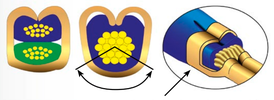
Visual inspection of crimped connections

Insulation crimping

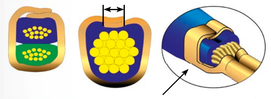
B or F-Crimp



Insulation is enclosed and fixed
The crimp flanks are closed

Note: In case of double crimping with differing cross-sections and/or outer diameters, the smaller cable is ALWAYS at the bottom!

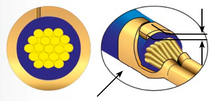
Overlapping crimp



Insulation is enclosed and fixed
The crimp flanks "overlap"

Note: In case of double crimping with differing cross-sections and/or outer diameters, the smaller cable is ALWAYS at the bottom!

O or enclosed crimp



Insulation is enclosed and fixed.
The crimp flanks "overlap" one another

Mismatch
Cross-section contact

Insulation pierced

Crimp too high

Iso-crimp overfilled

Insulation pierced

Mismatch
Cross-section contact

Insulation pierced

Crimp too high

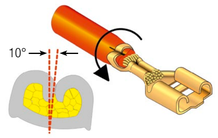
Insulation pierced

Note: The same quality standards apply for processing single wire seals

Iso-crimp is "overpressed"

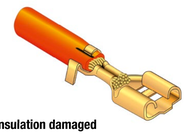
Iso-crimp too large
Insulation not enclosed

Contact twisted

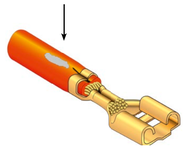


The twisting between the crimp zone and the contact body must be a maximum of 10°!

Crimp flank bent



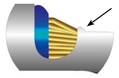
Insulation damaged



No damage to the insulation permissible!
Pressure marks must be visible!

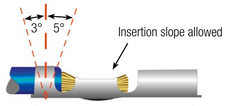
Wire crimping

0.03–0.56 mm²	(AWG 32–20)	0.25 +/- 0.15 mm
0.30–0.81 mm²	(AWG 22–18)	0.25 +/- 0.15 mm
0.50–2.50 mm²		0.40 +/- 0.20 mm
2.50–6.00 mm²		0.60 +/- 0.30 mm



Insert slope
(trumpet, bell mouth) must be visible!

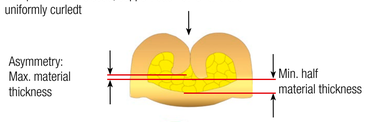
Position deviation
Insulation crimp

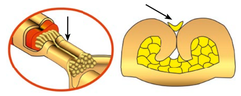


Insertion slope allowed

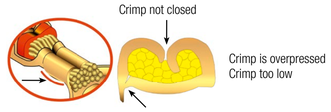
Dividing tab must be present! (max. 0.5 mm)

Crimp flanks are closed, support each other and are uniformly curledt



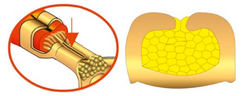


Individual strands are not enclosed in wire crimp – insertion error



Cracks in crimp base and severe burr formation

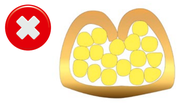
Wire crimp is not closed and is overfilled



Mismatch: conductor cross-section contact

Crimp flanks hit upon the crimp contact base

Mismatch: conductor cross-section contact



Crimp not filled

Crimp too high
Mismatch

Crimp flanks curl unevenly

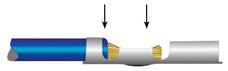
Mismatch: conductor cross-section contact

Contact is not centred to the tool

Position of the conductor in the crimp contact

Conductor and insulation must be visible!

End of the conductor must be visible!

