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# INSULATING COMPOSITION 4956

## HOS Heaters on Steel® • COS Circuits on Steel® • TFOS Thick Film on Steel®

## RoHS Compliant*

ESL 4956 is a dielectric composition designed to insulate unabraded, unoxidised, ferritic steels. The 4956 is non-porous and produces minimum bowing of substrate as its TCE closely matches that of 430 S17 grade stainless steel. Three separately fired layers of 4956, having a minimum total thickness of 80 µm, provide excellent breakdown voltage between top conductive prints and the steel base. It is essential that the steel is only handled using protective gloves and that printing is carried out in clean-room conditions. With 9695 or 9501-CH terminations and 29XXX resistors used as the heating elements, 4956 is recommended as an 850°C overglaze. These materials are also useful in other TFOS (Thick Film on Steel)® applications.

### PASTE DATA

| | |
|---|---|
| **Rheology:** | Thixotropic, screen-printable paste |
| **Viscosity:** (Brookfield RVT, 10 rpm, No. 7 spindle, 25.5 ± 0.5 °C) | 120 ± 20 Pa.s |
| **Colour:** | Dark blue |
| **Shelf Life (20 - 25 °C):** | 6 months |

### PROCESSING

| | | |
|---|---|---|
| **Screen Mesh, Emulsion:** | | 165 S/S, 0 µm |
| **Levelling Time (at 20°C):** | | 5 - 10 min |
| **Drying Time (at 125°C):** (dependent on substrate volume) | | > 15 min |
| **Firing Temperature Range:** | | 850°C - 930°C in air |
| | Optimum: | 850°C |
| | Time at peak: | 10 min |
| **Total Firing Cycle:** | | 1 hour |
| **Substrate for Calibration:** | | Unabraded, unoxidised 430 S17 stainless steel |
| | | 122.5 mm diameter x 1.2 mm |
| **Thinner:** | | ESL 401 |



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## TYPICAL PROPERTIES

**Fired Thickness:**
(at least 3 layers between 9695 and 430 S17 stainless steel measured using an Elcometer 345 thickness gauge) > 80 µm

**Approximate Coverage:** 40 cm²/g
(80 µm thickness)

**Breakdown Voltage**:
(measured on an 88 mm diameter 9695 print on a 108 mm diameter area of dielectric at 25°C in air using a standard Clare Flash Tester) ≥ 1800 V AC

A wide range of ESL materials are compatible with 4956 permitting the fabrication of other COS (Circuits on Steel)®