



## NUCREL™ 3990

### Acid Copolymer

Description			
Product Description	NUCREL™ 3990 is a copolymer of ethylene and acrylic acid. It is available for use in conventional extrusion coating, coextrusion coating and extrusion laminating equipment.		
Restrictions			
Material Status	Commercial: Active		
Typical Characteristics			
Composition	9.5% By Weight Acrylic Acid comonomer content		
Typical Properties			
Physical	Nominal Values	Test Method(s)	
*Density ( )	0.94 g/cm <sup>3</sup>	ASTM D792	ISO 1183
*Melt Flow Rate ( 190°C/2.16kg)	10 g/10 min	ASTM D1238	ISO 1133
Thermal	Nominal Values	Test Method(s)	
*Melting Point ( DSC)	97 °C ( 206.6 °F )	ASTM D3418	ISO 3146
Freezing Point ( DSC)	78 °C ( 172.4 °F )	ASTM D3418	ISO 3146
Vicat Softening Point ( )	79 °C ( 174.2 °F )	ASTM D1525	ISO 306
Processing Information			
*Maximum Processing Temperature	310 °C ( 590 °F )		
General Processing Information	<p>NUCREL™ 3990 is normally processed at melt temperatures ranging from 235° to 305°C (455° to 580°F) in extrusion coating equipment. Typical extruder profiles are shown below. Actual processing temperatures will usually be determined by either the specific equipment or one of the other polymers in a coextrusion. NUCREL™ 3990 can also be used in cast extrusions and coextrusions.</p> <p>Materials of construction used in the processing of this resin 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.</p> <p>If surface properties of the extruded resin require modification (such as, lower C.o.F. for packaging machine processing), refer to the CONPOL™ Processing Additive Resins product information guide.</p> <p>After processing NUCREL™, purge the material out using a polyethylene resin, preferably with a lower melt flow rate than the NUCREL™ 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 Dow Sales Representative.</p>		

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

**Extrusion Coating/Lamination Processing**

**Nominal Values**

**Processing Information**

A suggested extruder set temperature profile.

Feed Zone	185 °C ( 365 °F )
Second Zone	235 °C ( 455 °F )
Third Zone	260 °C ( 500 °F )
Fourth Zone	285 °C ( 545 °F )
Fifth Zone	285 °C ( 545 °F )
Adapter Zone	285 °C ( 545 °F )
Die Zone	285 °C ( 545 °F )

**FDA Status Information**

NUCREL™ 3990 complies with Food and Drug Administration Regulation 21 CFR 177.1310(a)(1) - - Ethylene-acrylic acid copolymers, subject to the limitations and requirements therein. This Regulation describes polymers that may be used in contact with food, subject to the finished food-contact article meeting the extractive limitations under the intended conditions of use, as shown in paragraph (b) of the Regulation.

The information and certifications provided herein are based on data we believe to be reliable, to the best of our knowledge. The information and certifications apply only to the specific material designated herein as sold by Dow and do not apply to use in any process or in combination with any other material. They are provided at the request of and without charge to our customers. Accordingly, Dow cannot guarantee or warrant such certifications or information and assumes no liability for their use.

**Regulatory Information**

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

**Product Stewardship**

The Dow Chemical Company and its subsidiaries (“Dow”) has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our Product Stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

**Customer Notice**

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

**Medical Applications Policy**

**NOTICE REGARDING MEDICAL APPLICATION RESTRICTIONS:** Dow will not knowingly sell or sample any product or service (“Product”) into any commercial or developmental application that is intended for:

a. long-term or permanent contact with internal bodily fluids or tissues. “Long-term” is contact which exceeds 72 continuous hours (or for

PELLETHANE™ Polyurethane Elastomers only, which exceeds 30 days);

- b. use in cardiac prosthetic devices regardless of the length of time involved (“cardiac prosthetic devices” include, but are not limited to, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems, and ventricular bypass-assisted devices);
- c. use as a critical component in medical devices that support or sustain human life; or
- d. use specifically by pregnant women or in applications designed specifically to promote or interfere with human reproduction.

Dow requests that customers considering use of Dow products in medical applications notify Dow so that appropriate assessments may be conducted.

Dow does not endorse or claim suitability of its products for specific medical applications. It is the responsibility of the medical device or pharmaceutical manufacturer to determine that the Dow product is safe, lawful, and technically suitable for the intended use. **DOW MAKES NO WARRANTIES, EXPRESS OR IMPLIED, CONCERNING THE SUITABILITY OF ANY DOW PRODUCT FOR USE IN MEDICAL APPLICATIONS.**

#### Disclaimer

**NOTICE: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, the Customer is responsible for determining whether products and the information in this document are appropriate for the Customer’s use and for ensuring that the Customer’s workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Dow assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.**

**NOTICE: If products are described as “experimental” or “developmental”: (1) product specifications may not be fully determined; (2) analysis of hazards and caution in handling and use are required; (3) there is greater potential for Dow to change specifications and/or discontinue production; and (4) although Dow may from time to time provide samples of such products, Dow is not obligated to supply or otherwise commercialize such products for any use or application whatsoever.**

#### Additional Information

##### North America

U.S. & Canada: 1-800-441-4369  
1-989-832-1426  
Mexico: +1-800-441-4369

South Africa +800-99-5078

##### Europe/Middle East

All Countries +31-11567-2626  
+800-3694-6367  
Italy: +800-783-825

Asia Pacific +800-7776-7776  
+60-3-7958-5392

##### Latin America

Argentina: +54-11-4319-0100  
Brazil: +55-11-5188-9000  
Colombia: +57-1-219-6000  
Mexico: +52-55-5201-4700

<http://www.dow.com>

Published August 2019

© 2019 The Dow Chemical Company