

NOTE



All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [$\pm .005$] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of EVERCLEAR connectors and QSFP+ Enhanced EVERCLEAR Surface Mount Technology (SMT) connectors. These connectors interconnect with fiber optic or copper transceiver modules to host printed circuit (pc) boards used in the communications industry and peripheral component interconnect (PCI) applications. The connectors are compatible with QSFP, QSFP+, and Mini-SAS applications.

The connector is a housing with right-angle surface mount contacts and is available in 26, 36, and 38 positions for EVERCLEAR connectors and 38 positions for QSFP+ Enhanced EVERCLEAR connectors with contact spacing on 0.8 mm centerlines. The alignment posts provide stability for placement of the connector on the host pc board. The standoffs allow easy pc board cleaning after soldering, and the card entry slot accepts 1.0 ± 0.1 mm-thick integrated circuit card housed in the transceiver.

The connector is supplied in tape-mounted form for manual or high-speed automatic machine placement (typically vacuum pick and place).

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

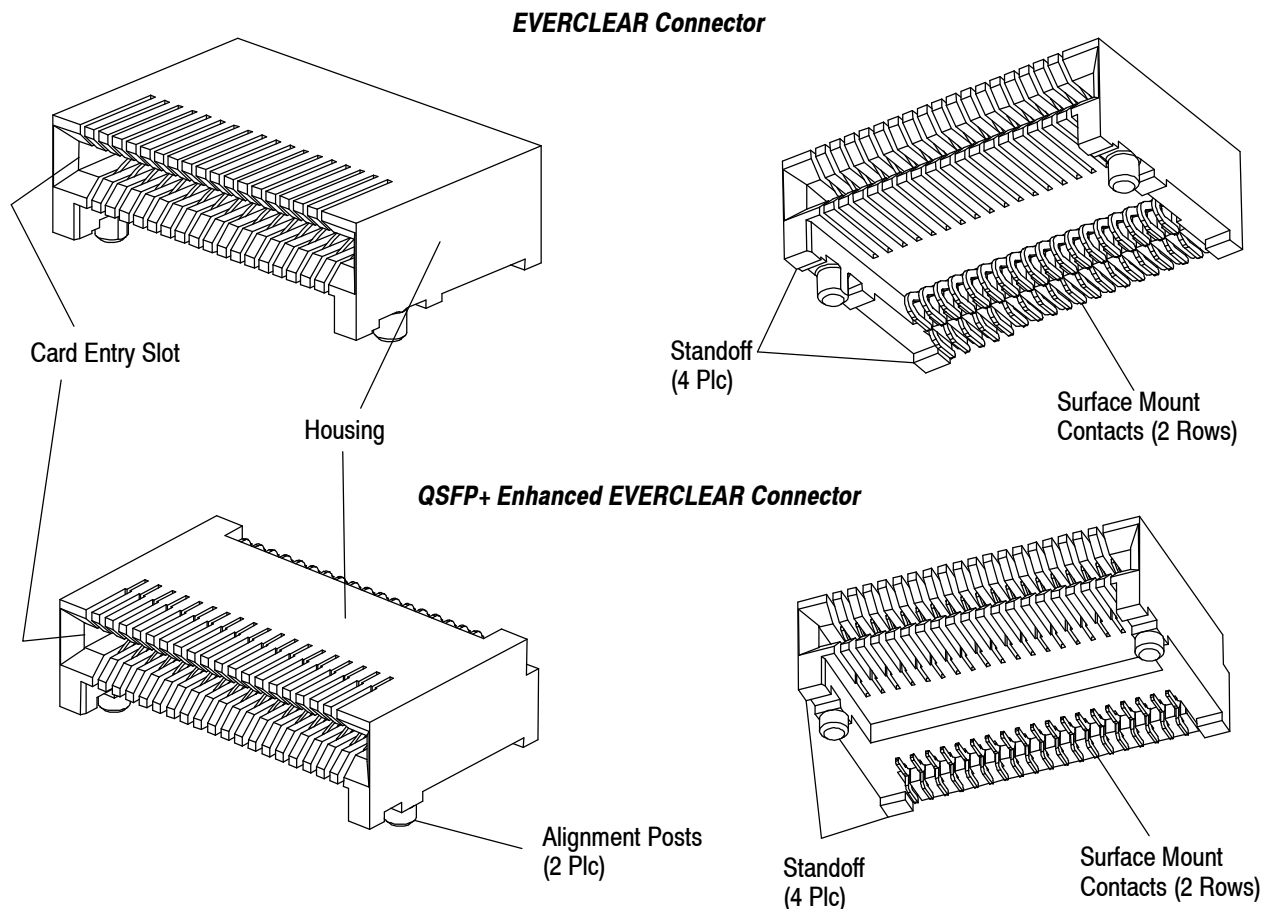


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements.

2.2. Customer Assistance

Reference Product Base Part Number 1761987 for EVERCLEAR Connectors and 2110819 for QSFP+ Enhanced EVERCLEAR Connectors, and Product Codes L760 and K845 are representative of the EVERCLEAR Connector. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local TE Representative or, after purchase, by calling Product Information at the number 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 in the customer drawings takes priority.

2.4. Manuals

Manual 402-40 can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.5. Specifications

Product Specification 108-2234 (EVERCLEAR Connector) provides product performance and test information; and Design Objective 108-2425 (QSFP+ Enhanced EVERCLEAR Connectors) provides expected product performance and test information.

2.6. Instructional Material

Instruction Sheets (408-Series) provide assembly instructions. Documents available which pertain to this product are:

<u>Document Number</u>	<u>Document Title</u>
408-10187	QSFP Connector, Thru Bezel Cage Assemblies, Heat Sinks and Light Pipes
408-10188	QSFP Connector, Behind Bezel Cage Assemblies, Heat Sinks and Light Pipes
408-9816	Handling of Reeled Products

