NOTE
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of ±0.13 mm and angles have a tolerance of ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of SMT Releasable Poke-In Connectors for use on printed circuit (pc) board based LED strip lighting typically used for sign lighting. The connector accommodates 18 thru 22 AWG solid copper wires; or 18 thru 20 AWG stranded or pre-bond copper wires.

The low profile housing with flat top surface allows for vacuum pick-and-place application. The connector is packaged in tape and reel packaging per EIA-481.

When corresponding with TE Connectivity Personnel, use the terminology provided in this specification to facilitate inquiries for information. Basic terms and features of this product are provided in Figure 1.

Two-Position Shown;
One-Position, Three-Position, and Select Loaded
Two-Position Also Available

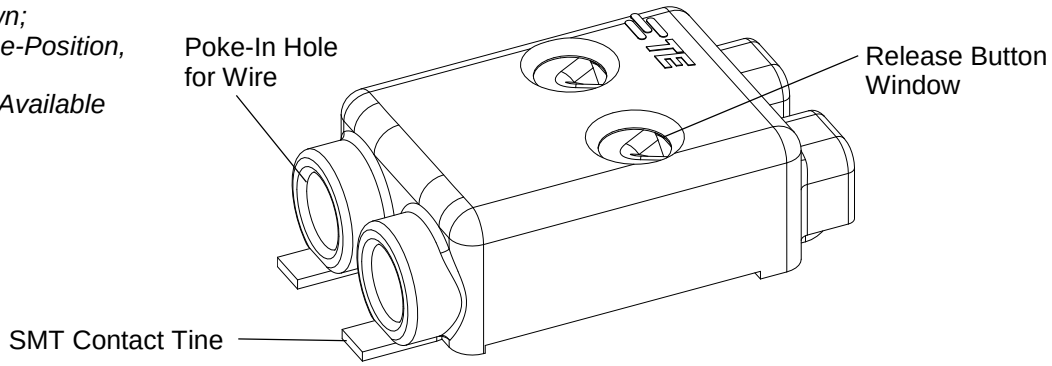

Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Changed text in Section 1, INTRODUCTION and deleted information in table in Figure 2

2.2. Customer Assistance

Reference Product Base Part Numbers 2213301-[ ] and Product Code L012 are representative of the SMT Releasable Poke-In Connectors. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information 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 at the numbers at the bottom of this page.

2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

2.4. Manuals

Manual 402-40 is available from the service network. This manual provides information on various flux types and characteristics along with the commercial designation and flux removal procedures. A checklist is included in the manual as required for information on soldering problems.

2.5. Specifications

Product Specification 108-32063 provides product performance and test information for the Releasable Poke-In Connector. Workmanship Specification IPC-A-610 provides solderability requirements and evaluation methods.

3. REQUIREMENTS

3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

3.2. Limitations

The connectors are designed to operate in a temperature range of -40° to 105°C [-40° to 221°F].

3.3. Material

The housing is made of UL 94V-0 rated thermoplastic. The contacts are made of copper alloy, under-plated with nickel, and plated overall with tin.

3.4. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

B. Shelf Life

The product should remain in the shipping containers until ready for use to prevent deformation to components. The product should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

C. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

Alkalies	Ammonia	Citrates	Phosphates Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites	Tartrates

3.5. Wire Selection and Preparation

These connectors will accept 18, 20, and 22 AWG solid copper wire; 18 and 20 AWG prebond copper wire; and 18 AWG stranded copper wire. The table in Figure 2 provides wire selection for the Poke-In Connectors. See Figure 2.

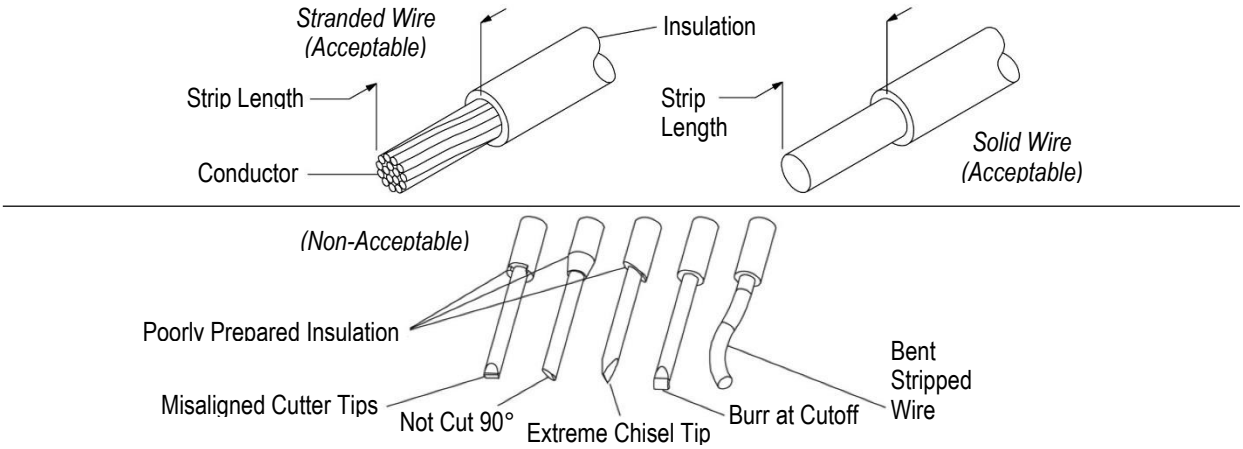

Figure 2 (cont'd)

RECOMMENDED WIRE				
WIRE SIZE	WIRE TYPE (UL 1007)		INSULATION DIAMETER	STRIP LENGTH
18 AWG	Single Strand	Solid	2.05 Max	9.00 ±1.00
	16 Strand	Prebond		
	16 Strand	Stranded		
20 AWG	Single Strand	Solid		
	7 Strand	Prebond		
	7 Strand	Stranded		
22 AWG	Single Strand	Solid		

Figure 2 (end)

NOTE
If Prebond wire is used, the strand count must be per Figure 2.

