



Laser+[®] C
CUSTOM CONTAINER PET RESIN

Laser+[®] C (C60A)
polyethylene terephthalate resin

Product Information

Material Drying

Proper drying of polyethylene terephthalate (PET) is essential to produce a high quality part (container, film, etc.) with optimum physical properties. PET is hygroscopic, meaning that when it is exposed to humid atmospheres, it will absorb moisture. In PET the moisture is not only on the surface but diffuses slowly through the whole pellet and is firmly held by molecular attraction. Before processing the PET, this moisture must be removed. Carefully controlled drying of all PET is an essential requirement for optimum processing performance and final product properties. If drying is not carried out properly, to the known requirements of the type of PET in use, then deficiencies in process and product will result. The deficiencies will be impossible to remedy by later process changes. These defects arise in the injection molding or extrusion processes because at PET melt temperature (250°-280° C) any water present causes hydrolytic degradation of the PET, almost instantaneously, with the resultant loss in intrinsic viscosity (IV). Significant drops in IV cause loss of process control and reductions in end product properties.

Drying of PET polymer involves the diffusion of absorbed moisture from the interior of the polymer chip to its surroundings and, subsequently the removal of moisture from the bulk of polymer chips. Moisture removal can be achieved by heating the polymer chip under dry air or vacuum. In an air drying system, heated dehumidified air flows up through a chip bed and returns to the dehumidifier. The key requirements for a reliable drying process are:

Drying temperature: The ACTUAL chip temperature should achieve between 300° and 340° F measured at the dryer exit.

Dehumidified air temperature: Correctly designed equipment should operate at temperatures up to 340° F measured on entry to the dryer hopper, with an absolute maximum of 370° F to prevent possible discoloration.

Dehumidified air dew point: This should not be allowed to rise above -34° F and should preferably be -40° F or lower, measure after the desiccant bed. Always check the correct regeneration temperatures are being used.

Dehumidified air flow through the chip bed: Most dryers operate at around 1 cfm of airflow per 1lb/hr of PET chip as a minimum requirement, with the airflow at the correct temperature and dew point.

Chip residence time (drying time): DAK recommends a chip residence time for Laser+[®] PET of not less than four hours and preferably six hours. This is the theoretical drying time, which is calculated by dividing dryer capacity in lbs. by throughput in lb./hr. Extended periods of high temperature can adversely affect the polymer processing conditions. In the event of a stoppage for an extended period, dry polymer can be stored in the dryer-hopper by reducing the air temperature to 240° F (or even lower).



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PDS-C60A Rev 06/11



Laser+[®] C (C60A)

polyethylene terephthalate resin

Product Information

Product Description

Laser+[®] C (C60A) is a unique copolymer particularly suited for use in the custom PET container applications where clarity and neutral color are desired. It is a medium intrinsic viscosity (IV) product that gives the end user a strong clear bottle and offers excellent processing and consistency.

Typical Properties

Bi-orientation of Laser+[®] C (C60A) by injection/stretch blow molding provides optimal barrier and mechanical properties, including excellent vacuum performance. It performs well in both single- and two-stage processes used in the manufacturing of PET containers.

Laser+[®] C (C60A) offers excellent clarity and color, while maintaining good reheat characteristics for stretch blow molding. In addition, because it is a copolymer resin, it offers reduced crystallization rates and a wide processing window.

Certification

Laser+[®] C (C60A) is ideally suited for food packaging applications and is considered in compliance with the Food and Drug Administration (FDA) Food Contact Notification (FCN) 000635, covering PET polymers.

Sales Specifications

| Property | Value | Unit | Test Method |
|--------------------------------------|-------------|----------------------|------------------|
| Intrinsic Viscosity | 0.83 ± 0.02 | dL/g | DAK-QAR-SOP-0012 |
| Color L* | 87 ± 2.0 | CIE | DAK-QAR-SOP-0011 |
| Color b* | -3.0 ± 2.0 | CIE | DAK-QAR-SOP-0011 |
| Acetaldehyde | 2 max | ppm | DAK-QAR-SOP-0010 |
| Moisture Content (as packaged) | 0.25 max | weight % | DAK-QAR-SOP-0013 |
| Fines (as packaged, +24 Mesh Size) | 0.10 max | weight % | DAK-QAR-SOP-0014 |
| Chip Size, nominal | 53 ± 5 | chips / g | DAK-QAR-SOP-0015 |
| Crystallinity | > 45 | % | DAK-QAR-SOP-0016 |
| Partical Size, Shape (Flat Cylinder) | 3x3x2 | mm | DAK-QAR-SOP-0017 |
| Melting Point, nominal | 246 | °C | DAK-QAR-SOP-0016 |
| Bulk Density | 54.3 | lb / ft ³ | DAK-QAR-SOP-0018 |

