



TE CONNECTIVITY (TE) CONNECTOR TROUBLE SHOOTING GUIDE

The purpose of this Connector Trouble Shooting Guide is to provide TE customers and Channel/Distribution Partners with an overview of the most common questions or concerns related to TE Appliances BU connector products.

The Connector Trouble Shooting Guide

- Is a document with criteria regarding customer's product questions or concerns
- Provides clarifications on criteria and standardized decision making
- Contains textual inputs for answering customer's questions or concerns

Connector Trouble Shooting Guidance

Basic Knowledge For Connectors	Failure Mode	Detail
Customer Concern Checklist TE.com Application Specification (114-**) Product Specification (108-**)	Complete and Accurate Details	• Submitting a Complaint
	Aesthetics	• Plastic
	Crimping	• Crimping/ Termination Process • Application of Crimped Terminals • Misapplication due to incorrect mated pair connector
	Packaging/Handling	• Terminals • Plastic Housings
	Manufacturing details	• Gate Marking • Flash

Submitting a Complaint

Detailed problem statement: develop clear problem statement (use data to describe). Characterize "As is" and "Desired states." Determine degree of problem. Prior to submitting a complaint, Review Product Drawings, Product Specifications, Application Specifications, and recent Product Change Notifications (PCN).

- **Based on data**
 - **Who:** Who detected the issue? (operator, quality line inspector etc.)
 - **Where:** Where did the issue occur? Where was the issue detected? (at incoming inspection, on production line etc.)
 - **When:** When was the issue detected? (Date, shift, operation)
 - **What:** What was detected? (failure description)
 - **Why:** Why the detected condition is raising concerns? (it's not meeting TE specs, it's different from previous supplies etc.)
 - **How:** How was the issue detected? (Visual inspection, electrical test, etc.)
 - **How many:** How many suspect parts were detected? How many were received?
 - **IMPACT:** What is the impact that you are seeing due to this identified?
- **No causes**
- **No corrective actions/solutions listed in the problem statement**
- **Not too broad**
- **Guidelines**
 - Use consistent wording (i.e., positive or negative tone) for "as is" and "desired" states (see example in next section below)
 - Use the same metric (Quantity's or % percent's) for "as is" and "desired" state
- **Helpful Hints for a more effective and efficient investigation**
 - Photos of "As is" and "Desired states" products with annotated text clarifying the suspect non-conformance
 - Photos of labels and shipping boxes
 - Videos if not any non-TE process is involved
 - Review TE Specifications to verify if the concern is a product enhancement or a non-conformance to the TE Specification
 - Samples of "As is" and "Desired states" product should be ready to be shipped so TE can verify the problem and determine the root cause
- **Examples of Ideal Problem Statement**
 - **Topic:** Customer complains about molding flash
 - **Problem Statement:** As Is - 99% of the parts produced do not have flash. Desired State - 100% of the parts produced are "flash free". Gap = 1%. Include annotated photos, data and other supporting details
- **Complete the customer concern checklist to attach to the complaint and prepare samples to send once requested**

[Customer concern checklist](#)

Reasons for Customer Support Response Closure

No Response	TE will send 3 requests for samples. If no response is received, TE will extend the due date of the complaint to 30 working days before closing it for no response. TE will complete any investigation that is possible without feedback, but often samples are required to verify the problem. If the problem cannot be verified, then the complaint will be closed as customer support response and no RMA will be approved.
Repeat Complaints	Only one complaint will be accepted for a specified order/problem. If duplicates are entered, one will be cancelled. TE Recommends reviewing previous complaints if the issue/batch is addressed in previous complaints.

