



ESL ELECTROSCIENCE

CERAMIC TAPES &
THICK-FILM MATERIALS

416 EAST CHURCH ROAD
KING OF PRUSSIA, PA 19406-2625, U.S.A

T: 610-272-8000
F: 610-272-6759

www.electroscience.com

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

ESL Europe 4956 0610-A

ESL Affiliates

ESL Europe (Agmet Ltd) • 8 Commercial Road • Reading • Berkshire • England • RG2 0QZ • Tel: +44 (0) 118 918 2400 • Fax: +44 (0) 118 986 7331 • Sales@ESLEurope.co.uk

ESL Nippon • Sukegawa Bldg. • 6th floor • 3-4 Yanagibashi 1-chome • Taito-ku • Tokyo 111, Japan • Tel: +81-3-3864-8521 • Fax: +81-3-3864-9270 • Sales@ESL-Nippon.co.jp

ESL China • Room #1707, Tower A, City Center of Shanghai • 100 Zunyi Road • Shanghai, China 200051 • Tel: +86-21-6237-0336 and 0337 • Fax: +86-21-6237-0338
ESLChina@eslshanghai.net

See Caution and Disclaimer on other side.

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:

(80 μm thickness)

40 cm^2/g

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)[®]

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*None of the six substances referred to in the RoHS Directive (2002/95/EC) are used in the formulation of this product.

CAUTION: Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapours emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

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