



PROCESS SPECIFICATION

HPS40-2 2+2

Female Connector NAFTA SCC

EVS-100101



HIRSCHMANN
AUTOMOTIVE



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1 General

1.1 Introduction

This process specification is valid for all variants describes the product structure as well as the assembly of the Hirschmann Automotive HPS40-2 2+2 female connector NAFTA SCC.

System number	Coding	Wire cross section
809-886-501	A	4.0 mm ²
809-886-502	B	
809-886-503	C	
809-886-504	D	
809-886-507	Z	
809-886-521	A	6.0 mm ²
809-886-522	B	
809-886-523	C	
809-886-524	D	
809-886-527	Z	
809-886-531	A	4.0 mm ²
809-886-532	B	
809-886-533	C	
809-886-534	D	
809-886-537	Z	
809-886-541	A	6.0 mm ²
809-886-542	B	
809-886-543	C	
809-886-544	D	
809-886-547	Z	
809-886-551	A	5.0 mm ²
809-886-552	B	
809-886-553	C	
809-886-554	D	
809-886-557	Z	

The manufacturer of the listed products is responsible for the qualitative processing and the accuracy of the version. In the case of improper processes or deviation from specification that results in quality issues, the right of complaint is void.

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1.2 Customer-releases

It is our suggestion that the specified dimensions are observed during processing. Further functional features must be coordinated and defined with the OEM. The adjustments in the processing specification with the status 08/ 2023 must be considered for new applications, but not for existing applications.

1.2.1 Customer: Miscellaneous

Customer: Miscellaneous					
L	S	F	Characteristic	Specific Purpose	Place of implementation
L1	-	-	"d" Height of shield-crimping	Strain-relief, electrical shield connection - EMC	Tier 1
L2**	-	-	Retention force of shield crimping	Strain-relief, electrical shield connection - EMC	
-	-	F1	L12 depth of contact carrier	Pluggability	

**No 100% check possible since the specimens are destroyed during testing.

Proof of capability or continuous testing of all special characteristics must be aligned with the OEM directly.

Legend: L = Legal, S = Safety, F = Function

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1.3 Other current documents

A	HCT4 Process specification (Ag)	EVS-100068
B	Datasheet Shielded SCC 4.0 mm ² Huber & Suhner	12582674
C	Datasheet Shielded SCC 6.0 mm ² Coficab	FHLR91XC91X-B ISO
D	Datasheet Shielded SCC 4.0 mm ² Coficab	FHLR91XCB91X / FHLR91XC91X (not validated)
E	Datasheet Shielded SCC 5.0 mm ² Aptiv	M-Number M7284FFX
F	Datasheet Shielded SCC 6.0 mm ² Champlain	Ergoflex ISO19642-9 (Part Number:15-08921)

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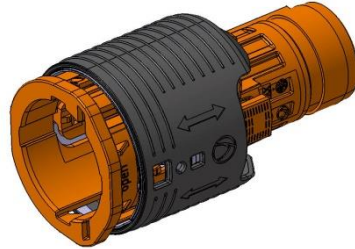
2 Product structure (single components)

2.1 Sheated cable (see table)

Wire manufacturer	Wire cross section		
	4.0 mm ²	6.0 mm ²	5.0 mm ²
Huber & Suhner	FHLR91XC13X -1x 4.0 mm ² RADOX 155S (91X) RADOX Elastomer S (13X)	-	-
	Validated acc. USCAR	-	-
Coficab	FHLR91XCB91X T4 PSA 1x 4.0 mm ²	FHLR91XC91X T4 ISO 1x 6.0 mm ²	-
	Validated acc. GELEC	Validated acc. GELEC	-
	FHLR91XC91X T4 LV 1x 4.0 mm ²	-	-
	Validation ongoing	-	-
Champlain	-	ISO19642-915-08921 1x 6.0 mm ²	-
	-	Validation ongoing	-
Aptiv	-	-	M7284FFX 1x 5.0 mm ²
	-	-	Validated acc. USCAR

Only wires which are listed here and released by the respective OEM are allowed to use.

2.2 HPS40-2 2+2 locking sleeve NAFTA



-501

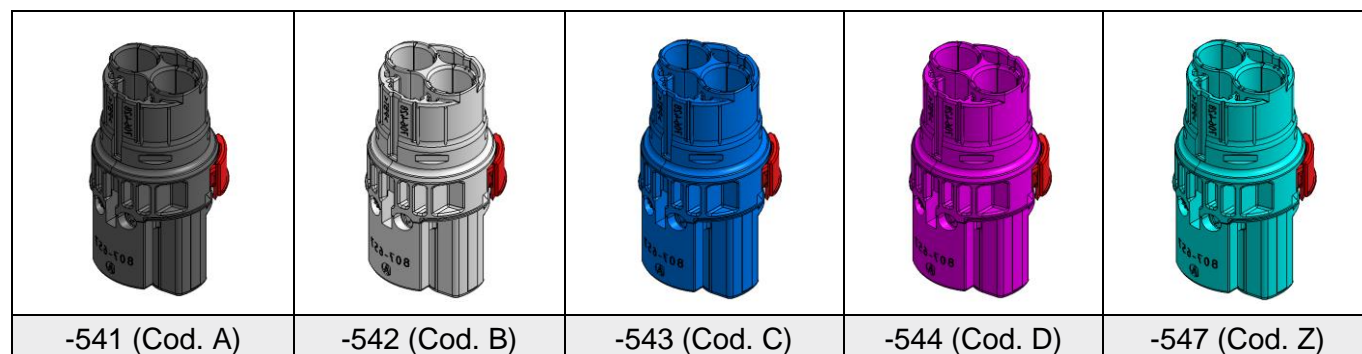
Hirschmann Automotive No.	Wire cross section
807-656-503	4.0 mm ² 5.0 mm ² 6.0 mm ²

Delivery condition: The locking sleeves are delivered as bulk good.

This document is not subject to change service!



2.3 HPS40-2 2+2 female contact carrier NAFTA



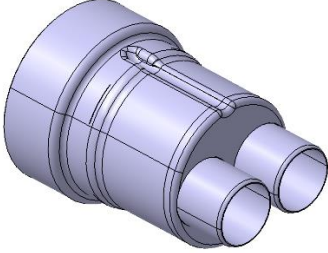
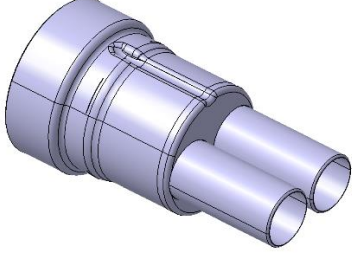
Hirschmann Automotive No.	Coding	Colour	HVIL bridge	Wire cross section	Flammability according to UL94
807-657-541	A	Black	Yes	6.0 mm ²	V-0
807-657-542	B	Natural/white	Yes		
807-657-543	C	Blue	Yes		
807-657-544	D	Purple	Yes		
807-657-547	Z	Water/ Blue	Yes		
NAFTA version					
807-657-551	A	Black	Yes	4.0 mm ² 5.0 mm ²	V-0
807-657-552	B	Natural/white	Yes		
807-657-553	C	Blue	Yes		
807-657-554	D	Purple	Yes		
807-657-557	Z	Water/ Blue	Yes		

Delivery condition: The contact carriers are delivered as bulk good.

This document is not subject to change service!

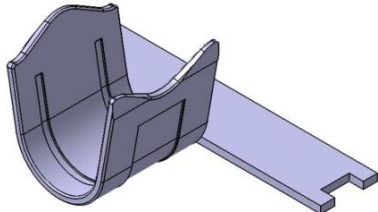



2.4 HPS40-2 2+2 shielding sleeve NAFTA

	
-504	-506
Hirschmann Automotive No.	Wire cross section
710-161-504	4.0 mm ² 5.0 mm ²
710-161-506	6.0 mm ²

Delivery condition: The shield sleeves are delivered as bulk good.

2.5 HPS40-2 2+2 stress relief NAFTA

	
-502	-501
Hirschmann Automotive No.	Wire cross section
710-195-502	4.0 mm ² 5.0 mm ²
710-671-501	6.0 mm ²

Wire manufacturer: On the product drawing (HA No. 809-886-...106), you can find the released cables for each stress relief.

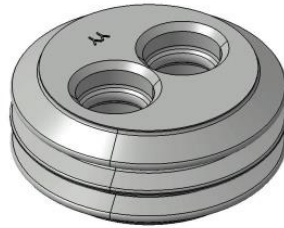
Delivery condition: The stress reliefs are delivered as bulk good.

Delivery condition: The ferrule crimp will be delivered at strip on a spool.

This document is not subject to change service!



2.6 HPS40-2 2+2 wire seal



-502

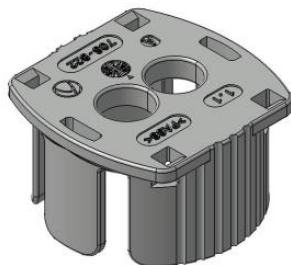
Hirschmann Automotive No.	Colour	Wire cross section
709-972-502	Grey	4.0 mm ² 5.0 mm ² 6.0 mm ²

Wire manufacturer: On the product drawing (HA No. 809-886-...106), you can find the released cables for each seal.

Delivery condition: The seals are delivered as bulk good.

This document is not subject to change service!

2.7 HPS40-2 2+2 cover cap



-503

Hirschmann Automotive No.	Colour	Wire cross section
706-822-503	Grey	4.0 mm ² 5.0 mm ² 6.0 mm ²



Wire manufacturer: On the product drawing (HA No. 809-886-...106), you can find the released cables for each cover cap.

Delivery condition: The cover caps are delivered as bulk good.

This document is not subject to change service!



2.8 HCT4 2+2 female terminal

	
-504	-505
Hirschmann Automotive No.	Wire cross section
709-427-504	4.0 mm ²
709-427-505	5.0 mm ² 6.0 mm ²

Delivery condition: The female terminal will be delivered at terminal strip on a spool.

2.9 HPS40-2 2+2 X-ring NAFTA



-501

Hirschmann Automotive No.	Wire cross section
710-675-501	6.0 mm ²

Delivery condition: The x-rings are delivered as bulk good.

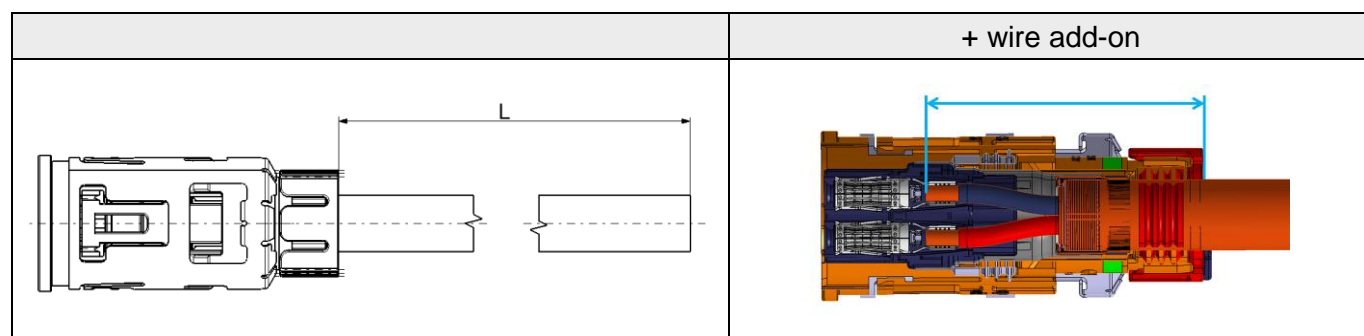
This document is not subject to change service!



3 Processing steps (4.0 mm²/ 5.0 mm²)

Use the following described processing steps as necessary for the wire cross sections 4.0 mm² and 5.0 mm². As a reference sample, a terminal holder coding A and a 6.0 mm² wire was used.

3.1 Cut the shielded cable



Add following lengths for the HPS40-2 2+2 female connector:

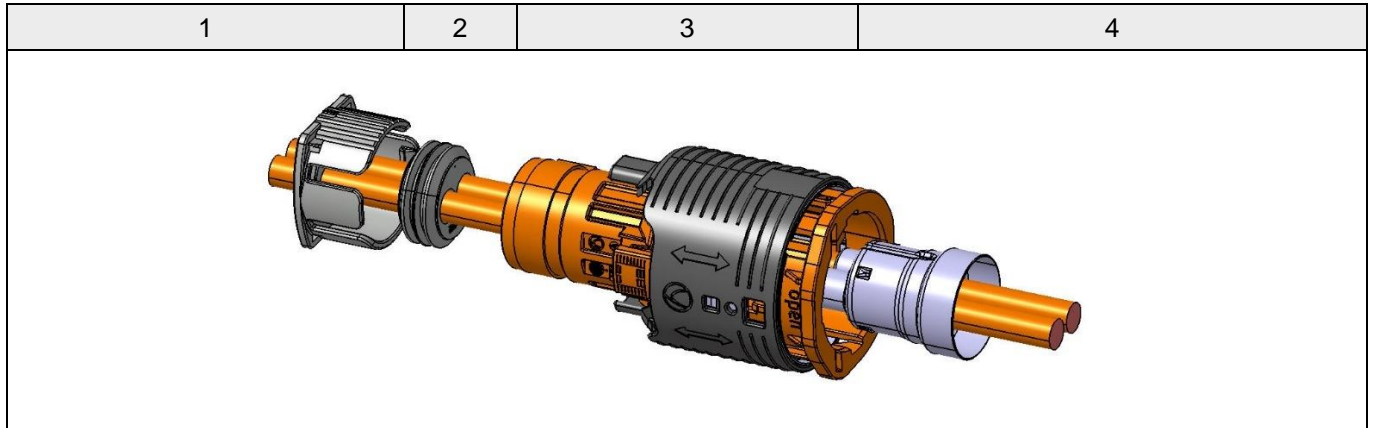
Wire cross section	Dimension L after zero-cut (mm)	Dimension L for the HCT4 terminal incl. zero-cut (mm)
4.0 mm ²	L + 50	L + 54
5.0 mm ²	L + 50	L + 54

This dimension must be added to the planned length at cutting process of the wire for each female connector.

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3.2 Assembly of the single components

Slide the cover cap (1), the seal (2), the female locking device (3) and the shielding sleeve (4) onto the shielded cable. Seal, cover cap and shielding sleeve are 180° symmetrical and can be assembled either way.

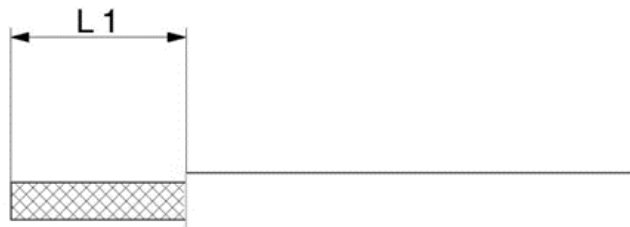


Note: The locking device unit (3) and shielding sleeve (4) may as well be assembled onto the cable after crimping of HCT4-female terminals.

3.3 Strip off the shielded cable



Stripping length:



Wire cross section	Dimension L1 after zero-cut (mm)	Dimension L1 for the HCT4 terminal incl. zero-cut (mm)
4.0 mm ²	18.0 ± 1	22.0 ± 1
5.0 mm ²	18.0 ± 1	22.0 ± 1

Do not damage the shielding during the processing operation.

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3.4 Crimp the crimp ferrule



The following process steps must be done, but the manufacturer can choose the sequence:

- Crimp the crimp ferrule
- Remove the foil.
- Shorten the shielding.

In this processing specification, the recommended sequence is shown.

- **Single stroke crimping machine**

For the positioning and the crimping process of the crimp ferrules, the crimping machine of the company “Schäfer” can be used:

Name of the device: Crimp-Device Crimp-Ferrule HPS40-2 SCC
Article number: EPS2001-HPS40-2-SCC

The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

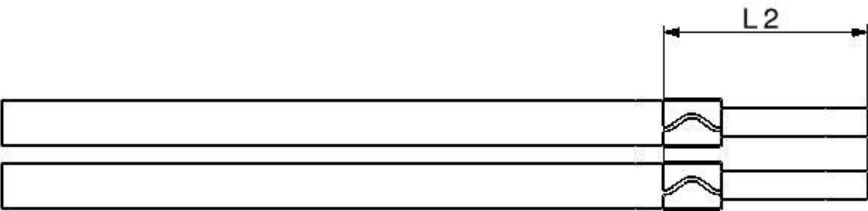
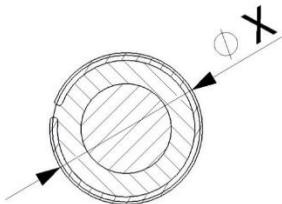

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the crimping device must be done through the manufacturer. In this edition you can only find the information of the crimping and positioning of the crimping process.

