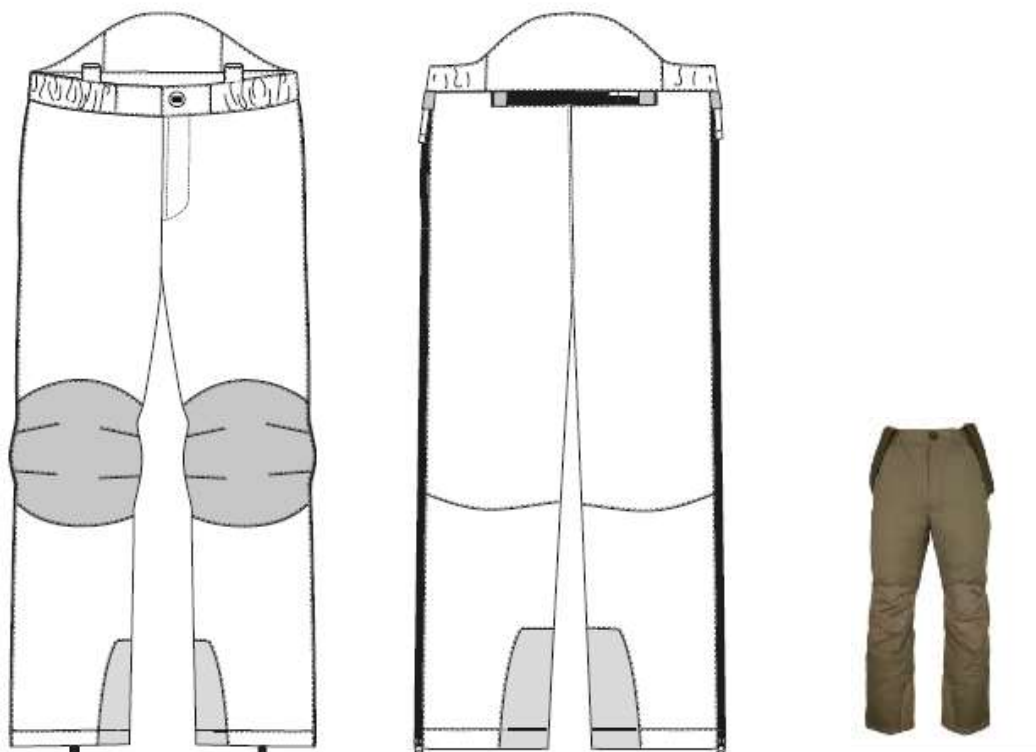


Technical Specification  
**THERMAL CLOTHING**  
**3.2 Trousers**

**HIG 4.0 | HIGH INSULATED GARMENTS -  
TROUSERS**



## MAIN FEATURES:

- windproof and water-repellent material;  
(2 Layer Laminate ePFTFE membrane)
- covered zipper in closed position, pullable in both directions;  
(2way zipper covered with kissing flaps )
- compression bag included;
- use temperature up to -20°C
- Colour olive IRR

## ADDITIONAL FEATURES:

- Outer material water repellent, windproof, & IRR
- Elastic waistband with button closure
- All zippers & cords are covered for IRR
- Water-repellent outer zippers
- High-cut rear waist band
- Large rear pocket
- Ergonomic pre-shaped knees
- 2-way leg zipper to hem, with wind flap
- Adjustable elastic drawcord at hem
- Shoe fixation hook
- Reinforcement at knees and ankles
- Adjustable suspenders
- Compression bag included
- Machine washable




