

ТЕМПЕРИЛОДЖИСТИКСЕОД
TEMPERI LOGISTICS LTD



Overview of the Sheet Glass Market in Ukraine

2023



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Introduction

At the moment, the market of the glass industry in Ukraine is not experiencing the best time, which is facilitated by the economic crisis associated with military operations in the country. A sharp change in consumer behavior, mass mobilization, destroyed infrastructure of enterprises, and accelerated inflation do not contribute to economic revival in this area. Significant decline in production, closure, and bankruptcy of the oldest enterprises of the glass industry - all this has led to an acute shortage of domestic sheet glass. Therefore, the Ukrainian market of sheet glass is not satisfied with its production and is forced to import products from other countries.

Previously, domestic glass production was provided by: CJSC "Lisichanskiy glass plant "Proletary", LLC "Glaskomerts" (Konstantinovka, Donetsk region), OJSC "Lviv mechsteklozavod", LLC "Buchanskiy glassware plant".

Lysychansk glass plant did not survive the global economic crisis of 2008 and was shut down in 2013, in 2015 an attempt was made to launch an industrial glass processing shop with modern equipment, but since 2016 the plant entered bankruptcy proceedings and in 2017 was sold for scrap. The specialization of the enterprise was the production of sheet glass (in the 2000s the plant produced float glass, furniture glass, mirrors for furniture, haberdashery mirrors, tinted glass, glass-mirror showcases, as well as tempered glass with silk-screened pattern, and glass furniture).

Lviv Mechsteklozavod is currently closed and completely dismantled, and a new residential complex has been built on its territory. The plant produced glass for Lviv buses, mopeds and motorcycles, forklifts, windows, and furniture.

Buchansky Glassware Plant LLC was established as a result of the restructuring of Buchansky Glassware Plant OJSC in 2000 and was a manufacturer of patterned and reinforced glass, window glass, mirrors, and glass processing tools. Not in operation since 2012.

Glaskomerts LLC was established based on the Kostyantynivskiy Glass Plant named after the October Revolution and is currently the only operating glass plant producing rolled sheet glass in Ukraine.

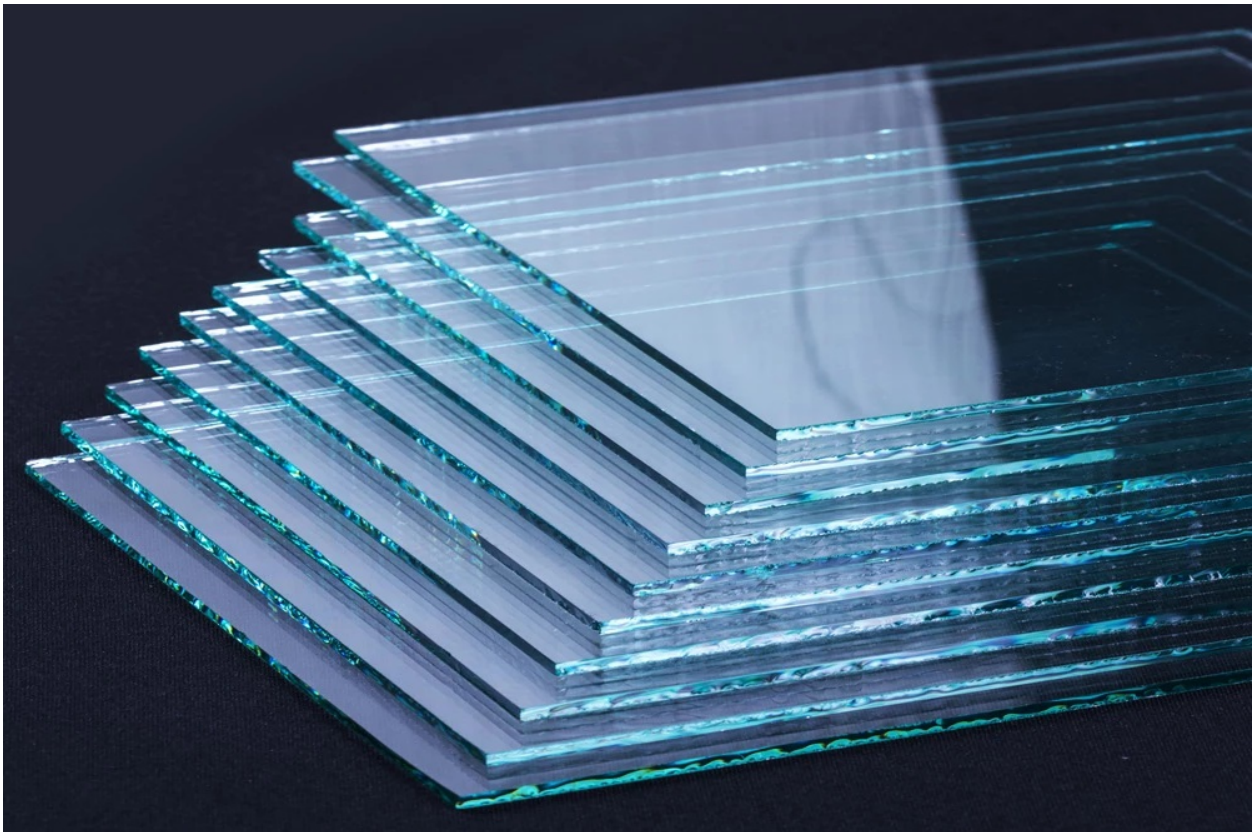
The next problem for the market, starting from the pandemic of 2021, was the shortage of materials, even more, aggravated in the market of raw materials and components: the previous systems of their supply, in particular steel and aluminum, were disrupted and interrupted, there was a dependence on energy, uncertainty, and globalization led to the emergence of uncontrolled value chains, which gave rise to a constant rise in prices for products.

The review considers global trends, as well as the place and problems of the Ukrainian sheet glass market.



1. General concepts. Raw material components. Glass production technology.

Glass is one of the most popular materials of our time, widely used in industry, construction, and households. The reason for this popularity is its properties: low thermal conductivity, light refraction, absolute water resistance, and universal chemical resistance. Starting with sand as a raw material, glass goes through a series of industrial processes before being transformed into a wide range of finished products.



In the manufacture of glass, are the following elements:

- quartz sand or silica raw materials;
- soda, which reduces the necessary temperature for melting the charge;
- lime, used to increase the strength of the material and its resistance to weathering;
- zinc oxide to increase light refraction;
- potash, boric anhydride, borax, feldspar, lead, barium.

Metal oxides are introduced into the mixture to obtain glass of a certain shade (chromium and copper color the material in green, cobalt - in indigo).

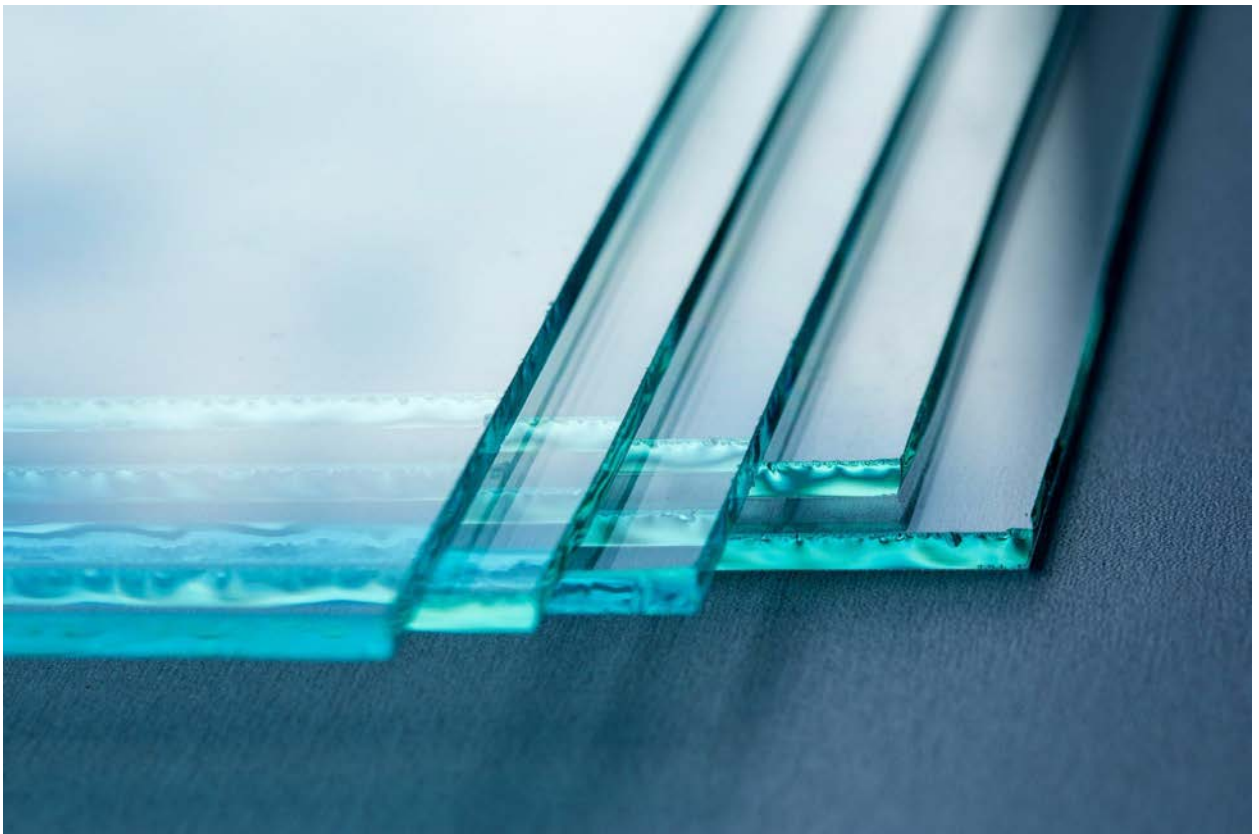
The most common and cheapest material is obtained with the addition of sodium and calcium to the composition. Lead and calcium are used in glass for decorative items and applications in electronics and electrical engineering.