NOTE
When preparing stranded wire, it is recommended NOT to twist strands after stripping the insulation. The stranded wire inserts best if the strands are straight or slightly twisted as the wire is manufactured.

NOTE
Recommended maximum insulation diameter should be as provided in Figure 2. Wires with larger insulation diameters will not fit within the housing's poke-in hole insulation tunnel.

3.6. Wire Termination

The receptacles must be terminated according to the following instructions.

A. Workmanship

CAUTION
The housing must not be damaged in any way. There shall be no bending of the contacts. There shall be no exposed copper wire or broken or bent conductor strands.

B. Wire Insertion

All wires must be pushed firmly inside the contact wire openings. The wires must be fully inserted so that the wire insulation is inserted into and surrounded by the end of the housing. Refer to Figure 3.

CAUTION
To avoid buckling of wire strands during insertion, depressing the release button to open the contact wire retention beams is recommended. Using up to a 1.80 mm diameter device, depress the release button vertically through the release button window, then insert the stranded wire. Refer to Figure 3.

C. Wire Termination Depth

The required wire termination depth is achieved when the wire has bottomed in the connector housing. Refer to Figure 3.

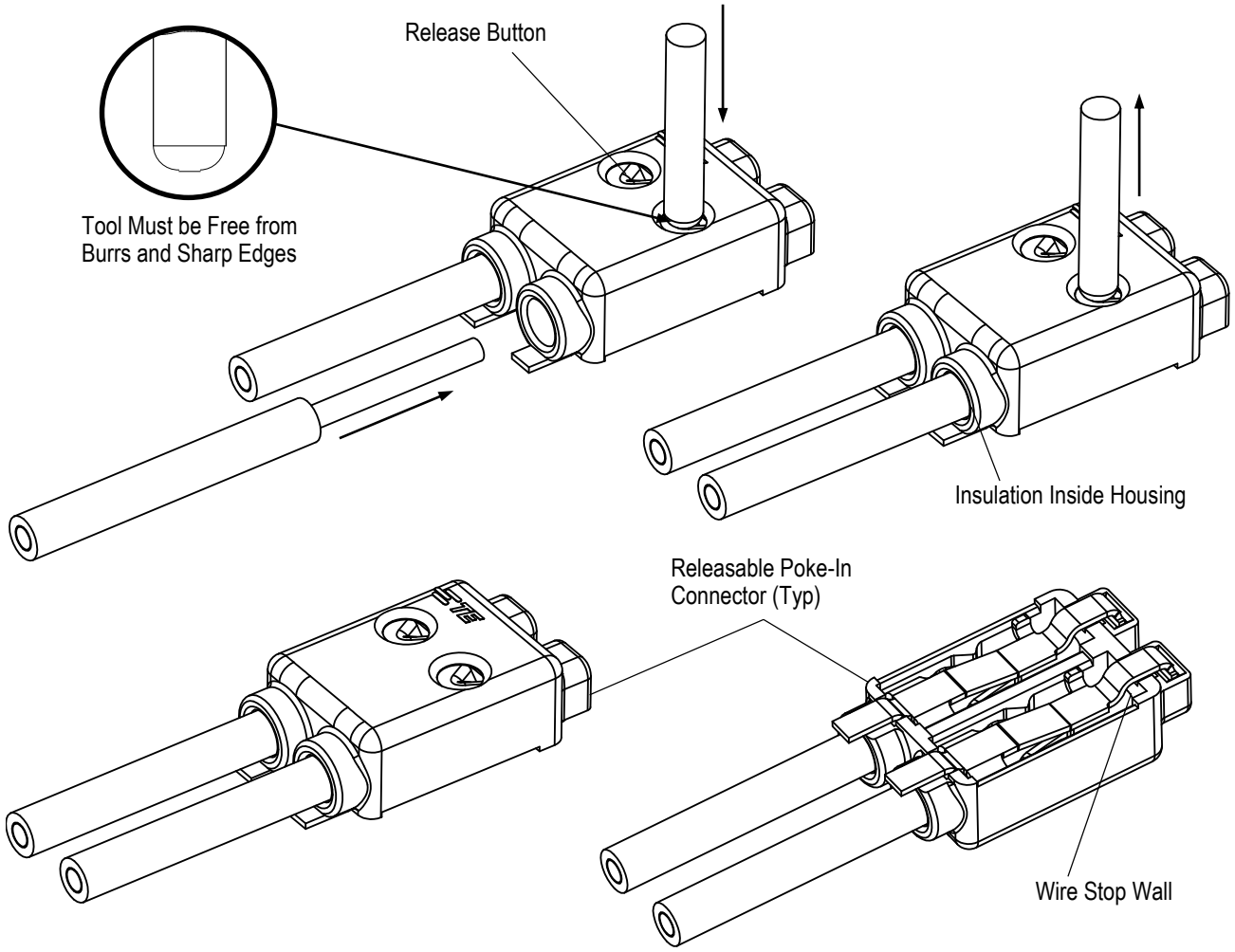

Figure 3

D. Wire Extraction

A fully inserted wire can be extracted from the connector using the release button located on the top of the connector housing. Using up to a 1.8 mm diameter device, depress the release button vertically through the release window, then wire may be extracted from the connector along the axis of wire insertion direction. Refer to Figure 4.

