Test Report based on DIN EN ISO/IEC 17025

Measurement of a RJ45 Cat.6A Connector
to its Power over Ethernet Type III & IV capability
according to DIN IEC 60512-99-002:2015 & DIN IEC 60512-9-3 Ed 2.0:2010

Project-no.: ZVKGA0317

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17559-01-00

Document-No.: P4712a-17-E

This Test Report with the measurements consists of 29 pages.

Content

Revision history

Document number	Date	Content/ Changes
P4712a-17-E	01.09.2017	initial version

1 General statements

1.1 Test Laboratory

GHMT AG
In der Kolling 13

66450 Bexbach, Germany

Phone: +49 / 68 26 / 92 28 – 0
Fax: +49 / 68 26 / 92 28 – 290

E–Mail: info@ghmt.de
Internet: www.ghmt.de

1.2 Test Date

Receipt of goods:		14. June 2017
Test number:		17-CS179
Testing	from:	20. June 2017
	until:	07. July 2017
	during:	(23 ± 3)°C

1.3 Test Site

Accredited Test Laboratory of GHMT AG, Bexbach

1.4 Test Conducted by

Mr. Bernd Jung, GHMT AG
Mr. Roman Schwoll, GHMT AG

1.5 Persons Present at Test

Mr. Stefan Grüner, GHMT AG (present temporarily)

2 Customer

2.1 Address

ZVK GmbH
Parkring 11

85748 Garching, Germany

Phone: +49 (0)89 31 20 349- 0
Fax: +49 (0)89 31 20 349- 220

Internet: www.zvk-gmbh.de

2.2 Responsible contact person

ZVK GmbH

Mr. Andreas Klees
Parkring 11

85748 Garching, Germany

Phone: +49 (0)89 31 20 349- 216
Fax: +49 (0)89 31 20 349- 220

E-Mail: a.klees@zvk-gmbh.de
Internet: www.zvk-gmbh.de

3 Device under test (DUT)

3.1 Description of the Components

The following sample(s) was/were part of the test:

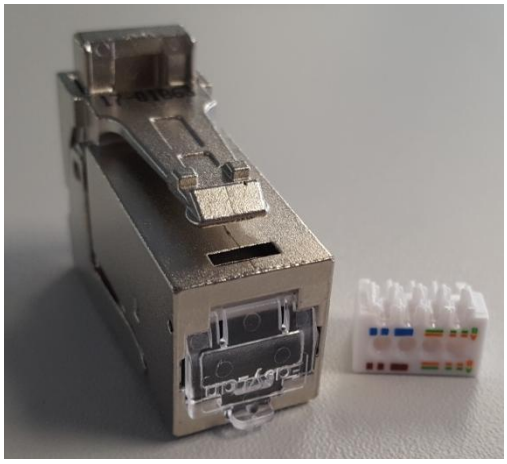
DUT: **fixLink® SL RJ45 Keystone Cat.6A ISO/IEC**

Part-no.: **CKFAK001**

Chargen-no.: **17-01863**

Condition of the sample(s): The sample(s) had no visible damages

Picture:



3.2 Provision

The DUT was / the specimens were...

☐	... with drawn on site. The selection of the sample / the samples was carried out by GHMT.
☐	... obtained by GHMT through resellers. The sampling procedures was neutral and unaffected by the client.
■	... obtained by GHMT through the client. The selection of the sample / the samples was carried out by client. Hence there was no neutral sampling by GHMT.

4 Test Type

4.1 Applied Rules and Regulations

- ISO/IEC 11801 Ed. 2.2: 2011-06
  Information technology – Generic cabling for customer premises

- DIN IEC 60512-99-002 (2015)
  Connectors for electronic equipment –
  Tests and measurements – Part 99-002: Test schedule for mating and un-mating
  connectors under electrical load – Power over the internet (plus) PoEP, particularly
  applicable to IEC 60603-7 series connectors

- DIN IEC 60512-9-3 Ed 2.0 (2010)
  Connectors for electronic equipment - Tests and
  measurements - Part 9-3: Endurance tests - Test 9c: mechanical operation (mating
  and un-mating) with electrical load"

4.2 Reference of testing

Measurement of a RJ45 Connector to its „Power over Ethernet Type III & IV - capability“ according to DIN IEC 60512-99-002:2015 und DIN IEC 60512-9-3 Ed 2.0:2010.

4.3 DUT

According to DIN IEC 60512-99-002 five samples of RJ45 Connectors, describes in chapter 3.1, are tested and evaluated.

