

01/23/01
Calibration Information
for
Crimping Tools

Introduction

Paladin Tools® offers calibration information and support for professional crimping tools in our HTO (1600 Series) and CTO (Heavy Duty Series) frame styles. The professional tools are designed, manufactured, assembled, and tested to meet the calibration criteria specified by DIN (Deutsche Industry Norm) Standards.

Our economy 1300 Series Interchangeable Die crimping tools, and the CrimpALL 8000 Series crimping tools are not covered by a calibration program. These tools, while manufactured with the highest quality materials and workmanship, are intended for multiple application use that prevents a calibration standard for the tool. The continuous changing of die sets and applications prohibits an acceptable calibration platform for these tools. The 1440 Series closed barrel crimp tools have no calibration information and are not supported for calibration.

Calibration Requirements

Customers may utilize the information contained within this document as a reference to calibrate the tools using their own calibration facilities. The facilities must be ANSI, DIN, UL, CSA, or VDE certified to be qualified for calibration of crimping tools. Please verify your calibration facilities have the appropriate certifications, equipment, and experience to properly calibrate the crimping tools.

For the 1300 and 8000 Series crimping tools, calibration can be performed at a certified calibration lab. Customers will need to contact the connector manufacturer for the connectors being crimped. The connector manufacturer can supply the pull-out force, crimp shape, and inspection and testing criteria needed to determine the proper calibration of the tool. By crimping the connector and testing it to the connector manufacturer's criteria, calibration can be determined for the tool.

Proper Crimping Requirements

In order to obtain an optimum crimp, the following components must be matched:

1. Wire or Cable type and size (proper cross sectional area, AWG size, insulation and material type, and physical structure)
2. Connector, cable lug, contact, or ferrule must meet crimp requirements and sizes.
3. Tool and tool setting must be comparable to the specifications listed by the connector manufacturer (i.e. crimp size, shape, and type).
4. Wire and cable preparation must meet the specifications listed by the connector manufacturer (i.e. coaxial cable trim code sizes and wire stripping lengths).

Testing of Crimping Tools: Intervals and Pull-out Force Requirements

Intervals for routine testing are subject to certain restrictions. The frequency of testing is highly dependent on the respective intensity of use. Information can only be given for a defined number of crimped connections, although there is also a dependence on the crimped cross-section and wire size.

The following intervals are recommended for performing calibration testing:

Model No.	Crimper Part No.	Type	Recommended test interval for controlled crimping
CTI 6	900612	Insulated Terminal	Every 5,000 crimp cycles at 10 AWG (6.0mm ²)
CTI 6S	900621	Insulated Terminal	Every 5,000 crimp cycles at 10 AWG (6.0mm ²)
HTF 28	901309	Open Barrel "F"	Every 5,000 crimp cycles at 18 AWG (0.75mm ²)
HTF 34	1631	Open Barrel "F"	Every 5,000 crimp cycles at 14 AWG (2.5mm ²)
HTF 36	1645	Open Barrel "F"	Every 5,000 crimp cycles at 18 AWG (0.75mm ²)
HTF 48	901308	Open Barrel "F"	Every 5,000 crimp cycles at 14 AWG (2.5mm ²)
HTF 63	1635	Open Barrel "F"	Every 5,000 crimp cycles at 14 AWG (2.5mm ²)
HTF SUB-D	1646	Open Barrel "F"	Every 5,000 crimp cycles at 20 AWG (0.50mm ²)
HTF SUB-HD	901353	Open Barrel "F"	Every 5,000 crimp cycles at 24 AWG (0.25mm ²)
HTG 58	1610	Coaxial Hex	Every 5,000 crimp cycles with RG58 (standard, non-plenum or Teflon)
HTG 59	1615	Coaxial Hex	Every 5,000 crimp cycles with RG59 (standard, non-plenum or Teflon)
HTG 58-59	1617	Coaxial Hex	Every 5,000 crimp cycles with RG59 (standard, non-plenum or Teflon)
HTG 59-HDTV	1611	Coaxial Hex	Every 5,000 crimp cycles with RG59 (standard, non-plenum or Teflon)
HTI 12	1625	Insulated Terminal	Every 5,000 crimp cycles at 14 AWG (2.5mm ²)
HTI 15	1605	Insulated Terminal	Every 5,000 crimp cycles at 14 AWG (2.5mm ²)
HTN 21	1618	Non-Insulated Terminal	Every 5,000 crimp cycles at 10 AWG (6.0mm ²)
HTN 21L	901461	Non-Insulated Terminal	Every 5,000 crimp cycles at 10 AWG (6.0mm ²)
PZ 1.5	900599	Ferrule	Every 10,000 crimp cycles at 16 AWG (1.5mm ²)
PZ 3	56730	Ferrule	Every 5,000 crimp cycles at 12 AWG (4.0mm ²)
PZ 4	1648	Ferrule	Every 10,000 crimp cycles at 12 AWG (4.0mm ²)
PZ 6 ROTO	901435	Ferrule	Every 10,000 crimp cycles at 12 AWG (4.0mm ²)
PZ 6/5	901146	Ferrule	Every 10,000 crimp cycles at 12 AWG (4.0mm ²)
PZ 16	901260	Ferrule	Every 10,000 crimp cycles at 6 AWG (16.0mm ²)
PZ 16S	1649	Ferrule	Every 10,000 crimp cycles at 6 AWG (16.0mm ²)
PZ 35	900625	Ferrule	Every 5,000 crimp cycles at 2 AWG (35.0mm ²)
PZ 50	900645	Ferrule	Every 5,000 crimp cycles at 2 AWG (35.0mm ²)