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 -55°C to 105°C [-67°F to 221°F].

3.3. Material

The connector housing is made of liquid crystal polymer (LCP) thermoplastic, UL 94-V-0. The contacts are made of copper alloy underplated with nickel; plated with tin on the solder tails, and plated with gold or gold equivalent at the interface area.

3.4. Storage

A. Ultraviolet Light

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

B. Shelf Life

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

C. Reeled Products

Connectors are supplied in reels on carrier tapes approved in EIA-481. These reels have a diameter of 330 with 400 connectors per reel. Coil wound reels must be stored horizontally and traverse wound reels vertically.

NOTE

Refer to Section 5, TOOLING for carrier tape dimensions.



D. Chemical Exposure

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

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

3.5. Host PC Board

A. Material and Thickness

The host pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be a minimum of 1.44 mm for mounting the connector to one side of the pc board, and the pc board thickness must be 2.2 mm minimum for QSFP and QSFP+ applications and 4.5 mm minimum for Mini-SAS applications when mounting the connector to both sides of the pc board.

NOTE

Contact PRODUCT INFORMATION at the number listed at the bottom of page 1 for suitability of other board materials.



B. Tolerance

Maximum allowable bow of the mother board shall be 0.08 mm over the length of the cage assembly. The coplanarity of the pc board circuit pads must be 0.03 mm.

C. Circuit Pads

The circuit pads must be solderable in accordance with EIA-364-52.

D. Layout

All holes and circuit pads must be precisely located on the pc board to ensure proper placement and optimum performance of the connector. Refer to the specific customer drawing for the recommended pc board layout.

3.6. Solder Paste Characteristics

1. Alloy type for tin-lead solder shall be 63 Sn/37 Pb, 60 Sn/40 Pb, or 62 Sn/36 Pb/2 Ag.
2. Alloy type for lead-free solder shall be compatible with pure tin or gold, for example, SAC305 (96.6 Sn/3 Ag/0.5 Cu) or SAC405 (95.5 Sn/4 Ag/0.5 Cu)
3. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
4. Paste will be at least 80% solids by volume.
5. Mesh designation -200 to +325 (74 to 44 square micron openings, respectively).
6. Minimum viscosity of screen print shall be 5X10% cp (centipoise).
7. Minimum viscosity of stencil print shall be 7.5X10% cp (centipoise).