CAUTION
Extraction device to be free from burrs and sharp edges to ensure no damage is done to connector terminals.

CAUTION
A new stripped wire must be re-inserted into cavity after extraction of existing wire. DO NOT re-use extracted wire.

DANGER
Extreme caution to ensure there is no power in the system prior to insertion of wire extraction device. Electrical shock or system damage can result if care is not taken.

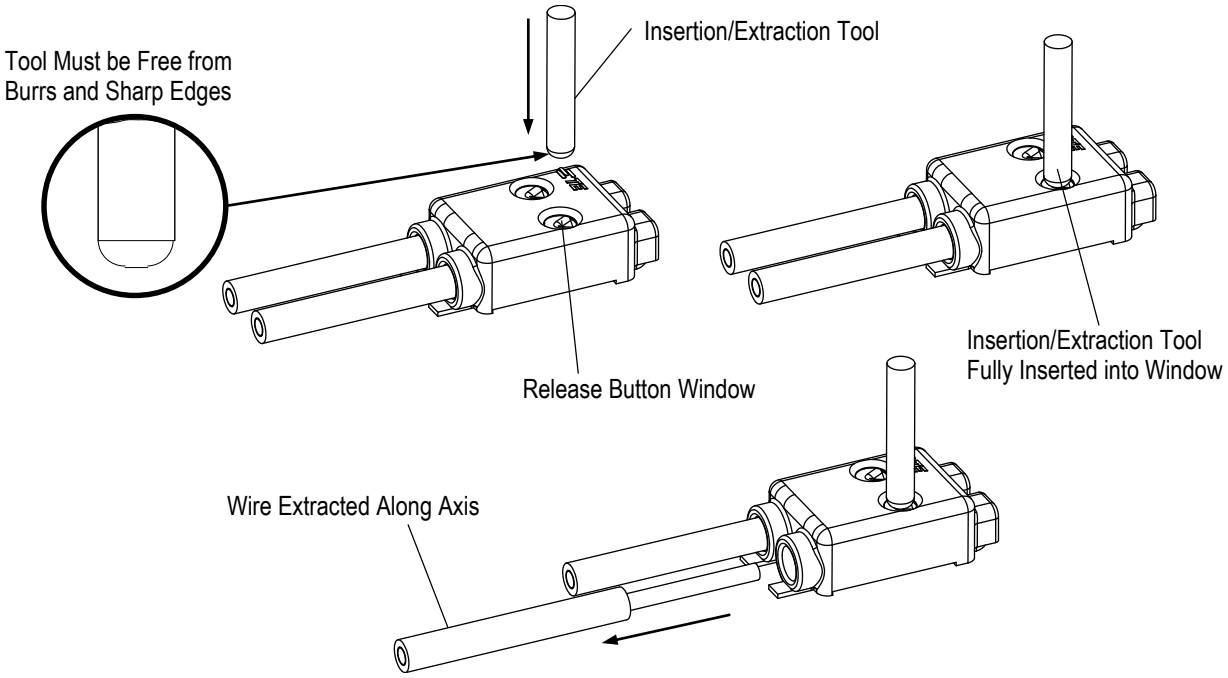

Figure 4

3.7. Strain Relief

To prevent high force from being exerted on the wire/connector interface, and to prevent the connector housing from lifting off the contact, it is recommended that the wire bundle use a strain relief as shown in Figure 5. When the wire/connector interface or connector housing is expected to be exposed to a force greater than 9 N [2.0 lbs], an external strain relief is recommended. Due to the increased rigidity of 18 AWG wire, an external strain relief is also recommended for all 18 AWG wire types. The suggested strain relief method is to use a cable tie and anchor as shown in Figure 5.