All five test specimens were prefabricated as so-called "mini links", with a total length of 100 cm consisting of the following individual components:

DUT	Product name	Part number
Connector	**fixLink® SL RJ45 Keystone Cat.6A ISO/IEC**	**CKFAK001**
Data Cable	**SCHRACK CAT7 S/FTP 4x2xAWG23/1 LSOH**	**HSEKP423HP**

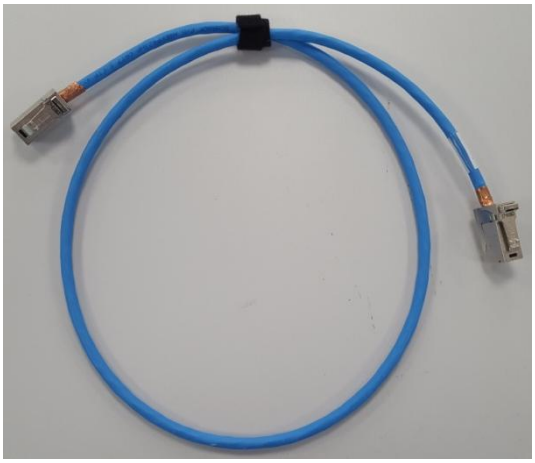


Figure 1: Mini- Link / Pattern

4.4 Test plan UEL 1

At the following all **5 Samples** of the RJ45 print socket were tested and evaluated by the following test plan.

Test step	Description
UEL 1.1a	Visible inspection
UEL 1.1b	Dimensional inspection
UEL 1.2	Resistance
UEL 1.3	Insulation resistance
UEL 1.4	Dielectrical strength
UEL 1.5	Mechanical operation with electrical load
UEL 1.7	Resistance
UEL 1.8	Mechanical operation with electrical load
UEL 1.9a	Visible inspection
UEL 1.9b	Dimensional inspection
UEL 1.10	Resistance
UEL 1.11	Insulation resistance
UEL 1.12	Dielectrical strength

Table 1: Test plan according to DIN IEC 60512-99-002

4.5 Test requirements – Visible inspection

The visible inspection (UEL 1.1a / 1.9a) performed according to DIN IEC 60512 no.1a.
A photographic Documentation with the following perspectives were create

- top view (contacts)

The criteria for pass result is, that **no** damages can be recogoniced, which interfere the proper function of the socket

4.6 Test requirements – Dimensional inspection

The dimensional inspection performed according to DIN IEC 60512 no.1b.

For a positive result all dimensions must be within the limits of the DIN IEC 60603-7-51:2010.
The following requirements were test and evaluated at the describes DUTs.

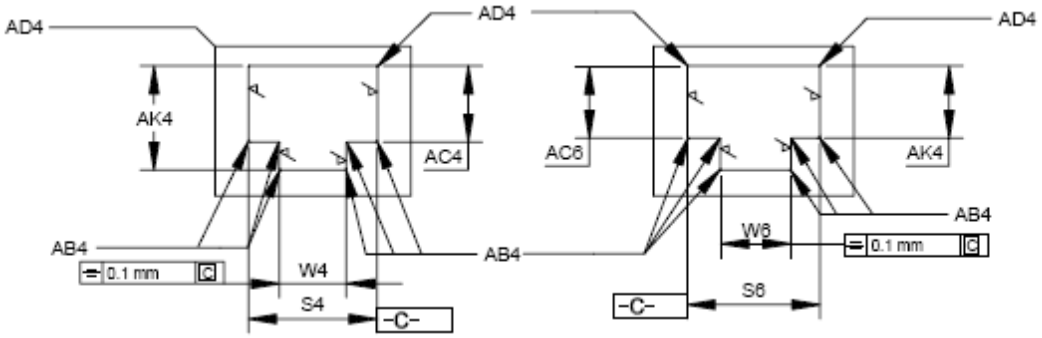


Figure 2: extract from DIN IEC 60603-7-51:2010

The dimensions „AC4/AC6, S4/S6 und W4/W6“ from figure 2 were tested and evaluated.

4.7 Test requirements – Resistance

Test step	Limit	Annotation
UEL 1.2	≤ 200 mOhm	Initial measurement
UEL 1.7	≤ 20 mOhm	Variance to the initial measurement
UEL 1.10	≤ 20 mOhm	Variance to the initial measurement

4.8 Test requirements – Insulation resistance

The insulation resistance test performed according to DIN IEC 60512 no.3a.
As measurement equipment the insulation resistance measurement device describes in chapter 4.11 were used.