# 1 Technical Requirements – Main Materials

## 1.1 Outer Fabric

Properties	Standard	Requirement
Face fabric properties		
composition		100% Polyamid
construction	ISO 9354	Ripstop
Functional layer	Membrane based on PTFE	
Physical & Mechanical laminate properties		
Weight [g/m²]	ISO 3801, method 5 / EN 12127	≤ 120
Ret [m²Pa/W]	EN ISO 11092	≤ 5
Tensile strength	EN ISO 1421 method 1	Warp ≥ 650 N Weft ≥ 500 N
Tear Strength (Tounge)	EN ISO 4674-1, method A	Warp ≥ 70 N Weft ≥ 70 N
Dimensional stability	EN ISO 5077/EN ISO 3759 EN ISO 6330/6N, dry method F (1 wash cycle)	Warp ≤ 3% Weft ≤ 3%
Abrasion Martindale Face / Backing [Rubs]	EN ISO 12947-2 12kPa/wool SM 25	≥ 100.000
Permeability to air		
Initial		< 5 l/m².s
After 50x/5x wash/dry cycles	EN ISO 6330/6N, dry method F60	< 5 l/m².s
Durability		
Visuell assessment of resistance to delamination after 50x/5x wash/dry cycles	EN ISO 6330/6N, dry method F60	- no delamination (disintegration of composite membrane) - no separation of individual components - no bubbles or crimping (bigger than 3mm) Visuell assessment every 10 wash cycles
Spray rate Initial	EN 24920/ISO 4920	Grade ≥ 5
Oil rate Initial	EN ISO 14419	Grade ≥ 5
Colour fastness properties		
Colour fastness to light	EN ISO 105-B02, method 2	≥ 4-5 Depending on color depth
Colour fastness to washing 60°C	EN ISO 105-C06, C1S Colour change: Staining: (PA) Staining: (CO)	Depending on color depth ≥ 4-5 ≥ 3-4 ≥ 3-4
Colour fastness to water	EN ISO 105-E04 (alkaline/acid) Colour change: Staining: (PA) Staining: (CO)	Depending on color depth ≥ 4-5/4-5 ≥ 3-4 ≥ 3-4
Colour fastness to rubbing	ISO 105-D01 Colour change: Staining: (PA) Staining: (CO)	Depending on color depth ≥ 4-5 ≥ 3-4 ≥ 3-4
Colour Requirements		Note colour fastness and colour requirements meet typical plain colour and



		camouflage requirement for military application
IRR All plain colours	As measured on Perin Elmer Lambda 950 in a range between 800 -1100 nm	Kakhi grey 10-55% Urban grey 10-55% Olive 10-55% Black 10-55% Navy Blue 10-55%
Care Labelling: Related to This Laminate Only		

## 1.2 Inner fabric

Properties	Standard	Requirement
Material		100 % Polyamide 6 or 6.6; 44 dtex; semi dull or dull
Thread count		Warp $\geq 650/10\text{cm}$ Weft $\geq 440/10\text{cm}$
Construction		1/1 Ripstop
Weight per m <sup>2</sup> in gram	DIN EN 12127-1	53 g/m <sup>2</sup> $\pm 10$ g
Breaking load in N/5 cm	DIN EN ISO 13934-1	Warp $\geq 500$ N Weft $\geq 330$ N
Tear strength	DIN EN ISO 13937-2	Warp $\geq 18$ N Weft $\geq 18$ N
<b>Colorfastness</b>		
To the light	DIN EN ISO 105-B02	min. 5
To rubbing dry and wet	DIN EN ISO 105-X12	min. 4
To washing 40 °C	DIN EN ISO 105-C06	min. 4
*Size changes after 5 washes 40°C	DIN EN 25077*	$\leq 3$ %
Value of the pH		from 4,8 to 7,5

\* Washing according to DIN EN ISO 6330-4M

Washing machine type A

Drying method F,  $\leq 50^\circ\text{C}$

## 1.3 Reinforcement Material

Properties	Standard	Requirement
Material		100% polyamid 6.6 + ePTFE laminated
Weight	EN 12127 method 5	240 g / m <sup>2</sup> ( $\pm 10\%$ )
Weave structure		Plain weave
Tensile strength warp	ISO 13934-1 2013	1600 N