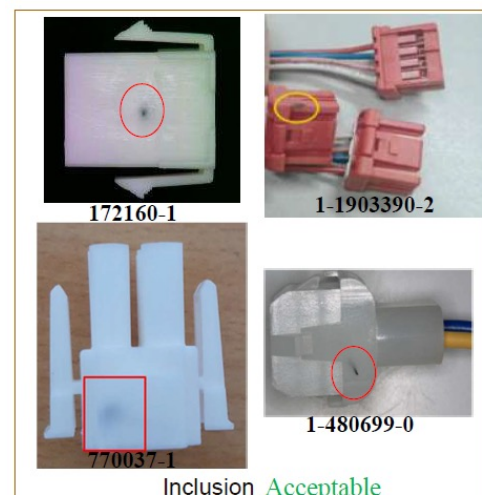
Aesthetics- Plastic

Investigation Process

- Samples are required to compare to the TE Specifications and requirements and identify if there is a difference in material composition of the non-conformance
- Natural Color does not indicate white, but a hue of an off-white shade. This could have a yellow or green hue due to increased moisture in the part. This does not impact the function of the part and is therefore not considered a product non-conformance.
- Marbling or color variation light to dark may be visible in plastic housings
- Rendering on te.com may vary in color hue from actual part.
- Small, isolated non-metallic inclusions are typically permitted in the part as long as they do not impact the performance of the part

Comments

- TE uses specific plastic vendors for raw materials which arrive in a pelletized form. Although measures are in place to prevent contamination throughout the manufacturing process, small amounts of non-metallic inclusions may appear in the final product
- Review this Connector Trouble Shooting Guide for a preliminary review of the concern
- Review material to verify it is nonmetallic and does not interfere with the performance of the product



[← Back](#)

Termination Process for F-Crimp

Investigation Process

- Measure Crimp Dimensions according to the Application Specification (114-***)
- Visually inspect the crimp based on the application specification to look for cut, nicked or strand-outs, excessive flash, and deformation that could be caused during the application process
- Review the TE Applicator to verify the applicator and all replacement tooling is from TE Connectivity and the preventative maintenance is fully implemented so the tooling is not worn from use
- Review the TE Application procedure and the application process being used to inspect proper set-up of the equipment and loading of terminals. Terminal bending or deformation caused prior to crimping could hinder the application process

Comments

- The crimp is key in the function of the terminal to meet the product performance requirements identified in the product specification, 108-***

Recommendation

- Reference the Application Specification related to the terminal, 114-*** and the Crimp Quality Guidelines document to verify the integrity of the crimp
- GATD Training Site has details and trainings on Crimping and proper crimp techniques

Crimp Quality Guidelines

Good Crimp Quality

WIRE CRIMP

WIRE CRIMP

Insulation Present

Conductor Present

Bellmouth must always be present

Bellmouth permissible

Cut off tabs present

Locking lances and terminal body not deformed

Correct selection of wire, terminal and applicator

Sufficient gap between legs and bottom of crimp. All strands are equally distributed and deformed.

Correct selection of wire, terminal and applicator

Insulation crimp 'I'

Insulation crimp 'OVERLAP'

Insulation crimp 'CLOSED BARREL'

For double wire applications with different size wires always place wire with smallest outer diameter in the bottom

Insulation is securely held. Crimp barrel closed.

Insulation is securely held. Legs overlap.

Insulation is securely held. No gaps.

Incorrect Crimp Quality

WIRE CRIMP

WIRE CRIMP

Terminal twisted

Insulation inside the wire crimp

Conductor break protruding into terminal body

Bellmouth on wrong end

Terminal bend

Cut off tab deformed

Crimp barrel distorted

Cut off tab too long

Incorrect applicator adjustment

Asymmetric crimp formation

Excessive flash and/or cracks

Terminal feed incorrectly adjusted

Crimp barrel not closed

Insulation crimp 'I'

Insulation crimp 'OVERLAP'

Insulation crimp 'CLOSED BARREL'

Insulation is planned and could damage conductor

Insulation legs are not closed

Insulation is not securely held. Legs do not overlap.

