

# 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“**

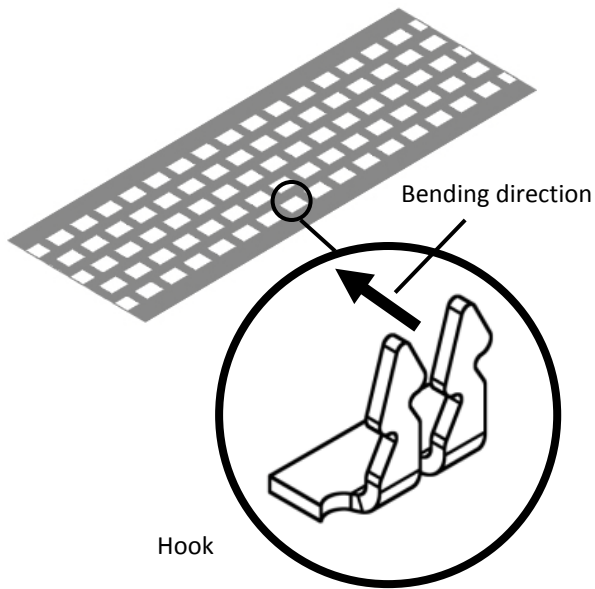
Material:	1.4310
Sheet thickness t:	0.2 mm
Sheet width b:	30 mm
Sheet length l:	can be cut to variable length
Properties:	1.4310 according to DIN 10088 corrosion and acid resistant chromium nickel steel austenitic, high weldability

### **Complement „LOOP 001“**

Material:	Polyamide, woven
Mass:	300 g/m <sup>2</sup>
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

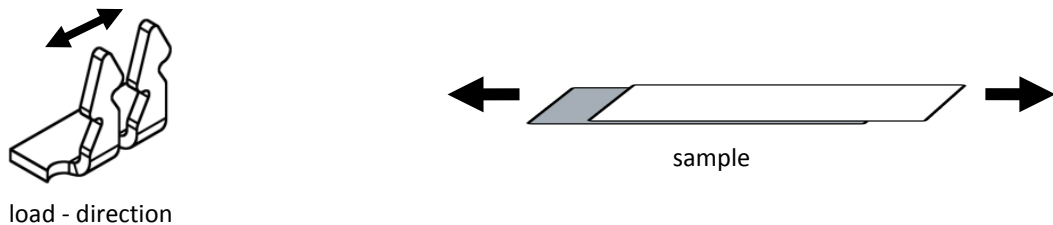
**Geometrical definition**



**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 cm<sup>2</sup>. 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.



Force per area (25 tests, 23 °C room temperature, joined area 15 cm<sup>2</sup>)

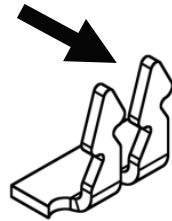
Clamp	N/cm <sup>2</sup>			
	Min.	Ø	Max.	σ
Shear strength 0°	20	30	39	15 %

Data valid for a mounting area greater than 15 cm<sup>2</sup>.

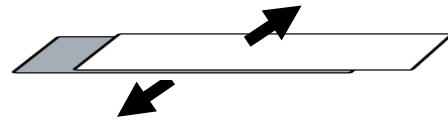
**Application values**

**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.



load-direction (shear strength)



sample

peel tension	pull-out tension	shear tension			
	90°	60°	45°	30°	0°

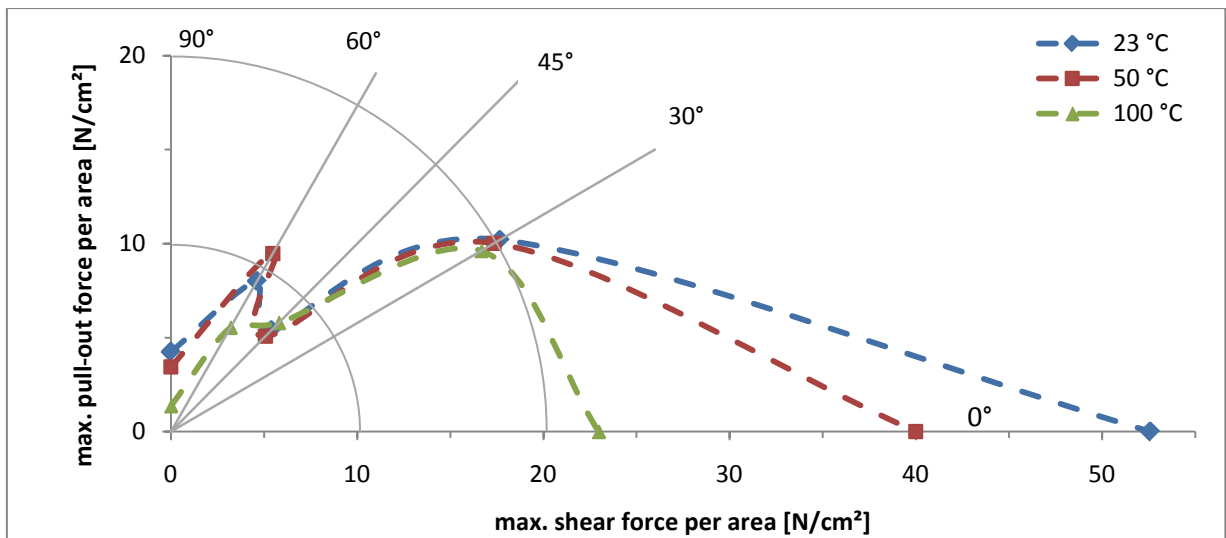
The data below shows the maximum force per area as function of the different types of load\* and temperatures\*\* (10 tests, mounting area 6.6 cm<sup>2</sup>). The synthetic hook strip was adhered on a sheet with a thickness of 0.2 mm using synthetic resin adhesive.

Clamp	N/cm <sup>2</sup>											
	23 °C				50 °C				100 °C			
	Min.	∅	Max.	σ	Min.	∅	Max.	Σ	Min.	∅	Max.	Σ
<b>Pull-out strength</b>	2,8	<b>4,2</b>	5,5	21 %	1,6	<b>3,4</b>	5,0	31 %	0,9	<b>1,4</b>	2,3	32 %
<b>Shear strength 0°</b>	48,6	<b>52,6</b>	57,3	5 %	30,9	<b>40,0</b>	46,4	13 %	8,4	<b>23,0</b>	35,6	37 %
<b>Shear strength 30°</b>	15,8	<b>20,4</b>	23,2	10 %	15,9	<b>20,0</b>	22,6	10 %	16,4	<b>19,2</b>	21,7	11 %
<b>Shear strength 45°</b>	5,3	<b>7,6</b>	10,3	19 %	5,9	<b>7,2</b>	9,4	15 %	5,8	<b>8,2</b>	14,0	28 %
<b>Shear strength 60°</b>	6,4	<b>9,2</b>	12,7	21 %	8,3	<b>10,9</b>	14,2	18 %	4,4	<b>6,4</b>	10,2	28 %
<b>Peel strength</b>	0,4	<b>0,9</b>	2,0	57 %	0,3	<b>0,6</b>	1,1	41 %	0,6	<b>0,9</b>	1,3	25 %

\*: 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 dismantled

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



*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 dismantling 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