3.7. Solder Volume

Minimum solder volume (V) (before curing) for each circuit pad is calculated by multiplying the pad length (L) by the pad width (W) by the stencil thickness (T): $1.8(L) \times 0.35(W) \times 0.15(T) = 0.095 \text{ mm}^3$ (V). Solder volume for each connector must be 0.15 mm³ per contact solder line.

NOTE Solder volume may vary depending on solder paste composition.



3.8. Solder Paste Thickness

Solder paste thickness for the connector contact solder tines must be at least 0.15 mm.

3.9. Stencil

The stencil aperture is 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. The stencil should be 0.15 mm thick. The stencil layout must be designed using the dimension provided on the customer drawing for the specific connector.

3.10. Solder Mask

When soldering, solder mask is recommended between all circuit pads to minimize solder bridging between pads. The mask must not exceed the height of the pad. If a trace is run between adjacent pads on the pc board, a solder mask **MUST** be applied over the trace to prevent bridging and wicking of solder away from the connector contact solder tines. Mask most suitable is Liquid Photo Imageable.



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.

3.11. Connector Placement



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



The connector must be soldered to the host pc board before seating the cage assembly. The soldering process will cause damage to the cage assembly or shield assembly.

A. Registration

The connector contact solder tines must be aligned with matching circuit pads and alignment posts aligned with matching holes before placing the connector onto the host pc board.

B. Position

Optimally, the contact solder tines should be centered on the host pc board circuit pads. However, slight misalignment is permissible.

C. Seating

Because the connector alignment posts are for clearance and fit only, the force required to seat the connector is minimal. The alignment posts must be inserted into the host pc board holes prior to fully seating solder tines into solder paste. See Figure 2.

