

GWIPPO

硅普 GWIPPO

35 YEARS EXPERIENCE IN RESEARCH & MANUFACTURING ENAMEL



COMPANY CULTURE

GWIPPO + Great
+ Workmanship
+ Idea
+ Personalise
+ Popularize
+ Objective

GWIPPO

Vitreous and porcelain enamels

PRODUCT MANUAL

Glass-Lined
Equipment Parts

35-year experience in enamel making & craftsmanship inheritance >>>



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JIANGYIN GWIPPO ENAMEL CORP.,LTD



**Keep improving,
casting quality model.**

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GWIPPO

30-year experience in enamel making
& craftsmanship inheritance
Keep improving & be a model of quality goods

ABOUT US

· 1995
Founded in



▶▶ COMPANY PROFILE

JIANGYIN GWIPPO ENAMEL CORP., LTD.

Founded in 1995, Jiangyin GWIPPO Enamel Corp., Ltd. has participated in drafting 9 national standards and 6 industrial standards of vitreous and porcelain enamels. The company has received 6 patents for invention and have been granted more than 50 patents for utility models. Specializing in the research and development of enamel technologies, we have grown into a high and new technology enterprise integrating R&D, production, sales, and service.

GWIPPO has an advanced automated glaze material production line with an annual capacity of over 10,000 tons, provides services for about 90% of glass lined equipment manufacturers in China, and establishes partnerships with other countries and regions including South East Asia and Korea. We keep improving, hoping to be the model of quality goods in this section. We stay dedicated to the R&D, pilot production and production of high-end vitreous and porcelain enamels and glass lining products.

GWIPPO has a professional after-sales service team. With 35 years of experience in enameling skills and 30 years of experience in enamel making, we are proficient in the operation processes of enamels and dedicated to providing high-quality after-sales service. Customer satisfaction is our unremitting pursuit.

GWIPPO wins the market with integrity and earns customer trust with dedication. Through joint efforts with our customers at home and abroad, we are able to make great achievements together.

Listed in 2017, stock name: GWIPPO, stock code: 871274

▶▶▶ THE DEVELOPMENT COURSE



GB National Standards drafted by GWIPPO

No.	Standard Name	Standard Type	Standard No.	How to participate
1	Vitreous and porcelain enamels-Test method of specular glossiness	National standard	GB/T 11420-2024	Mainly drafted by Gwippo
2	Vitreous and porcelain enamels-Determination of resistance to chemical corrosion by boiling acids and their vapours	National standard	GB/T 7989-2013	Mainly drafted by Gwippo
3	Vitreous and porcelain enamels-Determination of resistance to alkaline liquids	National standard	GB/T 7988-2013	Mainly drafted by Gwippo
4	Specification of glass-lined equipment for industry	National standard	GB 25025-2010	Mainly drafted by Gwippo
5	Determination of coefficient of mean linear thermal expansion for vitreous and porcelain enamels	National standard	GB/T 7991.7-2019	Mainly drafted by Gwippo
6	Vitreous and porcelain enamels-Determination of resistance to therm shock	National standard	GB/T 7991.3-2021	Mainly drafted by Gwippo
7	Vitreous and porcelain enamels-Determination of resistance to hot sodium hydroxide	National standard	GB/T 7988-2002	Mainly drafted by Gwippo
8	Glass lining - Test methods - Part 4: Determination of resistance to mechanical impact	National standard	GB/T 7991.4-2019	Mainly drafted by Gwippo
9	Vitreous and porcelain enamels-Determination of resistance to condensing hydrochloric acid vapour	National standard	GB/T 7989-2003	Mainly drafted by Gwippo

NB/HG Industrial standards drafted by GWIPPO

No.	Standard Name	Standard Type	Standard No.	How to participate
1	Vitreous and porcelain enamels	Industry standard	HG/T 4798-2021	First drafting unit by Gwippo
2	Vitreous and porcelain enamels for sheet steel-Production of specimens for testing	Industry standard	HG/T 3105-2009	Exclusively drafted by Gwippo
3	Vitreous and porcelain enamels-Determination of fluidity behavior-fusion flow test	Industry standard	HG/T 2735-2009	Mainly drafted by Gwippo
4	Standard test methods for sieve analysis of porcelain enamels	Industry standard	HG/T 3128-2009	Mainly drafted by Gwippo
5	Vitreous and porcelain enamels-Determination of resistance to abrasion	Industry standard	HG/T 3221-2009	Mainly drafted by Gwippo
6	Enamel parts of heat storage water heater	Industry standard	QB/T 2590-2021	First drafting unit by Gwippo



▶▶ ENTERPRISE HONOR



ISO 9001 Quality Management System Certification



Patents for invention



Patens for utility models

5
Patents For Invention

50
Patents for utility models

9
National standards of glass lining products

6
Drafting 6 industrial standards



2 THE GLASS LINING GLAZE

>> Experimental Testing Equipment And Team

>> Production Process And Quality Control

>> Product Introduction

·Vitreous And Porcelain Groundcoat Enamels

·Vitreous And Porcelain Overglaze Enamels

>> Introduction Of High-end Glaze Materials

>> Enamel And Enameling Process Combined

▶▶▶ Experimental Testing Equipment And Team

GWIPPO has a solid technical foundation and a powerful R&D team. Under the technical leadership of Xianzhong XU, the former Chairman of the Board, GWIPPO has established its High-performance Enamel Research Institute. Subordinate to it, our "Glass Enamel Postgraduate Workstation of Donghua University" is equipped with an advanced physical and chemical laboratory and an enamel baking laboratory. We have established strict criteria of glaze material formulation. Many senior consultants of enamels participate in relevant R&D activities and discussions.

Material Test Laboratory

▶ Test component content, fineness, viscosity, and whiteness of raw materials.

Enamel Baking Laboratory 1

▶ Perform Fusion flow test, glaze property tests (e.g., adsorbing capacity, fineness, bulk density, and slump), test plate enamel firing and conductivity testing.

Enamel Baking Laboratory 2

▶ Perform Fusion flow test, glaze property tests (e.g., adsorbing capacity, fineness, bulk density, and slump), test plate enamel firing and conductivity testing.

Physical And Chemical Property Testing Laboratory

▶ Uniformity, adherence, acid resistance, alkali resistance, abrupt temperature difference change resistance, mechanical shock resistance, boiling water erosion resistance, the mean of coefficients of thermal expansion thermal expansivity, sintering test, and solubility tests of mixed materials.

