

# DuPont 3500N

INSULATING GLAZE FOR STEEL

## Technical Data Sheet

### Product Description

DuPont 3500N Insulating Glaze for steel is intended to form an electrically insulating layer on stainless steel sheets, in order to provide a substrate for electrical circuitry. It is applied to the steel by screen printing and is fired in a conveyor furnace in an air oxidizing atmosphere. DuPont 3500N Glaze is a dense dielectric based upon a high softening point partially crystallizable glass. This is combined with a unique inorganic filler combination to minimize bowing on 430 grade and similar stainless steels. DuPont 3500N Glaze may be used with other system components to build circuits on steel, for example for use as heating elements.

### Product Benefits

- No pre-oxidation of the steel surface required prior to application
- Bowing minimized for use on 430 grade stainless steel and derivatives
- Firing using 30 minute profile
- Excellent breakdown voltage
- Lead, Cadmium, and Nickel free\*

\*Cadmium, lead and nickel "free" as used herein means that these are not intentionally added to the referenced product. Trace amounts however may be present.

### Other System Components

- DuPont 6160 silver termination

### Compatibility

While DuPont has tested this composition with specified materials and under the recommended processing conditions, it is impossible or impractical to cover every combination of materials, customer processing conditions and circuit layout. It is therefore essential that

### Typical Physical Properties

Test	Properties
Solids (%)	76 - 79
Viscosity (Pa.S) (Brookfield HBT, 10rpm, SC4-14/6r, 25°C)	60 - 140
Coverage <sup>1</sup> , (cm <sup>2</sup> /g)	30
Thinner	DuPont 9179

<sup>1</sup>based on a fired film thickness of 75 µm

Table 1 shows anticipated typical physical properties for DuPont 3500N based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.

customers thoroughly evaluate this material in their specific situations, in order to completely satisfy themselves as to the overall quality and suitability of the composition for its intended application (s).

### Processing Substrates

Properties are based on work carried out on S430 or S444 grade stainless steels with either a dull polished or on a grit blasted (180/220 alumina) surface. Substrates of different compositions, with different surface finished or from alternative manufacturers may result in variations in performance. For applications where the substrate is larger than 10 cm<sup>2</sup>, the use of steel which is thicker than 1mm is recommended for ease of processing. It is the responsibility of the user to determine the suitability of any particular grade of steel for their application.

### Printing

DuPont 3500N insulating glaze composition should be thoroughly mixed before use. This is best achieved by slow, gentle hand stirring with a clean, burr-free spatula (flexible plastic) for 0.5 - 1 minute. Care must be taken to avoid air-bubble entrapment.

Printing should be carried out in a clean, well-ventilated area. The optimum printing characteristics of DuPont 3500N 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.

Printing with 145-200 mesh stainless steel screens is recommended. The glaze may be applied in 3 - 4 prints, with each layer being sequentially fired to give a minimum of 75µm fired thickness.

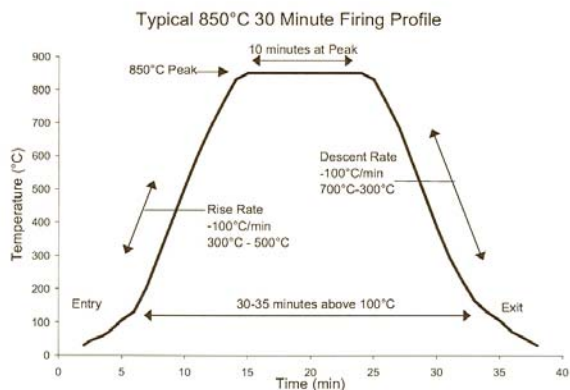
### Drying

Allow prints to level at room temperature for 2 - 5 minutes. Dry for 15 minutes at 150°C in a well ventilated oven, or using a belt drier. The surface should be touch dry.