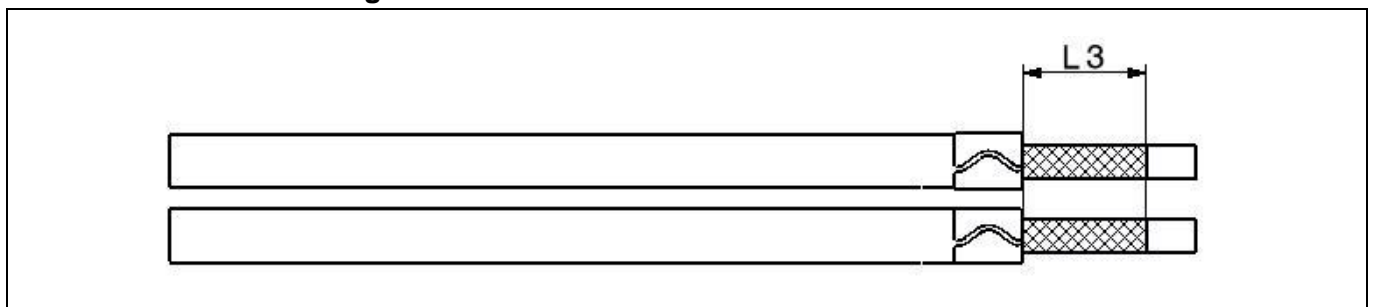
This document is not subject to change service!



- **Process data**

The crimp ferrules need to be crimped in relation to the single wires.	
	L2: max. 25.5 mm after zero-cut max. 29.5 mm incl. zero-cut
	Wire cross section: 4.0 mm ² / 5.0 mm ²
	Dimension X: 6.1 ± 0.1
	An overlap of the foil around the crimp like small edges is allowed.

Dimension of the shielding:



Depending on the production method of each manufacturer, the dimension L3 can vary.

After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:

- Can be avoided by removing the residues of the shielding.
- Can be avoided by blowing out or by suction of the residues of the shielding.

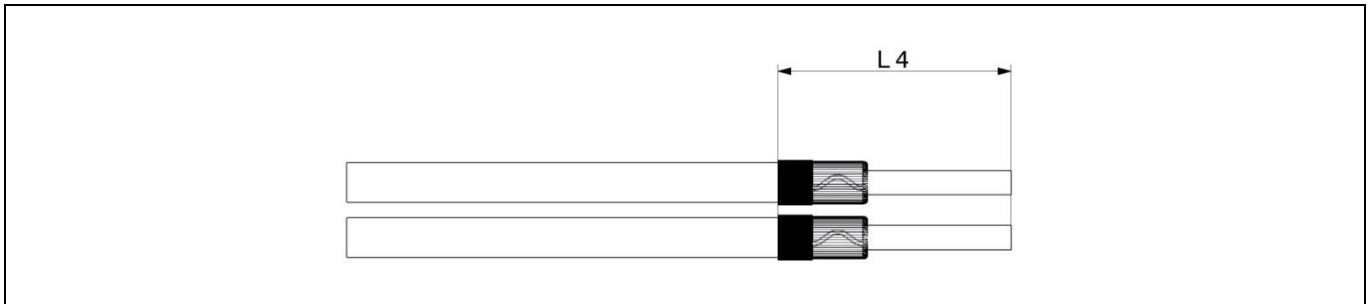
In the next process step, make sure that the shielding is rising over the crimp 100%.

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3.5 Wire processing I

Fold the shield backwards, hold the shield with tape



100% of the shield must be turned over the crimp. A targeted unbraiding of the shield is not necessary. By turning over the shield, a process related unbraiding is possible. After this the shield must be fixed with a fixing device after the crimp. (for example: tape) The fixing tape needs to stay on, until the pressing procedure is done and can be left inside the connector. The max. width of the tape is **5.0 mm**. The fixing tape must be positioned immediately after the crimp and must not reach the crimp. No shielding is allowed outside the fixing tape.

The max. position of the tape is showed with the dimension L4.

L4 = max. 33.0 mm after zero-cut
= max. 37.0 mm incl. zero-cut

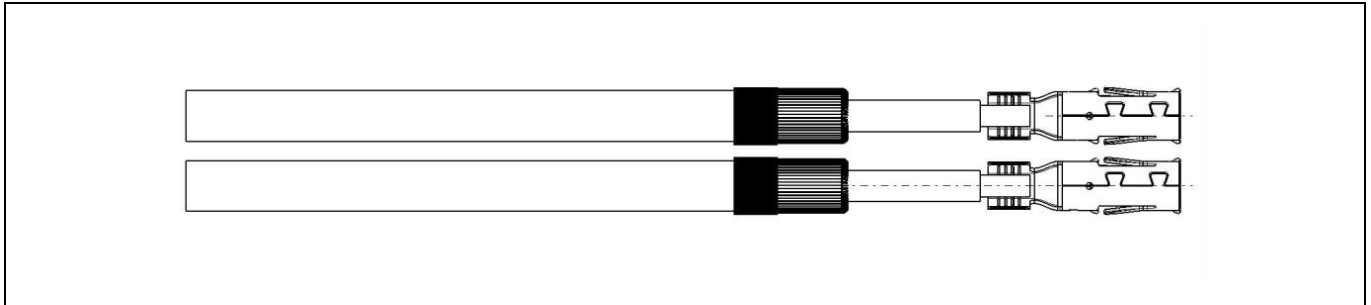
In this specification the PET- fabric tape 837X (838X) 5.0 mm of the company coroplast is used. It is possible to use another product to fix the shield. The max. outer diameter after assembling is $\varnothing 6.5$ and the shield sleeve must be able to be mounted easily. The product must have min. 150° C thermal resistance.

Single strands of the shield which are not fixed with the tape and stick out must be removed before further process steps. Do not damage the single wires during the complete processing operation.

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3.6 Crimp the HCT4 female terminal



- **Double stroke crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company “Schäfer” can be used:

<u>Name of the device:</u>	HPS40-2 Double stroke crimping machine
<u>Article number:</u>	EPS2001-HPS40-2
<u>Name of the device:</u>	Interchangeable crimping unit
<u>Article number:</u>	Shown in the process specification HCT4 female terminal „EVS-100068“

The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the crimping device must be done through the manufacturer. In this edition you can only find the information of the crimping and positioning of the crimping process.

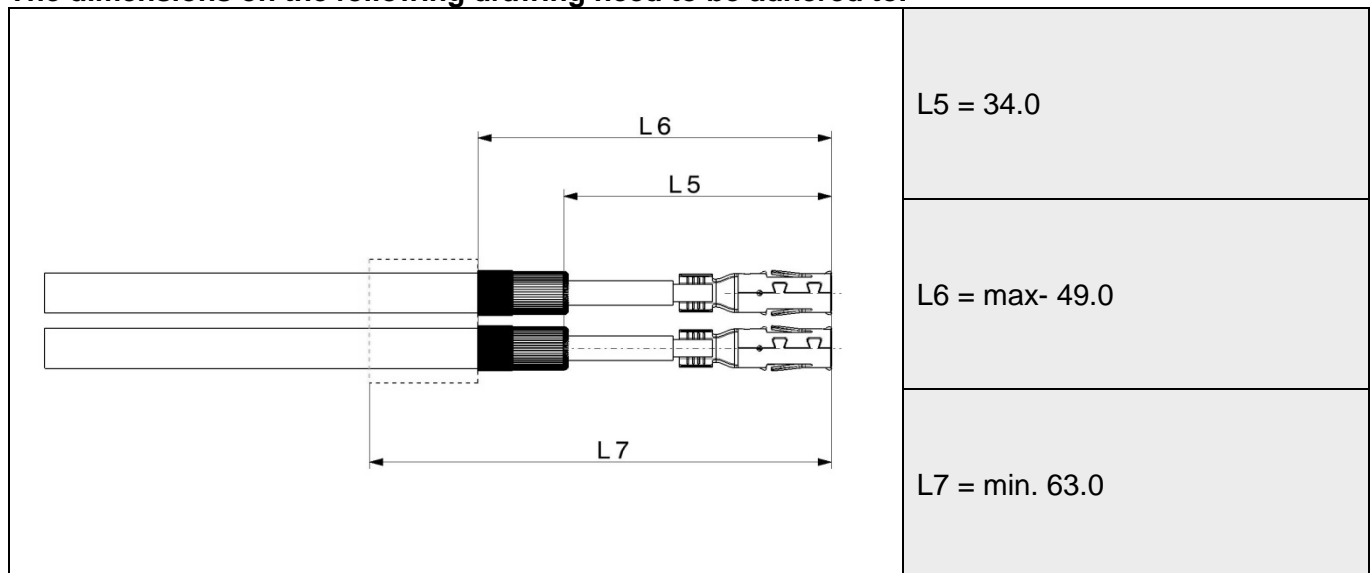
This document is not subject to change service!



- **Process data**

- a) The crimp data can be seen in the „Process specification HCT4 female terminal EVS-100068“.
- b) The HCT4 female terminals need to be crimped in relation to the single wires. For a smooth assembly into the contact holder, the terminals need to be crimped in the correct position.

The dimensions on the following drawing need to be adhered to.

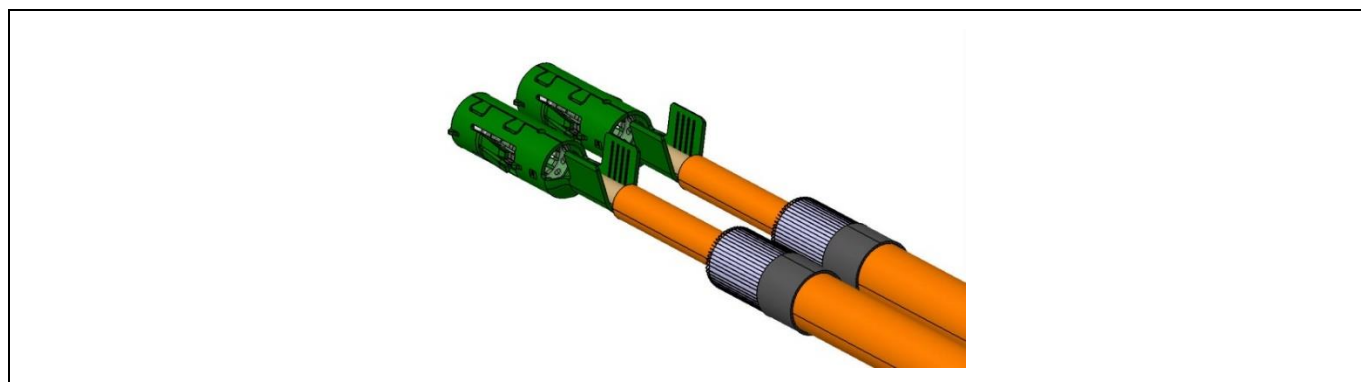
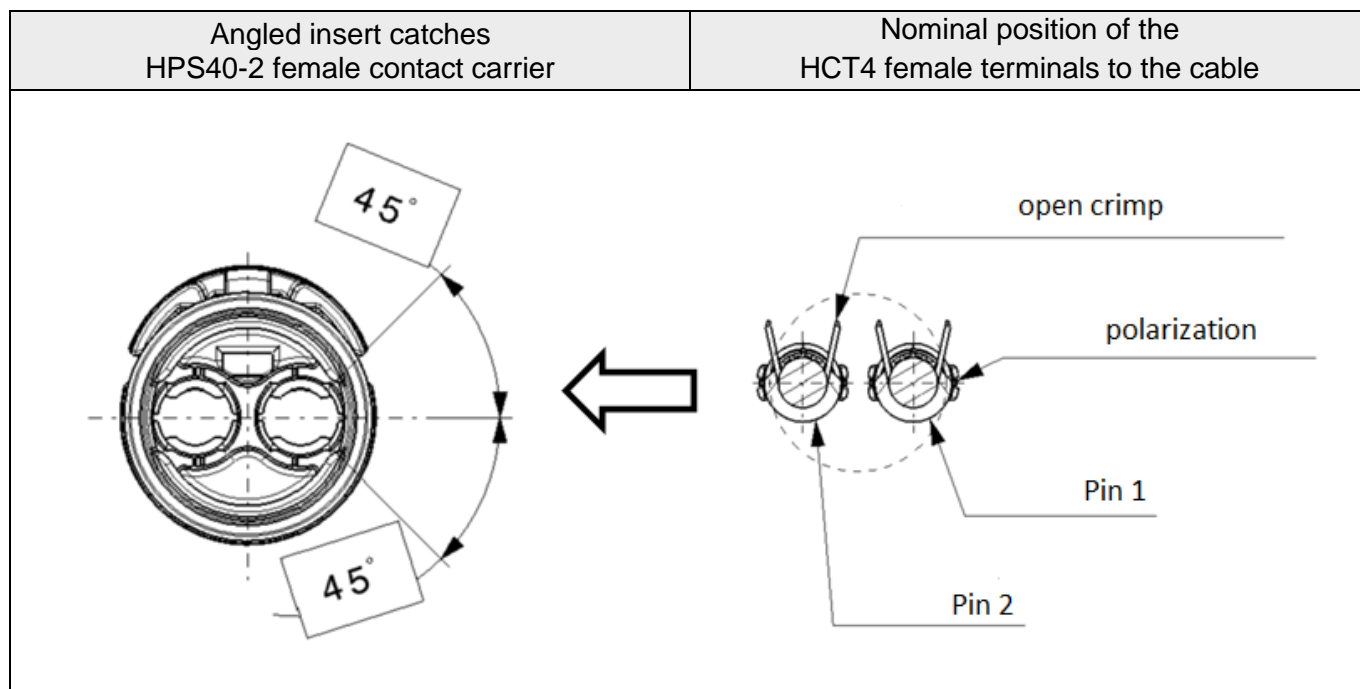


The dimension L5 and L6 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068.

The difference of the length between the female terminals of max. 0.5 mm is allowed.

A mark on the insulation of the single wires or on the outer sheath which is caused due to fixing the wire at the crimping process is allowed. It must be ensured that the insulation will not be damaged because this will lead to an insulation resistance failure. At the area of the wire, seal it is not allowed to deform or damage the outer sheath which has negative influence on the sealing function.

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To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the terminals and the wire is very important and needs to be ensured. Usually, the horizontal version is intended.

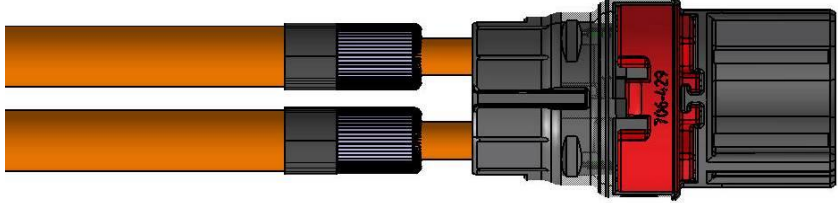
The allowed angle deviation results from the geometry of the angled insert catches on the female contact holder and the max. assembling force of the cable with the terminals into the contact holder. This can be checked during the assembling process.

Note: The locking device unit and shielding sleeve may as well be assembled onto the cable after crimping of HCT4-female terminals.

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3.7 Assembly I

Assemble HCT4 female terminals into the contact carrier (1).		
	Pin	Polarity / Colour
	1	+ / May vary
	2	- / May vary

While assembling the HCT4 female terminals, the latching lance of the HCT4 female terminals will be deflected. Once the end position is reached, the latching lance will audibly engage, and the female terminals will be primary locked. (The female terminals must be crimped.)

The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company "Schaefer" is not used or if the terminals are mounted fully automated inside the contact holder.