TEST - WIRE CRIMP

TEST - WIRE CRIMP

Crimp height measurement

Crimp height and tolerances

For crimp height tolerances for any given contact, please refer to the relevant application specification. Examples

Contact	P/N	Wire Range	Thickness	Application Spec.
MOG	8750	0.20 - 0.25 mm	0.03 mm	14-00225
AMP	8775	0.25 - 0.50 mm	0.05 mm	14-00300
PT	8770	0.25 - 0.50 mm	0.03 mm	14-00202

Digital crimp height micrometer

(0.001mm increments) according to DIN ISO 9001 Part Number 54073-01

Insulation Crimp

Wire crimp w/o conductor

Insulation must be securely held after bend test

OPEN BARREL

OPEN BARREL

Insulation Present

Conductor Present

Front Strands Flush with Reference Line

Stripping Length

SIDE VIEW

CH1: Conductor crimp height

CH2: Insulation crimp height

TOP VIEW

CB1: Conductor crimp width

CB2: Insulation crimp width

CLOSED BARREL

CLOSED BARREL

Front Strands Flush with Reference Line

Stripping Length

CH1: Conductor crimp height

CH2: Insulation crimp height

CB1: Conductor crimp width

CB2: Insulation crimp width

CRIMP CROSS SECTION CHARACTERISTICS

CRIMP CROSS SECTION CHARACTERISTICS

CH1: Conductor crimp height

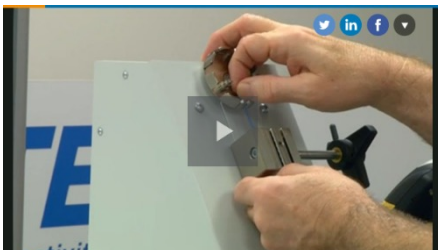
CH2: Insulation crimp height

CB1: Conductor crimp width

CB2: Insulation crimp width

Scan to watch our Crimp Quality Video.

To learn more about our tooling solutions, please call us on 773 400 2062 or email us at Toolingquality@bra.com



[Video: Crimp Theory Fundamentals: Series II \(English\)](#)

[← Back](#)

Application of Crimped Terminals into Plastic Housings

Investigation Process

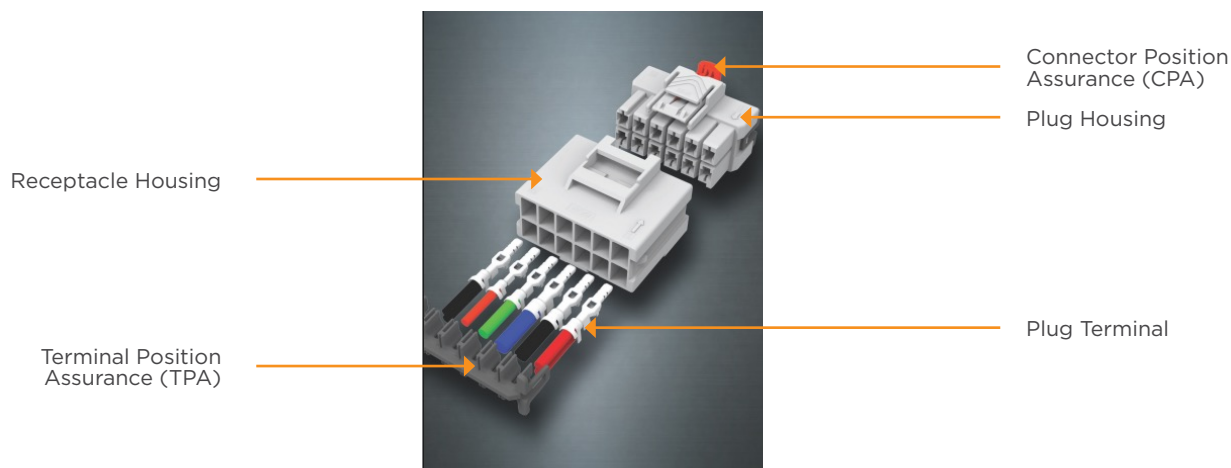
- Terminals should be fully seating in the housing with locking lances engaged
- When available, Terminal Position Assurance (TPA) pieces, and Connector Position Assurance (CPA) pieces, can be utilized to assure proper installation of the connector

Comments

- Contacts designed to accept stranded or solid wire size per TE Application Specification. Proper strip length is necessary to properly insert the wire into the contact
- Placement of crimped contacts into connector housing. The contact orientation barrel must be aligned with the receptacle contact cavity orientation feature (located on the back of the receptacle). The contact must be inserted into the housing contact cavity and snapped into place. When fully inserted, the contact locking lance will engage the receptacle contact retention shoulder and prevent backing out during mating of the connectors. After inserting contact into housing, pull back lightly on the wire to ensure contact is fully seated
- Strain relief and wire dress. If required, wires can be bundled together and supported with cable ties. Wires must not be stretched or confined in any way that would restrict the floating action of the contacts. Therefore, the wires must remain perpendicular to the connector and avoid an excessively sharp bend radius. The minimum distance for the cable tie, measured from the wire end of the connector to the cable tie per TE Application Specification