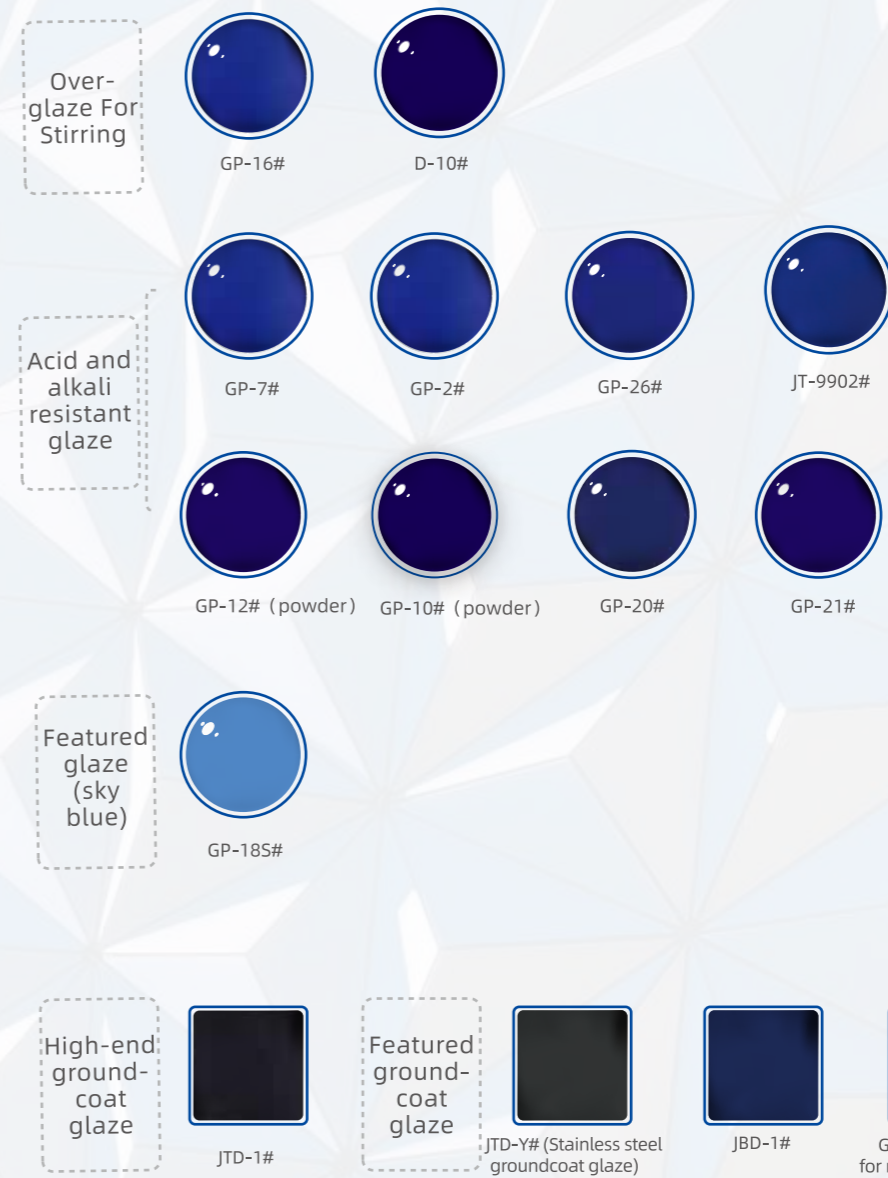
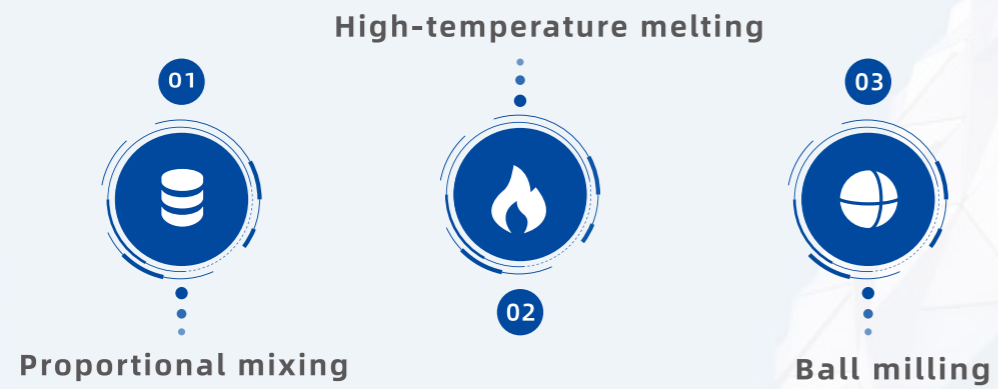


▶▶▶ Productionprocess And Quality Control

▶▶▶ Product Introduction

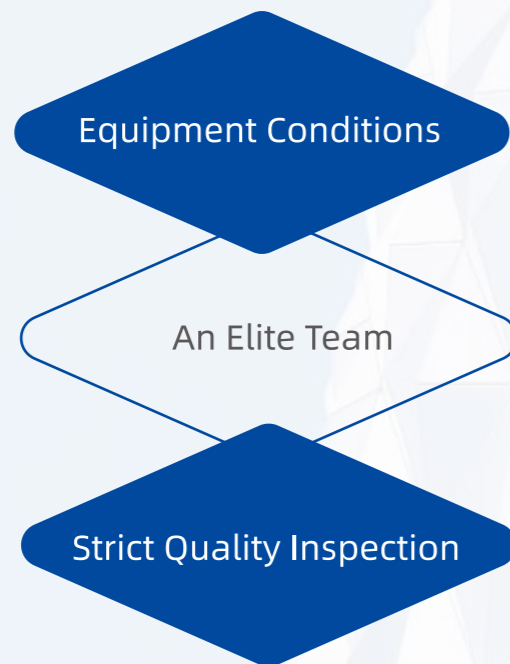
Production Process

Product Overview



Quality Control

We have stable workers with rick experience in production. Centering on prevention, we can timely identify and solve quality issues, thus lowering their frequency and preventing defective products from leaving factory.



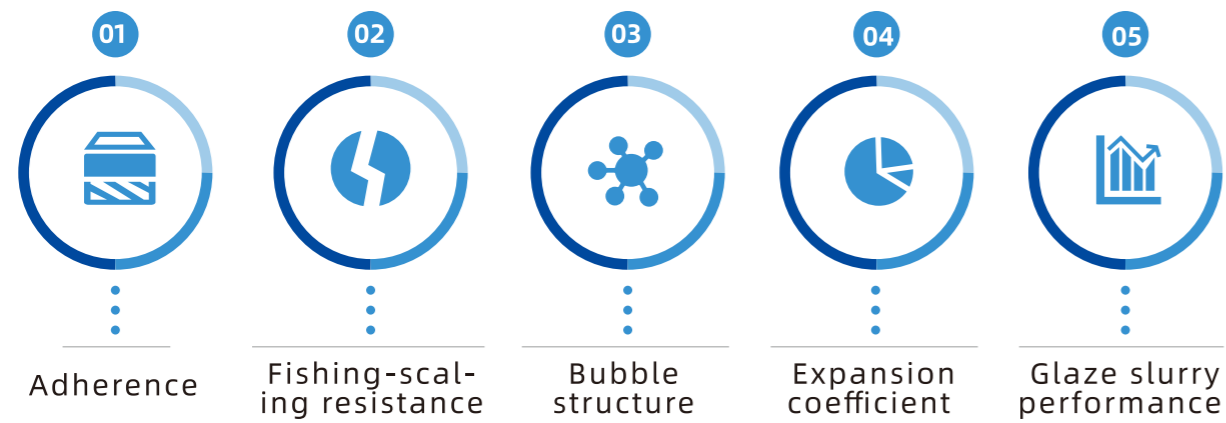
GWIPPO has built a production base of 18,000m2, and is equipped with an automated production line integrating R&D, design, and manufacturing.

By standardizing the quality control system, raw materials, semi-finished products, and finished products are all tested, ensuring rigorous control over all links.

 **Groundcoat Glaze**



Gwippo Vitreous And Porcelain Groundcoat Enamel Advantage 



01 High adhesiveness is proved by a 90° bending test of the steel plate;

02 permeability of the groundcoat glaze layer is enhanced by introducing oxides that produce fine pores;

03 a bubble structure reasonably and uniformly distributed;

04 the expansion coefficient matches the steel plate;

05 Grinding of the imported clay improves rheological properties (e.g., suspendability and pausibility) of the glaze slurry, generating more outstanding maneuverability.

GROUND GLAZE MODEL

NO.	MODEL	STATE	ENAMEL COLOR	RECOMMENDED FIRING TEMPERATURE (WORKING TEMP °C)	APPLICABLE PRODUCTS	FEATURES
01	JBD-1# Agitator Ground Enamel	Powder	Blue	Fast firing: 920-960°C Slow firing: 890-920°C	Agitators, accessories, outer-surface enamel products	Superior adhesion, high thermal expansion coefficient
02	JT-901# Cast Iron Ground Enamel	Slurry	Blue-Gray	Fast firing: 920-940°C Slow firing: 870-900°C	Cast iron parts	Compatible with all gwippo-based top enamels
03	JTD-Y# Stainless Steel Ground Enamel	Slurry	Gray-Brown	860-880°C	Stainless steel reactors/accessories; Carbon steel reactors/accessories	Compatible with all gwippo-based top enamels
04	JTD-1# Ground Enamel	Powder	Gray-Brown	Fast firing: 920-960°C Slow firing: 880-910°C	Reactors, agitators, accessories	Wide application range
05	JTD-1#S Medium-Temp Ground Enamel	Powder	Gray-Brown	Fast firing: 940-960°C Slow firing: 890-920°C	Reactors, agitators, accessories	Wide application range
06	JTD-1#G High-Temp Ground Enamel	Powder	Blue-Gray	Fast firing: 940-980°C	Reactors	Higher heat resistance than standard Ground enamels
07	JTD-1#C Ground Enamel	Slurry	Gray-Brown	Fast firing: 920-960°C Slow firing: 880-910°C	Reactors, agitators, accessories	Suitable for humid seasons, adjustable anti-fish-scale effect per customer requirements
08	JTD-1#SF Medium-Temp Anti-Fish-Scale	Powder	Gray-Brown	Fast firing: 920-960°C	Reactors, agitators, accessories	Premium anti-fish-scale performance
09	JT-E03# Low-Temperature Ground Enamel	Slurry	Gray-Brown	Fast firing: 860-900°C Slow firing: 840-880°C	Agitators, accessories	Low firing temperature; Superior adhesion; Usable as repair enamel
10	JTD-1#X Ground Enamel	Powder	Blue-Gray	Fast firing: 920-960°C Slow firing: 880-910°C	Reactors, agitators, accessories	Superior adhesion; High thermal expansion coefficient; Good anti-fish-scale effect
11	Gray Repair Enamel	Slurry/ Powder	Gray-Brown	820-860°C	Used for local repair of reactors, agitators, and accessories. Must be proportioned with conventional Ground enamel based on the number of firing cycles.	
	Blue Repair Enamel	Slurry/ Powder	Blue	810-860°C	Used for local repair of reactors, agitators, and accessories. Delivers optimal performance in low-temperature prolonged firing processes with minimal color variation at repair sites.	