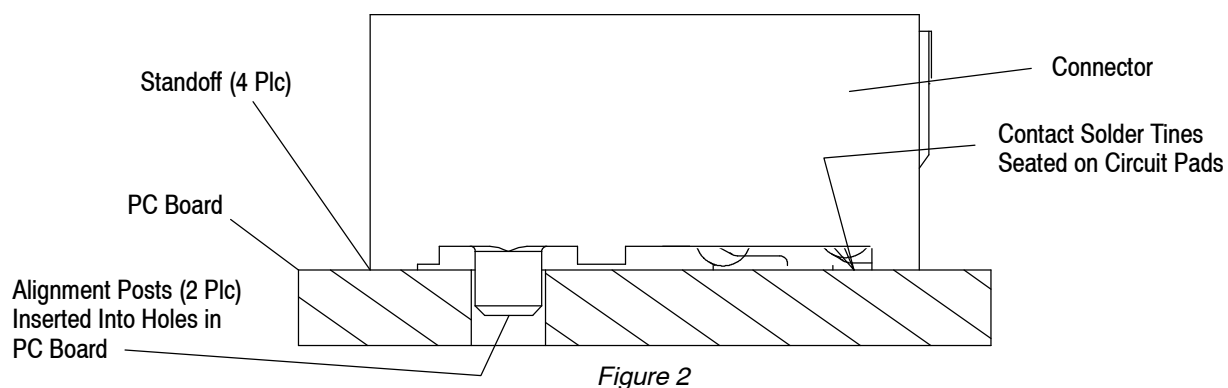
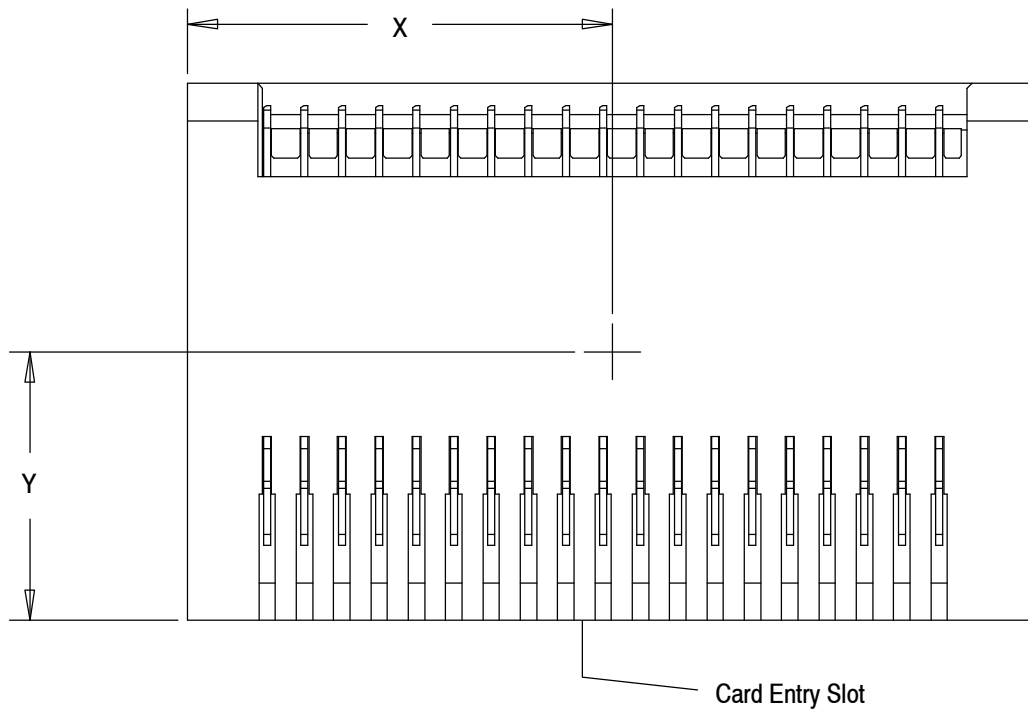


Figure 2

D. Placement by Vacuum Pickup

In order to facilitate use of a vacuum pick and place tool, the location of the centroid of the right-angle connectors is defined in the table in Figure 3.



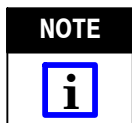
POSITION	EVERCLEAR CONNECTOR			QSFP+ Enhanced EVERCLEAR Connector
	26	36	38	38
X	6.7	8.7	9.1	9.1
Y	4.64	4.58	4.57	6.42
Weight	1.03	1.34	1.4	1.22

Figure 3

3.12. Soldering

A. Process

The connector must be soldered using non-focused infrared (IR) reflow or equivalent soldering technique. When mounting to both sides of the host pc board, adhesive must be applied to the alignment posts to retain the inverted part while going through the second pass reflow process. (Other options are mechanical retention with pallets or thermal shields to prevent the solder from turning to a liquid state.) Reflow temperature and time may vary depending on the size of the host pc board and placement of other components. The reflow temperature and approximate time to which the connector can be subjected is specified in Figure 4.