Recommendation

- TE published Instruction Sheets can be obtained through a local TE Representative, by visiting our website at www.te.com, or by calling product information or the tooling assistance center



Example: Power Triple Lock

Misapplication due to incorrect mated pair connector

Investigation Process

- Review the TE Part numbers and the TE Documentation to verify if the suspect parts were designed to mate together
- Inspect parts for signs of interference between components including but not limited to skiving of plastic housing from terminal, damage of the terminal, inability to install a TPA, and the inability for parts to mate and seat properly

Comments

- Use of incorrect mating part (terminal) can cause “skiving” of internal surfaces resulting in damage/plastic shavings
- Improper crimp dimensions or terminal deformation (Ex. Oversized Insulation barrel,...) could also cause interference during mating

Recommendation

- Verify the mated pair conforms to TE published design drawing, catalog pages and/or Application Specification. www.te.com links directly to the latest revision of necessary documents for reference



Example Part: FASTON 250 Receptacle P/N 1969295-4 Skiving of Plastic Housing

Handling Product – Terminals

Investigation Process

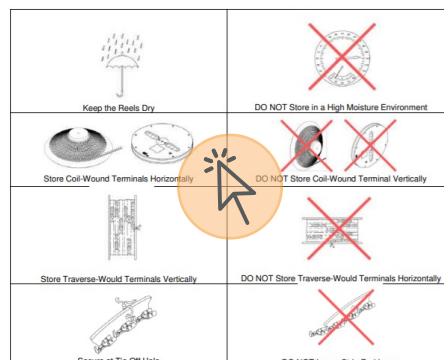
- Review the box that the spools arrived in. Most boxes contain arrows that indicate the direction the box should be facing during storage and transportation. Verify that this box has been stored in these specific directions
- Verify the storage conditions and inspect boxes for damage from the environment such as high moisture or impact

Comments

- Proper handling of reels is critical to maintain product integrity and uniform de-reeling of product
- When spools are stored in a different direction, the terminals are at risk of shifting and becoming tangled. This could cause a jam when unspooling the product and/or cause deformation in the terminal
- Damage due to impact may be visible on the outside of the box as well as the spool. This could cause damage to the terminals as well as a risk of the spool to break and one side to become loose
- Terminals should be stored in a temperature and humidity-controlled environment

Recommendation

- Follow [408-9816](#) handling of reeled product specification



[← Back](#)

Handling Product – Moisturized Plastic Housings

Investigation Process

- Review storage requirements of the connector product to prevent damage prior to usage
- Review product for moisture sensitivity. Plastic housings should be resealed in their bags if not used to prevent them from becoming dry and brittle
 - If material becomes dry and brittle, a moisturization process may be required to bring elasticity back into the plastic housings until they are assembled
 - A change in the moisture level may impact dimensions on some materials beyond the tolerances identified on the TE Customer Drawing

Comments

- Proper handling of plastic housings is critical to maintain product integrity. TE Connectivity requires Customers to use the parts right after the opening of the bags, to take advantage of the moisturized feature of the product during its application. Parts that are not used immediately should be resealed in plastic bags to maintain the moisturization level
- Dimensions of products are measured “As Molded” which is in a dry state. These can be verified if the part is placed in the open air in a dry environment for 48 hours. Parts should be re-moisturized prior to used following TE specification [408-143119](#)

Recommendation

- Follow the 114 spec related to each product
- Undamaged connector housings may undergo a re-moisturization process if they are dried according to TE specification [408-143119](#)



3 DIMENSIONS SHOWN REPRESENT PRODUCT IN DRY, AS MOLDED, CONDITION. ADDITIONAL 2% GROWTH DUE TO SUBSEQUENT MOISTURE ABSORPTION MAY OCCUR AND SHOULD BE ACCOUNTED FOR.

