57.6	11.8
11.0-13.0	0.433-0.512	3.6	3.5	3.6	3.2	2.8	2.8	2.9	62.4	12.8
12.0-14.0	0.472-0.551	4.0	3.8	4.0	3.5	3.0	3.1	3.2	67.2	13.8
14.0-16.0	0.551-0.630	4.7	4.5	4.6	4.1	3.5	3.6	3.7	76.8	15.7
16.0-18.0	0.630-0.709	5.3	5.1	5.3	4.7	4.0	4.1	4.3	86.4	17.7
18.0-20.0	0.709-0.787	6.0	5.7	5.9	5.2	4.4	4.6	4.8	96.0	19.7

Physical Properties

Optical Properties

Refractive Index n_d 1.76

Transmission % @ 55nm through 5 mm path ≥85.0

Chemical Properties

Lead (Pb) 52%

Barium (Ba) 17%

Mechanical Properties

Density (g/cm^3) 4.8

Knoop Hardness (kg/mm^2) 409

Young's Modulus (GPa) 62.6

Torsion Modulus (GPa) 24.8

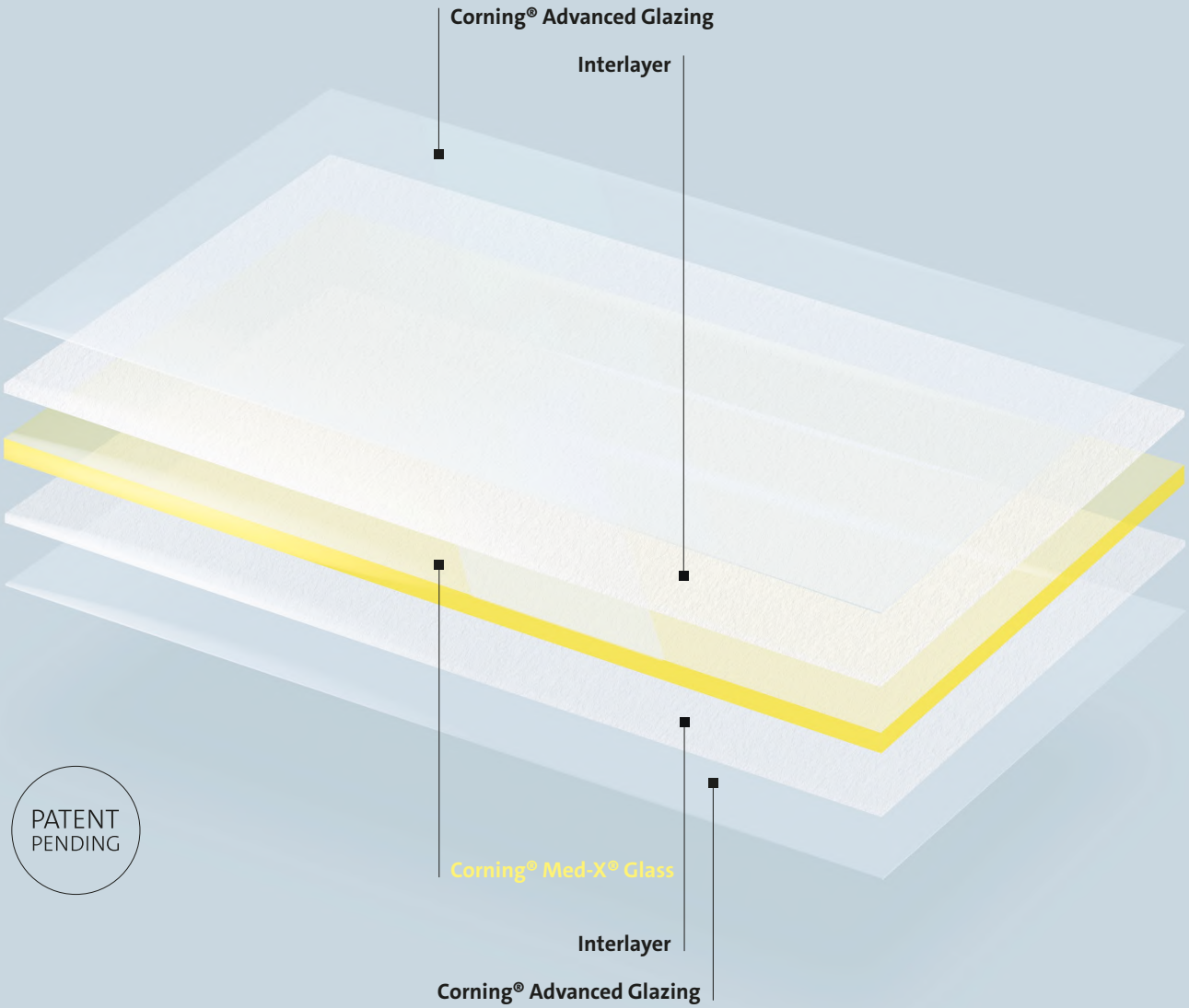
Poisson's Ratio 0.26

Coefficient of Thermal Expansion

($x10^{-7}/^0C$) 78.8

CORNING® MED-X® LT GLASS

Innovative Lami-Thin Shielding



PATENT PENDING

Corning® Advanced Glazing = Thin Glass <1 mm

CORNING INNOVATION

With Corning® Med-X® LT Glass, Corning innovation continues in the field of Radiation Shielding Glass.

Thanks to an innovative laminated design combining different Corning glasses, new Corning® Med-X® LT Glass enables improved glazing.

The new radiation shielding solution brings improved features:

- Improved safety in case of impact
- Improved clarity, scratch resistance, and ease of cleaning
- Easy handling and framing thanks to a lightweight design

COMBINATION OF UNIQUE TECHNOLOGIES

CORNING® MED-X® GLASS offers reliable radiation-shielding performance and clear transparency for safer X-ray operations.

CORNING® ADVANCED GLAZING offers a unique combination of thin, lightweight, and tough properties, enabling a new generation of innovative windows.

PRODUCT LIFE CYCLE

From transportation to installation into window panels inside architectural healthcare facilities and laboratory around the world, radiation shielding glass **must withstand several constraints during its life cycle:**

- Handling, packing, unpacking, and storage
- Daily maintenance and cleaning
- Repeated ionizing radiation

IMPACT RESISTANCE:
Building requirements **are becoming increasingly strict with regard to safety standards.**

CLARITY:
Visual comfort and a well-lit work environment are essential for specific glazing materials such as radiation shielding glass.

A new construction project? A new device?
Material reliability and ease of use is crucial.

