

CLEARTUF® 8006C



GRUPPO MOSSI & GHISOLEI

July 2003

Polyethylene Terephthalate (PET)

Data Sheet

DESCRIPTION

CLEARTUF® 8006C Polyester Resin is a TPA-based polyethylene terephthalate copolymer resin designed for a wide range of custom bottle applications produced on both one or two step processes. It is a high molecular weight polymer with an 0.80 intrinsic viscosity (IV) and a wide processing range which can help in obtaining fine detail into containers.

CLEARTUF® 8006C Polyester Resin is designed to provide highly desirable container properties, particularly for the custom container market. These include excellent color, high clarity and sparkle, high strength and toughness, and good barrier properties. **CLEARTUF® 8006C** Polyester Resin is designed with a special catalyst and stabilizer system that offers property retention during processing. This superior stability also enables use of the required drying conditions without affecting color or molecular weight

The following table provides the Parameters that characterize the grade. Some Parameters are shown with values that are specified to fall within certain limits. Other Parameters are shown as a single value that we regard as typical of the grade. Minor differences around this typical value will not detract from the performance of the product. All Parameters are measured under laboratory conditions by the M&G analytical method shown. Different methods or conditions of analysis may give rise to different values. Purchased material may be accompanied by a Certificate of Analysis or other document, confirming that the product is within specified limits and is consistent with the other values for the stated Parameters.

Parameter	Unit	Value	Limits	Test Method
Intrinsic viscosity (IV)	dl/g	0.80	± 0.02	M&G/QC-01
Acetaldehyde content	ppm	1.2	Max	M&G/QC-03
Color (L*-value)	--	80	Min	M&G/QC-02
Color (b*-value)	--	-1.0	Max	M&G/QC-02
Melting point ++	°C	248.0	--	M&G/QC-06
Foreign particles	--	None	--	Visual Detection

++ monitored on feed resin only

REGULATORY STATUS

CLEARTUF® 8006C Polyester Resin is suitable for the manufacture of articles for numerous food packaging applications. Since food packaging regulations differ from country to country, for information about the regulatory status within the United States under FDA regulations or within Europe under EC and/or national regulations, please contact your local account manager or our Product Stewardship and Regulatory Compliance Department in the US at +1 330 239 7450.

Supply Company
M&G Polymers USA, LLC

Address
450 Gears Road, Suite 240
Houston, Texas 77067
USA

Phone / Fax
Tel. +1 281 873-5780
Fax +1 281 873-5787



GRUPPO MOSSI & GHISOLFI

IMPORTANT ASPECTS OF USE IN PROCESSING

Drying

Thermoplastic polyesters such as **CLEARTUF® 8006C** Polyester Resin can undergo hydrolysis if moisture is not eliminated prior to injection molding leading to a decrease in molecular weight and loss in mechanical properties of the bottle, particularly top load performance and impact strength. Moisture content of the resin must be reduced to a level of 0.003% (30ppm) or less, prior to melt processing. Drying is best accomplished in a continuous high heat dehumidifying type air hopper dryer with a regenerative desiccant bed using -20 °F max (-29 °C max) dew point air. Typical drying conditions are an air temperature of 350 °F (175 °C), 4-6 hours residence time and a minimum air flow rate of 1.0 ft³ per minute per pound of polymer consumed per hour.

Injection molding and Stretch blow molding

Injection molding temperatures should be maintained at the minimum levels needed to produce clear quality preforms. In addition to temperature limits, care should be taken to avoid excessive shear during injection. Typical processing temperatures are generally between 20°C and 40°C hotter than the Melting Point Parameter indicated on the front of this Data Sheet, largely dependent upon injection barrel dynamics such as residence time and shear. When stretch blow molding, preforms should be heated to minimum levels needed to produce clear, quality biaxially oriented containers. Typical preform surface temperatures are generally between 90°C to 105°C, largely dependent upon the equipment setup and efficiency.

SAFETY ASPECTS

Please read the **Material Safety Data Sheet** written for this product. It may be obtained from your **CLEARTUF** account manager.

- **Handling**
CLEARTUF® 8006C Polyester Resin presents no toxic hazards, either from skin contact or inhalation, under normal conditions. Contact with melted polymer should be avoided. Product delivered in bags must not be stacked.
- **Fire precautions**
In common with most other organic polymers, PET polymers will burn. They are difficult to ignite, but are defined as 'combustible' but not 'highly inflammable'. Reasonable precautions should be taken to ensure absence of sources of ignition in warehouses and storage areas. If large quantities are stored, normal good housekeeping should be enforced, including freedom from dust, uncluttered access ways, sprinkler system etc

WARRANTY

All products purchased from or supplied by M&G Polymers USA, LLC, are subject to terms and conditions set out in the contract, order acknowledgment and/or bill of lading. M&G warrants only that its product will meet those specifications designated as such herein or in other publications. All other information, including that herein, supplied by M&G is considered accurate but is furnished upon the express condition that the customer shall make its own assessment to determine the product's suitability for a particular purpose. M&G makes no other warranty either express or implied, regarding such other information, the data upon which the same is based, or the results to be obtained from the use thereof; that any products shall be merchantable or fit for any particular purpose; or that the use of such other information or product will not infringe any patent.