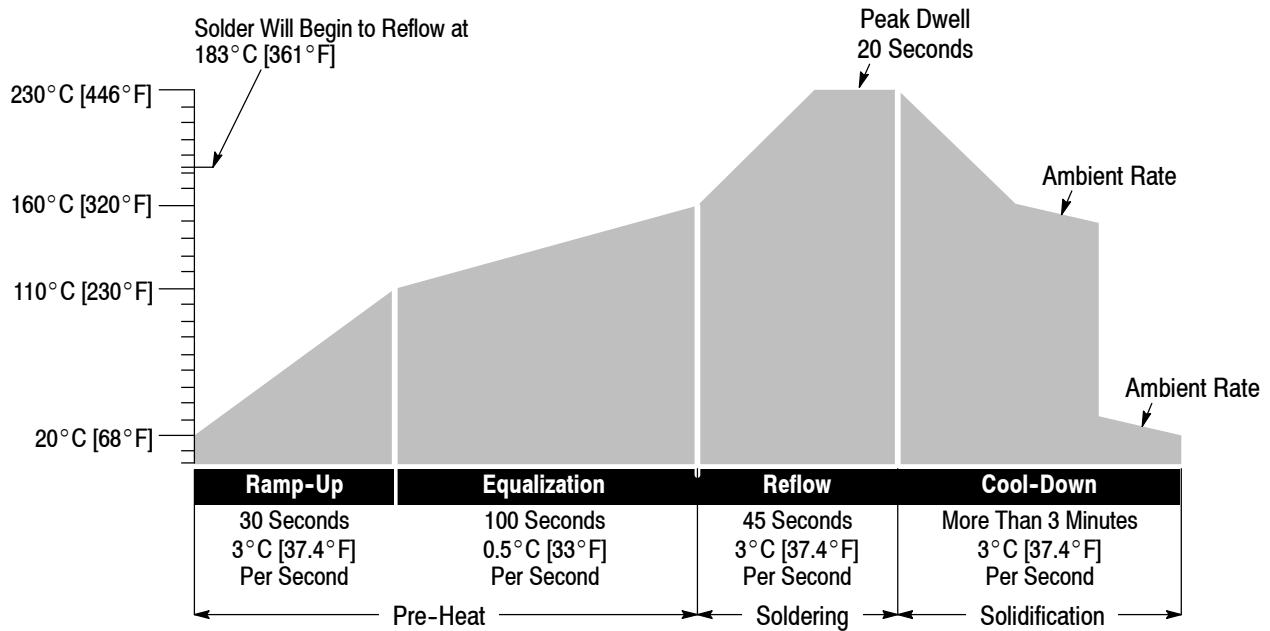
For double-sided SMT applications, the connector must be fastened to the pc board by adhesive or other mechanical methods as it passes through the reflow process in the inverted position.



Excessive temperatures may cause connector housing degradation or plating deterioration. It is recommended that component temperatures not exceed 230 °C [446 °F] when using tin-lead solder and 260 °C [500 °F] when using lead-free solder.

Reflow Soldering Process Cycle

Tin-Lead Solder
 (Maximum 230°C [446°F] for 20 Seconds)



Lead-Free Solder
 (Maximum 260°C [500°F])