CORNING DEVELOPED A NEW GLASS SOLUTION

A solution that brings

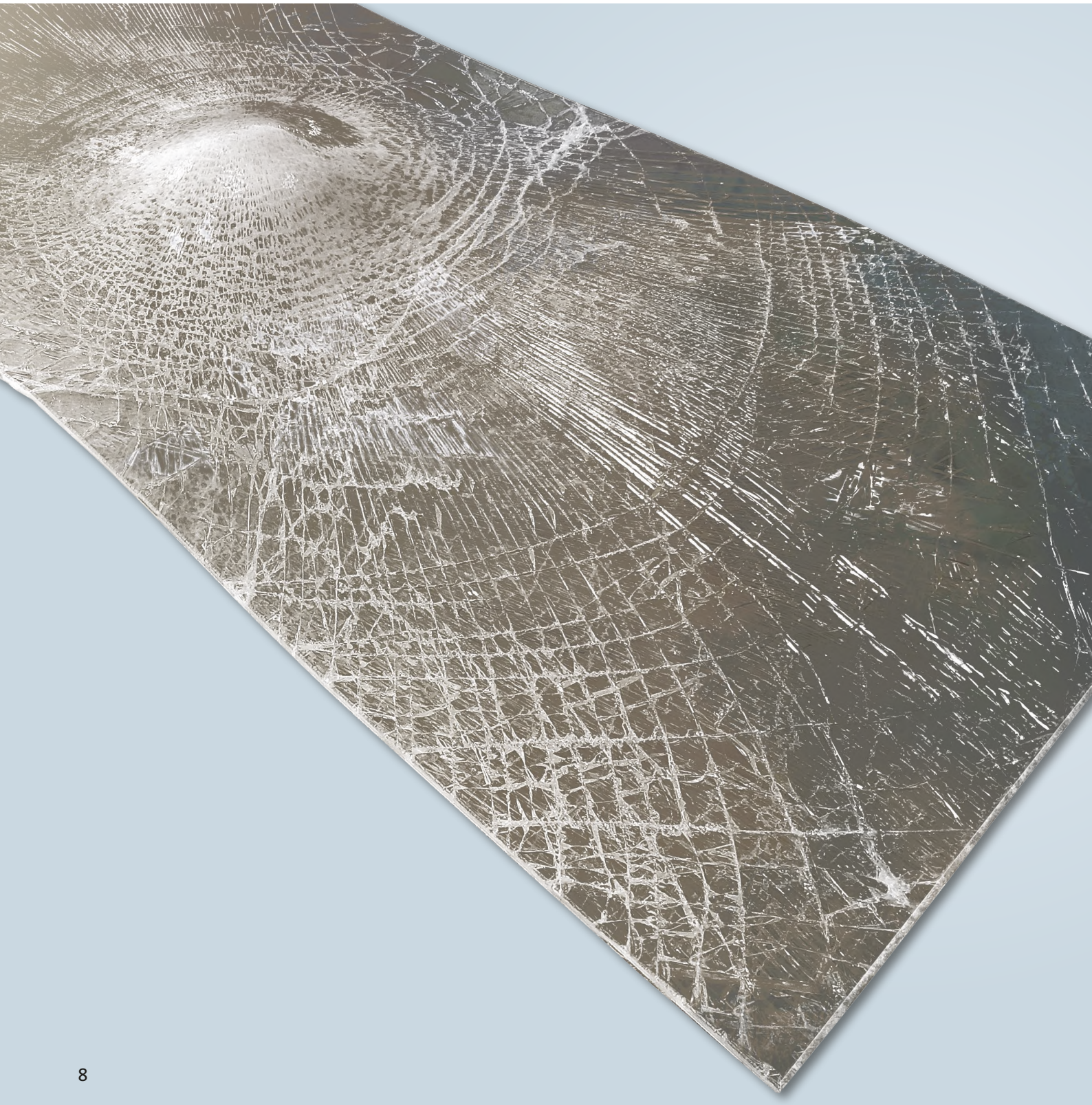
SAFETY
DURABILITY

and

USER-FRIENDLINESS

for all stakeholders along the product life cycle

Whether you are a distributor looking for the best solution to offer to your customers, a radiation specialist designing and installing the most reliable X-ray room, or an architect working with engineering consultants looking for the best solution available on the market, **the new Corning® Med-X® LT Glass will meet your expectations.**



SAFETY

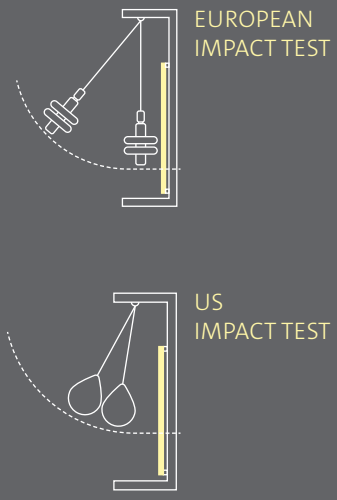
Protects from ionizing radiation
Corning® Med-X® LT Glass offers excellent radiation protection performance: **1.2 mmPb to 2.6 mmPb lead equivalence at 150 kV** tested according to **international standard IEC 61 331:2014.**

Limits the risk of injury in case of impact
Corning® Med-X® LT Glass is a laminated glass.

In case of impact, numerous cracks could appear but fragments are being held together: no projection of glass.

Corning® Med-X® LT Glass is qualified with the most stringent Impact Safety standards for glazing:

- EN 12600 (Europe)
- Cat II CFR Part 16 #1201 (United States)



SAFETY GLAZING IMPACT TEST

Safety glass tests reveal how the glass will behave when subjected to an impact of about 50 kg at different drop heights: from a few centimeters to more than 1.20 m (equivalent to an adult hitting the glass unintentionally or a child landing on it accidentally). All tests are performed by accredited independent laboratories.

DURABILITY

Radiation shielding glass requires special care. Corning® Med-X® LT Glass is resistant to scratching and daily cleaning.

Scratch Resistant
Corning® Med-X® LT Glass has better scratch resistance than other products available on the market:

- Up to **4 times better** than conventional radiation shielding glass
- **24 times better** than lead acrylic panels

It is measured using the ASTM F735-94 abrasion protocol (BAYER test – 3,600 cycles – Corundum sand – Haze measurements).

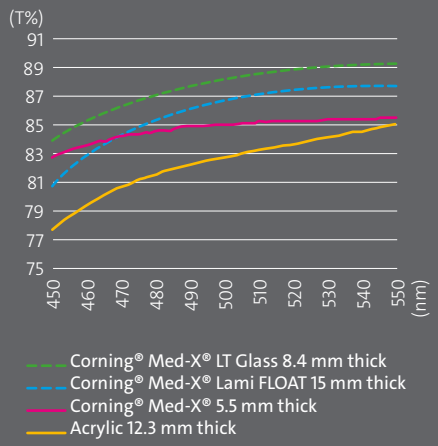
Easy to clean
Corning® Med-X® LT Glass is easy to clean with common detergents.

USER-FRIENDLINESS

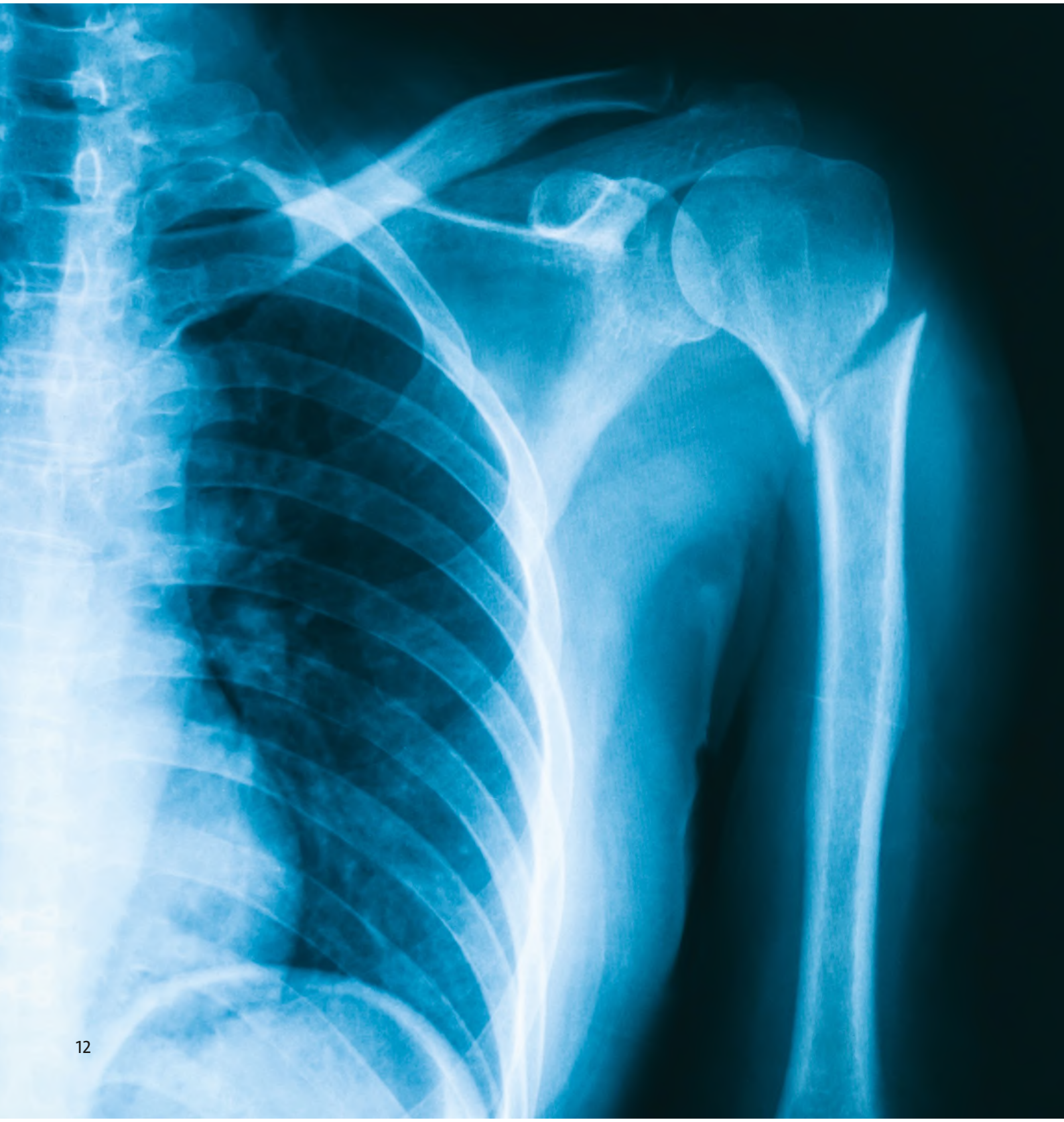
Improved clarity for users
Corning® Med-X® LT Glass guarantees the properties and reliability of a premium radiation shielding glass while offering improved clarity and transparency. Visual clarity is improved as the new solution brings **up to 5 extra points** of light transmission.