Borosilicate material with a low coefficient of thermal expansion and resistance to chemical attack is the basis for laboratory glassware and fiberglasses.



The use of glass sludge reduces the melting temperature of components (1600°C and less), which indirectly affects the preservation of equipment life, energy saving, as well as reduces the amount of dust, SO₂, and NO emissions and significantly reduces energy costs, making production practically waste-free. At the final stage of material production, it can be subjected to various types of processing to give the final product special properties.

Auxiliary substances such as manganese, chromium, cobalt colorants, clarifiers (saltpeter, arsenic trioxide), etc. are used to give the glass the specified properties.



The glass mixture consists of the following basic components: sand (70%), soda, and lime (30%). After the addition of other substances according to the technological process, the mass is mixed, melted, cooled, and cut into sheets of a given size. Modern production lines are designed to produce sheet glass with a thickness of 2-50 mm and a size of 5x3 m².

The use of modern technologies in glass production allows manufacturers to influence the technical characteristics of the final product: increased strength, and resistance to chemical and thermal effects.

The technology of glass production is rather labor-intensive.

The classical method of glass production is based on the melting of the initial mass, where decolorizers, silencers, dyes, intensifiers, etc. are introduced. Then the composition is cooled and cut based on the specified parameters.



At the moment there are 2 popular technologies of glass production in the world.

Emile Fourco method

The technology is based on vertical machine drawing of the material. The glass mass is melted in a glass furnace drawn using rolling rollers and then fed into a cooling and cutting shaft. The almost-finished sheets are sanded and polished. By varying the drawing speed, the thickness of the sheet is shaped.

Float method [main]

The technology assumes that the molten glass mass from the furnace is placed on horizontal pallets and fed into a float bath with molten tin and a gas-air atmosphere. Moving on the surface, the future glass acquires a flat shape and is saturated with tin particles. This is followed by cooling and annealing. Advantages of the method: high productivity, no need for subsequent processing (grinding, polishing). In addition, such glass has:

- correct geometry, uniform thickness throughout the sheet;
- high quality;
- transparency;
- excellent optical properties.

Reinforced glass with shaped cells is produced similarly.

Some of these processes bring very high added value. The float process is followed by various downstream processes such as coating, assembly of double glazing or laminated glass, thermal or chemical quenching, silvering, and many others.

Coverage

Extremely thin, almost invisible layers of metal oxide are applied to the glass, providing better insulation against cold and/or protection against sunlight.

The coatings are applied either online on hot glass (pyrolytic coating) or by an electromagnetic process (vacuum coating).





Thermal Quenching

The thermal tempering process involves heating glass to its softening point (about 700°C) and then cooling it sharply. Glass tempered in this way is five times more resistant to thermal and mechanical shocks. And when it breaks, it shatters into thousands of small, non-cutting pieces. Chemical tempering involves ion exchange between the glass and a bath of molten salt, which increases its mechanical strength.

Sheet glass is a type of glass industry product, which is widely used in construction. Such glass is produced by vertical pulling or float method, without specific surface treatment. From its shape - rectangular sheets - glass got its name.

Sheet glass is used as a final product and also as a basis for the production of laminated, tinted, tempered, heat-saving glass, and mirrored glass. A distinction is made between windows, thick and thin glass. Due to its low strength, thin glass is not used in construction.

In most modern houses and apartments, windows made with window glass are installed, while in the construction of storefronts and for windows of high-rise buildings thicker glass is used.

Also, this type of glass is widely used in the furniture industry. It has a thickness of more than 4 mm - such thickness is optimal for the manufacture of interior items such as various shelves, table tops, and mirrors.

Laminated glass, like tinted glass, is most often used in the automotive industry. **Tinted glass** reduces the penetration of ultraviolet sunlight.

Laminated glass has high strength and impact resistance, which provides maximum safety for the driver and passengers in the vehicle. This is achieved by bonding two sheets of glass together with a synthetic resin gasket that holds the shards together when the glass breaks.

Heat-saving glass is also made from sheet glass by sandwiching a silicate gel between two glass sheets, which prevents the glass from fogging up. A window made of heat-saving glass will not only retain heat like a double-pane window frame but will also have a soundproofing function.

Tempered glass, which has the household name "stalinite", has much greater strength than simple sheet glass, as well as safety in use. When breaking such glass, many blunt-angled shards are formed, which are not dangerous in terms of traumatism. Thus, the use of sheet glass is quite diverse and includes various spheres of human activity, which served in favor of various modifications and improvements of this material.





2. Global trends in sheet glass production

The global sheet glass market size in 2022 reached USD 108.3 billion. Leading sheet glass companies maintain their market position through significant investments in developing new manufacturing processes and upgrading existing products. They are utilizing mergers & acquisitions, joint ventures, collaborations, and partnerships to support the market growth on a global level. Moreover, the growing preference for glass architecture in residential and non-residential buildings, and solar energy installations across the globe also provides lucrative growth opportunities for the key market players. Some of the other factors creating a positive outlook for the market include rapid urbanization, continuously decreasing prices of solar installations, increasing income levels of the population, and extensive research and development activities. Considering these factors, the market is expected to reach a value of USD 148.5 billion by 2028, exhibiting a growth rate of 4.8% during 2023-2028.

One notable trend in the glass manufacturing market is the growing preference for sustainable and eco-friendly products and the increasing integration of technologies to improve product quality and efficiency. Artificial intelligence, software, and blockchain are being used to develop innovative products that outperform traditional alternatives in terms of efficiency and effectiveness. For example, a software system in glass manufacturing, allows a power plant to reduce electricity consumption during the most carbon-intensive peaks in the grid.





The trend toward "green" glass continues to grow. Manufacturers continue to develop their energy-efficient and sun-protective glass products. For example, last year Guardian Glass launched SunGuard Amber control glass. The product's amber-bronze hue is in line with aesthetic trends and also blocks 54 percent of heat and lets in 44 percent of sunlight.

On average, glass manufacturing consumes 21 percent of raw materials, about 8 percent of fuel, and 13 percent of electrical energy from total industrial production.

Glass has a long service life; it can be recycled indefinitely or so-called closed-loop recycling. It is also possible to produce glass 100% from recycled raw materials without any change in the quality or characteristics of the glass produced. For example, using 1 ton of glass scrap in production avoids the extraction of 1.2 tons of raw materials. It can also help reduce CO2 emissions by 700 kilograms. Therefore, global glass manufacturers are striving to conserve natural resources through sustainable raw material management by promoting the recycling of end-of-life glass for glass scrap.

The major producers and consumers of sheet glass in the world are considered to be China, the USA, and Europe.

The main leading companies are NSG Group, Guardian, Saint-Gobain, AGC, Fuyao Group, Cardinal Glass Industries, Vitro, Nihon Yamamura, Vitro, and 3B.



*According to manufacturers, **environmentally friendly** and sustainable production methods are also becoming the norm.*



Representatives of English NSG/Pilkington announced that the company has successfully produced float glass using hydrogen energy. The world's first test took place at the company's facility in St. Helens, UK. The second test, using a mixture of hydrogen energy and natural gas, was conducted at the same facility and involved operating the furnace for five days.

On March 30, 2023, SAINT-GOBAIN also produced sheet glass using more than 30% hydrogen for the first time.

These industrial trials in Herzogenrath (Germany) on a laboratory scale were preceded by tests conducted at two research centers in France: Saint-Gobain Research Paris in Aubervilliers and Saint-Gobain Research Provence in Cavaillon. The analysis of data from these trials will enable the deployment of hydrogen in the Group's fleets in the coming decades when low-carbon hydrogen will be available in sufficient quantities. This innovation complements research initiatives for the electrification of glassmaking and notable achievements such as the world's first zero-carbon sheet glass production in Aniche in May 2022, thanks to 100% glass bead and 100% decarbonized energy (biogas).





