Ball Lens Subassembly, Size 16 Expanded Beam

1. SCOPE

This specification covers the acceptable and the not acceptable conditions for ball lens subassemblies manufactured for the Size 16 Expanded Beam termini.

2. INSPECTION CRITERIA

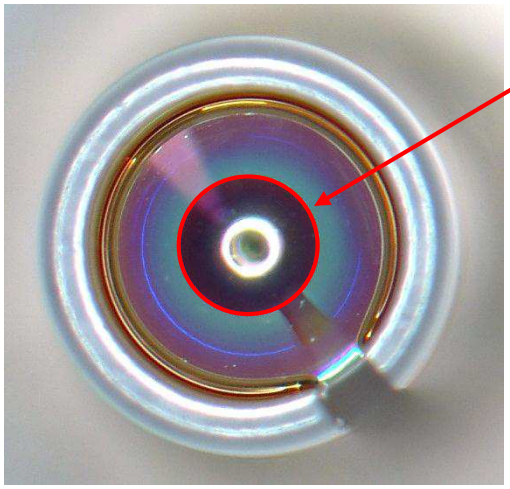
2.1 Inspection Method

- Inspection of ball lens subassemblies must be performed in an environment consistent with fiber optic assembly manufacturing environments.
- Ball lens subassemblies shall be inspected using a direct view optical microscope with a 10X eyepiece and a minimum of 2.5X zoom.
- Ball lens subassemblies can be cleaned with clean, dry compressed air or nitrogen, an ultrasonic Acetone bath, or 99% isopropyl alcohol and a small compressed CleanFoam swab (TX751B).
- Consult Engineering for ball lens subassemblies that remain in question after cleaning and re-inspection.

2.2 Limits of Acceptability

A. Ball Lens

1. The critical zone of the lens must be free from dirt, epoxy, imperfections and/or blemishes. The critical zone is defined by the reflection of the internal diameter of the ceramic alignment sleeve on the ball lens. See Figures 1 through 4.



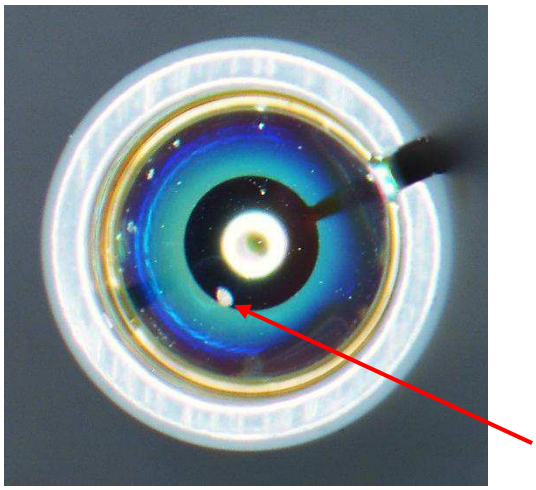
ACCEPTABLE

No dirt, epoxy,
imperfections or blemishes
on lens.

Figure 1

©2014 Tyco Electronics Corporation,
Harrisburg, PA
All International Rights Reserved

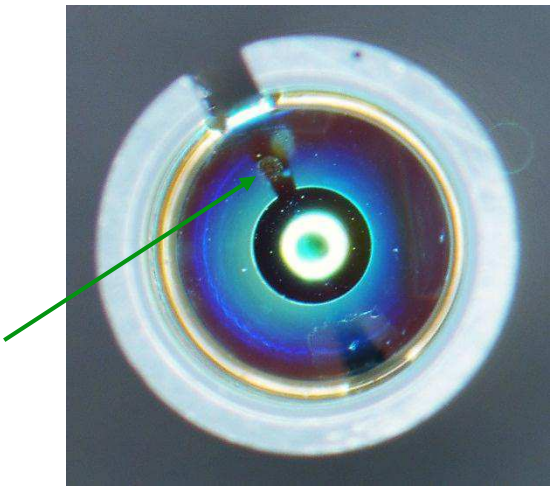
* Trademark
| Indicates change



NOT ACCEPTABLE

AR coating blemish inside the critical zone.