Added value for installers and integrators
Corning® Med-X® LT Glass provides the added value of a laminated sheet without the constraints of extra weight and thickness. Compared to current solutions on the market, Corning® Med-X® LT Glass is **up to 10 kg/m²** lighter.

LIGHT TRANSMISSION COMPARISON*



* Light transmission % for different materials Shielding @150 kV of 1.2 mm Pb for glass vs 0.5 mm Pb for acrylic



TECHNICAL INFORMATION

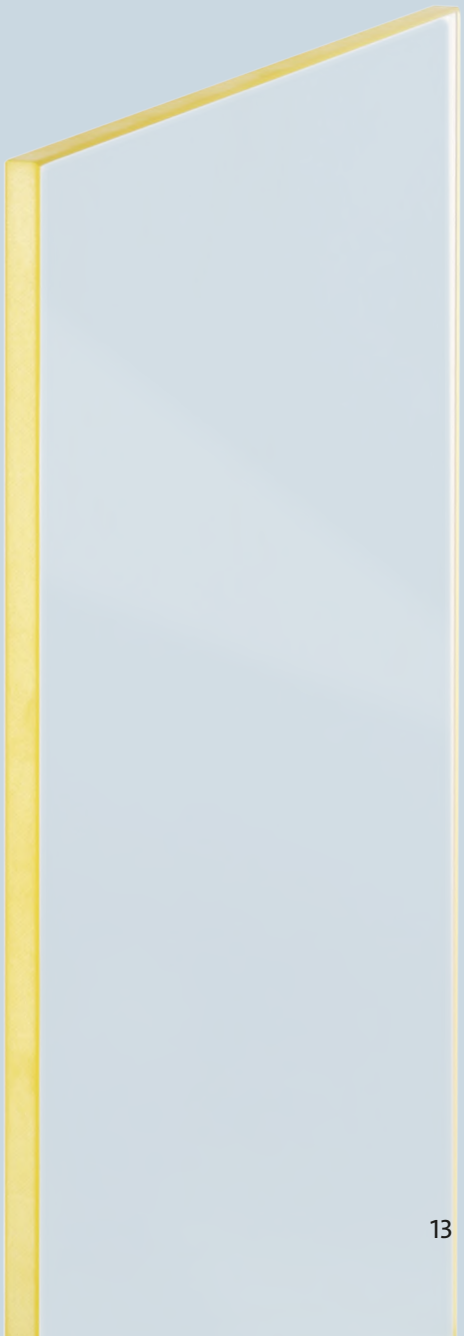
Corning® Med-X® LT Glass characteristics:

Optical Properties	
Transmission % @550 nm	> 89%
Y D(65%): Optical transmission for visible spectrum at daylight – D65 illuminant	> 89%
Mechanical Properties	
Density of lead glass (g/cm^3)	4.8
Knoop Hardness (kg/mm^2)	489
Chemical Properties	
Lead content (Pb)	52%
Barium content (Ba)	17%
Testing*	
Radiation Shielding	IEC 61 331: 2014 international standards, data provided by the Public Health of England (PHE)
Safety Impact Glazing	EN 12600, 1B1 class** Cat. 2 - CPSC 16 CFR 1201***
Abrasion	ASTM F735-94 (3,600 cycles, Corundum sand)

*More information available on request
**Test performed for the LE 2.1 mmPb item
*** Test performed for the LE 1.7 mmPb item

Thickness and weight

Thickness of lead glass	4.0-5.5 mm	5.0-6.5 mm	5.7-7.0 mm	7.0-8.5 mm	8.5-10.0 mm
SHIELDING performance @150 KV	1.2 mmPb	1.5 mmPb	1.7 mmPb	2.1 mmPb	2.6 mmPb
Thickness	6.9 to 8.9 mm	7.9 to 9.9 mm	8.6 to 10.4 mm	9.9 to 11.9 mm	11.4 to 13.4 mm
Weight ratio	24 to 33 kg/m^2	29 to 38 kg/m^2	32 to 41 kg/m^2	38 to 48 kg/m^2	45 to 55 kg/m^2




off
on

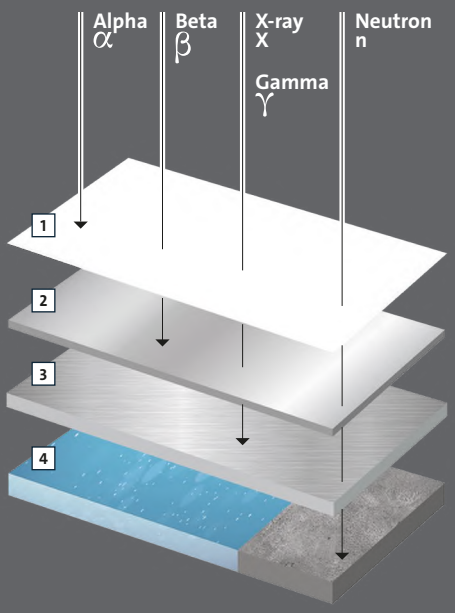
RADIATION SHIELDING GLASS APPLICATIONS

Why use radiation shielding glass?
Wherever X-ray and gamma ray technologies are used, radiation shielding glass can protect people from ionizing radiation (interventional cardiology, CT scans, radiation therapy, etc.).

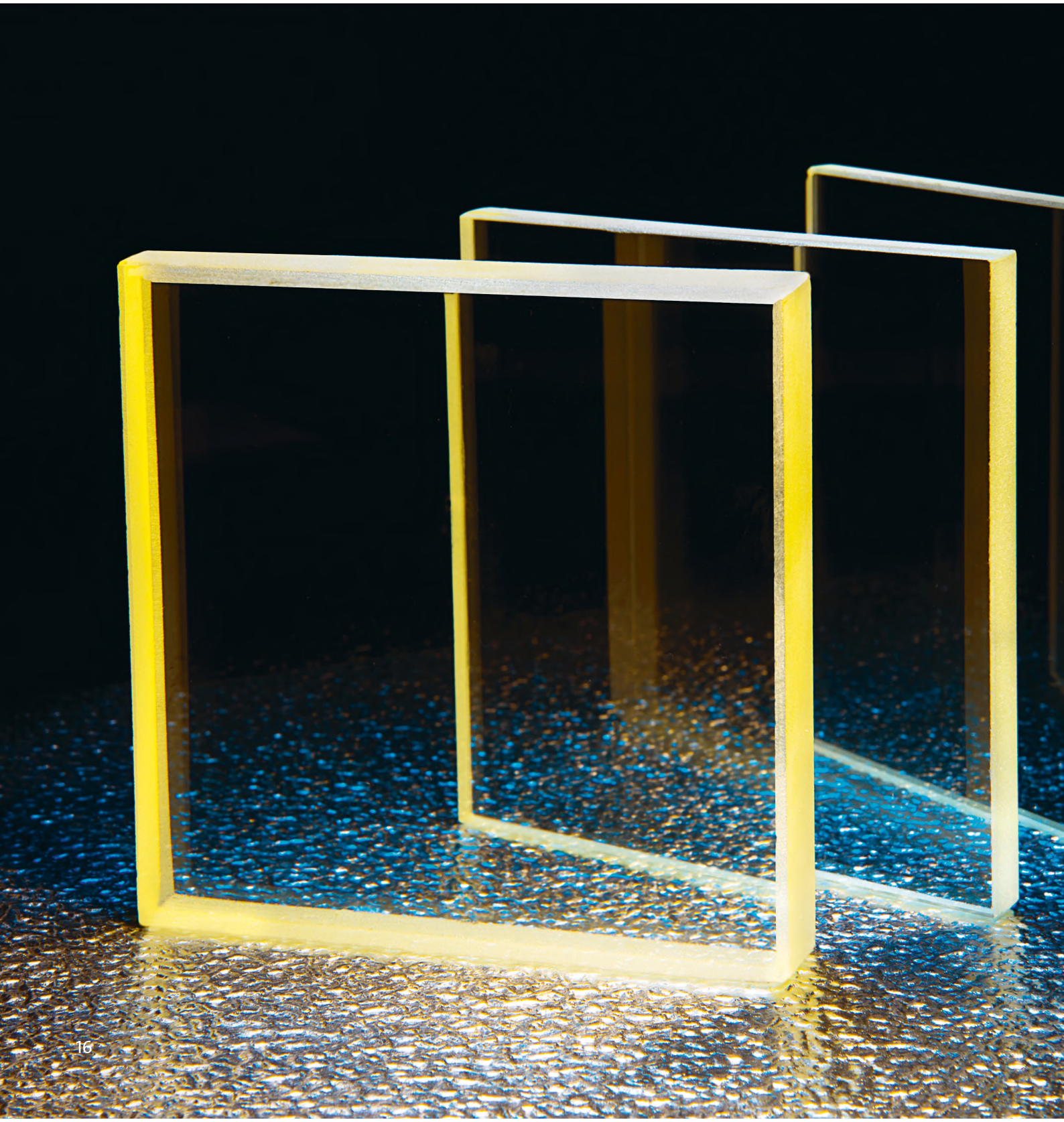
Medical, technical, and industrial applications:

- Fixed windows in hospitals or smaller practices
- Suspended or mobile panels in hospitals or smaller practices
- Research laboratories
- Industrial scanners and non-destructive testing

TYPES OF RADIATION AND PENETRATION



1 Paper
2 Aluminium, wood, etc.
3 Lead, iron, etc.
4 Water, concrete, etc.



RADIATION SHIELDING GLASS PRODUCT RANGE

Corning® Med-X® Glass and Corning® Med-Gamma® Glass

Corning is one of the worldwide leaders in radiation shielding glass, with years of experience providing high-quality glass with a comprehensive range of thickness and sizes.