The following criteria's were tested and evaluated:

Test step	Limit	Test Level
UEL 1.3	≥ 500 MOhm	500V DC, Setup A
UEL 1.11	≥ 500 MOhm	500V DC, Setup A

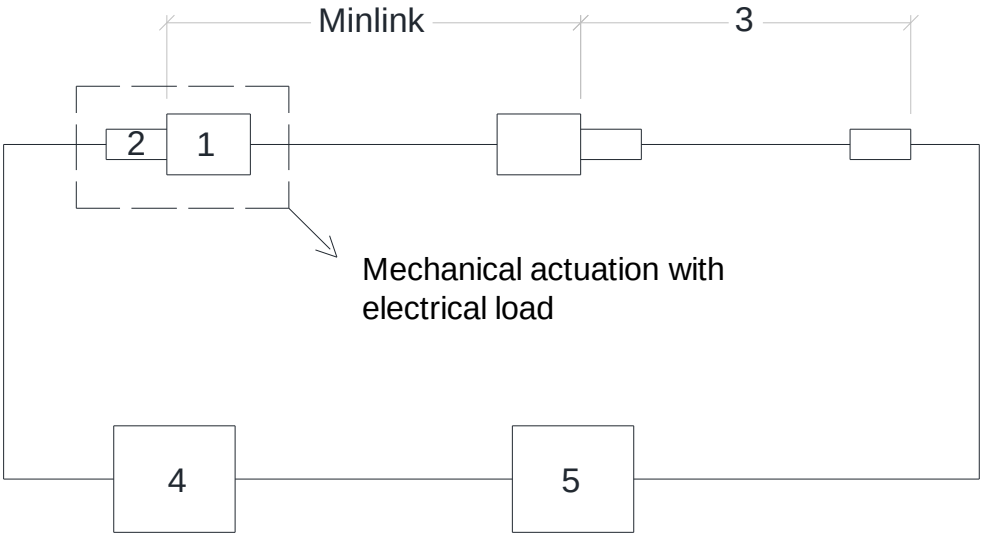
4.9 Test requirements – Dielectrical strength

The dielectrical strength test performed according to DIN IEC 60512 no.4a.
As measurement equipment the dielectrical strength measurement device describes in chapter 4.11 were used.

The following criteria's were tested and evaluated:

Test step	Requirements	Test level
UEL 1.4	Contact to contact 1000V	Setup A, mated
UEL 1.12	All contacts to screen 1500V	Setup A, mated

4.10 Test requirements - and setup - Mechanical operation with electrical load



1	**fixLink® SL RJ45 Keystone Cat.6A ISO/IEC** Part-no.: **CKFAK001**
2	**EasyLan Patch Cord Cat. 6A ISO/IEC DualBoot® 1:1, saCon® (2 Meter)** Part-no.: **CP10AAAAA0020**
3	**EasyLan Patch Cord Cat. 6A ISO/IEC DualBoot® 1:1, saCon® (2 Meter)** Part-no.: **CP10AAAAA0020**
4	Voltage source / current source
5	**SCHRACK CAT7 S/FTP 4x2xAWG23/1 LSOH (90 Meter)** Part-no.: **HSEKP423HP**

Figure 3: Mechanical operation with electrical load

The test " Mechanical operation with electrical load " performed according to DIN IEC 60512 no..9c.

The following devices were used to perform the " Mechanical operation with electrical load " test, as described in chapter 4.11:

- mating cycles device
- Power Source

The following criteria's were tested and evaluated:

Test step	Description	Test Level
UEL 1.5	25 cycles, mating & un-mating with electrical load, positive polarity 25 cycles, mating & un-mating with electrical load, negative polarity	**1A** current per conductor and **55V** voltage in all circuits
UEL 1.8	25 cycles, mating & un-mating with electrical load, positive polarity 25 cycles, mating & un-mating with electrical load, negative polarity	**1A** current per conductor and **55V** voltage in all circuits

Note: Future "Power over Ethernet" technologies up to 100 watts of power consumption describe a voltage of 55 volts with a current of approx. 0.5 amperes per wire in the case of a power supply over four wire pairs in current standardization designs. Thus, the parameters, current and voltage defined in this test are within these future specifications and thus allow conclusions to be drawn as to the future suitability of the described test specimens

4.11 Testing Equipment

For the described test, the following test devices were used by the GHMT AG:

Device	Number	Characteristic
mating cycles device	GHMTA0099	---
RLC-Meter	GHMTA0034	0,10 % Accuracy
Power Source	GHMTA0024	384 Watt
Dielectrical strength	GHMTA0031	0,01 – 7,00 kV DC
Insulation resistance	GHMTA0031	1 - 500 MΩ

5 Summary

Customer: ZVK GmbH
Parkring 11
85748 Garching, Germany

DUT: **fixLink® SL RJ45 Keystone Cat.6A ISO/IEC**
Part-No.: **CKFAK001**

Applied standards: DIN IEC 60512-99-002 (2015)
Connectors for electronic equipment – Tests and measurements –Part 99-001: Test schedule for mating and un-mating connectors under electrical load –Power over the internet (plus) PoEP, particularly applicable to IEC 60603-7 series connectors

DIN IEC 60512-9-3:Ed 2 (2010)
Connectors for electronic equipment - Tests and measurements - Part 9-3: Endurance tests - Test 9c: mechanical operation (mating and un-mating) with electrical load"

Results:

Test step	Description	Result
UEL 1.1a	Visible inspection	PASS
UEL 1.1b	Dimensional inspection	PASS
UEL 1.2	Resistance	PASS
UEL 1.3	Insulation resistance	PASS
UEL 1.4	Dielectrical strength	PASS
UEL 1.5	Mechanical operation with electrical load	PASS
UEL 1.7	Resistance	PASS
UEL 1.8	Mechanical operation with electrical load	PASS
UEL 1.9a	Visible inspection	PASS
UEL 1.9b	Dimensional inspection	PASS
UEL 1.10	Resistance	PASS
UEL 1.11	Insulation resistance	PASS
UEL 1.12	Dielectrical strength	PASS

The test results which were determined in the course of the measurement refer to the submitted specimen.

Bexbach, 01. September 2017

i.O. Stefan Grüner, engineer
(Head of Accrediteded Test Laboratory)

GHMT AG · IN DER KOLLING 13 · 66450 Bexbach
GHMT

GHMT AG
In der Kolling 13
D-66450 Bexbach
info@ghmt.de
www.ghmt.de

6 Results (UEL1)

6.1 Results test-step UEL 1.1a

No damages could be detected at the initial visible inspection.

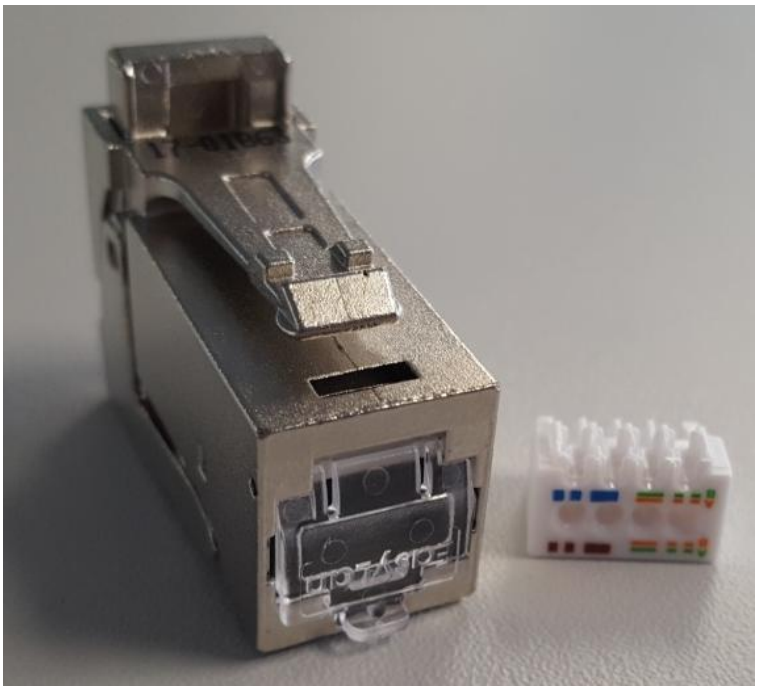
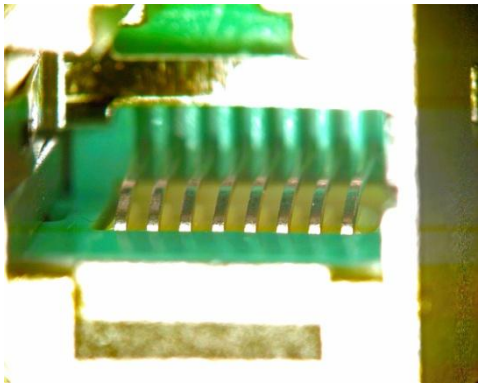
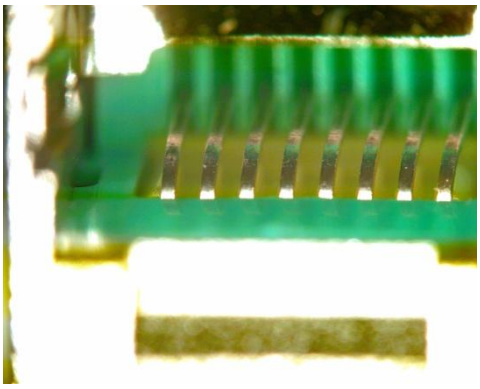
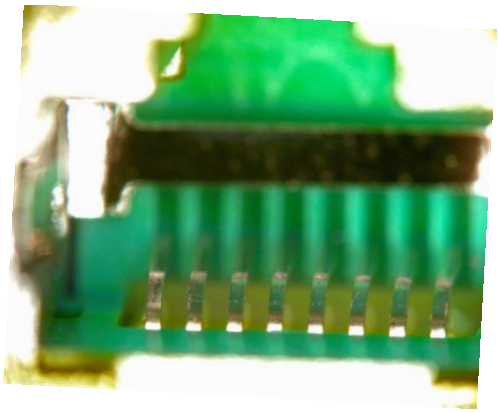
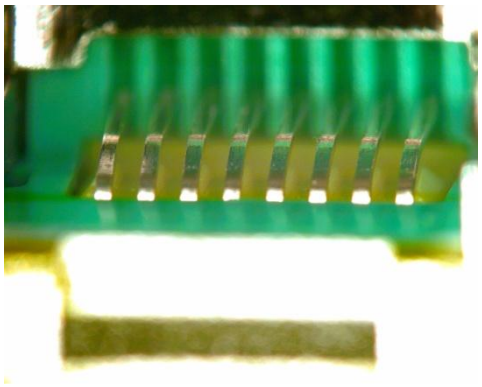