Tensile strength weft	ISO 13934-1 2013	1300 N
Tear strength (3 legs) warp	4674-1A 2003	90 N
Tear strength (3 legs) weft	4674-1A 2003	75 N
Watercolumn	EN 20811 / ISO811	≥ 10.000 MM
<b>Colourfastness</b>		
To washing 60°C	ISO 105C06 2010	Light ≥ 5 Middle ≥ 4 Dark ≥ 3/4
To water	ISO 105E01 2013	Light ≥ 5 Middle ≥ 4 Dark ≥ 3/4
To rubbing dry	ISO 105X12 2001	Light ≥ 5 Middle ≥ 4 Dark ≥ 3/4
To rubbing wet	ISO 105X12 2001	Light ≥ 5 Middle ≥ 3/4 Dark ≥ 3
IRR All plain colours	As measured on Perin Elmer Lambda 950 in a range between 800 - 1100 nm	Kakhi grey 10-55% Urban grey 10-55% Olive 10-55% Black 10-55% Navy Blue 10-55%

### 1.7 Heat reflection insert

Material	100 % polypropylene, white
Fibrous structure	loose filaments, thermobonded, without additives
Breaking load	N/50 mm, DIN EN 29073-3, lengthwise/crosswise 24 N/15 N
Weight	15,0 to 19,0 g/m² DIN EN 29073-1
Aluminised	82 mg/m², (+/- 10%), on one side

### 1.8 Polyester Insulating Fleece (125g)

Fiber quality	100 % original brand polyester fiber (hybrid fiber) with conjugate, helical crimp and silicone-finished fiber surface.
Manufacture	Insulation made of thermobond and spray-bonded random-fiber polyester consisting of 3 different polyester fibers (i.e., Hollow Fiber, Micro Fiber and Thermobond Fiber)

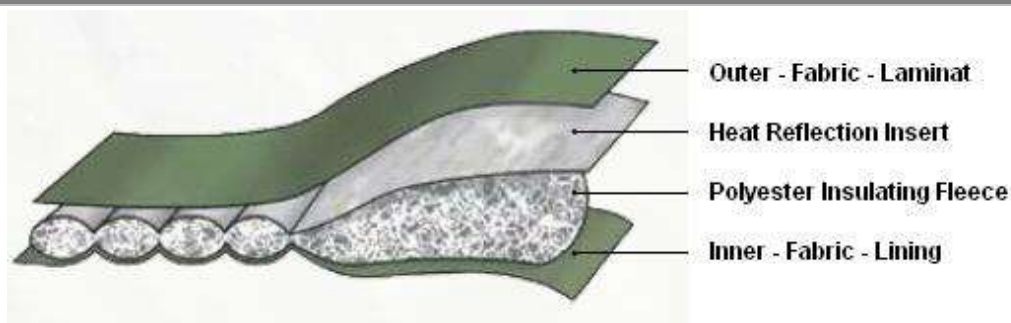


### 1.8.1 Basic Performance Parameters

Parameter	Product Targets	Tolerances	Test Methods
Area Weight (g/m <sup>2</sup> )	125	± 10 %	DIN EN 29073-1
Thickness (mm)	21	min.	DIN EN ISO 9073-2
Thermal Resistance Rct (m <sup>2</sup> K/W)*	0,4	min.	DIN/EN 31092:1994-02A resp. ISO 11092:1993-10A

\*Measured in new and unquilted condition

## 2 Structure



### Physiological Properties

Taken from the finished jacket

Rct-Value*		
125 g insulation	DIN EN 31092 ISO 11092	≥ 0,330 m <sup>2</sup> K/W

\*Measured in new and unquilted condition

## 3 Accessories

### 3.1 Zipper (All zippers according to DIN EN 3418)

#### 3.1.1 Fly Zipper

Type	one-way zipper
Modell	Water repellent; 6 to 7 mm spiral
Material	polyester

#### 3.1.2 Zippers on the legs

Type	two-way zipper, double sliders
Modell	Water repellent; 6 to 7 mm spiral



### 3.1.3 Zipp Slider

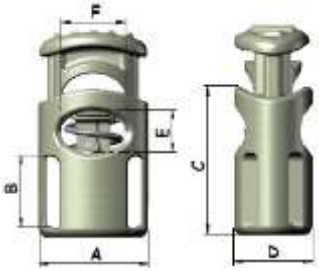
Material	Zinc die cast, Stainless steel
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## 3.2 Hook and Loop Fastener (according to DIN 3415-A, ISO 9001:2015)

