

## DuPont™ HPF 1000

### DuPont™ HPF resins Product Data Sheet

#### Description

Product Description

DuPont™ HPF 1000 is based on a new technology platform. It is extremely versatile and can be used to manufacture all layers of the golf ball. DuPont™ HPF 1000 offers a combination of high resilience and low compression never before available. This polymer is a highly amorphous material.

#### Restrictions

Material Status

- Commercial: Active

#### Typical Characteristics

Features

Magnesium ionomer

Characteristics / Benefits

Shore Hardness (D Scale) -----ASTM D2240D ----- 52  
 Flex Modulus -----ASTM D790 ----- 31 Kpsi (220 MPa)  
 Tensile Strength -----ASTM D638 ----- 2.6 Kpsi (18 MPa)  
 Elongation % -----ASTM D638 ----- 430

Applications

Golf Ball constructions.

#### Typical Properties

| Physical                        | Nominal Values         | Test Method(s) |          |
|---------------------------------|------------------------|----------------|----------|
| * Density ( )                   | 0.96 g/cm <sup>3</sup> | ASTM D792      | ISO 1183 |
| * Melt Flow Rate (190°C/2.16kg) | 0.65 g/10 min          | ASTM D1238     | ISO 1133 |
| Thermal                         | Nominal Values         | Test Method(s) |          |
| * Melting Point (DSC)           | 78°C (172°F)           | ASTM D3418     | ISO 3146 |
| Vicat Softening Point ( )       | 59°C (138°F)           | ASTM D1525     | ISO 306  |

#### Processing Information

##### General

- \* Maximum Processing Temperature 285°C (545°F)

General Processing Information

This material is readily processible in conventional molding equipment. Typical melt temperatures for injection molding are 410°F (210C) to 500°F (260C). Actual processing temperatures will usually be determined by either the specific equipment or other polymers in a blend or coextrusion.

Drying

DuPont™ HPF 1000 is shipped dry, (<1000 ppm moisture), in moisture-resistant bags or in moisture-resistant liners in boxes, and can be used as received. However, DuPont™ HPF 1000 does absorb moisture from the air, and should be

kept sealed in a moisture-resistant container whenever possible. DuPont™ HPF 1000 may be dried using regenerative-type desiccant bed dryers capable of producing dry air with a dew point of -20 to -40°C (-4 to -40°F). Typical drying conditions for this magnesium ionomer grade are 24 hours at a temperature below 50°C (122°F). If moisture levels have reached greater than 2000 ppm, it may be necessary to employ vacuum as well as heat to remove moisture.

Materials of construction used in the processing of this resin preferably should be corrosion resistant. Stainless steels of the types 316, 15-5PH, and 17-4PH are excellent, as is quality chrome or nickel plating, and in particular duplex chrome plating. Type 410 stainless steel is satisfactory, but needs to be tempered at a minimum temperature of 600°C (1112°F) to avoid hydrogen-assisted stress corrosion cracking. Alloy steels such as 4140 are borderline in performance. Carbon steels are not satisfactory. While stainless steels can provide adequate corrosion protection, in some cases severe purging difficulties have been encountered. Nickel plating has been satisfactory, but experiments have shown that chrome surfaces have the least adhesion to acid based polymers. In recent years, the quality of chrome plating has been deteriorating due to environmental pressures, and the corrosion protection has not always been adequate. Chrome over top of stainless steel seems to provide the best combination for corrosion protection and ease of purging.

After processing DuPont™ HPF 1000, purge the material out using a polyethylene resin, preferably with a lower melt flow rate than the DuPont™ HPF resin in use. The "Disco Purge Method" is suggested as the preferred purging method, as this method usually results in a more effective purging process. Information on the Disco Purge Method can be obtained via your DuPont Sales Representative.

Never shut down the extrusion system with DuPont™ HPF resin in the extruder and die. Properly purge out the DuPont™ HPF with a polyethylene, and shut down the line with polyethylene or polypropylene in the system.

#### **Regulatory Information**

For information on regulatory compliance outside of the U.S., consult your local DuPont representative.

#### **Safety & Handling**

For information on appropriate Handling & Storage of this polymeric resin, please refer to the Material Safety Data Sheet..

A Product Safety Bulletin, Material Safety Data Sheet, and/or more detailed information on extrusion processing and/or compounding of this polymeric resin for specific applications are available from your DuPont Packaging and Industrial Polymers representative.

### **Read and Understand the Material Safety Data Sheet (MSDS) before using this product**

#### **Regional Centres**

DuPont operates in more than 70 countries. For help finding a local representative, please contact one of the following regional customer contact centers:

#### **Americas**

DuPont Company  
Chestnut Run Plaza – Bldg. 730  
974 Centre Road  
Wilmington, Delaware  
19805 U.S.A.  
Toll-Free (USA): 1-800-628-6208  
Telephone: 1-302-774-1000  
Fax: 1-302-355-4013

#### **Asia Pacific**

DuPont China Holding Co., Ltd.  
Shanghai Branch  
399 Keyuan Road, Bldg. 11  
Zhangjiang Hi-Tech Park  
Pudong New District, Shanghai  
P.R. China (Postcode: 201203)  
Telephone +86 21 3862 2888  
Fax +86-21-3862-2889

#### **Europe / Middle East / Africa**

DuPont de Nemours Int'l. S.A.  
2,Chemin du Pavillon Box 50  
CH-1218 Le Grand Saconnex  
Geneva, Switzerland  
Telephone +41 22 717 51 11  
Fax +41 22 717 55 00

DuPont do Brasil, S.A.  
Alameda Itapecuru, 506  
06454-080 Barueri, SP Brasil  
Telephone: +55 11 4166 8000  
Fax: +55 11 4166 8736

*The data listed here fall within the normal range of properties, but they should not be used to establish specification limits nor used alone as the basis of design. The DuPont Company assumes no obligations or liability for any advice furnished or for any results obtained with respect to this information. All such advice is given and accepted at the buyer's risk. The disclosure of information herein is not a licence to operate under, or a recommendation to infringe, any patent of DuPont or others. Since DuPont 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.*

*CAUTION: Do not use DuPont materials in medical applications involving implantations in the human body or contact with internal body fluids or tissues unless the material has been provided from DuPont under a written contract that is consistent with DuPont policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your DuPont representative. You may also request a copy of DuPont POLICY Regarding Medical Applications H-50103-3 and DuPont CAUTION Regarding Medical Applications H-50102-3.*

*Copyright © 2009 DuPont. The DuPont Oval Logo, DuPont™, The miracles of science™, and trademarks designated with "®" are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates. All rights reserved.*

*This data sheet is effective as of 08/09/2010 05:57:49 PM and supersedes all previous versions.*