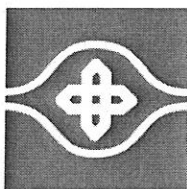
These values represent the anticipated performance data for these polyester resins and intermediates; they are not intended to be used as design data. We believe this information is the best currently available on the subject. It is offered as a possible helpful suggestion in the experimentation you may care to undertake along these lines. It is subject to revision as additional knowledge and experience is gained. DAK Resins makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information. This publication is not a license to operate under, or intended to suggest infringement of, any existing patents.

CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DAK Medical Caution Statement".



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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

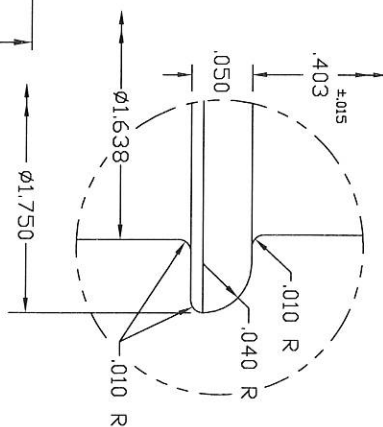
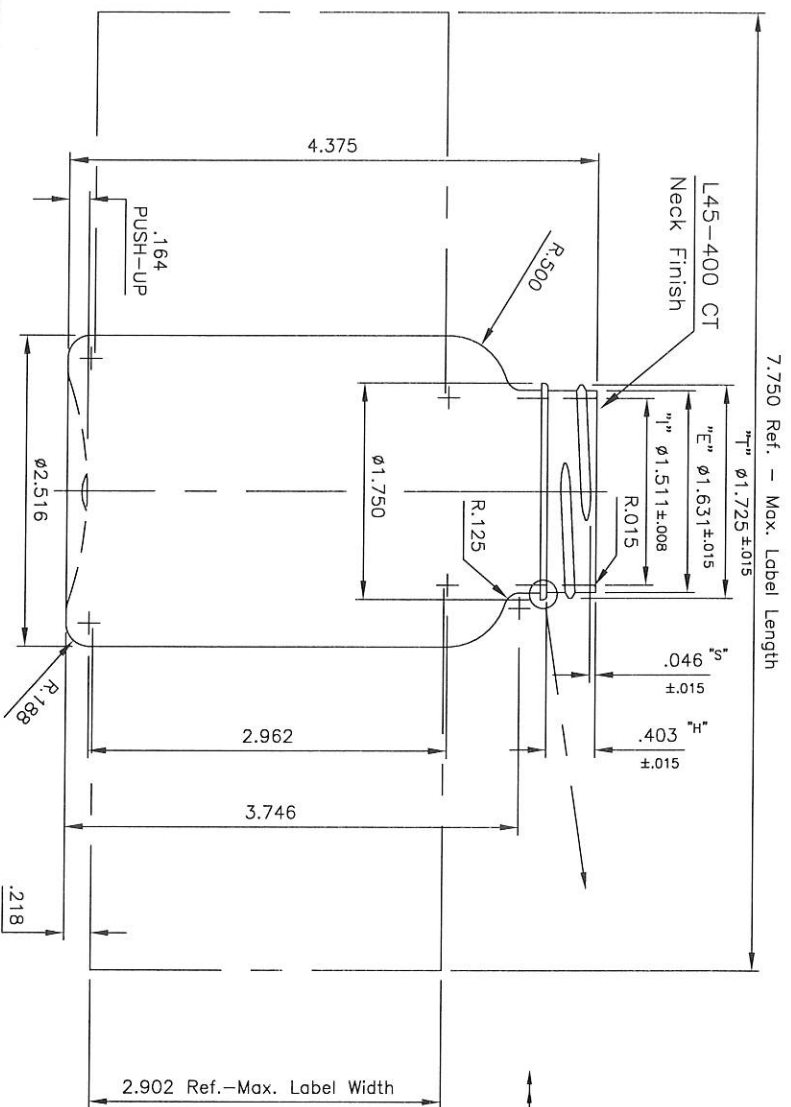
Drying air dew point: $< -40^{\circ}\text{C}$