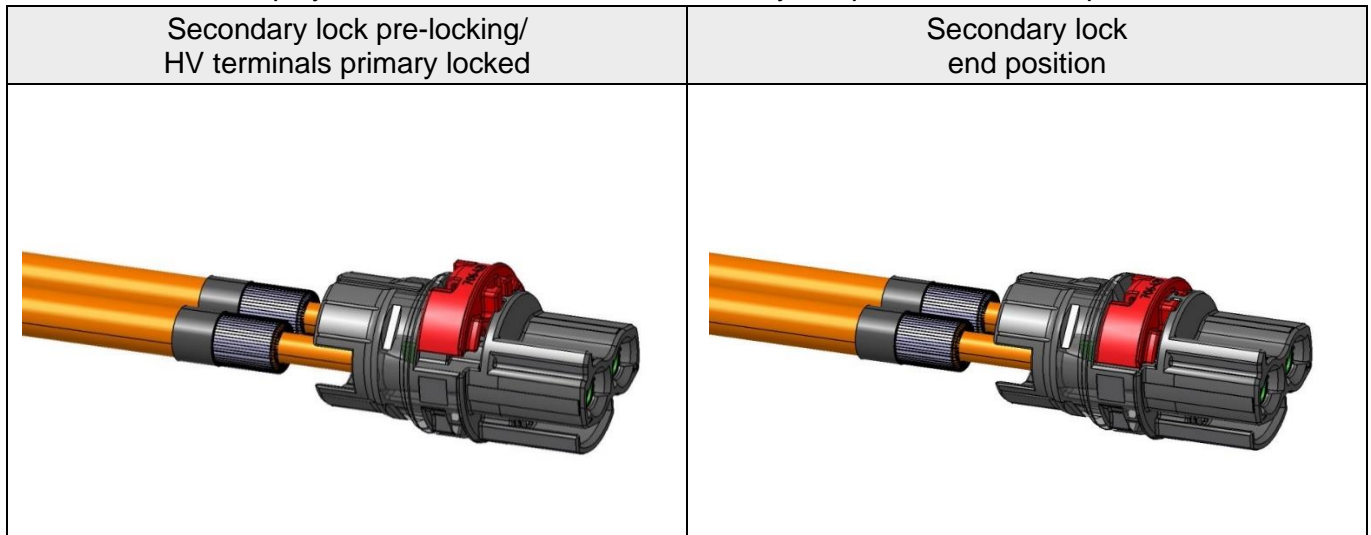
Wire manufacturer	Wire cross section	
	4.0 mm ²	5.0 mm ²
Aptiv	-	M-Number M7284FFX 1x 5.0 mm ²
	-	30 N
Coficab	FHLR91XC91X T4 LV 4.0 mm ²	-
	30 N	-
Coficab	FHLR91XCB91X T4 PSA 4.0 mm ²	-
	30 N	-
Huber & Suhner	FLR91XC33X 1x4,0 T150 1x 4.0 mm ² RADOX 155S FLR	-
	30 N	-

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3.8 Assembly II

Assembly of the secondary lock (2)

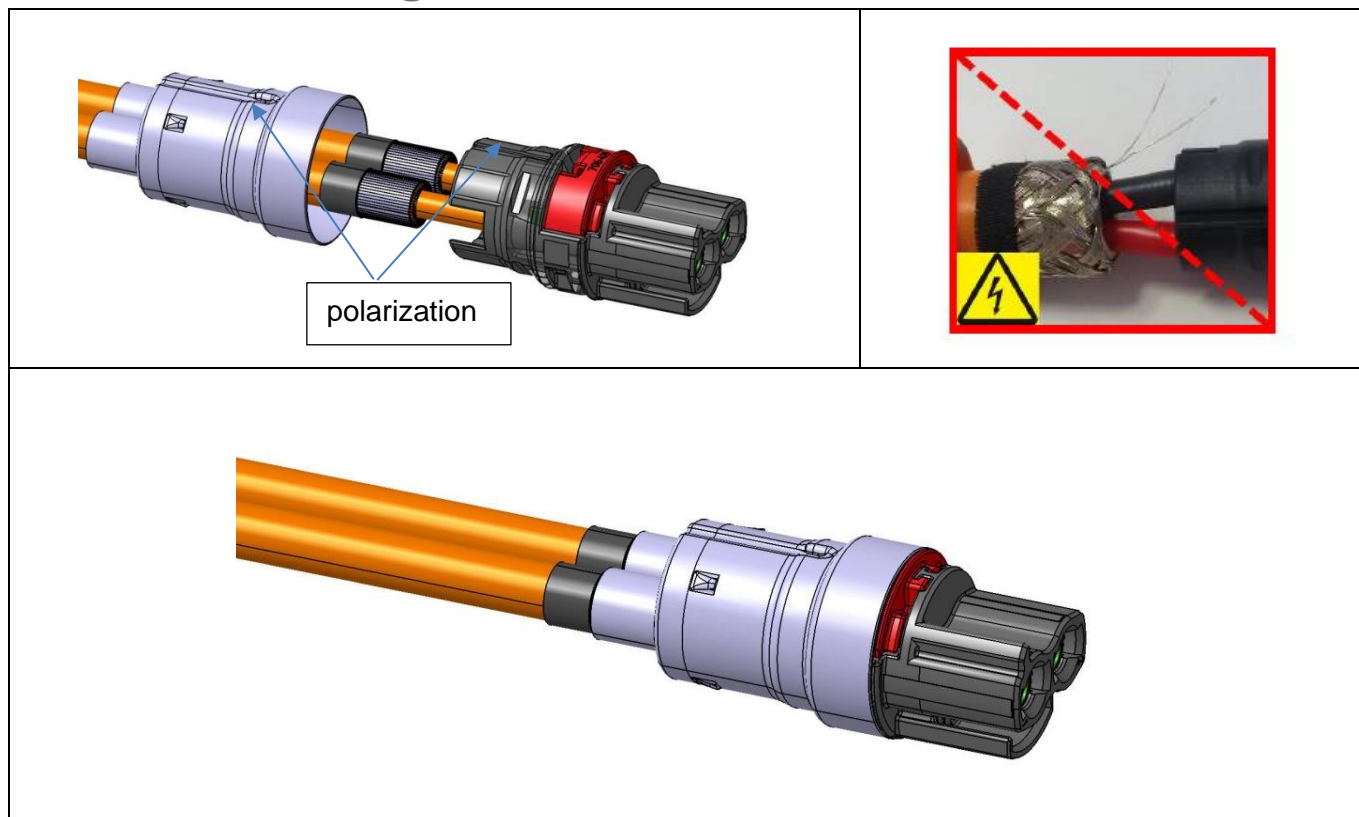
The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the contact cavity. Because of the position of the contacts on the wire, and the play of the contacts in the contact cavity it is possible and acceptable.



This document is not subject to change service!



3.9 Push shielding sleeve onto contact carrier



- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve must be assembled until the end position is reached.
- The fixing tape must come out of the shield sleeve completely after assembling.
- It must be ensured that no single strands of the shield stick out before the shield sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework must be clarified with each OEM.



Risk of insulation failure!



3.10 Press shielding sleeve

- **Pressing device**

For the process of positioning and pressing of the stress relief and the shielding sleeve, the following pressing device of the company "Schäfer" can be used:

Name of the device: Pressing device HPS40-2 SCC
Article number: EPS3000-HPS40-2

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

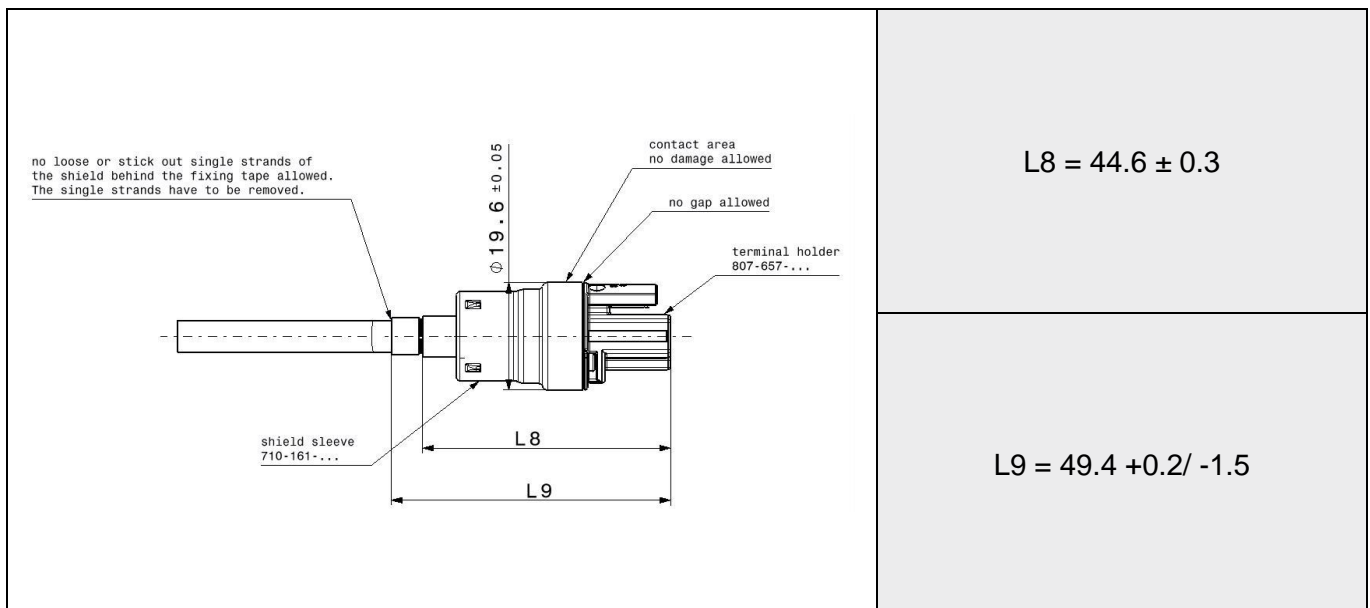
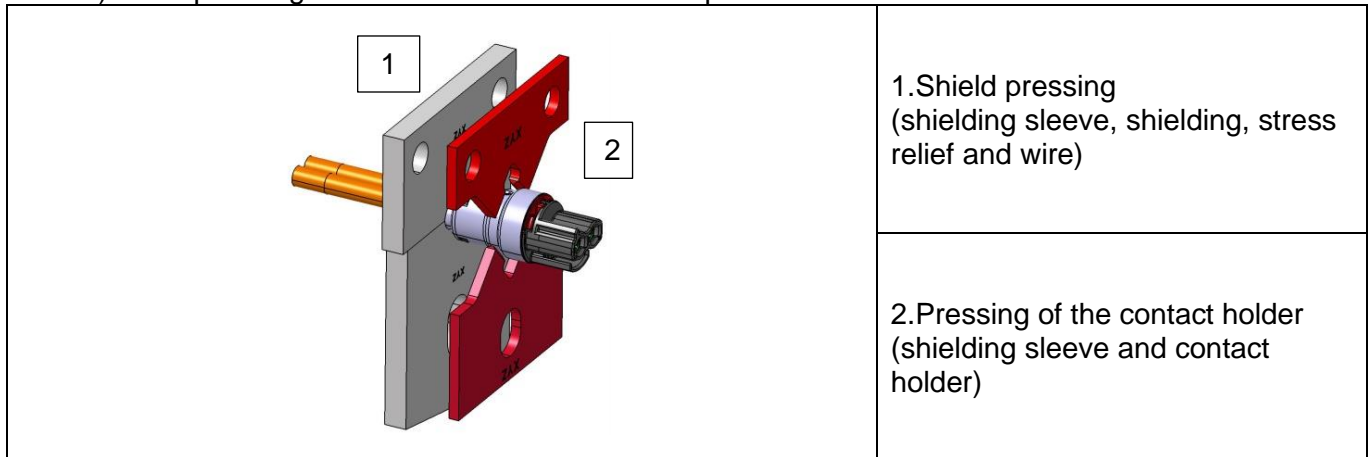
The commissioning of the pressing device must be done through the manufacturer. In this edition you can only find the information of the pressing data of the pressing.

This document is not subject to change service!



- **Pressing data**

- a) The contact holder incl. the female contacts must be put into the device in the correct position.
- b) Make sure, the shielding sleeve is on the end position of the contact holder.
The tape must stick out of the end of the shielding sleeve.
- c) The circularity of the shielding sleeve in the contact area must be ensured.
- d) The measurements on the following drawing, must be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step



The dimension L8 and L9 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068.

Do not damage the following parts during the pressing process.

- Insulation of the wire
- Insulation of the single wires
- Stress relief
- Shield sleeve
- Shield strands of the wire

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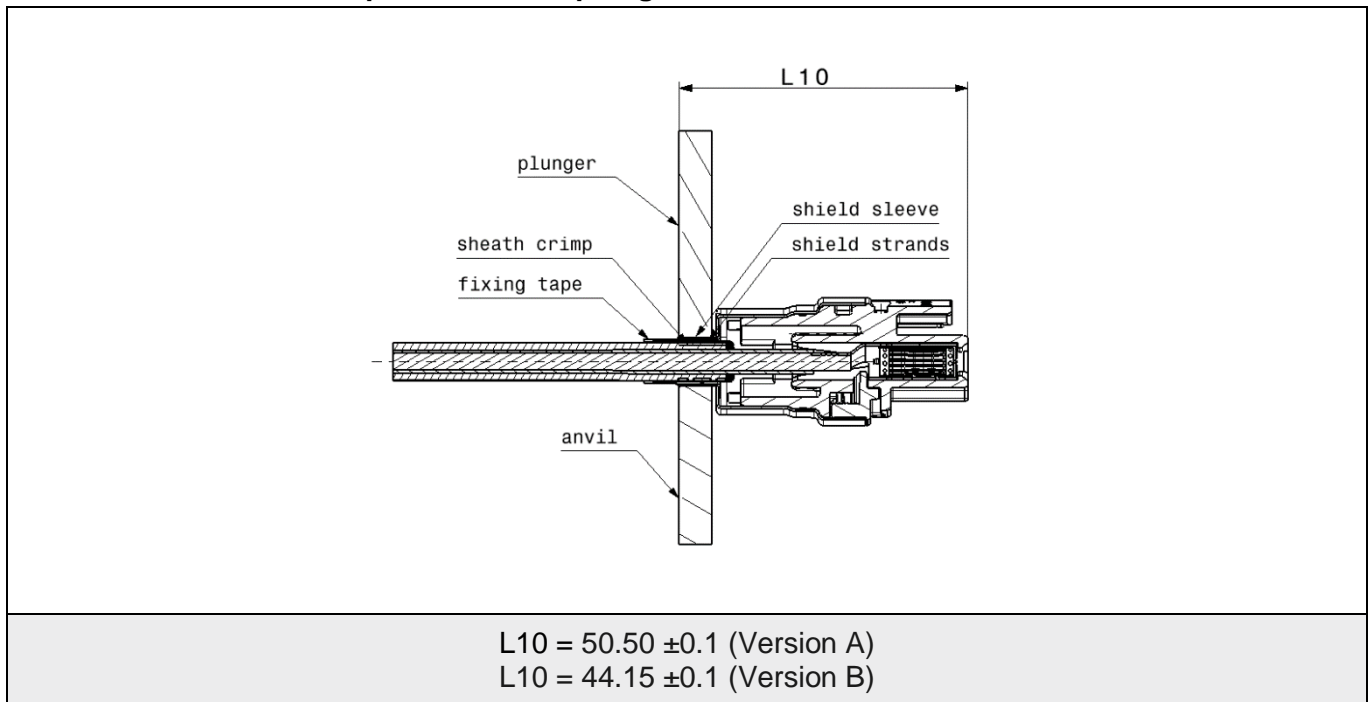


3.10.1 Shield pressing by two half-shells

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder.

The dimension L10 is the position of the plunger and the anvil.

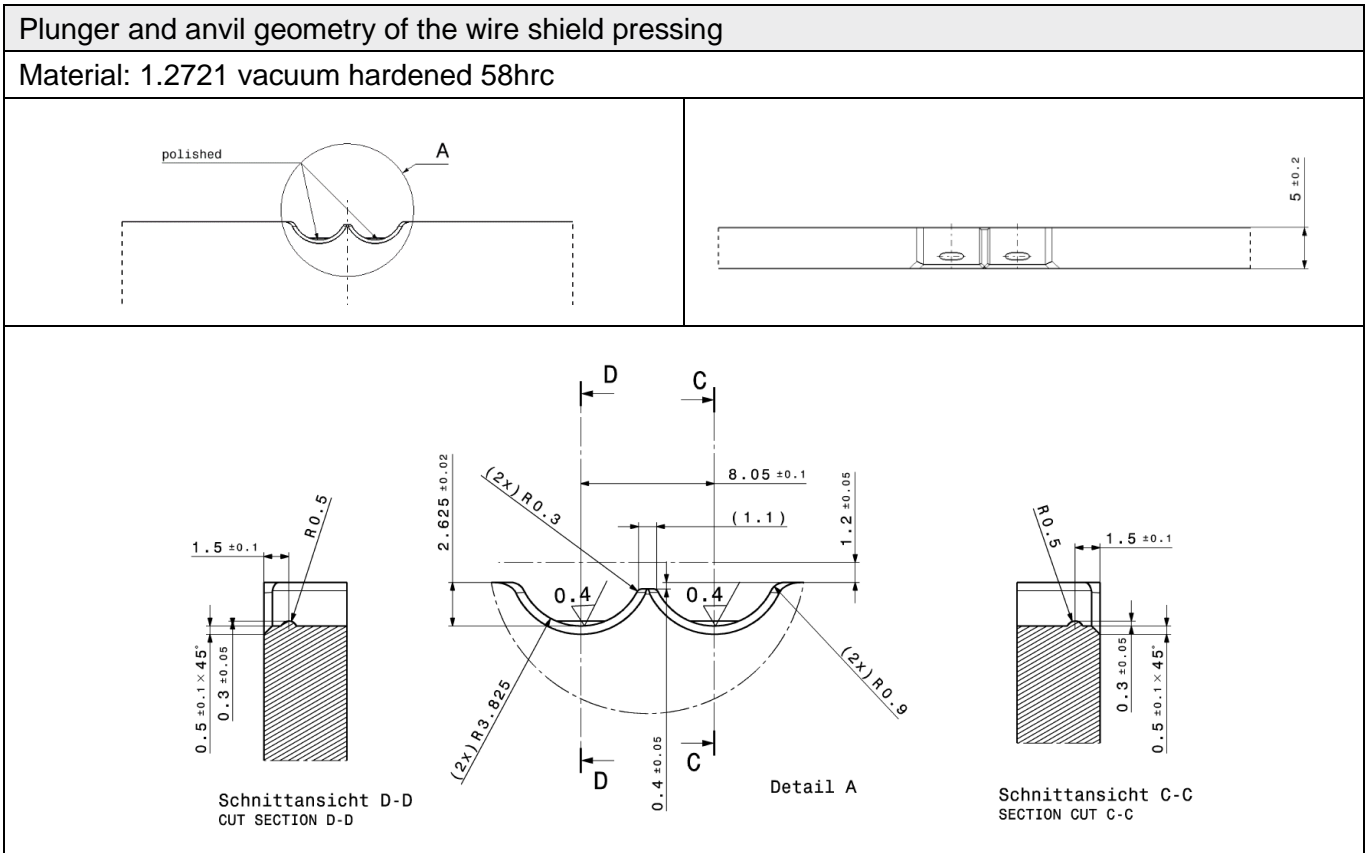


L10 = 50.50 ±0.1 (Version A)
L10 = 44.15 ±0.1 (Version B)

This document is not subject to change service!



