



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  $\pm 0.13$  [ $\pm .005$ ] 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 stacked QSFP+ through bezel connector and cage assembly (with or without light pipes) are used to interconnect SFP dense wavelength division multiplexing (DWDM) fiber optic transceiver modules to host printed circuit (pc) boards used in the communications industry and peripheral component interconnect (PCI) applications. The connector and cage assembly is available in a 2x1 configuration. The cage assembly houses the connector and serves as a housing for the mating module. The optional light pipes are located inside of the cage assembly and are used to transmit light from up to 4 LEDs on the pc board to a panel. The connector and cage assembly is designed to be mounted through a cutout in a bezel.

The right-angle connector has 76 positions of compliant pins contacts with spacing on 0.8 centerlines, 2 card entry slots that each accept a 1.0+0.1 thick integrated circuit card housed in the mating module, and 2 alignment posts designed to provide proper placement on the pc board.

The cage assembly is a frame with compliant pins contacts and front-perimeter electromagnetic interference (EMI) conductive elastomeric gasket and internal EMI springs. Each cage assembly contact features a standoff that aids in proper seating of the cage assembly on the pc board. The cage assembly features 2 ports that each accept a mating module, 2 hard stops that controls the insertion depth of the mating modules, and locking latches that hold the installed mating modules in place. The EMI springs block any EMI emissions emanating from the mating module and the elastomeric gasket provides EMI shielding for the system. The EMI/dust covers are used to confine EMI emissions and prevent contaminants from entering the cage assembly when mating modules are not installed. EMI/dust covers are available separately.

When corresponding with 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.

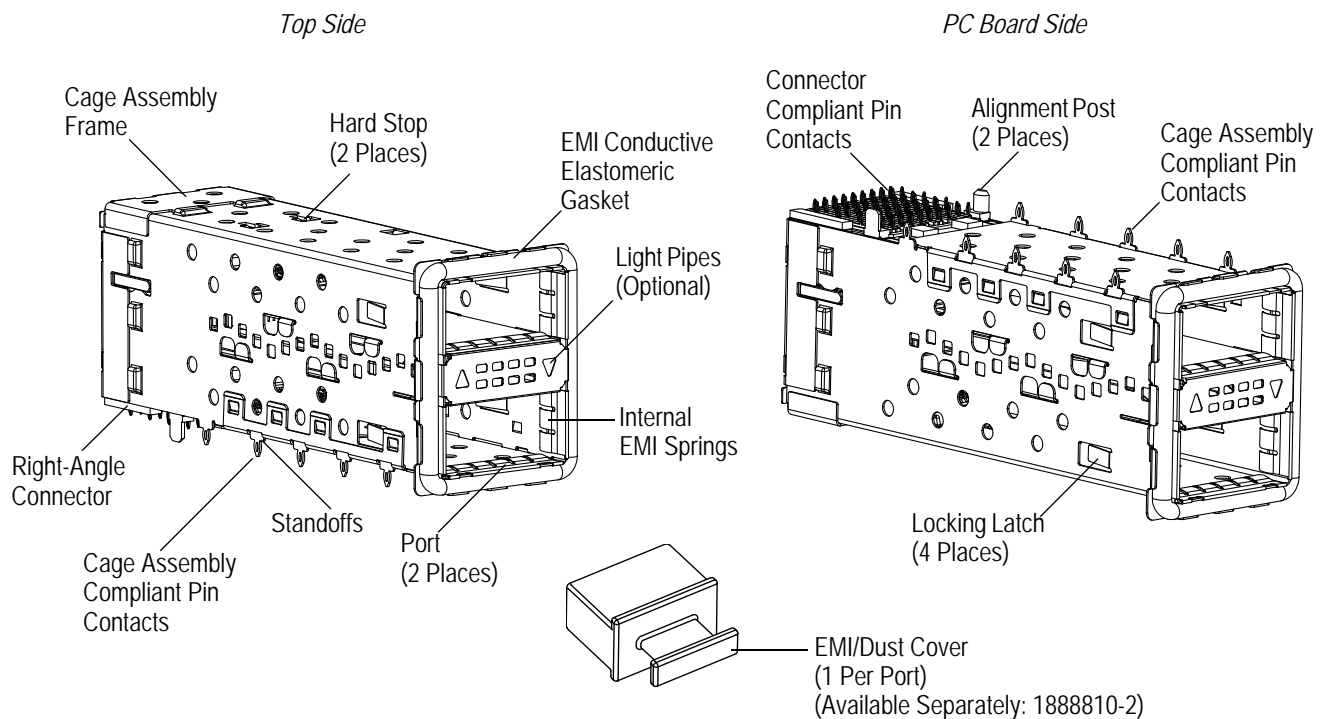


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification include:

- Changed cage assembly contact shoulders to contact standoffs

### 2.2. Customer Assistance

Reference Product Base Part Number 2085945 and Product Code J553 are representative of stacked QSFP+ through bezel connector and cage assembly (with or without light pipes). 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 Representative or, after purchase, by calling PRODUCT INFORMATION at the number at the bottom of page 1.

### 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, call PRODUCT INFORMATION at the number at the bottom of page 1.

### 2.4. Specifications

Design Objective 108-127010 provides expected product performance and test information.

### 2.5. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures. Documents available that pertain to this product are:

- 408-6923 Manual Arbor Frame Assembly 58024-1
- 408-32048 Stacked QSFP+ Extraction Tool Kit 2217070-1
- 408-32049 Stacked QSFP+ Seating Tool Kit 2215001-1

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. Limitations

The requirements given for the bezel are specifically configured for products used in the communications industry and PCI applications.

### 3.3. Material

The connector housing and chicklets (part that holds the compliant pin contacts) are made of molded thermoplastic, UL 94-V-0. All compliant pin contacts are made of copper alloy underplated with nickel and plated with tin at the leads and gold or palladium nickel at the interface area. The cage assembly is made of copper alloy. The EMI/dust cover is made of die cast zinc. The light pipes are made of clear polycarbonate.

### 3.4. Storage

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

### 3.5. Chemical Exposure

Do not store product 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

### 3.6. Host PC Board

#### A. Material and Thickness

The host pc board material shall be glass epoxy (FR-4 or G-10). The thickness shall be a minimum of 1.57.

**NOTE**

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

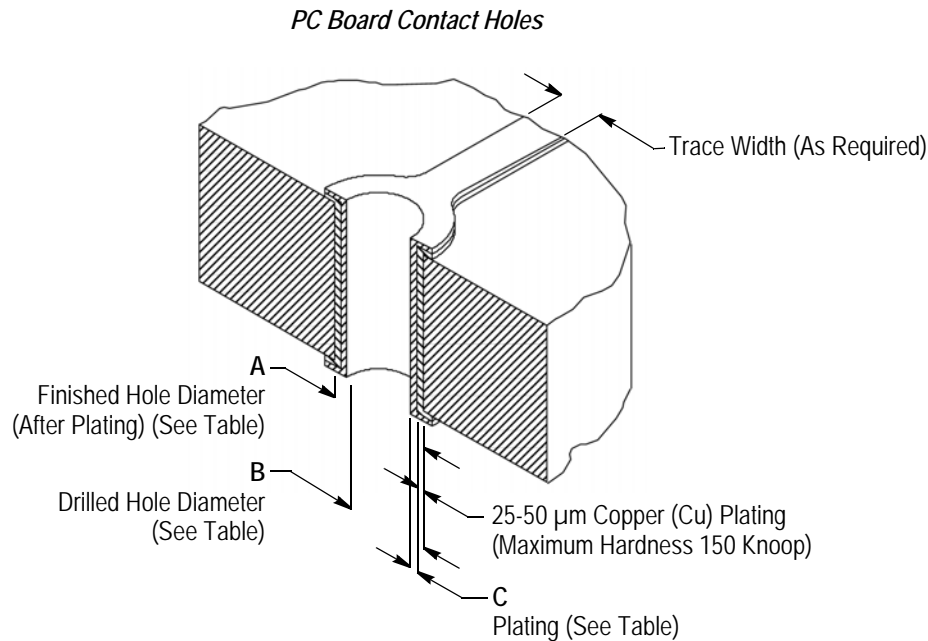


#### B. Tolerance

Maximum allowable bow of the pc board shall be 0.08 over the length of the connector and cage assembly.

#### C. Holes

The holes for the compliant pin contact must be drilled and plated through to dimensions specified in Figure 2. Diameter of the holes for the connector alignment posts are given in Figure 3.