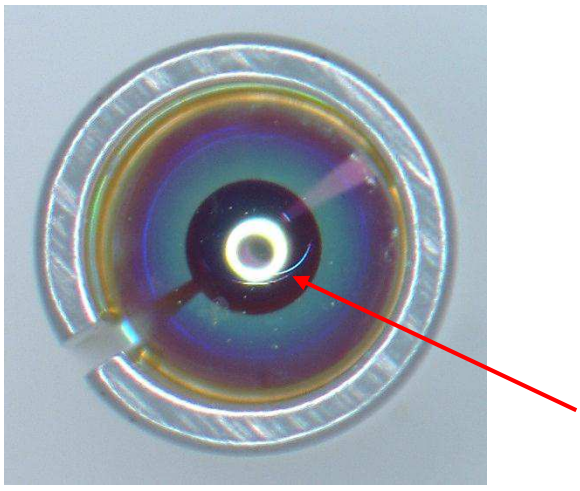
Figure 2



ACCEPTABLE

AR coating blemish outside the critical zone.

Figure 3

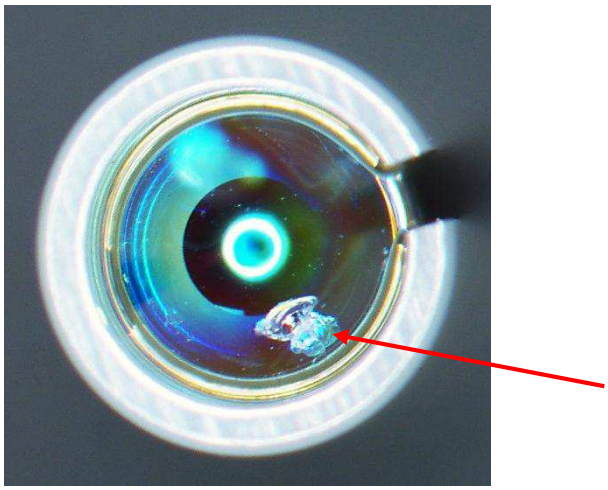


NOT ACCEPTABLE

Scratches inside the critical zone.

Figure 4

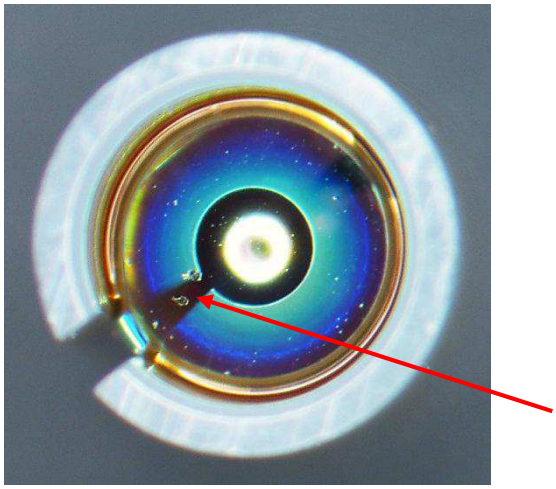
2. Ball lens subassemblies are to be rejected if the lens is chipped or the AR coating is damaged, regardless of location. See Figures 5 and 6.



NOT ACCEPTABLE

Chip in lens.

Figure 5

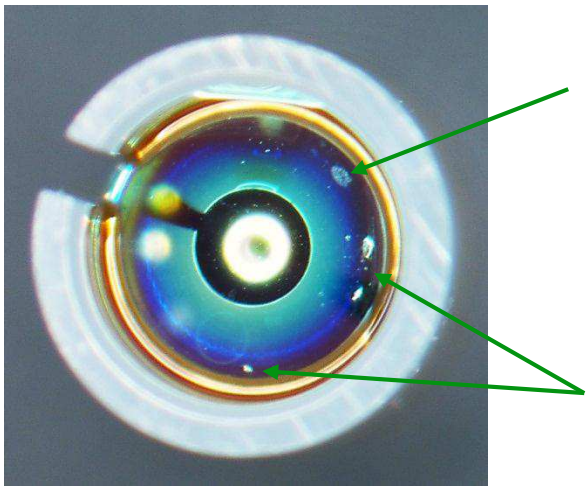


NOT ACCEPTABLE

AR coating is damaged, chipped or flaking off.