- Plunger and anvil geometry of the wire shield pressing – Version A



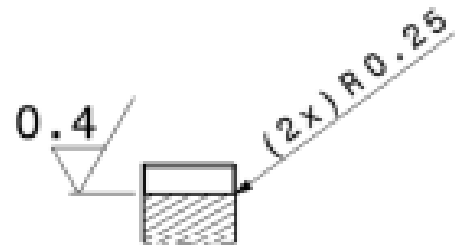
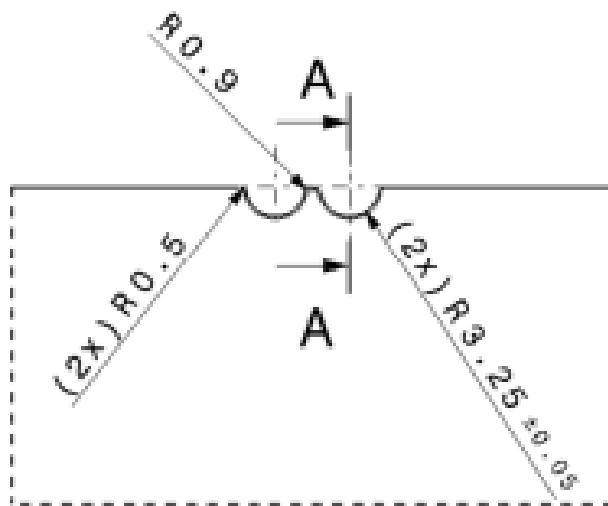
This document is not subject to change service!



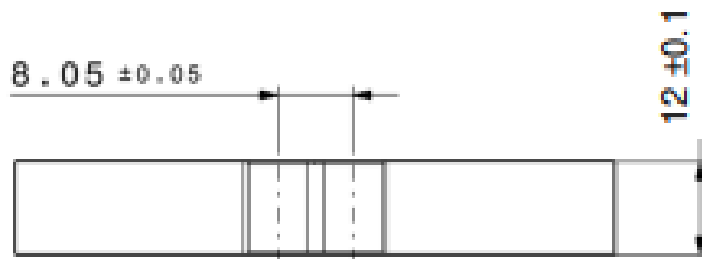
- **Plunger and anvil geometry of the wire shield pressing – Version B**

Plunger and anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



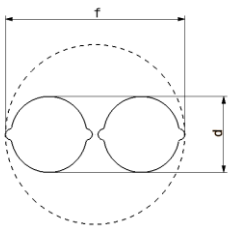
Schnittansicht A-A
CUT SECTION A-A



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- Embossing height “d”

	The plunger and anvil are pressed together to 0.2 mm clearance. Due to this the dimension “d” will be given. See table of each cross section.
---	---

Wire manufacturer*	Measurement “d” in mm	
	4.0 mm ²	5.0 mm ²
Huber & Suhner	6.80 ± 0.1	-
Coficab	6.15 ± 0.1	-
Aptiv	6.80 ± 0.1	6.80 ± 0.1

*Wire type according system drawing

During the pressing process a fold appears on two sides.

This fold is not allowed to be bigger than the diameter $\varnothing f = 17.2 \text{ mm}$ (17.1 ± 0.1) refer to the centerline of the connector.

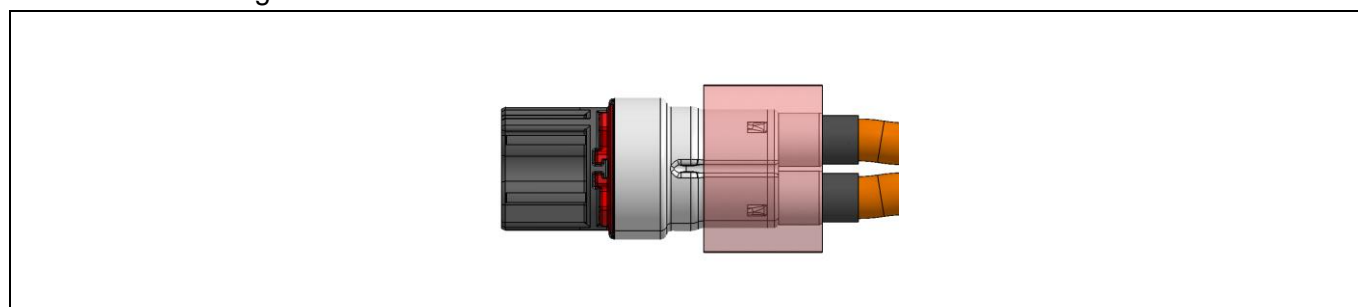
In the area of the fold the material of the shield sleeve is not allowed to be cracked.

- Check measurement of the embossing height “d” and the max. diameter “f”

To check the dimension “f”, a gauge with an inner diameter of 17.2 mm must be used.

The diameter “f” must be respected within the entire highlighted area.

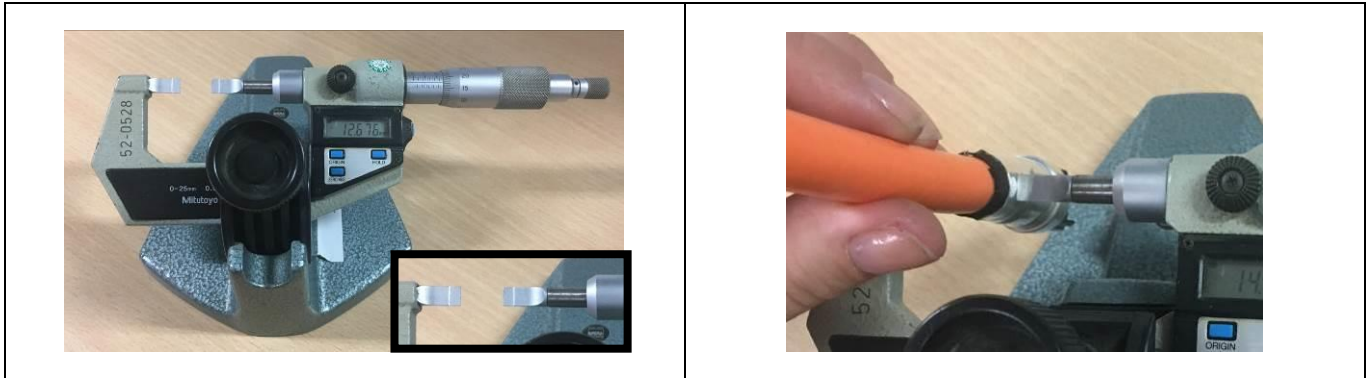
To check the dimension “d”, the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.



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The measuring of the embossing height must be done with a suitable measuring device.

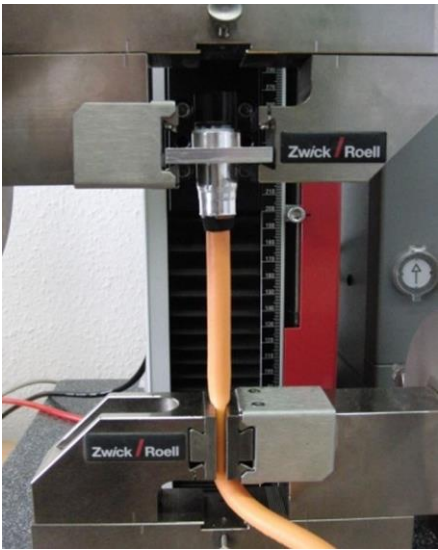
Proposal:



- **Pulling force of the wire**

To measure the pull-out force, the wire must be clamped firmly into a clamping device. The distance between the clamping position of the wire and the fixing tape is about 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest sleeves.

HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached. $v = 50.0 \text{ mm/ min} \pm 10.0 \text{ mm/ min}$

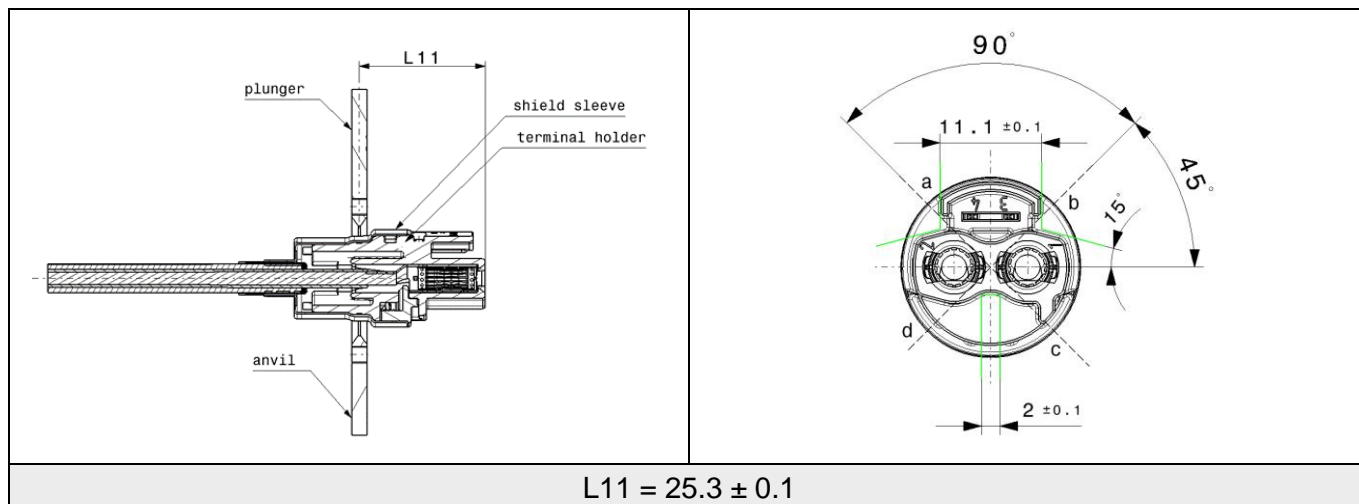
	Wire cross section	Pulling force
	4.0 mm ²	≥ 150 N
	5.0 mm ²	≥ 150 N

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3.10.2 Pressing contact carrier

- **Embossing position**



The dimension L11 describes the position of the pressing. The position of the plunger and the anvil must be aligned in relation to the front plane of the terminal holder. The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefore the terminal holder must be secured against rotation. The green areas can be used as a jack for the contact holder. Ensure that any coding version of the terminal holder can be inserted into the jack.

The exact geometry of the plunger and anvil is given.

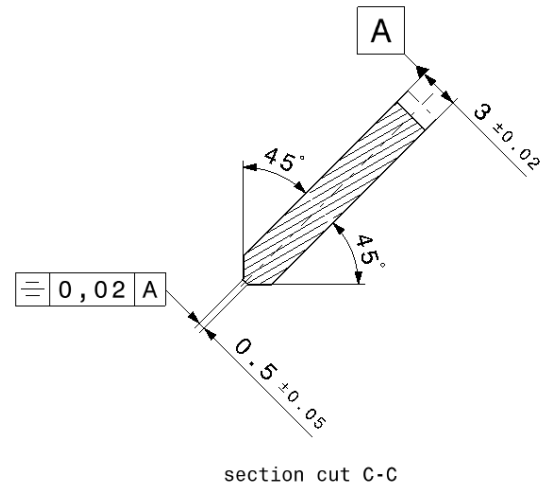
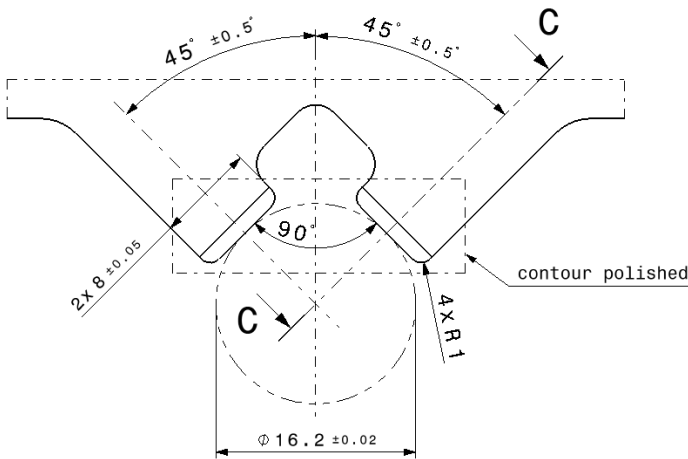
This document is not subject to change service!



- **Geometry of the plunger and the anvil pressing on the terminal holder**

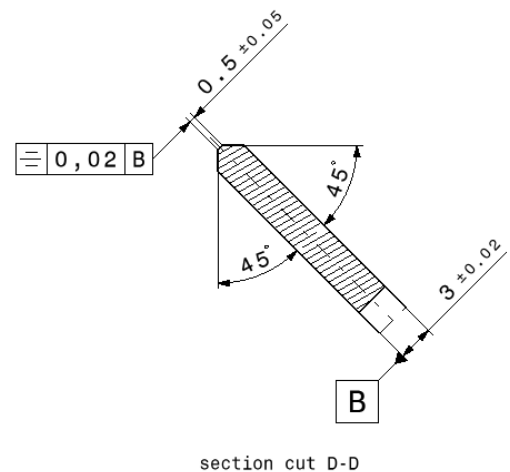
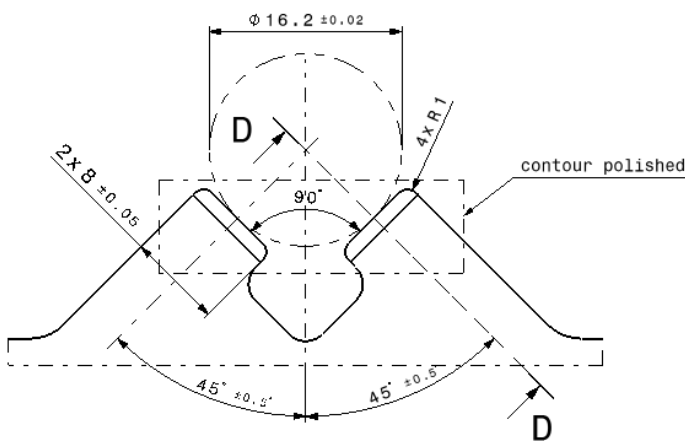
Plunger and anvil geometry of the terminal holder pressing

Material: 1.2721 vacuum hardened 58hrc



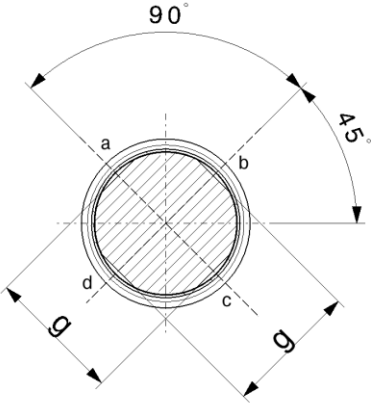
Plunger and anvil geometry of the terminal holder pressing

Material: 1.2721 vacuum hardened 58hrc



This document is not subject to change service!

- **Embossing height “g”**

	<p>The dimension “g” results from the embossing in between a-c and b-d.</p> <p>The embossing must be done at the same time.</p>
---	---

The dimension g is defined as following:

“g” = 16.40 mm ± 0.1

- **Check the measurement of the embossing height “g”:**

To check the dimension “g”, the height needs to be measured acc. to the drawing.
All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.
(Micrometer, measuring range: 0-25 mm).

The thickness of the measuring blades must be lower than 0.6 mm.

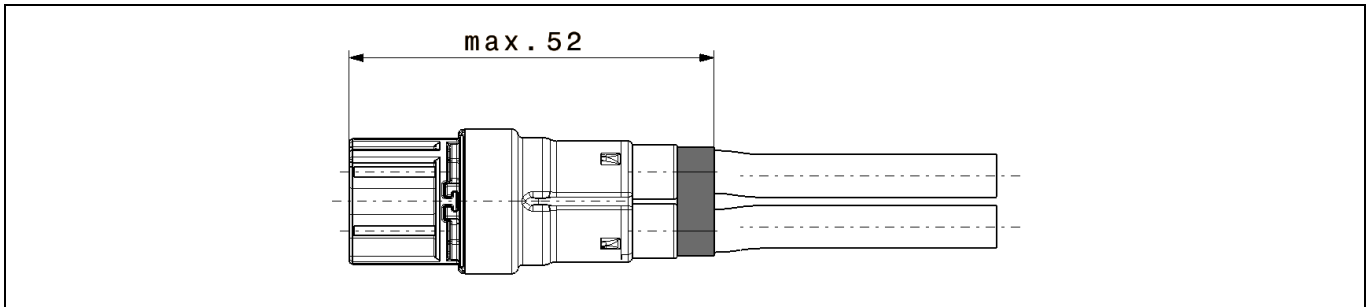


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3.11 Taping of the wires

To ensure that the welding of the shield-sleeve is not damaged. The two wires must be taped together. In this specification the PET- fabric tape 837X (838X) 5.0 mm of the company coroplast is used. It is possible to use another product to fix the wires. The product must have min. 150° C thermal resistance.