COMPONENT	DIMENSION	
	A	B
	FINISHED HOLE DIAMETER (After Plating)	DRILLED HOLE DIAMETER
Connector	0.37 Ref	0.45±0.02
Cage Assembly	1.05 Ref	1.13±0.02

DIMENSION C	
SURFACE FINISH	THICKNESS
Hot Air Solder Leveling (HASL) Tin-Lead (SnPb)	0.004-0.010
Immersion Tin (Sn)	0.0005 Min
Organic Solderability Preservative (OSP)	0.0002-0.0005
Immersion Gold (Au) Over Nickel (Ni) (ENIG)	0.004-0.0076 (Ni) 0.0001-0.0005 (Au)

Figure 2

#### D. Layout

The holes for the connector and cage assembly must be precisely located to ensure proper placement and optimum performance. Recommended hole pattern, dimensions, and tolerances are provided on the Customer Drawing for the specific connector and cage assembly. Sample layout is provided in Figure 3.

**Sample Recommended PC Board Layout  
(Component Side of Board)**

**Note:** The entire area of the connector footprint, indicated by the dashed line, is the keep out area for components and signal traces, top side only. Top side traces are allowed within the connector hole pattern.

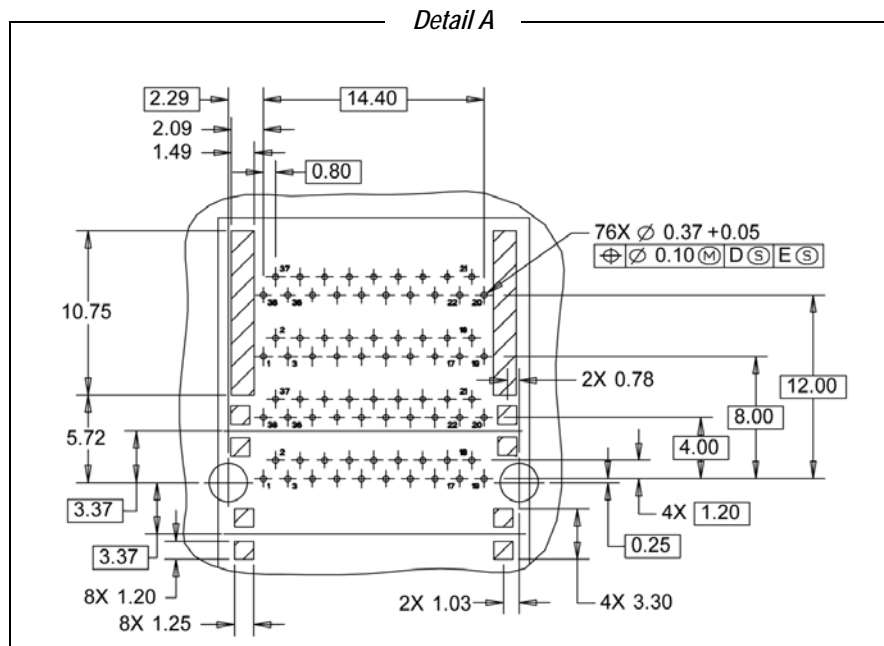
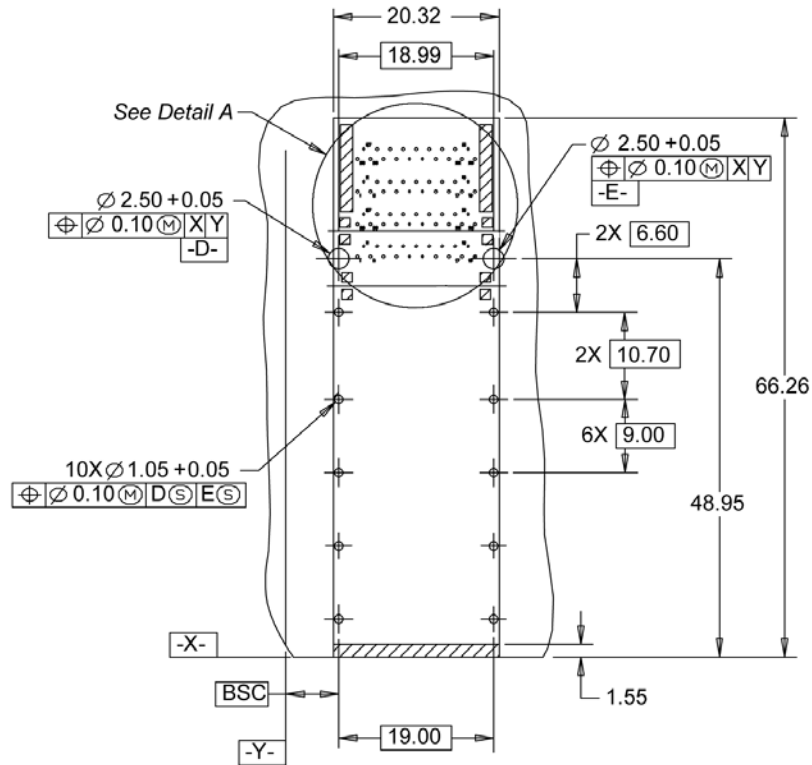


