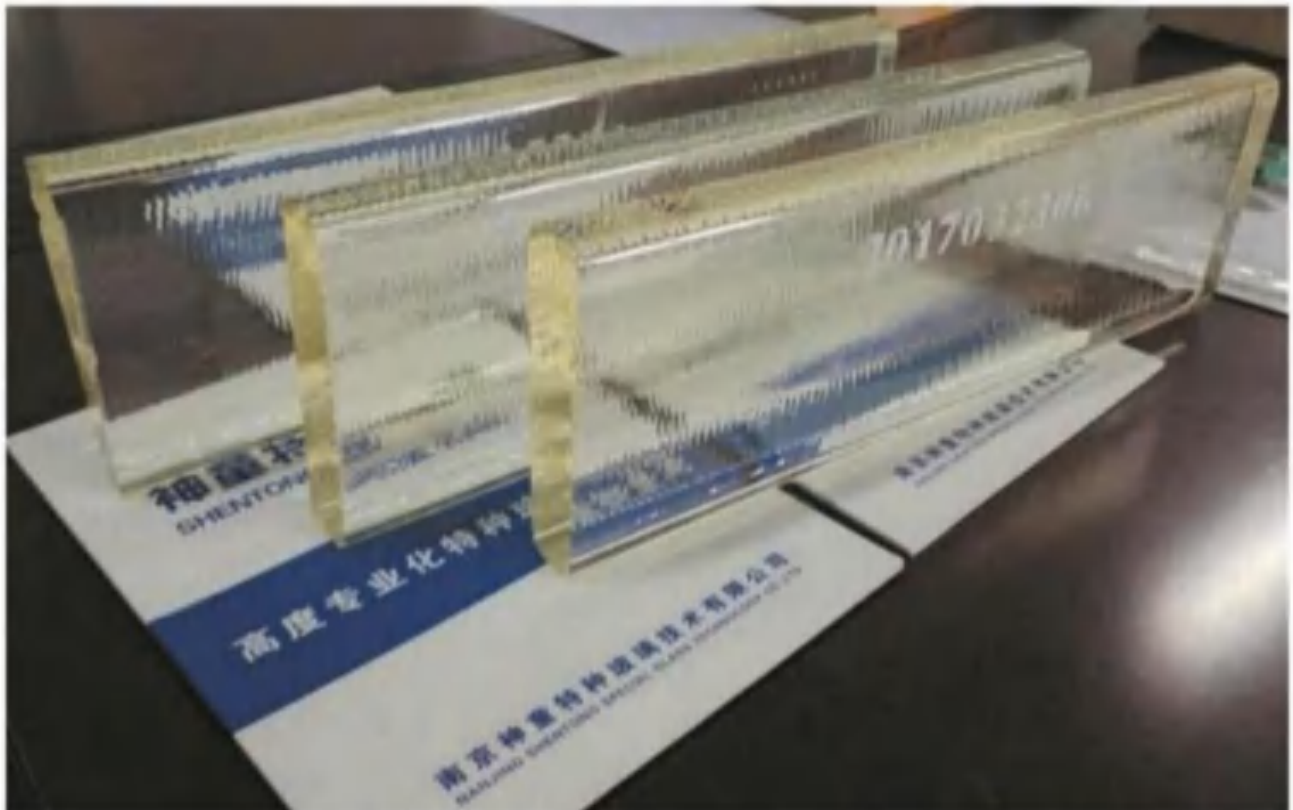


Super high pressure alkali-resistant mica glass (garnet-yttrium-lanthanum-aluminum-silicate glass)

For a long time, the glass sight window of pressure vessels and boiler steam drums has been a safety hazard and technical problem for users manufacturers of high-pressure level gauges due to its lack of resistance to alkaline corrosion. The using unit can only protect the glass from alkaline ion corrosion by adding mica pad in front of the glass sight window. The clarity of the glass with mica pads is seriously reduced, and both scientific researchers and users are eager to a technical glass that can withstand high temperature and pressure and resist alkaline ion corrosion without the need for mica protection.

The price of natural mica sheets, which mainly produced in India, has shown an upward trend year by year. Mica mines are non-renewable, and long-term disorderly mining has led to a decline in mica quality. Affected by international politics and economy, it has brought considerable economic pressure and technical difficulties to the using units such as petrochemical and plants. At present, international companies such as Japan's BBK and NBK have successively developed alkali-resistant glass that can replace mica protection and can be for a long time under PH values of 10-14, and it does not accumulate dirt. Since it belongs to a high-tech product, the selling of Japanese companies is quite high, and they implement a ban on sales to Chinese companies. The development of high-end pressure vessel sight windows and high-pressure water level ga in China is seriously restricted.