OVERGLAZE

PREMIUM ACID AND ALKALI RESISTANT GLAZE

GP-10#、GP-12#、GP-20#、GP-21#、GP-26#

- High temperature resistance
- Fish-scaling resistance
- High corrosion resistance
- Extending the servicelife of devices

01 GP-10#

In general cases of high temperature,GP-10 shows excellent performance of resistance to acids.



EXCELLENT ACID RESISTANCE

EXCELLENT ALKALI RESISTANCE

ACID CORROSION RESISTANCE

Concerning all acid substances in the chemical industry, hydrochloric acids are rather common and their corrosion to devices is comparatively stronger. When the concentration of hydrochloric acids reaches 10%, their acid corrosion capability is the highest. In this case, enamels have the weakest corrosion resistance. Then, the corrosion resistance of the enamel becomes increasingly strong when the acid concentration keeps rising from 10%. Moreover, the corrosion rate diagram of hydrochloric acids is also applicable to hydrobromic acids, iodic acids and chloroacetic acids.

When sulfuric acids, sulfurous acids, nitric acids, or nitrous acids are selected as the media, the acid corrosiveness reaches its maximum when their concentration is around 20% and corrosion resistance of enamels accordingly declines. Once their concentration exceeds 20%, the corrosion resistance of enamel is improved as the concentration keeps increasing.

Phosphoric acid, however, is an exception. In a phosphoric acid solution, corrosion resistance drops as the acid concentration goes up. Here, what calls for special attention is that phosphoric acid commonly contains fluorine as an impurity. For example, the maximum operating temperature is suggested to be no higher than 120°C when the acid concentration is 70%; and if the operating temperature reaches 140°C, the concentration of the phosphoric acid should be no higher than 30%.

GP-10 is applicable to strong acid media at any concentration provided that the operating temperature is no higher than 120°C, such as hydrochloric acids, sulfuric acids, sulfurous acids, hydrobromic acids, hydroiodic acids, chloroacetic acids, nitric acids, and nitrous acids. Exceptionally, the concentration should be no greater than 70% at the operating temperature of 120°C as far as phosphoric acids are concerned. If the operating temperature exceeds 120°C, please refer to the corrosion rate diagram for specifics.

ALKALI CORROSION RESISTANCE

Alkali corrosion resistance of vitreous and porcelain enamels declines as the temperature rises. When the concentration of a strong alkaline medium reaches 50% , the corresponding reaction temperature needs to be below 50°C. If its PH value is 13, the operating temperature should be no higher than 80°C. Thermokalite must be used with caution and strict control over temperature for a reason that corrosiveness to vitreous and porcelain enamels will be doubled when the temperature increases by 10°C. If you need to put alkali in a vessel, please select a draft tube to prevent the alkali from flowing along the high-temperature wall of this vessel.

STEAM CORROSION RESISTANCE

The thermal shock resistance of vitreous and porcelain enamels is closely related to shrinkage stress on its surface. The higher the shrinkage stress is, the stronger the thermal shock will be. Therefore, the allowable temperature difference between rapid heating and fast cooling depends on the temperature of the tank wall.

THEMAL SHOCK RESISTANCE

All enamels for vitreous and porcelain enamels have high corrosion resistance in the condition of being below the boiling point of water. When vapor phase corrosion occurs in a condition of being above this boiling point, glaze materials with superior alkali resistance should be selected.

FLUORIDE

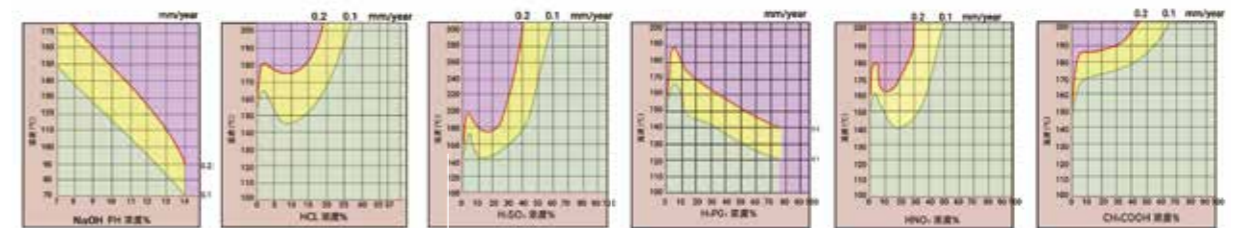
Fluorides can corrode silicon structures. Therefore, they should be avoided to the greatest extent even though their dosage is considerably low. Moreover, the corrosion mechanism of fluorides is also very complicated.

Fluorides corrode glass lined layers via an acid medium, the hydrofluoric acid at an ionic state. Once they contact dry hydrofluoric acid gas, the corrosiveness of fluorides or fluorine mixtures (in alkaline media) and anhydrous organic solvents to vitreous and porcelain enamels can be comparatively weak.

Erosion by fluorides makes glass lined layers not glossy any longer in most cases, which further leads to the production of pinholes in the glass lined layer. Although there exist great variations in corrosion rates of hydrofluoric acids to the glass lined layer, the corrosion can be more significant when the concentration exceeds 10PPM.

ISOETCH CURVE

Isoetch curves below are plotted based on the performance of GP-10 and stand for the correspondence between medium concentrations and temperature values when the corrosion rates are 0.1mm and 0.2mm per year respectively. When the corrosion rate is below 0.1mm per year, it has no impact on vitreous enamels; if the corrosion rate lies between 0.1mm per year and 0.2mm per year, close attention should be paid to the degree that the glass lined layer is corroded; and when it is above 0.2mm per year, vitreous enamels are not recommended.



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data GP-10#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g/ (m ² .d)	GB/T7989	≤0.55	0.2-0.3
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g/ (m ² .d)	GB/T799.1	≤2.75	1.0-1.5
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	203-210
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	270-290
Color				Cobalt blue
Applicable to				Reactors & stirring accessories

02 GP-12#



- EXCELLENT ACID RESISTANCE
- EXCELLENT ALKALI RESISTANCE

ACID CORROSION RESISTANCE

In general cases of high temperature, GP-12 shows excellent performance of resistance to acids. Concerning all acid substances in the chemical industry, hydrochloric acids are rather common and their corrosion to devices is comparatively stronger. When the concentration of hydrochloric acids reaches 10%, their acid corrosion capability is the highest. In this case, enamels have the weakest corrosion resistance. Then, the corrosion resistance of enamel becomes increasingly strong when the acid concentration keeps rising from 10%. Moreover, the corrosion rate diagram of hydrochloric acids is also applicable to hydrobromic acids, iodic acids and chloroacetic acids.

When sulfuric acids, sulfurous acids, nitric acids, or nitrous acids are selected as the media, the acid corrosiveness reaches its maximum when their concentration is around 20% and corrosion resistance of enamel accordingly declines. Once their concentration exceeds 20%, the corrosion resistance of enamel is improved as the concentration keeps increasing.

Phosphoric acid, however, is an exception. In a phosphoric acid solution, corrosion resistance drops as the acid concentration goes up. Here, what calls for special attention is that phosphoric acid commonly contains fluorine as an impurity. For example, the maximum operating temperature is suggested to be no higher than 110°C when the acid concentration is 70%; and if the operating temperature reaches 140°C, the concentration of the phosphoric acid should be no higher than 30%.