Corning® Med-X® Glass for X-Ray shielding:

- observation windows & panoramic glazing
- door glazing
- panel (fixed and mobile)
- glove boxes for X-Ray rooms
- CT scanning facilities

Corning® Med-Gamma® Glass for Gamma-Ray shielding:

- windows for nuclear medicine applications including hot cell, cyclotron, and PET scanning

Corning® Med-X® Glass and Corning® Med-Gamma® Glass are supplied as polished plates in the largest available sizes on the market (up to 2,800 x 1,400 mm) and as finished, cut-to-size plates. Customized shapes and finishing are available upon request for the widest range of possibilities.

Corning® SUPERCONTRYX® Glass

The reference glass for x-ray protection

Description

Corning® SUPERCONTRYX® Glass is a single sheet of glass comprised of up to 70% heavy elements. Lead oxide makes up at least 48% of this part.

Its density is at least 4.8, that is, nearly twice the density of standard glass, such as PLANILUX.

SUPERCONTRYX® Glass is used to protect any person potentially exposed to ionizing x-rays.

It significantly reduces this type of radiation exposure.

Applications

Corning® SUPERCONTRYX® Glass is used in x-ray rooms, operating theaters, and laboratories by public and private hospitals, clinics, dentists' offices, veterinary practices, and radiology departments; and in industry, e.g., medical equipment manufacturers, etc., and research centers.

Its most frequent applications include:

- glazed interior partitions
- screens
- doors
- windows
- industrial equipment

Advantages

Expertise, technology and production from a French company

Corning has been recognized for its glassmaking expertise and quality for more than 170 years.

Corning SOVIS facility has been setting the benchmark for 50 years, delivering radiation-protection solutions to the nuclear industry's leading names (Areva, British Energy, etc.).

Advice and assistance

Our experts provide consulting services and assistance to customers for all their radiation protection projects.

Reactivity

- A swift response to quotation requests
- 3 to 5 weeks delivery times, the shortest on the market.

Corning® SUPERCONTRYX® Glass

Range

The range includes five products:

SUPERCONTRYX® Range	Thickness (mm)	Min. lead eq. 110 kV	Min. lead eq. 150 kV	Eq pb min Min. lead eq. 200 kV	Max dimensions (mm)	Max. weight (kg/m²)
2 Pb	7 to 8.5	2.3	2	1.8	2 400 x 1 200	41
2.5 Pb	8.5 to 10	2.8	2.5	2.1	2 010 x 1000	48
3 Pb	11 to 13	3.5	3	2.7	2 400 x 1 200	62
4 Pb	14 to 16	4.7	4	3.5	2 010 x 1000	77
5 PB	17.5 to 19	5.7	5	4.3	2 010 x 1000	92

NB: 2-mm lead equivalent X-ray protection glass means that the glass offers the same level of protection as a 2-mm thick sheet of lead.

Additional range

Higher lead equivalences may be achieved by laminating Corning® SUPERCONTRYX® Glass.
E.g., a lead equivalence of 8 mm at 150 kV is achieved by laminating two sheets of *SUPERCONTRYX® 4 Pb.*

Standard finishing

Seamed edges, i.e., rough cut edges with all sharp edges seamed. On request, SUPERCONTRYX® can also be supplied flat ground or flat polished.

Options

Corning® SUPERCONTRYX® Glass can be laminated to produce safety glass.

Corning® SUPERCONTRYX® Glass can also be assembled to produce insulating glass.

Please contact Corning for any specific requests.

Reglementation

Please refer to local (country) regulations.

Corning® SUPERCONTRYX® Glass

Installation

Installation guidelines

- Corning® SUPERCONTRYX® Glass significantly reduces x-rays. The design of the rabbet and the glazing strip must ensure the radiological Protection continuity.
- Corning® SUPERCONTRYX® Glass should only be used inside buildings in a dry and heated atmosphere. If used on the exterior, it must be laminated or assembled in a double-glazing unit with the Corning® SUPERCONTRYX® Glass sheet facing the interior.
- The weight of the glass should be taken into account for its installation, as it is approximately twice that of standard glass of the same thickness.

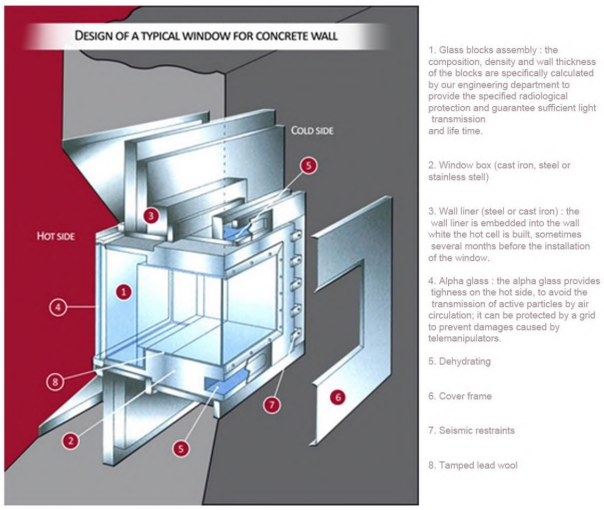
Handling precautions

- Corning® SUPERCONTRYX® Glass is a soft glass and must be handled with care.
- Use a clean, soft cloth and a conventional glass cleaner, if required, to clean the glass. Avoid splashing water and detergents.
- Corning® SUPERCONTRYX® Glass must be stored in a dry, heated area (between 7°C and 40°C).

Corning SAS through the “Sovis offering” designs, manufactures and supplies radiation shielding windows for more than 60 years.

Applications are **Nuclear Power Plants, Waste treatment, and Nuclear laboratories to protect people from Low and High radioactivity.**
Windows allow a visual control of operations conducted on radioactive elements into the hot cells. The wall thickness of one shielding window can reach up to 1.50 meter and the weight exceed 12 tons !

Radiation Shielding Windows 'Design by Sovis'



'Design by Sovis'

Radiations shielding windows are embedded into the wall. Our design includes wall liner, window frame, glass blocks assembly, hot side alpha glass and cold side protective glass.

The composition, density and wall thickness of the Glass blocks assembly are specifically calculated by our engineering department to provide the specified radiation shielding protection, protect against dielectric discharge, prevent browning and ensure optimum light transmission during lifetime of service.

Materials used are best in class materials, such as lead glass blocks assembly for **gamma ray shielding**, as well as acrylic panel for **neutron shielding**.
Additional features can be designed on demand:
-fire safety,
-seismic restraints,
-gloveboxes design (panel cut with holes for gloves)
-…
Corning provides dedicated services for heavy shielding applications

Glass Characteristics

Glass is the main component of a radiation shielding window. It provides both essential required functions: protection and vision.
The protection is related to glass thickness and composition: Corning SAS works with lead loaded glass (density : 3.3 - 5.2) and borosilicate (density : 2.5).
Some glass types can be cerium oxyde doped if needed to provide non browning properties (item with * below).
The vision comes from the extreme purity of the basic material, associated to polishing and assembling operations carried out with particular care.
Glass types
Corning proudly produces all glass types in France, under strict manufacturing standards, in accordance with ISO 9001 (Quality), ISO 14001 (Environment) and ISO 45001 (Health and Safety).
Click to see our Glass Types

GLASS FOR GLASS POWDERS

Corning offers a wide range of glass suitable for glass powders or other applications like decoration. Many different glass formulations are available to support unique requirements. Our glass portfolio and our innovation skills allow to identify the appropriate solutions for specific applications and industries.