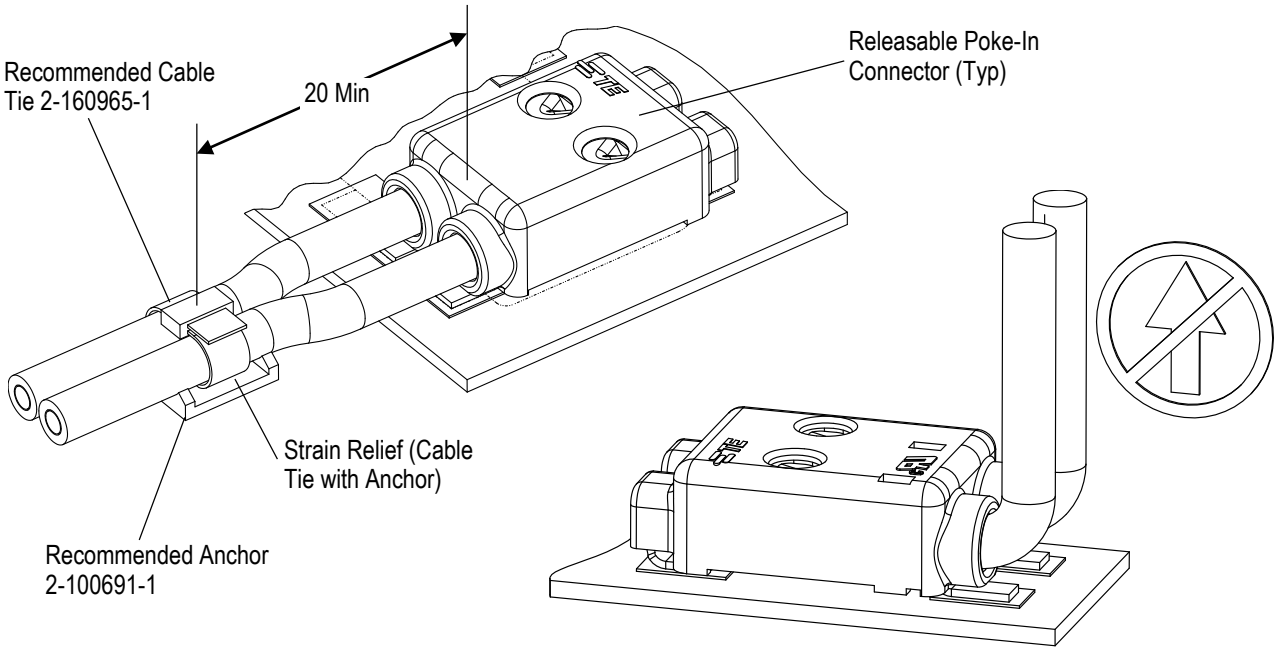

Figure 5

3.8. PC Board

A. Material and Thickness

Common pc board materials may be used such as glass epoxy (FR-4 or G-10), aluminum-clad pc boards and flex circuits. The pc board thickness may vary to suit the end use thickness.

B. Tolerance

Maximum allow bow of the pc board shall be 0.10 mm over the length of the connector.

CAUTION
Since the connector housings may rest on top of the solder mask, an excessively high mask will allow too much space between the solder tine and pad for a good solder joint. A solder joint under these conditions would be weak, and would not provide long-term performance for the connector.

C. Pads

The pc board circuit pads must be solderable in accordance with IPC J-STD-003.

D. Layout

The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector. The recommended pc board layout is shown in Figure 6.

SMT PC Board Layout

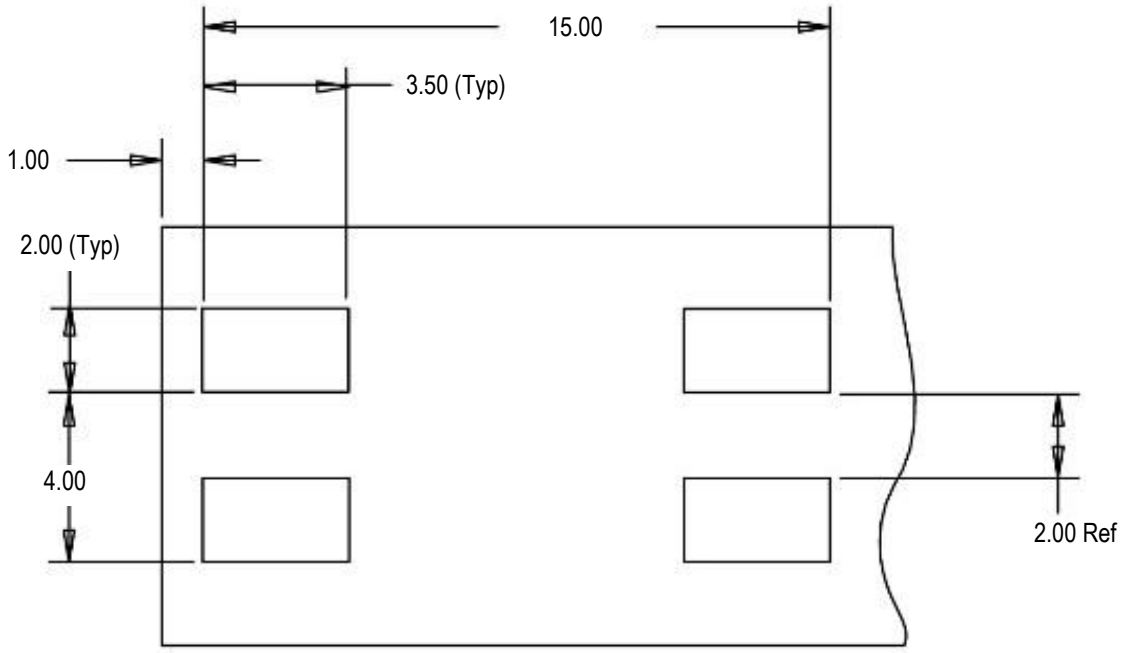

Figure 6

3.9. Spacing

The connector is able to be placed side-by-side on the pc board when pads are placed on 4.0 mm centers. See Figure 7.

CAUTION
Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contact tines.