Lumistar Special Glass Technology Co., Ltd. has invested a huge amount of funds, hired famous experts and scholars in the domestic glass industry, and cooperated with scientific research institutions to overcome technical problems. From the design of product for mutations, the selection of raw materials, melting processes, anne processes, cutting processes, grinding and polishing processes, and tempering processes, it has taken more than two years of scientific and technological research and development. From sample trial, pilot production, and mass production, it has lasted for two and a half years. Without any melting experience to refer to, it has overcome many difficulties and successfully out mass production in March 2017. After testing by the National Glass Fiber Quality Supervision and Inspection Center (Nanjing Glass Fiber Institute), the fully reaches the technical level of foreign similar products! In terms of ultra-high temperature tempering technology, Lumistar Company is even better than foreign similar products. At the products have been mass-produced and supplied to large domestic instrument manufacturers such as Tieling Iron Light, Changchun Boiler Instrument Co., Ltd., Shanghai Xhen, Dandong Tongbo Group, Hubei Huaxing, Wuhan Hyde Long, National Nuclear Power Research Institute, Sen Song Pharmaceutical, Dongyang, Siemens, and Valmet Paper Machinery, and the users' feedback is very good.



Lumiglas®

The mystery of alkali-resistant glass is that the basic raw material for making glass, silica, is an acidic substance, which will undergo acid-base reaction when it encounters an alkaline solution.

Lumistar scientific researchers have significantly reduced the content of silica and added a large amount of rare earth alkaline oxides, including lanthanum oxide, yttrium oxide, aluminum oxide, zirconia and other refractory alkaline earth metal oxides. Through scientific, the technical indicators such as the material structure density, flexural strength, and hardness of the glass have been greatly improved. The Young's modulus has reached $1780 \times 10^7 \text{Pa}$, the alkali corrosion rate $\leq 0.004 \text{mg/cm}^2$, the flexural strength has reached 40~450Mpa, and the pressure resistance performance has also been improved by 2~3 times compared with high-pressure aluminum silicate glass, which meets various pressure vessel windows below 600 °C high temperature and high pressure alkali corrosion.

The alkali resistance performance and mechanical performance index of alkali-resistant m glass are compared with aluminum silicate glass and PYR EX7740 glass, which shows excellent technical advantages.