Figure 3

### 3.7. Bezel

#### A. Thickness

The bezel thickness range shall be 0.8 through 2.6.

## B. Cutout

The bezel must provide a cutout that allows proper mounting of the connector and cage assembly. The cage assembly EMI springs or elastomeric gasket must be compressed by the bezel in order to provide an electrical ground between the connector and cage assembly and bezel for EMI suppression.

Care must be used to avoid interference between adjacent connector and cage assemblies and other components. The minimum allowable distance between connector and cage assemblies must be considered to ensure proper assembly. Dimensions for bezel cutout and minimum allowable distance between cutouts are shown in Figure 4.

## C. PC Board and Bezel Position

The bezel and pc board must be positioned in relation to each other to avoid interference with the function of the cage assembly locking latches and to ensure proper function of the EMI springs. This relationship must conform to the dimensions given in Figure 4.

*Recommended Bezel Cutout (Minimum Pitch) and PC Board and Bezel Position*

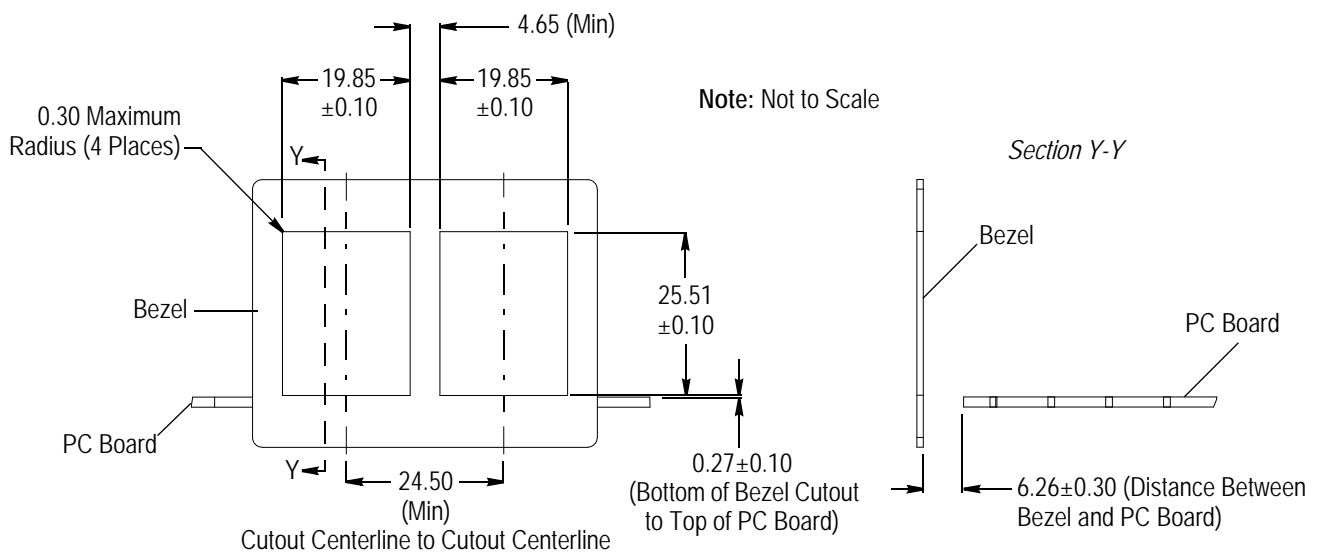


Figure 4

## 3.8. Installing Connector and Cage Assembly on PC Board

### A. Placement

The compliant pin contacts and alignment posts (connector only) must be aligned with matching holes in the pc board, then inserted into the pc board simultaneously to prevent twisting or bending of these parts.

