

HOJA PARÁMETROS PRUEBAS INYECCIÓN

| | | | | | |
|---------|------------|----------------------------------|-------|-----------------------------|-----------------------------|
| FECHA | 02/12/2021 | REF. MOLDE | 1854 | TERMOPLÁSTICO | PLA LUMINY LX175 NATURAL |
| | | CAVIDADES | 2 / 2 | | |
| TÉCNICO | | COLORANTE (%)blanc MTB 2457 | N/A | TIEMPO/R.P.M COLORIMETRO | |
| MÁQUINA | 44 | ADITIVO | | TIEMPO/R.P.M COLORIMETRO | |

TEMPERATURAS HUSILLO

| | BOQUILLA | Z1 | Z2 | Z3 | Z4 |
|---------|----------|-----|-----|-----|----|
| Nominal | 190 | 170 | 165 | 160 | |
| Real | 190 | 185 | 173 | 160 | |

TEMPERATURAS CÁMARA MOLDE

| | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | RC1 | RC2 |
|---|-----|-----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| N | 255 | 255 | | | | | | | | | | | | |
| R | 255 | 255 | | | | | | | | | | | | |
| | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | RC3 | RC4 |
| N | 195 | 190 | | | | | | | | | | | | |
| R | 190 | 190 | | | | | | | | | | | | |

B, Boquilla R, Ramal RC, Ramales Centrales

MOLDE TEMPERATURAS

| LADO INYECCIÓN | | | LADO EXPULSIÓN | | |
|----------------|--|---------|----------------|--|-----|
| Zona Molde | | ° C | Zona Molde | | ° C |
| Boquillas | | Cerrada | vasos | | 45 |
| Punxons | | 45 | | | |
| | | | | | |
| | | | | | |

TIEMPOS/PRESIONES

| | | | | | |
|------------------|-------|----------------|------|--------------|------|
| T. CICLO | 38,70 | T.ENFRIAMIENTO | 25 | P. LIMITE | 1000 |
| T.PLASTIFICACIÓN | 11.23 | T. 2ª. PRESIÓN | 3.50 | P. REAL INY. | 961 |
| T. INYECCIÓN | 2.38 | T. SEG. MOLDE | 2 | P. REAL C.C | 785 |

REGISTRO VELOCIDADES/PRESIONES

| Perfiles | 1 | 2 | 3 | 4 | 5 | 6 |
|------------|------|-----------------|------|------|--------------|-----|
| m.m/s | 10 | 15 | 20 | 25 | | |
| m.m | 0 | 25 | 35 | 45 | | |
| 140Presión | 1000 | 1000 | 1000 | 1000 | | |
| 2ª.PRESIÓN | | COTA CAMBIO: 12 | | m.m | COJÍN: 10 .5 | m.m |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Presión | 0 | 910 | 900 | 890 | | |
| Tiempo | 3.50 | 3 | 1.50 | 0 | | |

PLASTIFICACIÓN

| | | | | | | |
|-------|-----|-----|-----|--|---------|----|
| r.p.m | 100 | 100 | 100 | | Succión | |
| m.m | 15 | 25 | 50 | | m.m/s | 10 |
| Cp | 150 | 150 | 150 | | m.m | 5 |

VARIOS

| ABERTURA MOLDE | REC. SEG. MOLDE | P. SEG. MOLDE | PIEZAS/HORA |
|----------------|-----------------|---------------|----------------|
| 247 m.m | 2 m.m | 25 V Bar | und. |
| Φ BOQUILLA | CARRO | PESO PIEZA | PESO INYECTADA |
| m.m | M () F (x) | 18.35 g. | g. |

REGISTRO CAMBIOS

| FECHA | PARAMETRO | CAMBIO | MOTIVO | TÉCNICO |
|-------|-----------|--------|--------|---------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

TOLERANCIA PARÁMETROS +- 5 %

| | |
|--|---|
| APROBADO RESPONSABLE INYECCIÓN: Firma/fecha | APROBADO RESPONSABLE CALIDAD: Firma/fecha: |
|--|---|

OBSERVACIONES:

23/09/2021:

Prueba de molde con material PLA

Material utilizado: PLA

Fabricante: Total / Corbion

Denominación: Luminy LX175

Datos de Máquina:

Injectora: 28

Injectora: 50

Molde utilizado:

1854

Resultados de las pruebas:

Hemos realizado 2 tipos de pruebas:

1º Prueba en inyectora 28, con diámetro husillo 55mm y volumen de inyección máximo de 590.

