

# Aegis® OXCE Resin

Effective Date: 1/23/17

## Description

**Aegis® OXCE** resin is an oxygen scavenging polyamide composition formulated specifically for use in high performance packaging applications where high gas barrier is required. This product is useful in injection and extrusion molding applications. Aegis® OXCE offers high oxygen barrier, even at high humidity, good carbon dioxide barrier, easy processing (particularly in the PET co-injection stretch blow molding process) excellent delamination resistance and clarity.

Properties	Typical Value		Test Method	
	English	Metric		
<b>Physical Properties</b>				
Density	72.4 lb/ft <sup>3</sup>	1.16 g/cm <sup>3</sup>	D1505	
Bulk Density	47 lb/ft <sup>3</sup>	0.75 g/cm <sup>3</sup>	ISO 60	
<b>Mechanical Properties</b>				
Tensile Strength	@ yield @ break	13,080 psi 7,790 psi	90.2 MPa 53.7 MPa	ISO 527
Elongation	@ yield @ break	4.4 % 130 %	4.4 % 130 %	ISO 527
Flexural Strength Flexural Modulus		17,100 psi 432,000 psi	118 MPa 2980 MPa	ISO 178
<b>Thermal Properties</b>				
Melt Index @ 280°C / 2.16 kg Melt Index @ 260°C / 2.16 kg			23 g/10 minutes 13 g/10 minutes	ISO 1133
Deflection Temperature Under Load (DTUL)	@ 66 psi @ 264 psi	158 °F 145 °F	70 °C 62.7 °C	D648
Melting Point, T <sub>m</sub>		457 °F	236 °C	DSC
Glass Transition, T <sub>g</sub>		165 °F	74 °C	DSC

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<b>Gas Barrier Properties</b>			
<b>Oxygen Transmission Rate*</b> 80% RH 23 C (Cast film)	< 0.003 cc mil/100 in <sup>2</sup> /atm day	< 0.05 cc mil/m <sup>2</sup> /atm day	
<b>Carbon Dioxide Transmission Rate</b> 80% RH 23 C (Oriented film)	1.6 cc mil/100 in <sup>2</sup> /atm day	25 cc mil/m <sup>2</sup> /atm day	

\*During scavenging period. After scavenger is consumed, OTR is approximately 0.5-1 cc mil/100 in<sup>2</sup>/atm day.

## Product Testing Guidelines

Aegis® OXCE resin is specifically formulated for use as the barrier layer in multilayer co-injection stretch blow molded bottles. We recommend a loading of 5% to 8% Aegis® OXCE resin for most applications.

### Package Testing

#### Oxygen Transmission/Ingress Testing

We recommend oxygen transmission testing of multilayer bottles containing Aegis® resin at conditions of 100% RH air outside of bottle and 50% RH nitrogen inside bottle. Bottle testing should be done in accordance with the guidelines set forth by the test equipment manufacturer. A 100% RH air environment can be achieved with a plastic liner filled with moistened sponge material. Aegis® resins are activated by the presence of moisture; an induction time is typically observed before the full activation of the resin.

For oxygen ingress testing for total package oxygen, we recommend testing of multilayer bottles containing Aegis® resin at conditions of 100% RH air inside of bottle (fill bottles with de-oxygenated water) and ambient (or higher/lower) RH outside bottle.

#### Carbon Dioxide Transmission Testing

We recommend carbon dioxide transmission testing of multilayer bottles containing Aegis® resin at application specific conditions (e.g. 100% RH carbonated water inside bottle, ambient RH outside bottle). Three regimes are typically observed in data which depicts the percent loss of CO<sub>2</sub> versus time in multilayer bottles. They are: (1) a steep negative slope over a 24-48 hour period due to pressure loss from bottle due to elastic, plastic and creep deformation (2) a moderating (decreasingly negative slope) due to adsorption, absorption and diffusion of carbon dioxide into the inner PET layer, and (3) steady state diffusion of carbon dioxide through the total multilayer structure. This third regime demonstrates the barrier performance of the total three-layer structure.

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## Product Processing Guidelines

Aegis® OXCE resin is specifically formulated to process in injection or co-injection systems, even systems that utilize a ram or plunger process to deliver the melt.