GP-12 is applicable to strong acid media at any concentration provided that the operating temperature is no higher than 120°C, such as hydrochloric acids, sulfuric acids, sulfurous acids, hydrobromic acids, hydroiodic acids, chloroacetic acids, nitric acids, and nitrous acids. Exceptionally, the concentration should be no greater than 70% at the operating temperature of 120°C as far as phosphoric acids are concerned. If the operating temperature exceeds 120°C, please refer to the corrosion rate diagram for specifics.

ALKALI CORROSION RESISTANCE

Alkali corrosion resistance of vitreous and porcelain enamels declines as the temperature rises. Thermokalite must be used with caution and strict control over temperature for a reason that corrosiveness to vitreous and porcelain enamels can be doubled when the temperature increases by 10°C. If you need to put alkali in a vessel, please select a draft tube to prevent the alkali from flowing along the high-temperature wall of this vessel. Moreover, GP-12 is applicable to strong alkaline media having a PH value below 13. If its PH value is 13, the operating temperature should be lower than 60°C.

STEAM CORROSION RESISTANCE

All vitreous and porcelain enamels have high corrosion resistance in the condition of being below the boiling point of water. When vapor phase corrosion occurs in a condition of being above this boiling point, glaze materials with superior alkali resistance should be selected.

THERMAL SHOCK RESISTANCE

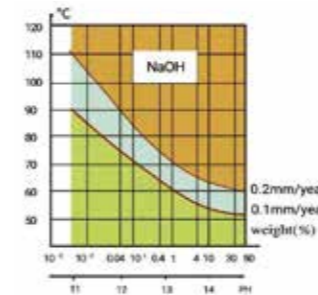
The thermal shock resistance of vitreous and porcelain enamels is closely related to shrinkage stress on its surface. The higher the shrinkage stress is, the stronger the thermal shock will be. Therefore, the allowable temperature difference between rapid heating and fast cooling depends on the temperature of the tank wall.

FLUORIDE

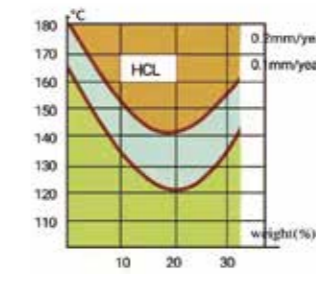
Fluorides can corrode silicon structures. Therefore, they should be avoided to the greatest extent even though their dosage is considerably low. Moreover, the corrosion mechanism of fluorides is also very complicated.

Fluorides corrode glass lined layers via an acid medium, the hydrofluoric acid at an ionic state. Once they come contact hydrofluoric acid gas, the corrosiveness of fluorides or fluorine mixtures (in alkaline media) and anhydrous organic solvents to vitreous and porcelain enamels can be comparatively weak.

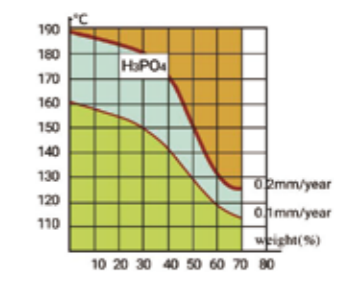
Erosion by fluorides makes glass lined layers not glossy any longer in most cases, which further leads to the production of pinholes in the layers. Although there exist great variations in corrosion rates of hydrofluoric acids to the glass lined layer, the corrosion can be more significant when the concentration exceeds 10PPM.



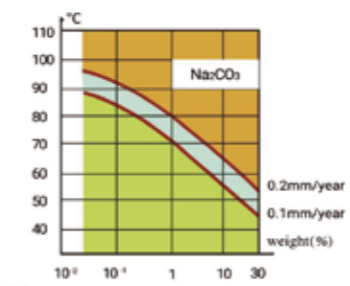
Corrosion resistance to NaOH



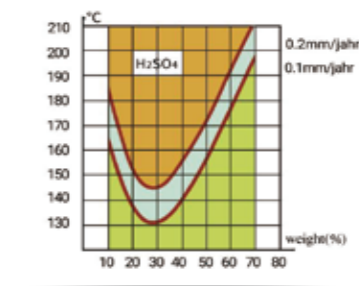
Corrosion resistance to HCL



Corrosion resistance to H₃PO₄



Corrosion resistance to Na₂CO₃



Corrosion resistance to H₂SO₄

Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				GP-12#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / (m ² .d)	GB/T7989	≤0.55	0.2-0.3
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / (m ² .d)	GB/T7991.1	≤2.75	1.5-2.0
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	210-250
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	280-330
Color			Cobalt blue	
Applicable to			Reactors	



The adoption of the draft new standard GB25025 "Technical Requirements for Glass-lined Equipment" marks a significant turning point for China's glass-lined glaze and equipment market toward high-end development. The new standard requires:
Resistance to boiling hydrochloric acid corrosion: $\leq 0.55 \text{ g/m}^2\cdot\text{d}$
Resistance to sodium hydroxide corrosion: $\leq 2.75 \text{ g/m}^2\cdot\text{d}$
As an industry pioneer, Gwippo's R&D team is committed to developing superior glass-lined glazes, laying a solid foundation for the glass-lined reactor market to advance toward high-end, refined, and cutting-edge products.
In response to market demands and customer feedback, Gwippo will launch three new high-performance glass-lined glazes—GP-20, GP-21, and GP-26—building upon the existing premium glazes GP-2, GP-12, and GP-10.
Gwippo's R&D directions are:
GP-20: Retains excellent acid resistance while enhancing alkali resistance to approach GP-10 levels, offering exceptional cost-effectiveness.
GP-21 & GP-26: While GP-10 has long been recognized as the market-leading alkali-resistant glaze, meeting most industrial demands, Gwippo continues to innovate. After years of dedicated research, GP-21 and GP-26 now surpass GP-10 in alkali resistance.
For detailed specifications and applicable products, please refer to the technical parameter table below.

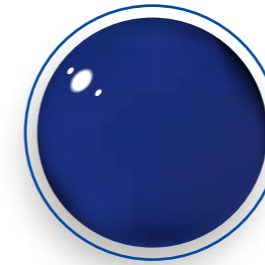
03 GP-20#



GP-20# features exceptional alkali resistance, suitable for:
All strong alkaline media at room temperature
Strong alkaline media below 80°C with pH ≤ 13
Meanwhile, it maintains superior acid resistance, applicable to strong acids below 120°C, including:
Hydrochloric acid, Sulfuric acid, Sulfurous acid, Hydrobromic acid, Hydroiodic acid, Chloroacetic acid, Nitric acid, Nitrous acid — at any concentration.
Its alkali resistance approaches GP-10#, while acid resistance parallels GP-2#, delivering outstanding cost-effectiveness.

Technical indicators	Measuring units	Testing standards	Reference targets	Testing data GP-20#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g/ (m ² .d)	GB/T7989	≤ 0.55	0.4-0.5
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g/ (m ² .d)	GB/T799.1	≤ 2.75	1.0-1.8
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥ 200	200-220
Mechanical shock resistance	J	GB/T7991.4	$\geq 220 \times 10^{-3}$	240-300
Color		Cobalt blue		
Applicable to			Reactors & stirring accessories	

04 GP-21#



GP-21# delivers exceptional acid and alkali resistance, with alkali resistance surpassing GP-10#. It is suitable for:
All strong alkaline media at room temperature
Strong alkaline media below 100°C with pH ≤ 13
Additionally, it offers superior acid resistance for strong acids below 140°C, including:
Hydrochloric acid, Sulfuric acid, Sulfurous acid, Hydrobromic acid, Hydroiodic acid, Chloroacetic acid, Nitric acid, Nitrous acid — at any concentration.
(Excludes phosphoric acid and phosphorous acid; applications involving these require customized selection based on specific reaction concentration and temperature.)