Figure 4: DUT as delivered

Visible inspection **UEL 1.1a**	Sample 1: 
Sample 2: 	Sample 3: 
Sample 4: 	Sample 5: 

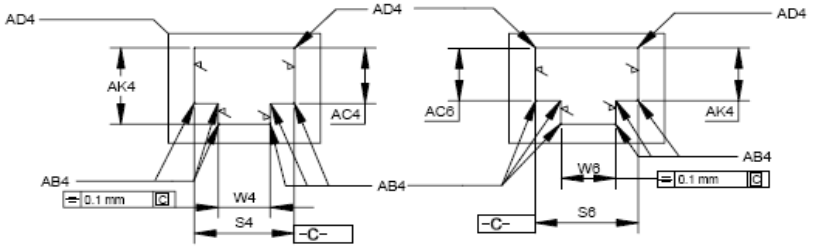
6.2 Results test-step UEL 1.1b

At the following the results of the dimensional inspection according to IEC60512 no.1b are listed.
All results are within the Limits.

Sample	dimensional inspection
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS

Result:	PASS

Mechanical dimensions



		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
Sample 1	Min (AC4) Max (AC6)	6,50	6,91	**6,86**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,78**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,29**	PASS
Sample 2		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,88**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,74**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,13**	PASS
Sample 3		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,89**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,96**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,16**	PASS
Sample 4		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,87**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,91**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,18**	PASS
Sample 5		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,82**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,87**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,2**	PASS

6.3 Results test-step UEL 1.2

At the initial "resistance test" UEL 1.2 all results are within the limits (≤ 400 m0hm) of the DIN IEC 60512-2a.