Tenemos muchas dificultades para inyectar estas piezas con este material, los principales problemas vienen por degradación del material, dificultades por el diseño los puntos de inyección del molde, si nos regimos por las temperaturas recomendadas por el fabricante, el material se enfría en las puntas del molde y no inyecta, al aumentar las temperaturas de las boquillas conseguimos inyectar pero el material se degrada. (ver fotos de piezas). Se para la prueba por incompatibilidad molde / material / diseño.

2º Prueba en inyectora 50, con diámetro husillo 40 y volumen de inyección máximo de 220.

Con esta prueba hemos querido reducir el tiempo de permanencia del material en el husillo, los resultados de las pruebas también han sido NOK, tenemos problemas para pasar el material por las boquillas de este molde, y al aumentar temperaturas el material continúa degradándose y material enganchado en molde.

Conclusión:

En el caso del molde 1854 Tapa Tarro 50ml bola, existe una incompatibilidad entre el diseño de pieza, molde y material, No podemos trabajar con este molde y material.

Para poder inyectar necesitamos aumentar temperaturas de la punta boquilla y esto genera degradación, al reducir temperaturas las boquillas se anulan y no inyecta.

También tenemos muchos problemas de material enganchado en molde.

Para poder trabajar con las temperaturas recomendadas, se debería modificar la entrada de material del molde de tal forma que no se enfriara el material al inyectar.

Las piezas presentan un color amarillento, este color ya se aprecia en la granza sin inyectar.

No hemos podido hacer muestras representativas ok para presentar a cliente.

Fotos de piezas inyectadas:



Fotos de piezas inyectadas:



Product Data Sheet

Luminy® LX175

Revision date 07 May 2019
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Date previous version 01 Sep 2017
Version & language B/0975 - EN
Product availability Global
Product status Commercial

PRODUCT DATA SHEET
LUMINY® LX175

Interested in solutions for bioplastics? Please contact us at
www.total-corbion.com or pla@total-corbion.com

DESCRIPTION

PLA is a biobased polymer derived from natural resources and offers a significant reduction in carbon footprint compared to oil-based plastics. Luminy® LX175 is a high viscosity, low flow, amorphous, transparent PLA resin suitable for film extrusion, thermoforming or fiber spinning.

TYPICAL PROPERTIES¹

| Physical properties | Method | Typical value |
|---|---------------------------|---------------------------|
| Density | Literature value | 1.24 g/cm ³ |
| Melt flow index | ISO 1133-A (210°C/2.16kg) | 6 g/10 min |
| Melt flow index | ISO 1133-A (190°C/2.16kg) | 3 g/10 min |
| Stereochemical purity | Total Corbion PLA method | 98% (L-isomer) |
| Appearance | Visual | Crystalline white pellets |
| Residual monomer | Total Corbion PLA method | ≤ 0.3% |
| Water / moisture | Coulometric Karl-Fischer | ≤ 400 ppm |
| Melting temperature | DSC | 155°C |
| Glass transition temperature | DSC | 60°C |
| Mechanical properties | Method | Typical value |
| Tensile modulus | ISO 527-1 | 3500 MPa |
| Tensile strength | ISO 527-1 | 45 MPa |
| Elongation at break | ISO 527-1 | ≤ 5% |
| Charpy notched impact, 23°C | ISO 179-1eA | ≤ 5 kJ/m ² |
| Heat deflection temp., amorphous ² | ISO 75-1 | 60°C |

¹ Typical properties, not to be interpreted as specifications

² HDT B, 0.45MPa flexure; HDT depends on processing conditions

PROCESSING INFORMATION & RECOMMENDATIONS

Standard PLA can be processed on conventional extrusion equipment and can be used as neat resin or as part of a compound to further optimize overall material properties. It is recommended to use a general purpose screw with L/D ratios between 24 and 32. Pre-drying of the resin is recommended.