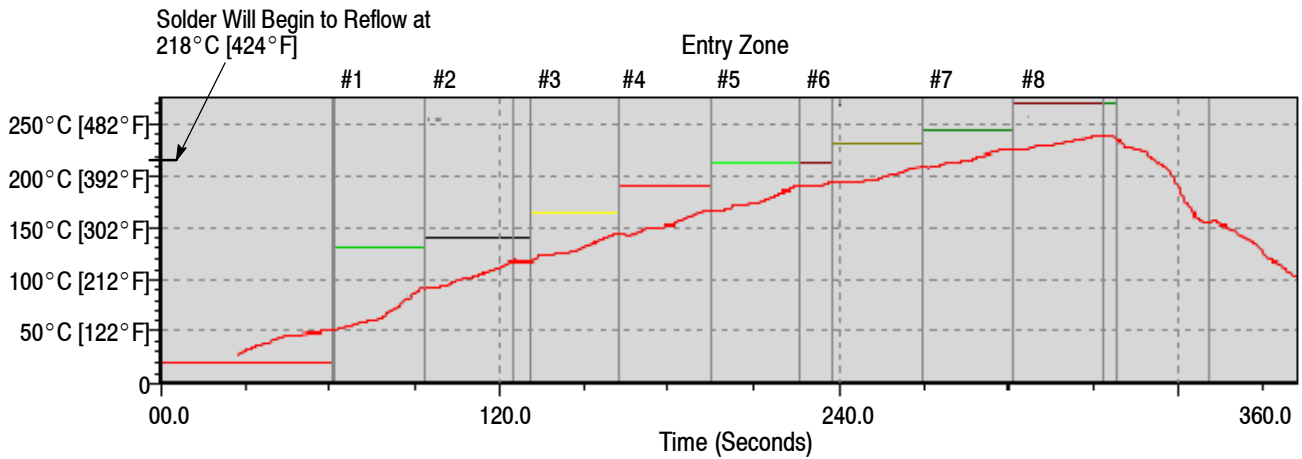


Figure 4

B. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Cleaners must be free of dissolved flux and other contaminants. It is recommended cleaning the host pc board on its edge. If using aqueous cleaner, standard equipment such as a soak-tank or an automatic in-line machine should be used. Common cleaning solvents that will not affect the connector for the time and temperature specified are listed in Figure 5.



Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).



If a particular cleaning solvent that is not listed, contact PRODUCT INFORMATION at the number at the bottom of page 1.

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous	5	100°C [212°F]
KESTER 5779	Aqueous	5	100°C [212°F]
LONCOTERGE 520	Aqueous	5	100°C [212°F]
LONCOTERGE 530	Aqueous	5	100°C [212°F]

Figure 5

C. Drying

When drying cleaned assemblies and host pc boards, make certain that temperatures do not exceed 85°C [185°F]. Excessive temperatures may cause connector housing degradation.

3.13. Checking Installed Connector

All solder joints must conform to those specified in Workmanship Specification 101-21 and all other requirements specified in this document. The installed connector must have solder fillets evenly formed around each contact solder tine. Solder must have 95% minimum coverage over the circuit pad. See Figure 6.

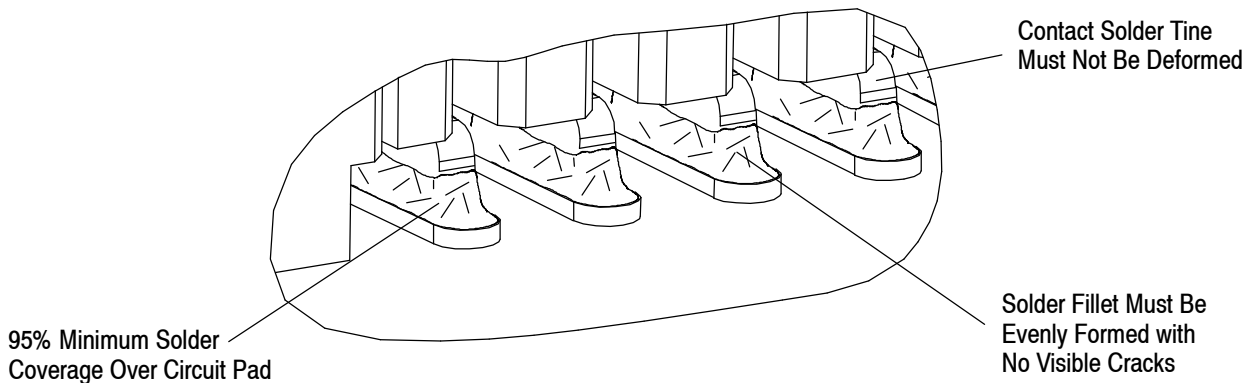


Figure 6

3.14. Removal and Repair

Standard de-soldering methods must be used to remove the connector from the host pc board.



The connector must not be re-used after removal. The connector is not repairable. Any defective or damaged products must not be used.

4. QUALIFICATIONS

EVERCLEAR and QSFP+ Enhanced EVERCLEAR connectors are Recognized by Underwriters Laboratories, Inc. (UL) in File E28476.

5. TOOLING (Figure 7)

No tooling is required for manual placement of the connectors onto the pc board. For automatic machine placement, the robotic equipment must have a true position accuracy tolerance sufficient to properly locate the connector. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surfaces to ensure reliable placement.

