



DuPont Photopolymer & Electronic Materials

4195 High Temperature Glass Encapsulant Thick Film Composition Data Sheet

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

High temperature glass encapsulant composition 4195 is intended to form an insulating and protective layer over thick film circuits and especially over thick film silver bearing conductors. It is applied to ceramic substrates by screen printing and fired in a conveyor furnace in an air (oxidising) atmosphere.

Key features

- Protection against silver migration of adjacent silver bearing conductor lines and solder barrier
- Protection against environmental conditions, and mechanical abrasion
- Protection against reactive chemicals and potting compounds
- Blue fired film
- Fired at a peak temperature of 850°C

Design Notes

Properties are based on tests on 96% alumina substrates.

4195 encapsulant composition can be used with DuPont silver bearing conductors such as 7474, 7484, and 6160.

Glass encapsulant 4195 is not usually suggested as a resistor encapsulant. This encapsulant is not suitable for laser trimming. It

Composition Properties

Viscosity (Pa.s)	170-230 Brookfield HBF, #5, 10rpm, 25°C ±0.1°C
Coverage (cm²/g)	80-90 (based on wet film thickness of 50µm)
Thinner	8250

Processing Conditions

Printing¹	200 or 250 mesh stainless steel screen with 45° bias and 10-12µm emulsion thickness. Print speed of 2.5 -10 cm/sec.
Drying	10-15 minutes @ 150°C
Firing	850°C peak held for 10 minutes on 30/60 minute cycle in an air atmosphere

Typical Fired Properties

Fired Thickness	18-20µm
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Note 1

The use of a double wet pass print mode should help to minimize pinholes in the film.

should also be noted that refiring of thick film resistors at high temperature will change the resistance values, so allowances should be made for this in the processing and design of a circuit.

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 cus-

tomers thoroughly evaluate the materials in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the compositions for their intended application(s)

Recommended Processing Procedure

Storage

Containers may be stored in a clean, stable environment at room temperature (< 25°C), with their lids tightly sealed. Storage in freezers (temperature < 0°C) is

NOT recommended as this could cause irreversible changes in the material.

For guidance regarding storage of material, please consult DuPont Technical Note EUT 7.2 "Shelf Life Policy".

Shelf life

This composition has a shelf life of 6 months from date of shipment for factory-sealed (unopened) containers, stored under room-temperature conditions.

Substrates

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

Thinner

This composition is optimized for screen printing, 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 behaviour of the material and its printing characteristics. Refer to table

Printing

The composition should be thoroughly mixed before use. This is

best achieved by slow, gently, hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air entrapment.

Printing should be performed in a clean and 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 this 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 table

Drying

Allow prints to level for 5-10 minutes at room temperature, then dry in a well ventilated oven or conveyor dryer. Refer to table

Firing

Fire in a well ventilated belt or conveyor 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 table

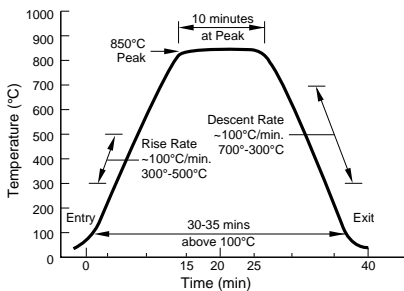
General

Performance will depend to a large degree on care exercised during processing, particularly 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.

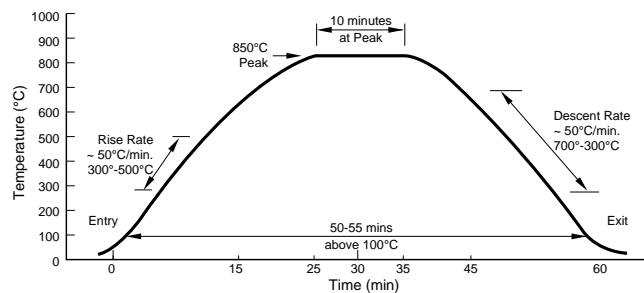
Health/safety considerations

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".

Typical 30 Minute Profile



Typical 60 Minute Firing Profile



This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience become available. Since we cannot anticipate all variations in actual end-use conditions, DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right. **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.**

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