Supply Company
M&G Polymers USA, LLC

Address
450 Gears Road, Suite 240
Houston, Texas 77067
USA

Phone / Fax
Tel.+1 281 873-5780
Fax +1 281 873-5787

EASTLON PET CB-602 (CLEAR)

PHYSICAL PROPERTY DATA SHEET

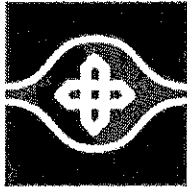
Product Name : EASTLON PET CB-602
 Chemical Name : Poly (Ethylene Terephthalate - Isophthalate)
 Formula : $(\text{OCOC}_6\text{H}_4\text{COOCH}_2\text{CH}_2)_n$
 Manufacturer : FAR EASTERN NEW CENTURY CORPORATION
 33F No. 207 Sec 2 Tun Hwa S. RD Taipei Taiwan
 TEL: 886-2-27338000 FAX : 886-2-27368304
 Version : DEC 2013

Property, Units	Test Method	Value
Density, g/cm ³	ASTM-D-1505	1.40
Bulk Density, lb/ft ³ (kg/m ³)		
Poured	ASTM-D-1895	49 (785)
Vibrated		54 (870)
Melt Density, @285°C, g/cm ³	-	1.2
Molecular Number average (Mn)	-	28,000
Molecular Weight average (Mw)	-	42,000
Intrinsic viscosity *	ASTM-D-4603	0.80 ± 0.02
Crystallinity, %	-	> 45
Crystalline Peak Melting Point, °C	ASTM-D-3418	250 ± 5
Heat of Fusion, cal/g (j/kg)	DSC	14 (58 * 10 ³)
Thermal Conductivity, Cal/cm°C. S(W/m.k)	ASTM-D-177	6.5*10 ⁻⁴ (0.27)
Acetaldehyde, ppm	Celanese-Method	< 1.0
Diethylene Glycol, % by wt.	-	1.3 ± 0.2
Pellets Weight, g/100 grains	-	1.5 ± 0.2

* Eastlon PET CB-602 is a condensation polymer produced from pure terephthalic acid (PTA), isoterephthalic acid (IPA) and ethylene glycol (EG) using a continuous polymerization.

* Packing : 1,100 or 1,050kgs in PP woven bag with PE interlining.
20bags in one 20 feet container.

* Properties reported here are typical of average lots.
FENCC makes no representation that the material in any particular shipment will conform exactly to the values given.



NAN YA PLASTICS CORPORATION, AMERICA SOUTH CAROLINA PLANT

140 E BEULAH ROAD, LAKE CITY, SOUTH CAROLINA
P.O. BOX 939, LAKE CITY, SC 29560
TEL 843-389-7800 FAX 843-389-6894

Tairilin Chip General Specifications

Specification: CNGFA080
Description: A-grade Bottle Resin
Lot No: AA20

Property	Unit	General Specification	Test Method
A. IV (Intrinsic Viscosity)	dL/g	0.800 ± 0.02	NALC-QC-104
B. Color			
1. L, Luminance		84.0 ± 3.0	NALC-QC-106
2. b, Yellowness		-2.0 ± 3.0	
C. Melting Point	°C	246 ± 3	NALC-QC-115
D. Acetaldehyde Content	ppm	< 1.00	NALC-QC-410

1. Nan Ya PET resin complies with the U.S. FDA Code of Federal Regulations Title 21 part 177.1630 and EC Directive 2002/72/EC with respect to its use for food contact applications.

2. Typical drying conditions:

Maximum acceptable moisture level: 40ppm

Drying air temp: 160-180°C

Drying air dew point: < -40°C

Drying residence time: 4 - 6hours

3. Typical molding conditions:

Barrel temperatures: 275-285 °C

The conditions stated above are typical but not specific. Individual machine conditions will vary from machine to machine.

Standard Specifications of **Gatronova** PET RESIN (Polyester Chips Bottle Grade)

Properties	Unit	Test Method *	Test Equipment	Value	Value	Value	Value
Grade				A 74 / A 76	A 80	A 84	A-8 FR / A-84 FR
Intrinsic Viscosity (IV) ^a	dl/g	PV-07040.5 [†]	Capillary Viscometer	0.76 ± 0.02	0.80 ± 0.02	0.85 ± 0.02	0.83 ± 0.02 0.85 ± 0.02
DEG Content	%	PV-09040	GAS Chromatograph	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Acetaldehyde	ppm	Cobarr 201/A [‡]	GAS Chromatograph	< 1.0	< 1.0	< 1.0	< 1.0
Moisture Content	%	PV-07109.5	MEECO	0.3 max	0.3 max	0.3 max	0.3 max
Melting Point	(°C)	PV-07089.2	Mettler DSC	247 ± 2	247 ± 2	247 ± 2	247 ± 2
Color No. Hunter Lab	LH	PV-07136.1	Color View	≥ 83	≥ 83	≥ 83	≥ 75
Color No. Hunter Lab	*bH	PV-07136.1	Color View	0.0 ± 0.95	0.0 ± 0.95	0.0 ± 0.95	- 1 ± 0.95
Number of Chips/Gram	No.	Manual		61 ± 3	61 ± 3	61 ± 3	61 ± 3

* Specifications as per zimmer test methods.