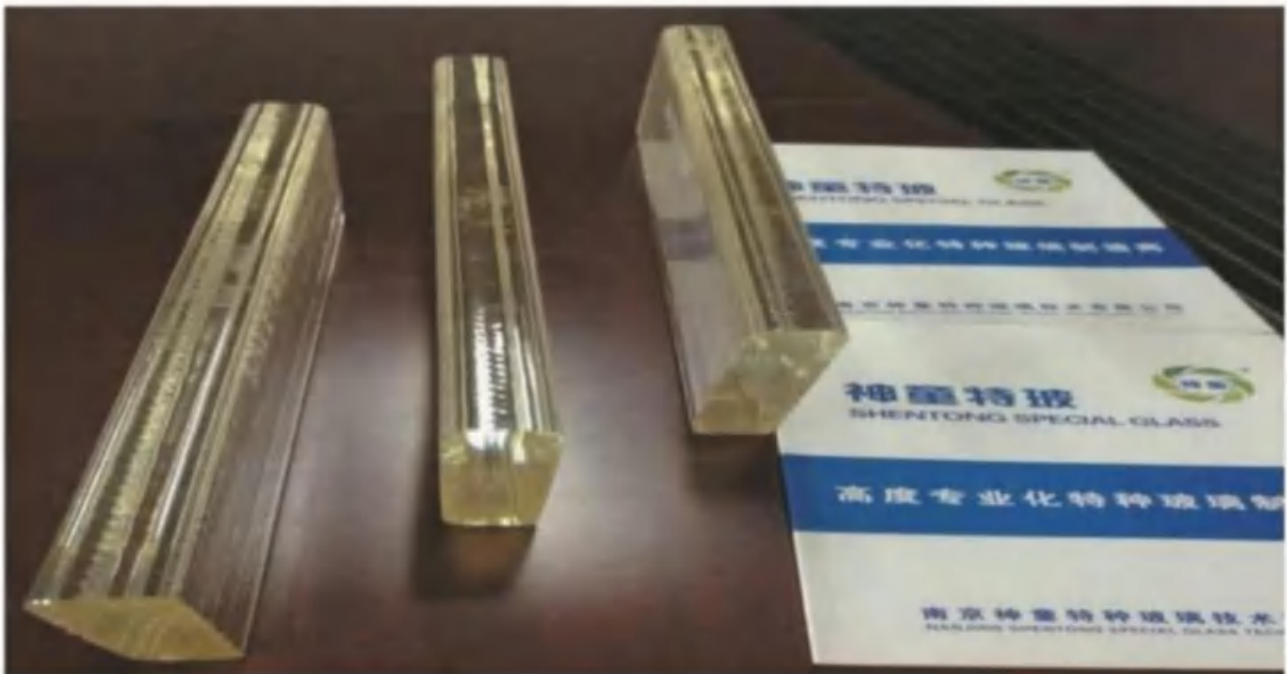


Comparison of corrosion performance data of mica and aluminum-silicate glass, borosilicate glass

	NO	1.Alkali resistant glass		2.Aiuminosilicate	3. PYERX7740 Borosilicate glass
		2nd generation	First generation		
Composition ratio	SiO ₂	22.8	35	57	72
	Al ₂ O ₃	19.0	19	16	5.0
	Y ₂ O ₃	25.2	22.5	0	0
	La ₂ O ₃	20.0	12.5	0	0
	TiO ₂	6.4	1.94	0	0
	ZrO ₂	6.6	3.5	0	0
	MgO	0	0	0	0
	BaO	0	0.93	0	0
	ZnO	0	1.23	0	0
	B ₂ O ₃	0	0.93	5.0	14
	Sb ₂ O ₃	0	0.95	0	0
	Other	0	0	23	9
Physical and chemical properties	specific gravity	3.92g/cm ³	3.42g/cm ³	2.62g/cm ³	2.23g/cm ³
	Alkaline corrosion amount	3.6mg/dm ²	6.7mg/dm ²	142mg/dm ²	174mg/dm ²
		0.20mm/Year	3.5mm/Year	21.7mm/Year	53.1mm/Year
	Mechanical strength	374-450 N/mm ²	370-450 N/mm ²	240-300N/mm ²	100-170N/mm ²
	Expansion coefficient	58*10 ⁻⁷ /	63*10 ⁻⁷ /	48*10 ⁻⁷ /	33*10 ⁻⁷ /

It can be seen from the above figure that the alkali resistance of the alkali-resistant mica glass is 800 times that of aluminum-silica glass and 1750 times that of the borosilicate glass, which has excellent performance.

The successful development of Lumixingali-resistant glass will save tens of millions of dollars in mica sheet purchase costs for domestic enterprises, especially for petrochemical and power plant users, and provide strong support and guarantee for the manufacturers of various high-pressure vessels and high-pressure water level gauges, which will alleviate the import economic pressure of various manufacturers and greatly enhance comprehensive competitive advantage of China's high-pressure power station equipment export !



Lumistar Special Glass Technology Co., Ltd., Nanjing Shentong Special Glass Technology Co., Ltd. through:

ISO9001: 2015 quality management system,
ISO14001-2004 environmental management system,
GJB9001C-017 military equipment quality management system,
EJ/T9001-2014 nuclear industry quality management system and other multi-system certifications.

The decrease in alkali resistance is 800 to 1750 times that of existing glass.

Looking AR features:

1. Alkali corrosion resistance

Comparing the alkali corrosion loss, it is about 800 times of aluminum silicate glass and about 750 times of silicate glass, which shows how good the alkali corrosion resistance is.

2. Mechanical strength

The flexural strength is 270N/mm² (27kgf/mm²), showing excellent mechanical strength compared to glass.

3. Heat resistance

The maximum use temperature is 500°C, showing excellent heat resistance compared to existing glass.

Looking AR applications and benefits:

● Advantages of using the observation type level gauge

(1) Since the alkaline corrosion is very small at 0.020/year, the level gauge does not require a mica plate, greatly reducing the leakage caused by the mica plate.

(2) Therefore, there is almost no need to replace consumables such as mica, glass, and gas gaskets and related maintenance, resulting in a significant reduction in costs.