Start-up and shutdown

1. Purge the system with a polyolefin or a purging compound (e.g. Dyna-Purge, Clean LDPE) at its recommended temperature settings.
2. Reset the temperature settings to the recommended PLA temperature profile.
3. Purge with PLA resin or PLA compound until stable processing is obtained free of contaminants.
4. Reset the temperature settings to the recommended purging compound temperature profile.
5. Purge with a polyolefin or a purging compound for 5 times the average residence time.

After completion of the run, PLA must be removed from the whole system. PLA can degrade into lactic acid causing corrosion of the equipment (e.g. die plates).

Processing recommendations

| | |
|----------------------|-------------------|
| Predrying | 4-6 hours at 85°C |
| Feed zone | 20-40°C |
| Melt zone | 170-190°C |
| Mixing & conveying | 190-210°C |
| Die head temperature | 190-210°C |

Typical settings, may require optimization



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MOISTURE & PRE-DRYING

It is recommended to dry Luminy® LX175 from the packaging for 4-6 hours at 85°C. Drying of standard PLA can be performed in a desiccant hot air dryer, with a dew point of -40°C or less. It is recommended to reduce the moisture content before melt processing to a level less than 250ppm and preferably less than 100 ppm, measured by e.g. Karl-Fischer or Brabender aquatrac method. Predrying is in particular important prior to injection molding, film and sheet production. Moisture causes hydrolysis of the PLA polymer during melt processing, resulting in reduced mechanical performance in the final part.

PACKAGING & STORAGE CONDITIONS

Luminy® LX175 is available in 1250 kg form-stable aluminum-lined big bags and 25 kg sample bags (moisture level not guaranteed for sample bags). It is recommended to store PLA polymer in its closed, original moisture-barrier packaging at temperatures below 50°C. Storage in direct sunlight should be avoided. The supplied PLA polymer pellets are typically semi-crystalline, unless otherwise stated.

COMPOSTABILITY

Composting of organic waste helps to divert organic waste from landfill or incineration. Composting is a biological process in which organic wastes are degraded by microorganisms into carbon dioxide, water and humus, a soil nutrient. Luminy® PLA polymers are in compliance with the EN-13432 standard. Luminy® LX175 has been certified compostable by TÜV Austria (OK Compost S478) and by European Bioplastics (Seedling 7W2030) up to a thickness of 3.5 mm. As the compostability of the end product is also dependent on the geometry of product, it is the responsibility of the manufacturer of the end product to ensure compliance with the regulations.



BIOBASED CONTENT

Luminy® LX175 has a biobased content of 100% (confidence level 1) and a biobased carbon content of 100% according to EN16785-1 under certificate number DIC-00001. Luminy® LX175 is certified 100% biobased according to ASTM D6866 under the USDA Biopreferred program.



FOOD CONTACT STATUS

In the European Union, Luminy® PLA polymers are compliant with EU commission regulation 10/2011 of 14 January 2011 (and amendments) on plastic materials and articles intended to come into contact with food. Lactic acid is considered a dual use substance, since lactic acid is approved as a food additive (additive number E270). There are no SMLs or SML(T)s for the ingredients used to produce Luminy® PLA. The regulation does include a migration limit of 10 mg/dm² on the overall migration from finished plastic articles into food. It is the responsibility of the manufacturer of the final product, when intended as a food contact product, to determine that the use of the product is safe and also suitable for the intended application. While it is Total Corbion PLA's conclusion that the above mentioned polymers are permitted, it is the final product which must meet the given regulations and the manufacturer should take responsibility to check if the final product is in compliance with these regulations.

In the United States of America, Luminy® PLA as supplied by Total Corbion PLA has been evaluated and was found to be suitable for use in food contact applications. On 30 November 2018, FCN 001926 as applied for by Total Corbion PLA to the FDA became effective. It is included in the list of effective notifications for FCNs on the website of the FDA. The evaluation performed was in line with the requirements of Section 201(s) and Section 409 of the Federal, Drug and Cosmetic Act, and Parts 182, 184 and 186 of the Food Additive Regulations. Luminy® PLA neat resin is approved for all food types and conditions of use B through H.



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