[†] Solvent (phenol+1.2 dichlorobenzene) solution test with capillary viscometer (1c) type ubbelohde at 25°C temperature.

[‡] As per Sincro method.

≤ Read as less than or equal to.

* bH value if tested by (Color Guard Equipment) may give a result of minus 1 ± 0.90

≥ Read as greater than or equal to.

The information and data contained herein is believed to be correct. FDA/IEC compliance certificate and Fast Reheat (FR) version of resin and other major approvals are also available and can be provided on request.

Hot Fill Resin A84-HF / A80-HF

Properties	Unit	Test Method	Novatex Specifications
Intrinsic Viscosity (IV) ^a	[dl/g]	PV-7040.5 [†]	0.80 / 0.85 ± 0.02 [‡]
DEG Content	%	PV-09040	1.2 Max
Acetaldehyde	ppm	Cobarr 201/A1	1.0 Max
Moisture Content	%	PV-07109.5	0.4 Max
Melting Point	[°C]	PV-07089.2	252 ± 2
Color No. Hunter Lab	LH	PV-07136.1	≥ 83
Color No. Hunter Lab	bH	PV-07136.1	-1.0 ± 0.9
Number of Chips / Gram	No.	Manual	61 ± 3



Specifications as per Zimmer test methods. Details of method can be provided upon request.

[†] As per Sincro method

[‡] IV is done according to PV-7040.5- Solvent is Phenol/Dichlorobenzene using ubbelohde type 1(c) capillary viscometer at 25°C.

^a IV's in range of 0.74-0.86 dl/g are available upon request.

The information and the data contained here is believed to be correct and there are FDA/IEC compliance certifications and other major food grade approvals available and can be provided upon request.

APET Resin-Copolymer

Properties	Unit	Test Method	Novatex Specifications
Intrinsic Viscosity (IV)	[dl/g]	PV-7040.5 [†]	0.60 ± 0.02 [‡]
DEG Content	%	PV-09040	1.5 Max
Acetaldehyde	ppm	Cobarr 201/A1	90 Max
Moisture Content	%	PV-07109.5	0.4
Melting Point	[°C]	PV-07089.2	249 ± 2
Color No. Hunter Lab ^a	LH	PV-07136.1	≥ 75
Color No. Hunter Lab ^a	bH	PV-07136.1	-2.0 ± 1.0
Number of Chips / Gram	No.	Manual	61 ± 3

Specifications as per Zimmer test methods. Details of method can be provided upon request.

[†] As per Sincro method

[‡] IV is done according to PV-07040.5- Solvent is Phenol/Dichlorobenzene using ubbelohde type 1(c) capillary viscometer at 25°C.

^a Color value is done on chips after they are crystallized.

The information and the data contained here is believed to be correct and there are FDA/IEC compliance certifications and other major food grade approvals available and can be provided upon request.





Leading Synthetics Pty Ltd

ACN 061 744 849 ABN 90 924 327 582
2068 Hume Highway, Campbellfield, Victoria 3061 Melbourne Australia
Telephone: 61 + 3 9308 0098 Facsimile: 61 + 3 9308 0110



Marketing Specification

Product : 'OZPET' PET Chips – 2180 (GG)

Quality :

Grade : A-grade (General Grade – GG)
Type : Polyester PET Bottle grade
Pellet Size : 2 mm x 3 mm x 2.5 mm long

Properties :

I.V. : 0.80 ± 0.02
COOH : < 35 meq/kg
DEG : $2.5 - 3.0$ mol %
IPA content : 1.7 ± 0.2
Specific Gravity : 1.41 ± 0.02
Bulk Density : 0.9 ± 0.1 gms/cm³
Melting Point : 248 ± 5 °C
Color 'b' value : 0 ± 2
Acetaldehyde content : < 1 ppm
Moisture content : < 0.2 %
Physical appearance : Normal white chips, free from oil, dirt,
dust, contaminants or any foreign matter

Packing details :

	<u>1 MT bags</u>	<u>20' Container</u>
Packet weight	: 1100 kg	23,500 kg
Bags per 20' container	: 20 nos	1no
Net weight per 20' container	: 22,000 kg	23,500 kg

(note : The above specifications are for customers who use PET chips for specific application to produce Bottle grade preforms. Deliveries are executed based on specific approval of samples or acceptance by customer.)