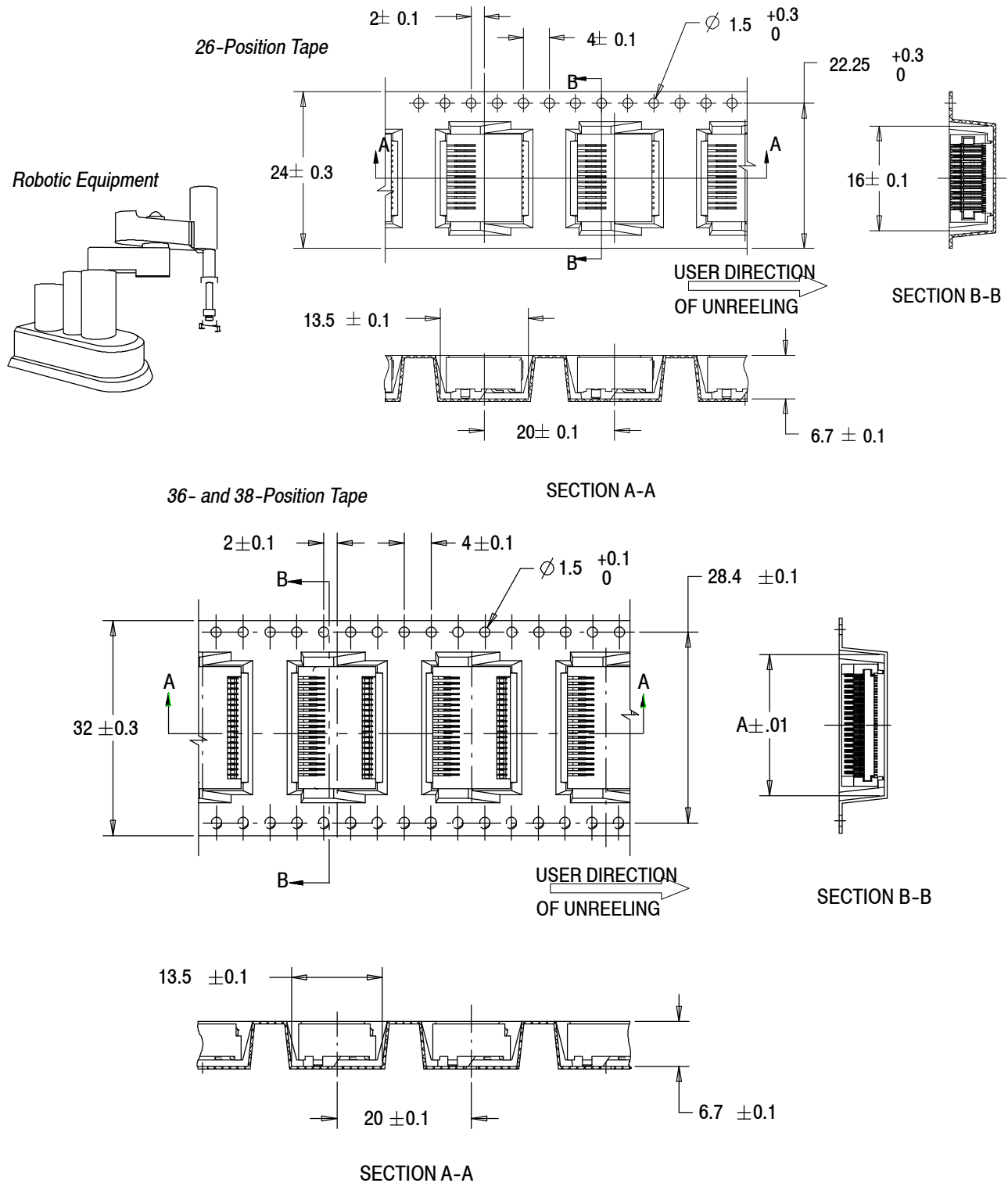


Figure 7

6. VISUAL AID

Figure 8 shows a typical application of an EVERCLEAR 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.