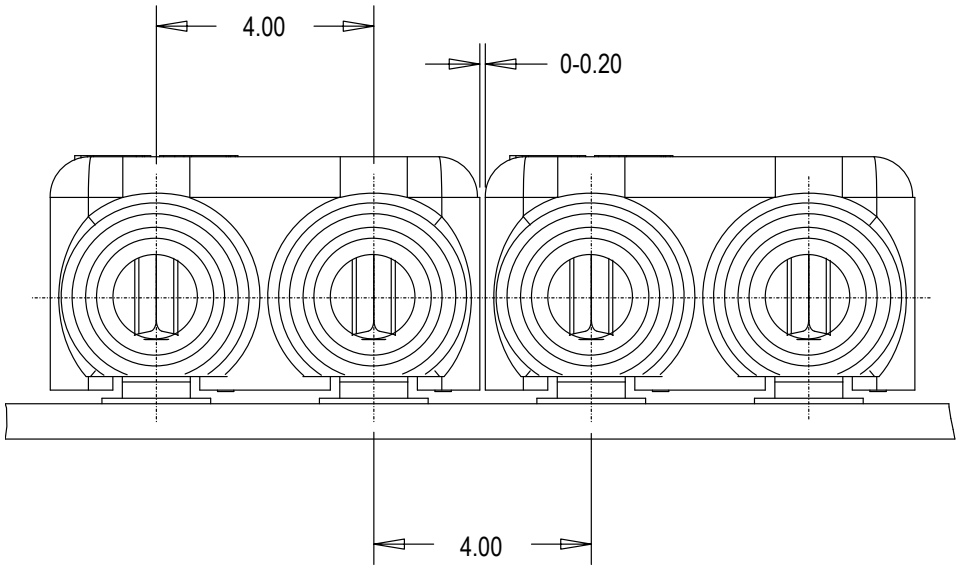

Figure 7

3.10. SMT Connector Placement

This product is packaged in tape and reel packaging per EIA-481. Robotic/gripper placement requires total equipment accuracy of 0.13 mm to locate the connector for insertion. This includes gripper and fixture tolerances, as well as equipment repeatability. Insertion location will be programmed by a simple pantograph/template system or software package. Optimally, the contact solder tines should be centered on the pc board pads. However, slight misalignment is permissible for the performance classifications specified in Association of Connecting Electronics Industries IPC J-STD-001, “Requirements for Soldering Electrical and Electronic Assemblies”. See Figure 8.

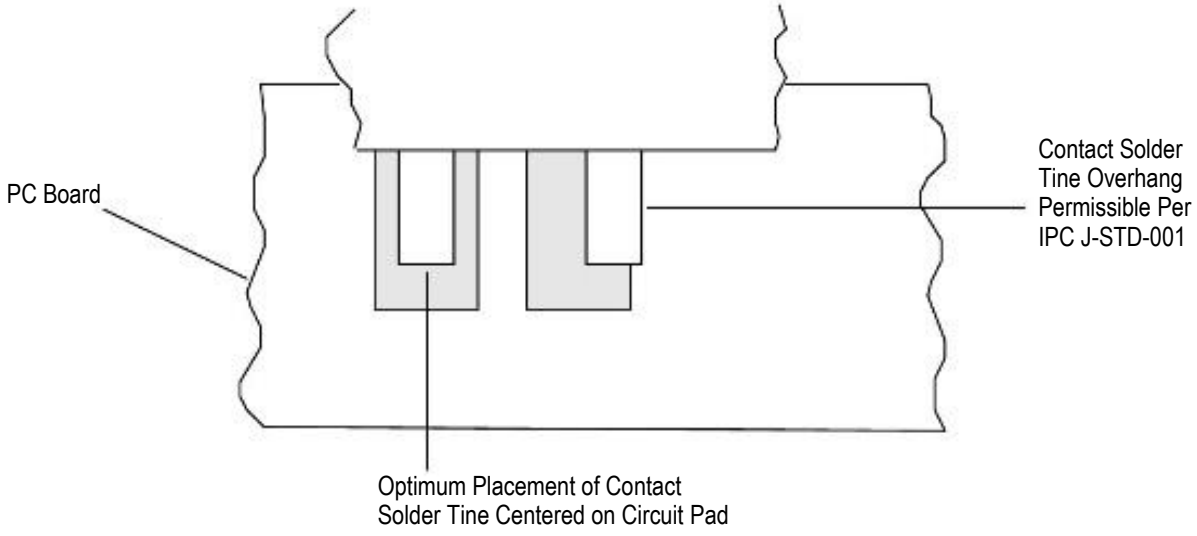

Figure 8

3.11. Soldering

Observe guidelines and procedures when soldering contacts. Solder, clean, and dry all leads to contacts according to the following. The connectors should be soldered using vapor phase reflow (VPR), double-sided, non-focused infrared (IR), forced air convection, or equivalent soldering techniques. All solder joints should conform to the Workmanship Specification IPC-A-610 and IPC J-STD-001.

A. Flux Selection

Contacts must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Flux that is compatible with the connectors is provided in Figure 9.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
Type RMA (Mildly Activated)	Mild	Noncorrosive	185/197	611

Figure 9

B. Connectors with SMT Contacts

1. Solderability

The pc board pads must be solderable in accordance with IPC/EIA J-STD-003 and all other requirements for surface mount contacts specified in this document.

2. Solder Paste Characteristics

a. Alloy type shall be SAC 305; Sn 96.5/Ag 3.0/Cu 0.5.
b. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
c. Paste will be at least 80% solids by volume.
d. Mesh designation -200 to +325 (74 to 44 square micron openings, respectively).
e. Minimum viscosity of screen print shall be 5x10% cp (centipoise).
f. Minimum viscosity of stencil print shall be 7.5x10% cp (centipoise).

3. Solder Volume

NOTE
Solder paste volumes are required as follows (calculated per 50% solids content). Paste volume may vary depending on the composition.

Solder volume for each SMT Releasable Poke-In Connector must be according to the following:
1.75 mm^3 per contact solder tine

4. Stencil

The stencil aperture shall be determined by the circuit pad size and stencil thickness. It may be any shape as long as it prevents solder bridging from one pad to another. Generally, the thinner stencil will need a larger aperture to maintain the given volume of solder paste. See Figure 10.