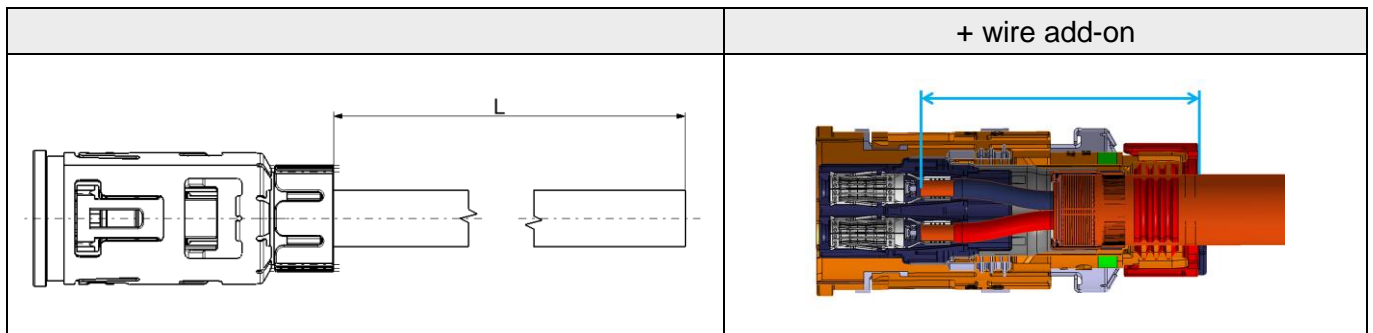
This process step can be skipped if it is ensured that the wires are not pulled apart in a different way.



4 Processing steps (6.0 mm²)

Use the following described processing steps as necessary for the wire cross section 6.0 mm². As a reference sample, a terminal holder coding A and a 6.0 mm² wire was used.

4.1 Cut the shielded cable



Add following lengths for the HPS40-2 2+2 female connector:

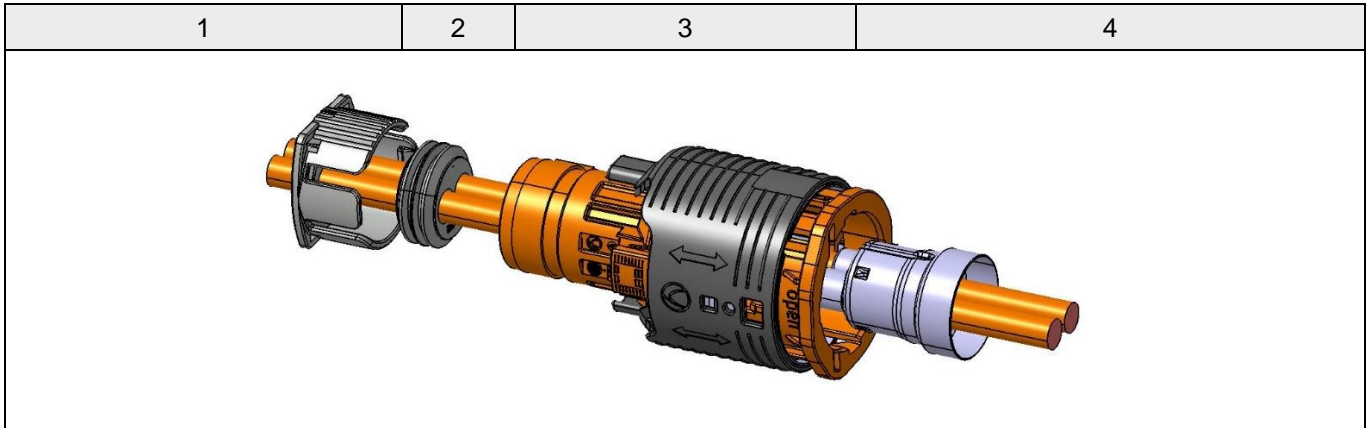
Wire cross section	Dimension L after zero-cut (mm)	Dimension L for the HCT4 terminal incl. zero-cut (mm)
6.0 mm ²	L + 50.0	L + 54.0

This dimension must be added to the planned length at cutting process of the wire for each female connector.

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4.2 Assembly of the single components

Slide the cover cap (1), the seal (2), the female locking device (3) and the shielding sleeve (4) onto the shielded cable. Seal, cover cap and shielding sleeve are 180° symmetrical and can be assembled either way.



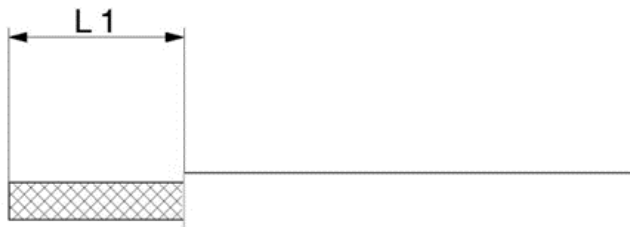
Note: The locking device unit (3) and shielding sleeve (4) may as well be assembled onto the cable after crimping of HCT4-female terminals.



4.3 Strip off the shielded cable



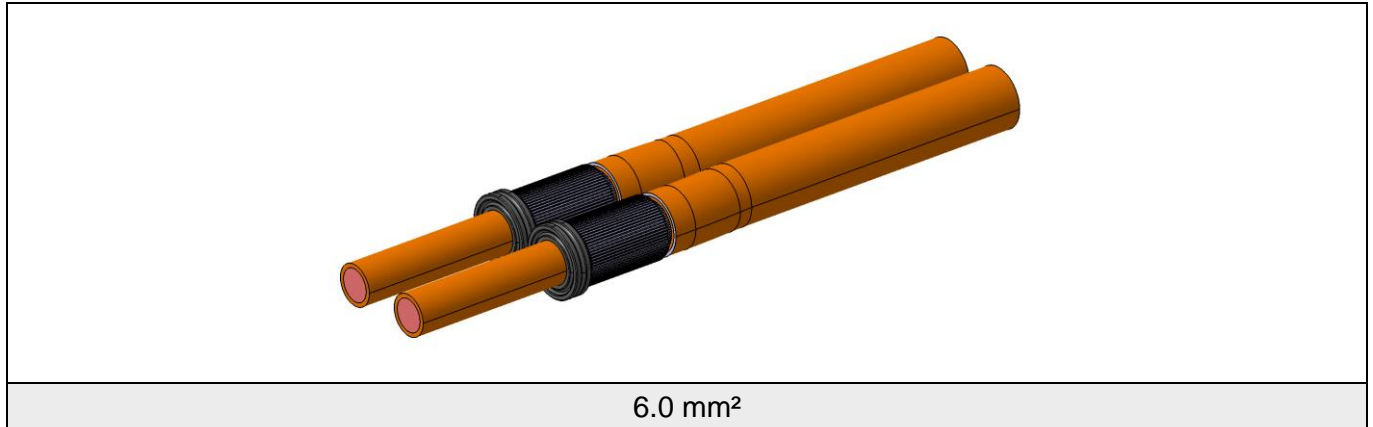
Stripping length:



Wire cross section	Dimension L1 after zero-cut (mm)	Dimension L1 for the HCT4 terminal incl. zero-cut (mm)
6.0 mm ²	30.5 ± 1	34.5 ± 1

Do not damage the shielding during the processing operation.

4.4 Assemble strain relief



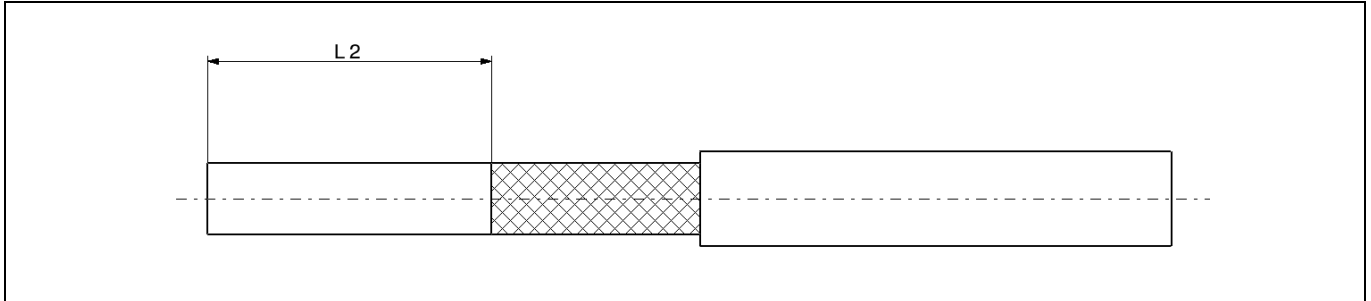
The following process steps must be done, but the manufacturer can choose the sequence:

- Assemble the strain-relief
- Remove the foil (max. 1.0 mm revolving or single edges \leq 3.0 mm)
- Shorten the shielding.

In this processing specification, the recommended sequence is shown.

- Process data

Dimension of the cutted shielding:



Wire cross section	Dimension L2 After zero-cut (mm)	Dimension L2 for the Hirschmann Automotive HCT4 terminal incl. zero-cut (mm)
6.0 mm ²	22.6 ± 1	26.6 ± 1

After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:

- Removing the residues of the shielding.
- Blowing out or by suction of the residues of the shielding.

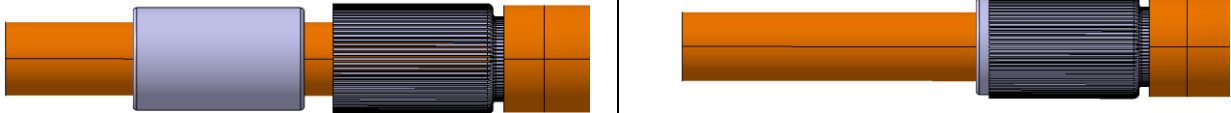
In the next process step, make sure that the shielding is rising over the crimp 100%.

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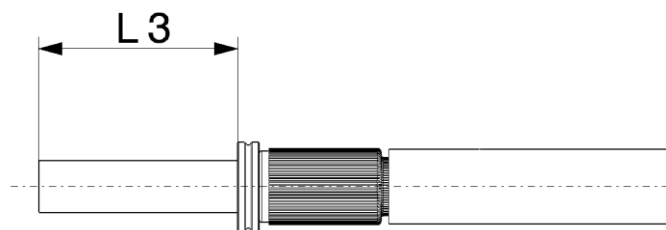
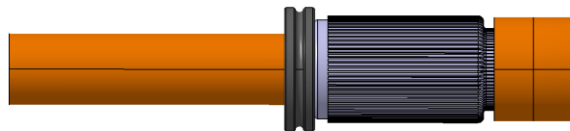


4.5 Wire processing I

Shielding needs to be spread slightly, strain-relief must be assembled.



Strain-relief needs to be fixed in place with X-ring.
The assembly of the strain-relief and fixture with X-ring can be done in one step.



Wire cross section	Dimension L2 After zero-cut (mm)	Dimension L2 for the Hirschmann Automotive HCT4 terminal incl. zero-cut (mm)
6.0 mm ²	19.2	23.2

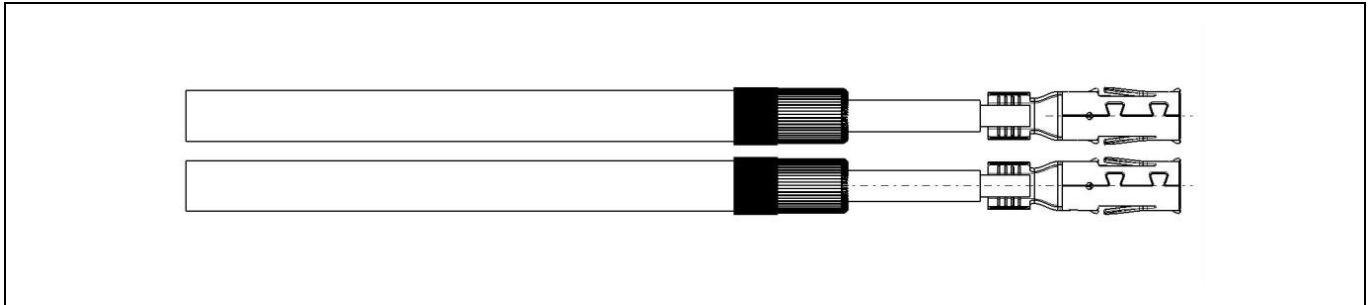
- L3 ensures the correct position of the strain-relief
- The strain-relief shall be assembled so it will block on the final position
- The X-ring shall be assembled so it will block on the strain-relief

Do not damage the single wires during the complete processing operation

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4.6 Crimp the HCT4 female terminal



- **Double stroke crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company "Schäfer" can be used:

<u>Name of the device:</u>	HPS40-2 Double stroke crimping machine
<u>Article number:</u>	EPS2001-HPS40-2
<u>Name of the device:</u>	Interchangeable crimping unit
<u>Article number:</u>	Shown in the process specification HCT4 female terminal „EVS-100068“

The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

The commissioning of the crimping device must be done through the manufacturer. In this edition you can only find the information of the crimping and positioning of the crimping process.

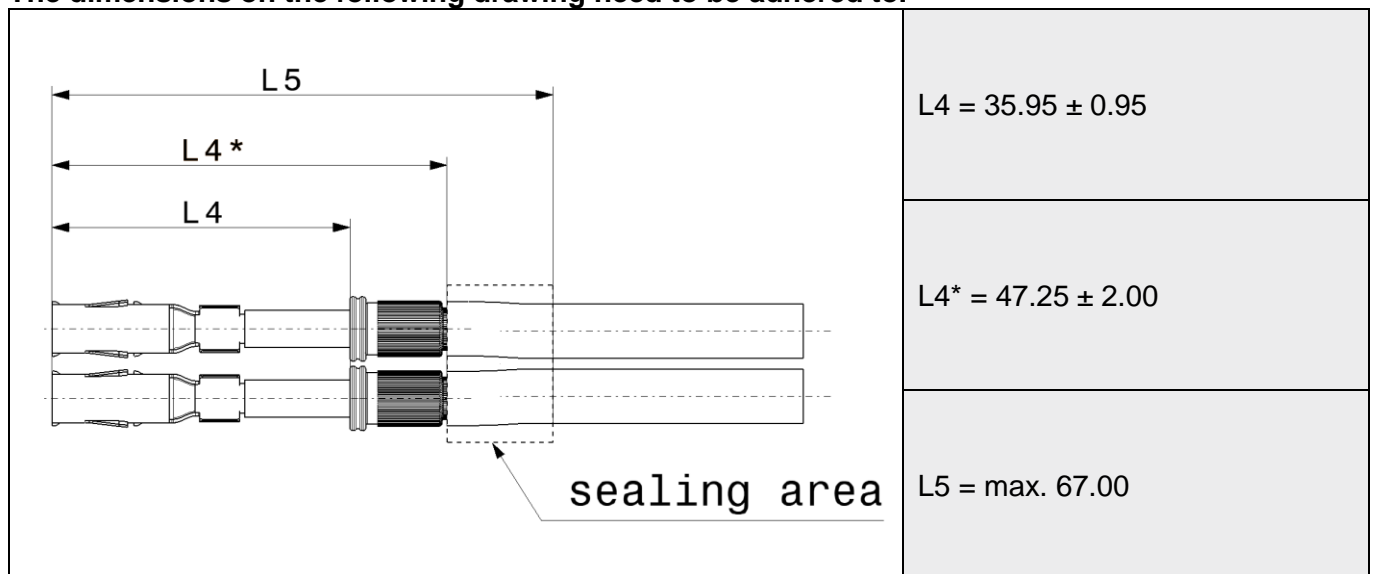
This document is not subject to change service!



- **Process data**

- a) The crimp data can be seen in the „Process specification HCT4 female terminal EVS-100068“.
- b) The HCT4 female terminals need to be crimped in relation to the single wires. For a smooth assembly into the contact holder, the terminals need to be crimped in the correct position. The dimensions on the following drawing need to be adhered to.
- c) If aluminium conductors are used, special processing steps and responsibility apply; see Appendix for Alu wiring EVS-100111-A1.
- d) If the contact carriers 807-657-561/562/563/564/567 are used, the stripping length mentioned in EVS-100068 can be extended by max. 2.0 mm.

The dimensions on the following drawing need to be adhered to.

