LOCTITE LIOFOL LA 3644 / LA 6055 Known as Liofol UR 3644 / UR 6055 May 2013

PRODUCT DESCRIPTION
LOCTITE LIOFOL LA 3644 / LA 6055 has the following product characteristics:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Polyurethane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Type</td>
<td>Laminating adhesive</td>
</tr>
<tr>
<td>Condition</td>
<td>Solvent-based</td>
</tr>
<tr>
<td>Components</td>
<td>Two component - requires mixing</td>
</tr>
<tr>
<td>Application</td>
<td>Film/Film and Film/Foil laminates</td>
</tr>
<tr>
<td>Performance</td>
<td>High Performance</td>
</tr>
<tr>
<td>Cure</td>
<td>Room temperature cure after mixing</td>
</tr>
<tr>
<td>Appearance Base</td>
<td>LOCTITE LIOFOL LA 3644 yellow transparent to slightly opaque</td>
</tr>
<tr>
<td>Appearance Hardener</td>
<td>LA 6055 yellowish clear</td>
</tr>
<tr>
<td>Mix Ratio, by weight</td>
<td>Base : Hardener 18 : 1</td>
</tr>
<tr>
<td>Mix Ratio, by weight for High Performance Laminates</td>
<td>Base : Hardener 20 : 1</td>
</tr>
</tbody>
</table>

Application Areas:
LOCTITE LIOFOL LA 3644 / LA 6055 is suitable for film/film and film/foil laminates. It is recommended for the manufacture of retortable laminates with outstanding heat resistance. LOCTITE LIOFOL LA 3644 / LA 6055 has a good chemical resistance and is recommended for the manufacture of foil laminates for aggressive filling goods. Laminates manufactured with suitable materials are resistant to boiling, pasteurisation and sterilisation (30 min, 121 °C). The combination of thermic and mechanic stress - particularly when oriented films are used - has to be checked in each single case.

Suitable Films:
- Aluminum Foil
- Polyethylene
- Polypropylene
- Polyester
- Polyamide
- rigid PVC

Not suitable Films:
- EVA-Copolymerfilms

Product Properties:
LOCTITE LIOFOL LA 3644 / LA 6055 meets the requirements of effective production techniques by increasing the machine speed and the channel temperature. The result is a fast cure and low contents of retaining solvents in the laminates. The cured adhesive film is transparent, odorless, elastic and age-resistant.

TECHNICAL DATA
LOCTITE LIOFOL LA 3644:
- Solid Content, % 58 to 62
- Viscosity, Brookfield - LVT, 20 °C, mPas: 240 to 400 Spindle 2, speed 30 rpm
- Volumetric Density, g/cm³ 1.1
- Component NCO component
- Solvent Ethylacetate

LOCTITE LIOFOL LA 6055:
- Solid Content, % 100
- Viscosity, Brookfield - LVT, 20 °C, mPas: 1,900 to 3,500 Spindle 3, speed 30 rpm
- Volumetric Density, g/cm³ 1.1
- Component OH component
- Solvent none

Compliance with food packaging regulations:
Under specific conditions LOCTITE LIOFOL LA 3644 / LA 6055 is suitable for the manufacture of food packaging materials under the applicable FDA, EC-provisions and/or BfR recommendations.
LOCTITE LIOFOL LA 3644 / LA 6055 contains aromatic isocyanates. We therefore recommend migration testing of the fully cured material under conditions of use, particularly with high temperature applications, to demonstrate compliance with the limits for primary aromatic amines. A food contact statement with further details is available on request.
The responsibility for compliance with the specific conditions is with the converter and not with the adhesive supplier.

DIRECTIONS OF USE
Preliminary Statement:
Prior to application it is necessary to read the Safety Data Sheet for information about precautionary measures and safety recommendations. Also, for chemical products exempt from compulsory labeling, the relevant precautions should always be observed. Please also refer to the local safety instructions and contact Henkel for analytical support.

Protective Measures:
As the adhesive contains polyisocyanates any contact with skin should be avoided. If skin gets in contact with LOCTITE LIOFOL LA 3644 / LA 6055 please remove the adhesive immediately. Safety regulations with regard to handling of isocyanates have to be followed as per the guide lines issued by the International Isocyanates Institute.
Dilution:
Suitable solvents are ethyl acetate, acetone and Methylethylketone provided that the water content does not exceed 300 ppm. Do not use aromatic or alcoholic solvents.

Dilution Table:
In order to obtain a certain solids content, the following quantities of solvent have to be added.
The Ford/DIN cup (4 mm/20 °C) viscosities are based on an average viscosity of LOCTITE LIOFOL LA 3644 / LA 6055.