Figure 6

3. The size and location of dirt, epoxy, imperfections and/or blemishes outside the critical zone must also be considered when critiquing overall workmanship. Dirt outside the critical zone impacts the customer's perception of the assembly's quality. See Figures 7, 8 and 9.

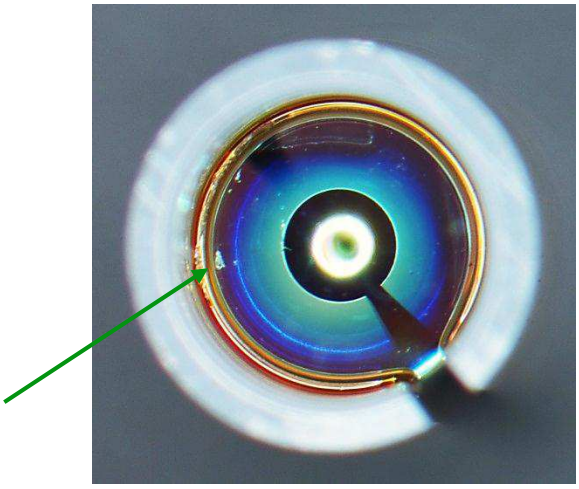


ACCEPTABLE

Epoxy/encapsulated dirt near epoxy ring (is not removed by cleaning).

AR coating blemish outside of critical zone.

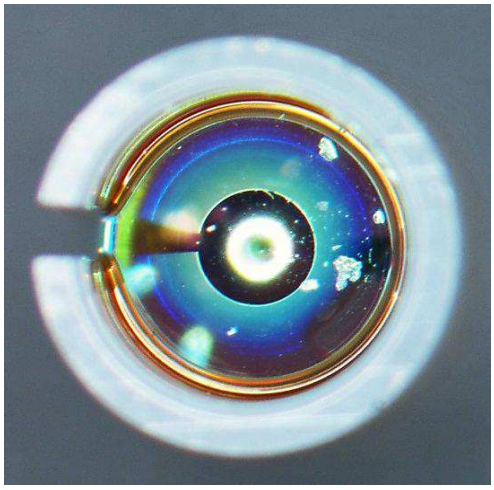
Figure 7



ACCEPTABLE

Epoxy/encapsulated dirt near epoxy ring (is not removed by cleaning).

Figure 8

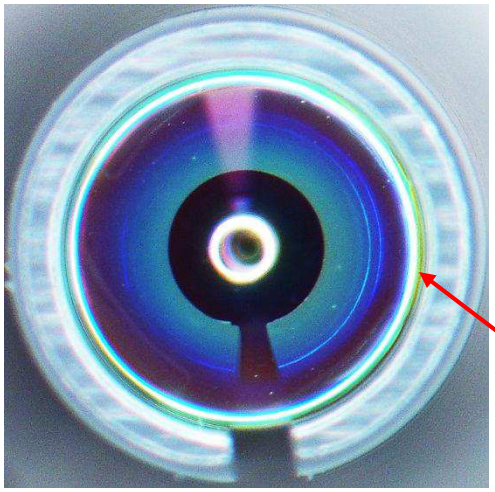


NOT ACCEPTABLE

Loose dirt covering lens. Needs to be cleaned and re-inspected.

Figure 9

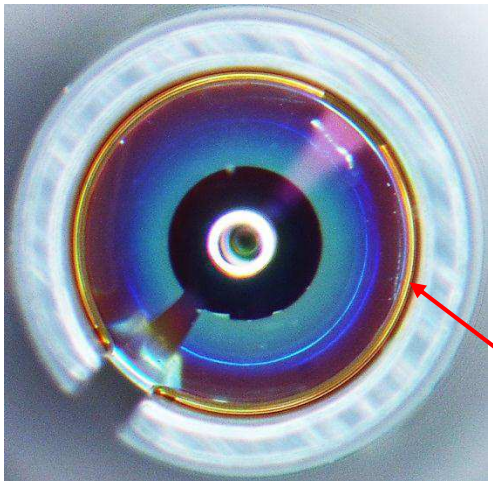
4. Ball lenses must be epoxied in place, having both adequate volume and proper cure. Ball lens subassemblies are to be rejected for too little or too much epoxy surrounding the ball lens. If the lens is rejected for too little epoxy or the epoxy step was skipped, the lens subassembly can be reworked by adding the proper amount of epoxy and curing per the process time and temperature. Lens subassemblies suspect of not being properly cured are to be rejected. See Figures 10 through 14.