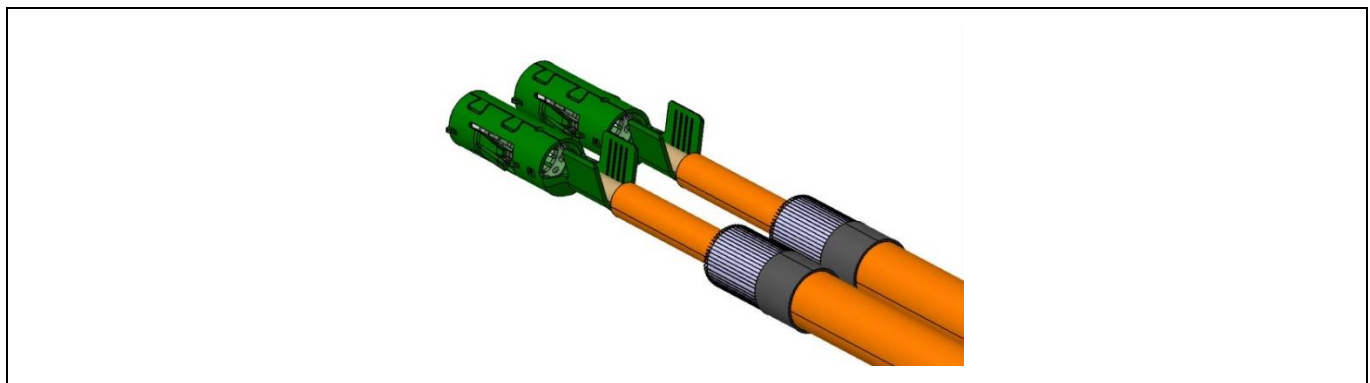
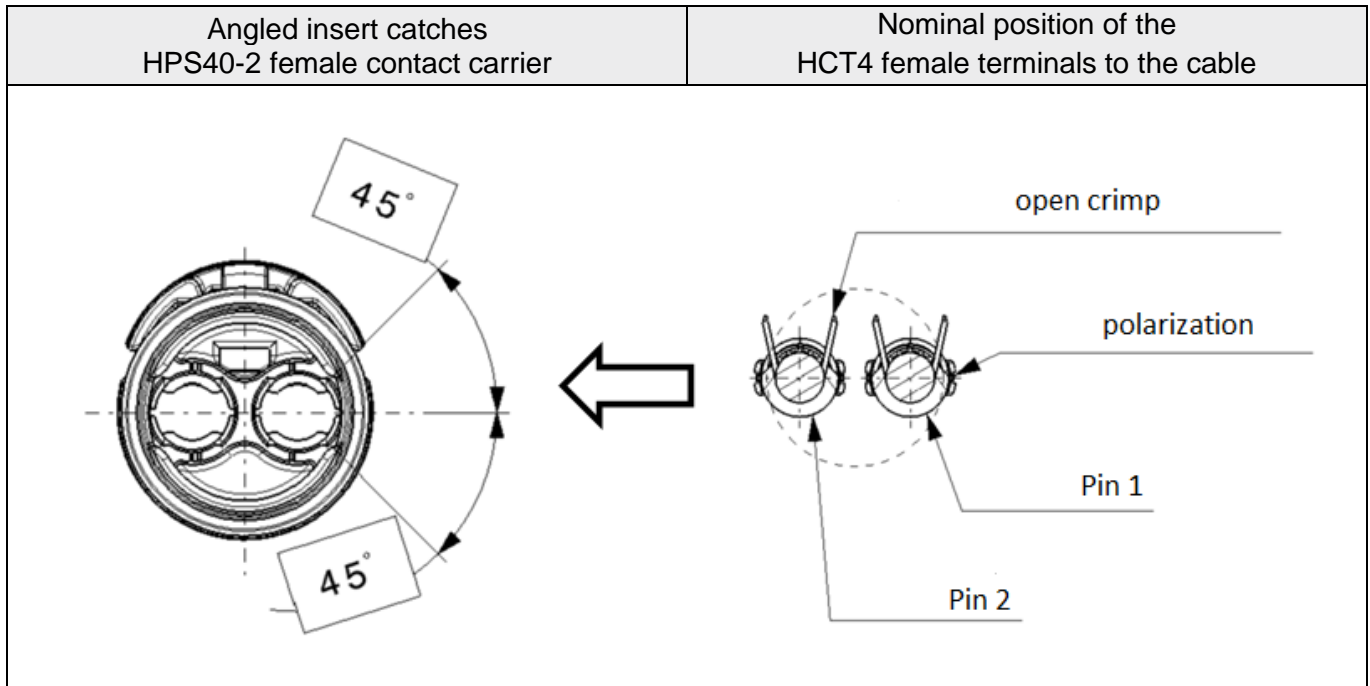


The dimension $L4$ and $L5$ are just for information. The dimensions are caused from the dimension $L1$, $L3$ and the EVS-100068.

If agreed to by the OEM, either $L3$, $L4^*$ or $L4$ must be proven, since they are correlating.

A mark on the insulation of the single wires or on the outer sheath which is caused due to fixing the wire at the crimping process is allowed. It must be ensured that the insulation will not be damaged because this will lead to an insulation resistance failure. At the area of the wire, seal it is not allowed to deform or damage the outer sheath which has negative influence on the sealing function.

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To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the terminals and the wire is very important and needs to be ensured. Usually, the horizontal version is intended.

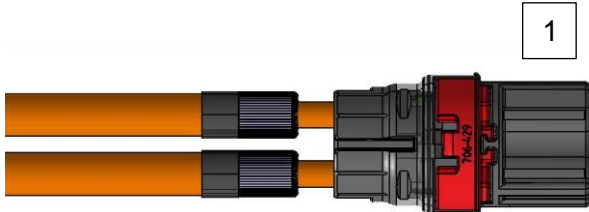
The allowed angle deviation results from the geometry of the angled insert catches on the female contact holder and the max. assembling force of the cable with the terminals into the contact holder. This can be checked during the assembling process.

Note: The locking device unit and shielding sleeve may as well be assembled onto the cable after crimping of HCT4-female terminals.

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4.7 Assembly I

Assemble HCT4 female terminals into the contact carrier (1).		
	Pin	Polarity / Colour
	1	+ / Red
	2	- / May vary

While assembling the HCT4 female terminals, the latching lance of the HCT4 female terminals will be deflected. Once the end position is reached, the latching lance will audibly engage, and the female terminals will be primary locked. (The female terminals must be crimped.)

When two wires with the same colour are used, the pinning must be confirmed via electrical testing.

The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company "Schaefer" is not used or if the terminals are mounted fully automated inside the contact holder.

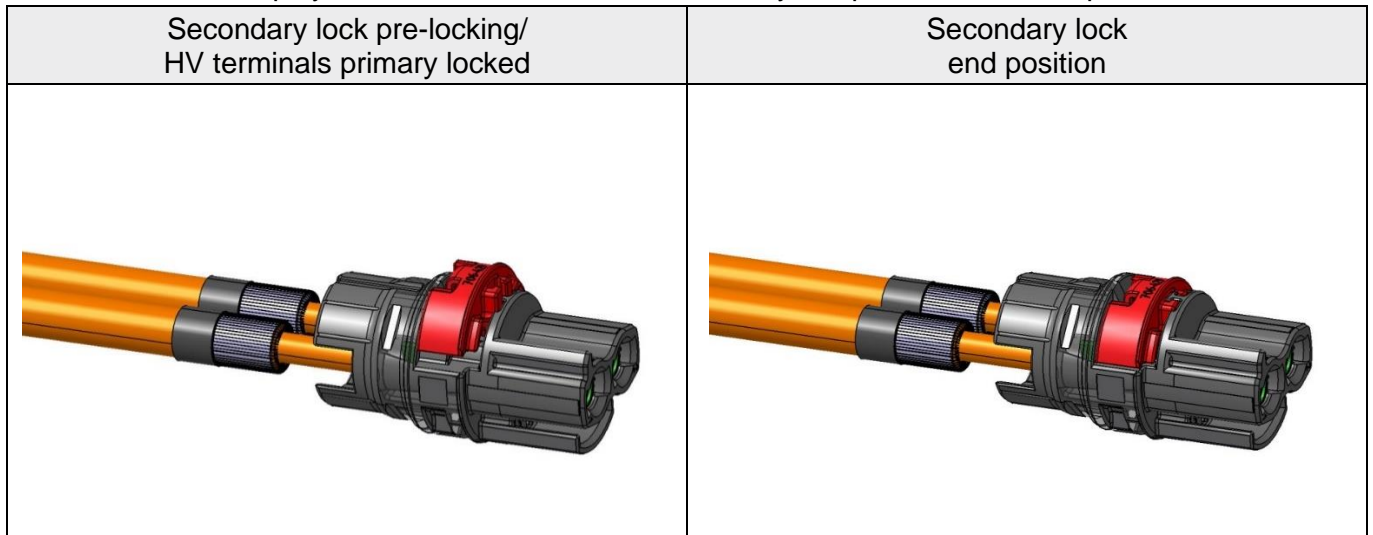
Wire manufacturer	Wire cross section
	6.0 mm ²
Champlain	Shielded ergoflex ISO19642-9 15-08921 6.0 mm ²
	36 N

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4.8 Assembly II

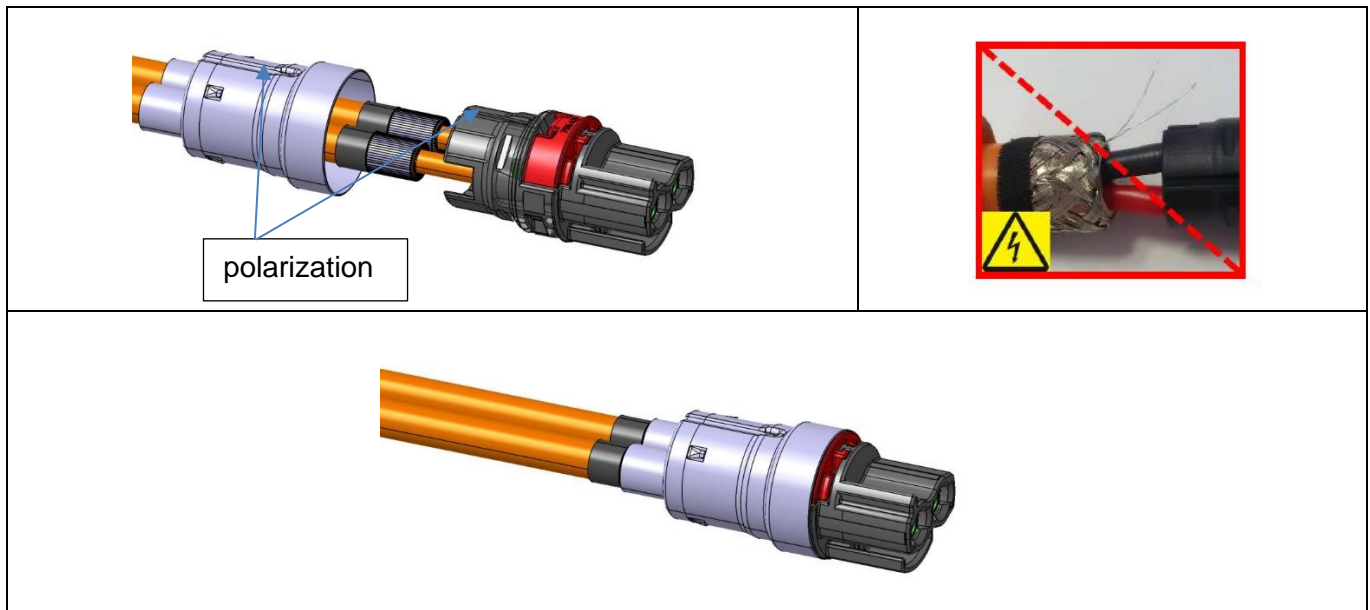
Assembly of the secondary lock (2)

The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the contact cavity. Because of the position of the contacts on the wire, and the play of the contacts in the contact cavity it is possible and acceptable.

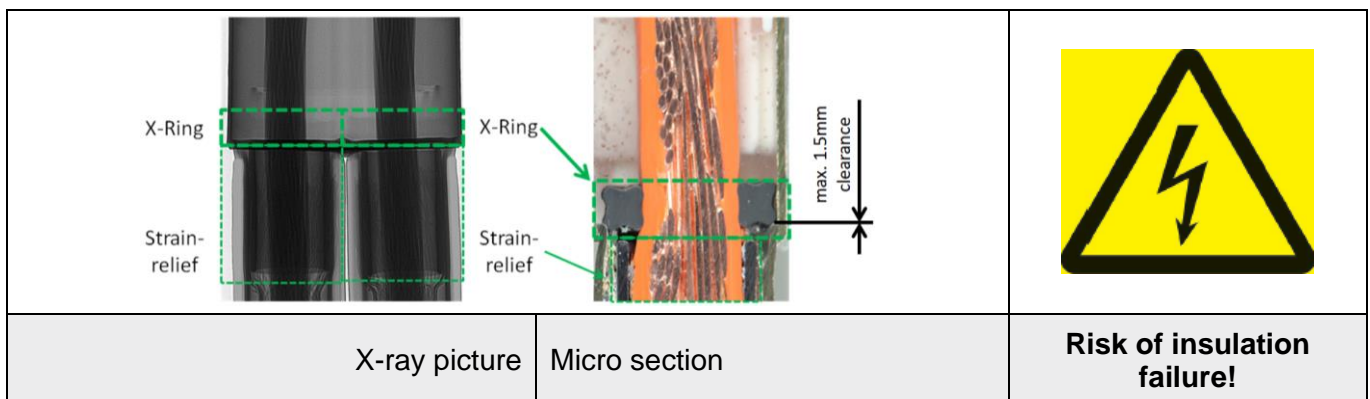


This document is not subject to change service!

4.9 Push shielding sleeve onto contact carrier



- The wires shall be fixed during this process to prevent the cable and/or the strain-relief from being compressed or pushed inside the connector, for this can cause damage on the insulation and therefore a dielectric breakdown.
- The implemented assembly process can be verified via x-ray analysis. Especially the compression of wires, positioning of the strain-relief and positioning of the x-ring can be confirmed. Also, other impacts from this and previously applied assembly steps can be checked. The x-ring shall be adjacent to the shield-sleeve. Deviations of this figure must be double-checked with Hirschmann Automotive.



- The shielding sleeve must be assembled until the blocking position is reached.
- It must be ensured that no single strands of the shield stick out before the shield sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework must be clarified with each OEM.

This document is not subject to change service!

4.10 Press shielding sleeve

- **Pressing device**

For the process of positioning and pressing of the stress relief and the shielding sleeve, the following pressing device of the company "Schäfer" can be used:

Name of the device: Pressing device HPS40-2
Article number: EPS3000-HPS40-2

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

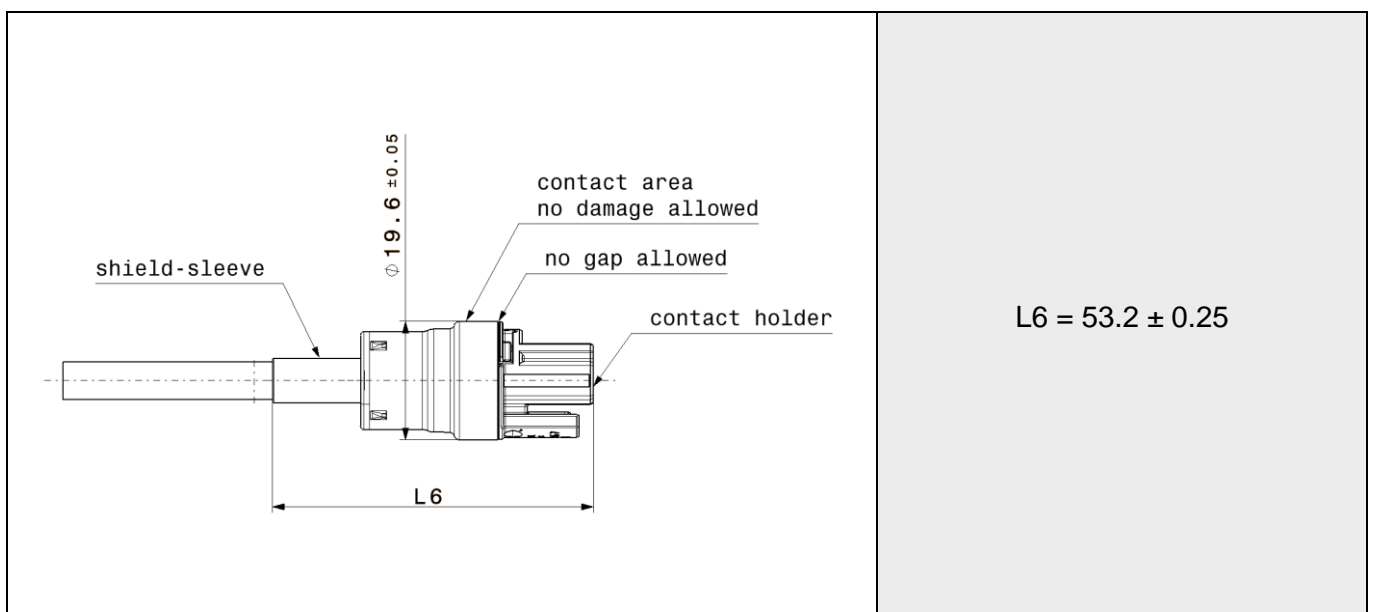
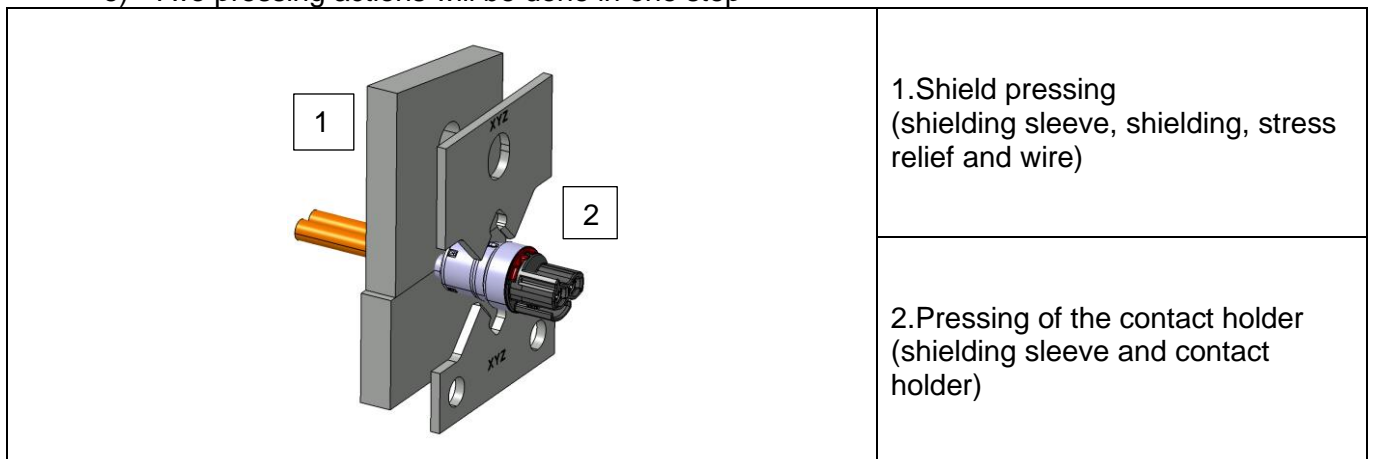
The commissioning of the pressing device must be done through the manufacturer. In this edition you can only find the information of the pressing data of the pressing.

