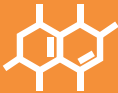




## Technical Datasheet

# Rigid DLFR



Daylight Resin

Photo**centric**



Rigid DLFR

UL 94 V-0 (2mm)

100%

HDT (Low – High)

100%

Compatible Printers



Liquid Crystal  
MAGNA



Liquid Crystal  
TITAN

Colour



Black

Available in  
5kg bottle



Industrial IEC 3phase plug housing

Rigid DLFR is Photocentric's first Daylight Flame Retardant resin with UL 94 V-0 certification, showing self-extinguishing properties in the green state. Combined with an exceptionally high HDT and high tensile modulus, it is ideal for 3D parts in industries such as aerospace, automotive and railway. It is easy to print and process due to its low viscosity. Printed parts exhibit a superior level of detail and dimensional accuracy, making it the perfect choice for connectors and fittings for both consumer and industrial applications.

### Optimised for:

- Electrical and electronic enclosures and connectors
- Battery housings
- High power electrical applications
- Suitable for parts in industries like automotive, aerospace, railway, appliances, medical and furniture.

## Unique features:



UL 94 V-0 (2mm)  
V-1 (1.5mm)



Incredible heat  
resistance  
HDT >250°C



Low viscosity



Printed parts exhibit  
a superior level of  
detail and dimensional  
accuracy



TPO Free



## Rigid DLFR Properties

| Tensile Properties                       | Green                                        | UV*      | Standard                     |
|------------------------------------------|----------------------------------------------|----------|------------------------------|
| Tensile Modulus                          | 1302 MPa                                     | 2848 MPa | ASTM D638                    |
| Ultimate Tensile Strength                | 39.5 MPa                                     | 66 MPa   | ASTM D638                    |
| Elongation at break                      | 12.3%                                        | 3.5%     | ASTM D638                    |
| Flexural Properties                      | Typical Values (UV*)                         |          | Standard                     |
| Flexural Modulus                         | 3400 MPa                                     |          | ASTM D790                    |
| Flexural Strength                        | 115 MPa                                      |          | ASTM D790                    |
| Impact Properties                        | Typical Values (UV*)                         |          | Standard                     |
| Impact Strength Notched Izod             | 19 J/m                                       |          | ASTM D256                    |
| Thermal Properties                       | UV*                                          |          | Standard                     |
| Heat Deflection Temperature (@ 0.45 MPa) | 260°C                                        |          | ASTM D648                    |
| Heat Deflection Temperature (@ 1.82 MPa) | 86°C                                         |          | ASTM D648                    |
| Fire Properties                          | Typical Values (UV*)                         |          | Standard                     |
| Flammability                             | V-0 (3.0 mm)<br>V-0 (2.5 mm)<br>V-0 (2.0 mm) |          | UL 94                        |
| Advanced Thermal Properties              | Typical Values (UV*)                         |          | Standard                     |
| C.T.E (20°C to 60 °C)                    | 74 µm/(m·K)                                  |          | ASTM E831                    |
| C.T.E (60 °C to 120 °C)                  | 112 µm/(m·K)                                 |          | ASTM E831                    |
| Other                                    | Typical Values (UV*)                         |          | Standard                     |
| Shore Hardness                           | 92 Shore D                                   |          | ASTM D2240                   |
| Water Absorption, Short Term (24 hours)  | 0.46 %                                       |          | ASTM D570                    |
| Water Absorption, Medium Term (72 hours) | 0.87 %                                       |          | ASTM D570                    |
| Water Absorption, Long Term (168 hours)  | 1.23%                                        |          | ASTM D570                    |
| Viscosity                                | 580 cPs                                      |          | At 25°C Brookfield spindle 3 |
| Liquid Density                           | 1.21 g/cm3                                   |          | Internal                     |
| Printed Part Density                     | 1.32 g/cm3                                   |          | Internal                     |
| Storage                                  | 10<T>50°C                                    |          |                              |

\* Post cured for 2 hrs at 60 °C in Photocentric Cure L2.



We are constantly reviewing and improving our range of high-performance materials.  
For the very latest information, please visit the Photocentric website



## Design & Print Orientation Consideration Parameters

Printed on Photocentric LC Magna (100 µm layer height)

| Properties                   | Parameters                       |
|------------------------------|----------------------------------|
| Minimum feature size (pins)  | 0.4 mm                           |
| Minimum hole diameter        | 0.7 mm                           |
| Minimum slot thickness       | 0.5 mm                           |
| Minimum wall thickness       | 0.2 mm                           |
| Overhangs                    | Successful for overhangs < 60°   |
| Delamination (unsupported)   | Not visible for overhangs ≤ 2 mm |
| Delamination (between walls) | Not visible for overhangs ≤ 4 mm |