Technical indicators	Measuring units	Testing standards	Reference targets	Testing data GP-21#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g/ (m ² .d)	GB/T7989	≤ 0.55	0.2-0.3
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g/ (m ² .d)	GB/T799.1	≤ 2.75	0.5-1.0
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥ 200	200-220
Mechanical shock resistance	J	GB/T7991.4	$\geq 220 \times 10^{-3}$	280-320
Color		Cobalt blue		
Applicable to			Reactors & stirring accessories	

05 GP-26#



GP-26# offers exceptional alkali resistance, performing comparably to GP-21# and surpassing GP-10#. It is suitable for:
All strong alkaline media at room temperature
Strong alkaline media below 100°C with pH ≤ 13
While maintaining high acid resistance for strong acids below 120°C, including:
Hydrochloric acid, Sulfuric acid, Sulfurous acid, Hydrobromic acid, Hydroiodic acid, Chloroacetic acid, Nitric acid, Nitrous acid — at any concentration.
Optimized for specialized processes:
Reactions involving initial alkali exposure followed by acid
Neutralization processes yielding alkaline final products
Delivering outstanding cost-effectiveness for these critical applications.

Technical indicators	Measuring units	Testing standards	Reference targets	Testing data GP-26#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g/ (m ² .d)	GB/T7989	≤ 0.55	0.4-0.5
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g/ (m ² .d)	GB/T799.1	≤ 2.75	0.6-1.1
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥ 200	200-210
Mechanical shock resistance	J	GB/T7991.4	$\geq 220 \times 10^{-3}$	250-280
Color		Cobalt blue		
Applicable to			Reactors & stirring accessories	

SUPER GRADE OVERGLAZE SERIES

GP-2#、JT-9902#、GP-7#

- High temperature resistance
- Fish-scaling resistance
- High corrosion resistance
- Extending the servicelife of devices

01 GP-2#



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				GP-2#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / (m ² .d)	GB/T7989	≤0.55	0.4-0.45
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / (m ² .d)	GB/T799.1	≤2.75	2.0-2.5
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	200-210
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	240-280
Color			Cobalt blue	
Applicable to			Reactors & stirring accessories	



02 JT-9902#



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				JT-9902#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / (m ² .d)	GB/T7989	≤0.55	0.4-0.45
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / (m ² .d)	GB/T799.1	≤2.75	1.8-2.3
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	200-210
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	240-280
Color			Cobalt blue	
Applicable to			Reactors & stirring accessories	

03 GP-7#



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				GP-7#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / (m ² .d)	GB/T7989	≤0.55	0.42-0.5
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / (m ² .d)	GB/T799.1	≤2.75	2.2-2.7
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	200-210
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	260-280
Color			Cobalt blue	
Applicable to			Reactors & stirring accessories	

MIXING SPECIAL GLAZE SERIES

D-10#、GP -16#

Extending the
servicelife of devices

HIGH COEFFICIENT OF EXPANSION

EXCELLENT ACID RESISTANCE

EXCELLENT ALKALI RESISTANCE



01 D-10#

ACID CORROSION RESISTANCE

D-10 is a high-end porcelain enamels specially designed for stirring developed by GWIPPO. In elegant cobalt blue, it has excellent chemical and physical properties of alkali and acid resistance. Thanks to a high coefficient of expansion, it is rather suitable for stirring accessories. In general cases of high temperature, D-10 still shows superior acid corrosion resistance. Concerning all acid substances in the chemical industry, hydrochloric acids are rather common and their corrosion to devices is comparatively stronger. When the concentration of hydrochloric acids reaches 10%, their acid corrosion capability is the highest. In this case, enamels have the weakest corrosion resistance. Then, the corrosion resistance of the enamel becomes increasingly strong when the acid concentration keeps rising from 10%. Moreover, the corrosion rate diagram of hydrochloric acids is also applicable to hydrobromic acids, hydroiodic acids and chloroacetic acids.

When sulfuric acids, sulfurous acids, nitric acids, or nitrous acids are selected as the media, the acid corrosiveness reaches its maximum when their concentration is around 20% and corrosion resistance of enamels accordingly declines. Once their concentration exceeds 20%, the corrosion resistance of enamel is improved as the concentration keeps increasing.

Phosphoric acid, however, is an exception. In a phosphoric acid solution, corrosion resistance drops as the acid concentration goes up. Here, what calls for special attention is that phosphoric acid commonly contains fluorine as an impurity. For example, the maximum operating temperature is suggested to be no higher than 120°C when the acid concentration is 70%; and if the operating temperature reaches 150°C, the concentration of the phosphoric acid should be no higher than 30%.

D-10 is applicable to strong acid media at any concentration provided that the operating temperature is no higher than 120°C, such as hydrochloric acids, sulfuric acids, sulfurous acids, hydrobromic acids, hydroiodic acids, chloroacetic acids, nitric acids, and nitrous acids. Exceptionally, the concentration should be no greater than 70% at the operating temperature of 120°C as far as phosphoric acids are concerned. If the operating temperature exceeds 120°C, please refer to the corrosion rate diagram for specifics.

ALKALI CORROSION RESISTANCE

Alkali corrosion resistance of vitreous and porcelain enamels declines as the temperature rises. When the concentration of a strong alkaline medium reaches 50% or its pH value is 14, the corresponding reaction temperature should be lower than 50°C. If its PH value is 13, the operating temperature should be no higher than 80°C. Thermokalite must be used with caution and strict control over temperature for a reason that corrosiveness to vitreous and porcelain enamels can be doubled when the temperature increases by 10°C. If you need to put alkali in a vessel, please select a draft tube to prevent the alkali from flowing along the high-temperature wall of this vessel.

STEAM CORROSION RESISTANCE

All vitreous and porcelain enamels have high corrosion resistance in the condition of being below the boiling point of water. When vapor phase corrosion occurs in a condition of being above this boiling point, enamels with superior alkali resistance should be selected.

THERMAL SHOCK RESISTANCE

The thermal shock resistance of vitreous and porcelain enamels is closely related to shrinkage stress on its surface. The higher the shrinkage stress is, the stronger the thermal shock will be. Therefore, the allowable temperature difference between rapid heating and fast cooling depends on the temperature of the tank wall.

FLUORIDE

Fluorides can corrode silicon structures. Therefore, they should be avoided to the greatest extent even though their dosage is considerably low. Moreover, the corrosion mechanism of fluorides is also very complicated.

Fluorides corrode glass lined layers via an acid medium, the hydrofluoric acid at an ionic state. Once they contact dry hydrofluoric acid gas, the corrosiveness of fluorides or fluorine mixtures (in alkaline media) and anhydrous organic solvents to vitreous and porcelain enamels can be comparatively weak.

Erosion by fluorides makes glass lined layers not glossy any longer in most cases, which further leads to the production of pinholes in glass lined layers. Great variations in glass lined layer corrosion rates of hydrofluoric acids can be more significant when the concentration exceeds 10PPM.

Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				D-10#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / m ² .d	GB/T7989	≤0.55	0.2-0.25
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / m ² .d	GB/T799.1	≤2.75	1.0-1.3
Resistance to abrupt temperature difference variations	°C	GB/T7991.3	≥200	200-203
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	240-280

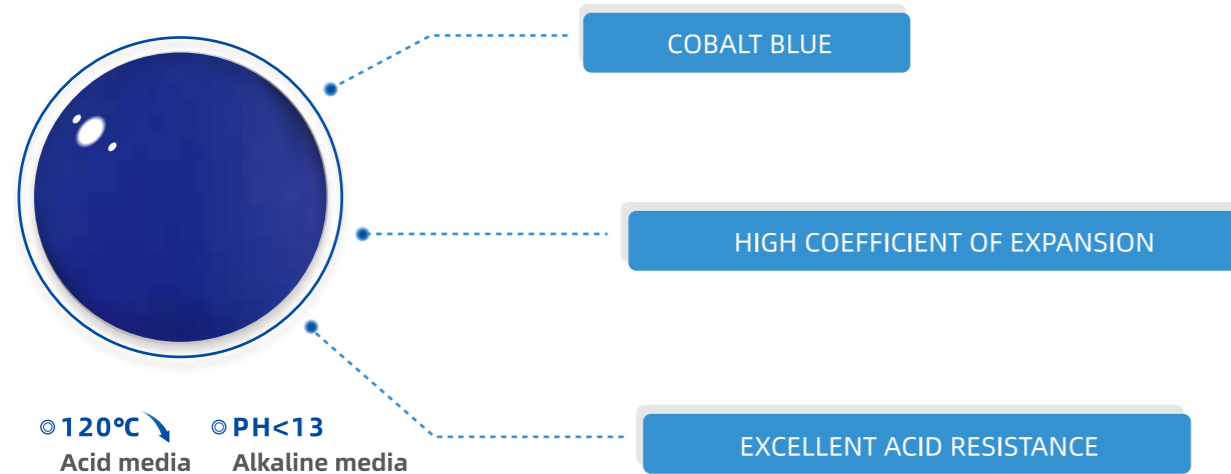
Color

Cobalt blue

Applicable to

Stirring accessories

02 GP-16#



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				GP-16#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / m ² .d	GB/T7989	≤0.55	0.40-0.45
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / m ² .d	GB/T7991.1	≤2.75	2.0-2.5
Resistance to abrupt t emperature difference variations	°C	GB/T7991.3	≥200	200-203
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	220-260
Color		Cobalt blue		
Applicable to		stirring accessories		