NOT ACCEPTABLE

No epoxy around ball lens. (Lens subassembly can be reworked.)

Figure 10

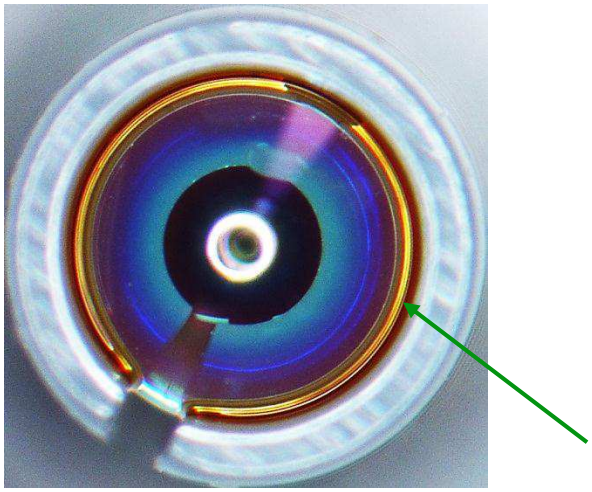


NOT ACCEPTABLE

Minimal epoxy around ball lens. (Equivalent to 1 shot per epoxy set-up chart. Lens subassembly can be reworked.)

Epoxy fully cured, dark amber color.

Figure 11

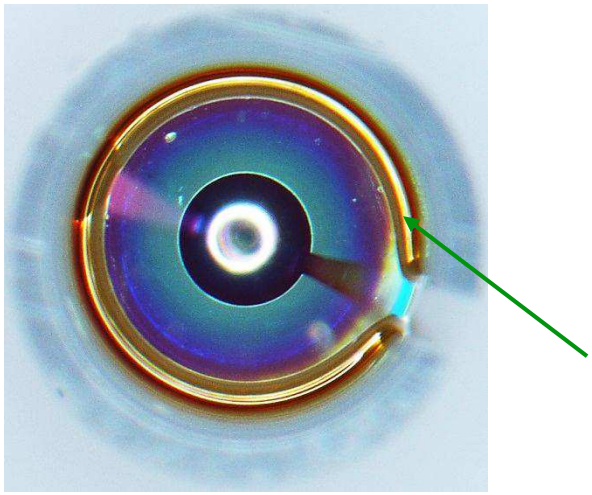


ACCEPTABLE

Adequate volume of epoxy surrounding ball lens. (Equivalent to 2 shots per epoxy set-up chart.)

Epoxy fully cured, dark amber color.

Figure 12

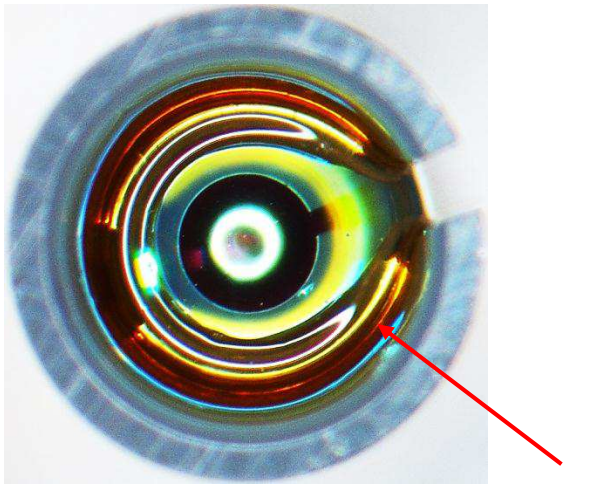


ACCEPTABLE

Ideal/typical volume of epoxy surrounding ball lens. (Equivalent to 3 shots per epoxy set-up chart.)

Epoxy fully cured, dark amber color.