NOTE
The stencil layouts illustrated apply to the top (connector) side (unless otherwise noted) of the pc board. For any other variations, refer to the pc board mounting configurations on the appropriate customer drawing to determine modifications necessary to the solder stencils in Figure 9.

NOTE
All traces must be covered by solder mask in the solder deposit area. Exposed traces could cause bridging and create a short, or wick solder away from the solder tines, producing a weak solder joint.

CAUTION
If a hold-down aperture is required other than that specified, the design must ensure that the connector housing will not sit on the solder deposit.

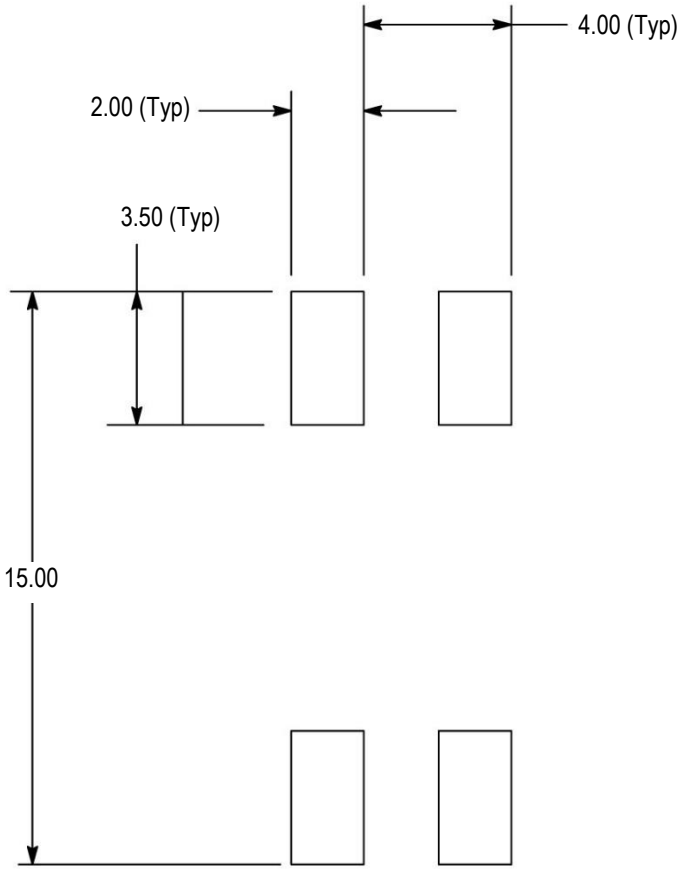

Figure 10

5. Solder Mask

Solder mask is recommended between all pads when soldering connectors with surface mount contacts to minimize solder bridging between pads. The mask must not exceed the height of the pad by more than 0.05 mm. If a trace is run between adjacent pads on the solder side of the pc board, a solder mask must be applied over the trace to prevent bridging and wicking of solder away from the contact solder tines. Those most suitable are Liquid Photo Imageable and Dry Film.

CAUTION
Since the connector may rest on top of the solder mask, an excessively high mask will allow too much space between the lead and pad for a good solder joint. A solder joint under these conditions, would be weak and would not provide long-term performance for the connector.

6. Process

Connectors with surface mount contacts should be soldered using vapor phase (VPR), double-sided, non-focused infrared reflow (IR) or equivalent soldering techniques. Due to many variables involved with the reflow process (i.e., component density, orientation, etc.), it is recommended that trial runs be conducted under actual manufacturing conditions to ensure product and process compatibility. These connectors will withstand the temperature and exposure time specified in Figure 11.

SOLDERING PROCESS	TEMPERATURE (Max)	TIME (At Max Temperature)
IR	220°C [428°F]	3 Minutes

Figure 11

The lead-free reflow is shown in Figure 12.