Glass Powder Products include:

Alkali Barium 9013
Alkali Borosilicate 7056
Borosilicate 7052
Borosilicate 7070
Soda Borosilicate 7740 - Pyrex®

CORNING SAS - Specialty Glass
Rue St Laurent - CS 10243 Bagneaux sur Loing - 77797 NEMOURS CEDEX - FRANCE

Glass designation : **Alkali Barium** Code **9013**

Color : **White**
Glass type : **Alkali barium (Low Lead)**

CORNING

Excellent for glass to metal sealing, historically leveraged in space applications

Mechanical

	Metric	English
Density	2.640 g/cm3	165 lb/ft^3

Viscosity

Softening Point ($10^{7.6}$ poise)	656 °C	1213 °F
Annealing Point (10^{13} poise)	462 °C	864 °F
Strain Point (10^{14} poise)	423 °C	793 °F

Thermal

Coefficient of Expansion (0 °C - 300 °C)	88.5 x 10^{-7} / °C	49.2 x 10^{-7} / °F
(25 °C to set point 428 °C)	99.2 x 10^{-7} / °C	55.1 x 10^{-7} / °F

Electrical

Log_{10} Volume Resistivity @ 250 °C	8.9 ohm-cm
Log_{10} Volume Resistivity @ 350 °C	7.0 ohm-cm
Dielectric Constant @ 20 °C, 1 MHz	6.7
Loss Tangent @ 20 °C, 1 MHz	0.20%

Chemical

Weathering: 3
Acid Durability: 2

Weathering is defined as corrosion by atmospheric-borne gases and vapors such as water an carbon dioxide. Glasses rated(1) will almost never show weathering effects;those rated (2) will occasionally be troublesome,particulary if weathering products cannot be removed; those glasses rated (3) will require more carreful consideration.
Acid durability classified glasses according to their behavior in 5% hydrochloric acid at 95 °C (203 °F) for 24 hours.
Classification: Thickness loss (inches) (1) < 10^{-6} (2) 10^{-6} - 10^{-5} (3) 10^{-5} – 10^{-4} (4) > 10^{-4}

Non-toleranced numerical values are typical values

CORNING SAS - Specialty Glass
Rue St Laurent - CS 10243 Bagneaux sur Loing - 77797 NEMOURS CEDEX - FRANCE

Glass designation : **Alkali Borosilicate** Code **7056**

Color : **White**
Glass type : **Alkali borosilicate**

CORNING

Kovar sealing glass material

Mechanical	**Metric**	**English**
Density	2.29 g/cm3	143 lb/ft^3
Youngs Modulus	6.4 x10^3 kg/mm^2	9.2 x 10^6 psi
Poissons Ratio	0.21	
Shear Modulus	2.7 x 10^3 kg/mm^2	3.8 x 10^6 psi

Viscosity

Working Point (10^4 poise)	1058 °C	1936 °F
Softening Point (10$^{7.6}$ poise)	718 °C	1324 °F
Annealing Point (10^{13} poise)	512 °C	954 °F
Strain Point (10^{14} poise)	472 °C	882 °F

Thermal

Coefficient of Expansion (0 °C - 300 °C)	51.5 x 10^{-7} / °C	28.5 x 10^{-7} / °F
(25 °C to set point 477 °C)	54.5 x 10^{-7} / °C	30.0 x 10^{-7} / °F

Electrical

Log$_{10}$ Volume Resistivity @ 250 °C	10.3 ohm-cm
Log$_{10}$ Volume Resistivity @ 350 °C	8.4 ohm-cm
Dielectric Constant @ 20 °C, 1 MHz	5.7
Loss Tangent @ 20 °C, 1 MHz	0.27%

Optical

Refractive index (589.3nm)	1.486

Chemical

Weathering: 2

Acid Durability: 4

Weathering is defined as corrosion by atmospheric-borne gases and vapors such as water an carbon dioxide. Glasses rated(1) will almost never show weathering effects;those rated (2) will occasionally be troublesome,particulary if weathering products cannot be removed; those glasses rated (3) will require more carreful consideration.

Acid durability classified glasses according to their behavior in 5% hydrochloric acid at 95 °C (203 °F) for 24 hours.

Classification: Thickness loss (inches) (1) < 10^{-6} (2) 10^{-6} - 10^{-5} (3) 10^{-5} - 10^{-4} (4) > 10^{-4}

Non-toleranced numerical values are typical values

CORNING SAS - Specialty Glass
Rue St Laurent - CS 10243 Bagneaux sur Loing - 77797 NEMOURS CEDEX - FRANCE

Glass designation : **Borosilicate** Code **7052**

Color : **White**
Glass type : **borosilicate**

CORNING

Compatible with Kovar or Kovar-like alloys; thermal shock resistance

Mechanical	**Metric**	**English**
Density	2.27 g/cm3	141.7 lb/ft^3
Youngs Modulus	5.76 x10^3 kg/mm^2	8.2 x 10^6 psi
Poissons Ratio	0.22	
Shear Modulus	2.39 x 10^3 kg/mm^2	3.4 x 10^6 psi
Knoop Hardness (KNH $_{100}$)	403	5.73 x 10^5 psi
Viscosity		
Working Point (10^4 poise)	1128 °C	2062 °F
Softening Point (10$^{7.6}$ poise)	712 °C	1314 °F
Annealing Point (10^{13} poise)	484 °C	903 °F
Strain Point (10^{14} poise)	440 °C	824 °F
Thermal		
Coefficient of Expansion (0 °C - 300 °C)	47.0 x 10^{-7} / °C	26.1 x 10^{-7} / °F
(25 °C to set point 441 °C)	53.1 x 10^{-7} / °C	29.5 x 10^{-7} / °F
Electrical		
Log$_{10}$ Volume Resistivity @ 250 °C	9.2 ohm-cm	
Log$_{10}$ Volume Resistivity @ 350 °C	7.4 ohm-cm	
Dielectric Constant @ 20 °C, 1 MHz	5.1	
Loss Tangent @ 20 °C, 1 MHz	0.15%	
Optical		
Refractive index (589.3nm)	1.484	

Chemical

Weathering: 2

Acid Durability:3

Weathering is defined as corrosion by atmospheric-borne gases and vapors such as water an carbon dioxide. Glasses rated(1) will almost never show weathering effects;those rated (2) will occasionally be troublesome,particulary if weathering products cannot be removed; those glasses rated (3) will require more carreful consideration.

Acid durability classified glasses according to their behavior in 5% hydrochloric acid at 95 °C (203 °F) for 24 hours.

Classification: Thickness loss (inches) (1) < 10^{-6} (2) 10^{-6} - 10^{-5} (3) 10^{-5} – 10^{-4} (4) > 10^{-4}

Non-toleranced numerical values are typical values

CORNING SAS - Specialty Glass
Rue St Laurent - CS 10243 Bagneaux sur Loing - 77797 NEMOURS CEDEX - FRANCE

Glass designation : **Borosilicate** Code **7070**

Color : **White**
Glass type : **Borosilicate**

CORNING

Excellent thermal expansion match to silicon, high electrical resistivity, suitable to anodic bonding to silicon

	Metric	English
Mechanical		
Density	2.13 g/cm3	139.2 lb/ft^3
Youngs Modulus	5.2 x10^3 kg/mm^2	7.42 x 10^6 psi
Poissons Ratio	0.22	
Viscosity		
Working Point (10^4 poise)	1068 °C	1954 °F
Softening Point ($10^{7.6}$ poise)	755 °C	1391 °F
Annealing Point (10^{13} poise)	507 °C	945 °F
Strain Point (10^{14} poise)	460 °C	860 °F
Thermal		
Coefficient of Expansion (0 °C - 300 °C)	32.0 x 10^{-7} / °C	17.7 x 10^{-7} / °F
(25 °C to set point 461 °C)	39.0 x 10^{-7} / °C	21.7 x 10^{-7} / °F
Optical		
Refractive index (589.3nm)	1.47	
Electrical		
Log_{10} Volume Resistivity @ 250 °C	11.2 ohm-cm	
Log_{10} Volume Resistivity @ 350 °C	9.1 ohm-cm	
Dielectric Constant @ 20 °C, 1 MHz	4.1	
Loss Tangent @ 20 °C, 1 MHz	0.06%	

Chemical

Weathering: 2
Acid Durability: 2

Weathering is defined as corrosion by atmospheric-borne gases and vapors such as water an carbon dioxide. Glasses rated(1) will almost never show weathering effects;those rated (2) will occasionally be troublesome,particulary if weathering products cannot be removed; those glasses rated (3) will require more carreful consideration.
Acid durability classified glasses according to their behavior in 5% hydrochloric acid at 95 °C (203 °F) for 24 hours.
Classification: Thickness loss (inches) (1) < 10^{-6} (2) 10^{-6} - 10^{-5} (3) 10^{-5} – 10^{-4} (4) > 10^{-4}

Non-toleranced numerical values are typical values

.