### B. Seating

Using proper seating force and seating height is essential to interconnection performance. The force used to seat the connector and cage assembly must be applied evenly to prevent deformation or other damage to the compliant pin contacts and alignment posts. The force required to seat the connector and cage assembly onto the pc board can be calculated by:

$$\text{Amount of Cage Assembly Compliant Pin Contacts } 44.5 \text{ N [10 lb-force]} \text{ (Force per Contact) +} \\ \text{Connector Compliant Pin Contacts } 12 \text{ N [2.7 lb-force]} \text{ (Force per Contact) = Seating Force}$$



*Over-driving of the connector and cage assembly will deform parts critical to the quality of the connection. Maximum force occurs prior to the connector and cage assembly bottoming on the pc board.*

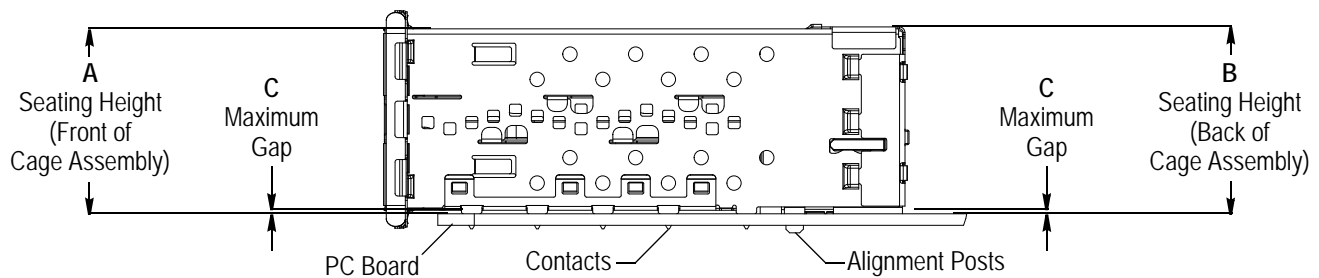
The shut height of the application tool must be specifically set for proper seating of the connector and cage assembly. The shut height can be calculated by:

$$\text{Seating Height (Connector and Cage Assembly Seated)} + \text{Height of Seating Tool} + \text{Combined Thicknesses of PC Board and PC Board Support Fixture} = \text{Shut Height (Ram Down)}$$



The seating height, measured from the top of the cage assembly (not including the EMI springs or elastomeric gasket) to the top of the pc board, given in Figure 5, may need to be adjusted to maintain the maximum gap between the bottom of the cage assembly standoff and the pc board.

The contacts must be inserted into the holes in the pc board until the bottom of the cage assembly contact standoffs are seated on the pc board. The alignment posts of the connector must be through the holes in the pc board. The connector and cage assembly must be seated on the pc board not exceeding the dimensions given in Figure 5.



DIMENSION (Top of Cage Assembly, Not Including EMI Springs or Elastomeric Gasket, to PC Board)		DIMENSION C (Bottom of Cage Assembly Standoffs to PC Board)
A	B	
25.4	25.65	0.10

Figure 5

### 3.9. Mounting in Bezel

The cage assembly EMI springs must be compressed by the bezel or the elastomeric gasket must be flush against the bezel. A slight bow in the cage assembly is permitted. The mating face of the cage assembly must be centered in the bezel cutout. It is recommended that the distance from the top of the bezel cutout to the pc board meet the dimension given in Figure 6.