Drying residence time: 4 - 6hours

3. Typical molding conditions:

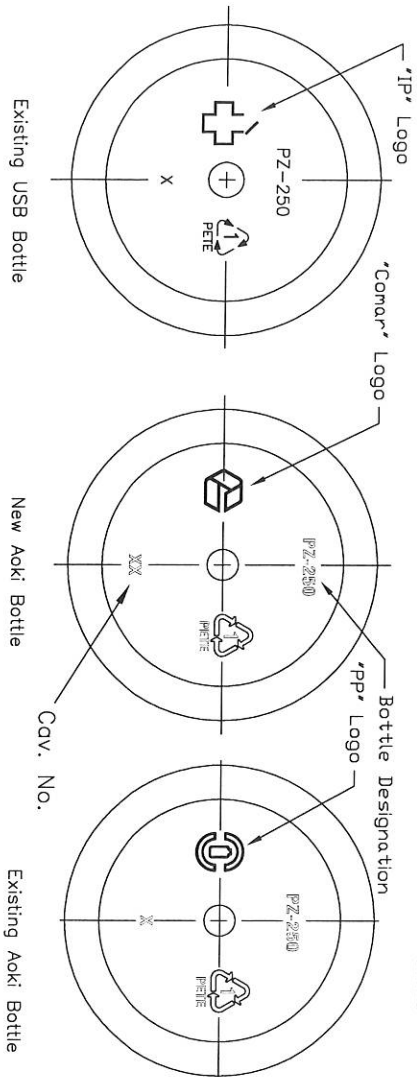
Barrel temperatures: 275-285 °C

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



Bead Detail
Scale 10 to 1

- NOTES:
- 1) GRAM WEIGHT: 30.0 GRAMS \pm 1.5 GRAMS
 - 2) EST FLOW CAP'Y: 297cc \pm 9cc
 - 3) MAX. PERPENDICULAR DEVIATION = .005
 - 4) MAX. TAPER = .003/INCH
 - 5) LABEL PANEL WALL VARIATION NOT TO EXCEED .012" VERTICALLY AND RADially
 - 6) MIN WALL IN LABEL PANEL = .019 / MIN .015
 - 7) TOP LOAD > = 90 LBS



UNLESS OTHERWISE SPECIFIED
DRAWING IS IN INCHES
TOLERANCES
3 PLACE DECIMAL \pm .000
2 PLACE DECIMAL \pm .005
1 PLACE DECIMAL \pm .010
ANGLES \pm 1°
CONCENTRICITY \pm .010
DO NOT SCALE DRAWING

| NAME | DATE |
|----------|----------|
| KAD | 05/24/17 |
| CHK | 05/30/17 |
| ENG APPR | 05/30/17 |
| MFG APPR | |
| QA APPR | |

| | |
|--|--|
| THIS DRAWING CONTAINS CONFIDENTIAL & PROPRIETARY INFORMATION AND MAY NOT BE REPRODUCED IN WHOLE OR PART WITHOUT WRITTEN AUTHORIZATION FROM COMAR LLC | |
| TITLE | PZ-250 (250cc) WIDE MOUTH ROUND BOTTLE |
| MATERIAL | PETE |
| CUSTOMER | STOCK |
| PART NO | PD-B-5227 |
| SIZE | 45mm CT NECK FINISH |
| SCALE | 1X1 |
| REV | 1 |
| DATE | 05/24/17 |
| BY | KAD |
| CHK | CHK |
| ENG APPR | 05/30/17 |
| MFG APPR | |
| QA APPR | |
| DO NOT SCALE DRAWING | |

| REV | REVISION DESCRIPTION | CHECKED BY | DATE |
|-----|---|------------|-------------|
| 1 | COMAR OFFICIAL TITLE BLOCK | CHK | KAD05/26/17 |
| 2 | ADDED COMAR LOGO TO BASE ENGRAVING | CHK | KD 08/19/15 |
| 3 | ADDED "COMAR" TO TITLE BLOCK | CHK | KD 08/19/15 |
| 4 | ECN# 1686, WEIGHT 30.0 \pm 1.5g WAS 30.4 \pm 1g | CHK | 03/22/05 |
| 5 | ECN# 1648, ADDED AN OPTIONAL BOTTOM VIEW | CHK | 08/02/04 |
| 6 | ECN #1417 WEIGHT: 30.4 \pm 1 WAS 25.6 \pm 1 | CHK | 10/26/99 |

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