3. General characteristics of the silicate market in Ukraine

The development of the Ukrainian market silicate industry largely depends on the volume of construction in the country which is currently experiencing bad times. At the same time, the construction industry practically stopped in 2014, and stagnation in the building materials market continued in 2018, and then in early 2020 due to Covid-19. As a result, major investment projects were put on hold and the retail sector shrank significantly. However, late 2020 saw an increase in domestic demand, which can be considered a sign of a gradual recovery from the crisis. In 2022, due to military operations, there was a collapse in the economy and construction industry: loss of enterprises located in the war zone, destruction of industrial facilities, shortage of raw materials, disruption of logistics chains, etc.

In Ukraine, 116 thousand residential houses were destroyed or damaged, and 60% of damaged houses need, major repairs, which allows us to forecast an increase in demand for construction materials and, in particular, for glass.

In the coming year, we can forecast a further increase in prices for glass and windows, due to high demand and lack of own production of high-quality glass. Now the price increase does not exceed 30% and is 23% in 2022 compared to last year, which correlates with the general inflation rate.

4. Producers of sheet glass in Ukraine



4.1. "Glaskommerce" Ltd, Konstantinovka, Donetsk oblast.

Glaskommerce Ltd. is the only enterprise in Ukraine producing rolled, patterned, reinforced sheet glass, as well as Solar Glass for solar systems and greenhouses.



GLASSCOMMERCE
ВИРОБЛЯЄМО СКЛО З 1897 РОКУ



Glaskommer LLC was established based on the Konstantinovsky Glass Plant named after the October Revolution, OJSC.



The history of this plant began in 1895 with its construction by a Belgian joint-stock company. Being one of the leading manufacturers of glass in Ukraine, the enterprise mastered new types of products, introducing advanced technologies, and modernizing equipment. Thus, in 2007 the industrial processing shop with the production capacity of 300 thousand meters of glass per year was put into operation. In 2008 a new workshop was built and the production of patterned rolled glass was mastered. In 2011 "Glaskommer" Ltd. acquired production facilities for the production of sheet rolled glass and its industrial processing.

It reconstructed the glass furnace and equipment according to the projects of German companies "GROB" and "STG" to achieve a production output of up to 3.1 million square meters per year and reorientation to the production of competitive products.

In September 2012 the production of patterned glass was launched. Glaskommer Ltd. introduced additional production capacities and mastered the technology for the production of Solar Glass, which is used both in the manufacture of various modifications of solar modules and thermal collectors (heli systems) as transparent insulation from the impact of external natural factors during their operation, and for safe structural glazing of various modifications of greenhouses.

Products of the plant

The company is oriented on the glass trade all over the world and produces 68 types of glass for various purposes: glass for solar panels and modules, interior glass, architectural glass (sheet glass reinforced with steel mesh), and others.



Patterned glass is produced by the rolling method.



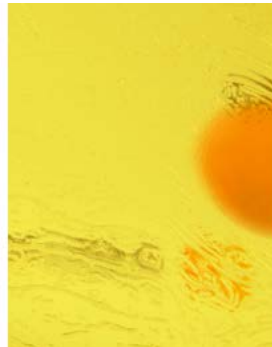
Productive capacity

More than 9000 square meters per day.

Revenue volume in 2019

More than 50 million euros

Range





Rolled sheet glass

Categories: bronze, chemical. etching, transparent, yellow, mirror, satin. Patterned glass, has a thickness of 4 mm and a wonderful patterned reflection.

- **TRANSPARENT:** serenity, sylvite, punta, gloria, basak, diamond, hortifrost, screen, creset, karatachi, delta p, May flower, Atlantic, smooth rolled glass, 3.2 and 4 mm thick, armir, 6 mm thick with metal mesh inside, orange, chinchilla, mat/prismatic, thickness 3.2 and 4 mm
- **YELLOW:** Gloria yellow, Basak yellow, Atlantic yellow
- **BRONZE:** bamboo bronze, corduroy bronze, creset bronze, Siriniti bronze, May flower bronze, Gloria bronze, Aniblic bronze, delta p bronze, delta bronze, hortifrost bronze, sylvite bronze, runta bronze, basak bronze, shigshshila bronze, diamond bronze

Glass characteristics:

Complies with the Ukrainian standard: DSTU BV.2.7-156:2008(EN 572:2004); GOST 5533(ST SEV 5070):

- glass is made from sodium-calcium silicate raw materials with an iron content of 0.016 to 0.04%
- minimum value of the directional light transmittance coefficient with a glass thickness of 4.0 mm (indicator value according to ND -0.82): 0.84 (with an iron content of 0.017%)
- the value of the total transmittance of scattered light depending on the pattern with a glass thickness of 4 mm (the value of the indicator according to ND is at least 0.75) from 0.88 to 0.95
- the value of residual internal stresses of glass (the value of the indicator according to ND is no more than 100 nm/cm), nm/cm: up to 25
- maximum sheet size 2100x1600



Types of transport for transporting products

Automobiles and trains, maritime transport.

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5. Float glass market in Ukraine

5.1. Trends in recent years

High-quality thermally polished float glass of the M1, M2, and M7 brands (large format) was produced in Ukraine by only one enterprise: Lisichansky Glass Factory Proletary CJSC. The remaining closed factories and the only currently operating glass factory, Glaskomerz, produce drawn glass (VVS), which has lower quality grades M5 and M6. This glass has limited use - small-format window and greenhouse glazing.

The outdated VVS technology used in domestic production is being removed from world production everywhere, but in Ukraine, the delay in the withdrawal of VVS is due to the lack of sufficient float glass production capacity.

In this regard, the float glass market in Ukraine in recent years has been characterized by the following trends:

- an increase in market capacity at the beginning of 2021 by 41% and 77% in physical and monetary terms, respectively, which is expressed by the need to oust “old” designs from the window market (up to 40% of windows produced) while simultaneously replacing stretched glass with sheet float glass;
- at the same time, the industry is completely dependent on imported products.
- stable demand for cheaper float glass,
- dependence of prices in the domestic market on exchange rates, because sheet glass products are completely imported into the country
- the lack of necessary components, such as soda and Glauber’s salt, to organize our production entails the need to import these raw materials.
- existing financial barriers to market entry for new producers. To create your float glass production, there is a need for large financial investments and expensive credit resources.
- shortcomings of the existing legislative framework, when the interests of foreign investors are poorly protected and difficulty arises in accumulating the necessary volumes of capital investments.
- insufficient level of support from the public sector due to crisis phenomena: inflation, exchange rate fluctuations, and increases in utility tariffs led to increased production costs.

However, it is important to note that glass production is considered an important component, and demand for these products is expected to recover as the situation stabilizes. In this scenario, major producers with a diverse customer base, the ability to adapt to production fluctuations, and strong financial capabilities are likely to be the main beneficiaries as they can navigate long periods of uncertainty.

5.2. Raw materials for the production of float glass

The main components for the production of float glass are quartz sand (from 50% and above), soda ash (sodium carbonate) (about 20%), limestone (about 5%), as well as components such as dolomite (15%), feldspar (about 4%), glass cullet, dyes, and others. Ukraine is rich in deposits of sand, dolomite, chalk, kaolin, and pegmatites.



Quartz sand

Ukraine, having the largest reserves of quartz sand in Europe, exports it to other countries, and finished glass products are imported into Ukraine.

According to Geoinform Ukraine, there are 42 deposits of quartz sand in Ukraine. As of the end of 2023, the total reserves of quartz sand in Ukraine amount to 331 million tons.

For glass production, it is important that the silica content - the quartz component in sand - be at the level of 95-98 percent. Such sand is available in Lviv, Ivano-Frankivsk, Chernihiv, Chernivtsi, Kherson, Volyn, Sumy, Kharkiv, Donetsk, and Zaporizhzhia regions. In addition, sand is present as an accompanying component in amber and titanium deposits available in the Rivne region.

The largest reserves of quartz sand are concentrated in the Kharkiv region and amount to about 100 million tons. In this region, there is the Novoselovskoye deposit, based on which the Novoselovsky mining and processing plant operates, which produces more than 10 types of quartz concentrate. A third of Kharkov reserves are concentrated in the Lviv (30.1 million tons), Donetsk (about 28 million tons), and Zaporizhzhia (about 25 million tons) regions, and about 20 million tons in the Chernihiv region.

In 2010, 2 million tons of sand were extracted for the country's glass industry, and after 10 years, production decreased by almost half. Today, a significant part of the sand continues to be mined illegally. The glass industry has been collapsing for years, shifting emphasis to the extraction of raw materials and then transferring them for processing to neighboring countries.

Soda

Deposits of carbonate rocks (lime and chalk) for the production of the second component involved in the production of float glass soda were discovered in the Dnieper, Donetsk, Lviv, Volyn regions, and Crimea. However, after the annexation of Crimea, a key operator left the Ukrainian market, whose production volume in 2013 amounted to 551.8 thousand tons of soda - 99.7% of the total volume. The remaining 0.3% was accounted for by the Avdeevka Coke and Chemical Plant, which has been subject to artillery shelling since 2014 and is not yet capable of replacing the shortage. Two more factories are located near the war zone, so at the moment, the main consumers are forced to import soda (Table 1).