Mix Ratio 20:1

<table>
<thead>
<tr>
<th>LOCTITE LIOFOL LA 3644</th>
<th>LA 6055</th>
<th>Ethyl Acetate</th>
<th>Solid Content (%)</th>
<th>Viscosity (sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 kg</td>
<td>1.25 kg</td>
<td>14.38 kg</td>
<td>40</td>
<td>16 - 17</td>
</tr>
<tr>
<td>25 kg</td>
<td>1.25 kg</td>
<td>20.18 kg</td>
<td>35</td>
<td>14 - 15</td>
</tr>
<tr>
<td>25 kg</td>
<td>1.25 kg</td>
<td>27.92 kg</td>
<td>30</td>
<td>12 - 14</td>
</tr>
</tbody>
</table>

Mix Ratio 18:1

<table>
<thead>
<tr>
<th>LOCTITE LIOFOL LA 3644</th>
<th>LA 6055</th>
<th>Ethyl Acetate</th>
<th>Solid Content (%)</th>
<th>Viscosity (sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 kg</td>
<td>1.40 kg</td>
<td>14.60 kg</td>
<td>40</td>
<td>16 - 17</td>
</tr>
<tr>
<td>25 kg</td>
<td>1.40 kg</td>
<td>20.46 kg</td>
<td>35</td>
<td>14 - 15</td>
</tr>
<tr>
<td>25 kg</td>
<td>1.40 kg</td>
<td>28.27 kg</td>
<td>30</td>
<td>12 - 14</td>
</tr>
</tbody>
</table>

The recommended solid content is 30 to 35 %

Mixing:
LOCTITE LIOFOL LA 3644 has to be diluted under stirring with corresponding solvent to the desired application solids. Then the correct amount of Hardener LA 6055 has to be added under agitation.

Pot Life:
The Ready-for-use adhesive in closed containers has a working time of about 7 hours without substantial viscosity increase. Ready-for-use adhesive which has not been consumed in the machine for more than 6 hours has to be disposed of. To be on the safe side, we suggest to dispose of the remaining adhesive in the machine unless it can be added gradually to fresh adhesive mixtures for non-critical laminates (no heat resistance, no chemical resistance).

Potlife under tropical conditions:
Please note that due to tropical conditions, i.e. high ambient temperatures and/or high humidity the potlife for the mix adhesive is shorter. For adhesive systems intended for high performance applications, not more adhesive should be mixed that can be consumed within a 2 hours time period, to be used directly after mixing.

Application:
LOCTITE LIOFOL LA 3644 / LA 6055 can be applied with all dry laminating units with smooth or gravure rollers.

Application Weight:
The usual application weight is 3 g/m² dry. Sterilisable and deep draw laminates require a coating weight of up to 4 to 5 g/m² dry. For printed laminates the weight has to be adjusted to higher weights accordingly, it should be approx. 1 to 2 g/m² higher than for unprinted films.

Working Conditions:
High laminating temperatures together with a high line pressure of the calander improve the bond strength and optical appearance of the laminates.

Drying:
Drying conditions depend on the efficiency of the dryer and the line speed.

Curing:
Manufacture of triplex laminates is possible 2 to 4 hours after duplex production. The laminates may be rewound and slit after 1 to 2 days. Complete curing i.e. total resistance to severe environments will be achieved after 7 to 14 days of storage at room temperature depending on film combination and intended use of the laminates.

Film Properties:
The completely cured LOCTITE LIOFOL LA 3644 / LA 6055 polyurethane film is transparent, odourless, elastic and age resistant.

STORAGE
When stored in a dry and cool place in the original unopened containers storage life is as follows. Store separately from food. Once opened containers of LOCTITE LIOFOL LA 3644 have to be closed tightly again and the material should be consumed within a short period. Opened containers of Hardener LA 6055 can also be consumed later.

<table>
<thead>
<tr>
<th>Shelf life:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCTITE LIOFOL LA 3644, months: 9</td>
</tr>
<tr>
<td>LOCTITE LIOFOL LA 6055, months: 12</td>
</tr>
</tbody>
</table>

Classification:
Please refer to the corresponding safety data sheets for details on:
Hazardous Information
Transport Regulations
Safety Regulations
ADDITIONAL INFORMATION

Film Requirements:
Film additives - particularly slip agent content in LDPE, MDPE and CPP films - packed goods, printing inks, pre-treatment and coating of films are of significant importance to the intended use of the laminates and may affect the performance properties either straight away or later. Therefore, practical laminating tests as well as checks on the laminates are necessary before going into full scale production. For high slip containing films we recommend Liofol UR 3610 / Hardener UR 6055. Further detailed information can be obtained from our "Technical Guide Line for Laminating with Liofol Laminating Adhesives".

Product Range:
Apart from LOCTITE LIOFOL LA 3644 / LA 6055 we can offer the following products for the manufacture of film/foil laminates:

- Solventbased, solventless and waterbased laminating adhesives for flexible packaging and special applications
- Coldseal Adhesives
- Heatseal Coatings
- Primer for Extrusion and PVDC-coating
- Adhesives for High Gloss Lamination
- Special Cleaning agents

To obtain product specifications please ask for the relevant technical datasheets.

Disclaimer

Note:
The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

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Reference 0.0