Sample	Resistance Test
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS

DC - Resistance

Result:	PASS	
Limit:		
max. Value:	400	mΩ
max. Deviation	20	mΩ
	-20	mΩ

Pin1_ws/gn
Pin2_gn
Pin3_ws/or
Pin6_or
Pin4_bl
Pin5_ws/bl
Pin7_ws/br
Pin8_br

		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
Sample 1	Pin1_ws/gn	237,89	-		PASS
	Pin2_gn	215,59	-		PASS
	Pin3_ws/or	180,34	-		PASS
	Pin6_or	197,08	-		PASS
	Pin4_bl	190,96	-		PASS
	Pin5_ws/bl	245,20	-		PASS
	Pin7_ws/br	206,60	-		PASS
	Pin8_br	175,82	-		PASS
Sample 2		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	231,57	-		PASS
	Pin2_gn	215,19	-		PASS
	Pin3_ws/or	202,25	-		PASS
	Pin6_or	177,05	-		PASS
	Pin4_bl	239,45	-		PASS
	Pin5_ws/bl	240,80	-		PASS
	Pin7_ws/br	202,20	-		PASS
	Pin8_br	177,94	-		PASS
Sample 3		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	232,87	-		PASS
	Pin2_gn	221,67	-		PASS
	Pin3_ws/or	175,81	-		PASS
	Pin6_or	197,56	-		PASS
	Pin4_bl	243,16	-		PASS
	Pin5_ws/bl	239,75	-		PASS
	Pin7_ws/br	205,78	-		PASS
	Pin8_br	176,15	-		PASS
Sample 4		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	230,98	-		PASS
	Pin2_gn	214,65	-		PASS
	Pin3_ws/or	175,02	-		PASS
	Pin6_or	194,16	-		PASS
	Pin4_bl	241,67	-		PASS
	Pin5_ws/bl	243,75	-		PASS
	Pin7_ws/br	203,80	-		PASS
	Pin8_br	174,90	-		PASS
Sample 5		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	250,87	-		PASS
	Pin2_gn	219,50	-		PASS
	Pin3_ws/or	178,93	-		PASS
	Pin6_or	195,93	-		PASS
	Pin4_bl	243,71	-		PASS
	Pin5_ws/bl	245,88	-		PASS
	Pin7_ws/br	207,33	-		PASS
	Pin8_br	179,60	-		PASS

6.4 Results test-step UEL 1.7

At the "resistance test" UEL 1.7 all results are within the limits of the DIN IEC 60512-2a.

Sample	Resistance Test
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS

DC - Resistance

Result:	PASS	
Limit:		
max. Value:	400	mΩ
max. Deviation	20	mΩ
	-20	mΩ

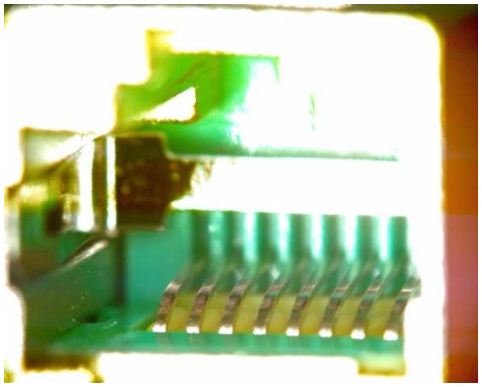
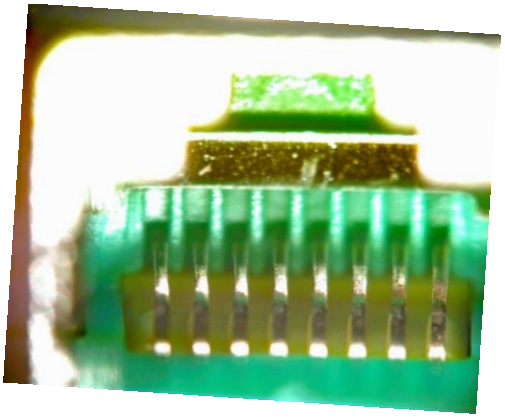
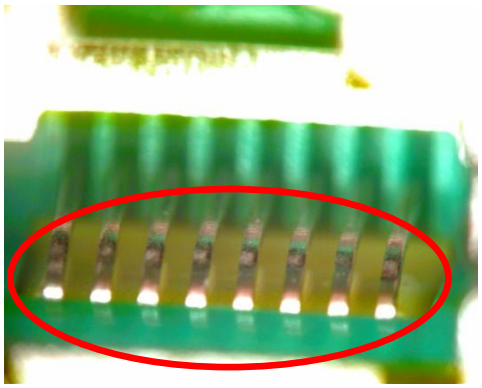
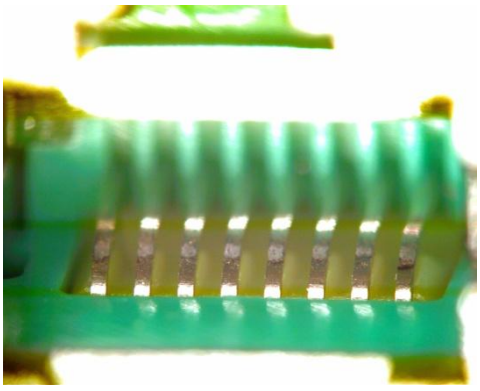
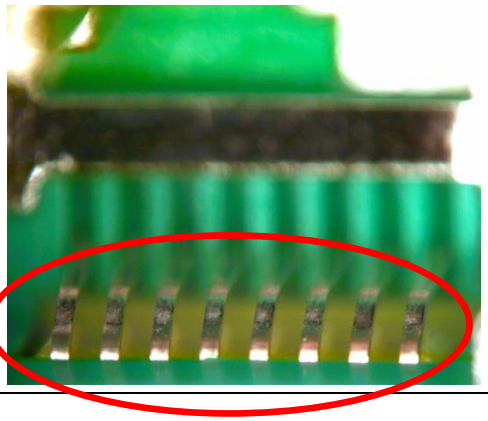
Pin1_ws/gn
Pin2_gn
Pin3_ws/or
Pin6_or
Pin4_bl
Pin5_ws/bl
Pin7_ws/br
Pin8_br

