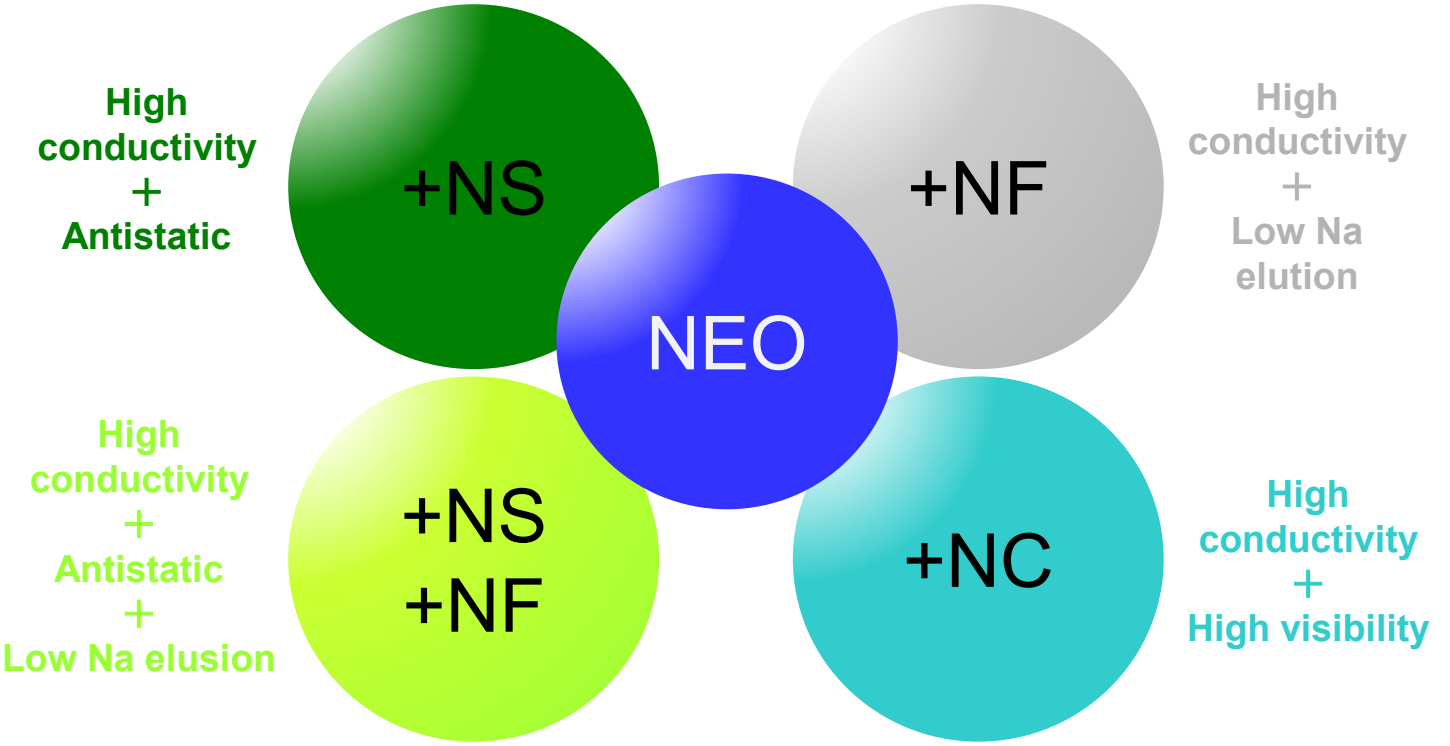
The cutting-edge N-Series GL

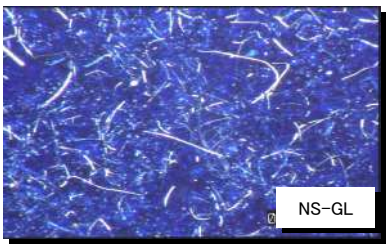
"Multi-GL" A combination of various functions to satisfy customer needs



Safe & High purity next generation GL

Non-spark GL(NS-GL)

Safety first

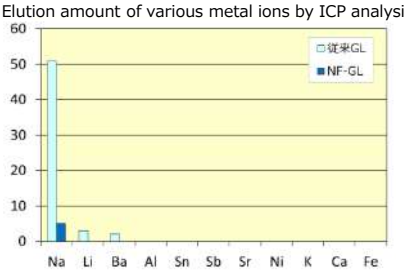


1. World's first Anti-electrostatic glass lining (Using Platinum fiber)
2. Conductive in the volumetric direction
3. No performance deterioration over time
4. Corrosion resistance equivalent to standard GL