59 cents



DRAGON SPECIAL RESIN (XIAMEN) CO., LTD.

NO.1189 NANHAI ROAD, HAICANG INVESTMENT ZONE, XIAMEN, 361026, P.R. CHINA

TEL: +86 592 6888888 FAX: +86 592 6888877

PET RESIN CHIPS SPECIFICATION

CODE NO. TLE-101

WATER BOTTLE GRADE

ITEM	UNIT	INDEX	TEST METHOD	
I.V.	dL/g	0.80±0.02	ASTM D4603-03	
AA	ppm	≤1.0	GC	
DEG	%	1.25±0.2	GC	
M.P.	°C	≥245	DSC	
COOH	mmol/kg	≤35	Titration	
COLOR	L VALUE	—	≥80	GB17931-2003
	B VALUE	—	≤0	GB17931-2003
CRYSTALIZATION	%	≥45	DSC	
HUMIDITY	%	≤0.4	IR	
DUST	mg/kg	≤100	GB17931-2003	
ASH	%	≤0.08	GB17931-2003	
IMPURITIES	pellet/500g	NULL	GB17931-2003	



台南紡織公司太子廠
TAINAN SPINNING CO., LTD. TAITZ PLANT

瓶片酯粒規格表

Specification of bottle chip

批號
Lot No

BT280

規格
Article

A級

No	檢驗項目	管制界線	備註
1	特性黏度 (IV)	0.80 ± 0.02	
2	羧基(meq/kg) (-COOH)	< 35	
3	b值 (b value)	-2.0 ± 2.0	
4	熔點(°C) (M.P)	246.5 ± 3.0	
5	乙醛(ppm) (AA)	< 1	
6	粒重(g/100粒) (g/100 chips)	1.6 ± 0.2	
7	L值 (L value)	84 ± 2	
8	含水率(%) (Water Content)	< 0.4	

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CLEARTUF® 8006C Specification

Property	Unit	Value	Test method
IV	dl / g	0.80 ± 0.02	M&G/QC-01
Melting point	°C	248 ± 5	M&G/QC-06
Color (L* value)		> 80	M&G/QC-02
Color (B* value)		< -1.0	M&G/QC-02
Pellet shape		cylinder	
AA content	ppm	< 1.2	M&G/QC-03

- * *Far Eastern Group is the new owner of Apple Grove and Sharon Center facilities of M&G Polymers, USA LLC, and the new company name of the M&G Apple Grove facility is APG Polytech.*
- * *APG Polytech will keep the same product name, formulation and production process of “CLEARTUF® 8006C” and there is no any change compared with previous products, produced by M&G Polymers, USA LLC.*
- * *APG Polytech, hereby certifies that “CLEARTUF® 8006C” PET resins are fully in compliance with:*
 - *US regulations: FDA CFR 21 § 177.1630 (f)(g).*
 - *EU Commission Regulation: No 10/2011 and amendments.*



PT PETNESIA RESINDO

MITSUI PET SA135

One of highest quality PET resin supplied by PT. Petnesia Resindo is SA135.
The basic chip physical properties of SA135 are listed below,

Item	Unit	Typical Values	Method
Basic Properties			
Intrinsic Viscosity	dl/g	0.82	PNR
Density	kg/m ³	1400	ASTM D792
Thermal Properties			
Melting point	°C	247	DSC
Glass transition temperature	°C	75	DSC
Other Properties			
Acetaldehyde	ppm	2 or less	PNR
	ppm	1 or less	Celanese
Water content	%	0.4 or less	PNR
Mechanical Properties			
Tensile strength at yield	MPa (kgf/cm ²)	87 (580)	ASTM D638
Tensile strength at break	MPa (kgf/cm ²)	59 (600)	ASTM D638
Elongation at break	%	300	ASTM D638
Tensile modulus	MPa (kgf/cm ²)	2100 (21,000)	ASTM D638
Izod impact strength	J/m (kgf.cm/cm)	80 (6)	ASTM D256 (with notch)
Rockwell hardness	Rockwell scale	110	ASTM D785

Note: Figures shown here are typical values, not manufacturer's specifications.
PNR method: Petnesia Resindo method.



SHINKONG SYNTHETIC FIBERS CORPORATION

8FL, 123, SEC. 2, NANKING E. ROAD,
TAIPEI, TAIWAN, R.O.C.