FEATURED GLAZE SERIES
GP -18S#

Extending the
servicelife of devices

01 GP-18S#



Technical indicators	Measuring units	Testing standards	Reference targets	Testing data
				GP-18S#
168-hour corrosion resistance to 20% boiling hydrochloric acids	g / m ² .d	GB/T7989	≤0.55	0.25-0.30
24-hour corrosion resistance to 0.1mol/L 80°C sodium hydroxides	g / m ² .d	GB/T7991.1	≤2.75	1.8-2.0
Resistance to abrupt t emperature difference variations	°C	GB/T7991.3	≥200	200-210
Mechanical shock resistance	J	GB/T7991.4	≥220x10 ⁻³	240-280
Color		Cobalt blue		
Applicable to		Reactors & stirring accessories		

▶▶ Introduction Of High End Glaze Varieties

01 High-performance ceramic glass glaze

01 High abrasion resistance;
02 Chemical and physical properties: Strong resistance to abrupt temperature difference changes, high resistance to mechanical shock.

02 Detachable groundcoat glaze for stirring

01 Superior adherence;
02 High expansion coefficient;
03 Suitable for double-sided enameling

03 Super-grade alkali resistant glaze

Alkali corrosion resistance $\leq 1.0g/m^2.d$

04 Anti-phosphoric acid glaze

Resistant to corrosion by high-temperature phosphoric acid solution.

05 Special anti-static glaze

Realize electricity conductance at a static level.

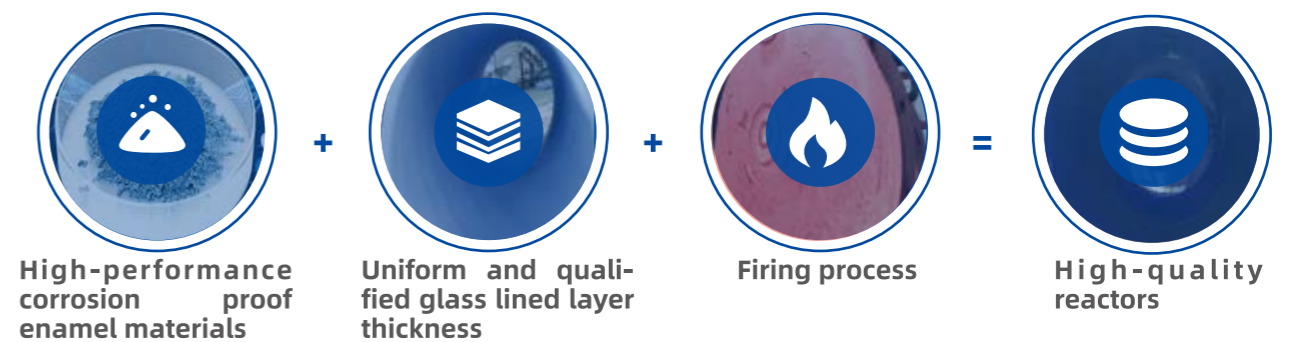
06 Glaze for low-level dissolution of metallic ions

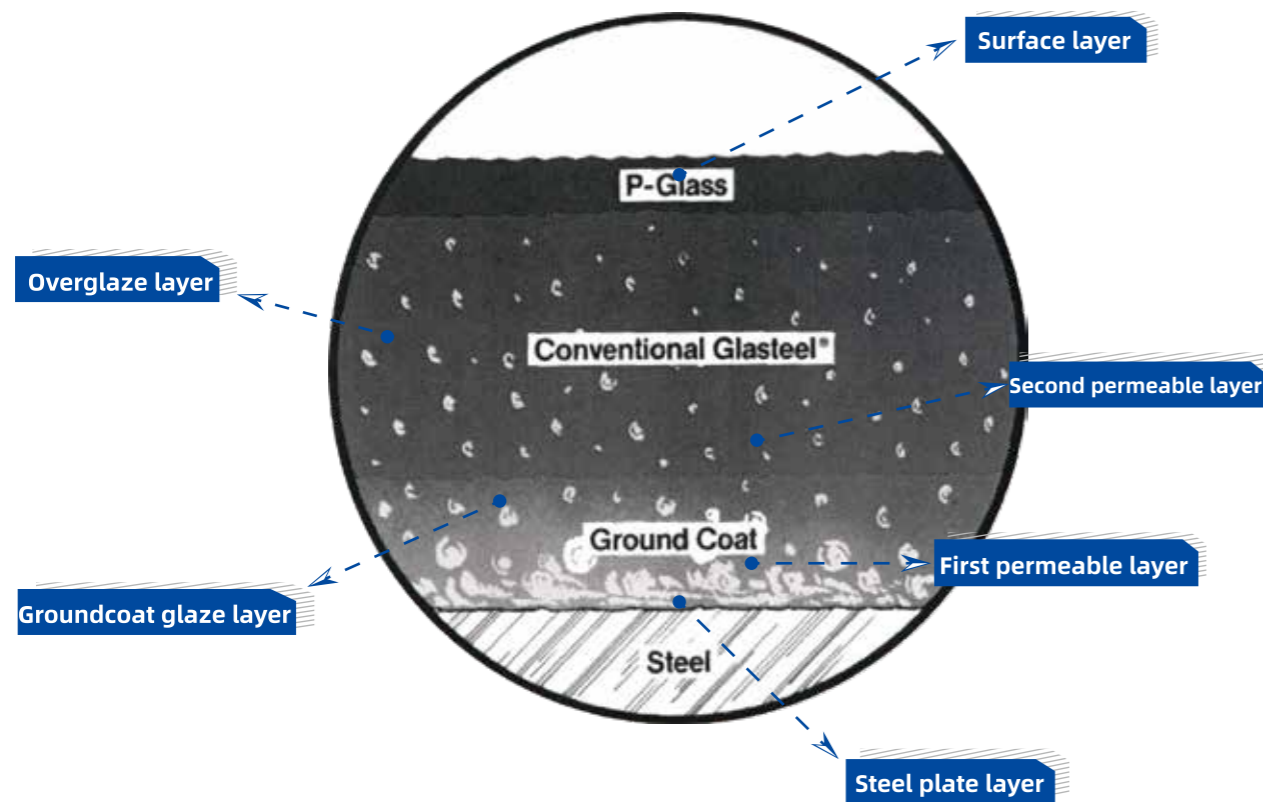
Realizing low-level dissolution of various ions and alkali metals, applicable to "raw materials for electronic materials", "high-purity reagents", "semi-conductor materials" and other fields.



