



AGC Glass Powders for Electronics

POWDER GLASS

AGC Glass Pastes for Electronics

GLASS PASTE

Product Catalog

Advanced Material Division

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Product lines

The Asahi powder and paste business made their breakthrough in 1956, with the mass production of low-melting and crystallized type glass powder used for CRT sealing.

AGC is taking up the challenge of harnessing and integrating our glass, chemistry and ceramics technologies, exploiting our strengths in design and analysis to expand the application of glass as a high-performance electronic material, and moving actively into lead-free glasses.



POWDER GLASS



GLASS PASTE



GLASS PREFORM

POWDER GLASS

AGC powder glass is available in a wide range of products variants for use in applications from flat display panels, thick-film circuit boards, and Glass-Ceramic Multilayer Substrate. From the original melt, through grinding, to the final sieving, Asahi Glass's proprietary technology is used under the strictest quality control regime. The track record established over many years has won these products the full confidence of industrial users, particularly in terms of ease of use and fast technical service unrivalled by competitors, and ensures that they fully meet every need.

Applications for Powder Glass Sealants

Purpose of Seal	Items Sealed	Main Applications
Frit seals	Glass-Glass Glass-Ceramic Glass-Metal Ceramic-Ceramic	PDP Fluorescent indicator tubes IC packages
Binders	Glass-Glass Glass-Ceramic	thick-film glass paste thick-film metal paste
Coatings	Ceramics Metals	Alumina substrate

The following criteria should govern your selection of Powder Glass:

● Thermal expansion coefficient

It is normally desirable to apply press to the glass after sealing, so choose a powder glass with a thermal expansion coefficient smaller than that of the materials being sealed by between 0 and $15 \times 10^{-7}/^{\circ}\text{C}$.

● Sealing temperature

To form a good seal, the powder glass should properly wet the material being sealed, so raise its temperature above the softening point of the glass.

● Seal atmosphere

In Air or nitrogen

● Chemical resistance

Powder glass consisting primarily of SiO_2 has excellent acid and water resistance. Powder glass consisting primarily of $\text{B}_2\text{O}_3\text{-PbO}$ or $\text{B}_2\text{O}_3\text{-ZnO}$ has slightly lower acid resistance.

● Particle size

Particles of powder glass for molds or paints generally pass 100~150 mesh, while those for screen-printing generally pass 250~325 mesh. Various types of particle distribution are available by request.

R2O R can be any alkali metal (K, Na or Li)

RO RO can be any alkaline earth metal (Mg, Ca, Sr or Ba)

Thermal expansion coefficient . . . The average ratio by which the glass expands when heating through 1°C .

Transformation point . . . The temperature at which the glass structure changes, with viscosity of approx. $10^{13.3}$ poise.

(Values are the temperature on the shoulder at the first thermal absorption region on the DTA curve. The exception specified in the list individually.)

Softening point . . . The temperature at which glass deforms under its own weight, with a viscosity of about $10^{7.6}$ poise.

(Values are temperature at the peak of the second thermal absorption region on the DTA curve. The exception specified in the list individually.)

Crystallization temperature . . . The temperature at which the heat of crystallization of a crystalline glass reaches a maximum while it is being heated. (The peak temperature for thermal dissipation on the DTA curve.)

Sealing temperature . . . The temperature suitable for actual operations

Average particle size . . . Mean particle diameter. (Permeability method)

Particle size (centre value) . . . Median particle diameter. (Laser diffraction method)

Sieving size 100 mesh : mesh size of $149 \mu\text{m}$

150 mesh : mesh size of $105 \mu\text{m}$

200 mesh : mesh size of $74 \mu\text{m}$

250 mesh : mesh size of $63 \mu\text{m}$

325 mesh : mesh size of $44 \mu\text{m}$

POWDER GLASS

Powder Glass for Binder (Lead Contained Type)

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (× 10 ⁻⁷ /°C)	CTE Temp range (°C)	Specific Gravity	Viscosity Property (DTA)			Particle Property			Color After Firing	Lead Free or Contd.	Glass Characteristics
						Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			
ASF1216	PbO·SiO ₂	600-10	63	50-350	4.3	468	576	-	-	1.7	325	Yellow-White	Contd.	Vitreous
ASF1330	PbO·B ₂ O ₃	500-15	92	50-350	5.6	380	445	-	2.0	-	325	Gray	Contd.	Vitreous
ASF1340	PbO·SiO ₂ ·B ₂ O ₃	550-10	77	50-350	5.2	420	505	-	2.0	1.1	325	White	Contd.	Vitreous
ASF1370	PbO·SiO ₂ ·B ₂ O ₃	650-15	51	50-350	3.8	465	615	-	2.1	1.9	250	White	Contd.	Vitreous
ASF1373	PbO·SiO ₂	700-15	84	50-350	4.0	435 ^{*1}	550	-	2.7	6.3	325	White	Contd.	Vitreous
ASF1380	PbO·SiO ₂	800-15	62	50-350	3.8	555	690	-	2.0	4.9	325	White	Contd.	Vitreous
ASF1460	ZnO·B ₂ O ₃	720-10	39	50-350	3.9	527	-	688	4.8	-	250	Yellow-Green	Contd.	Devitrifying
ASF1500	SiO ₂ ·Al ₂ O ₃ ·RO	850-15	59	50-350	3.0	693	-	803	2.3	3.8	325	White	Contd.	Devitrifying
ASF1550	ZnO·PbO·B ₂ O ₃	550-15	47	50-350	4.7	450	-	540	2.0	1.3	325	White	Contd.	Devitrifying

*1 Transformation point of TMA curve.

