

DuPont Technical Datasheet

DuPont™ Solamet® PV412

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™ Solamet® PV412 photovoltaic metallization is a silver based polymer conductor designed to provide excellent front side conductivity for CIGS and other Thin Film solar cells.

Key Features :

- Low grid line resistance (Rgl)
- Fine line print capability
- Low contact resistance (Rc) to TCO
- Compatible with many TCO's
- Excellent 85°C/85%RH Stability (See Figure1)

Processing Summary

- **Screen Printing Equipment**
reel-to-reel, semi-automatic, manual
- **Substrates**
Rigid/Flexible with sputtered coated TCO
- **Screen Type**
Polyester, Stainless Steel (e.g. 325 mesh SS)
- **Typical Drying Conditions**
Typically: 120°C - 170°C/ 5 - 60min
- **Typical Circuit Line Thickness**
15µm for a track width around 150µm, (Using a 325 mesh SS screen)
- **Clean-up Solvent**
Ethylene Glycol diacetate or Methyl propasol acetate

TABLE 1. COMPOSITION PROPERTIES

Solids (%) at 750°C	79.5 - 82.5
Viscosity (Pa.s.) (RVT, spindle # 14, 10rpm)	45 - 75
Thinner	8210

TABLE 2. TYPICAL PHYSICAL PROPERTIES

Resistivity (mΩ/sq/25µm)	< 22
Coverage (cm²/g) (using screen type PET 77-48Y)	120-150
Abrasion Resistance (ASTM Pencil Hardness)	2H

General

Yield and performance will depend to a large degree on the care exercised during processing, particularly in the printing stage. Scrupulous care should be taken to keep Solamet® PV412 photovoltaic composition, the printing equipment and other tools free of metal contaminants. Dust, lint and other particulate matter may also contribute to poor yield.

Drying

Depending on the temperature tolerance of the cell, Solamet® PV412 can be dried at temperatures between 120°C and 170°C. Drying times can vary from 5-60

minutes depending on the efficiency of the drier. Longer drying times and higher drying temperatures will improve the adhesion, resistivity and abrasion resistance.

Printing

The composition should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free flexible plastic spatula for 1-2 minutes. Care must be taken to avoid air entrapment. The screen and emulsion thickness with strongly influence the thickness and definition of the printed circuit. Printing should be carried out in a



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clean, 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 of Solamet® PV412 photovoltaic composition 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.

Compatibility

Whilst DuPont has tested this composition with the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and wafer designs. 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).

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 "Composition Properties".

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)

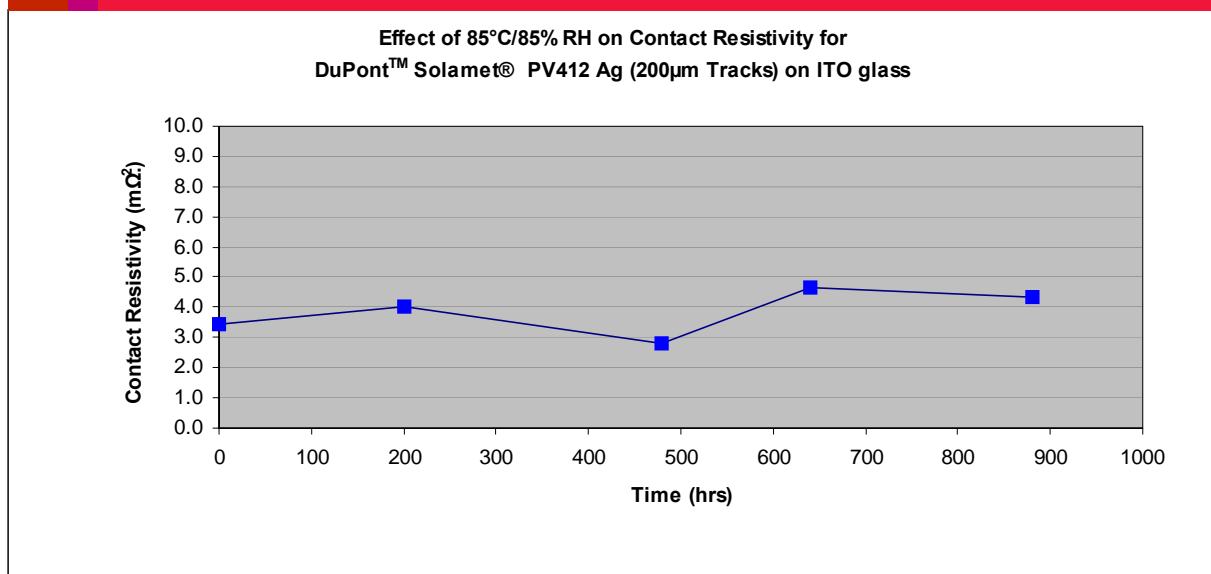
containers, stored under room-temperature (between 5°C - 30°C) conditions is 6 months from date of shipment. Some settling of the solids can occur during storage. Re-dispersion is easily achieved either through mixing with a spatula or with a flame proof blender set at a low speed.

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

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".

CHART 1. ENVIRONMENTAL TESTING AT 85°C/85%RH



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