TEL :886-2-25071251-7590
FAX :886-2-25068047

SHINPET 5015W

(TECHNICAL SPECIFICATION) 2013.06.03

PROPERTY	UNIT	VALUE	TEST METHOD
I.V.	dl / g	0.80 ± 0.02	ASTM D-2857
H ₂ O CONTENT	wt %	< 0.5	ASTM D-4019
MELTING POINT	° C	246 ± 4	ASTM D-3418
COLOR (b)		0.9 ± 2.0	JIS Z 8722
PELLET SHAPE		OVAL	
BULK DENSITY	g / cm ³	0.9 ± 0.1	
PACKING	Kg / BAG	1050 or 1100	
A.A.CONTENT	ppm	< 1.0	CELANESE
MOLDING TEMP.	° C	275 ~ 285	

•NOTE:1.RECOMMENED DEHUMIDIFIED DRYING TEMP. / TIME
160 ~ 170 ° C / 5 ~ 7 hours

2.MAIN APPLICATION: CSD & MINERAL WATER BOTTLE

RECRON (MALAYSIA) SDN. BHD. (Company No. 781769-K)

Member Reliance Group
(Formerly known as Real Aim Development Sdn. Bhd)
NILAI, POLY PLANT

SSP PET SPECIFICATION

PRODUCT NAME	Polyethylene Terephthalate
COLOUR	SSP (Bottle Grade)
LOT NUMBER	6868
GRADE	A

ITEM	UNIT	SPECIFICATION	TEST METHOD
IV	dl/g	0.8000 ± 0.02	Zimmer PV 07040.4
COOH	µeq/g	≤ 35	Zimmer PV 07090.4
L*	-	> 82	Zimmer PV 07110.5
a*	-	<0.5	Zimmer PV 07110.5
b*	-	-3.5 ~ 0.0	Zimmer PV 07110.5
DEG	%	1.3 ± 0.3	Zimmer PV 09008.7
IPA	%	2.0 ± 0.3	Zimmer PV 09008.7
AA	ppm	≤ 1.0	Zimmer WN-B010-9013E
Tm	degC	244± 2	Zimmer PV 07089.2
Cryst	%	≥ 50	Zimmer PV 07016.3
Moisture	wt%	≤ 0.25	AQP-35KF COULOMETER

Technical Datasheet RAMAPET N180

RAMAPET N180 is a general purpose, non-reheat PET resin for bottles, film, thermoformed containers and other transparent applications. It has good optical properties, the mechanical properties are representative for a PET resin with IV of 0.80. RAMAPET thermoplastic polyesters are condensation polymers produced by a continuous melt-phase polymerization process followed by a solid-state polymerization process.

Applications and use:

- Carbonated soft drinks
- Water bottles
- Juices, beer, wine and spirits
- Household products
- Food packaging
- APET sheet and thermoformed containers
- Pharmaceutical and medical applications (European and US Pharmacopoeia approved)

Sales specification:

Property	Unit	Test method	RAMAPET N180 value
Intrinsic Viscosity	dl/g	(K) SDP-15 (R) IND-A-AN-G-V-1	0.80 ± 0.02
Acetaldehyde	ppm	(K) SDP-21 (R) IND-A-AN-G-GC-2	Max 1
Colour L*	-	(K) SDP-05 (R) IND-A-AN-G-RS-0001	Min 78
Colour a*	-	(K) SDP-05 (R) IND-A-AN-G-RS-0001	-3.8 to -0.8
Colour b*	-	(K) SDP-05 (R) IND-A-AN-G-RS-0001	-3.5 to 1
Pellet weight	Pieces/gram	(K) SDP-18 (R) IND-A-AN-G-PTM-09	60 ± 5
Fines	Wt%	(K) SDP-60 (R) IND-A-AN-G-GA-01	Max 0.05

The specification describes a grade of clear co-polyester in the form of pellets which meets all of the requirements when tested as directed by the referenced methods.

Neither Indorama Ventures Europe BV, UAB Orion Global PET, Indorama Ventures Poland Sp. z o.o. nor their marketing affiliates shall be responsible for the use of this information, or of any product, method or apparatus mentioned, and you must make your own determination of its suitability and completeness of your own use, for the protection of the environment, and for the health and safety of your employees and purchasers of your products. No warranty is made of the merchantability or fitness of any product, and nothing herein waives any of the Seller's conditions of sale.

Indorama Ventures Europe BV - UAB Orion Global PET- Indorama Ventures Poland Sp. z o.o.

Metalo g. 16, LT-94102 Klaipėda Tel: +370 46 300749; +370 46 300684; Fax: +370 46 314 323

www.indoramaventures.com



Product shipments are not tested for acetaldehyde. Samples that are representative of product are tested in a monitor program to ensure that the process capability for acetaldehyde in the polymer is less than the specification limit.

Typical properties:

Property ^a	Test ^b Method	Typical Value, Units ^c
Pellet Properties		
Crystalline Density Solid Stated pellets	D 1505	1.39 - 1.4 g/cm ³
Bulk Density Poured	D 1895	830 ± 30 kg/m ³
Bulk Density Vibrated	D 1895	880 ± 30 kg/m ³
Melt Density @ 285°C	D 1238 (Note A- Table 2)	1.2 g/cm ³
Crystalline Peak Melting Point (T _m) ^d	D 3418	245 ± 5°C
Glass transition point (T _g) (dry)	D 3418	78 ± 2°C
Heat of Fusion ^e	E 793	56 kJ/kg (13 cal/g)
% crystallinity solid Stated pellets		50 ± 5 %
Pellet Size		2.5 mm
Pellet Shape		Cylindrical
Moisture content pellets		<0.3%
^a Unless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity. ^b Unless noted otherwise, the test method is ASTM. ^c Units are in SI or US customary units. ^d Determined by DSC on the second heating cycle. ^e Determined by DSC on the first heating cycle.		
Properties reported here are typical of average lots. Indorama makes no representation that the material in any particular shipment will conform exactly to the values given.		