		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
Sample 1	Pin1_ws/gn	237,89	236,90	-0,99	PASS
	Pin2_gn	215,59	219,74	4,15	PASS
	Pin3_ws/or	180,34	183,36	3,02	PASS
	Pin6_or	197,08	208,52	11,44	PASS
	Pin4_bl	247,36	252,68	5,32	PASS
	Pin5_ws/bl	245,20	248,83	3,63	PASS
	Pin7_ws/br	206,60	212,26	5,66	PASS
	Pin8_br	175,82	179,45	3,63	PASS
Sample 2		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	231,57	233,61	2,04	PASS
	Pin2_gn	215,19	222,52	7,33	PASS
	Pin3_ws/or	202,25	197,11	-5,14	PASS
	Pin6_or	177,05	195,17	18,12	PASS
	Pin4_bl	239,45	246,04	6,59	PASS
	Pin5_ws/bl	240,80	244,57	3,77	PASS
	Pin7_ws/br	202,20	208,87	6,67	PASS
	Pin8_br	177,94	180,57	2,63	PASS
Sample 3		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	232,87	234,72	1,85	PASS
	Pin2_gn	221,67	220,57	-1,10	PASS
	Pin3_ws/or	175,81	183,38	7,57	PASS
	Pin6_or	197,56	211,38	13,82	PASS
	Pin4_bl	243,16	249,56	6,40	PASS
	Pin5_ws/bl	239,75	245,16	5,41	PASS
	Pin7_ws/br	205,78	214,66	8,88	PASS
	Pin8_br	176,15	193,07	16,92	PASS
Sample 4		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	230,98	231,75	0,77	PASS
	Pin2_gn	214,65	213,91	-0,74	PASS
	Pin3_ws/or	175,02	177,43	2,41	PASS
	Pin6_or	194,16	208,13	13,97	PASS
	Pin4_bl	241,67	244,04	2,37	PASS
	Pin5_ws/bl	243,75	242,12	-1,63	PASS
	Pin7_ws/br	203,80	187,72	-16,08	PASS
	Pin8_br	174,90	177,53	2,63	PASS
Sample 5		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	250,87	235,52	-15,35	PASS
	Pin2_gn	219,50	222,31	2,81	PASS
	Pin3_ws/or	178,93	182,56	3,63	PASS
	Pin6_or	195,93	211,36	15,43	PASS
	Pin4_bl	243,71	249,13	5,42	PASS
	Pin5_ws/bl	245,88	247,72	1,84	PASS
	Pin7_ws/br	207,33	209,39	2,06	PASS
	Pin8_br	179,60	180,45	0,85	PASS

6.5 Results test-step UEL 1.9a

The test step UEL 1.9a visual inspection shows loss of contact material because of the Mechanical operation with electrical load at the contacts of the socket. But this has **no** effect on the electrical performance.

<table>
<tr><td>Visible inspection

UEL 1.9a</td><td>Sample 1:
  </td></tr>
<tr><td>Sample 2:
  </td><td>Sample 3:
  </td></tr>
<tr><td>Sample 4:
  </td><td>Sample 5:
  </td></tr>
</table>

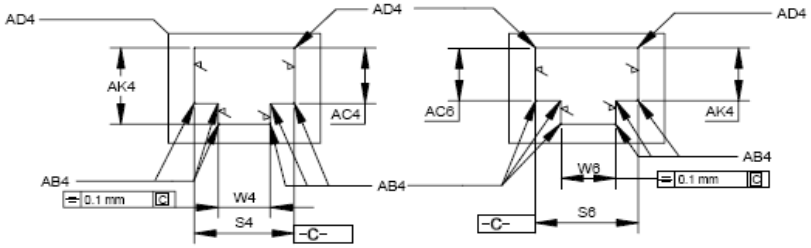
6.6 Results test-step UEL 1.9b

At the following the results of the dimensional inspection according to IEC60512 no.1b are listed.
All results are within the Limits.