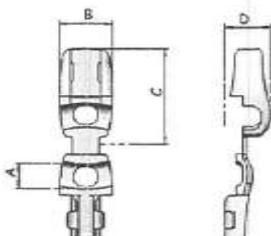
### 3.2.1 Hook and Loop Fastener (according to DIN 3415-A, ISO 9001:2015)

Material	100% Polyamid
Mass per unit area	~ 330g / m <sup>2</sup> hook and ~ 330g / m <sup>2</sup> loop part
after 10.000 openings & closings (EN1414)	
peel strength (EN 12242)	min.0,60N/cm
shear strength (EN 13780)	min.3,0N/cm <sup>2</sup>

## 3.3 Cord-Stopper

Modell	GTSP or equivalent with hole for self cleaning of snow and dirt	
Material	Polyamide (PA6, Nylon) or POM	
Color	olive	
Measurement	A14,5 B9,5 C 19,5 D10,4 E 5,5 F 8,5mm Tolerance ±0,5mm	

## 3.4 Cord- Clip

Material	Polyamide (PA6 or 6.6) or POM	
Color	Black or olive	
Measurement	A3,8 x B7,9 x C14,8 x D6,7 mm Tolerance ±0,5mm	

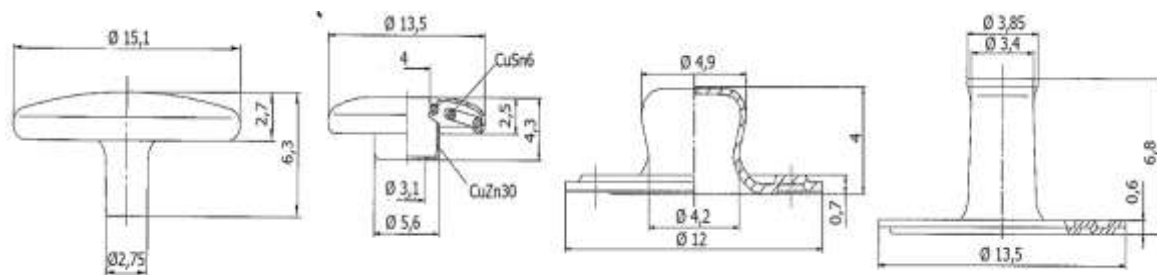
## 3.5 Hanging-Loop (inside)

Material	100% Polyester
Weave structure	rip
Width	8 mm +0,5mm; -1,0mm



### 3.6 Press studs

Material	brass
Color	brass

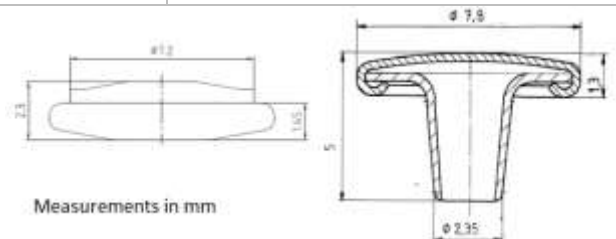


Tolerance  $\pm 3\%$

### 3.7 Eyelet

#### 3.7.1 Eyelet 5

Material	Brass
Colour	Brass



Tolerance  $\pm 0,5\text{mm}$

### 3.8 Elastic Draw Cord

Material	Latex Nr.30, PES 167x1
Diameter	$3 \pm 0,5 \text{ mm}$
Elasticity/Shrink	$\pm 5\%$