Figure 13

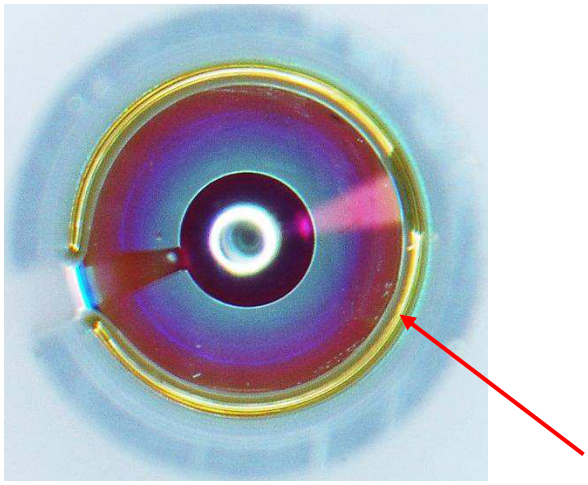


NOT ACCEPTABLE

Too much epoxy surrounding ball lens.

Epoxy fully cured, dark amber color.

Figure 14



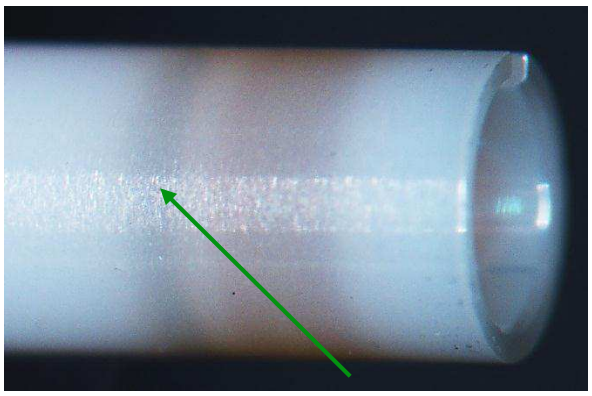
NOT ACCEPTABLE

Epoxy not fully cured, pale yellow in color, should be dark amber. Epoxy volume is acceptable.

Figure 15

B. Focal Spacer

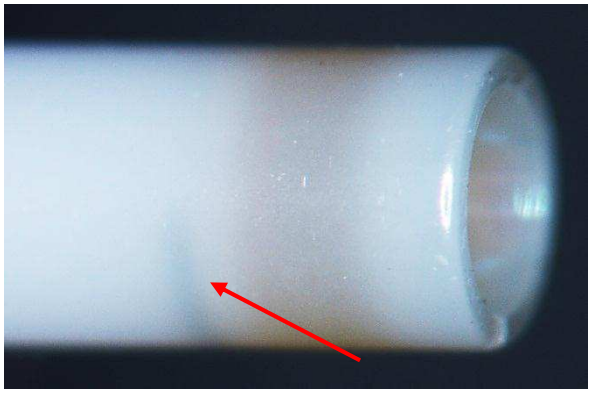
1. Ball lens subassemblies are to be rejected if the epoxy does not adequately flow around the focal spacer or interferes with the optical path or prevents the ferrule from bottoming on the focal spacer. See Figures 16 through 21.



ACCEPTABLE

Amber band is epoxy flow around ball lens
Dark band indicates epoxy flow around focal spacer.

Figure 16

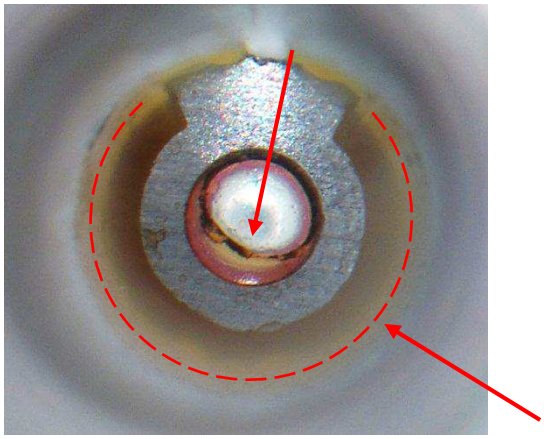


NOT ACCEPTABLE

Incomplete band around focal spacer. Band must be present for half the circumference of the alignment sleeve.

