NYLON SOLUTIONS

# Aegis® PIR-H135ZP Nylon 6 Extrusion Grade Homopolymer

## Description

**Aegis® PIR-H135ZP** resin from AdvanSix contains 100% post-industrial recycled (PIR) raw materials[1] while providing the same top performance and processability as Aegis® H135ZP, its standard, non-recycled counterpart.

Aegis® PIR-H135ZP is a high viscosity, nylon 6 extrusion grade homopolymer for cast and blown film applications. Aegis® PIR-H135ZP combines the strength, toughness and thermoforming of nylon 6 with excellent heat, chemical and abrasion resistance. It also meets the food contact materials requirements of US FDA regulation 21 CFR 177.1500 as well as EU Directive 2011/10/EC.

| Typical Properties | Test Method | Unit | Value |
|---|---|---|---|
| **Parameter** | | | |
| Viscosity, FAV | ASTM D-789 | | 135 |
| RV @ 96% Sulfuric Acid | | | 3.75 |
| Extractable Content | SOP-702-307 | % | Max. 0.8 |
| Density | ASTM D-792 | g/cm$^3$ | 1.13 |
| Melt Flow Rate, 235°C/1.0 kg (455°F/1.0 kg) | ASTM D-1238 | g/10 min | 1.2 |
| **Moisture** | | | |
| Moisture Content | ASTM D-6869 | % | Max. 0.08 |
| Moisture (24 Hour) | ASTM D-570 | % | 1.6 |
| Moisture (50% RH) | ASTM D-570 | % | 2.7 |
| Moisture (Saturation) | ASTM D-570 | % | 9.5 |
| **Thermal** | | | |
| Melting Point | ASTM D-3418 | °C (°F) | 220°C (428°F) |

| Film Properties | Test Method | Unit | Value |
|---|---|---|---|
| **Gas Barrier @ 23°C (73°F)/0% RH** | | | |
| Oxygen Permeability | D-3958 | cc.25µm/m²/day (cc.mil/100 in²/day) | 40.3 (2.6) |
| Water Vapor Permeability @ 38°C (100°F)/100% RH | F-1249 | gm.25µm/m²/day (gm.mil/100 in²/day) | 992 (64) |
| Nitrogen Permeability | | cc.25µm/m²/day (cc.mil/100 in²/day) | 14.0 (0.9) |
| Carbon Dioxide Permeability | | cc.25µm/m²/day (cc.mil/100 in²/day) | 72.8 (4.6) |

*Film properties continued on page 2.*

[1] *Using an industry-accepted mass balance method, AdvanSix allocates recycled material into 100% PIR Aegis® resins. PIR grades are certified by an independent third-party organization (SCS Global Services) for recycled content, with annual audits.*

*The values presented in this data sheet are typical values and are not to be interpreted as product specifications.*

| **Film Properties** (continued) | **Test Method** | **Unit** | **Value (MD)*** | **Value (TD)*** |
|---|---|---|---|---|
| **Mechanical** | | | | |
| Tensile Modulus, 23°C (73°F) | ASTM D-882 | MPa | 660 | 640 |
| Tensile Yield, 23°C (73°F) | ASTM D-882 | MPa | 30 | 30 |
| Tensile Strength, 23°C (73°F) | ASTM D-882 | MPa | 90 | 90 |
| Elongation, 23°C (73°F) | ASTM D-882 | % | 330 | 330 |
| Graves Tear, 23°C (73°F) | ASTM D-1004 | N | 2,170 | 2,380 |
| Elmendorf Tear Strength, 23°C (73°F) | ASTM D-1922 | N | 860 | 990 |
| Puncture Strength, 23°C (73°F) | ASTM D-5478 | grams | 1,050 | - |
| Puncture Index, 23°C (73°F) | ASTM D-5478 | gm/mil | 470 | - |

**Note: MD = Machine Direction and TD = Traverse Direction. Test samples obtained from 2-mil thick unoriented cast film.*

| **Molded Properties** | **Test Method** | **Unit** | **Value (MD)*** |
|---|---|---|---|
| **Mechanical** | | | |
| Tensile Modulus, 23°C (73°F) | ASTM D-882 | MPa | 2,630 |
| Tensile Strength, 23°C (73°F) | ASTM D-882 | MPa | 80 |
| Yield Elongation, 23°C (73°F) | ASTM D-882 | % | 4.1 |
| Flexural Modulus, 23°C (73°F) | ASTM D-790 | MPa | 2,610 |
| Flexural Strength, 23°C (73°F) | ASTM D-790 | MPa | 100 |
| Notched Izod, 23°C (73°F) | ASTM D-256 | J/m | 60 |
| Heat Deflection Temperature, 23°C (73°F) | ASTM D-648 | ºC (ºF) | 55 (131) |

*Processing conditions for test specimens: melt temperature = 240ºC (464ºF); mold temperature = 80ºC (176ºF).*

## Processing Guidelines

### Material Handling

Aegis® PIR-H135ZP is supplied in sealed containers and drying prior to processing is not required. However, higher moisture is the primary cause of processing issues. If drying becomes necessary, a dehumidifying or desiccant dryer operating at 80°C (176°F) is recommended. Drying time is dependent on moisture level. More information about safe handling procedures can be obtained by requesting the Safety Data Sheet on AdvanSix.com.

## Extrusion Guidelines

### Melt Viscosity vs. Temperature

Melt Temperature: 220°C (428°F)
Melt Temperature Range: 232°C (450°F) to 271°C (520°F).
Two key factors affect the melt viscosity (stiffness or fluidity of the melt):

1. The molecular weight (Mw) of the resin: Higher Mw resins will have a higher melt viscosity than lower Mw resins.
2. Temperature of the melt for any given Mw resin: Higher process temperatures will provide a more fluid melt viscosity than lower process temperatures.

### Typical Barrel Profile for Cast Films

Barrel: 230-260°C (446-500°F)
Adapter: 260-266°C (500-510°F)
Die: 260°C (500°F)
Process Melt Temperature: 260-270°C (500-518°F)

### Typical Barrel Profile for Tubular (Blown) Films

Barrel: 246-254°C (474-490°F)
Adapter: 260°C (500°F)
Die: 254°C (490°F)
Process Melt Temperature: 254-260°C (490-500°F)

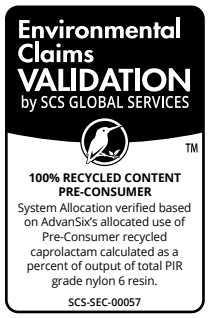
### Screw Parameters

Metering Section: 40%
Transition Section: 3 to 4 flights
Feed Section: Balance of screw length
Compression Ratio: 3.5:1 to 4.0:1
L/D Ratio: 24:1

### Metering Section Flight Depth

| Screw Diameter | Recommended Depth |
|---|---|
| 1" | 0.055" |
| 1.5" | 0.060" |
| 2" | 0.070" |
| 2.5" | 0.080" |
| 3.5" | 0.100" |
| 4.5" | 0.115" |
| 6" | 0.135" |

Note: The values in this data sheet are for natural color resins only. Colorants or other additives may alter some or all of these properties. The data listed here fall within the normal range of product properties, but should not be used to establish specification limits nor used alone as the basis of design.

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**Contact AdvanSix**
To learn more about the benefits of Aegis® Nylon Resins, visit **AdvanSix.com/NylonSolutions** or call:
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