(3) In addition, by the mica plate, it is also possible to remove the dirt caused by the peeling of the mica plate, thus achieving clear water surface monitoring.

(4) In addition, even after regular inspection, Looking-AR can be reused. (Please check for scratches, dirt, corrosion, and transparency to ensure perfect condition)

● Advantages of using a reflective water level gauge for a reflective boiler:

At present, reflective water level gauges are used for boilers with a pressure 2.5 MPa or less.

Since the reflective type does not use a mica plate due to the characteristics of the glass shape, the glass is replaced/discarded when it is corroded and leaks.

Therefore, by using Looking-AR, the frequency of glass replacement and maintenance is significantly reduced (no maintenance is required for at least 1 to 2 years before inspection), and the cost can also be significantly reduced.

*Looking-AR is a glass developed to improve alkali resistance, and it is slightly inferior to traditional glass in acid resistance, so please avoid long use with acidic liquids.

Looking AR types (shape and size):

● Boiler water level gauge and chemical (alkaline wave) level gauge glass.

Type (shape)	Our D defect product number (size)	Size (unit/mm)			Bias in inspection
		l	w	t	
Flat reflective	No. 10 *	400	34	17	Order production
	No. 9	340	34	17	
	No. 8	320	34	17	
	No. S7 *	300	34	17	Order production
	No. 7	280	34	17	
	No. 6	250	34	17	
	No. 5	220	34	17	
flat transmissive	No. S4 *	200	34	17	Order production
	No. 4 *	190	34	17	Order production
	No. 3 *	165	34	17	Order production

● Sodium silicate glass (for alkaline liquids).

Type (shape)	Size (unit/mm)		Bias in inspection
	d	t	
Circular perspective	φ20~φ80	10~25	The size that this can do can also be explained. Please be careful.

note :

(1) For orders from Looking-AR, please check with the manufacturer for stock status and delivery forecast.

(2) Regarding the order, please provide the conditions of use (pressure, temperature, fluid name, etc.).

A revolutionary glass that is 100% ARI resistant

In general, glass has excellent durability to chemicals, but very weak properties to high-temperature steam, hot water, and alkaline solutions.

Therefore, when glass is used in a direct-view level gauge (water level gauge), a durable transparent fluororesin sheet or mica plate is installed on the contact surface to prevent glass corrosion.

However, this method comes with the added burden of having to replace the fluororesin board or mica plate after a certain period of time.

A new type of glass that performs well in terms of strength and heat resistance and is not subject to alkali corrosion.

●Mechanical properties of R-king AR

Type of glass Compare items	Look for AR	Aluminosilicate	Low expansion borosilicate (heat-resistant glass)	borate
Specific gravity	3.50	2.58	2.23	2.31
Coefficient of thermal expansion $\times 10^{-7}/$	50.0	38.0	32.5	45.0
Refractive index	1.672	1.532	1.474	1.484
Poisson's ratio	0.28	0.16	0.20	0.23
Torque $\times 10^*N/mm^2$ ($\times 10^*kgt/mm^2$)	11.15 (11.15)	7.54 (7.54)	6.68 (6.68)	7.54 (7.54)
Flexural strength $N/mm^2(kgt/mm^2)$	270 (27)	200 (20)	120 (12)	150 (15)
Maximum operating temperature	500	400	300	250
Measurement of heat resistance deg	220	220	220	190
Mohs hardness kgt/cm^2	685	657	418	375
Distortion points	733	625	515	485

●Chemical properties of Lu-King-AR (alkali resistance/comparison with other glasses)

Glass	Corrosion Quantity (Alkali Resistance)		
Looking AR	0.004 mg/cm^2	(Calculated value) 0.020mm/Year	According to the acid number of our company
Aluminosilicate	3.2 mg/cm^2	(Calculated value) 21.7mm/Year	According to the manufacturer's data
Low expansion borosilicate glass (Birex)	7.0 mg/cm^2	(Calculated value) 53.1mm/Year	JIS BB2110 has a specification value of less than 7.0 mg/cm^2
Borate	7.0 mg/cm^2	(Calculated value) 53.1mm/Year	

【Testconditions】

Liquid NaOH300mg/8.50kgf/cm, 262°Cx5hours (Corrosion resistance test using Oitokureep of J1SB8211)

* The values of Rooking-AR in the table are test values and are not necessarily guaranteed values for user use.