Food Contact Position:

RAMAPET N180 is a copolymer made from terephthalic acid (PTA), isophthalic acid (IPA) and mono-ethylene glycol (MEG) complies with the requirements of the European Legislation (EU) No 10/2011 for plastics used in contact with food.

This product is produced under good manufacturing practices in compliance with EU Regulation 2023/2006 and is intended for use to manufacture articles in compliance with the general requirements (in Article 3) of Regulation (EC) 1935/2004.

Under the regulations administered by the U.S. Food and Drug Administration (FDA), RAMAPET N180 may lawfully be used as articles or components of articles intended for the use in contact with food subject to provisions of CFR 177.1630 and 21 CFR 174.5.

Neither Indorama Ventures Europe BV, UAB Orion Global PET, Indorama Ventures Poland Sp. z o.o. nor their marketing affiliates shall be responsible for the use of this information, or of any product, method or apparatus mentioned, and you must make your own determination of its suitability and completeness of your own use, for the protection of the environment, and for the health and safety of your employees and purchasers of your products. No warranty is made of the merchantability or fitness of any product, and nothing herein waives any of the Seller's conditions of sale.

Processing:

PET is hygroscopic, and since moisture adversely affects the IV during melt processing of the polymer, it must be dried prior to molding. Undried PET pellets can contain up to 0.3% (3000 ppm) of moisture. After drying the moisture content typically is below 50 ppm.

In the drying process, there are four variables that should be considered:

- Drying temperature 150 - 170°C
- Residence time in the dryer silo 6 hours
- Dew Point of Drying Air < - 20°C
- Airflow Rate 2.2 m³/h/kg PET

PET has a relatively high melting point of around 245°C. Processing PET pellets on an extruder or injection moulding machine requires temperature setting of 30 – 40°C above the melting point.

A typical temperature profile (from hopper to nozzle) is: 295 – 285 – 280°C and hot-runners can be set at 275 to 285°C. Temperatures above 300°C should be avoided. The melt residence time should be limited to < 2 minutes to avoid discoloration. During machine stops the temperature setting should be reduced to avoid the material to degrade or decompose.

To find the latest version of this document visit our website:

www.indoramapolymers.eu

Revision date
March 2015

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SOUTH ASIAN PETROCHEM LTD.

POLYETHYLENE TEREPHTHALATE (BOTTLE GRADE) RESIN PRODUCT SPECIFICATIONS

ASPET -20C

Sl No.	Properties	Grade	Unit	Values	TEST METHOD
1.	Intrinsic Viscosity		dl / g	0.80 ± 0.02	Zimmer
2.	-COOH Group		meq / kg	30 Max	Zimmer
3.	Acetaldehyde		PPM	≤ 1.0	GC
4.	Crystallinity		%	≥ 50	DSC
5.	L color		CIE	≥ 90	Hunter
6.	b color		CIE	-0.5 to 1.20	Hunter
7.	Moisture Content		PPM	250 Max	Zimmer
8.	Dust Content		PPM	100 Max *	Zimmer
9.	Melting Point		° C	246 - 252	DSC
10.	Chips Weight		gm / 100 Chips	≤ 1.7	SAPL

* As measured at the time of bagging.



Certificate of Analysis

Polyethylene Terephthalate – PET

(PQS MW)

Certificate n°: 00024/2014

Batch number: BAMWBON CC 26614C 21719

Production date: 2014-23-09

Container: HASU 124191-9

Parameter	Specification	Test Method	Result
Intrinsic Viscosity (IV)	0,80+/- 0,02 dl/gr	UBBELOHDE/LAUDA ASTM D4603 PE-PTA-LAB-2-028	0,79
Color L*	Min. 87,5	HunterLab LabScan XE Colorimeter PE-PTA-LAB-2-003	90,2
Color b*	Max. 0	HunterLab LabScan XE Colorimeter PE-PTA-LAB-2-003	-3,1
Acetaldehyde	Max. 1,0 mg/Kg	Gas Chromatography PE-PTA-LAB-2-005	0,5
Fines Particles	< 100 mg/Kg	Gravimetric PE-PTA-LAB-2-007	29

David C. Silva
Laboratory Coordinator

PREFORMANCE[®] PET 1708CC

DESCRIPTION

PREFORMANCE[®] PET 1708CC is a food grade PET copolymer that is suitable for a wide variety of beverage and juice containers as well as many other custom containers. It is engineered for heat-set applications and offers exceptional clarity and color. The low acetaldehyde content in the resin helps eliminate any impact on aroma and flavor.