Pull-Out Force Requirements:

Information is provided for pull-out force test on tools for crimping open barrel contacts, push-on tab sleeves, insulated and non-insulated terminals, coaxial connectors, and wire ferrules.

The crimp connection is to be uniformly loaded in the tensile testing machine at a test speed of 30mm/min. Any insulation support is to be rendered ineffective beforehand. The following results can be selected for destruction of the crimp connections:

- a.) Conductor breaks outside the crimp connection.
- b.) Conductor breaks in front of the crimp connection.
- c.) Conductor breaks in the crimp connection.
- d.) Conductor is pulled out of the crimp connection.
- e.) Strength of the contact is exceeded.
- f.) Contact breaks or separates.

**1.0 Tools for crimping push-on tabs (non-insulated terminals with open-barrel “F” crimps and slide-on tabs)
DIN 46247, Parts 1-3; 3/75**

HTF 28

Wire Size/Cross Section	Pull-out Force
26 AWG (0.10mm ²)*	>/= 3.4 lbs (15 N)
27 AWG (0.14mm ²)*	>/= 4.5 lbs (20 N)
24 AWG (0.20mm ²)*	>/= 7.9 lbs (35 N)
24 AWG (0.25mm ²)*	>/= 9.0 lbs (40 N)
22 AWG (0.34mm ²)*	>/= 10.0 lbs (45 N)
20 AWG (0.50mm ²)	>/= 13.5 lbs (60 N)
18 AWG (0.75mm ²)	>/= 15.7 lbs (70 N)
18 AWG (1.0mm ²)	>/= 18.0 lbs (80 N)
16 AWG (1.5mm ²)	>/= 18.0 lbs (80 N)

HTF 48 / HTF 63

Wire Size/Cross Section	Pull-out Force
20 AWG (0.50mm ²)	>/= 18.0 lbs (80 N)
18 AWG (0.75mm ²)	>/= 31.5 lbs (140 N)
18 AWG (1.0mm ²)	>/= 36.0 lbs (160 N)
16 AWG (1.5mm ²)	>/= 45.0 lbs (200 N)
14 AWG (2.5mm ²)	>/= 56.2 lbs (250 N)

Test conductor H05 V-K or H07 V-K; values according to EN 61210 9/1995.

* Values according to EN 60352, Part 2; 9/95.

2.0 Tools for crimping insulated terminals

HTI 12 / HTI 15 / CTI 6 / CTI 6S

Wire Size/Cross Section	Pull-out Force
20 AWG (0.50mm ²)	>/= 13.0 lbs (58 N)
18 AWG (0.75mm ²)	>/= 20.2 lbs (90 N)
16 AWG (1.5mm ²)	>/= 30.3 lbs (135 N)
14 AWG (2.5mm ²)	>/= 43.8 lbs (195 N)
12 AWG (4.0mm ²)	>/= 60.7 lbs (270 N)
10 AWG (6.0mm ²)	>/= 80.9 lbs (360 N)

Test conductor H05 V-K or H07 V-K
Values according to EN 60352, Part 2, 9/95

3.0 Tools for crimping non-insulated terminals and cable lugs

HTN 21 / HTN 21L

Wire Size/Cross Section	Pull-out Force
20 AWG (0.50mm ²)	>/= 16.6 lbs (74 N)
18 AWG (0.75mm ²)	>/= 29.2 lbs (130 N)
18 AWG (1.0mm ²)	>/= 33.3 lbs (148 N)
16 AWG (1.5mm ²)	>/= 47.7 lbs (212 N)
14 AWG (2.5mm ²)	>/= 73.0 lbs (325 N)
12 AWG (4.0mm ²)	>/= 110.0 lbs (490 N)
10 AWG (6.0mm ²)	>/= 184.3 lbs (820 N)

Test conductor H05 V-K or H07 V-K
Values according to DIN VDE 0220 Part 2

4.0 Tools for crimping open barrel subminiature D-sub contacts

HTF Sub-D / HTF Sub-HD

Wire Size/Cross Section	Pull-out Force
28 AWG (0.08mm ²)	>/= 2.7 lbs (12 N)
26 AWG (0.10mm ²)	>/= 4.0 lbs (18 N)
24 AWG (0.20mm ²)	>/= 6.7 lbs (30 N)
22 AWG (0.34mm ²)	>/= 9.7 lbs (43 N)
20 AWG (0.50mm ²)	>/= 14.6 lbs (65 N)
18 AWG (0.75mm ²)	>/= 21.3 lbs (95 N)