CORNING SAS - Specialty Glass
Rue St Laurent - CS 10243 Bagneaux sur Loing - 77797 NEMOURS CEDEX - FRANCE

Glass designation : **Soda Borosilicate** Code **7740**

Color : **White**
Glass type : **Soda Borosilicate**

Mechanical	Metric	English
Density	2.23 g/cm3	139.2 lb/ft^3
Youngs Modulus	6.4 x10^3 kg/mm^2	9.1 x 10^6 psi
Poissons Ratio	0.20	
Shear Modulus	2.67 x 10^3 kg/mm^2	3.8 x 10^6 psi

Viscosity

Working Point (10^4 poise)	1252 °C	2286 °F
Softening Point (10$^{7.6}$ poise)	820 °C	1508 °F
Annealing Point (10^{13} poise)	560 °C	1040 °F
Strain Point (10^{14} poise)	510 °C	950 °F

Thermal

Coefficient of Expansion (0 °C - 300 °C)	32.5 x 10^{-7} / °C	17.7 x 10^{-7} / °F
(25 °C to set point 515 °C)	35.0 x 10^{-7} / °C	21.7 x 10^{-7} / °F
Specific Heat, 25 °C	0.75 kJ/Kg °C	0.18 BTU/lb °F
Thermal Conductivity, 25 °C	1.09 W/m.K^{-1}	0.63 $\frac{BTU.ft}{h.ft^2.°F}$

Optical

Refractive index (589.3nm)	1.474

Electrical

Log_{10} Volume Resistivity @ 250 °C	8.1 ohm-cm
Log_{10} Volume Resistivity @ 350 °C	6.6 ohm-cm
Dielectric Constant @ 20 °C, 1 MHz	4.6
Loss Tangent @ 20 °C, 1 MHz	0.4%

Chemical

Weathering: 1
Acid Durability:1

Weathering is defined as corrosion by atmospheric-borne gases and vapors such as water an carbon dioxide. Glasses rated(1) will almos never show weathering effects;those rated (2) will occasionally be troublesome,particulary if weathering products cannot be removed; those glasses rated (3) will require more carreful consideration.

Acid durability classified glasses according to their behavior in 5% hydrochloric acid at 95 °C (203 °F) for 24 hours.

Classification: Thickness loss (inches) (1) < 10^{-6} (2) 10^{-6} - 10^{-5} (3) 10^{-5} - 10^{-4} (4) > 10^{-4}

Non-toleranced numerical values are typical values

MACOR® Machinable Glass Ceramic

MACOR® - Giving the Freedom to Design

Building on Corning's 160 years of innovation, MACOR® machinable glass ceramic is a solid, trusted foundation that can help you realize your designs quicker. Its unique combination of properties makes it an easily machinable, versatile, and high performing material even in harsh operating environments where precision is a necessity. MACOR reduces fabrication times and is tested to fit complex design requirements even within a short turnaround time, as it remains stable at high temperatures and high pressure.

MACOR's properties enable great design flexibility, which in turn translates into a high speed-to-market rate for new industrial products, with minimal additional investments. MACOR is also clean, and exhibits zero porosity.

Benefits at a Glance

MACOR® is a mica glass ceramic material with a unique combination of properties. It is:

- A versatile ceramic material with technical strength and insulation properties exceeding high performance plastics
- Easily machinable using conventional metalworking tools
- Fast turnaround, no post firing required
- Holds tight tolerances, up to .0005"
- Clean, no outgassing and zero porosity
- Won't deform, unlike ductile materials
- Has low thermal conductivity, is an excellent electrical insulator
- Radiation resistant
- Can be soldered – both to itself and to a wide range of materials

Breaking Barriers to Industrial Innovation

This versatile material is employed worldwide across a variety of cutting edge industries, including but not limited to:

- Aerospace
- Semiconductor/ Electronics
- Medical and Laboratory Equipment
- Laser Systems
- Ultra-high and constant vacuum environments
- …and even Nuclear-Related Research

Did You Know?

Over 200 distinctly shaped MACOR® parts can be found on America's reusable Space Shuttle Orbiter; retaining rings of MACOR® are used at all hinge points, windows and doors. Large pieces of MACOR® have also been used in a NASA spaceborne gamma radiation detector.

On the ground, medical device manufacturers also appreciate MACOR®'s machinability and dimensional stability. The material is incorporated into precision devices, which helps medical professionals deliver quality and effective patient care.

Corning® Pyroceram®
Code **9606**

Corning® Pyroceram® glass-ceramic material is opaque, light gray in color, and has high strength, high elastic modulus, and uniform dielectric properties. It can be manufactured in ogival* shapes, hemispheres, pressware sheets, and various machined shapes.

* pointed arch

Applications

Tactical Missile Nosecones
Antenna Windows
Radomes
Solid Wave Guides
Hydrospace Systems

Dimensions

Ogival Shapes	Up to 48 inches long x 20 inches diameter
Hemispheres	Up to 16 inches in diameter
Pressware Sheets	Up to 27 inches x 27 inches x 1 .0 inch or 17 inches x 17 inches x 2.0 inches

Physical Properties

Water Absorption	< 0.01%
Softening Point	1350 ˚C; 2462 ˚F
Gas Permeability	Impermeable
Density	2.6 g/cm^3; 160 lb/ft^3
Elastic Modulus	120 x 10^6 kPa; 17.4 x 10^6 psi

Thermal Properties

Coefficient of Linear Expansion	57 x 10^{-7}/˚C — 32 x 10^{-7}/˚F (20 ˚C - 320 ˚C; 68 ˚F - 608 ˚F)
Thermal Conductivity	0.0081 cal/(s·cm·˚C) — 2 BTU·ft/(h·ft^2·˚F) (mean 20 ˚C - 800 ˚C — 68 ˚F - 1472 ˚F)
Thermal Diffusivity	0.0127 cm^2/s — 0.049 ft^2/h (mean 20 ˚C - 800 ˚C — 68 ˚F - 1472 ˚F)
Specific Heat	0.233 cal/(g·K) — 0.233 BTU/(lb·˚F) (mean 20 ˚C - 800 ˚C — 68 ˚F - 1472 ˚F)

INFRA RED TRANSMITTING GLASS

9754

CORNING 9754 is a clear germanate glass composition material with excellent transmitting capabilities from ultraviolet to infrared. Good optical qualities combine with good environmental durability.

Excellent transmittance UV to NIR

50% UV cutoff at .33 microns to 50% IR cut off at 5.33 microns
(1.346 mm Thickness).

Good environmental durability without coatings

Good optical quality

Striae Grade A
Low inclusion count.

Service to high heat to 650°C

Low refractive Index

nd = 1.6601

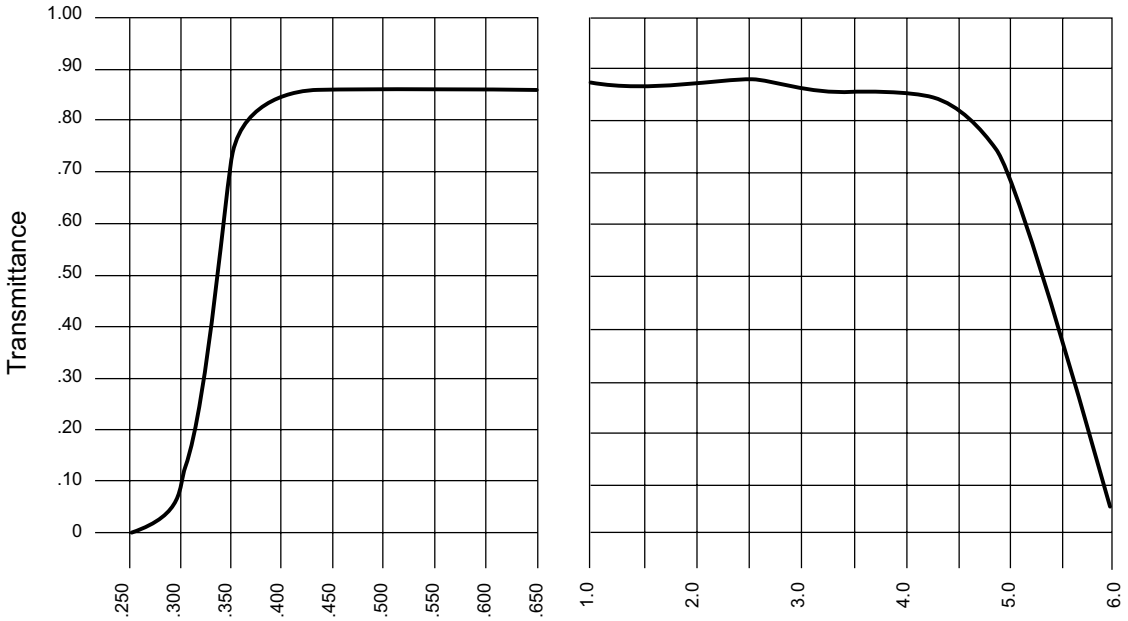
Near net shapes

Offered in bars, cut plates or discs, molded blanks, and even polished blanks (in size up to 4” / 101.6 mm – for larger dimensions please contact us.)