### Firing

Fire in a well ventilated belt or conveyor furnace, in air with a 30 minute cycle to a peak temperature of 850°C for 10 minutes, see figure 1. 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 essential that the air supply to the furnace is clean, dry and free of contaminants.

Figure 1



### General

Yield and performance will depend to a large degree on the care exercised during processing, particularly in screen printing. Scrupulous care should be taken to keep the DuPont 3500N insulating glaze composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

### 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).



*The miracles of science™*

For more information on DuPont 3500N or other DuPont Microcircuit Materials products, please contact your local representative:

Americas

DuPont Microcircuit Materials  
14 T.W. Alexander Drive  
Research Triangle Park, NC 27709  
Tel.: 800-284-3382

Europe

Du Pont (U.K.) Limited  
Coldharbour Lane  
Bristol BS16 1QD  
U.K.  
Tel.: 44-117-931-3191

Asia

DuPont Kabushiki Kaisha  
Sanno Park Tower, 11-1  
Nagata-cho 2-chome  
Chiyoda-ku, Tokyo 100-611  
Japan  
Tel.: 81-3-5521-8650

DuPont Taiwan Ltd  
45, Hsing-Pont Road,  
Taoyuan, Taiwan 330  
Tel.: 886-3-377-3616

DuPont China Holding Co. Ltd  
Bldg 11, 399 Keyuan Rd., Zhangji Hi-Tech Park,  
Pudong New District, Shanghai 201203, China  
Tel.: 86-21-6386-6366 ext.2202

DuPont Korea Inc.  
3-5th Floor, Asia tower #726,  
Yeoksam-dong, Gangnam-gu  
Seoul 135-719, Korea  
Tel.: 82-10-6385-5399

E. I. DuPont India Private Limited  
7th Floor, Tower C, DLF Cyber Greens,  
Sector-25A, DLF City, Phase-III,  
Gurgaon 122 002 Haryana, India  
Tel.: 91-124-4091818

Du Pont Company (Singapore) Pte Ltd  
1 HarbourFront Place, #11-01  
HarbourFront Tower One,  
Singapore 098633  
Tel.: 65-6586-3022

<http://mcm.dupont.com>

Copyright © 2009 DuPont. All rights reserved. The DuPont Oval, DuPont™, The miracles of science™, Green Tape™ and all products or words denoted with ® or ™ are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates ("DuPont").

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT.

Caution: Do not use in medical applications involving implantation in the human body or contact with internal body fluids or tissue unless the product is provided by DuPont under a formal written contract consistent with the DuPont Policy Regarding Medical Applications of DuPont Materials H-50103-2 ("Medical Applications Policy") and which expressly acknowledges the contemplated use. For additional information, please request a copy of DuPont Medical Caution Statement H-50102-2 and the DuPont Medical Applications Policy.

The information provided herein is offered for the product user's consideration and examination. While the information is based on data believed to be reliable, DuPont makes no warranties, expressed or implied as to the data's accuracy or reliability and assumes no liability arising out of its use. The data shown are the result of DuPont laboratory experiments and are intended to illustrate potential product performance within a given experimental design under specific, controlled laboratory conditions. While the data provided herein falls within anticipated normal range of product properties based on such experiments, it should not be used to establish specification limits or used alone as the basis of design. It is the product user's responsibility to satisfy itself that the product is suitable for the user's intended use. Because DuPont neither controls nor can anticipate the many different end-uses and end-use and processing conditions under which this information and/or the product described herein may be used, DuPont does not guarantee the usefulness of the information or the suitability of its products in any given application. Users should conduct their own tests to determine the appropriateness of the products for their particular purpose.

The product user must decide what measures are necessary to safely use the product, either alone or in combination with other products, also taking into consideration the conditions of its facilities, processes, operations, and its environmental, health and safety compliance obligations under any applicable laws.

This information may be subject to revision as new knowledge and experience become available. This publication is not to be taken as a license to operate under, or recommendation to infringe any patent.



*The miracles of science™*