Values according to EN 60352, Part 2; 9/95

5.0 Tools for crimping open barrel contacts (F-crimp)

HTF 34 / HTF 36

Wire Size/Cross Section	Pull-out Force
28 AWG (0.08mm ²)	>/= 2.7 lbs (12 N)
26 AWG (0.10mm ²)	>/= 3.4 lbs (15 N)
24 AWG (0.20mm ²)	>/= 6.7 lbs (30 N)
22 AWG (0.34mm ²)	>/= 9.7 lbs (43 N)
20 AWG (0.50mm ²)	>/= 13.5 lbs (60 N)
18 AWG (0.75mm ²)	>/= 16.9 lbs (75 N)

Values according to EN 60352, Part 2; 9/95

6.0 Tools for crimping coaxial connectors (BNC/TNC/N-type)

Note:

Cables must be prepared according to manufacturers trim code specifications. Verify crimp sizes and types specified by the connector manufacturer match those of the crimping tool. Only standard PVC coaxial cable types to be used. Plenum and Teflon cables are not acceptable to determine pull-out forces.

HTG 58 / HTG 59 / HTG 58-59 / HTG 59-HDTV

Cable Type (Standard)	Pull-out Force
RG58	>/= 11.25 lbs (50 N)
RG59	>/= 11.25 lbs (50 N)
RG62	>/= 11.25 lbs (50 N)
RG71	>/= 11.25 lbs (50 N)

Only the inside conductor with the contact pin is tested.
Refer to DIN 45999, Part 11; 2/81

7.0 Tools for crimping wire ferrules

- a.) It is not necessary to test all combinations of crimping articles and conductor sizes.
- b.) Pull-out force tests on tools used to crimp ferrules according to DIN 46228, Part 1, 8/92 and Part 4: 9/90.
- c.) Test Specification:
 1. Feed the conductor through a perforated plate, crimp the ferrule to the conductor at the back of the perforated plate. The conductor may protrude slightly from the ferrule.
 2. The connection is loaded up to the target value in the tensile testing machine. The target value must be maintained for 60 seconds, during which time the conductor must not be noticeably pulled out of the ferrule. The load is then increased until the ferrule is pulled from the conductor.
 3. The maximum value is noted on the test control sheet.
 4. The test speed is to be 25 mm/min.

(Continued: Wire Ferrules)

PZ 1.5 / PZ 3 / PZ 4 / PZ 6 ROTO / PZ 6/5 / PZ16 / PZ 16S

Wire Size/Cross Section	Pull-out Force
24 AWG (0.20mm ²)	>/= 2.7 lbs (12 N)*
23 AWG (0.25mm ²)	>/= 3.37 lbs (15 N)*
22 AWG (0.34mm ²)	>/= 4.5 lbs (20 N)*
20 AWG (0.50mm ²)	>/= 6.7 lbs (30 N)*
18 AWG (0.75mm ²)	>/= 6.7 lbs (30 N)*
18 AWG (1.0mm ²)	>/= 6.7 lbs (30 N)
16 AWG (1.5mm ²)	>/= 9.0 lbs (40 N)
14 AWG (2.5mm ²)	>/= 11.2 lbs (50 N)
12 AWG (4.0mm ²)	>/= 11.2 lbs (50 N)
10 AWG (6.0mm ²)	>/= 13.5 lbs (60 N)
8 AWG (10.0mm ²)	>/= 18.0 lbs (80 N)
6 AWG (16.0mm ²)	>/= 20.2 lbs (90 N)

PZ 35 / PZ 50

Wire Size/Cross Section	Pull-out Force
4 AWG (25mm ²)	>/= 22.5 lbs (100 N)
2 AWG (35mm ²)	>/= 27.0 lbs (120 N)
1/0 (50mm ²)	>/= 31.5 lbs (140 N)

Values according to DIN 46228, Part 1: 8/92 and DIN 46228, Part 4; 9/9

Test conductors H05 V-K or H07 V-K with corresponding cross-sectional area is to be used for test.

Setting Tool Calibration, and Tool Repair

1. Set ratchet gear to proper setting to ensure good calibration and crimp performance.
2. Inspect and replace worn die sets and die screws as required.
3. Inspect and replace frame and ratchet springs as needed.
4. Inspect for metal fatigue in the frame, jaws, handles, and retaining pins. Replace or repair as required.
5. If exceeding 50,000 crimp cycles, or deterioration occurs due to normal wear and tear replace the tool with a new one.
6. Contact Paladin Tools[®] technical support at 1-800-272-8665 for additional information.

Acquiring DIN, UL, ANSI, CSA, or VDE Specifications

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