# Technical Data Sheet

## Electronic Glass Powders
Passivation Glasses

### Application

Ferro's Pb-Silicate and Pb-Si-Borate passivation glasses are designed for use on transistors, thyristors and diodes. These products are formulated and processed to achieve very low alkali and iron levels and can be applied by a variety of techniques including Doctor Blading, Photo-Spin, Sedimentation, Screen Printing and Electrophoresis.

Ferro's Zn-B-Silicate passivation glasses are used for hermetic passivation of high voltage devices. They provide high junction temperatures and can be applied to wafers using electrophoresis and thick film methods. These products also possess low alkali and iron levels.

Ferro Passivation Glasses are also used for encapsulation of rectifiers using glass beading applications.

IP 745 is primarily used for single chip, low to medium voltage rectifiers. IX 2443 and EG 2730 are crystallizing glasses with thermal expansions closely matched to silicon for use on stacked-chip diodes for high voltage applications.

For applications requiring thicker layers or on large diameter wafers, composite "L" or "C" low expansions versions are available for most products. Due to the addition of low expansion fillers, they typically require a 25°C higher firing temperature.

Composites such as these are typically not suitable for direct application on the junction and so an underlying layer of the un-filled glass is recommended.

Typical Passivation Glass properties can be seen below.

### Pb-Si-Al Based Passivation Glass Powders

| Product Code | | IP 900 | IP 750 | IP 830 | IP 745 | IP 760 |
|---|---|---|---|---|---|---|
| Composition Family | | Pb-Si-B-Al Vitreous | Pb-Si-B-Al Vitreous | Pb-Si-B-Al Vitreous | Pb-Si-B-Al Vitreous | Pb-Si-B-Al Vitreous |
| Peak Firing Temperature | °C | 890 | 755 | 815 | 690 | 710 |
| Time at Peak Temperature | minutes | 15 | 10 | 15 | 10 | 10 |
| CTE at 260 °C | $x10^{-7}$/°C | 37.0 | 42.5 | 45.0 | 48.0 | 48.0 |
| CTE at Set Point | $x10^{-7}$/°C | 38.5 | 46.5 | 50.0 | 53.5 | 54.0 |
| Softening Point | °C | 771 | 698 | 740 | 630 | 653 |
| Annealing Point ($T_a$) | °C | 670 | 600 | 571 | 540 | 550 |
| Glass Transition Temp ($T_g$) | °C | 520 | 462 | 544 | 458 | 475 |
| Powder Density | g/cc | 2.90 | 3.29 | 3.54 | 3.45 | 3.52 |
| Typical Powder Types | | RWG | RWG | RWG | RWG, DSD | RWG |
| Typical Applications | | Wafer Passivation | Wafer Passivation | Wafer Passivation | Diode Encapsulation | Wafer Passivation |

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## Zn-B-Si-Pb Based Passivation Glass Powders

| Product Code | | IX 2443 | EG 2730 | IX 2218 |
|---|---|---|---|---|
| **Composition Family** | | Zn-B-Si-Pb Crystallizing | Zn-B-Si-Pb Crystallizing | Zn-B-Si-Pb Vitreous |
| Peak Firing Temperature | °C | 700 | 720 | 670 |
| Time at Peak Temperature | minutes | 10 | 10 | 10 |
| CTE at 260 °C | $x10^{-7}$/°C | 45.0 | 44.0 | 48.0 |
| CTE at Set Point | $x10^{-7}$/°C | 33.0* | 37.0* | 57.0* |
| Softening Point | °C | 618 | 615 | 612 |
| Annealing Point ($T_a$) | °C | 525 | 550 | 575 |
| Glass Transition Temp ($T_g$) | °C | 531 | 538 | 543 |
| Powder Density | g/cc | 3.96 | 3.90 | 4.03 |
| Typical Powder Types | | RWG | TF | REG, MVG |
| Typical Applications | | Wafer Passivation | High Voltage Diode Encapsulation | Diode Encapsulation |

* Fired Thermal Expansion (CTE)

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