Tab.1

The total volume of imports of caustic soda by product item for the period from 01/01/2023 to 09/30/2023.

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
2815 Sodium hydroxide (caustic soda); potassium hydroxide (caustic potash); sodium or potassium peroxides	40 586	32,217

Source: Customs Service of Ukraine

Dolomite

Dolomite is an essential component of glass, which gives it greater strength, and increases transparency and resistance to chemicals and weathering.



Deposits of dolomite, a natural mineral consisting of calcium and magnesium oxides, were found in the Donbass: the Stilskoye, Novotroitskoye, Olenovskoye, Severoshevchenkoye, Karakubskoye, Ukrainian shield deposits: the Negrebovskoye, Zavalevskoye, Krivorozhskoye, Bolshaya Gleevatka and Carpathian folded region deposits. The following dolomite deposits have been explored within the Volyn-Podolsk plate: Zavadovskoe, and Kuzinskoe. Currently, all work is prohibited at the Kuzinskoye field, since this area has become considered a protected area.

The problem with Ukrainian dolomite is that in terms of quality, it is rather dolomite-containing limestone, which is more suitable for the metallurgical industry than for glass production. Therefore, and given the previously stated crisis reasons, dolomite is imported from other countries (Table 2).

Tab.2

Total volume of dolomite by commodity item for the period from 01/01/2023 to 09/30/2023.

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
2518 Dolomite; dolomite ramming mixture	122 957	7,331

Source: Customs Service of Ukraine



Limestone

Limestone is a key reagent in the technical process of glass melting - almost a third of glass consists of calcium carbonate contained in limestone. Limestone is used as a source of calcium oxide, which promotes silicate formation and significantly facilitates cooking and light transmission.



Limestone deposits are available in Ternopil, Odesa, and Kherson regions, Lviv, Transcarpathian, Rivne, Ivano-Frankivsk, and Chernivtsi regions. About 80% of limestone is provided by the Donetsk region in the east and Ternopil and Khmelnytskyi in the west of the country.

The volume of the domestic limestone market in 2021 reached 17 million tons.

At the end of 2022, a drop in limestone production was recorded by 67% (i.e., 3 times), to 3.5 million tons, according to the specialized association. This is largely due to the loss of the largest producer, the Novotroitsk mine, which is located in the Donetsk region. (Volnovakha district). For the first quarter this year, Limestone production showed a decline of another 68%, to 530 thousand tons.

The volume of its imports for 9 months. 2023 - 103,747 tons. The largest market share - 64% - is in the metallurgical industry. Over the past few years, Ukraine has significantly increased the import of limestone; the increase in import volumes was primarily associated with a significant reduction in lime production due to the loss of part of the territories of Ukraine.

Glass fiber

Even though 800 thousand tons of cullet are generated annually in Ukraine, its collection and processing remain undeveloped. The major participants in processing remain the Utilita companies, the Gostomel and Malinovsky glass factories, as well as the Volnogorsk Glass enterprise.

Ukrainian glass factories still have to import cullet for production. More than 98% of these raw materials were imported from Belarus in 2016-2017. In 2018, the share of Belarus in imports decreased to 76.7% due to the opening of such a destination as Moldova for imports (Table 3).

Tab.3

Total volume of cullet by product item for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
7001 Cullet, glass scrap; glass in blocks	5 720	0,352

Source: Customs Service of Ukraine

At the same time, it exports 2 times more in volume terms and almost 6 times in value terms (Table 4):

Tab.4

The total volume of exports of Ukraine by commodity items for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
7001 Cullet, glass scrap; glass in blocks	11 282	1,994

Source: Customs Service of Ukraine



Glauber's salt

Sodium sulfate (Glauber's salt), used for the production of salt, is also an imported raw material (Table 5).

Tab.5

Total volume of sulfates by commodity item for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
2833 Sulfates; alum; persulfates	47 676	21,614

Source: Customs Service of Ukraine

Of all the above raw materials for the production of float glass in Ukraine, quartz sand and lime are available. Companies would have to import soda, dolomite, sodium sulfate, cullet, and some lime.

Thus, occupying second place in Eastern Europe in terms of available reserves of glass raw materials, Ukraine processes 2% of the extracted raw materials into low-quality products that the construction industry cannot use due to outdated technology that does not comply with the technical standards of the European Union, to which the country has committed to switching within the framework of Associations with the EU. The rest of the raw materials are exported to import quality glass for the manufacture of double-glazed windows.

5.3. Float glass import indicators

Indicators of import of the product group “Glass and glass products” from all countries for 9 months. 2023 amounted to \$226.7 million (Table 6).

Tab.6

Foreign trade of Ukraine by product groups with all countries for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tons	Import, \$ million.
70 Glass and glass products	221 025	226,698

Source: Customs Service of Ukraine

At the same time, the import of “Thermally polished glass; ground and polished glass,” the so-called float glass, amounted to \$75.7 million and 140,349 tons, which is 10% higher than the volume of imports of float glass in the same period in 2022 and 66% compared to the total import volume of this group product of 2010. Glass of this heading is often used in windows and doors, in cars, ships, airplanes, etc., for the manufacture of mirrors, glass for dining tables and desks, shelves, display cases, etc.



The float glass market is based on products from Poland and Bulgaria (Table 7).

Tab.7

Foreign trade of Ukraine indicating the main counterparty countries for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tn	Code of the country	Import, \$ million.
7005 Thermally polished glass; ground and polished glass		POL	30,993
		BGR	13,942
		BLR	12,703
		Other	18,069
Total	140 349		75,707

Source: Customs Service of Ukraine

At the same time, processed glass is supplied from Poland, China, and Hungary (Table 8).

Tab.8

Foreign trade of Ukraine, indicating the main counterparty countries for the period from 01/01/2023 to 09/30/2023

Code and name of goods items according to Ukrainian classification of goods of foreign economic activity	Weight, tn	Code of the country	Import, \$ million.
7006 Glass 7003, 7004, 7005 processed		POL	0,543
		CHN	0,258
		HUN	0,229
		Other	0,140
Total	824		1,170

Source: Customs Service of Ukraine



The share of energy-saving glass in supplies is approximately one-third of the total volume of this product group. However, glass without energy-saving properties continues to predominate in the structure due to its lower price.

More than 70% of imports are made from non-coated glass.

Solar control and tinted glass account for no more than 3% of imported goods.

According to the structure of import supplies, glass with a thickness of 4 mm is in greatest demand among consumers due to its wide range of applications, as well as due to its low cost compared to glass of greater thickness and due to the high percentage of light transmission and low heat loss coefficient.



5.4. Manufacturers of float glass imported to Ukraine

As of early 2022, there were several dozen thermally polished glass manufacturers worldwide, operating in more than 230 factories and more than 450 float glass lines.

The average float line is capable of delivering to the market 60 thousand m² of product with a thickness of 1.5-30 mm, meeting the requirements of international quality standards.

The top three largest suppliers of glass to Ukraine are AGC Flat Glass, the world's largest manufacturer of flat glass; NSG Group, which is considered a leader in innovative float glass production technologies; and one of the oldest transnational concerns Saint-Gobain, which is a manufacturer of not only glass but also other high-tech building materials.

The international concern Guardian, famous for its innovation and architectural glass with magnetron sputtering under the SunGuard TM, is also present in the Ukrainian market.



The Pittsburgh Plate Glass Co (PPG) concern is also known in Ukraine for its automotive glass, which also produces pyrolytic glass.

10 TOP manufacturers represented in the glass production market: AGC, Saint Gobain, Fuyao Group, Guardian Industries, NSG, Siseam, Euroglas, Taiwan Glass Group, Vitro, Corning Incorporated



5.4.1. AGC Flat Glass (GLAVERBEL)

AGC AGC Glass Europe

AGC Flat Glass is a Belgian company that is a branch of the Asahi Glass concern (Japan) (after rebranding to unify the band it became AGC), which occupies a leading position in the global market of glass and glass products.

AGC Flat Glass Europe has 16 float lines and approximately 100 production and processing plants that produce and process flat glass for the construction industry, automotive industry, and other sectors (transport, solar energy, and high technology).

European factories are located in Fleurus (Belgium), Anis (France), Roccasecca (Italy), Tatabanya (Hungary), and Huderzice (Czech Republic). In addition, there are factories, sales offices, and warehouses in Spain, Scotland, England, Germany, the Netherlands, Poland, Sweden, Turkey, and Ukraine - in total more than 100 locations with 16,500 employees.



Contacts:

Headquarters AGC Glass Europe
Avenue Jean Monnet 4
1348 Louvain-La-Neuve, Belgium
Tel.: +32 2 409 30 00
<https://www.agc-yourglass.com/en-UK/profiler>
<https://www.agc-glass.eu/en>

5.4.2. Saint-Gobain

The French concern Saint-Gobain, which began its production with sheet glass and mirrors, currently specializes in various areas of construction and finishing materials.