OPTICAL PROPERTIES

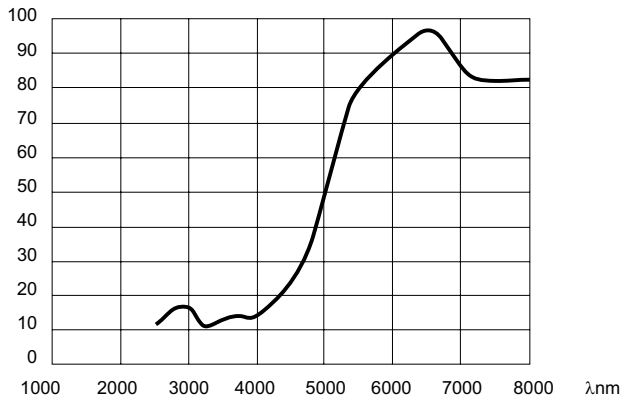
TRANSMITTANCE OF 9754

1.346 mm THICKNESS INCLUDING SURFACE LOSSES

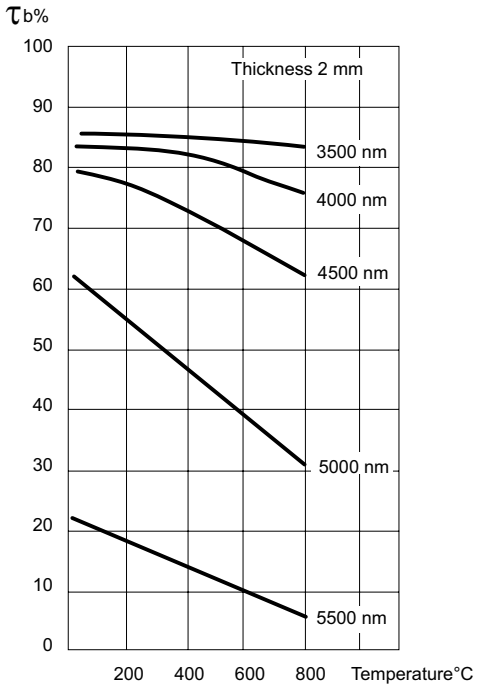


SPECTRAL EMMITTANCE (ARBITRARY UNIT)

(T= + 200°C, 3.2 mm thick)



TRANSMISSION VARIATIONS vs TEMPERATURE



REFRACTIVE INDEX

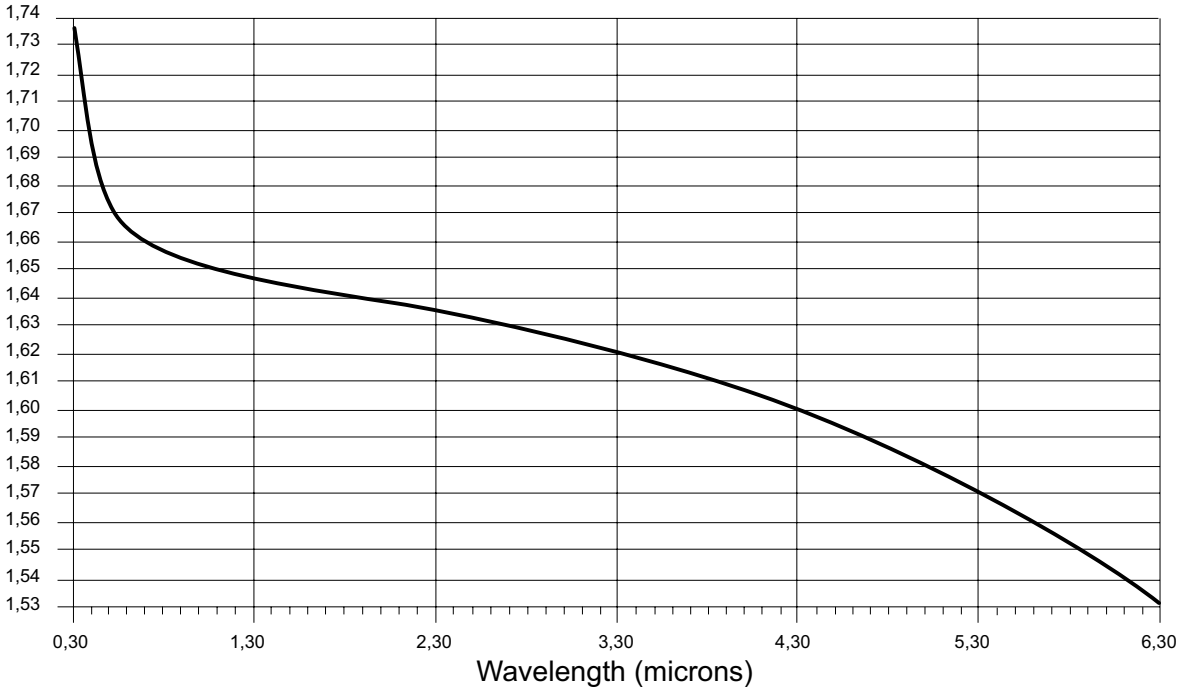
(+20°C)

nF (486.1 nm)	1.6702	nC (656.3 nm)	1.6560	Dispersion vd 46.5
nd (589.3 nm)	1.6601	n (3.5 mircons)	1.617	

λ (nm)	Index	λ (nm)	Index	λ (nm)	Index
400	1.69093	775	1.65511	2250	1.63505
425	1.68502	800	1.65431	2500	1.63203
450	1.68020	825	1.65358	2750	1.62874
475	1.67621	850	1.65289	3000	1.62514
500	1.67285	875	1.65226	3250	1.62119
525	1.67000	900	1.65167	3500	1.61686
550	1.66754	925	1.65112	3750	1.61214
575	1.66542	950	1.65060	4000	1.60698
600	1.66356	975	1.65011	4250	1.60135
625	1.66192	1000	1.64964	4500	1.59521
650	1.66046	1250	1.64595	4750	1.58853
675	1.65916	1500	1.64310	5000	1.58125
700	1.65800	1750	1.64049	5250	1.57332
725	1.65694	2000	1.63758	5500	1.56569
750	1.65599				

REFRACTIVE INDEX vs WAVELENGTH

CODE 9754 GLASS



THERMAL COEFFICIENT OF REFRACTIVE INDEX

Temperatures °C	Absolute coefficient — Wavelength (nm)					Relative coefficient — Wavelength (nm)				
	1060.0	643.8 C'	546.1 e	480.0 F	435.8 g	1060.0	643.8 C'	546.1 e	480.0 F'	435.8 g
-40	7.9	8.8	9.3	10.2	11.1	10.3	11.2	11.7	12.7	13.5
0	8.7	9.6	10.1	11.0	11.9	10.4	11.4	11.9	12.8	13.6
100	10.7	11.6	12.1	13.0	13.9	11.6	12.5	13.1	14.0	14.8

STRESS OPTICAL COEFFICIENT

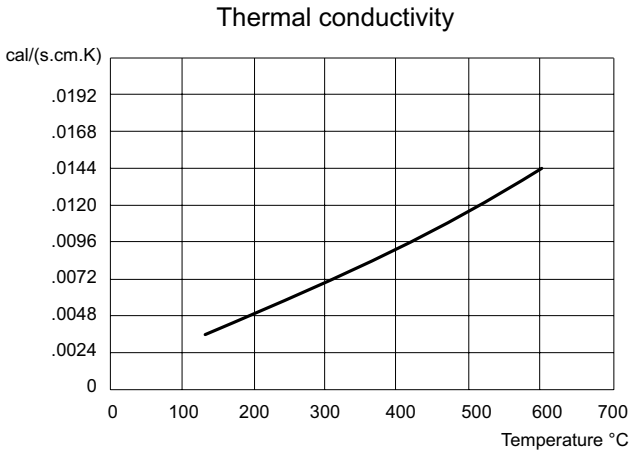
262 nm/cm/kg/mm²

MECHANICAL PROPERTIES

Specific gravity	3.51 g/cm³	
Young's modulus, 25°C	12.2 x 106 psi	8577 kg/mm²
Shear modulus, 25°C	5.14 x 106 psi	
Modulus of rupture, 25°C, abraded	6370 psi	3613 kg/mm²
Poisson's ration, 25°C	0.290	
Knoop hardness, 100 g load	560 kg/mm²	

THERMAL PROPERTIES

Softening point	874°C
Annealing point	735°C
Strain point	697°C
Service Temperatures:	
normal	650°C
extreme	680°C
Thermal conductivity	0.01 W/cm°C