Na-free GL(NF-GL)

For production of Electronics material

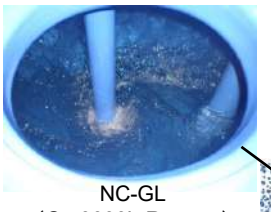
Elution amount of various metal ions by ICP analysis



1. Natrium ion elution reduced to less than 1/10 of the standard glass
2. Ideal for processes that must avoid metal ion elusion
3. Corrosion resistance equivalent to standard GL

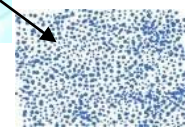
Neutral color GL(NC-GL)

Improved cleanability



NC-GL
(On 3000L Reactor)

Standard GL



1. White and Blue GL arranged in dots
2. Improved visibility for checking cleanliness of the product surface
3. Corrosion resistance equivalent to standard GL

NGK CHEMITECH, LTD.

Main Office	735, Shimotomi, Tokorozawa-city, Saitama 359-0001	Tel. (81) 4-2942-1185
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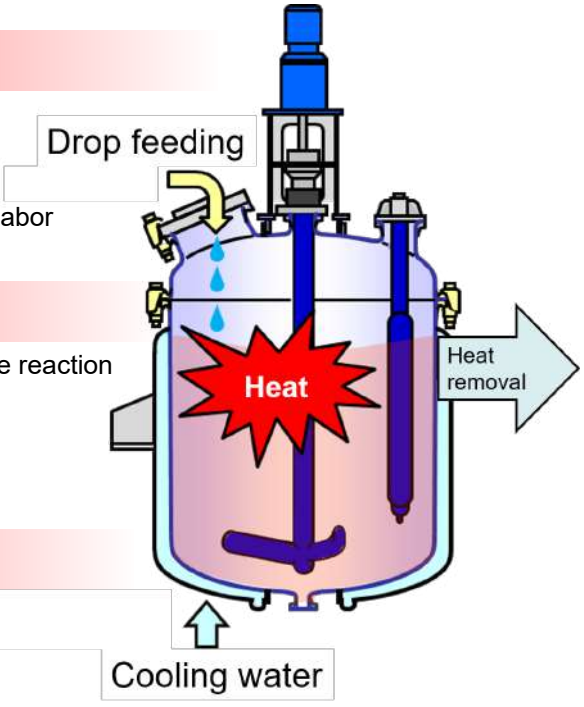
2020.6

NEO-GL: World's first high heat conductive GL

Glass Lining has a poor heat conductivity compared to iron therefore, the heat retention property is excellent but takes time to heat or cool. We have developed the NEO-GL with improved thermal conductivity with our unique enamel material formula and firing technology which is ideal for processes that are taking time for controlling temperature in exothermic reactions by drop feeding. The improved thermal conductivity of the glass lining eliminates the need for modifying peripheral equipment.

Saves cost by reducing manufacturing lead time

- Able to shorten heating and cooling time
- Improved heat removal efficiency in the dropping process
- Able to reduce time in the concentration process
- Reduces cost by saving energy, increasing batches and reducing labor



Improves product quality and yields

- Reducing byproducts by shortening the heat removal time after the reaction
- Reducing the workload for removing byproducts
- Improved temperature control in the crystallization process
- Stabilizing the quality and improving the yield

Contributes to keep yields high during scale-up

- Reduces the impact of S/V degradation by scale-up
  (S/V: heat transfer area per unit volume)

NEO-GL features

	Jacket media	Internal media	Heat transfer coefficient (U)	
			NEO-GL	Standard GL
Heat	Steam	Water	400～500	350～450
Heat	Hot water		150～200	120～170
Cool	Water		130～180	100～150
Cool	Brine		70～140	50～120