## Test Results

### Vertical Burning Test for Classifying Materials V-0, V-1, or V-2

|                                              |                                                                                 |                                                                         |
|----------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Tester:<br><b>Warringtonfire</b>             | Phone:<br>+44 1925-64-5116                                                      | Date of Test:<br>02-11-2023                                             |
| Address:<br>Holmesfield Road. Warrington. UK | Document Reference:<br>537704                                                   | Date of Report:<br>22-11-2023                                           |
| Customer:<br><b>Photocentric</b>             | Address:<br>Titan House, 20 Titan Drive,<br>Peterborough, PE1 5XN. UK           | Phone:<br>+44 1733-34-9937                                              |
| Product Reference:<br><b>Rigid DLFR</b>      | Generic Description:<br>(Meth)acrylate based 3D printable<br>photocurable resin | Thickness:<br>3mm<br>Density:<br>1.34g/cm <sup>3</sup><br>Colour: Black |

### Objective

To determine the performance of the following material when tested in accordance with Section 8 - "50W (20mm) Vertical Burning Test for Classifying Materials V-0, V-1 or V-2" of UL 94: 2013 ANSI/UL 94: 2018 - "Test for Flammability of Plastics Materials for Parts in Devices and Appliances".

### Results

When the test results are assessed using the test criteria specified in the Standard, the material, when tested at a nominal thickness of 3mm, is classified as 'V-0'.

An uncertainty of measurement estimation has been conducted in relation to the duration of flaming and glowing. The findings are as detailed in Test Results section of this report.

## Test Procedure

Each specimen was tested in accordance with the test method specified in the Standard and the following points were observed and recorded for each specimen.

A- Duration of flaming after first flame application ( $\pm 0.6$  seconds)

B- Duration of flaming after second flame application ( $\pm 0.8$  seconds)

C- Duration of glowing after second flame application ( $\pm 0.8$  seconds)

D- Whether or not the specimens burn up to holding clamp.

E- Whether or not the specimens drip flaming particles that ignites cotton swatch.

## Results

The following results were recorded for the ten specimens tested. The letters correspond with those listed under 'Test Procedure'.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

### Specimens conditioned at a temperature of $23 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$

| Specimen N°. | A   | B   | C   | D  | E  |
|--------------|-----|-----|-----|----|----|
| 1            | Nil | 1   | Nil | No | No |
| 2            | Nil | Nil | Nil | No | No |
| 3            | Nil | 1   | Nil | No | No |
| 4            | 1   | Nil | Nil | No | No |
| 5            | Nil | Nil | Nil | No | No |

### Specimens conditioned at a temperature of $70 \pm 1^\circ\text{C}$ for 168 hours.

| Specimen N°. | A   | B   | C   | D  | E  |
|--------------|-----|-----|-----|----|----|
| 1            | Nil | 1   | Nil | No | No |
| 2            | Nil | Nil | Nil | No | No |
| 3            | Nil | Nil | Nil | No | No |
| 4            | Nil | Nil | Nil | No | No |
| 5            | Nil | Nil | Nil | No | No |



## Pre-Print Instructions

### Printing on LC Magna

1. To print on Photocentric LC Magna, choose Rigid DLFR - Black and the desired layer thickness when preparing the print file in Photocentric Studio.
2. Warm the resin to 60°C for 5 hours, or until the resin is fully liquified in the bottle. Failure to do so prior to printing may lead to the resin crystallising, resulting in print failures.
3. Shake the resin bottle for up to 2 minutes before pouring into the printer vat.

### Printing on LC Titan

1. To print with Photocentric Liquid Crystal Titan, choose Rigid DLFR- Black and the desired layer thickness when preparing your print file in Photocentric Studio.
2. Heat the resin to 60°C for 5 hours or until the resin is fully liquified in the bottle. Failure to do so prior to printing may result in the resin crystallising, leading to print failures.
3. Shake the resin bottle for 2 minutes before pouring into the LC Titan resin tank. Allow resin to cool to 30°C prior to printing.



## Post-Print Instructions

### Printing on LC Magna

1. It is recommended to drain and clean the vat after printing if ambient temperatures are below 23°C.
2. Place the platform into the Photocentric Air Wash L unit, and wash printed parts for up to 10 minutes in Photocentric Resin Cleaner 30.
3. Rinse printed parts thoroughly in warm water for up to 2 minutes.
4. Dry well with compressed air to remove any remaining water. Alternatively, leave to dry naturally until no water is present.
5. Cure for 5 hours at 60°C in Cure L2.
6. Parts can be thermally shocked from the platform using very cold water when the platform is still warm from the curing process.

### Printing on LC Titan

1. Place the platform into the Photocentric Wash XL.
2. Parts can be washed in 10 minutes using Photocentric Resin Cleaner 30.
3. Once washed, rinse with warm water for up to 10 minutes. Pay extra attention to fine details and any internal features.
4. Dry with compressed air to remove any remaining water.
5. Place the platform into the Photocentric Cure XL, start 'Dry' cycle for 1 hour at 60°C (WITH NO UV LIGHT) to ensure parts are fully dry.
6. Start 'Cure' cycle, and leave to cure for 2 hours at 60°C.
7. Remove the platform from the Cure XL, allow to cool down and remove parts from the platform. Parts printed in Rigid DLFR can be thermally shocked for easier removal.