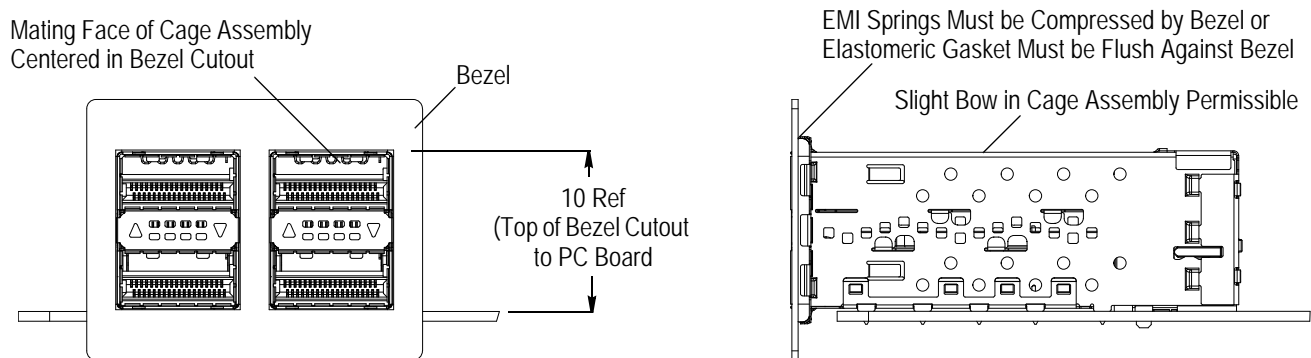


Figure 6

### 3.10. EMI/Dust Cover

An EMI/dust cover must be fitted into each port of the cage assembly when the connector and cage assembly is not mated to the module.

### 3.11. Replacement and Repair

Damaged or defective connector and cage assemblies must be removed and replaced. If repair or rework to the pc board requires soldering after the connector and cage assembly has been seated onto the pc board, the following must apply:

- 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. Even when using a "no clean" solder paste, it is imperative that the contact interface be kept clean of flux and residue (since it acts as an insulator).



*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).*

- Air drying is recommended. Otherwise, temperature limitations must not exceeded: -55° to 105°C [-67° to 221°F]. Excessive temperatures may cause housing degradation.

After extraction, the connector and cage assembly should not be re-used.

## 4. QUALIFICATION

No outside agency approvals for stacked QSFP+ through bezel connector and cage assembly (with or without light pipes) was defined at the time of publication of this document.

## 5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are given in Figure 7.

### 5.1. Seating Tool

The seating tool is used to seat the connector and cage assembly onto the pc board. The seating tool is available in a kit, which contains a wall support used to support the individual ports of the cage assembly.

### 5.2. Extraction Tool

The extraction tool is used to remove the connector and cage assembly from the pc board by pushing the pc board off of the connector and cage assembly. The extraction tool is available in a kit, which includes a wall support used to support the individual ports of the cage assembly.

### 5.3. Application Tool

Power for the seating tool and extraction tool must be provided by an application tool (with a ram) capable of supplying a downward force of 44.5 N [10 lb-force] per cage assembly contact and 12 N [2.7 lb-force] per connector contact. The manual arbor frame assembly is available for use with these tools.

### 5.4. PC Board Support Fixture

A pc board support must be used with the seating tool and the extraction tool. The support fixture provides proper support for the pc board and protects the pc board and the connector and cage assembly from damage. The support fixture must be customer designed. It is recommended that the support fixture be at least 25.4 longer and wider than the pc board and have flat surfaces with holes or a channel large enough and deep enough to receive any protruding components of the connector and cage assembly.