### 3.9 Draw Cord

Material	Polyester or PA
Color	white
Diameter	$3 \pm 0,5 \text{ mm}$



### 3.10 Elastic Rubber Band

Material	Latex Nr.30, PES 167x1
Thickness	1,5 ± 0,3 mm
Width	24,5 ± 1mm
Elasticity/Shrink	± 5%

### 3.11 Elastic Rubber Band (suspenders)

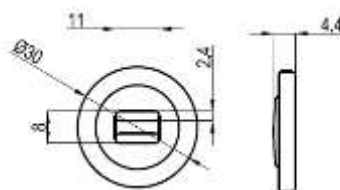
Material	Latex Nr.30, PES 167x1
Thickness	1,5 ± 0,3 mm
Width	35 ± 1mm
Elasticity/Shrink	± 5%

### 3.12 Elastic Rubber Band (shoe fastening)

Material	Polyester / Latex (Natural rubber)
Weight	5g/m ±10%
Width	8,4 ± 1mm

### 3.13 Button

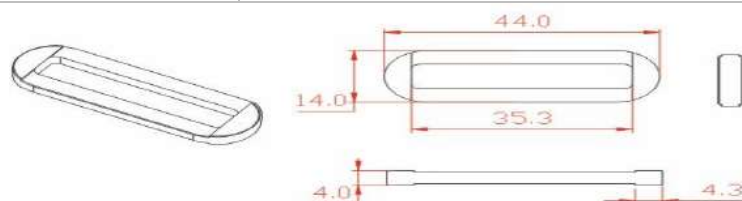
Material	PA or POM
Colour	Black, olive or coyote



Tolerance ±0,5mm

### 3.14 Loop for suspenders

Material	PA or POM
Colour	Black or olive



Tolerance ±0,5mm

### 3.15 Threads

#### Overlock Thread

Material	Poly/Poly
Construction	Core spun
Linear Density (Nm)	Approx. 60/2 (EN ISO 2060)

#### Sewing / Quilting Thread

Material	Poly/Poly
Construction	Core spun
Linear Density (Nm)	Approx. 50/2 (EN ISO 2060)

## 4 Compression Bag

### 4.1 Main Material Composition (textile)

Parameter	Test method	Value
Material		100% Polyamide + PU
Weight		$\leq 160 \text{ g/m}^2$
Shrinkage wash 40°C warp	ISO 5077 2007	$\pm 3,00 \%$
Shrinkage wash 40°C weft	ISO 5077 2007	$\pm 3,00 \%$
Tensile strength warp	ISO 13934-1 2013	$\geq 700 \text{ N}$
Tensile strength weft	ISO 13934-1 2013	$\geq 450 \text{ N}$
Tear resistance warp	ISO13937-1 2000	$\geq 35 \text{ N}$
Tear resistance weft	ISO13937-1 2000	$\geq 35 \text{ N}$
Watercolumn	ISO811 1981	$\geq 1000\text{mm}$
Colorfastness to washing 40°C	ISO105C06 2010	min. 4
Colorfastness to rubbing dry	ISO105X12 2001	min. 4
Colorfastness to rubbing wet	ISO105X12 2001	min. 4

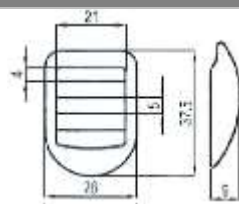
### 4.2 Belt (Compression Bag)