Sample	dimensional inspection
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS

Result:	PASS

Mechanical dimensions



		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
Sample 1	Min (AC4) Max (AC6)	6,50	6,91	**6,89**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,78**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,23**	PASS
Sample 2		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,85**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,86**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,22**	PASS
Sample 3		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,87**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,9**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,22**	PASS
Sample 4		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,86**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,97**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,23**	PASS
Sample 5		Minimum (mm)	Maximum (mm)	Measured (mm)	Result
	Min (AC4) Max (AC6)	6,50	6,91	**6,83**	PASS
	Min (S4) Max(S6)	11,58	11,99	**11,92**	PASS
	Min (W4) Max(W6)	6,01	6,40	**6,23**	PASS

6.7 Results test-step UEL 1.10

At the "resistance test" UEL 1.10 all results are within the limits of the DIN IEC 60512-2a.

Sample	Resistance Test
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS

DC - Resistance

Result:	PASS	
Limit:		
max. Value:	400	mΩ
max. Deviation	20	mΩ
	-20	mΩ

Pin1_ws/gn
Pin2_gn
Pin3_ws/or
Pin6_or
Pin4_bl
Pin5_ws/bl
Pin7_ws/br
Pin8_br

		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
Sample 1	Pin1_ws/gn	236,90	238,38	1,48	PASS
	Pin2_gn	219,74	220,92	1,18	PASS
	Pin3_ws/or	183,36	181,32	-2,04	PASS
	Pin6_or	208,52	223,54	15,02	PASS
	Pin4_bl	252,68	255,95	3,27	PASS
	Pin5_ws/bl	248,83	249,26	0,43	PASS
	Pin7_ws/br	212,26	211,97	-0,29	PASS
	Pin8_br	179,45	180,67	1,22	PASS
Sample 2		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	233,61	236,31	2,70	PASS
	Pin2_gn	222,52	222,91	0,39	PASS
	Pin3_ws/or	197,11	185,15	-11,96	PASS
	Pin6_or	195,17	207,13	11,96	PASS
	Pin4_bl	246,04	253,12	7,08	PASS
	Pin5_ws/bl	244,57	246,95	2,38	PASS
	Pin7_ws/br	208,87	210,26	1,39	PASS
	Pin8_br	180,57	182,26	1,69	PASS
Sample 3		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	234,72	237,05	2,33	PASS
	Pin2_gn	220,57	223,67	3,10	PASS
	Pin3_ws/or	183,38	184,49	1,11	PASS
	Pin6_or	211,38	219,05	7,67	PASS
	Pin4_bl	249,56	251,17	1,61	PASS
	Pin5_ws/bl	245,16	245,44	0,28	PASS
	Pin7_ws/br	214,66	214,23	-0,43	PASS
	Pin8_br	193,07	181,74	-11,33	PASS
Sample 4		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	231,75	236,48	4,73	PASS
	Pin2_gn	213,91	219,36	5,45	PASS
	Pin3_ws/or	177,43	184,28	6,85	PASS
	Pin6_or	208,13	224,92	16,79	PASS
	Pin4_bl	244,04	251,29	7,25	PASS
	Pin5_ws/bl	242,12	248,60	6,48	PASS
	Pin7_ws/br	187,72	201,78	14,06	PASS
	Pin8_br	177,53	179,97	2,44	PASS
Sample 5		before (mΩ)	after (mΩ)	Difference (mΩ)	Result
	Pin1_ws/gn	235,52	236,63	1,11	PASS
	Pin2_gn	222,31	221,47	-0,84	PASS
	Pin3_ws/or	182,56	184,15	1,59	PASS
	Pin6_or	211,36	224,09	12,73	PASS
	Pin4_bl	249,13	254,95	5,82	PASS
	Pin5_ws/bl	247,72	249,02	1,30	PASS
	Pin7_ws/br	209,39	210,51	1,12	PASS
	Pin8_br	180,45	182,85	2,40	PASS