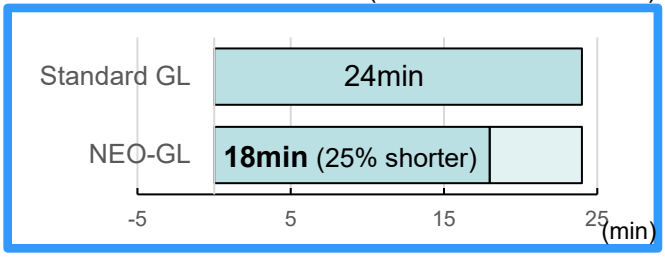
kcal／㎡・h・℃

GL type	Chemical resistance	
	Acid	Alkali
NEO-GL	1.0	1.0
Standard GL	1.0	1.0

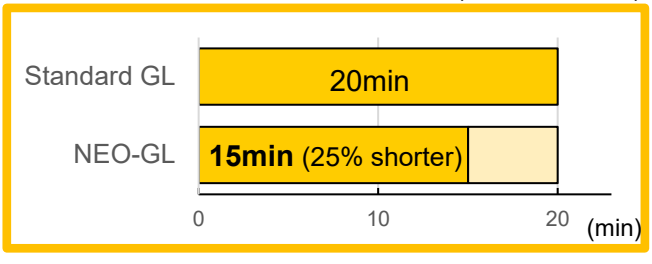
■Note 1: Relative value when the chemical resistance of conventional GL is 1.0.
■Note 2: Values are only for reference.

NEO-GL Cooling／Heating time test results

Internal Vessel cooling 80→50℃
(Jacket: Industrial water)



Internal Vessel heating 50→80℃
(Jacket: Steam)



Simulations per customers' individual conditions are available. Please contact us for details.

NGK

<State of the art High Safety, High Purity Glass>

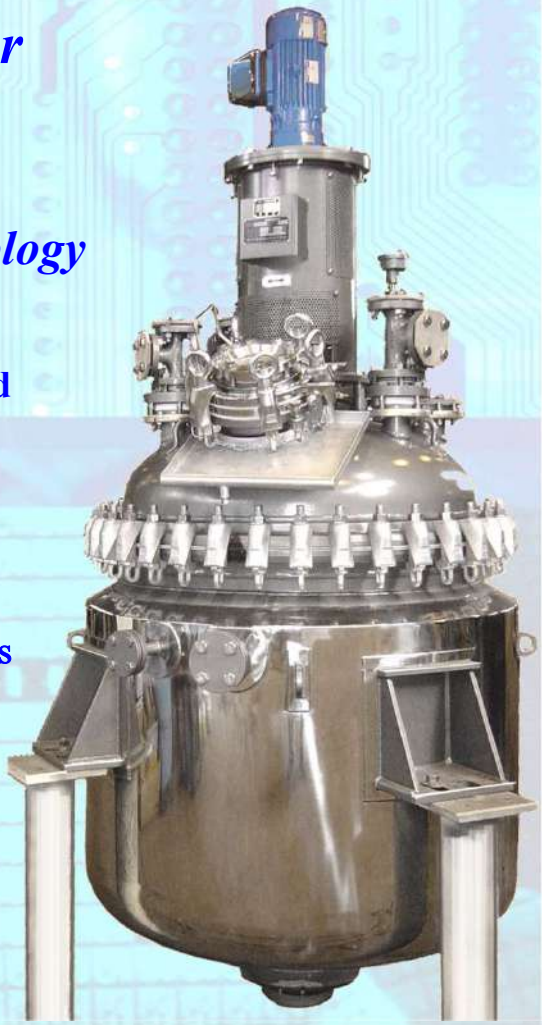
Top Runner【N-Series】

NF-GL　Natrium Free Glass（patented Product）

The world first Glass Lining for
High Purity Chemicals,
Photosensitizing Agent for
Cutting-edge Photo-Resist Technology

＜Features＞

- **Na ION elution level drastically reduced (less than 1/10th of conventional Glass)**
- **Reduced Equipment pre-cleaning time contributes vertical start-up**
- **Can simplify ION removal at post-process**
- **Corrosion Resistance and Chemical Resistance characteristics equivalent to conventional Glass**



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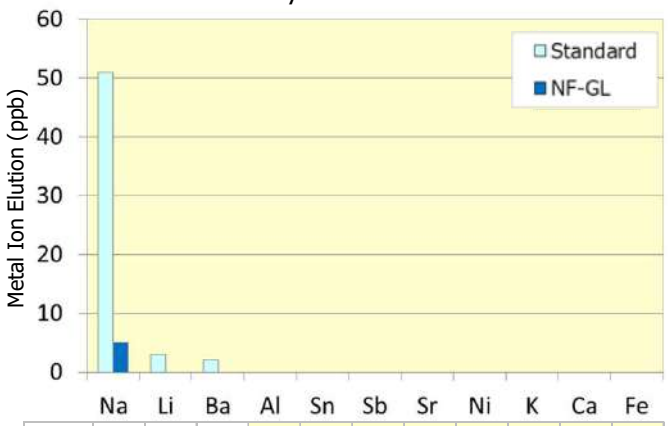
NF-GL (Natrium-Free GL)

Conventional Glass Lining material contains alkali metal such as Na (sodium)

