Coating, Laminating and Testing Capabilities
## Content

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### Lamination Techniques

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### Safety Precautions with Grillex

<table>
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<th>Precaution</th>
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<td></td>
<td>26</td>
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</tbody>
</table>
Gravure Roller Coating

- **Purpose**: Hotmelt coating with engraved roller
- **Griltex grades**: Granules G F
- **Manufacturer**: Lacom
- **Gravure roller**: CP 52
- **Coating weight**: 12 - 20 g/m², 10 - 25 g/m², 15 - 80 g/m²
- **Speed**: 2 - 40 m/min
- **Max. working width**: 500 mm
- **Min. fabric length**: 50 m
- **Core diameter**: 76 mm
Multi Roller Coating

**Purpose**
Hotmelt coating with closed or open surface structure

**Griltex grades**
Granules G F

**Manufacturer**
Lacom

**Coating weight**
5 - 400 g/m²

**Speed**
2 - 40 m/min

**Max. working width**
500 mm

**Min. fabric length**
50 m

**Core diameter**
76 mm
Slot Die Coating

Purpose: Hotmelt coating with closed or open surface structure
Griltex grades: Granules G F
Manufacturer: Robatech AG
Coating weight: 10 - 200 g/m²
Speed: 4 - 40 m/min
Max. working width: 500 mm
Min. fabric length: 50 m
Core diameter: 76 mm
Extruder

Purpose: Melting of granules

Manufacturer: Collin
Type: M
Screw diameter: 25 mm
Screw length: 25 D
Capacity: 6 kg/h
Scatter Coating

Purpose
Random coating with Griltex adhesive powders

Griltex grades
P 82 (80 - 200 μm); P 1 - 5 (100 - 500 μm) and P 2 - 5 (200 - 500 μm) powder

Manufacturer
Villars  Cavitec  Klieverik

Sintering with
IR-Heater  IR-Heater  Belt Calender

Speed
2 - 20 m/min  2 - 40 m/min  2 - 40 m/min
Max. working width
1000 mm  500 mm  500 mm
Min. fabric length
50 m  50 m  50 m
Core diameter
min. 50 mm  min. 40 mm  min. 40 mm
**Paste Dot Coating**

<table>
<thead>
<tr>
<th><strong>Purpose</strong></th>
<th>To coat fabrics with water based dispersions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Griltex grades</strong></td>
<td>P 1 (0 - 80 μm) powder</td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Stork</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>2 - 40 m/min</td>
</tr>
<tr>
<td><strong>Max. working width</strong></td>
<td>500 mm</td>
</tr>
<tr>
<td><strong>Min. fabric length</strong></td>
<td>50 m</td>
</tr>
<tr>
<td><strong>Core diameter</strong></td>
<td>40 mm</td>
</tr>
</tbody>
</table>
### Purpose
To coat fabrics with water based dispersions followed by scatter coating.

### Griltex grades
- **Base dot:** P 1 (0 - 80 μm) powder
- **Top dot:** P 82 (80 - 200 μm) powder

### Manufacturer
- **Screen print unit:** Stork
- **Suction unit:** Cavitec

### Speed
- 2 - 40 m/min

### Max. working width
- 500 mm

### Min. fabric length
- 50 m

### Core diameter
- 40 mm
Powder Dot Coating

Purpose
Dot coating of apparel interlinings

Griltex grades
P 0-160 (0 - 160 μm); P 82 (80 - 200 μm) powder

Manufacturer
Caratsch

Gravure roller
CP 36
CP 52
CP 200

Coating weight
11 - 13 g/m²
9 - 11 g/m²
5 - 7 g/m²

Speed
2 - 40 m/min

Max. working width
1000 mm

Min. fabric length
20 m

Core diameter
50 mm
## Nip Roll Calender

<table>
<thead>
<tr>
<th>Purpose</th>
<th>To laminate adhesive coated substrates with decorative fabrics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Villars</td>
</tr>
<tr>
<td><strong>In combination with</strong></td>
<td>Scatter line</td>
</tr>
<tr>
<td><strong>Max. working width</strong></td>
<td>1000 mm</td>
</tr>
<tr>
<td><strong>Laminating roll</strong></td>
<td>steel/driven</td>
</tr>
<tr>
<td><strong>Counter roll</strong></td>
<td>steel/driven</td>
</tr>
</tbody>
</table>
**Calender Press**

<table>
<thead>
<tr>
<th><strong>Purpose</strong></th>
<th>To laminate two flexible fabrics by means of temperature and pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Meyer</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>RPS Junior</td>
</tr>
<tr>
<td><strong>Max. fabric width</strong></td>
<td>700 mm</td>
</tr>
</tbody>
</table>
Purpose

To laminate backing and decorative fabrics

Manufacturer

Klieverik

Temperature range 50 - 200°C
Line speed 2 - 40 m/min
Max. working width 600 mm
Min. fabric length 20 m
Core diameter min. 40 mm
Ecosafe Line

Purpose
To laminate backing and decorative fabrics

Manufacturer
Klieverik

Temperature range
50 - 200°C

Line speed
2 - 40 m/min

Max. working width
600 mm

Min. fabric length
20 m

Core diameter
min. 40 mm
Platen Press

Purpose

To laminate rigid or flexible substrates

Manufacturer

Collin

Type

P 400

Temperature range

10 - 300°C

Pressure range

0 - 250 bar

Max. sample size

400 mm x 400 mm

Process possibilities

1. Pressing and laminating with hot tools
2. Preheating of substrates with IR-heaters
   Pressing and laminating with cooled tools

1 = IR-Heaters
2 = Shuttle Frame
3 = Decorative Fabric
4 = Adhesive
5 = Carrier
6 = Tool
Lamination Failures

Correct Adhesive Distribution

- Decorative fabric
- Adhesive
- Backing material

Incorrect Adhesive Distribution

- Strike through
- Strike back
- Penetration through face fabric and backing material
- Insufficient penetration
Tensile and Bonding Strength Tester

Purpose
To test the bond strength of laminates and to determine tensile properties of substrates

Manufacturer
Zwick
Stereo Microscope and Video Print Equipment

Purpose
Inspection of fabrics, coatings, fibers etc.