The company has 8 development centers, production, and sales in 19 countries, 42 divisions with 16,400 employees. The direction of flat glass is called Saint Gobain Flat Glass Division.

Saint-Gobain Building Glass manufactures and offers a complete range of different types of flat building glass. In addition to developing high-energy coated glass, the company offers insulated glass and insulated glazing with solar control, low emissivity, low maintenance, and transparency to meet the needs of low-energy buildings.

Saint-Gobain Glass in Poland The plant, with two floats, a coating machine, a mirror line, a laminated glass line, and three cutting lines, is one of the largest glass complexes in Poland, with an annual flat glass production capacity of 27.4 million m². In particular, the plant produces SGG PLANITHERM XN - low-e glass that maximizes the energy efficiency of double and triple-glazed windows.



<https://www.saint-gobain-glass.pl/pl>

Saint-Gobain in Calarasi, Romania

The plant, with an annual capacity of 21 million square meters, produces, among other things, one of Saint-Gobain's most innovative product series: Cool-Lite SKN sheet glass.

Products:

COOL-LITE SKN is a double solar control glass with thermal insulation properties in silver color with a highly effective coating. Coatings are applied to float glass PLANICLEAR or DIAMANT by cathode sputtering under vacuum conditions.



Glass can be used in residential and commercial buildings, both for facades and overhead glazing.

- ✓ Dimensions: Jumbo size (PLF) 6000 x 3210 mm, length up to 18,000 mm (for coatings supplied from Europe)
- ✓ Separate sizes on request
- ✓ Standard thickness: 4-6-8 mm (or on request)

Contacts:

Headquarters Tour Saint-Gobain

12 Place de l'Iris

92096 La Défense Cedex

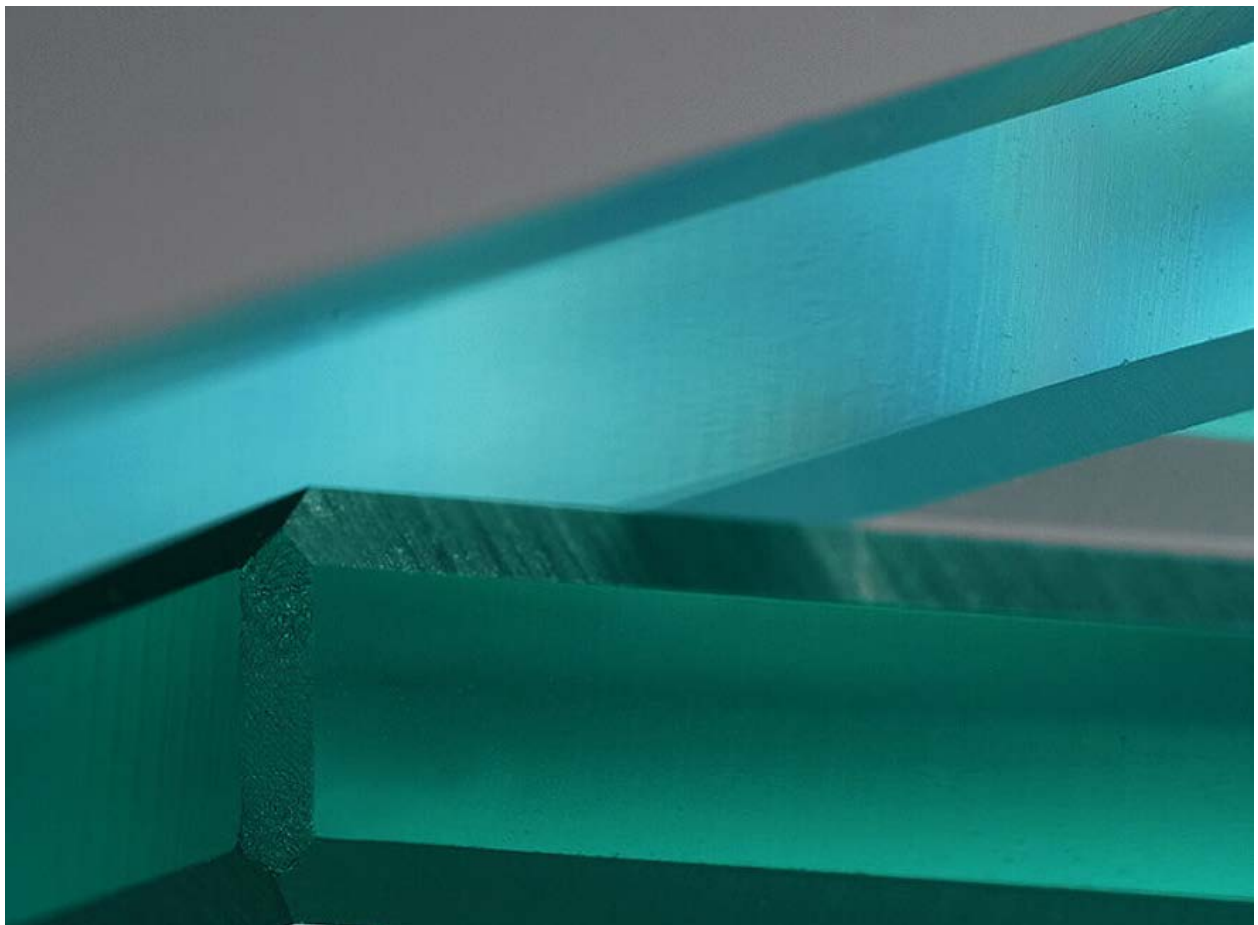
France

(+33) 1 88 54 00 00

<https://www.saint-gobain-glass.com/>

5.4.3. Euroglas

Euroglas (France) is part of the **Swiss Glas Trösch** group and produces thermopolished sheet glass (also known as float glass), thermal insulation, and solar control glass, as well as laminated safety glass in four European factories:





- Euroglas Hombourg

[Euroglas S.A](#)

[Zoning Industriel 68490 Hombourg France](#)

[+33 389 83 35 00](#)

hombourg@euroglas.com

- Euroglas Haldensleben

[Euroglas GmbH](#)

[Dammühlenweg 6039340 Haldensleben Германия](#)

[+49 3904 63 80](#)

info@euroglas.com

- Euroglas Osterweddingen

[Euroglas AG](#)

[Euroglas Strasse 10139171 Osterweddingen Германия](#)

[+49 3904 63 80](#)

info@euroglas.com

- Euroglas Ujazd

[Euroglas Polska Sp. Z o.o.](#)

[Osiedle Niewiadów 6597-225 Ujazd Польша](#)

[+48 44 719 40 00](#)

ujazd@euroglas.com

Products:

EUROFLOAT glass is a base glass with ideal clarity and optimized pure tint that forms the basis of most glass products. Resistant to bad weather, acids, and alkaline solutions, does not absorb odors and does not change color, depending on the thickness of the glass there is a characteristic light greenish tint.

Standard dimensions (slab dimensions) 6000x3210 mm; additional length 9000x3210 mm; thickness from 2 to 12 mm. 100% recyclable float glass.

Contacts:

East Europe

[+48 514 600 261](#)

m.jakobs@euroglas.com

<https://www.euroglas.com/fr/>

5.4.4. Fuyao Group

Fuyao Glass Industry Group Co is the largest Chinese company engaged in the production of float glass, automotive glass, and building glass.



With a variety of architectural, automotive, and creative building glass products that are widely used in solar energy, original equipment, aftermarket replacement, and specialty transportation applications, the company has made a major impact in the global market. Its product portfolio includes fire-resistant glass, solar control glass, noise control glass, thermal insulation glass, safety and security glass, solar energy glass, thin display glass, glass cord automotive engine belts, copier and printer lenses, machine separators, and batteries. In addition, Nippon Sheet Glass develops glass for various electronic devices such as plasma panels and optoelectronics.



Production is located in China and nine other countries, including the United States of America, Germany, Japan, and South Korea. There are six research and development centers in China, the United States of America, and Germany. In total, the concern employs more than 26,000 people.

Contacts:

(86-591) 8538-3777

fygi@fuyaogroup.com

<http://www.fuyaogroup.com>

5.4.5. NSG

Nippon Sheet Glass Co. is a Japanese glass manufacturing company. Acquired UK-based Pilkington in 2006, making NSG/Pilkington one of the four largest glass companies in the world, along with other Japanese companies.



Today, the company has total sales of approximately 600 billion yen, with manufacturing operations in 29 countries and sales in 130 countries, and employs approximately 28,500 people worldwide. Geographically, 42 percent of the Group's sales are in Europe.

The Group's flat glass businesses, including building products and automotive products, account for 90 percent of annual sales, with specialty glass accounting for the remainder.

Contacts:

<https://www.nsg.com/>





5.4.6. Guardian Industries

Guardian Industries is a private industrial manufacturer of glass, automotive, and construction products based in the United States.

The company produces float glass, fabricated glass products, fiberglass insulation, and building materials for commercial, residential, and automotive applications. The company employs more than 18,000 people and operates throughout the world.