Powder Glass for Binder (Lead Free Type)

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (× 10 ⁻⁷ /°C)	CTE Temp range (°C)	Specific Gravity	Viscosity Property (DTA)			Particle Property			Color After Firing	Lead Free or Contd.	Glass Characteristics
						Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			
ASF0070B	SiO ₂ ·B ₂ O ₃ ·Al ₂ O ₃	1020-10	55	50-350	2.8	612	766	916	-	2.0	150	White	Free	Devitrifying
ASF1094	Bi ₂ O ₃ ·B ₂ O ₃	550-10	79	50-350	5.4	466	526	-	-	0.8	150	Yellow	Free	Vitreous
ASF1096	Bi ₂ O ₃ ·B ₂ O ₃	400-15	120	50-350	6.7	355	405	465	-	1.0	325	Yellow	Free	Devitrifying
ASF1098	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	600-10	54	50-350	5.5	441	-	535	-	3.0	100	White	Free	Devitrifying
ASF1099	ZnO·Bi ₂ O ₃ ·B ₂ O ₃	600-10	42	50-350	4.7	475	-	562	-	3.5	100	White	Free	Devitrifying
ASF1100	Bi ₂ O ₃ ·B ₂ O ₃	460-30	113	50-350	6.3	380	440	510	-	5.2	150	Brown-Yellow	Free	Devitrifying
ASF1100B	Bi ₂ O ₃ ·B ₂ O ₃	460-30	107	50-350	6.3	382	-	520	-	1.1	325	Yellow	Free	Devitrifying
ASF1109	Bi ₂ O ₃ ·ZnO·B ₂ O ₃	580-5	65	50-350	5.1	461	537	-	-	2.8	325	Green	Free	Vitreous
ASF1560	SiO ₂ ·ZnO·RO	850-15	73	50-350	3.3	670	780	815	1.7	2.2	325	White	Free	Devitrifying
ASF1620B	ZnO·B ₂ O ₃ ·SiO ₂	850-15	55	50-350	3.7	570	656	759	-	4.5	150	White	Free	Devitrifying
ASF1700	SiO ₂ ·RO·ZnO	850-15	72	50-350	3.6	680	813	890	1.6	-	325	White	Free	Devitrifying
ASF1702	RO·SiO ₂ ·ZnO	950-15	119	50-350	3.8	679	807	911	-	2.6	325	White	Free	Devitrifying
ASF1780	SiO ₂ ·B ₂ O ₃ ·RO	850-15	52	50-350	2.5	538	783	-	3.1	4.9	325	Gray	Free	Vitreous
ASF1891	ZnO·B ₂ O ₃ ·SiO ₂	800-10	66	50-350	3.5	488	587	710	-	2.8	325	White	Free	Devitrifying
ASF1891F	ZnO·B ₂ O ₃ ·SiO ₂	800-10	63	50-350	3.5	495	589	707	-	1.5	325	White	Free	Devitrifying
ASF1898	RO·B ₂ O ₃ ·ZnO	600-10	106	50-350	3.4	433	527	-	-	4.5	200	White	Free	Vitreous
ASF1898B	RO·B ₂ O ₃ ·ZnO	600-10	106	50-350	3.4	442	526	-	-	1.1	200	White	Free	Vitreous
ASF1939	RO·SiO ₂ ·B ₂ O ₃	850-15	88	50-350	3.7	620	716	-	-	1.3	325	White	Free	Vitreous
ASF1941B	RO·SiO ₂ ·B ₂ O ₃	700-15	90	50-350	3.7	591	683	-	-	1.2	325	Black	Free	Vitreous
SK-231-300	Bi ₂ O ₃ ·RO·B ₂ O ₃	580-20	84	50-350	5.1	491	557 ^{*2}	-	4.0	5.8	325	-	Free	Vitreous
KF9173	Bi ₂ O ₃ ·B ₂ O ₃	500-10	98	50-350	6.4	403	459 ^{*2}	-	3.5	-	100	-	Free	Vitreous
FF209	RO·B ₂ O ₃ ·SiO ₂	-	121	50-350	2.9	400	450 ^{*2}	590	-	1.6	-	White	Free	Devitrifying
LS-5-300M	SiO ₂ ·RO·R ₂ O	-	106	50-350	2.9	476	553 ^{*2}	775	-	12.0	325	White	Free	Devitrifying

Developing Products

1097C2	SiO ₂ ·B ₂ O ₃ ·Bi ₂ O ₃	650-10	69	50-350	5.2	520	605	-	-	2	325	White	Free	Vitreous
1991Y10	SiO ₂ ·B ₂ O ₃ ·R ₂ O	600-10	150	50-350	2.8	404	524	-	-	4	100	White	Free	Vitreous
2452	SnO·ZnO·P ₂ O ₅	490-10	82	50-300	3.9	350	420 ^{*2}	510	-	50	100	Black	Free	Devitrifying
CB001	SiO ₂ ·RO·Al ₂ O ₃	900-10	90	50-300	3.8	700	770	-	-	1	250	-	Free	Vitreous
K301	SiO ₂ ·B ₂ O ₃ ·RO	-	88	50-300	3.1	556	596 ^{*2}	790	-	9	300	White	Free	Devitrifying
K303	SiO ₂ ·B ₂ O ₃ ·RO	490-60	135	50-300	3.1	370	400 ^{*2}	520	-	8	300	White	Free	Devitrifying
K304	SiO ₂ ·B ₂ O ₃ ·RO	490-60	112	50-300	2.9	440	479 ^{*2}	610	-	8	300	White	Free	Devitrifying
K807	SiO ₂ ·RO·B ₂ O ₃	770-10	77	50-300	3.6	638	725 ^{*2}	-	-	5	100	White	Free	Vitreous
K808	SiO ₂ ·RO·B ₂ O ₃	800-10	69	50-300	3.4	630	725 ^{*2}	-	-	10	100	White	Free	Vitreous
K834	B ₂ O ₃ ·RO·ZnO	-	80	50-300	4.0	500	580 ^{*2}	620	-	3	300	White	Free	Devitrifying
K835	B ₂ O ₃ ·ZnO	-	43	50-300	3.6	529	603 ^{*2}	654	-	10	100	White	Free	Devitrifying
K836	SiO ₂ ·RO·TiO ₂	-	93	50-300	4.1	693	757 ^{*2}	830	-	3	300	White	Free	Devitrifying
KP312	SnO·P ₂ O ₅	430-10	128	30-250	3.8	280	325 ^{*2}	-	-	6	150	Pale Brown	Free	Vitreous

