Datasheet Hybrid

METAKLETT “Hybrid” is a multiply mountable and dismountable hook-and-loop fastener. The hook-loop device consisting of the hook-element Entenkopf “HE1” and the loop-element “LOOP 001” can be assembled manually in varying angles at any position and disassembled by peeling or pulling. The synthetic loop-element is easy to integrate with non-metallic materials such as textiles etc.

Material

**Hook „HE1“**

- Material: 1.4310
- Sheet thickness t: 0.2 mm
- Sheet width b: 30 mm
- Sheet length l: can be cut to variable length
- Properties: 1.4310 according to DIN 10088 corrosion and acid resistant chromium nickel steel austenitic, high weldability

**Complement „LOOP 001“**

- Material: Polyamide, woven
- Mass: 300 g/m²
- Thickness: 2.35 ± 0.25 mm
- Width b: 38 mm
- Length l: can be cut to variable length
- Angle of assembling: no restriction

Total height assembled: 2.5 mm
Geometrical definition

Shear strength of the connection in longitudinal direction

Test set-up

With each of them clamped in a jaw chuck, the two hook and loop stripes are joined in the center within an area of 15 cm². The synthetic loop-element was bonded to sheet metal with a thickness of 0.2 mm using synthetic resin adhesive. The device is loaded in strip-direction.

<table>
<thead>
<tr>
<th>Clamp</th>
<th>N/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>Ø</td>
</tr>
<tr>
<td>Shear strength 0°</td>
<td>20</td>
</tr>
</tbody>
</table>

Data valid for a mounting area greater than 15 cm².
Application values

Test set-up

In the shear tension tests, the stripes are loaded in crosswise direction. The hooks are loaded against their bending-direction. The angle of the load direction during the dismounting process is adjustable.

<table>
<thead>
<tr>
<th>peel tension</th>
<th>pull-out tension</th>
<th>shear tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>60°</td>
<td>45°</td>
</tr>
<tr>
<td>30°</td>
<td>0°</td>
<td></td>
</tr>
</tbody>
</table>

The data below shows the maximum force per area as function of the different types of load* and temperatures** (10 tests, mounting area 6.6 cm²). The synthetic hook strip was adhered on a sheet with a thickness of 0.2 mm using synthetic resin adhesive.
<table>
<thead>
<tr>
<th>Clamp</th>
<th>23 °C</th>
<th>50 °C</th>
<th>100 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull-out strength</td>
<td>2,8 ø 4,2</td>
<td>1,6 ø 3,4</td>
<td>0,9 ø 1,4</td>
</tr>
<tr>
<td>Shear strength 0°</td>
<td>48,6 52,6 57,3</td>
<td>30,9 40,0 46,4</td>
<td>8,4 23,0 35,6</td>
</tr>
<tr>
<td>Shear strength 30°</td>
<td>15,8 20,4</td>
<td>15,9 20,0</td>
<td>16,4 19,2</td>
</tr>
<tr>
<td>Shear strength 45°</td>
<td>5,3 7,6</td>
<td>5,9 7,2</td>
<td>5,8 8,2</td>
</tr>
<tr>
<td>Shear strength 60°</td>
<td>6,4 9,2</td>
<td>8,3 10,9</td>
<td>4,4 6,4</td>
</tr>
<tr>
<td>Peel strength</td>
<td>0,4 ø 0,9</td>
<td>0,3 ø 0,6</td>
<td>0,6 ø 0,9</td>
</tr>
</tbody>
</table>

*: Test specification: LWF KS-2-specimen, Laboratory for Materials and Joining Technology, University of Paderborn
**: At 100 °C the adherence between synthetic stripe and sheet partly failed before the fastener was dismounted

**Maximum force per area as function of the loading angle**

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Polar diagram – averages of 10 tests, depending on loading angle and temperature

**Trend of separation force per area for multiple fastening**

After manually mounting and dismounting 100 times, the maximum force decreases by ca. 35 % (average of 10 tests, 23 °C, pull-out tension).

**Chemical and thermal resistance**

Hook element: According to DIN 10088, material 1.4310
Loop element: washable at 60 °C
Pressure sensitive adhesive: must be specified regarding to substrate and application

**Fastening**

Hook element: preferably by welding or riveting
Synthetic loop strip: adherence or sewing
Further possibilities depending on the application; customer’s decision