Guardian Glass Companies has 8 float glass production lines in Europe.

Products:

Guardian ExtraClear[®] glass contains less iron than standard flat glass. This significantly improves color neutrality and natural light transmission, providing a clearer, more transparent, and natural-looking image regardless of location.

Contacts:

Orosháza, Hungary Float Glass Plant

[+36-68-887-200](tel:+3668887200)

Thalheim, Германия Float Glass Plant

[+49-3494-361-500](tel:+493494361500)

Честохова, Польша Флоат Glass Plant

[+48-34-323-9-200](tel:+48343239200)

Goole, Великобритания Float Glass Plant

[+44 1405 726800](tel:+441405726800)

<http://www.guardian.com/>





5.4.7. Sisecam

The Turkish holding Sisecam, thanks to the purchase of the Italian glass assets of Sangalli Vetro Porto Nogaro, has become a global player in the flat glass production market and has reached a production capacity of 2.5 million tons of float glass per year.



Currently, the Şişecam Group operates 10 flat glass production plants located in six countries around the world, providing products to the construction, furniture, energy, and household appliance industries, while constantly expanding its range.

Sisecam has three main business areas: architectural glass, energy glass, and appliance glass. The company's portfolio includes plate glass, glassware, glass packaging, chemicals, automotive glass, mining, fiberglass, energy and waste management.

Contacts:

Türkiye Şişe ve Cam Fabrikaları A.Ş. (branch factory for the production of sheet glass Şişecam in Bursa, Türkiye)
Atatürk Organize Sanayii Bölgesi 16900 Yenişehir, Bursa/ Turkey
(0288) 400 80 00

«Trakia Glass Bulgaria» EAD (Bulgaria)
District “Vabel” Industrial Area, 7700 Targovishte, Bulgaria
(00359) 601 4 78 01

Sisecam Flat Glass Italy S.R.L. (Italy)
Via Jacopo Linussio, 2, 33058 San Giorgio di Nogaro UD, Italy
(0039) 0431 1983812

Sisecam Flat Glass South Italy S.R.L. (Italy)
Strada Statale 89 KM 162.250 SNC 71037, Monte Sant’Angelo FG/Italy
(0039) 0431 628111

Saint-Gobain Glass Egypt S.A.E. (Egypt)
66 Cornish El Nile, Elzahraa Building, Floor No. 38 Maadi Cairo, Egypt

Türkiye Şişe ve Cam Fabrikaları A.Ş. (branch factory for the production of sheet glass Şişecam in Ankara, Türkiye)
Polatlı Organize Sanayii Bölgesi 06900 Polatlı, Ankara/ Turkey
(0850) 206 26 46

Türkiye Şişe ve Cam Fabrikaları A.Ş. (branch factory for the production of sheet glass Şişecam in Mersin, Türkiye)
Mersin Tarsus Organize Sanayi Bölgesi, Atatürk Caddesi No: 1 33400 Akdeniz, Mersin/ Turkey
(0324) 676 40 70



5.4.8. Taiwan Glass Group

Headquarters: Taipei, Taiwan



Since the company's founding in 1964, Taiwan Glass Group has grown to become one of the largest glass manufacturers in China. The company's management philosophy is to commit to advanced technology and total quality control so that it can provide high-quality products to its customers. Taiwan Glass Industry Corporation manufactures various glass products, including float flat glass, glass containers, and kitchenware as well as glass fibers and fabrics.



Contacts:

<http://www.taiwanglass.com/>



5.4.9. Vitro

Vitro (headquartered in Monterrey, Mexico) is committed to extensive research and development, aiming to expand the capabilities of architects, glazing contractors, manufacturers, and window manufacturers in the coming years.



Vitro Architectural Glass factories use proprietary oxy-fuel technology to reduce energy consumption and improve environmental performance when processing flat glass, float glass, or oxy-fuel float glass to produce high-performance, energy-efficient, and low-emissivity (Low-E) glasses.



Contacts:

<https://www.vitro.com/>

5.4.10. Corning Incorporated

Corning Incorporated is an American company specializing in the production of specialty glasses, ceramics and related materials and technologies, and advanced optics, primarily for industrial and scientific applications. About 50,000 employees worldwide, research centers in North America, Europe, and Asia.



Sales volume for key businesses was about \$11.4 billion in 2018.



Products:



Corning® Gorilla® Glass is an optically clear, thermally stable glass fused using Corning's patented draw technology with pristine surface quality. Reduced weight and thickness compared to typical architectural glass panels. Gorilla Glass panels are only 25% of the thickness and weight of conventional glass panels commonly used in architecture and are ultra-lightweight, making them easy to transport and install. Gorilla Glass is chemically strengthened through an ion exchange process that creates a deep compression layer on the surface of the glass substrate. This layer acts as "armor", reducing the appearance of defects.

Characteristics:

Weight: 4.88 kg/m² with a thickness of 2.0 mm

Standard glass thickness: 2.0 mm

Maximum size:

— GG 2030 x 1200 | 79.92 x 47.24

— AG 2020 x 1170 | 79.52 x 46.06

Meets ASTM standards for flat glass.

Corning® Willow® Glass is an ultra-thin flexible glass that can enhance the durability of the substrate by adding a scratch-resistant, easy-to-clean, and beautiful surface to suit any taste.

Thickness 100 µm and 200 µm

Standard Sizes 1.3 m wide x 300 m long (4.25 ft x ~984 ft)

Cut Sizes Slit roll 300 mm wide up to 1.2 m wide (1 ft to 4 ft)

Packaging • Rolls with Interleaf • Option for Edge tab / Leader / Trailer

Contacts:

<http://www.corning.com/>

6. Ukrainian companies importing sheet glass

6.1. Zapad, PE



A wide range of glass products includes polished glass with a thickness of 2.2mm to 12mm, energy-saving glass, tinted glass, decorative glass, and mirrors. Special types of glass are also available - reflective and triplex.

Manufacturers: Saint Gobain Glass (France), Sangalli Vetro (Italy), Sphinx Glass (Egypt), TRAKAYA Glass (Bulgaria), Kaveh Glass Industry Group (Iran), PPG (USA), SISECAM (Turkey).



Contacts:

54052 Nikolaev, st. Aivazovsky, 15

+38 (0512) 639052, +38 (0512) 639165

Kovalenko Valery Olegovich – director

6.2. Kampen PE

Sale of 4mm sheet glass. box and jumbo format in Ukraine

Contacts:

Lviv region Nikolaev, Lysenko st. 37

+380 (67) 208-12-78

+380 (50) 661-00-00

Yarema Oleg - manager

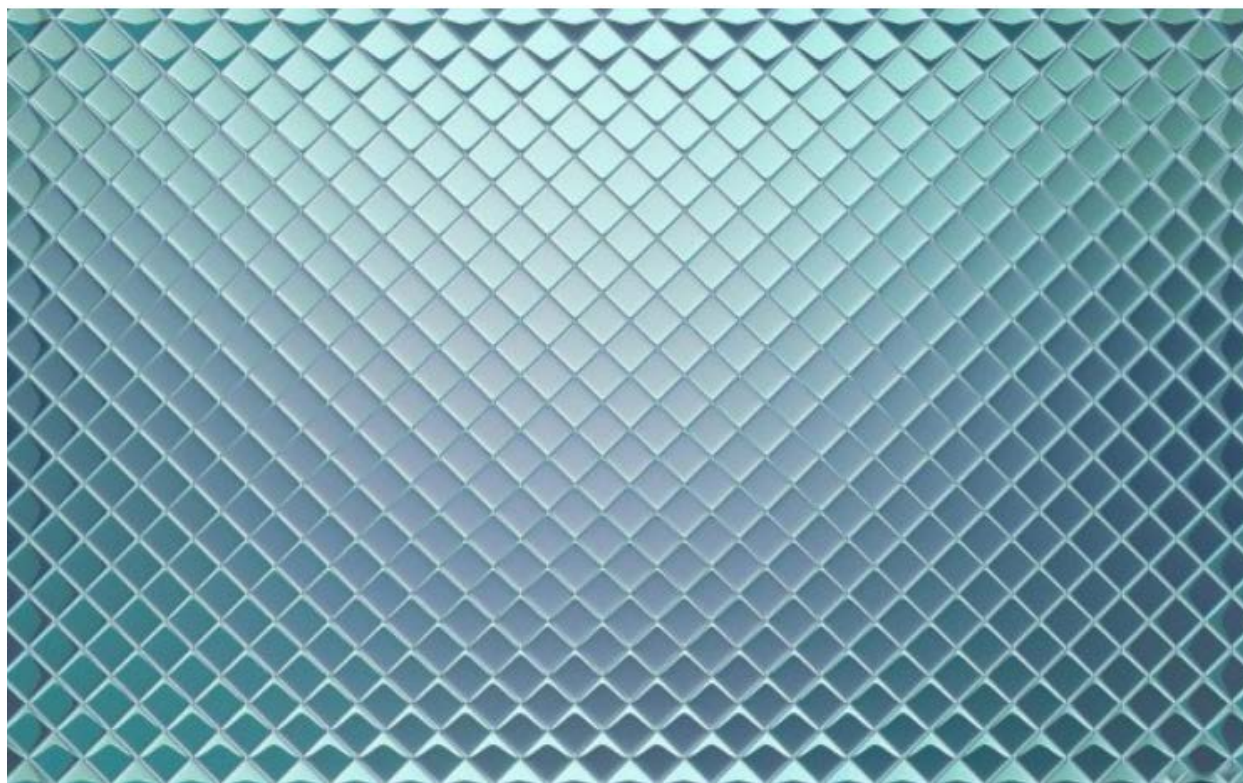
6.3. Glassshield, Ltd

Sale of sheet glass Float 4 mm 2250 x 3250 Gingdao Industry CHINA

Contacts: Kyiv, st. Volynskaya, 60

+380 (95) 633-78-88

Stefanishin Alexey – manager





6.4. Expertpromservice, Ltd

Float glass sheet colorless grade M1, 4 mm thick. Manufacturer - Azerfloat CJSC (Sumgait, Republic of Azerbaijan). Complies with European standard EN 572. Sheet size 3210 x 2250 mm.