ELECTRICAL PROPERTIES

Dielectric Constant		
350°C	100 C thru 10 Kc	9.95
400°C	100 c	10.08
400°C	1 Kc	10.08
400°C	10 Kc	10.05
550°C	100 c	10.61
550°C	1 Kc	10.41
550°C	10 Kc	10.35
Loss Tangent		
25°C	100 c	0.00137
25°C	1 Kc	0.00137
25°C	10 Kc	0.00170
300°C	100 c	0.00115
300°C	1 Kc	0.00130
300°C	10 Kc	0.00150
550°C	100 c	0.072
550°C	1 Kc	0.013
550°C	10 Kc	0.0039
Log DC resistivity		
350°C		14.9 ohm.cm
450°C		12.5 ohm.cm
550°C		10.5 ohm.cm

CHEMICAL PROPERTIES / WEATHERING

Acid durability	
10% HCL, 25°C, 30 seconds	no detectable weight loss or appearance change
10% HCL, 25°C, 10 minutes	0.648 mg/cm² weight loss; very slightly surface frosting
Weathering	
98% relative humidity, 2 weeks	Deposit visible only with intense illumination
98% relative humidity, 4 weeks	Deposit readily apparent in ordinary light

Corning Specialty glass has a broad range of capabilities including melting and forming as well as finishing and characterization. The versatile manufacturing capabilities enable production of more than 60 glass compositions each year in many different shapes including pressings, bars, strips, blocks, rods, sheets etc.

Different melting technologies enable production of glass :

- From 1.4 to 1.9 index
- From clear to tinted
- From 2.5 to 5.2 density
- With photochromic properties, from clear to dark or from tinted to tinted dark
- With low viscosity
- With sharp UV cut-off
- With low Tg

A vast majority of glass types can be produced: White Crowns, Fixed Tints, Baryums, Flint, Soda lime, Boro Silicate, Alumina Silicate, lead glass, Lithia potash borosilicate glass, Lanthanum Niobium Borate glass, phosphate and Fluo-Phosphate glass, germanium based glass, glass ceramics…

Capacity from small crucibles (40kg/ run) to large tanks :

- For low to large volume requests
- To accompany the development of new products, from pilot to industrial scale

Very wide capabilities from 4g to 4 tons / Rods : D76 x 317 / other customized dimensions available

- Pressings
  - Near net shape, gobs, discs, …
- Bars : customized dimensions on request
  - Typical dimensions : 190x80mm, 80-150x15-40mm, 355x330x55-60mm,
- Blocks : up to 1600x1400x400mm
- Rods : D76 x 317 other customized dimensions
- Sheet :
  - Thickness from 0.05 to 50mm glass sheets
  - Dimensions up to 2800x1400mm
- Glass powders : specific compositions developed as crushed glass for sealing or decoration purposes

Raw plate polishing equipment, down to 5mm thickness

Grinding & Screening: from cullet to 325 mesh

On-line and off-line equipment for glass measurement during production : index, abbe number, transmission, color, photochromism, density, composition, chem-temper ability, …

Additional equipment available at Corning European Research Center (20km from Bagneaux) for extensive glass characterization : mechanical performances, electrical performance, thermal performance, chemical performances, rugosity, etc…

Flexibility

More than 60 different glass compositions melted per year

More than 5000 different models produced per year

Molded Optical Components

Our expertise in glass molding and fire polishing allows us to offer optical components with complex shapes (prisms, plano-convex or biconvex lenses, plano-concave and aspherical lenses, etc.).

Applications:

Airport lighting, Medical, Optoelectronics, Light Condensers.

Optional features:

The following surface treatments and coatings allow enhanced performance:

- Thermal tempering resistance to scratches or thermal shocks
- Dichroic filter changing color temperature
- Anti-Caloric Coating to prevent infra-red and for heat reduction
- Anti-Reflective Coating for increased light transmission
- Mirror Coating to increase the light reflection.

Self-Cleaning Coating Corning® LUMICLEAN® Coating to destroy mineral and organic pollution deposits on the glass and to increase transparency.

Rigid and Flexible Optical Fiber

Corning manufactures light guides using either rigid or flexible optical fiber.

Rigid optical fibers from Corning combine precise and strong light intensity as well as lifetime durability. They also offer optimal light transmission and sustain hundreds of autoclave sterilization cycles.
Their rigidity allows for easy assembly within the handpiece mechanical system, and quicker maintenance.

Applications:
Dental hand pieces

Technical specifications:
- Fiber Numeric Aperture: 0.57
- Core refractive index 1.62
- Developed length of fiber up to 120 mm
- Standard fiber diameter from 1.7 up to 2.5 mm. Other diameters upon request

Flexible optical glass fibers (silica fiber upon request) allow versatile manufacturing capabilities in various combinations: single or bifurcated models, section conversion.
The bundle can be protected by a compression resistant sleeve and equipped with specific end fittings for perfect integration into the complete system.

Applications:
- Medical analysis
- Process control
- Industrial measurement or detection
- Nuclear industry
- Aircraft equipment

Optical Lenses

Corning manufactures lenses (prisms, plano-convex or biconvex lenses, plano-concave and aspherical lenses…) from high quality white crown or borosilicate glass.

Applications:

Theater lighting, projection equipment, architectural lighting, industrial optical systems, optoelectronics, optical automobile.

Technical specifications:

- Up to 320 mm in diameter
- Up to 40mm in thickness
- Shapes: prisms, plano-convex or biconvex lenses, plano-concave and aspherical lenses

Optional features:

- Thermal tempering to sustain scratches or thermal shocks
- Dichroic filter coloring the light at the lens output
- Anti-heat coating to prevent infra-red and reduce heat on one side of the lens
- Anti-reflective coating for improved light transmission
- Mirror Coating: increasing the light reflection

Self-Cleaning Coating Corning® LUMICLEAN® Coating: destroy the mineral and organic pollution deposit on the glass and increase transparency.

Optical Coatings

Corning offers the following coatings on almost all types of glass shapes (prisms, lenses, filters, jewelry, etc.).

We can customize coatings to meet very specific customer needs, based either on wavelength values, transmission curve or coated samples.

We develop and manufacture tailored parts, specific to your context. Please contact us for more details.

Technical specifications:

All product shapes from dimensional 10x10mm (or Ø 10) to 300x300 mm (or Ø 300) with a thickness between 2 and 40 mm.

Dichroic filters:

Dichroic filters are designed to select one color from a lamp while keeping a maximum light intensity.

Infra-red & anti caloric filters:

Infra-red filters or heat filters are used with modern and powerful sources using halogen or Xenon. They protect lit equipment and downstream optics within affecting visible light intensity. Those filters usually improve visible light transmission as they have also anti-reflective properties.

Antireflective Coating:

Corning provides simple or multi-layer treatment according to the level of required transmission. It is possible to control the residual reflected color.

Others:

Glass coating can achieve other interesting functions such as cold mirrors, UV mirrors or filters, light temperature corrective filters, self-cleaning coating, etc. All upon request.

Corning® LUMICLEAN® Self-Cleaning Coating

Corning under the brand Corning® LUMICLEAN® Coating offers a self-cleaning and hydrophobic coating that can degrade organic and inorganic pollution deposited on the glass.

Applications:

Outdoor lighting, tunnel lighting, outdoor video monitoring, etc.

LUMICLEAN® Coating allows:

· Thanks to its high photocatalytic activity, LUMICLEAN® can be used both in outdoor application as well as in places with low UV or humidity exposure, like tunnels.

· Elimination of stagnating water drops on the glass improving visibility through the glass panel

LUMICLEAN® is in line with sustainable development and generates substantial savings:

· **During design phase:** in case of public illumination for example, the light efficiency increase generated by LUMICLEAN® allows increasing the distance between light sources or reducing the of the lighting power… To provide the same illumination level.

· **During operation phase:** lower energy consumption and reduced cleaning frequency lead to lower maintenance costs and a limited use of chemical cleaning agents

Photocatalytic activity:

LUMICLEAN® has a very high photocatalytic activity and is therefore efficient even with low UV light or humidity exposure.

Technical specifications:

LUMICLEAN® can be deposited on glasses with the following characteristics:

· Length: minimum 20 mm - maximum 1400 mm

· Width: minimum 20 mm - maximum 500 mm

· Flat or bended surfaces

· Possibility of application on complex shapes

· Glass supplied by customer or by Corning

· LUMICLEAN® is transparent and colorless

Optional features:

· Thermal tempering resisting scratches or thermal shocks

По вопросам продаж и поддержки обращайтесь:

Алматы (7273)495-231
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Коломна (4966)23-41-49
Кострома (4942)77-07-48
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Ноябрьск (3496)41-32-12
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Саранск (8342)22-96-24
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
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