*2 Third inflection point on DTA curve

POWDER GLASS

Powder Glass for Low Temperature sealing

Code	Glass Type	Firing Condition Temp.-Time (°C—min)	Thermal Expansion Coeff. ($\times 10^{-7}/^{\circ}\text{C}$)	CTE Temp range (°C)	Specific Gravity	Viscosity Property (DTA)			Particle Property			Lead Free or Contd.	Glass Characteristi cs	Color After Firing	Major Application
						Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass				
ASF1290A4	PbO·B ₂ O ₃	430-10	105	30-300	6.3	332	394	-	-	3.9	325	Contd.	Vitreous	White	Stainless sealing
KF9173	Bi ₂ O ₃ ·B ₂ O ₃	520-20	98	30-300	6.4	403	459*1	-	3.5	-	100	Free	Vitreous	-	Seathed heaters
BNL115BB	Bi ₂ O ₃ ·ZnO	500-10	71	30-300	7.3	355	399*1	-	5.0	-	100	Free	Vitreous	Black	Ceramic sealing
ASF2511C	Bi ₂ O ₃ ·ZnO	470-10	82	30-300	6.4	351	400*1	-	-	8	100	Free	Vitreous	Black	Soda-Lime Glass sealing
T015	PbO·B ₂ O ₃	450-15	110	30-300	6.4	320	369*1	-	7.7	-	100	Contd.	Vitreous	White	Stainless sealing
7570	PbO·B ₂ O ₃ ·Al ₂ O ₃	500-5	84	30-300	5.4	378	447*1	-	6.3	-	100	Contd.	Vitreous	White	Seathed heaters
7583BF	PbO·ZnO	450-60	84	30-300	6.1	325	370	-	4.2	-	150	Contd.	Devitrifying	Gray	Ceramic sealing
7575BF	PbO·ZnO	450-60	89	30-300	6.4	320	375	-	3.7	-	100	Contd.	Devitrifying	Black	Soda-Lime Glass sealing
T436	PbO·B ₂ O ₃	450-10	60	30-300	7.2	308	348*1	-	4.5	-	150	Contd.	Vitreous	Green-Gray	Kovar sealing
DT430	PbO·B ₂ O ₃	430-10	72	30-300	7.2	310	353*1	-	5.6	-	100	Contd.	Vitreous	Gray	Soda-Lime Glass sealing
7574	ZnO·B ₂ O ₃ ·SiO ₂	775-30	37	30-500	3.6	567	647*1	-	10.2	-	100	Free	Devitrifying	White	AlN sealing
9079-150	SnO·P ₂ O ₅	480-10	122	30-250	3.8	287	344*1	-	-	13	150	Free	Vitreous	Gray	
FP-74	SnO·P ₂ O ₅	480-10	63	30-250	3.4	275	355	-	4.6	-	100	Free	Vitreous	Black	Ceramic sealing
Developing Products															
1928	SiO ₂ ·TiO ₂ ·R ₂ O	600-10	155	50-350	2.8	470	560	-	-	4	100	Free	Vitreous	White	Metal sealing
1991Y10	SiO ₂ ·B ₂ O ₃ ·R ₂ O	600-10	150	50-350	2.8	404	525	-	-	4	100	Free	Vitreous	White	Metal sealing
FP-67*2	SnO·P ₂ O ₅	480-10	81	30-250	3.6	280	345*1	-	-	10	150	Free	Vitreous	Black	Soda-Lime Glass sealing
FSN-62B	SnO·P ₂ O ₅	480-10	80	30-250	3.8	290	394	-	-	14	150	Free	Vitreous	Gray	Soda-Lime Glass sealing
FSN-70B	SnO·P ₂ O ₅	480-10	80	30-250	3.8	295	404	-	-	11	150	Free	Vitreous	Gray	Soda-Lime Glass sealing
KF10115	Bi ₂ O ₃ ·B ₂ O ₃	470-10	105	30-300	7.4	350	400*1	-	-	5	200	Free	Vitreous	Yellow	Stainless sealing
KP3103	SnO·P ₂ O ₅	430-10	135	30-250	3.8	255	315*1	-	-	20	150	Free	Vitreous	Gray	
KP312	SnO·P ₂ O ₅	430-10	128	30-250	3.8	280	325*1	-	-	6	150	Free	Vitreous	Gray	
KP312AS	SnO·P ₂ O ₅	430-10	80	30-250	3.6	280	340*1	-	-	11	150	Free	Vitreous	Black	Soda-Lime Glass sealing
KP312E	SnO·P ₂ O ₅	430-10	70	30-250	3.5	282	343*1	-	-	11	150	Free	Vitreous	Black	Ceramic sealing
LFP-A50Z	SnO·P ₂ O ₅	460-10	45	30-250	3.8	270	348*1	-	-	-	300	Free	Vitreous	Black	Non-Alkali Glass sealing
TNS031	V ₂ O ₅	420-10	95	30-250	-	275	325	-	-	2	-	Free	Devitrifying	Black	

*1 Third inflection point on DTA curve *2 Licensed product of U.S. Patent No.5281560. Could not be used for some application. Please contact us for further information.