PREFORMANCE[®] PET 1708CC resin is considered safe for food packaging applications based upon compliance with FDA Regulation 21 CFR Section 177.1630 and USP 661 specifications. 1708CC also has a Drug Master File registered with the FDA.

WARRANTY

Starpet Inc. warrants that its products will comply with the specifications and related regulatory compliance detailed in its publications. No other warranty, either expressed or implied regarding the suitability of the product for any particular purpose is made. The Buyers are expected to make their own determination about the safety, health, environmental protection and suitability of use for their intended purpose. No warranty is made of the merchantability or fitness of any product, and nothing herein waives any of the Seller's conditions of sale.

July 15, 2010

PREFORMANCE[®] PET 1708CC

SALES SPECIFICATION

Polyethylene Terephthalate (PET) Resin

Property	Value	Starpet Method
Intrinsic Viscosity (dl/g)	0.80 ± 0.02	QSWI 8.2.4.101
Color, CIE L* b*	85 ± 2.5 -1.0 ± 2.0	QSWI 8.2.4.104
Acetaldehyde (ppm)	≤ 1.0	QSWI 8.2.4.114
Bulk Density (lbs/ft ³)	56	QSWI 8.2.4.150
Dust (ppm)	≤ 300	QSWI 8.2.4.132
Moisture (wt. %)	≤ 0.25	QSWI 8.2.4.112
Contaminants/Black Specs	None	-----

Note

Please note that PET is hygroscopic and the moisture content can go up from the reported value during storage and transit. Also, please note that the dust value is as packed.

July 15, 2010

**Indorama Polymers Public Company Limited**

Head Office: 75/102 Ocean Tower 2, 37th Floor, Soi Sukhumvit 19, Asoke, Bangkok 10110, Thailand
Tel: +662 661 6661 / Fax: + 662 661 6664
www.indoramapolymers.com

Factory:

72 Moo 11, Bang-ngha Thaklong Road, T. Kaosamorkon, Amphur Tawung, Lopburi 15180.

Sales Specifications

Product: Polyethylene Terephthalate (PET) Polymers - Copolymer

RAMAPET N1

Property	Unit	Value	Test Method
Intrinsic Viscosity	dl/g	0.80 ± 0.02	IR-001 (Ubbelohde Viscometer)
Acetaldehyde	ppm	1 Max.	IR-002 (Gas Chromatograph)
Melting point	°C	247 ± 2	IR-003 (Differential Scanning Calorimeter)
Color b		-1.5 ± 1.5	IR-004 (CIE Lab)
Crystallinity	%	50 Min.	IR-005 (Density Gradient Column)
Moisture content (when packed)	wt %	0.2 Max.	IR-006 (Gravimetric Method)
Chips/gm	pieces	60 ± 5	IR-007 (Weighment Method)