Contacts:

02160, Kiev, Sobornosti Avenue, 7A

[+380 \(50\) 460-70-44](tel:+380504607044)

[+380 \(50\) 153-13-33](tel:+380501531333)

Chumak Evgeniy Vitalievich – director

6.5. ISK, Ltd

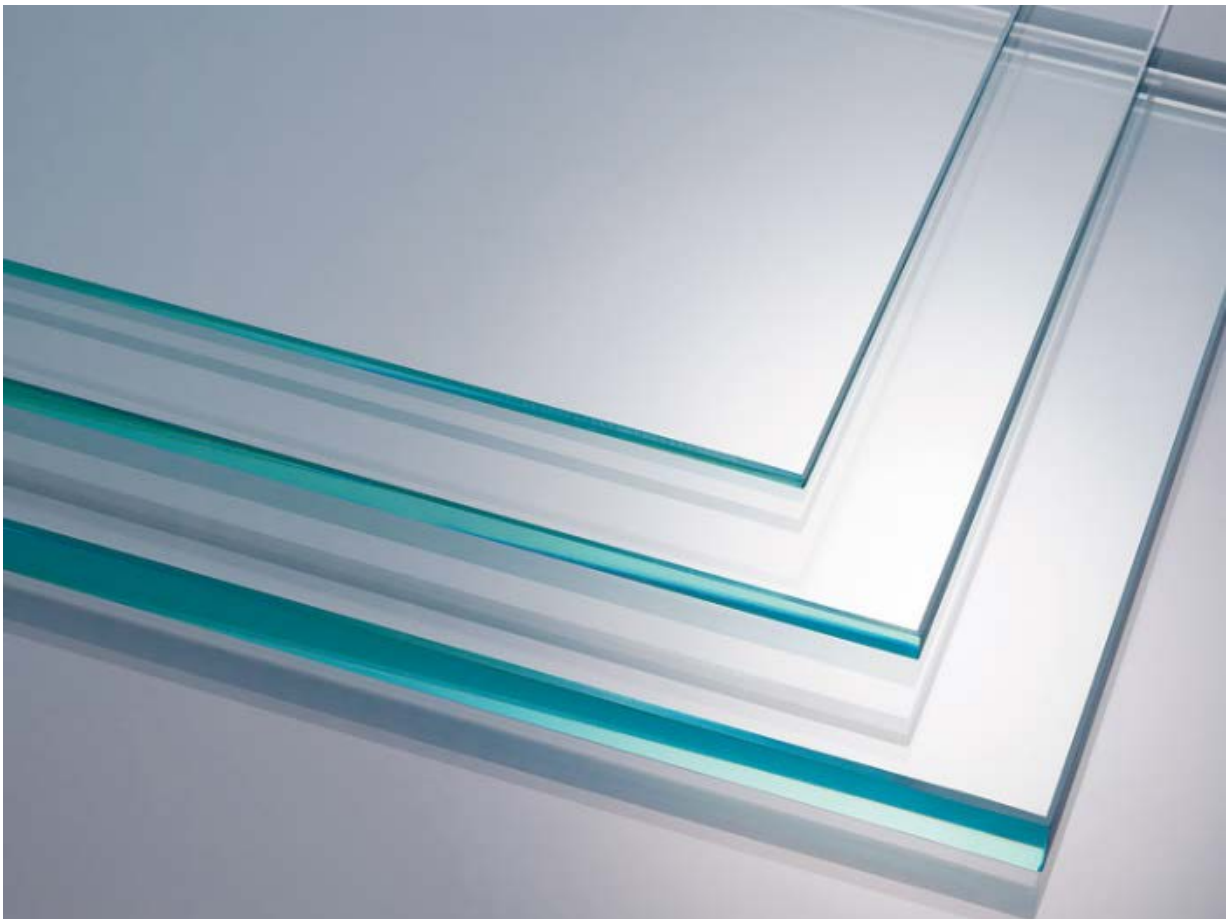
Pilkington Optifloat – clear float glass 4mm 3210x2250

Contacts:

Kyiv, Dneprovskaya embankment, 26

[+380 \(99\) 150-04-16](tel:+380991500416)

Turos Kirill Purchasing Manager





6.6. TDM Trading Ltd

Sale of float glass 4 mm thick

Contacts:

43024, Lutsk, ave. Vozrozhdeniya, 51, room 43

Yaruchik Andrey Leonidovich - director

6.7. INTER-NORM Ltd

Sale of float glass 4 mm thick

Contacts:

07455, Kyiv region, Brovary district, Knyazhichi village, Medovaya street, building 2

+380 (44) 503-08-31

info@vst.net.ua

Lysenko Yuri Mikhailovich – director





6.8. Thermoplast Plus Ltd

Large production with equipment for 350 windows per shift, and the volume of window production of the enterprise is 8000 pieces. per month. Sheet glass from the American manufacturer Guardian Glass and the European Euroglass.

Contacts:

82100, Drohobych, st. Drohobychskaya, 11

+380 96 198 3481

Zhirik Maxim

6.9. Gualos Ltd

Since 2004, it has been operating in the import market of flat glass from the EU countries and Turkey and supplies float glass, tinted, energy-saving, reinforced, patterned glass, and mirrors.



Manufacturers of float glass: Saint Gobain Glass (France), AGC Flat Glass (GLAVERBEL) (Belgium), Euroglas (France), and Guardian Industries (USA).

Contacts:

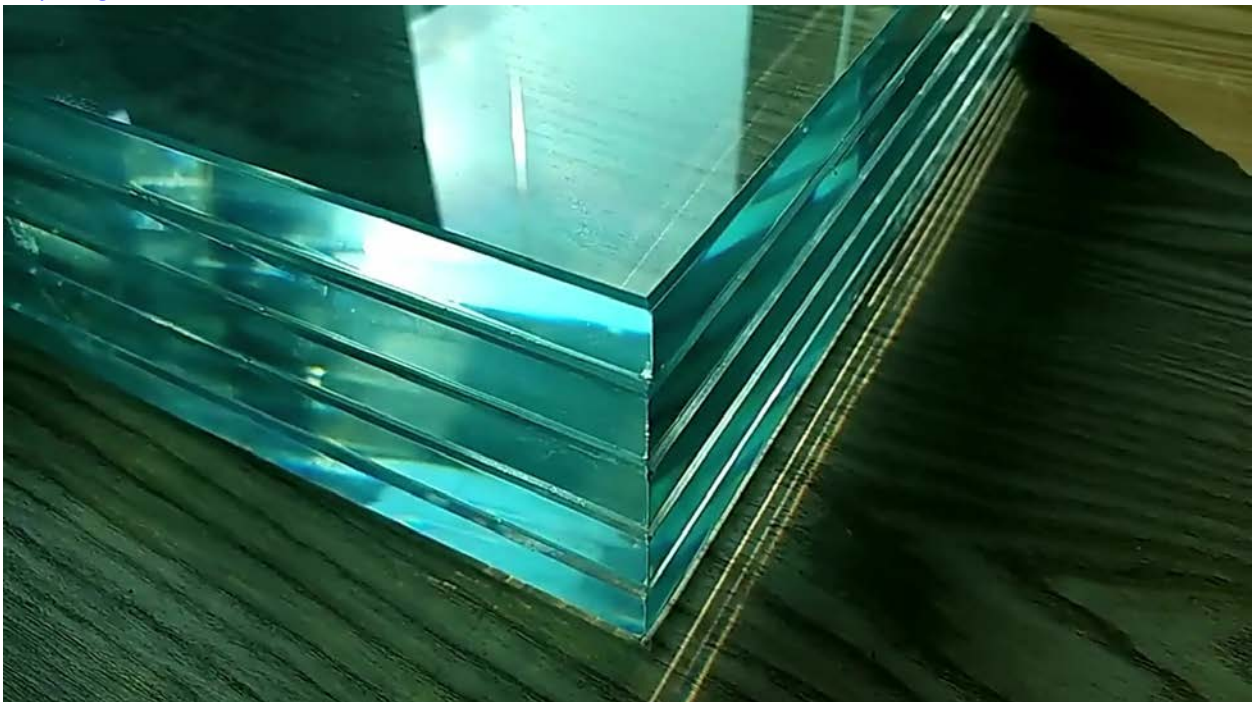
Rivne region Dubno, st. Semidubskaya, 103a

(093) 177-05-61 (multi-channel)

(044) 355-05-77 (multi-channel)

100@gualos.com

<https://gualos.com/>





7. Conclusions

Until 2022, the glass market per year was about 28 million square meters or \$150 million. Despite the market halving, glass prices have increased, and now a square meter of a 4 mm thick float plate costs on average 180–190 UAH, and coated glass – 280–290 UAH.