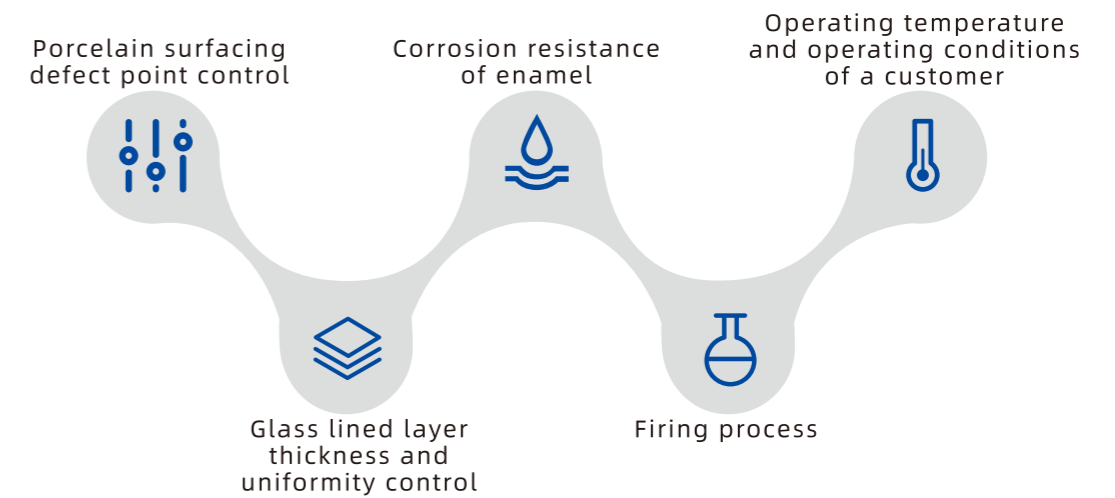
▶▶ Enamel And Enameling Process Combined

Perfect Combination Of Glaze And Enamelling Process





Analysis Of Factors Affecting The Service Life Of Reactor Equipment



Analysis Of Factors Affecting The Service Life Of Reactor Equipment

- ✓ Resistant to fish-scaling and high temperature, high corrosion resistance, and capable of extending the service life of equipment.
- ✓ Scientific formulation, a founding technique based on electric melting furnace, laminated glazes, and a fine process.
- ✓ Pass strict inspections, HG/T4798-2021, and ISO9001:2015 certification.

As known to all, we cannot produce glass lined coatings (also known as the glass lined layers) through simple firing of vitreous and porcelain enamels. In this evolving process, materials in fact undergo a series of extremely complicated physicochemical reactions, as shown in the figure above. Because of such a permeability phenomenon, the original stratification of vitreous and porcelain enamels changes. Then, physicochemical properties of the glass lined layer also changed.

Although vitreous and porcelain enamels are not a terminal product, it plays a critical role in the manufacturing and applications of glass lined equipment. Sufficient exertion of properties of the vitreous and porcelain enamels depends on quality of the plates, iron forming processes, iron surface treatment, enameling, firing, firing furnaces, and the content of atmosphere and water vapor in the furnace. Glass lined parts have an extremely complex production process, and variables in each link may affect performance of the finished products.

***Recommendations! Enamel materials and optimal enameling process should be selected according to specific operating conditions and media required by different customers.**

Diagram of Glass-Lined Enamel Applied to Reactor Vessels

The origin of the glass-lined reactor can be traced back to the early 20th century. At that time, the development of the chemical industry demanded reaction vessels that were corrosion-resistant and capable of withstanding high temperatures and pressures. Although traditional metal reactors were robust, they were prone to damage when handling certain corrosive chemicals.

To address this issue, scientists began researching materials that combined glass and metal, ultimately inventing glass lining. This material not only retained the corrosion resistance of glass but also incorporated the mechanical strength of metal. The glass-lined reactor thus came into being and rapidly gained widespread application across various fields, including chemical engineering, pharmaceuticals, and food processing.

With technological advancements, the design and manufacturing processes of glass-lined reactors have continuously improved, enhancing their performance and expanding their scope of application. Today, the glass-lined reactor stands as one of the standard pieces of equipment in numerous chemical reactions and industrial processes.



Stainless Steel Reactor Cover



Stainless Steel Reactor Vessel

Diagram of Glass-Lined Enamel Application in Agitators



Glass-Lined Agitator

As requirements for mixing homogeneity grew more stringent, engineers began designing various types of agitators—including anchor-type, impeller-type, frame-type, paddle-type, turbine-type, propeller-type, combinational-type, and detachable-type configurations—to accommodate different reaction processes.

In their earliest stages, agitator designs were relatively simple, primarily serving basic liquid mixing functions. With advancements in materials science and fluid dynamics, glass-lined agitators evolved increasingly sophisticated designs capable of achieving higher mixing efficiency and more precise reaction control.

Today, glass-lined agitators are widely utilized across the chemical, pharmaceutical, and food industries, meeting diverse reaction condition requirements. Their designs are continuously optimized to enhance reaction uniformity and operational efficiency.

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GLASS LINED EQUIPMENT PARTS

- >> Glass Lined Pipe
- >> Double-sided Enamel Feeding Tube
- >> Glass Lined Porous Disc Condenser
- >> Glass Lined Tower Section Tower Cap
- >> Glass Lining Equipment Products



▶▶▶ GLASS LINED PIPE

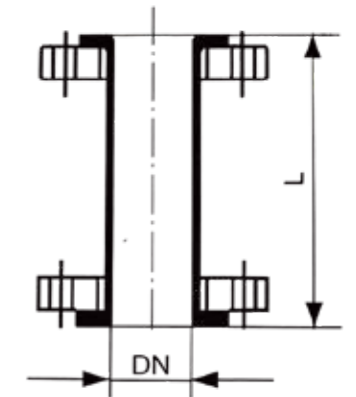
☑ 01 Glass lined straight tubes



△Standard Glass-Lined Straight Pipe



△Glass-Lined Straight Pipe with Stainless Steel Base



△Diagram Presentation



Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold penetration and a multiple thin-layer method
- Provided with nozzle welding neck flanges, and automatic welding technique; and weld joints are distant from the flange opening
- *Customize sizes according to user needs

Straight Pipe Parameter Table											
DN (mm)	25	32	40	50	65	80	100	125	150	200	250
L (mm)	100-1000			100-2000			100-3000				



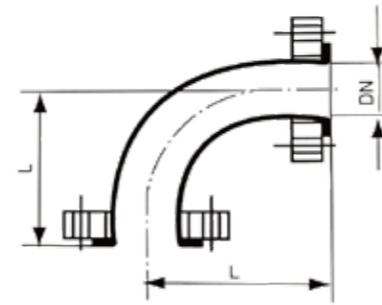
02 Glass lined 90° elbows



△ Standard Glass lined 90° elbows



△ Glass lined 90° elbows with Stainless Steel Base



Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold penetration and a multiple thin-layer method
- Provided with nozzle welding neck flanges, and automatic welding technique; and weld joints are distant from the flange opening
- *Customize sizes according to user needs

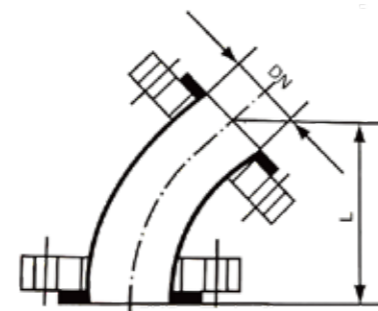
90° Elbow Parameter Table

DN (mm)	25	32	40	50	65	80	100	125	150	200	250
L (mm)	95	105	110	125	135	145	155	175	200	260	310

03 Glass lined 45° elbows



△ Standard Glass lined 45° elbows



△ Diagram Presentation

45° Elbow Parameter Table

DN (mm)	25	32	40	50	65	80	100	125	150	200	250	300	400
L (mm)	107	114	118	128	135	143	162	169	191	235	274	318	397

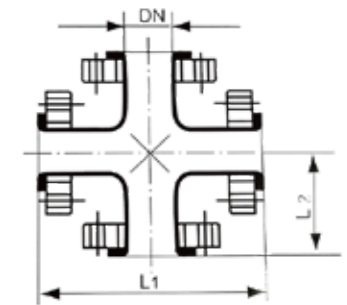
04 Glass-Lined Cross Fitting and Sight Glass Cross



△ Standard Glass-Lined Cross Fitting



△ Glass-Lined Sight Glass Cross



△ Diagram Presentation

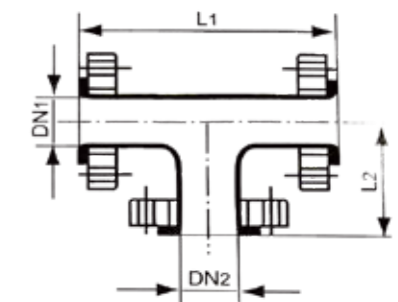
Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold penetration and a multiple thin-layer method
- Provided with nozzle welding neck flanges, and automatic welding technique; and weld joints are distant from the flange opening
- *Customize sizes according to user needs