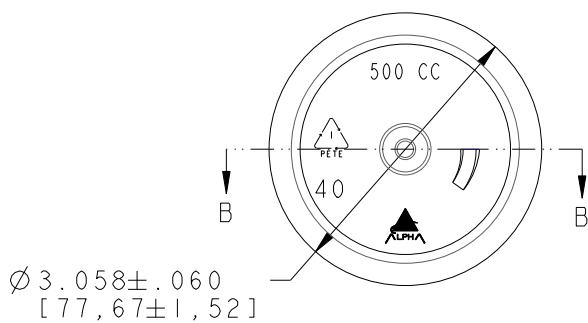
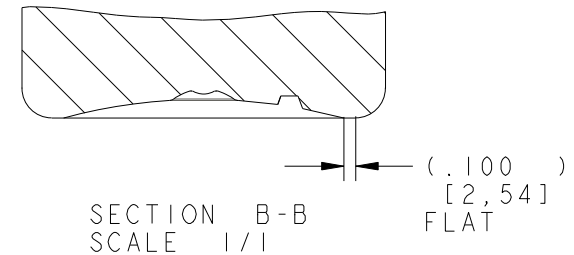
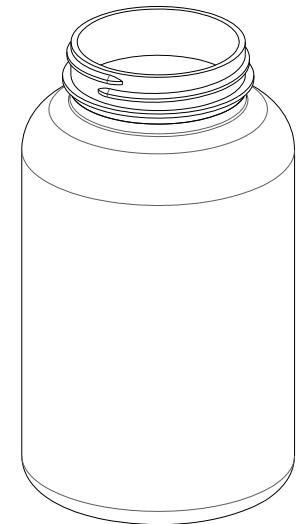
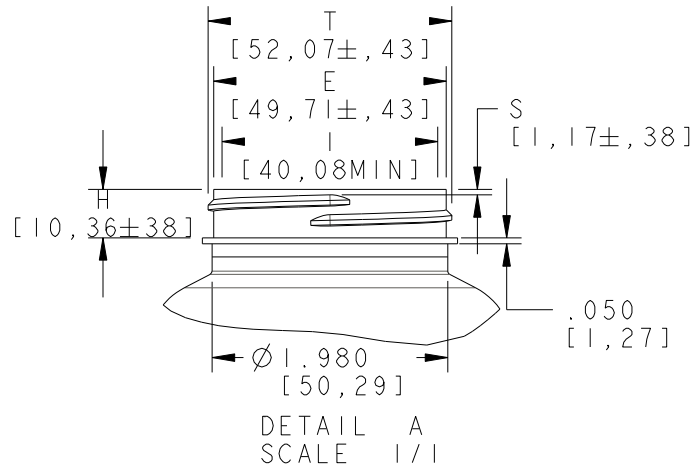
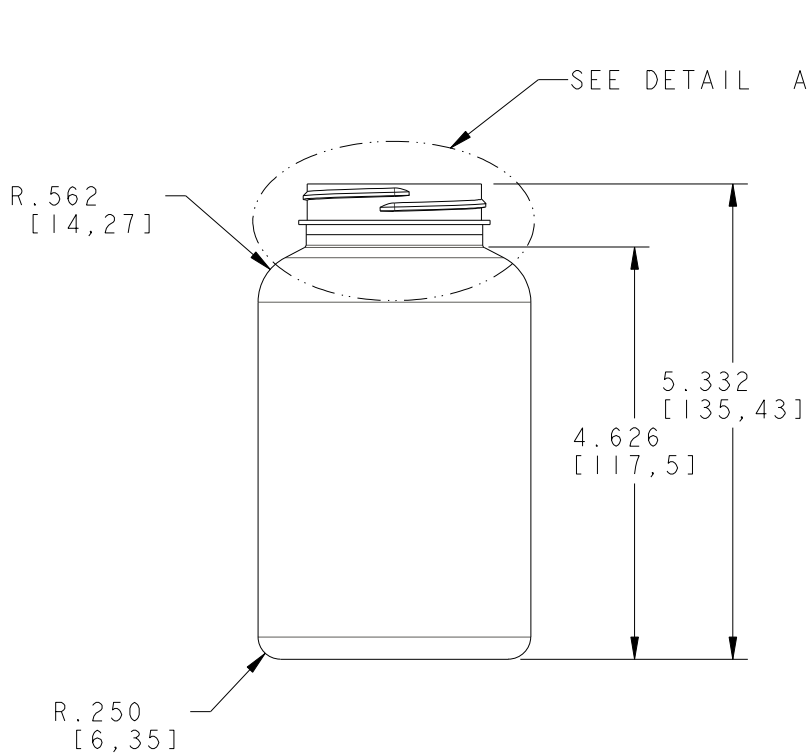
Description

RAMAPET N1 is a General purpose food grade PET copolymer resin that is suitable for a wide variety of containers. The resin offers good strength characteristics like dimensional stability and mechanical properties. Suitable for Carbonated water, Alcoholic beverages, Pharmaceuticals, Oils, Agrochemicals, wide mouth containers and for APET sheet / Film extrusion application. It is also suitable for heat set blow molding that are used for warm fill applications.

RAMAPET N1 resin is considered safe for food packaging applications based upon compliance with FDA regulation 21 CFR Section 177.1630, EC regulation 90/128/EEC and Coneg (Heavy metals) regulations.

Warranty

Indorama warrants that its products will comply with the specifications and related regulatory compliance detailed in its publications. No other warranty, either expressed or implied regarding the suitability of the product for any particular purpose is made. The buyers are expected to make their own determination about the safety, health, environmental protection and suitability of use for their intended purpose. No warranty is made of the merchantability or fitness of any product and nothing herein waives any of the seller's conditions of sale.



Neck Finish: M53SP400		DISCLAIMER: Alpha Packaging assumes no responsibility for form, fit and function of closures, accessories, and/or shelf life and compatibility of intended contents with this bottle.				
©Alpha Packaging, Inc.	Min Thk	Color	Weight	Std. Pack	Revisions	
All measurements are in inches, [Metric]	.012 [1,30]	All Colors	54 Gms±3	140, Stack	A	Was +/- 1.09-12-05.sct
					B	Add Metric, 5/20/10.sct
					C	tol was +/- 2.11/5/13.sct
Neck Dimensions:					Tolerance: Where not shown Decimal ±0.05 [1,27] Angular ±1°	
T = 2.050±.017 E = 1.957±.017 H = .408±.015 I = 1.578 MIN S = .046±.015					Material: PET	
Overflow Capacity: 531 ml ± 13						Scale: 3/4
				Alpha Packaging, Inc. (314) 427-4300-(800) 421-4772		Date: 11-19-02
				500 CC, STRAIGHT SIDED, PET, 53-400 CT		DwgRev: C
				500S53PET		Approved By: S J
						Drawing NO: 500PS1XX53M400