In the first seven months of 2023, about 5.65 million square meters were imported to Ukraine. m of float glass, according to data from the State Customs Service. Almost 68% are from Poland, another 7% each from Turkey and the Czech Republic.

Due to high demand and the lack of domestic production of high-quality glass in Ukraine, there will be a further increase in prices for glass and windows in the next few years. Currently, price growth does not exceed 30% and is 23% in 2022 compared to last year, which correlates with the general level of inflation.

The main reason for the lack of modern glass production in Ukraine is the long-term absence of a reasonable economic policy that would support the production of finished products on the domestic market, and not focus only on the extraction of raw materials. A policy that would ensure both an influx of investment into the domestic market and an influx of new technologies that keep up with the times. But it did not exist, and now the country is import-dependent, even having raw materials and experience in its production. In conditions of expensive credit resources, weak protection of foreign investors, as well as the existing legislative framework, great difficulties arise in accumulating the necessary volumes of capital investments.

To launch the production of the most popular float glass now, in addition to solving the above reasons, thoughtful engineering calculations are required.

In global practice, float glass production with a production capacity of 600 tons per day is considered the most profitable and quickly pays for itself, and with full sales of products, the payback of such production ranges from 2 to 7 years (depending on the geophysical location of the enterprise and the pricing policy of the region and the state as a whole). Gas consumption at such production volumes is, on average, about 100 million cubic meters per year. Electricity consumption is also on average about 100 thousand megawatts per year. The cost of developing a pre-engineering proposal is about 200 thousand euros. The project implementation period is about 2 years, and the cost, according to very approximate indicators, can be about 120-130 million euros.

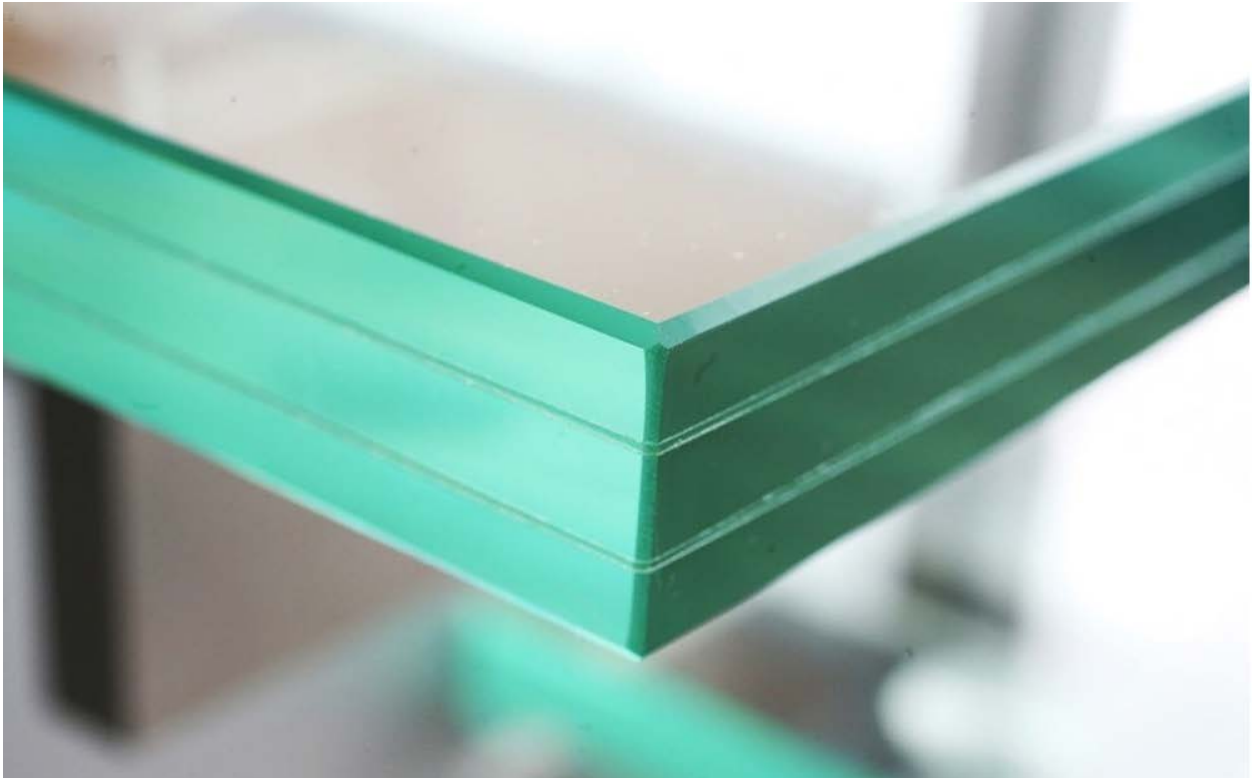
Today, world practice demonstrates that to consistently supply the country with glass production, it is necessary to have one glass tempering line with a capacity of 200 square meters per hour for every 1 million population.

That is, Ukraine needs at least 30 such lines. The country has all the prerequisites for its construction, except a comfortable business climate, transparent and non-corruption conditions for its conduct, and an effective regulatory framework.

There are 50-60 manufacturers of double-glazed windows and 300-350 manufacturers of windows in Ukraine, according to calculations by the Association of Window and Facade Market Participants. Five manufacturers of double-glazed windows, including Steko, Ekipazh, and Vikond, have their window production. In total, they account for approximately 50% of the Ukrainian market. Domestic manufacturers of double-glazed windows and windows use imported glass.



Our production of float glass can solve the shortage problem.



8. Plans and projects

Flat glass plant in Chernihiv region

Meanwhile, in the Chernihiv region in 2019, it was agreed to grant permission to use the Vershina quartz sand deposit with a view to the future use of this raw material in glass production at a plant that is planned to be built at the expense of foreign investors. The enterprise project should be implemented by Stuart Engineering LLC (USA) and the P-Build Holding AG fund (Switzerland). The total investment is \$250 million. Sand Industry LLC (sand mining) is registered in the city of Gorodnya, Chernihiv region, and Stuart Engineering Ukraine is registered in the village. Vaganichi.

The plant was to be built in the city of Gorodnya on the territory of a non-operating airfield. The industrial capacity of the enterprise should be 600 tons of glass per day from 400 tons of quartz sand. The assortment will consist of sheet glass and double-glazed windows, and later - automotive glass for export to Germany, Italy, and France. The plant was planned to employ 350 people.

The project was to be managed by Oleg Seminsky, director of Stuart Float Glass LLC. It was planned to build the enterprise no later than 2021, but all promises remained only on paper.



Glass production plant in Kyiv region

The president of the Agromat group of companies, Alexander Molyaka, announced plans to build a plant for the production of glass using the float method, with a capacity of 600 tons per day, which was to begin in 2019. It was expected that the volume of investment in the project would amount to more than 300 million euros, and the plant would become the largest production facility in Europe of this profile and fully cover Ukraine's needs for sheet glass. The American investor was supposed to officially announce construction at the beginning of 2019, but this never happened. American investors postponed construction of the plant due to concerns about the risk of raiding.

Plant in Berezan, Kyiv region.

In addition, City One Development by Valery Kodetsky announced plans to build two glass production plants by 2025. The launch of the first production near Kyiv in Berezan is planned for 2024 - the investment amount is €100 million. The second plant will be on the right bank of the Dnieper, in central Ukraine, and will produce glass with different coatings. The glass capacity will be supplemented by the purchase of a plant for the production of double-glazed windows in Romania. These three plants will create a single cycle. The payback period for the new production, according to Kodetsky, will be at least five years. Construction of the plant in Berezan has already begun, and for the second plant there is already a site, technical documents are being prepared.

If the state launches a program to restore housing destroyed by the war, the demand for sheet glass will increase several times. According to the Fast Recovery plan for the rapid restoration of Ukraine's social infrastructure, developed by the President's office, 29,108 private houses, and 6,674 multi-story buildings are in urgent need of restoration. To restore partially destroyed buildings, a minimum of 25 million square meters will be needed in glass. The estimated cost of implementation is \$750 billion by 2032.

At the same time, there are no initiatives on the part of the state to assist in the emergence of flat glass production in Ukraine.