Manufacturer
Microscope: Leica
Camera: Leica

Magnification
25 - 1000x
Heat Resistance

Purpose
To determine the heat resistance of laminates

Standard
EMS

Test sample size
50 mm x 150 mm

Load
50 g

Temperature interval
10°C

Time
30 min/10°C
Flame Resistance

Purpose: To determine the burn rate of substrates

Standard: DIN 53438
Test sample size: 50 mm x 127 mm
### Purpose
To measure the shear viscosity of Griltex hotmelt adhesives

### Manufacturer
Rheometrics

### Parameters
- **Temperature range**: -40 to 350°C
- **Shear rate**: 0.0001 to 500 rad/s
- **Viscosity range**: 0.01 to 100'000 Pa*s
Coating Weight by Extraction

**Apparatus:**
1 l round-bottomed flask reflux condenser

**Sample size:**
100 cm²

**Solvent:**
see page 24 and 25

**Drying/cooling:**
5-6 h vacuum/10 min exsiccator

**Balancing:**
G = Gross weight

**Extraction:**
2 h reflux

**Drying/cooling:**
5-6 h vacuum/10 min exsiccator

**Balancing:**
N = Net weight

**Formula:**
Coating weight = (G – N) x 100
## Solubility of CoPES

<table>
<thead>
<tr>
<th>CoPES</th>
<th>MeOH</th>
<th>EtOH</th>
<th>THF</th>
<th>Toluene</th>
<th>Me Cl₂</th>
<th>NMP</th>
<th>Cresol/ Xylene (1:1)</th>
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<tbody>
<tr>
<td>6E</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>9E</td>
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<tr>
<td>D 1309E</td>
<td>50°C</td>
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<td>D 1442E</td>
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<td>D 1539E</td>
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<td>D 1582E</td>
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<td>D 1655E</td>
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<tr>
<td>D 1765E</td>
<td>50°C</td>
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<td></td>
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<tr>
<td>D 1939E</td>
<td>50°C</td>
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<td>X = boiling solvent</td>
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</table>

0 – 5%
5 – 10%
>10%
## Solubility of CoPA

<table>
<thead>
<tr>
<th>CoPA</th>
<th>MeOH</th>
<th>EtOH</th>
<th>MeOH/MeCl₂ (1:1)</th>
<th>Me Cl₂</th>
<th>NMP</th>
<th>Cresol/ Xylene (1:1)</th>
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<tbody>
<tr>
<td>1A</td>
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<td>2A</td>
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<tr>
<td></td>
<td>50°C</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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</tbody>
</table>

0 – 5%  
5 – 10%  
>10%  

X = boiling solvent
Safety Precautions with Griltex

Recommendations for the safe use of Griltex Copolyamide and Copolyester adhesive powders

Like all organic, dust-like powders, the fine particles of Griltex-adhesive powder can form explosive mixtures with air.

Typical dust explosion parameters for Griltex fine powders (P 0-35):
- Lower Explosive Limit: 20 g/m³
- Minimum ignition temperature: 400 °C
- Minimum ignition energy: >25 mJ
- Dust explosion class: St 1

Griltex adhesive powders can be safely handled in well ventilated work areas without static electricity.

In the case of fire, Griltex adhesive powders will melt and gradually decompose above 300 °C. Combustible gases are produced during decomposition. Combustion in the presence of sufficient oxygen produces mainly carbon dioxide and water. Combustion of polyamides liberates nitrogenous compounds. As with all organic materials, an atmosphere poor of oxygen can cause production of toxic carbon monoxide.

With regard to toxicity, combustion products of Griltex are comparable to those of wood.

Recommended fire-fighting agents according to DIN 14 406 are the types A, B and C, e.g. water spray, foam, carbon dioxide foam (CO₂) or dry powder. A water jet might effective in the case of larger conflagrations.

Recommended precautions:

1. Powder concentration in the air should be kept below 20 g/m³. This can be done by effective ventilation or exhaust in the event of dust build-up.
2. Equipment and work areas should be kept clean and free from static electricity.
3. Dust deposits should be removed regularly using a vacuum device. Pressurized air should never be used to remove such deposits.
4. Possible ignition sources, e.g. naked flames or electrical sparks should be avoided near machinery and work areas.
5. Coating machinery should always be clean.
6. The build-up of static charges through friction of dust against non-metallic surfaces should be avoided. For safety reasons, all equipments should be well grounded.
7. During the processing of copolyamides, small amount of caprolactam might be liberated. Since caprolactam is solid at ambient temperature, vapor deposits can form at cold surfaces. Build-up of deposits can be minimized by ventilation of the work area. Caprolactam is of low toxicity and can be safely used if the concentration at the workplace is kept below 5 mg/m³ by proper ventilation (MAK-value).
8. Typical Griltex polymers comply with the requirements of Oeko-Tex® standard 100 regarding limit values and fastness. They can be safely used for the production of baby textiles complying with this standard.

Griltex polymers are chemically inert to a large extent at moderate temperatures. At appropriate storage conditions Griltex polymers do not undergo any noticeable change and thus in principle have an unlimited shelf life.

For optimal results we recommend to use the material within one year and to test older material before use regarding its suitability for the intended application.