Powder Glass for Glass-Ceramic Multilayer Substrate

Code	Glass Type	Firing Condition Temp.-Time (°C—min)	Thermal Expansion Coeff. ($\times 10^{-7}/^{\circ}\text{C}$)	CTE Temp range (°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property			Particle Property			Major Application	Lead Free or Contd.	Glass Characteristics	Feature
						Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Dielectric Constant ϵ	Dielectric Loss $\tan \delta (\times 10^{-4})$	Measuring Condition	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass				
ASF102M	SiO ₂ ·B ₂ O ₃	850-60	28	50-350	2.2	495 *1	790	-	4.0	-	1MHz 25°C	-	3.3	24	Multilayer Substrate	Free	Vitreous	Low ϵ
ASF102X	SiO ₂ ·B ₂ O ₃	850-60	28	50-350	2.2	495 *1	762	-	4.0	-	1MHz 25°C	-	1.0	24	Multilayer Substrate	Free	Vitreous	Low ϵ
ASF102Y	SiO ₂ ·B ₂ O ₃	850-60	28	50-350	2.2	495 *1	775	-	4.0	-	1MHz 25°C	-	1.3	24	Multilayer Substrate	Free	Vitreous	Low ϵ
ASF1700F	SiO ₂ ·RO·ZnO	850-60	72	25-300	3.6	671	810	923	9.0	-	1MHz 25°C	-	1.8	200	Multilayer Substrate	Free	Devitrifying	
FF201	SiO ₂ ·B ₂ O ₃ ·Al ₂ O ₃	900-60	55	40-750	2.6	720	820	1020	6.0	-	1MHz 25°C	-	2.9	100	Multilayer Substrate	Free	Devitrifying	Low ϵ
Developing Products																		
DL828	SiO ₂ ·B ₂ O ₃ ·R ₂ O	900-60	35	25-300	2.3	-	861	-	4.2	-	1MHz 25°C	-	1.0	-	Multilayer Substrate	Free	Vitreous	Low ϵ
FF202	SiO ₂ ·Al ₂ O ₃ ·RO	900-60	112	25-300	3.3	690	760*2	900	-	-	-	-	2.5	-	Multilayer Substrate	Free	Devitrifying	High CTE
ZX-1	SiO ₂ ·Al ₂ O ₃ ·RO	900-60	75	25-300	2.9	750	875	959	6.6	6	16GHz 25°C	-	2.5	-	Multilayer Substrate	Free	Devitrifying	Low $\tan \delta$
ZX-5	SiO ₂ ·Al ₂ O ₃ ·RO	900-60	55	25-300	2.9	740	870	941	6.0	3	17GHz 26°C	-	2.5	-	Multilayer Substrate	Free	Devitrifying	Low $\tan \delta$

*1 Transformation point of TMA curve. *2 Third inflection point on DTA curve

POWDER GLASS

*1 Transformation point of TMA curve.

*2 Third inflection point on DTA curve

Glass Powder Compendium (Softening Temp : 315~550°C)

Code	Glass Type	Thermal Expansion Coeff. ($\times 10^{-7}/^{\circ}\text{C}$)	CTE Temp range ($^{\circ}\text{C}$)	Specific Gravity	Viscosity Property (DTA)			Particle Property			Lead Free or Contd.	Glass Characteristics
					Transformation Point ($^{\circ}\text{C}$)	Softening Point ($^{\circ}\text{C}$)	Crystallization Temp. ($^{\circ}\text{C}$)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass		
KP3103	SnO·P ₂ O ₅	135	30-250	3.8	255	315*2	-	-	20	150	Free	Vitreous
KP312	SnO·P ₂ O ₅	128	30-250	3.8	280	325*2	-	-	6	150	Free	Vitreous
TNS031	V ₂ O ₅	95	30-250	-	275	325	-	-	2	-	Free	Devitrifying
KP312AS	SnO·P ₂ O ₅	80	30-250	3.6	280	340*2	-	-	11	150	Free	Vitreous
KP312E	SnO·P ₂ O ₅	70	30-250	3.5	282	343*2	-	-	11	150	Free	Vitreous
9079-150	SnO·P ₂ O ₅	122	30-250	3.8	287	344*2	-	-	13	150	Free	Vitreous
FP-67	SnO·P ₂ O ₅	81	30-250	3.6	280	345*2	-	-	10	150	Free	Vitreous
LFP-A50Z	SnO·P ₂ O ₅	45	30-250	3.8	270	348*2	-	-	-	300	Free	Vitreous
T436	PbO·B ₂ O ₃	60	30-300	7.2	308	348*2	-	4.5	-	150	Contd.	Vitreous
DT430	PbO·B ₂ O ₃	72	30-300	7.2	310	353*	-	5.6	-	100	Contd.	Vitreous
FP-74	SnO·P ₂ O ₅	63	30-250	3.4	275	355	-	4.6	-	100	Free	Vitreous