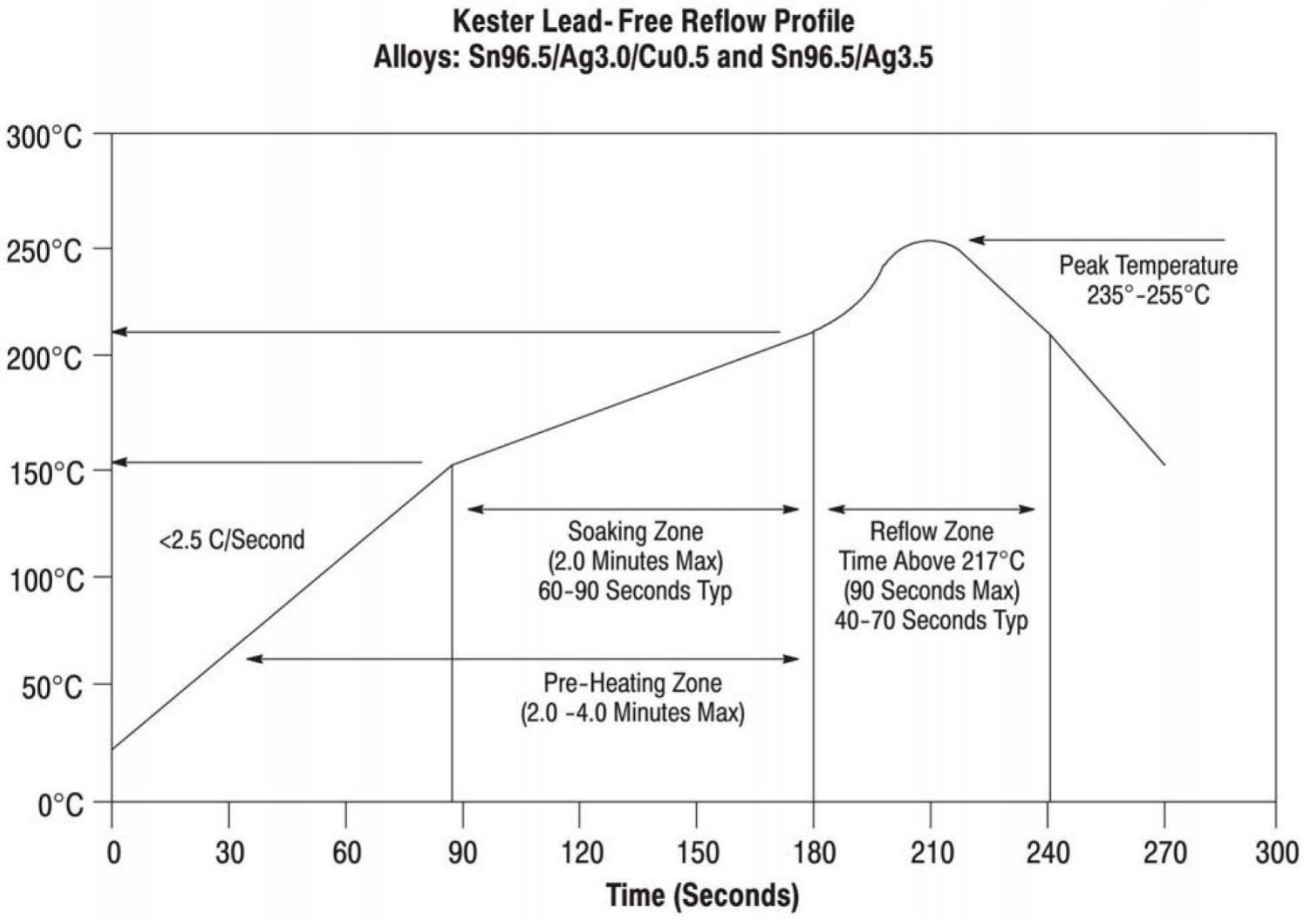

Figure 12

7. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Common cleaning solvents that will not affect the connectors or assemblies for the times and temperatures provided without any adverse effects on the connector assembly are listed in Figure 13.

DANGER

Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Trichloroethylene and Methylene Chloride can be used with no harmful effect to the connectors; however, TE does not recommend them because of the harmful occupational and environmental effects. Both are carcinogenic (cancer-causing) and Trichloroethylene is harmful to the earth's ozone layer.

CAUTION

If you have a particular solvent that is not listed, contact TE Tooling Assistance Center or Product Information at the number on the bottom of page 1.

CLEANER		TIME (Minutes)	TEMPERATURE (Max)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous		
KESTER 5779	Aqueous		
LONCOTERGE 520	Aqueous		
LONCOTERGE 530	Aqueous		
Terpene	Solvent		

Figure 13

8. Drying

CAUTION
Excessive temperatures may cause housing and plating degradation.

When drying cleaned assemblies and pc boards, temperatures to which the connectors are subject should not exceed 220°C [492°F] for more than 3 minutes.

3.12. Checking Installed Connector

All solder joints should comply with TE Workmanship Specification IPC-A-610. For typical fillets for surface mount and through-hole tine requirements, refer to Figure 14.

CAUTION
Connectors or pc boards should not be tested by the insertion of probes of any type into the contact wire openings. This will result in damage to the contacts. Poke-in contacts are designed for a single wire insertion, of the gage and type listed in Section 3.5.

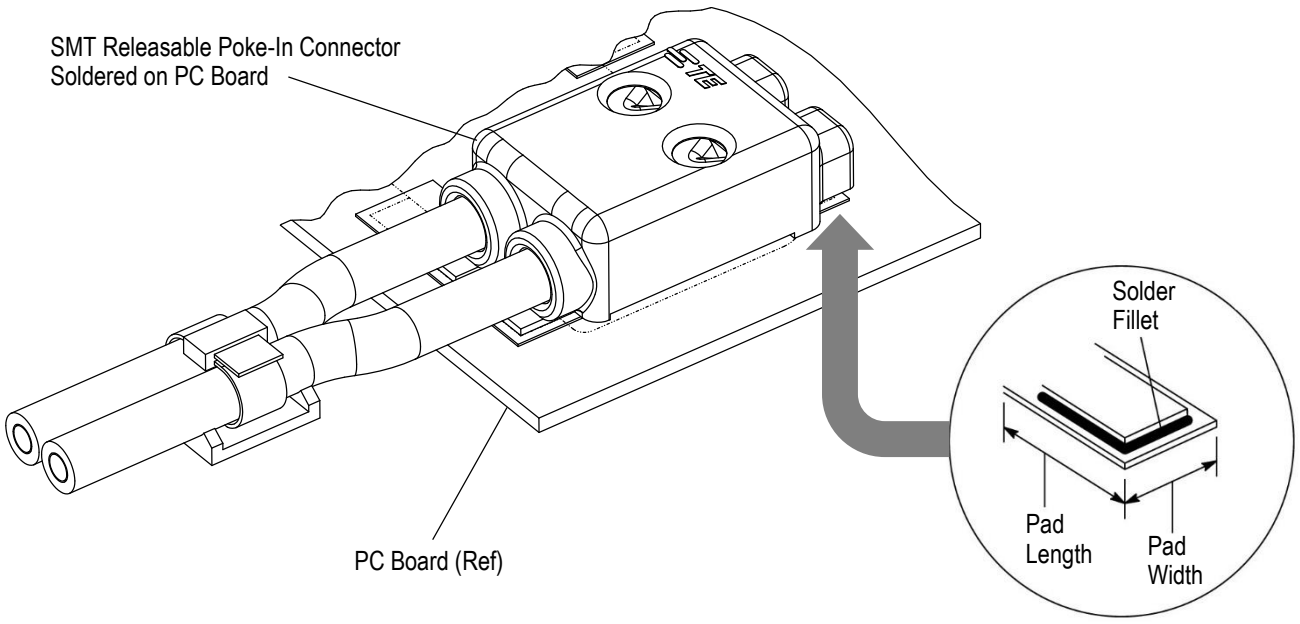

Figure 14

3.13. Replacement and Repair

The contacts and housings are not repairable.