### Screw Design

A general purpose screw with feed, transition and metering sections, a 20:1 L/D (flight length of screw/outside diameter of screw) and a compression ratio of 3:1- 4:1 (depth of feed section/depth of metering section) is recommended.

### Material Handling

All Aegis® resins are pre-dried and shipped in foil-lined containers. We recommend discarding any material that is: (1) in damaged/broken packages or (2) stored unsealed in ambient conditions for an extended period of time.

### Material Drying

We recommend loading Aegis® OXCE resin into a desiccant hopper dryer to eliminate moisture pickup during processing. A hopper dryer temperature of 70 °C (158 °F) - 80 °C (176 °F) should be used. Hopper dryer temperatures should not exceed 85°C (185 °F). Temperatures above 85 °C (185 °F) may cause material to soften or may cause yellowing of resin. If material is stored in the hopper dryer overnight or for long periods of time, we suggest a hopper dryer temperature of 50 °C (122 °F).

It is recommended to check the moisture level of Aegis® OXCE resin prior to processing. Moisture levels of Aegis® resin can be measured by titration or thermal (weight loss) analysis. For thermal analysis, we recommend a 25 g sample, a test temperature of 160 °C (320 °F) and a test time of 7 minutes.

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## Processing Conditions for Aegis® OXCE

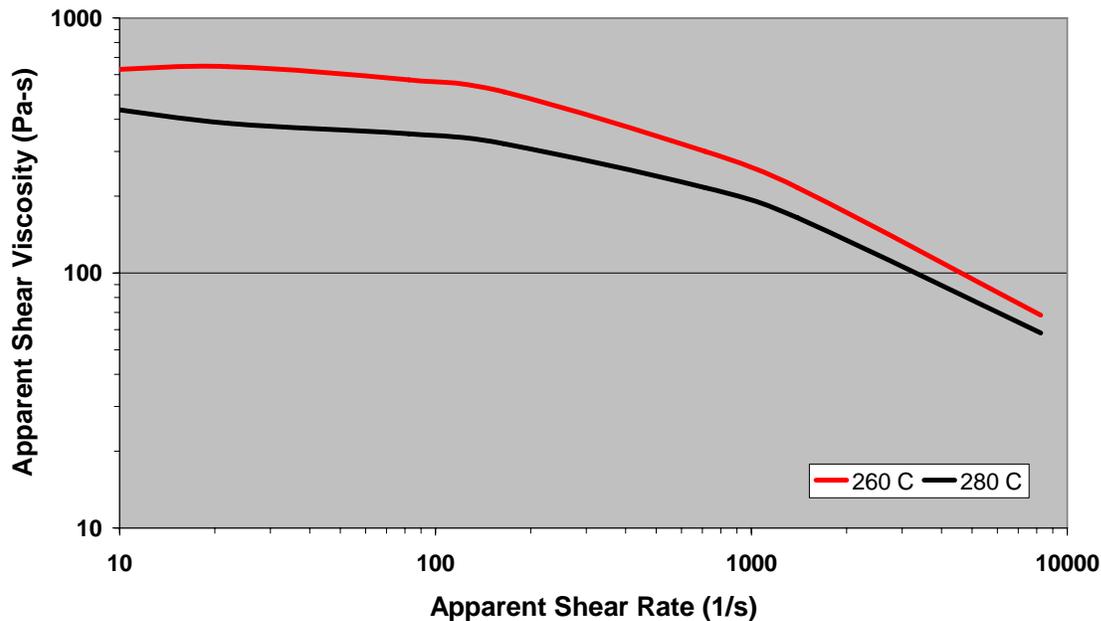
A typical processing temperature profile for Aegis® OXCE is given in Table 1.

**Table 1: Processing Temperature Profile**

Location	Temperature Setting /°C
Feed	35
Zone 1	245
Zone 2	265
Zone 3	265
Zone 4	265
Zone 5	265
Nozzle	265
Manifold	265-280

During startup, allow the barrels, nozzle and manifold to reach recommended temperatures before processing. If purging is required, PET can be used for the barrel and manifold.

### Aegis® OXCE Melt Rheology



#### Contact AdvanSix

To learn more about the benefits of Aegis® Nylon Resins, visit [Advan6.com](http://Advan6.com) or call: **1-844-890-8949** (toll free, U.S./Can.) **+1-973-526-1800** (international)

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