



# DUPONT™ LF172

## AG/PT CONDUCTOR COMPOSITION

All values reported here are results of experiments in our laboratories intended to illustrate product performance potential with a given experimental design. They are not intended to represent the product's specifications, details of which are available upon demand.

### PRODUCT DESCRIPTION

DuPont™ LF172 Ag/Pt conductor is intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in an air (oxidising) atmosphere. It has been developed to be cost-effective and to give excellent performance on alumina to form interconnecting tracks and pads for component and lead attachment in hybrid circuit applications.

### PRODUCT BENEFITS

- High conductivity
- High solder adhesion with pb-free SAC solder (95.5Sn/3.8Ag/0.7Cu)
- High solderability on alumina
- Excellent fine line and through hole printability Aluminium wire bondable
- Optimized for 30 minute 850°C firing profile
- Phthalate, cadmium, lead and nickel oxide free\*

\*Phthalate, cadmium and nickel oxide 'free' as used herein means that cadmium, phthalate and nickel oxide are not intentional ingredients in and are not intentionally added to the referenced product. Trace amounts, however, may be present.

### PROCESSING SUMMARY

#### Screen Type

200 Stainless steel screen with a 12 – 14 µm emulsion build up.  
For fine line applications, use 325 mesh stainless steel screen with a 12 – 14 µm emulsion build up

#### Drying

Allow prints to level for over 10 minutes at room temperature, then dry for ≥10 – 15 minutes at 150°C

#### Firing

850°C Peak held for 10 minutes on 30 – 60 minute cycle in an air atmosphere

### COMPATIBILITY

Whilst DuPont has tested this composition with the materials specified above and the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and circuit layouts. It is therefore essential that customers thoroughly evaluate the material in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the composition for its intended application(s).

**Table 1. Typical Physical Properties**

Test	Properties
Viscosity (Pa.s.) Brookfield HBT, utility cup and spindle, (SC4-14/6R), 10 rpm, 25°C±0.2°C	250 – 300
Coverage [cm <sup>2</sup> /g] Based on dried thickness of 22µm	70 – 75
Thinner	7502R
Shelf Life (months)	6

### STORAGE AND SHELF LIFE

Containers may be stored in a clean, stable environment at room temperature (between 5°C – 30°C) with their lids tightly sealed. Storage in high temperature (<30°C) or in freezers (temperature <0°C) is NOT recommended as this could cause irreversible changes in the material. The shelf life of compositions in factory-sealed (unopened) containers between (5°C – 30°C) is 6 months from date of shipment.

### SUBSTRATES

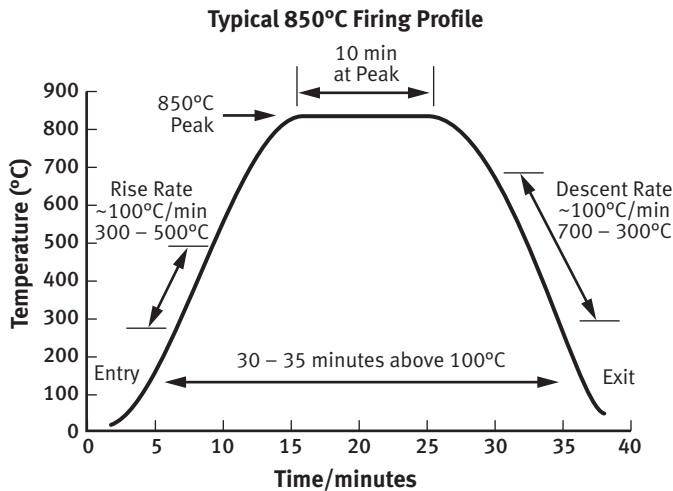
Substrates of different compositions and from various manufacturers may result in variations in performance properties.

### THINNER

LF172 composition is optimized for screen printing and thinning is not normally required. Use the DuPont recommended thinner for slight adjustments to viscosity or to replace evaporation losses. The use of too much thinner or the use of a non-recommended thinner may affect the rheological behavior of the material and its printing characteristics. Please refer to Table 1. Typical Physical Properties.

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**CHART 1. FIRING PROFILE**



## PRINTING

The composition should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for about 1 – 2 minutes. Care must be taken to avoid air entrapment. Printing should be performed in a well-ventilated area. Additional information on requirements for printing areas is contained in DuPont Technical Guide EUT 7.3 ‘Processing-Screen Printing Rooms’ available on request. Note: Optimum printing characteristics are generally achieved in the room temperature range of 20°C – 23°C. It is therefore important that the material, in its container, is at the temperature prior to commencement of printing. Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits, otherwise severe yield losses could occur. Refer to “Processing Summary”.

## DRYING

Allow prints to level at room temperature, then dry in a well-ventilated oven or conveyor dryer. Refer to “Processing Summary”.

## FIRING

Fire in well-ventilated belt, conveyor furnace or static furnace. Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle and that no exhaust gases enter the room. Full information on requirements for firing is contained in DuPont Technical Guide EUT 7.4 “Process Guide-Firing”. Refer to “Processing Summary”.

## GENERAL

Performance will depend to a large degree on care exercised in screen printing. Scrupulous care should be taken to keep the composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

## SAFETY AND HANDLING

DuPont thick film compositions are intended for use in an industrial environment by trained personnel. All appropriate health/safety regulations regarding storage, handling and processing of such materials should be complied with. For information on health/safety regulations please refer to the specific product MSDS and to the DuPont Safety Guide EUT 7.1 “Practical Safe Handling of Thick Film Compositions”.

**TABLE 2. TYPICAL FIRED PROPERTIES<sup>1</sup>**

Test	Properties
Fired Thickness (µm)	10 – 12
Print Resolution (µm lines and spaces) Screen pattern (µm) 125 – 125	150 – 100
Resistivity on alumina [mΩsq] (@ 10µm fired thickness)	≤5
Solder Acceptance <sup>2</sup> 95.5Sn/3.8Ag/0.7Cu @245°C	≥95% coverage
Solder Leach Resistance <sup>2</sup> 95.5Sn/3.8Ag/0.7Cu @245°C	4 – 5 cycles
Solder Adhesion [N] <sup>3</sup> Initial 240 hours @ 150°C	≥20 ≥20
Wire bond pull force [g] <sup>4</sup> Initial 240 hours @ 150°C	≥25 ≥15

## TEST PROCEDURE

1. Typical properties are based on laboratory data using recommended processing procedures. Unless expressly noted elsewhere the following processing conditions have been used:  
Printing: 200 mesh stainless steel screen, 12 – 14µm emulsion thickness  
Firing: 3x 30 minute cycles to a peak temperature of 850°C for 10 minutes  
Tested on 96% alumina substrates
2. Using Alpha 611 flux. Solder coverage measured after a 5s dip in solder. A leaching cycle is represented by a 10s dip in solder and tested on 500µm lines.
3. 90° wire peel test on 2mmx 2mm pads soldered with 95.5Sn/3.8AgPb/0.7Cu solder at 245°C and using a mildly activated Alpha 611.
4. Ultrasonic aluminium wire bonding . 50 µm wire (99% Al) . All wire breaks, no lifts.



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**FOR MORE INFORMATION ON DUPONT™ LF172 OR OTHER DUPONT MICROCIRCUIT MATERIALS PRODUCTS, PLEASE CONTACT YOUR LOCAL REPRESENTATIVE:**

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102-5.

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