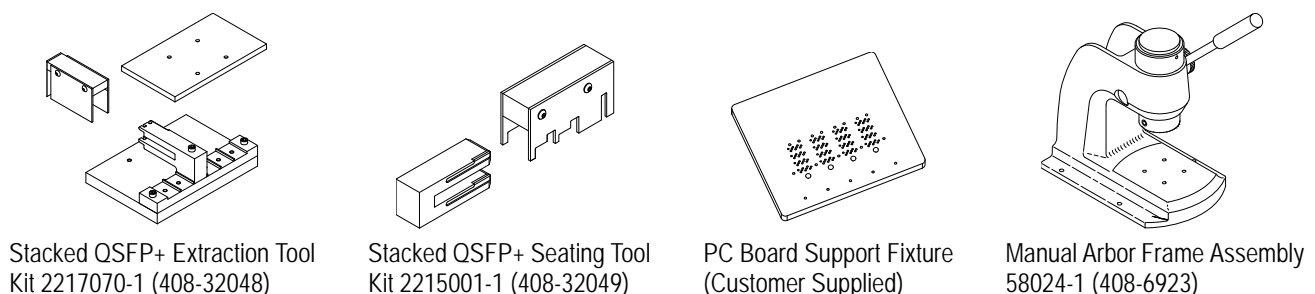
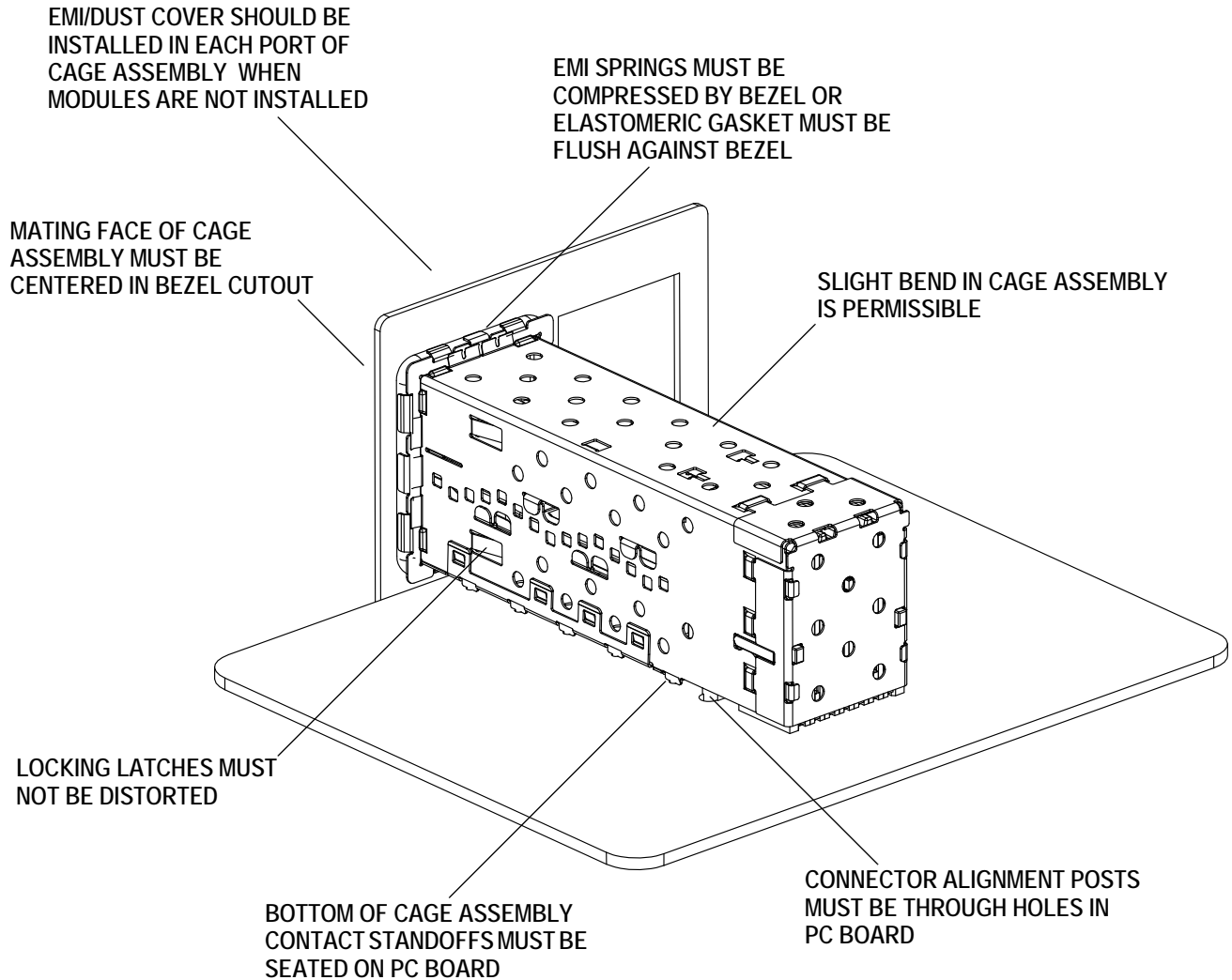


Figure 7

## 6. VISUAL AID

The illustration below shows a typical application of stacked QSFP+ connector and through bezel cage assembly (with or without light pipes). 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. VISUAL AID**