T015	PbO·B ₂ O ₃	110	30-300	6.4	320	369*2	-	7.7	-	100	Contd.	Vitreous
7583BF	PbO·ZnO	84	30-300	6.1	325	370	-	4.2	-	150	Contd.	Devitrifying
2505	PbO·B ₂ O ₃ ·SiO ₂	-	-	6.57	316	373	-	-	1.4	150	Contd.	Vitreous
7575BF	PbO·ZnO	89	30-300	6.4	320	375	-	3.7	-	100	Contd.	Devitrifying
2517	PbO·ZnO·B ₂ O ₃	-	-	6.47	322	388	487	-	1.1	150	Contd.	Devitrifying
FSN-62B	SnO·P ₂ O ₅	80	30-250	3.8	290	394	-	-	14	150	Free	Vitreous
ASF1290A4	PbO·B ₂ O ₃	105	30-300	6.3	332	394	-	-	3.9	325	Contd.	Vitreous
BNL115BB	Bi ₂ O ₃ ·ZnO	71	30-300	7.3	355	399*2	-	5.0	-	100	Free	Vitreous
ASF2511C	Bi ₂ O ₃ ·ZnO	82	30-300	6.4	351	400*2	-	-	8	100	Free	Vitreous
KFI0115	Bi ₂ O ₃ ·B ₂ O ₃	105	30-300	7.4	350	400*2	-	-	5	200	Free	Vitreous
K303	SiO ₂ ·B ₂ O ₃ ·RO	135	50-300	3.1	370	400*2	520	-	8	300	Free	Devitrifying
FSN-70B	SnO·P ₂ O ₅	80	30-250	3.8	295	404	-	-	11	150	Free	Vitreous
ASF1096	Bi ₂ O ₃ ·B ₂ O ₃	120	50-350	6.7	355	405	465	-	1.0	325	Free	Devitrifying
GV049B	V ₂ O ₅ ·RO·ZnO	111	50-300	3.2	367	414	496	-	1.4	100	Free	Devitrifying
2452	SnO·ZnO·P ₂ O ₅	82	50-300	3.9	350	420*2	510	-	50	100	Free	Devitrifying
FK1282	Bi ₂ O ₃ ·B ₂ O ₃	-	-	7.3	362	420	519	-	0.7	100	Free	Devitrifying
FK1256	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	104	50-350	6.7	390	431	541	-	0.6	325	Free	Devitrifying
DPS144	Bi ₂ O ₃ ·B ₂ O ₃	-	-	7.5	368	432	-	-	1.4	325	Free	Vitreous
ASF1100	Bi ₂ O ₃ ·B ₂ O ₃	113	50-350	6.3	380	440	510	-	5.2	150	Free	Devitrifying
ASF1100B	Bi ₂ O ₃ ·B ₂ O ₃	107	50-350	6.3	382	-	520	-	1.1	325	Free	Devitrifying
ASF1330	PbO·B ₂ O ₃	92	50-350	5.6	380	445	-	2.0	-	325	Contd.	Vitreous
7570	PbO·B ₂ O ₃ ·Al ₂ O ₃	84	30-300	5.4	378	447*2	-	6.3	-	100	Contd.	Vitreous
DPS149	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	-	-	7.0	382	450	511	-	1.2	325	Free	Devitrifying
FF209	RO·B ₂ O ₃ ·SiO ₂	121	50-350	2.9	400	450*2	590	-	1.6	-	Free	Devitrifying
KF9173	Bi ₂ O ₃ ·B ₂ O ₃	98	50-350	6.4	403	459*2	-	3.5	-	100	Free	Vitreous
FK1306	Bi ₂ O ₃ ·B ₂ O ₃ ·SiO ₂	-	-	7.0	401	462	522	-	0.6	100	Free	Devitrifying
ASF4001B	Bi ₂ O ₃ ·B ₂ O ₃	91	50-350	6.8	406	472	-	-	0.6	325	Free	Vitreous
K304	SiO ₂ ·B ₂ O ₃ ·RO	112	50-300	2.9	440	479*2	610	-	8	300	Free	Devitrifying
ASF1340	PbO·SiO ₂ ·B ₂ O ₃	77	50-350	5.2	420	505	-	2.0	1.1	325	Contd.	Vitreous
FK1356	Bi ₂ O ₃ ·ZnO·B ₂ O ₃	-	-	5.7	447	521	-	-	0.9	100	Free	Vitreous
1991Y10	SiO ₂ ·B ₂ O ₃ ·R ₂ O	150	50-350	2.8	404	524	-	-	4	100	Free	Vitreous
ASF1094	Bi ₂ O ₃ ·B ₂ O ₃	79	50-350	5.4	466	526	-	-	0.8	150	Free	Vitreous
ASF1898B	RO·B ₂ O ₃ ·ZnO	106	50-350	3.4	442	526	-	-	1.1	200	Free	Vitreous
ASF1898	RO·B ₂ O ₃ ·ZnO	106	50-350	3.4	433	527	-	-	4.5	200	Free	Vitreous
DPS203	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	-	-	6.2	440	527	-	-	1.4	325	Free	Vitreous
ASF1109	Bi ₂ O ₃ ·ZnO·B ₂ O ₃	65	50-350	5.1	461	537	-	-	2.8	325	Free	Vitreous
ASF1098	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	54	50-350	5.5	441	535	-	-	3.0	100	Free	Devitrifying
ASF1550	ZnO·PbO·B ₂ O ₃	47	50-350	4.7	450	-	540	2.0	1.3	325	Contd.	Devitrifying
ASF1099	ZnO·Bi ₂ O ₃ ·B ₂ O ₃	42	50-350	4.7	475	-	562	-	3.5	100	Free	Devitrifying
ASF1373	PbO·SiO ₂	84	50-350	4.0	435*1	550	-	2.7	6.3	325	Contd.	Vitreous