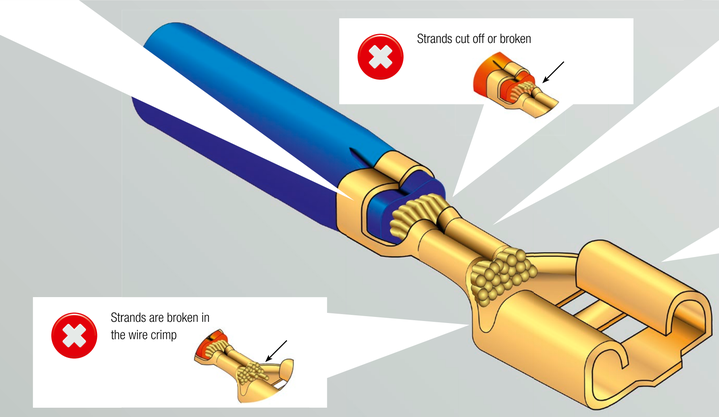


Cable inserted too short

Cable stripped too short

Cable inserted too far

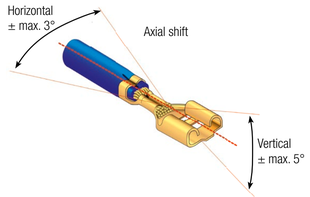
Cable stripped too long



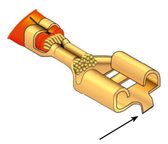
Strands cut off or broken

Strands are broken in the wire crimp

Functional zone of crimp contacts

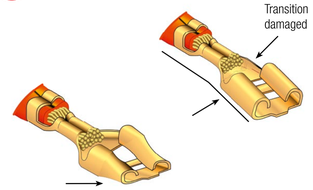


Dividing tab too long and deformed



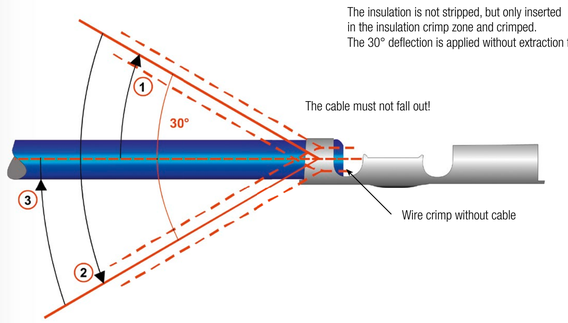
Note:
Divider tab must be visible.
Length max. 0.5 mm

Contact functional zone damaged and deformed



Note: Crimp contacts with damaged, bent and deformed functional zones (snap locks etc.) must NOT be "straightened out" and must always be disposed of as "bad parts"!

Definition of insulation crimp height in accordance with DIN 41 611 Part 3



The insulation is not stripped, but only inserted in the insulation crimp zone and crimped.
The 30° deflection is applied without extraction force.

The cable must not fall out!

Wire crimp without cable

Extraction force in accordance with DIN 46 249 Part 1, SEN 245010 and EN 60352-2: 2006

Always perform extraction tests with insulation crimp open!

Individual wires break off irregularly beyond the insert slope = Test OK!

Individual wires break irregularly beyond the insert slope = Crimp too low!

Crimp too high!

Note: It is not sufficient to simply measure the conductor extraction force, as it could have the same value for different compression levels! Inspection of the crimp dimensions is required!

Nominal conductor cross-section mm²	Nominal size (plug width)				Extraction force (N) min.	
					Nominal size 2.8	Nominal size 4.8–9.5
0.14	2.8				20	20
0.25	2.8				40	40
0.50	2.8	4.8	6.3		60	80
0.75	2.8	4.8	6.3		70	120
1.00	2.8	4.8	6.3		80	160
1.50		4.8	6.3			200
2.50		4.8	6.3			250
4.00			6.3	9.5		350
6.00			6.3	9.5		500

For different conductor cross sections the lower extraction force is definitive in each case.The extraction forces for the nominal size 2.8 arise from the lower material thickness. Excerpt: DIN 46 249 Part 1.

Extraction forces in accordance with SEN 245010: The SEN 245010 standard applies the most stringent QA requirements for a crimp connection in international comparison.

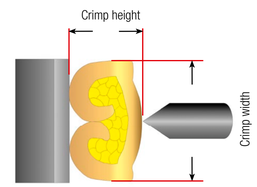
Cross-section	Extraction for
0,75–50 mm²	150 N per mm²
–95 mm²	120 N per mm²
over 95 mm²	100 N per mm²

Pull-Out Force of Crimp Connections
Testing has to be in accordance with Test 16d of IEC 60512.

Wire Gauge		Pull-Out Force	Wire Gauge		Pull-Out Force
mm²	AWG	N	mm²	AWG	N
0.05	30	6	1.3	16	135
0.08	28	11	1.5		150
0.12	26	15	2.1	14	200
0.14		18	2.5		230
0.22	24	28	3.3	12	275
0.25		32	4.0		310
0.32	22	40	5.3	10	355
0.5	20	60	6.0		360
0.75		85	8.4	8	370
0.82	18	90	10.0		380
1.0		108			

IEC 60760, Section 17 and IEC 61210, table 9, show the same values for validation of crimp connections.

Measuring crimping dimensions



Crimp dimensions and tolerances for the crimp contact under test are to be taken from the relevant processing specification!