05 Glass lined T-joint with equal diameters



△ Standard Glass-Lined Equal Tee



△ Diagram Presentation

Tee and Cross Parameter Table

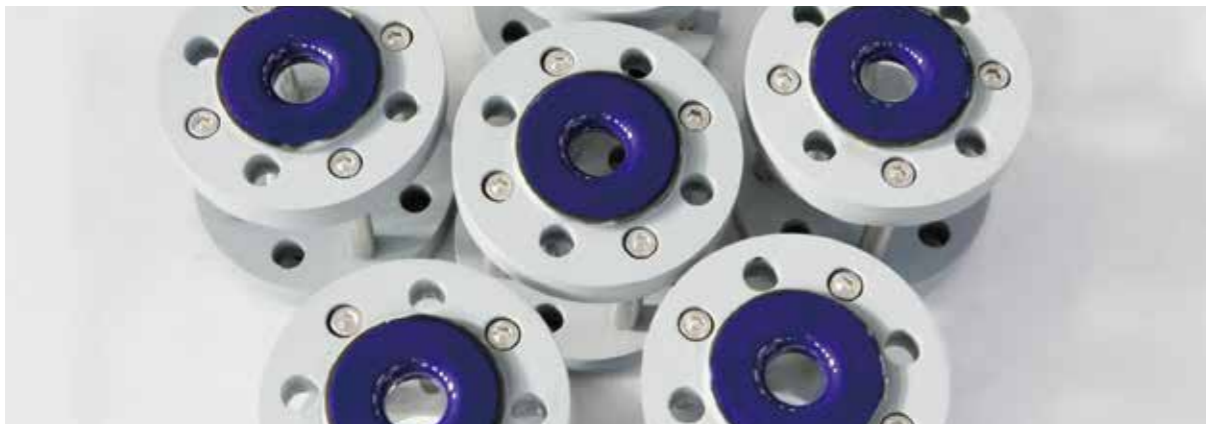
DN (mm)	25	32	40	50	65	80	100	125	150	200	250
L1 (mm)	180	210	220	240	260	280	310	340	390	460	540
L2 (mm)	90	105	110	120	130	140	155	170	195	230	270



06 Glass-Lined Sight Glass Assembly



△Glass-Lined Sight Glass Assembly



Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold penetration and a multiple thin-layer method

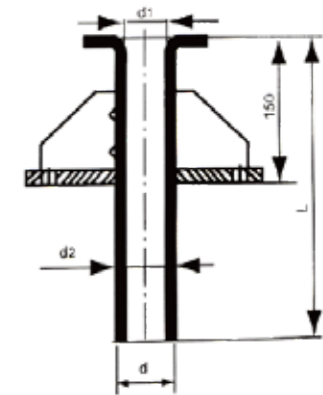
*Customize sizes according to user needs

▶▶ DOUBLE-SIDED ENAMEL FEEDING TUBE

01 Double-sided Enamel Feeding Tube



△Double-sided Enamel Feeding Tube



△Diagram Presentation



Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold penetration and a multiple thin-layer method
- *Customize sizes according to user needs

Double-Sided Glass-Lined Charging Pipe Parameter Table

DN (mm)	d	d1	d2	Lmax
50	73.6~75	43~44.4	61.6~63	1050
100	119.6~121	85~86.4	109.6~111	1750

▶▶ GLASS LINED POROUS DISC CONDENSER



Widely applied



Special glaze



Lightweight & compact

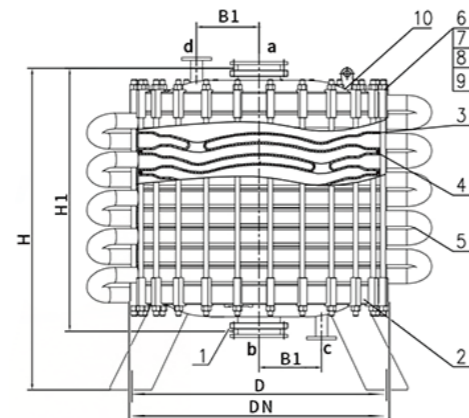


Easy for replacement



Uneasy to leak

01 New type glass lined porous disc condensers



- 1.Lap joint flange
- 2.Condenser bottom
- 3.Porous intermediate condenser fins
- 4.Sealing gasket
- 5.Adapter tube set
- 6.BM18 clamp
7. M20 stud
- 8.M20 nut
- 9.Spring gasket
- 10.Condenser cover

Items		In condenser	In interlayers
Pressure	Designed	FV~0.2Mpa	0.38Mpa
	Operating	-0.098~0.098Mpa	0.35Mpa
Temperature	Designed	-19~200°C	
	Glass lined layer thickness		0.8~1.5mm
Plate material		Q245R	
Nominal specifications of the outlets	Feed inlet	DN100 PN0.6	
	Feed outlet	DN100 PN0.6	
	Water inlet	PL32 PN1.0	
	Water outlet	PL32 PN1.0	
Nominal specifications of the outlets	Parts	Varieties	Features
	Gaskets	Metallic corrugated PTFE gaskets	A reliable sealing property & vacuum tolerable
		Ordinary PTFE asbestos gaskets	High sealing performance
	U-shaped tubes	304 stainless steel hose	Higher bar tolerance (operating pressure Ps0.3MPa)
Rubber tubes		High-pressure resistant (operating pressure Ps0.2MPa)	
Glaze type	Customized based on specific media	Superior in acid and alkaline erosion resista	

Product features

- Applicable to all chemical media excluding hydrofluoric acids, phosgene, strong phosphoric acids (concentration >30% & temperature >150°C), strong alkali (PH>12 & temperature >100°C) and other substances containing fluorion.
- With the cold spray process and a multiple thin-layer method, we are capable of fulfilling professional glaze customization according to specific operating conditions of reactions.
- Being small-sized, lightweight, and structurally simple and compact, it can complete heat transfer through counterflows of thermal and cold media.
- In case of damages of a single part after a certain period of service, users can change or reduce this part without causing complete machine scrapping or production suspension. Therefore, the service life of complete machine can be substantially extended.

New type disc condensers

With a three-pore design, fluids are distributed uniformly. Such new condensers are used in high vacuum distillers and evaporators.

Orifice

Because of a rather small single-pore outlet (intersecting by 180°), fluid resistance is high and the air cannot be distributed uniformly. Consequently, bias flows are generated. They cannot be used in a vacuum condition.

Thickness of condenser fins is reduced, while flow rate of cooling water improved, thus making it less likely for scale formation to occur. Compared with an ordinary condenser of an equal area, the total coefficient K of heat transfer is raised by about 30%.

Thickness

Although condenser fins are thick, flow rate of the cooling water is low, so that scale formation takes place easily. Besides, heat transfer efficiency of such ordinary condensers is also low.

Provided with metallic corrugated PTFE gaskets, their expansion and shrinkage rates are lowered and pressure resistance elevated, which makes it less likely for leakage to occur. Therefore, they are rather suitable for high vacuum sealing.

Gasket

Generally, 35mm gaskets with high expansion and shrinkage ratios are selected for use. They are not only vulnerable to deform, but also weak in pressure resistance, thus inapplicable to high vacuum conditions. Leakage occurs frequently.

▶▶ GLASS LINED TOWER SECTION TOWER CAP



△ Glass Lined Tower Section Tower Cap

Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold spray and a multiple thin-layer method
- Provided with nozzle welding neck flange; and weld joints are distant from the flange opening
- *Customize sizes according to user needs

▶▶ GLASS LINING EQUIPMENT ACCESSORIES

☺ Glass-Lined Reducer Flange

Product features

- Produced in strict accordance with international standards
- High-quality glaze (in white, sky blue and cobalt blue) special for pipes
- Adopting processes of cold spray and a multiple thin-layer method
- Adopting processes of cold spray and a multiple thin-layer method
- *Customize sizes according to user needs



Round Quick-Opening Manway Cover



Glass-Lined Reducer



Stainless Steel Glass-Lined Retaining Ring with Manway Cover



Temperature-Sensing Charging Pipe



Glass-Lined Perforated Plate



Glass-Lined Condenser Plate (Single)

4 GWIPPO BUSINESS SCOPE



◎ **90%**
Glass lined equipment manufacturers of China

◎ Korea ◎ Philippines ◎ Southeast Asia

Specialized in high-performance anti-corrosion vitreous and porcelain enamels, we have won trust from domestic customers, and our products are exported to overseas markets of Korea, Philippines, and Southeast Asia. GWIPPO wins the market with technologies, customers with whole-hearted services, and the reputation with integrity. Customer satisfaction is our unremitting pursuit.