Dimensional note as may be seen on a TE Customer Drawing

Gate Marks On Molded Housings (Connectors)

Investigation Process

- During the inspection of plastic molded housings, some small and localized projections or depressions may be detected on the parts' external surfaces. They can be visible to the naked eye and perceptible by touch
- These small imperfections may cause concerns to users regarding the conformity of the parts.

Comments

- This feature is well known to TE Connectivity and is named "Gating"
- The Gating projections or depressions are intrinsic characteristics of the molding process. They identify the area where the duct carrying the raw material connects with the mold cavity
- The perceivable feature is the result of the cut-off operation that is needed to separate the sprue from the final part
- TE Connectivity internal specifications define clear allowance criteria for the Gating projections or depressions and the manufactured parts are inspected accordingly

Recommendation

- Location, size and quantity of gates are designed so that the cut-off impact does not affect the functionality of the manufactured parts
- Housings with a normal Gating projection or depression can be used without any restriction
- In case of further doubts, you can contact TE Customer Care for recommendations



Example photos for gate marks non affecting form-fit-function of the product

Flashes (Also Known As «Burrs» Or Excess Of Material») On Molded Housings (Connectors)

Investigation Process

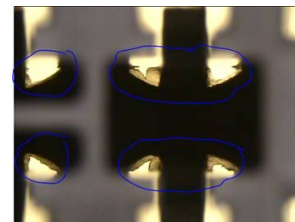
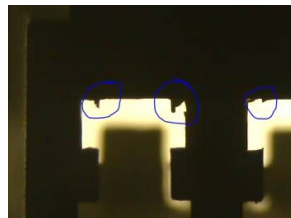
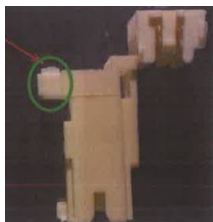
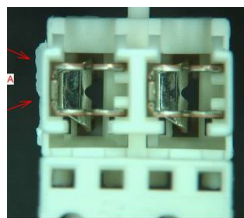
- During the inspection of plastic molded housings, some small and localized excess pieces of material, compatible with a thin film of material, may be detected on the parts' external or internal surfaces. It can be visible to the naked eye and perceptible by touch
- These small imperfections may cause concerns regarding the conformity of the parts
- Small amounts of Flash are acceptable as long as they do not interfere with the performance of the product

Comments

- This feature is well known to TE Connectivity and is identified as "Flash"
- Flash is defined as «a thin film of material formed on a molded part where material is forced between the mating faces of the mold sections. During the molding process, the injected material fill the area where the mold inserts join, generating the small "flash" on the molded housing
- Flashes are typically divided into "external", occurring beyond the normal boundary of an external feature of size of the part (e.g. an external edge), and "internal", occurring inside or across the opening of an internal feature of size (e.g. a cavity or a hole)

Recommendation

- TE Connectivity internal specifications define clear allowance criteria for the internal and external flashes and the manufactured parts are inspected accordingly
- Housings' areas that must be completely free from flashes are specified on the product drawing. If not specified on the drawing, the general TE Connectivity internal allowance criteria apply
- The maximum external flash projection is in addition to any overall dimensional tolerance indicated on the product drawing



External flashes

Internal flashes

Example photos for flashes non affecting form-fit-function of the product

[← Back](#)

te.com

TE Connectivity, TE Connectivity (logo) and Every Connection Counts, POWER TRIPLE LOCK are trademarks. All other logos, products and/or company names referred to herein might be trademarks of their respective owners.

The information given herein, including drawings, illustrations and schematics which are intended for illustration purposes only, is believed to be reliable. However, TE Connectivity makes no warranties as to its accuracy or completeness and disclaims any liability in connection with its use. TE Connectivity's obligations shall only be as set forth in TE Connectivity's Standard Terms and Conditions of Sale for this product and in no case will TE Connectivity be liable for any incidental, indirect or consequential damages arising out of the sale, resale, use or misuse of the product. Users of TE Connectivity products should make their own evaluation to determine the suitability of each such product for the specific application.

©2022 TE Connectivity. All Rights Reserved.

03/22 Original