POWDER GLASS

*1 Transformation point of TMA curve.

*2 Third inflection point on DTA curve

Glass Powder Compendium (Softening Temp : 550~950°C)

Code	Glass Type	Thermal Expansion Coeff. ($\times 10^{-7}/^{\circ}\text{C}$)	CTE Temp range ($^{\circ}\text{C}$)	Specific Gravity	Viscosity Property (DTA)			Particle Property			Lead Free or Contd.	Glass Characteristics
					Transformation Point ($^{\circ}\text{C}$)	Softening Point ($^{\circ}\text{C}$)	Crystallization Temp. ($^{\circ}\text{C}$)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass		
FK1361	$\text{Bi}_2\text{O}_3 \cdot \text{B}_2\text{O}_3 \cdot \text{SiO}_2$	-	-	5.5	459	552	-	-	0.9	100	Free	Vitreous
LS-5-300M	$\text{SiO}_2 \cdot \text{RO} \cdot \text{R}_2\text{O}$	106	50-350	2.9	476	553 ^{*2}	775	-	12.0	325	Free	Devitrifying
SK-231-300	$\text{Bi}_2\text{O}_3 \cdot \text{RO} \cdot \text{B}_2\text{O}_3$	84	50-350	5.1	491	557 ^{*2}	-	4.0	5.8	325	Free	Vitreous
FK1333	$\text{Bi}_2\text{O}_3 \cdot \text{ZnO} \cdot \text{SiO}_2$	-	-	5.4	475	558	-	-	1.0	100	Free	Vitreous
1928	$\text{SiO}_2 \cdot \text{TiO}_2 \cdot \text{R}_2\text{O}$	155	50-350	2.8	470	560	-	-	4	100	Free	Vitreous
ASF1655AW	$\text{PbO} \cdot \text{SiO}_2$	73	50-350	4.9	463	565	-	-	0.9	423	Contd.	Vitreous
ASF1216	$\text{PbO} \cdot \text{SiO}_2$	63	50-350	4.3	468	576	-	-	1.7	325	Contd.	Vitreous
K834	$\text{B}_2\text{O}_3 \cdot \text{RO} \cdot \text{ZnO}$	80	50-300	4.0	500	580 ^{*2}	620	-	3	300	Free	Devitrifying
ASF1891	$\text{ZnO} \cdot \text{B}_2\text{O}_3 \cdot \text{SiO}_2$	66	50-350	3.5	488	587	710	-	2.8	325	Free	Devitrifying
ASF1891F	$\text{ZnO} \cdot \text{B}_2\text{O}_3 \cdot \text{SiO}_2$	63	50-350	3.5	495	589	707	-	1.5	325	Free	Devitrifying
K301	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	88	50-300	3.1	556	596 ^{*2}	790	-	9	300	Free	Devitrifying
K835	$\text{B}_2\text{O}_3 \cdot \text{ZnO}$	43	50-300	3.6	529	603 ^{*2}	654	-	10	100	Free	Devitrifying
1097C2	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{Bi}_2\text{O}_3$	69	50-350	5.2	520	605	-	-	2	325	Free	Vitreous
ASF1370	$\text{PbO} \cdot \text{SiO}_2 \cdot \text{B}_2\text{O}_3$	51	50-350	3.8	465	615	-	2.1	1.9	250	Contd.	Vitreous
ASF1460	$\text{ZnO} \cdot \text{B}_2\text{O}_3$	39	50-350	3.9	527	-	688	4.8	-	250	Contd.	Devitrifying
7574	$\text{ZnO} \cdot \text{B}_2\text{O}_3 \cdot \text{SiO}_2$	37	30-500	3.6	567	647 ^{*2}	-	10.2	-	100	Free	Devitrifying
ASF1620B	$\text{ZnO} \cdot \text{B}_2\text{O}_3 \cdot \text{SiO}_2$	55	50-350	3.7	570	656	759	-	4.5	150	Free	Devitrifying
HHR0706	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	45	50-350	-	560	665	780	-	4.2	-	Free	Devitrifying
ASF1941B	$\text{RO} \cdot \text{SiO}_2 \cdot \text{B}_2\text{O}_3$	90	50-350	3.7	591	683	-	-	1.2	325	Free	Vitreous
ASF1380	$\text{PbO} \cdot \text{SiO}_2$	62	50-350	3.8	555	690	-	2.0	4.9	325	Contd.	Vitreous
CM251-H4	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	102	25-900	-	608	699	815	-	10	100	Free	Devitrifying
DSG006-S6	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	110	25-800	-	609	706	816	-	10	100	Free	Devitrifying
DSG006La4	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	126	25-800	-	620	712	840	-	10	100	Free	Devitrifying
ASF1939	$\text{RO} \cdot \text{SiO}_2 \cdot \text{B}_2\text{O}_3$	88	50-350	3.7	620	716	-	-	1.3	325	Free	Vitreous
K808	$\text{SiO}_2 \cdot \text{RO} \cdot \text{B}_2\text{O}_3$	69	50-300	3.4	630	725 ^{*2}	-	-	10	100	Free	Vitreous
K807	$\text{SiO}_2 \cdot \text{RO} \cdot \text{B}_2\text{O}_3$	77	50-300	3.6	638	725 ^{*2}	-	-	5	100	Free	Vitreous
K836	$\text{SiO}_2 \cdot \text{RO} \cdot \text{TiO}_2$	93	50-300	4.1	693	757 ^{*2}	830	-	3	300	Free	Devitrifying
CM251-ZL	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	126	25-900	-	658	757	896	-	10	100	Free	Devitrifying
FF202	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	112	25-300	3.3	690	760 ^{*2}	900	-	2.5	-	Free	Devitrifying
ASF102X	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3$	28	50-350	2.2	495 *1	762	-	-	1.0	24	Free	Vitreous
ASF0070B	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{Al}_2\text{O}_3$	55	50-350	2.8	612	766	916	-	2.0	150	Free	Devitrifying
CB001	$\text{SiO}_2 \cdot \text{RO} \cdot \text{Al}_2\text{O}_3$	90	50-300	3.8	700	770	-	-	1	250	Free	Vitreous
ASF102Y	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3$	28	50-350	2.2	495 *1	775	-	-	1.3	24	Free	Vitreous
CM251-ZL5	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	119	25-900	-	680	778	898	-	10	100	Free	Devitrifying
ASF1560	$\text{SiO}_2 \cdot \text{ZnO} \cdot \text{RO}$	73	50-350	3.3	670	780	815	1.7	2.2	325	Free	Devitrifying
ASF1780	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{RO}$	52	50-350	2.5	538	783	-	3.1	4.9	325	Free	Vitreous
ASF102M	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3$	28	50-350	2.2	495 *1	790	-	-	3.3	24	Free	Vitreous
ASF1702	$\text{RO} \cdot \text{SiO}_2 \cdot \text{ZnO}$	119	50-350	3.8	679	807	911	-	2.6	325	Free	Devitrifying
ASF1700F	$\text{SiO}_2 \cdot \text{RO} \cdot \text{ZnO}$	72	25-300	3.6	671	810	923	-	1.8	200	Free	Devitrifying
ASF1700	$\text{SiO}_2 \cdot \text{RO} \cdot \text{ZnO}$	72	50-350	3.6	680	813	890	1.6	-	325	Free	Devitrifying
FF201	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{Al}_2\text{O}_3$	55	40-750	2.6	720	820	1020	-	2.9	100	Free	Devitrifying
HHR1010	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	102	25-1000	-	715	831	970	-	10	100	Free	Devitrifying
DL828	$\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{R}_2\text{O}$	35	25-300	2.3	-	861	-	-	1.0	-	Free	Vitreous
ZX-5	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	55	25-300	2.9	740	870	941	-	2.5	-	Free	Devitrifying
ZX-1	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	75	25-300	2.9	750	875	959	-	2.5	-	Free	Devitrifying
ER001	-	65	50-350	-	670	905	-	-	10	100	Free	Vitreous
HHR0704	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	43	25-700	-	726	924	-	-	10	100	Free	Vitreous
ASF1500	$\text{SiO}_2 \cdot \text{Al}_2\text{O}_3 \cdot \text{RO}$	59	50-350	3.0	693	-	803	2.3	3.8	325	Contd.	Devitrifying

GLASS PASTE

AGC glass pastes consist of powder glass and the vehicle. They are widely used in the electronics industry for applications requiring extremely high precision and reliability, such as thick-film hybrid ICs, thermal print heads, etc., in which they have an excellent track record.

