ESL ELECTROSCIENCE
CERAMIC TAPES & THICK-FILM MATERIALS
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INSULATING COMPOSITION 4924

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

Cadmium, Lead, Nickel and Barium-Free*

ESL 4924 is a dielectric composition designed to insulate unabraded, unoxidised, ferritic steels. The 4924 is non-porous and its TCE closely matches that of 430 S17 grade stainless steel. Three separately fired layers of 4924, 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, 4924 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

Insulation Resistance:
(measured on an 88 mm diameter 9695 print on a 108 mm diameter area of dielectric using 500 VDC at 25 °C in air)

After storage at 93 ± 2% RH, 25 ± 2°C for 48 hrs.	$> 10^9\Omega$
At 300°C	$> 10^9\Omega$

A wide range of ESL materials are compatible with 4924 permitting the fabrication of other COS (Circuits on Steel)®

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