CAUTION
DO NOT use damaged or defective contacts or housings. DO NOT remove the wire and re-terminate contacts.

4. QUALIFICATIONS

SMT Releasable Poke-In Connectors have not yet been sent for agency evaluation and testing.

5. TOOLING

5.1. Robotic Equipment

The robotic equipment must have a true position accuracy tolerance of 0.25 mm to properly locate the connectors. This includes gripper and fixture tolerances as well as equipment repeatability.

NOTE
Automatic machine placement is recommended for connectors instead of manual placement with surface mount contacts.

5.2. PC Board Support

For automatic machine placement, a pc board support must be used to prevent bowing of the pc board during the placement of connectors. It should have flat surfaces with holes or a channel large enough and deep enough to receive any protruding components. The pc board support must be customer made.

6. VISUAL AID

The illustration below shows a typical application of SMT Releasable Poke-In Connector. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

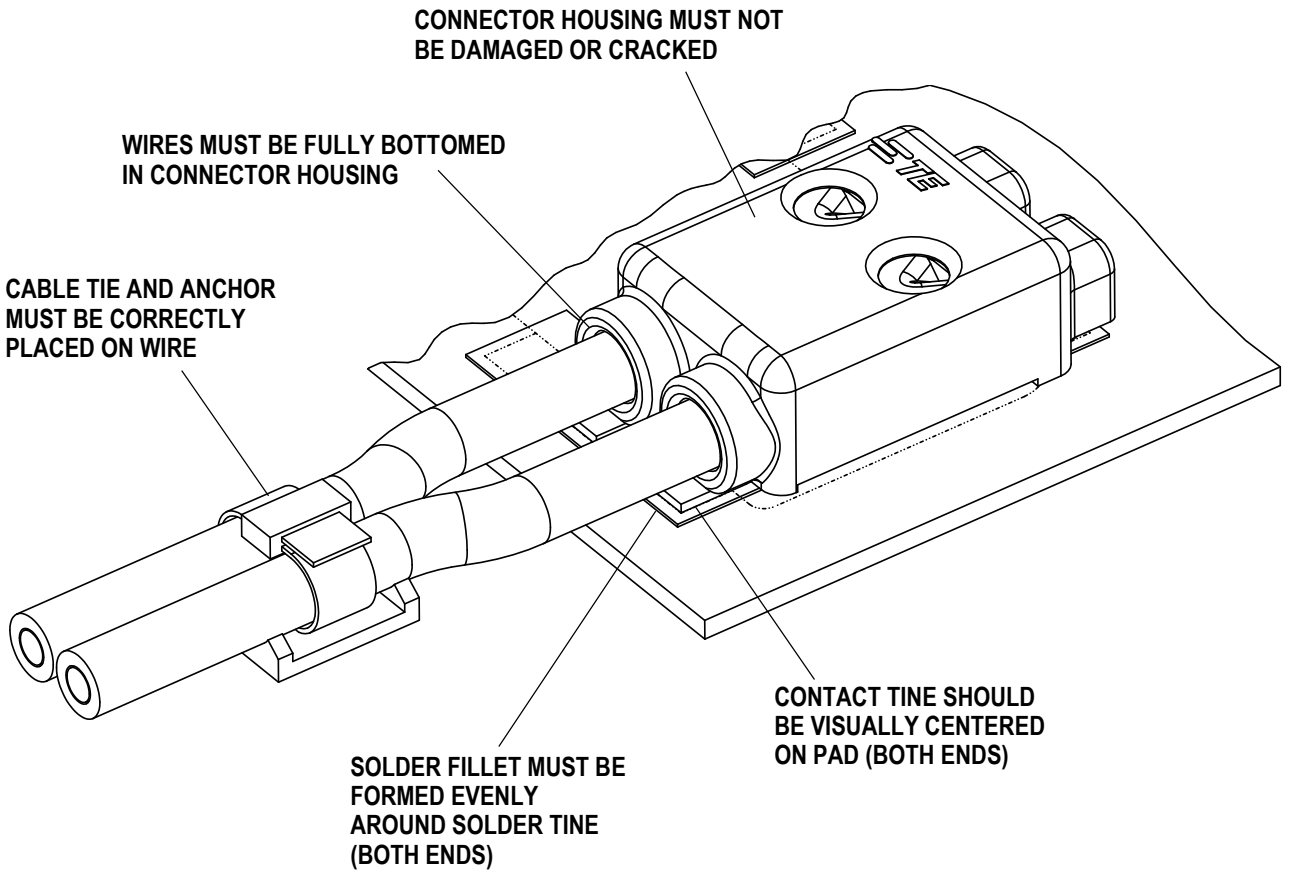

FIGURE 15. VISUAL AID