Long years of experience and advanced technical know-how, from the design of recipes for the ingredients, through the melting and grinding to the mixing of the paste, and the strictest quality control regime, are the secrets of our integrated production system.

Our continuous ongoing policy of improvement ensures that our pastes secure the widest possible use throughout the electronics industry, with improving ease of use and other distinctive features.

Be sure to remember the following considerations when using Asahi Dielectric Glass Pastes:

- **Storage locations**

Avoid direct exposure to sunlight and store in a cool, well-ventilated place.

Please use within six months of receipt.

Please ask the sales person about expiry date of each pastes.

- **Adjusting viscosity**

Pastes have been prepared for use without further adjustment but, if necessary, recommended thinner can be used to adjust their viscosity.

- **Mixing**

Mix thoroughly before use, taking particular care not to cause air bubbles.

- **Application**

Pastes should be applied in a well-ventilated area. Take particular care not to continue breathing the vapor for any considerable length of time, and do not allow the paste to remain in contact with the skin.

GLASS PASTE

AGC Overcoat Glass Paste for Hybrid IC

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (×10 ⁻⁷ /°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property				Paste Viscosity		Surface Roughness		Particle Property			Glass Characteristics	Lead Free or Contd.	Color	
					Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Insulation Resistance (Ω)	Breakdown Voltage (V)	ε	tan δ (%)	η 10 (Pa·s)	Viscosity ratio η 10/η 50	Ra (μm)	Rz (μm)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			Paste	Fired Glass
AP5346	SiO ₂ ·B ₂ O ₃ ·PbO	510-5	73	-	400	490	-	-	-	-	-	170	2.0	-	-	1.2	-	325	Vitreous	Contd.	Green	Green
AP5346B7	SiO ₂ ·B ₂ O ₃ ·PbO	510-5	73	-	400	490	-	-	-	-	-	600	3.2	-	-	1.2	-	325	Vitreous	Contd.	Black	Black
AP5550	B ₂ O ₃ ·ZnO·PbO	550-5	47	-	455	-	540	-	-	-	-	150	2.1	-	-	2.0	-	200	Devitrifying	Contd.	White	White
AP5551	B ₂ O ₃ ·ZnO·PbO	550-5	47	-	455	-	540	-	-	-	-	150	2.1	-	-	2.0	-	200	Devitrifying	Contd.	Green	Green
AP5840N	SiO ₂ ·PbO	550-5	61	2.2	460	560	-	-	-	-	-	80	1.4	-	-	2.0	-	325	Vitreous	Contd.	Green	Green

Developing Products

5033J	SiO ₂ ·ZnO·Bi ₂ O ₃	580-10	84	-	454	545	600	-	-	-	-	40	1.7	-	-	-	1.9	325	Devitrifying	Free	Black	Black
5094D1	SiO ₂ ·B ₂ O ₃ ·Bi ₂ O ₃	520-60	85	-	-	510	-	-	-	-	-	110	-	-	-	-	0.9	-	Vitreous	Free	Yellow	Yellow
5102Y	SiO ₂ ·B ₂ O ₃ ·R ₂ O	850-60	28	-	-	775	-	-	-	-	-	100	-	-	-	-	1.3	-	Vitreous	Free	White	Clear
YPT525	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	580-30	72	-	470	580	-	-	-	5~7	-	100	-	-	-	-	2.5	-	Vitreous	Free	White	Clear
YPT531E	Bi ₂ O ₃ ·B ₂ O ₃ ·ZnO	590-30	77	-	500	590	-	-	-	11~13	-	100	-	-	-	-	2.5	-	Vitreous	Free	White	Clear

AGC Dielectric Crossover Paste for Hybrid IC

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (×10 ⁻⁷ /°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property				Paste Viscosity		Surface Roughness		Particle Property			Glass Characteristics	Lead Free or Contd.	Color	
					Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Insulation Resistance (Ω)	Breakdown Voltage (V)	ε	tan δ (%)	η 10 (Pa·s)	Viscosity ratio η 10/η 50	Ra (μm)	Rz (μm)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			Paste	Fired Glass
AP5576VE	SiO ₂ ·ZnO·RO	850-10	53	-	670	785	830	>10 ¹²	>1000	9~14	<0.2	190	2.4	-	-	1.6	-	325	Devitrifying	Free	Orange	White
AP5577	SiO ₂ ·ZnO·RO	850-10	53	1.9	670	785	830	>10 ¹²	>1000	9~14	<0.2	190	1.7	-	-	1.6	-	325	Devitrifying	Free	Blue	Blue
AP5578	SiO ₂ ·ZnO·RO	850-10	53	1.9	670	785	830	>10 ¹²	>1000	9~14	<0.2	190	1.8	-	-	1.6	-	325	Devitrifying	Free	Black	Black
AP5700C	SiO ₂ ·ZnO·RO	850-10	72	-	680	815	890	>10 ¹²	>1000	9~14	<0.2	200	2.3	-	-	1.6	-	325	Partially	Free	Orange	White
AP5701C	SiO ₂ ·ZnO·RO	850-10	72	-	680	815	890	>10 ¹²	>1000	5~10	<0.2	200	2.3	-	-	1.6	-	325	Partially	Free	Blue	Blue

AGC Dielectric Paste for Alumina Substrate Glazing of Print Head

●By controlling crystalline refraction, a smooth-surface glaze can be formed. (AP5761D, AP5762D)

