

# DuPont 7401

GLASS ENCAPSULANT

## Technical Data Sheet

### Product Description

High temperature glass encapsulant composition DuPont 7401 is intended for use as an insulating and protective layer over hybrid circuits and resistor networks. DuPont 7401 has been designed to be compatible with DuPont 7400 surge resistor series. As well as providing a dense hermetic fired film. DuPont 7401 has been specifically formulated to allow resistors to be laser trimmed through the encapsulant. DuPont 7401 is applied to ceramic substrates by screen printing and fired in an air (oxidizing) atmosphere.

### Product Benefits

- Lead, nickel, and cadmium free
- Blue color
- Thin, dense fired film
- Fired at a peak temperature of 850°C
- Provides excellent high voltage pulse stability when used in conjunction with DuPont 7400 series surge resistors
- Laser trimmable

### Compatibility

Encapsulant DuPont 7401 is designed to be compatible with DuPont 7400 series surge resistor compositions.

### Processing

#### Thinner

DuPont 7401 is optimized for screen printing and thinning is not normally required. DuPont 4553 thinner, may be used sparingly for slight adjustments to viscosity or to replace evaporation losses.

**Table 1**  
**Composition Properties**

Test	Properties
Viscosity (Pa.S) <small>(Brookfield HBT, 10 rpm, SC4-14/6R, 25°C)</small>	100 - 250
Coverage <sup>1</sup> (cm <sup>2</sup> /g)	160 - 180
Thinner	DuPont 4553

<sup>1</sup>based on a fired film thickness of 12µm

Table 1 shows anticipated typical physical properties for DuPont 7401 based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

### Printing

Encapsulant composition DuPont 7401 should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic) for 1-2 minutes. Care must be taken to avoid air-bubble entrapment. Printing should be carried out in a clean, well-ventilated area.

Note: optimum printing characteristics of DuPont 7401 are generally achieved in the temperature range 20°C - 23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing. DuPont 7401 encapsulant should be printed with a 325 mesh stainless steel screen, to obtain a fired thickness of 10-14µm.

### Drying

Allow prints to level for 5-10 minutes at room temperature in a clean, environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

### Firing

Fire in a well ventilated belt or conveyor furnace in air with a 30 minute cycle with a peak of 850°C held for 10 minutes (See figure 1). Predictable shifts in resistance values of DuPont 7400 series resistors will occur after encapsulation, typical changes are shown in the table below.

Care must be taken to ensure that any gases/vapors from other chemicals/materials (e.g. halogenated solvents) do not enter the furnace muffle. It is also essential that the air supply to the furnace is clean, dry and free of contaminants.

Air flows and extraction rates should be optimized to ensure the oxidizing conditions exist within the muffle, and that no furnace exhaust gases enter the room.

### Laser Trimming

Laser trimming of resistors encapsulated with DuPont 7401 should be carried out at higher power setting than is normally used with low firing encapsulants. Typical conditions that have been used for DuPont 7401 encapsulant at 12µm fired thickness with DuPont 7400 series resistors are as follows: bite size 4-5 µm, pulse frequency 4-5kHz; average power 4.0-5.0 W, giving trim speeds of up to 25 mm/s.

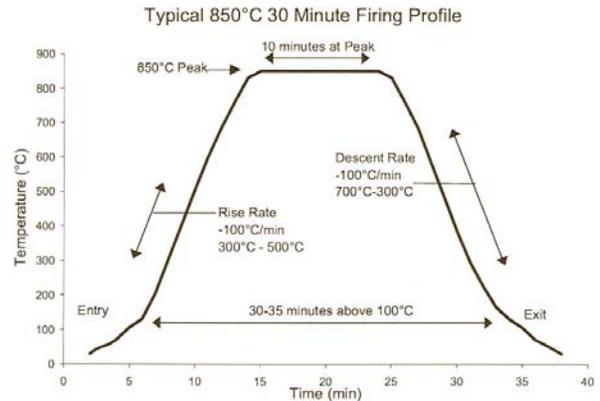
### General

Yields and performance will depend to a large degree on the care excised during processing, particularly in screen printing. Great care should be taken to keep the conductor composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

Resistance change on overglaze firing <sup>2</sup>	
Resistor	ΔR
7410	<5%
7420	<5%
7450	<5%
7499	<5%
743R	<10%

<sup>2</sup> Termination 7484 prefired using a 30 minute cycle. Resistor and encapsulant fired using a 30 minute cycle

Figure 1 - 30 Minutes Profile



### Storage and Shelf Life

Containers should be stored, tightly sealed, in a clean, stable environment at room temperature (<25°C). Shelf life of material in unopened containers is six months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

### Safety and Handling

For Safety and Handling information pertaining to this product, read the Material Safety Data Sheet (MSDS).



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