This document is not subject to change service!



- **Pressing data**

- a) The contact holder incl. the female contacts must be put into the device in the correct position.
- b) Make sure, the shielding sleeve is on the end position of the contact holder.
- c) The circularity of the shielding sleeve in the contact area must be ensured.
- d) The measurements on the following drawing, must be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step



The dimension L6 is just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068.

Do not damage the following parts during the pressing process.

- Insulation of the wire
- Insulation of the single wires
- Stress relief
- Shield sleeve
- Shield strands of the wire

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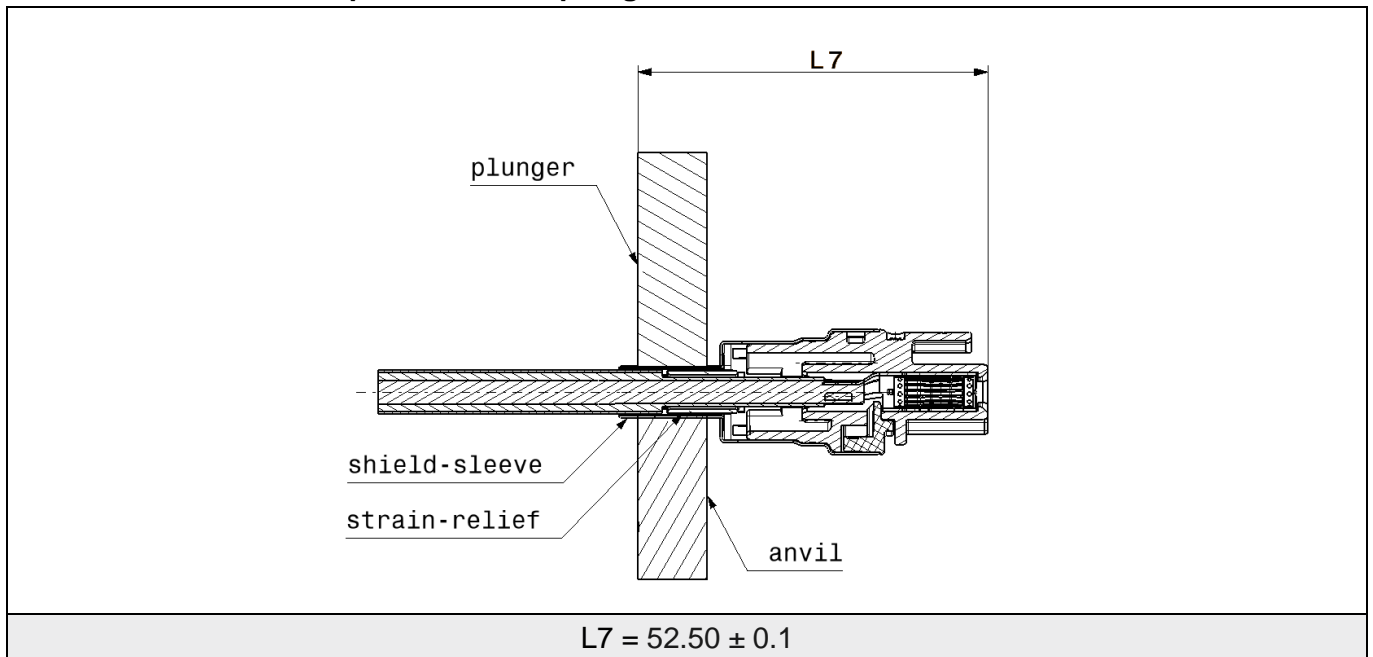


4.10.1 Shield pressing by two half-shells

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder.

The dimension L7 is the position of the plunger and the anvil.

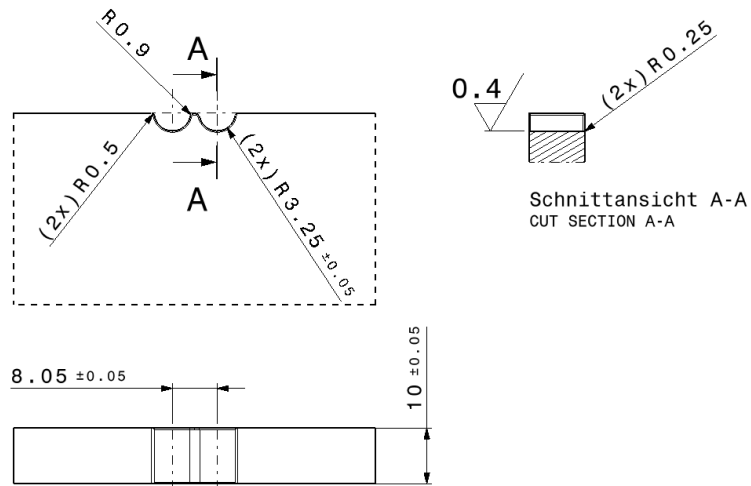




- **Plunger and anvil geometry of the wire shield pressing**

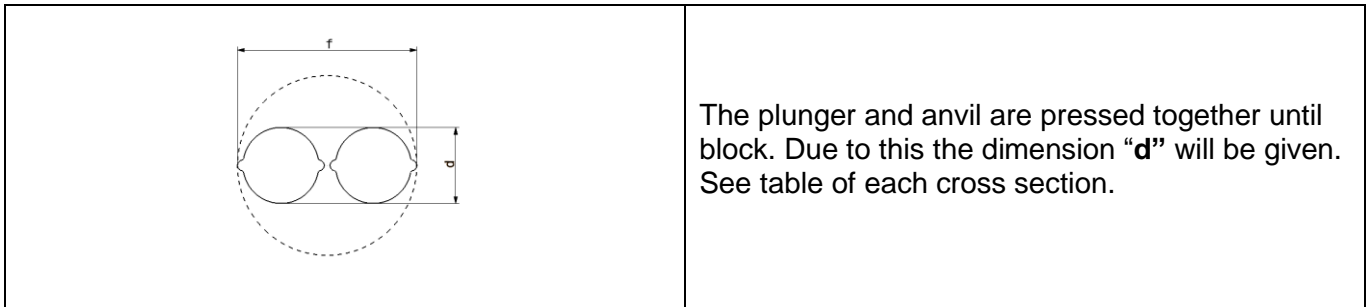
Plunger geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



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- **Embossing height “d”**



Wire manufacturer	Measurement “d” in mm
	Champlain Coficab

During the pressing process a fold appears on two sides.

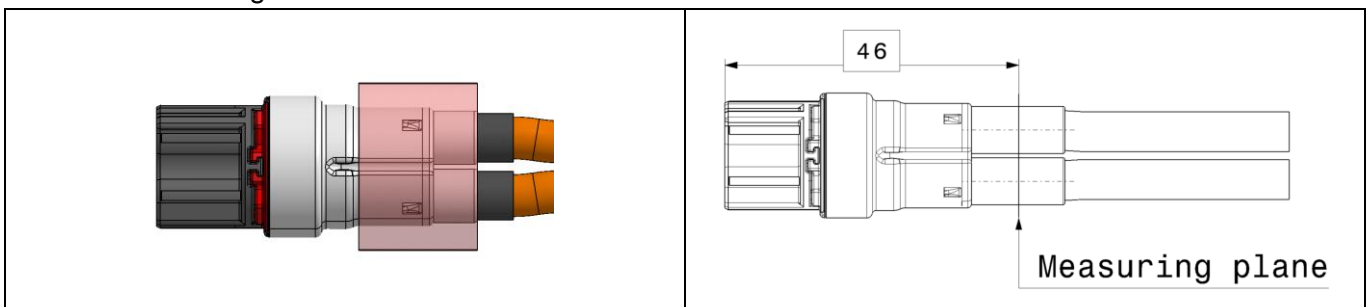
This fold is not allowed to be bigger than the diameter $\varnothing f = 17.2 \text{ mm}$ refer to the centerline of the connector. In the area of the fold the material of the shield sleeve is not allowed to be cracked.

- **Check measurement of the embossing height “d” and the max. diameter “f”**

To check the dimension “f”, a gauge with an inner diameter of 17.2 mm must be used.

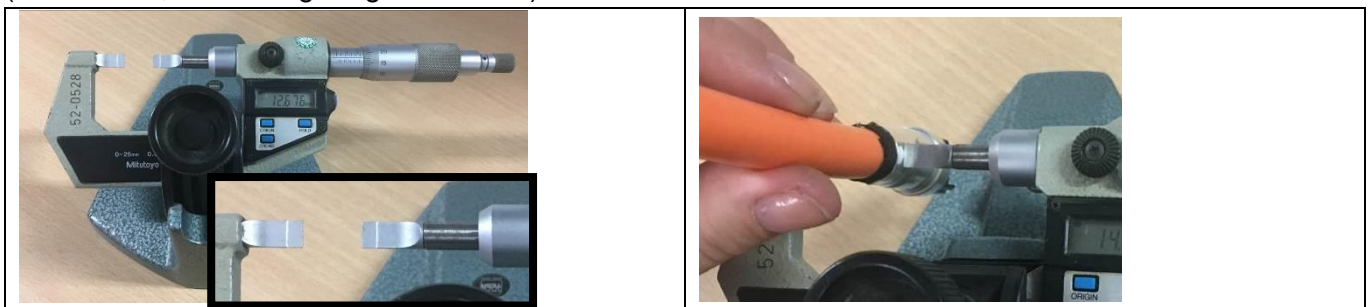
The diameter “f” must be respected within the entire highlighted area.

To check the dimension “d”, the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.



The measuring of the embossing height must be done with a suitable measuring device.

(Micrometer, measuring range: 0-25 mm)

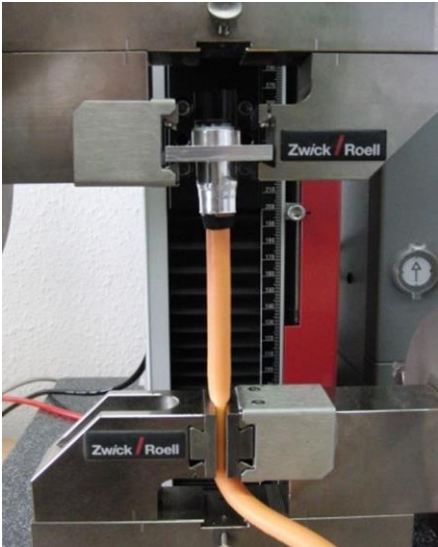


This document is not subject to change service!

- **Pulling force of the wire**

To measure the pull-out force, the wire must be clamped firmly into a clamping device. The distance between the clamping position of the wire and the fixing tape is about 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest diameter.

HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached. $v = 50.0 \text{ mm/ min} \pm 10.0 \text{ mm/ min}$

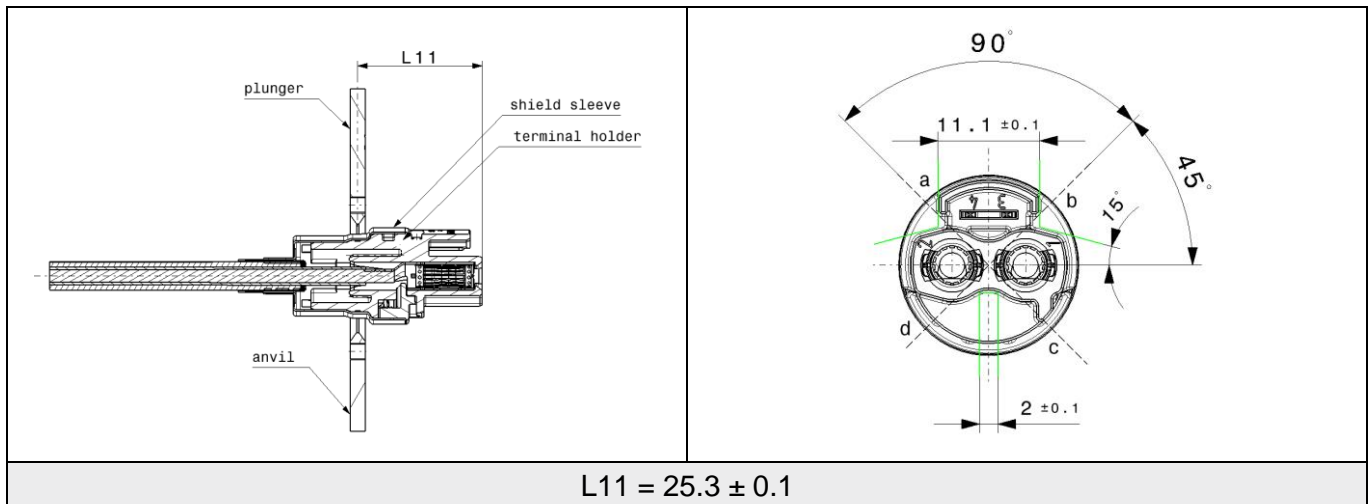
	Wire cross section	Pulling force
	6.0 mm ²	≥ 150 N

This document is not subject to change service!