Material	94% PES + 6%PA
Width	20±1mm
Thickness	1±0,5mm

### 4.3 Draw Cord

Material	Polyester or PA
Diameter	4 ± 1mm



4.4 Buckle		
Material	PA or POM	
Tolerance	±0,25mm	

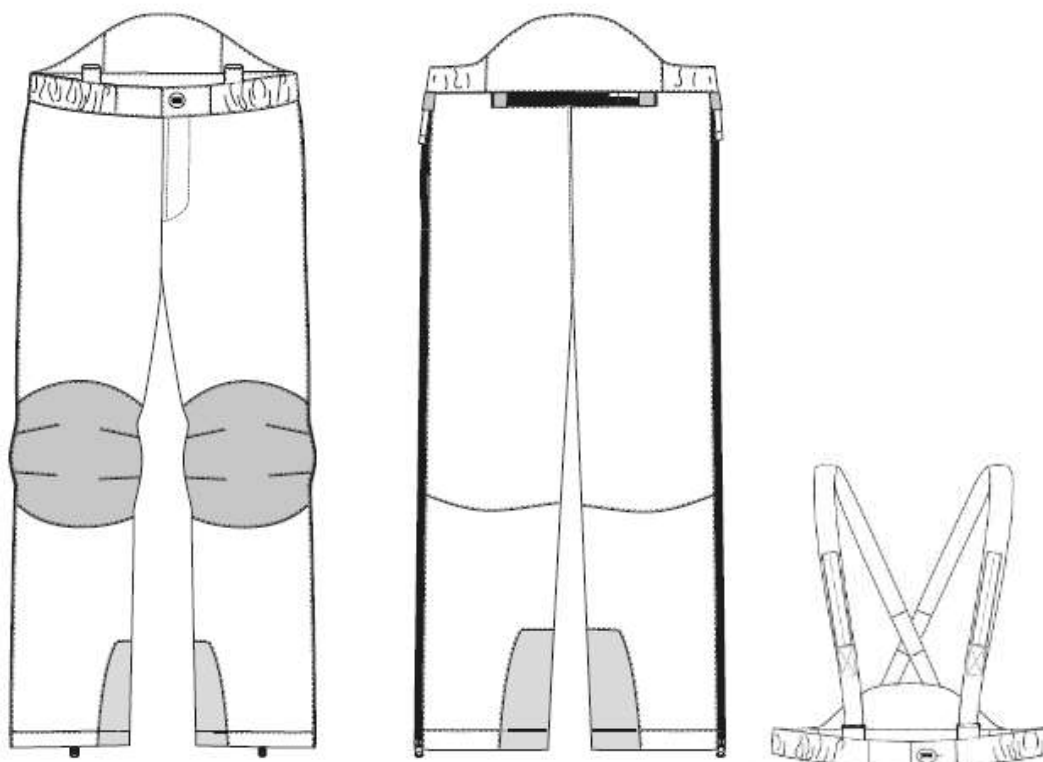
#### 4.5 Cord Stopper

Material	POM or PA
Diameter	Fitting to the drawcord (5.3)

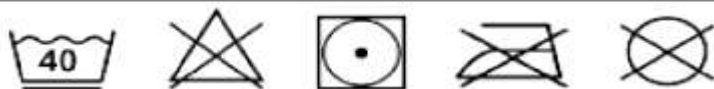
5 MEASUREMENT TABLE					
Size	S	M	L	XL	XXL
½ waistband (tight)	50	54	58	62	66
½ waistband (loose)	42	46	50	54	58
½ hip incl. side zip (fly end)	60	64	68	72	76
½ upper leg sleeve (5cm down)	34	36	38	40	42
side leg length (incl. waistband)	113	115	117	119	121
inside leg length	81	82	83	84	85
½ leg bottom	25	26	27	28	29
waistband height	4,5	4,5	4,5	4,5	4,5
side seam zipper under flap	4	4	4	4	4
side seam zipper length	108	110	112	114	116
front centre fly zipper length	22	23	24	24	24
back pocket zipper length	25	25	25	25	25
compression bag height	33	33	33	33	33
Compression bottom	20	20	20	20	20
<b>Weight (finished product)</b>					
Weight trousers (in gram)	920	940	970	1000	1020

Note: A tolerance up to ±3% is applicable for all measurements  
A tolerance up to ±10% is applicable for all weights





## 6 CARE INSTRUCTIONS



- Use very little amount of mild detergent only
- Use no softener
- Rinse thoroughly