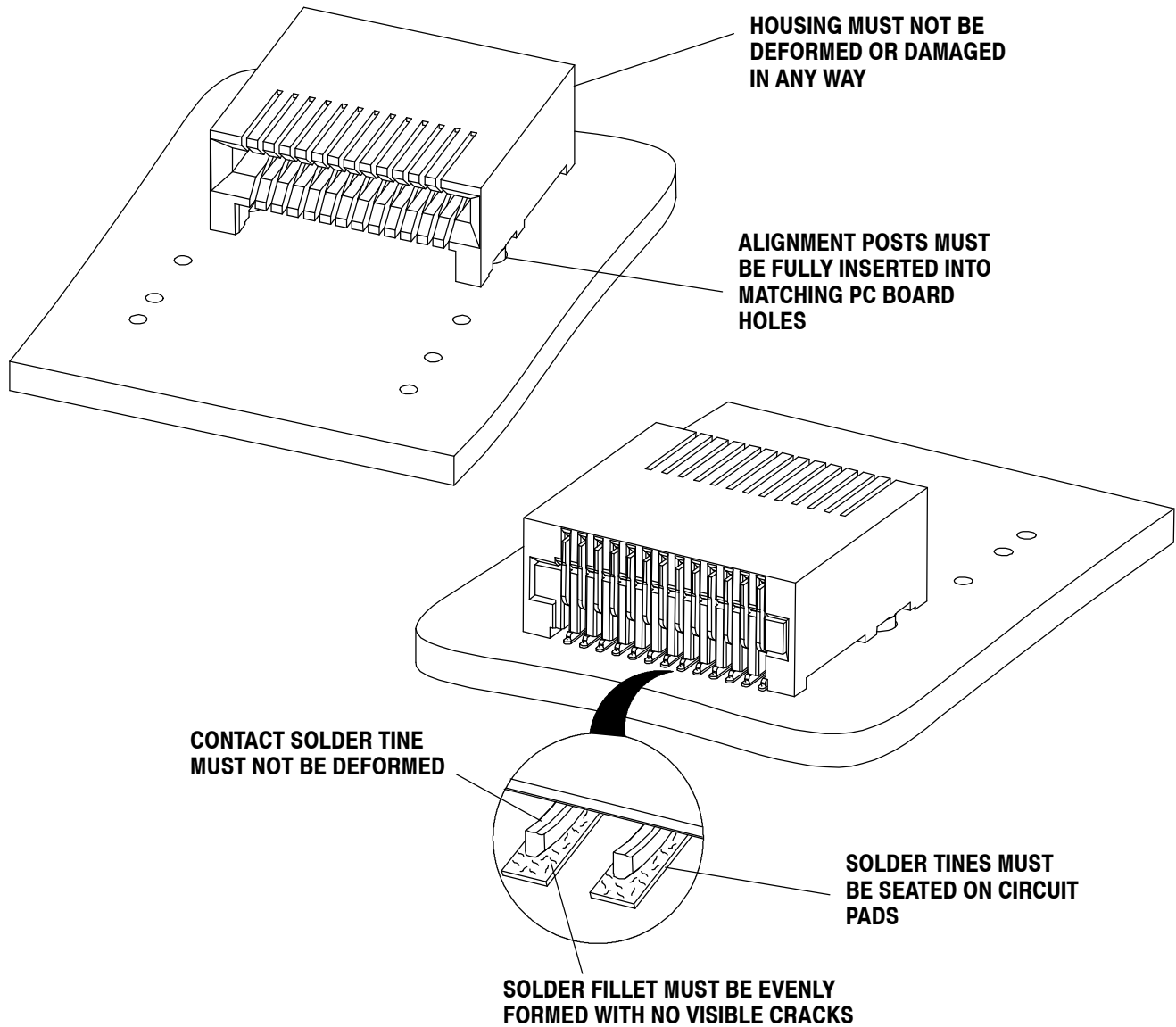


Figure 8