4.10.2 Pressing contact carrier

- **Embossing position**



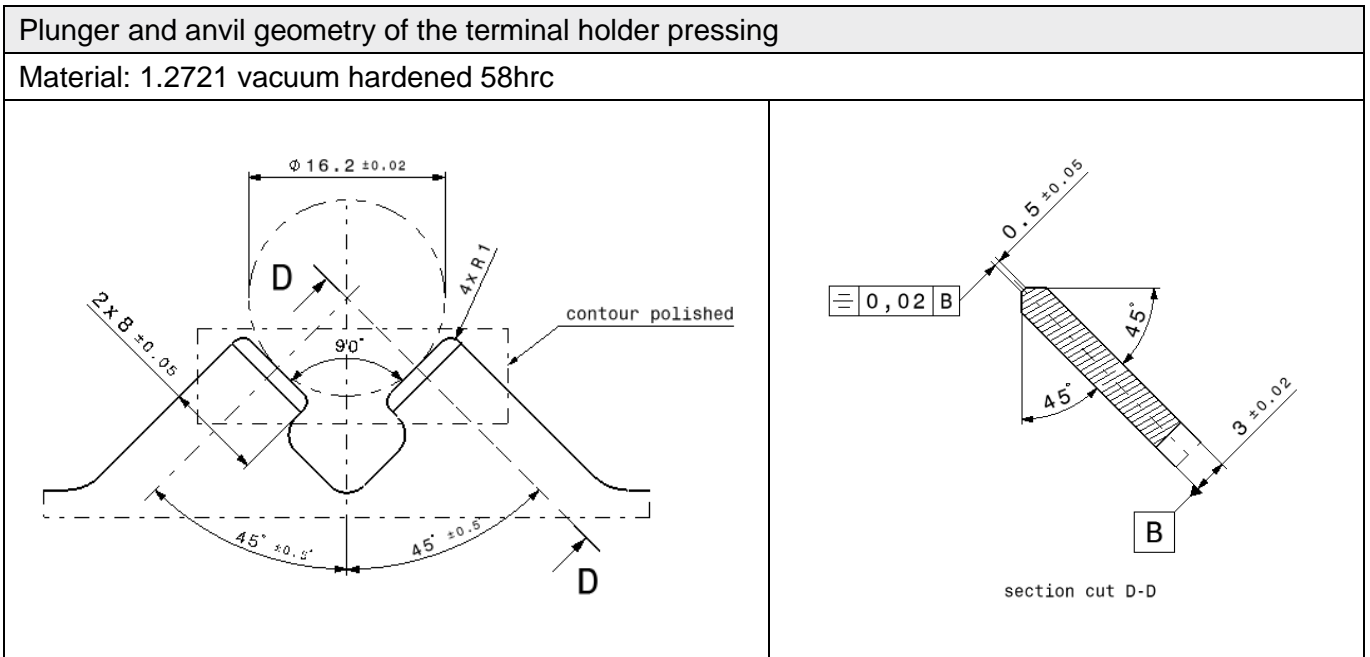
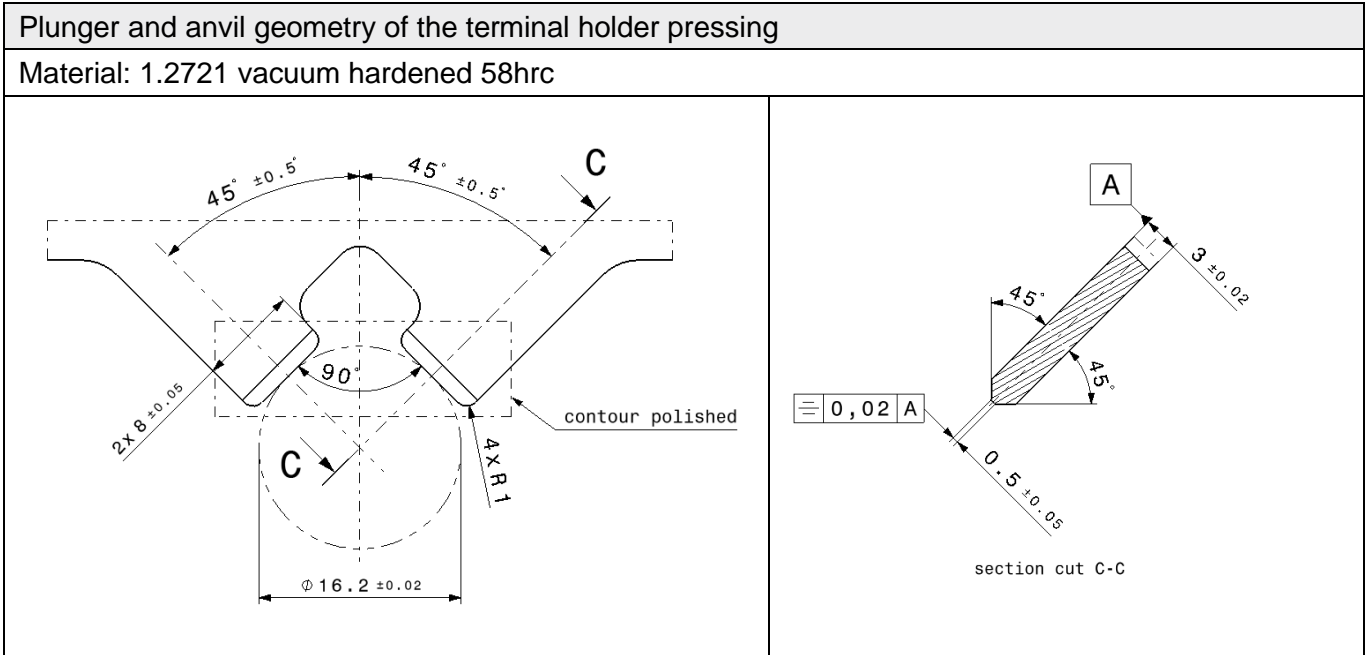
The dimension L11 describes the position of the pressing. The position of the plunger and the anvil must be aligned in relation to the front plane of the terminal holder. The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefore the terminal holder must be secured against rotation. The green areas can be used as a jack for the contact holder. Ensure that any coding version of the terminal holder can be inserted into the jack.

The exact geometry of the plunger and anvil is given.

This document is not subject to change service!

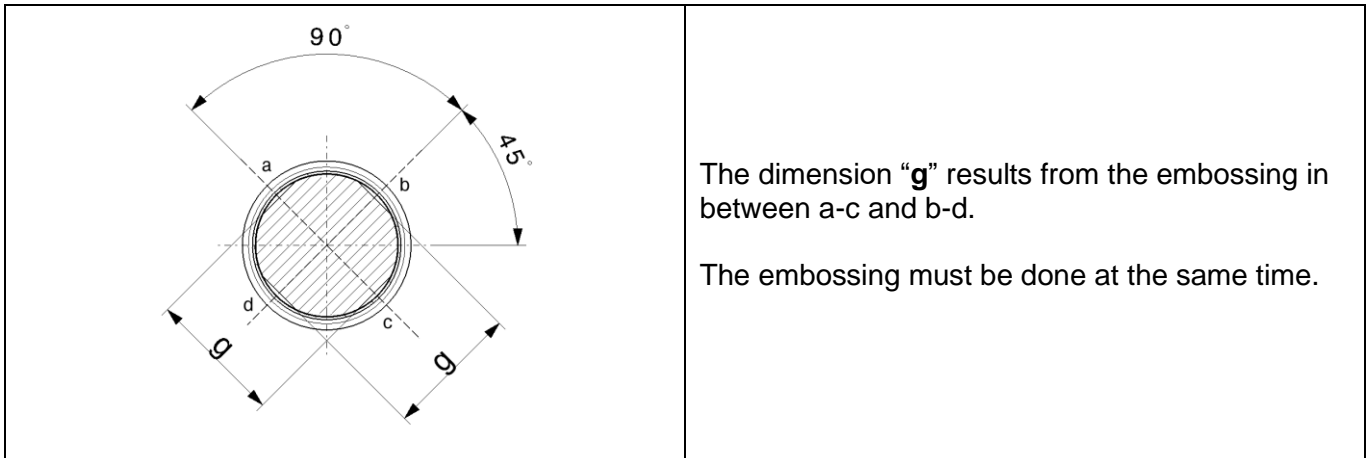


- **Geometry of the plunger and the anvil pressing on the terminal holder**



This document is not subject to change service!

- **Embossing height “g”**



The dimension g is defined as following:

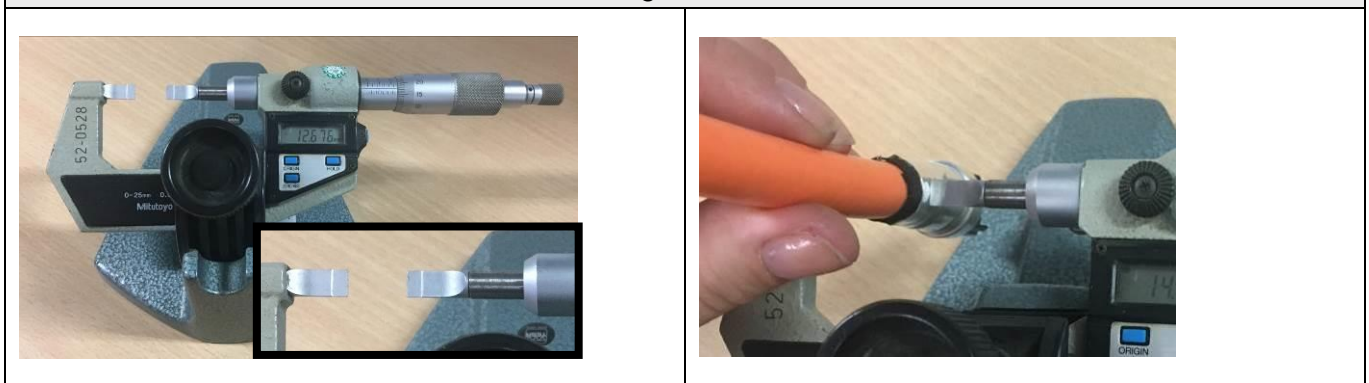
“g” = 16.40 mm ± 0.1

- **Check the measurement of the embossing height “g”:**

To check the dimension “g”, the height needs to be measured acc. to the drawing.
All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.
(Micrometer, measuring range: 0-25 mm).

The thickness of the measuring blades must be lower than 0.6 mm.



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5 Processing steps (Completion steps)

5.1 Positioning of the female locking device

The female locking device unit must be assembled power assisted, and in the correct position.



For the positioning and the assembly process of the female locking device unit onto the wire unit, the assembly device (Hand device) of the company “WKM” can be used.

Name of the device: Assembly device HPS40-2
Article number: HPS40-2

The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier. Each manufacturer is responsible of the commissioning of the pressing device.

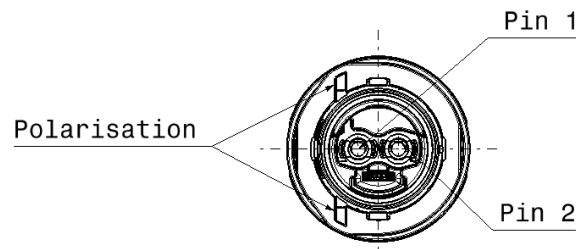
WKM - Maschinenbau GmbH
Oberes Ried 15
A-6833 Klaus
Tel. +43 5523 / 54907

The commissioning of the pressing device must be done through the manufacturer.

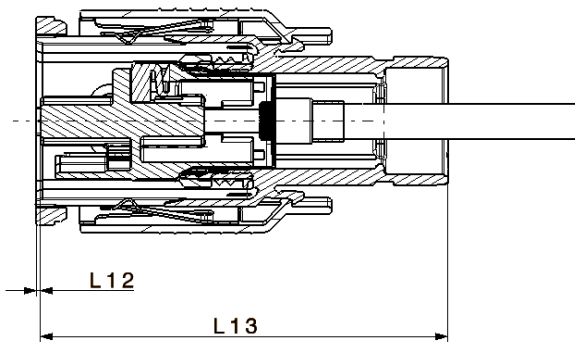
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The contact holder incl. the shield sleeve needs to be assembled into the locking device unit into the correct position. Both polarizations need to be symmetrical to the axis in the between of the centre of Pin 1 and Pin 2. Also, the polarization has to be on the side of Pin 1.



The locking sleeve must be assembled onto the shield sleeve force-assisted, until the dimension L12 is reached. The reference on the terminal holder is in the middle between PIN 1 and PIN 2. The dimension L13 is only for checking purposes. During the assembling process, there are no damages allowed on the shield sleeve, the contact carrier, or the wire. There is no pull on the wire necessary. Especially do not pull out the cable sheath out of the strain-relief



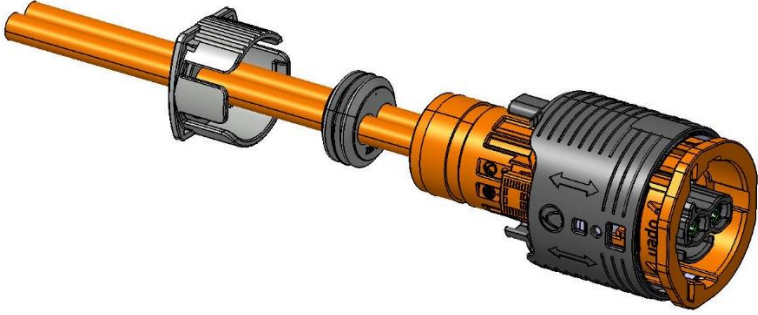
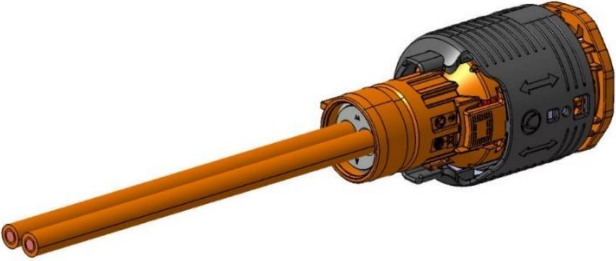
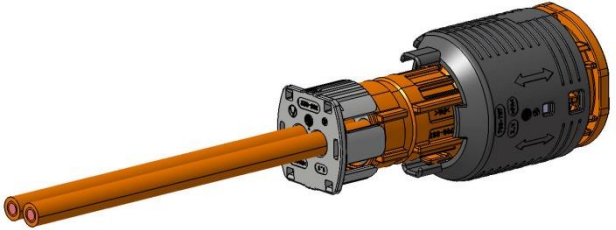


L12 = 0.7 ± 0.1
L13 = 66.7 (Info)

The adjustments in the processing specification with the status 08/ 2023 must be considered for new applications, but not for existing applications.

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5.2 Assemble seal and cover cap

1	2	3
		
		
<p>Snap the cover cap (1) into the recess of the female locking device unit [3]. The cap can be assembled either way, as it is 180°symmetrical.</p>		
		
<p>Do not damage the cover cap (1) or the seal (2) during assembly.</p>	<p>Cover cap on end position.</p>	

Push seal (2) into the female locking device unit (3). The cable seal slightly widened during assembly. It is possible to move the seal with the cover cap on the wire, but it must be taken care that the seal does not twist and is not pinched and damaged.

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6 Technical information

6.1 General requirements

Damage on the single components is not allowed during the whole production process.

6.2 Technical cleanliness

In general, pay attention to the cleanliness on the connector and inside of the connector. Metallic particles generated during the assembly process, must be removed with a suitable device. Inside the connector and on the connector, there are no metallic particles > 1,000 µm allowed.

For metallic particle at each connector: CCC = N (J4/ K0) acc. to VDA Band 19

For all other particle at each connector: CCC = N (J10/ K0) acc. to VDA Band 19

6.3 Stacking of produced harnesses

For an orderly and controlled stacking of the harnesses to quantitatively free defined bundles.

6.4 Degree of automation

There is a concept developed by the company Komax in which the process steps as shown in this process specification can be produced fully automatic in various stage of expansion. This concept was developed together with the company Hirschmann. Each manufacturer is responsible of the commissioning of the pressing device and can be requested direct at the company Komax.

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Concept of automation HPS40-2

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7 Change of documentation

Version	Change description	Change date	Editor
1	First edition (Draft)	07/ 2018	Hoor R.
2	Changed to FCA-specific design	11/ 2018	Hoor R.
3	Added Shield-crimping geometry	02/ 2019	Hoor R.
4	Added taping step; updated shield-crimping geometry	04/ 2019	Hoor R.
5	Changed dimension "f"	06/ 2019	Hoor R.
6	Defined dimension "d" / Updated dimension "f" / redefined requirement for pull-off force (shield)	06/ 2019	Hoor R.
7	Updated Crimping-geometry for shielding; Updated L10 due to wider anvil/crimper	01/ 2020	Hoor R.
8	Added alternative crimping geometry for shielding	02/ 2020	Hoor R.
9	Document number changed to EVS-100101 Numerical error fixed (809-887... replaced by 809-886...)	12/ 2020	Hoor R.
10	Changed specification for shielded cable 4.0 mm ² (Huber & Suhner FLR91XC33X 1x4 T150 1x 4.0 mm ² RADOX155S FLR) to FHLR91XC13X – 1x 4.0 mm ² RADOX 155S (91X) RADOX Elastomer S (13X)	10/ 2021	Immler J.
11	Implementing 4.0 mm ² Coficab cable (FHLR91XCB91X T4 PSA / FHLR91XC91X T4 LV) and 6.0 mm ² Coficab cable FHLR91XC91X T4 ISO) Implementing 5.0 mm ² Aptiv cable (M-Number M7284FFX) & 6.0 mm ² Champlain cable (ISO19642-915-08693)	02/ 2023	Engstler D.
12	Updated number of retaining cap on page 7; Updated table on page 35 and 58 with additional wire manufacturer	02/ 2023	Engstler D.
13	Changed 6.0 mm ² Champlain cable number	03/ 2023	Engstler D.
14	Update design specification	06/ 2023	Jussel E-M.
15	Adjusting data of the bottom line Correction of shielding sleeve PN	07/ 2023	Jussel E-M.
16	Updated PN contact carrier, ferrule crimp and stress relief	07/ 2023	Jussel E-M.
17	Update Pos. 2.3, 2.4, 2.5, 3.7	08/ 2023	Jussel E-M.
18	Topic 1.2: added with "Customer-releases" Page 59: update layout, added additional comment	10/ 2023	Jussel E-M.
19	Page 32,54: updated table and diameter from 16.9 to 17.2 mm of "embossing height" Page 30,31: switched the version A to B and B to A The Version B has an updated dimension of 12 ±0.1	11/ 2023	Jussel E-M.

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20	Page 4) Change of L from length to legal	04/ 2024	Jussel E-M.
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