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (×10 ⁻⁷ /°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property				Paste Viscosity		Surface Roughness		Particle Property			Glass Characteristics	Lead Free or Contd.	Color	
					Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Insulation Resistance (Ω)	Breakdown Voltage (V)	ε	tan δ (%)	η 10 (Pa·s)	Viscosity ratio η 10/η 50	Ra (μm)	Rz (μm)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			Paste	Fired Glass
AP5761D	SiO ₂ ·B ₂ O ₃ ·RO	1275-60	69	-	710	870	-	-	-	-	-	160	2.2	-	-	-	5.2	325	Vitreous	Free	Orange	Clear
AP5762D	SiO ₂ ·RO	1270-30	65	-	765	925	-	-	-	-	-	160	1.9	-	-	-	5.0	325	Vitreous	Free	Blue	Clear
AP5762-10	SiO ₂ ·RO	1200-60	65	1.8	765	925	-	-	-	-	-	150	1.7	-	-	-	5.0	325	Vitreous	Free	Black	Black

AGC Overcoat Glass Paste for Print Head

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (×10 ⁻⁷ /°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property				Paste Viscosity		Surface Roughness		Particle Property			Glass Characteristics	Lead Free or Contd.	Color	
					Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Insulation Resistance (Ω)	Breakdown Voltage (V)	ε	tan δ (%)	η 10 (Pa·s)	Viscosity ratio η 10/η 50	Ra (μm)	Rz (μm)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			Paste	Fired Glass
AP5316A	SiO ₂ ·B ₂ O ₃ ·RO	810-10	55	2.3	580	720	-	-	>1500	-	-	85	1.6	-	<1.5	-	1.5	325	Vitreous	Free	Gray	Gray
AP5317*3	SiO ₂ ·B ₂ O ₃ ·RO	850-10	55	2.0	580	720	-	-	-	-	-	90	1.8	-	<0.8	-	1.5	325	Vitreous	Free	Gray	Gray
AP5349	PbO·B ₂ O ₃ ·SiO ₂	810-10	62	-	460	-	-	-	>1500	-	-	105	2.7	-	<0.8	1.5	-	325	Vitreous	Contd.	Gray	Brown
AP5352B	PbO·B ₂ O ₃ ·SiO ₂	810-10	63	-	455	-	-	-	-	-	-	110	2.4	<0.1	-	-	1.5	325	Vitreous	Contd.	Black	Black
AP5564G	SiO ₂ ·B ₂ O ₃ ·PbO	830-10	51	-	565 *1	670	-	-	-	-	-	100	2.6	<0.3	-	0.8	0.9	325	Vitreous	Contd.	Orange	Clear
AP5565H	SiO ₂ ·PbO	830-10	58	-	623 *1	678 *2	-	-	-	-	-	100	3.1	<0.3	-	0.7	-	325	Vitreous	Contd.	Blue	Clear
AP5568	SiO ₂ ·PbO	830-10	59	-	555	-	-	-	-	-	-	90	2.5	<0.2	-	-	0.8	325	Vitreous	Contd.	White	Clear
AP5717*3	SiO ₂ ·ZnO·RO	850-10	35	2.2	680	810	845	-	-	-	-	150	1.3	-	-	-	2.5	325	Devitrifying	Free	White	White

Developing Products

5315HT101-A5	SiO ₂ ·B ₂ O ₃ ·RO	810-10	60	1.9	620	715	-	-	>2000	-	-	100	-	-	<0.8	-	2.0	-	Vitreous	Free	Gray	Gray
THN24	SiO ₂ ·B ₂ O ₃ ·RO	830-10	60	2.0	630	750	-	-	>2000	-	-	100	-	-	<0.3	-	2.0	-	Vitreous	Free	Blue	Blue

● Outstanding surface flatness, resistance to wear, and heat resistance make them ideal as over coats for various kinds of print heads, including heaters, image sensors and thermal heads.

*3 AP5317 and AP5717 are for AlN coat. (AP5317 : Top layer, AP5717 : Bottom layer)

AGC Low Temperature sealing Glass Paste

Code	Glass Type	Firing Condition Temp.-Time (°C-min)	Thermal Expansion Coeff. (×10 ⁻⁷ /°C)	Specific Gravity	Viscosity Property (DTA)			Electrical Property				Paste Viscosity		Surface Roughness		Particle Property			Glass Characteristics	Lead Free or Contd.	Color	
					Transformation Point (°C)	Softening Point (°C)	Crystallization Temp. (°C)	Insulation Resistance (Ω)	Breakdown Voltage (V)	ε	tan δ (%)	η 10 (Pa·s)	Viscosity ratio η 10/η 50	Ra (μm)	Rz (μm)	Average Particle (μm)	Particle Size (D50) (μm)	Sieving Size Mesh Pass			Paste	Fired Glass

Developing Products

5115HK1	Bi ₂ O ₃ ·B ₂ O ₃	450-10	103	-	357	413	528	-	-	-	-	105	-	-	-	-	2	325	Vitreous	Free	Yellow	Yellow
5115HT1	Bi ₂ O ₃ ·B ₂ O ₃	450-10	75	-	355	425	-	-	-	-	-	90	2.0	-	-	-	2	325	Vitreous	Free	Black	Black
5290D1	SiO ₂ ·B ₂ O ₃ ·PbO	430-10	80	3	340	405	-	-	-	-	-	90	2.5	-	-	-	3.5	325	Vitreous	Contd.	White	White
5290HT1	SiO ₂ ·B ₂ O ₃ ·PbO	430-10	70	-	335	410	-	-	-	-	-	95	-	-	-	-	3.5	325	Vitreous	Contd.	White	White
HT4304	SiO ₂ ·B ₂ O ₃ ·PbO	400-10	97	-	320	380	-	-	-	-	-	110	-	-	-	-	-	325	Vitreous	Contd.	White	White
KP312JM-10-N	SnO·P ₂ O ₅	420-10	98	-	240	370	520	-	-	-	-	100	2.5	0.5	-	-	1.5	-	Vitreous	Free	Gray	Gray
KP312JM-20-N	SnO·P ₂ O ₅	440-10	75	-	240	385	530	-	-	-	-	100	-	-	-	-	1.5	-	Vitreous	Free	Gray	Gray
PTNS031	V ₂ O ₅	420-10	95	-	275	325	460	-	-	-	-	150	-	-	-	-	2.0	-	Devitrifying	Free	Black	Black