To meet advancing needs of nano-intensification in electronics material manufacturing process, stringent control of metal ion free environment becoming of more grave importance.
We developed and commercialized the world first Na-Free Glass Material whose characteristics remain the same as conventional glass in corrosion resistance and chemical resistance

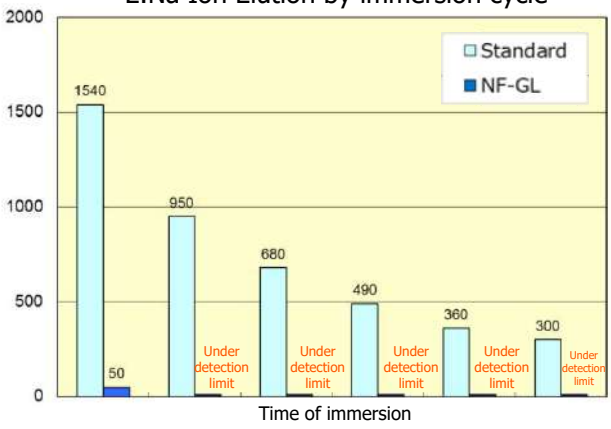
1.ICP Analysis on various elements



	Na	Li	Ba	Al	Sn	Sb	Sr	Ni	K	Ca	Fe
Standard	51	3	2.1	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<10	<10
NF-GL	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<10	<10	<10

・Na～Ni : ICP-MS (detection limit: 0.2ppb)
・K ～Fe : ICP-AES (detection limit: 10ppb)

2.Na Ion Elution by immersion cycle

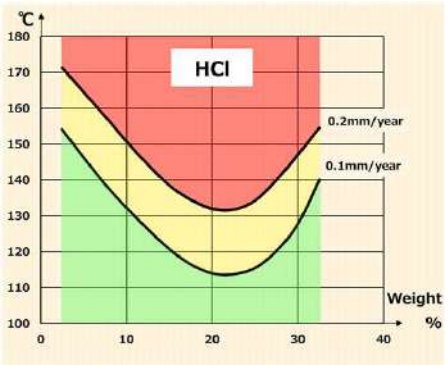


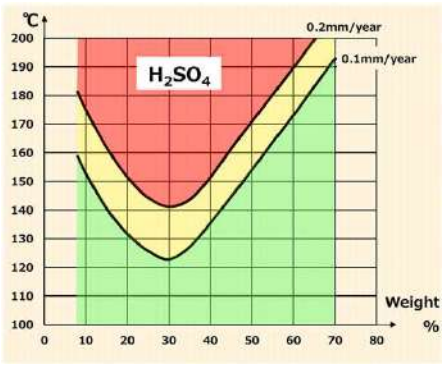
NF-GL quickly reaches undetectable level

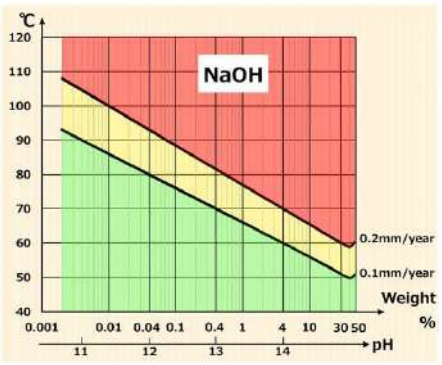
Note: The data show values under specific conditions and should not be construed as guaranteed value.

Corrosion Characteristics

NF-GL has the same chemical resistance as standard glass

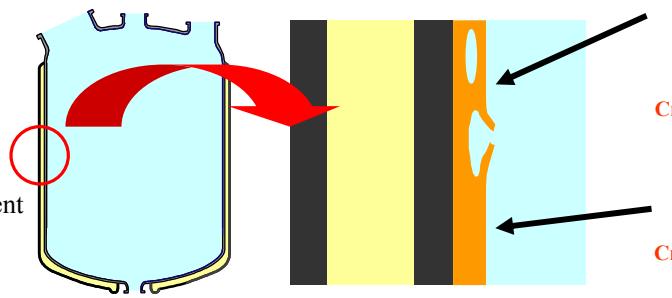






Comparison versus Fluororesine Product

Problems
- Buckling at Vacuum
- Stress Crack generated by Heat History
- Easily damaged by abbrasion
- Weak Heat Transfer Coefficient (20% less than GL)



Blister generation by permeation
↓
Bursting of the blister
↓
Cross Contamination between batches

Soft, easiliy damaged lining
↓
Cross Contamination between batches