Figure 17

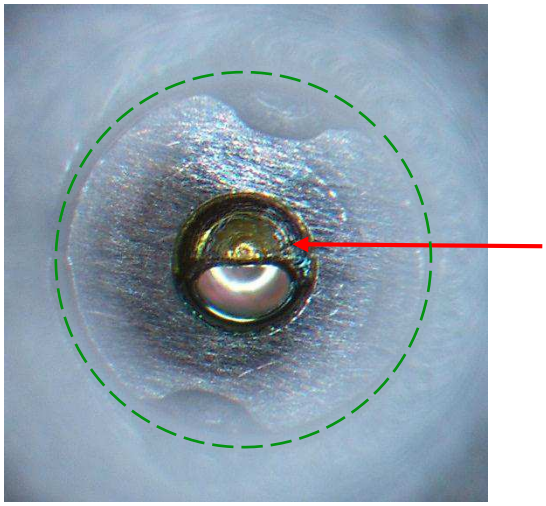
NOTE: Figures 18 through 21 are viewed through the bottom of the lens subassembly, the side the ferrule is inserted to make contact with the focal spacer (opposite the ball lens).



NOT ACCEPTABLE

Too much epoxy applied to focal spacer. Excess epoxy around spacer may prevent ferrule from bottoming and epoxy filling inside diameter may block optical path.

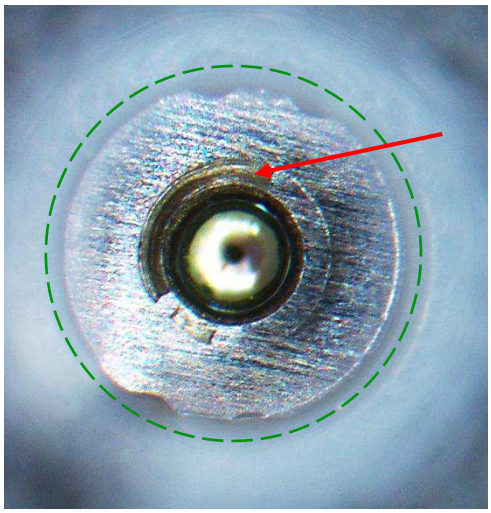
Figure 18



NOT ACCEPTABLE

Epoxy wicked to the inside diameter and is blocking optical path. Epoxy around outside diameter is acceptable.

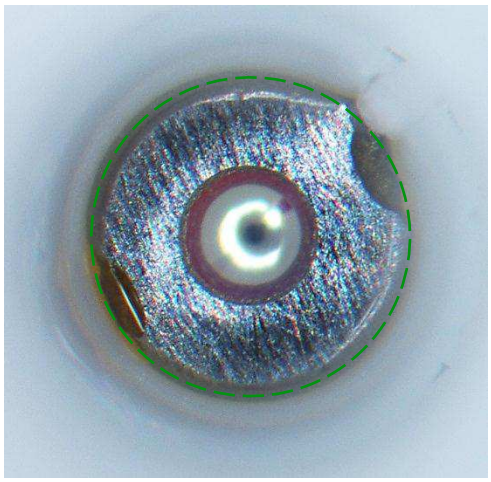
Figure 19



NOT ACCEPTABLE

Epoxy is adhered to spacer and will not allow ferrule to bottom. This happens when epoxy wick to the precision pin during assembly. Epoxy around outside diameter is acceptable.

Figure 20



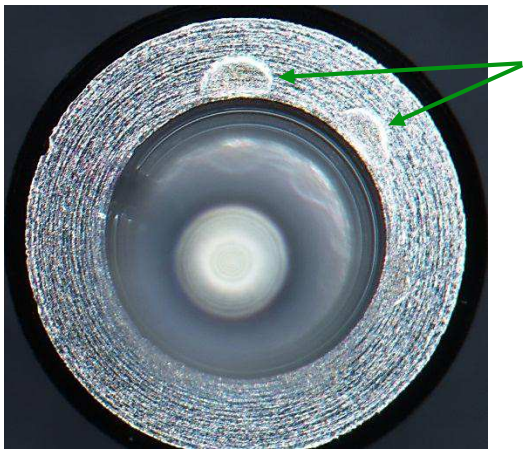
ACCEPTABLE

No epoxy on bottom surface of spacer. No epoxy wicked to spacer inside diameter. Epoxy around outside diameter is ideal.

Figure 21

C. Shroud (when applicable)

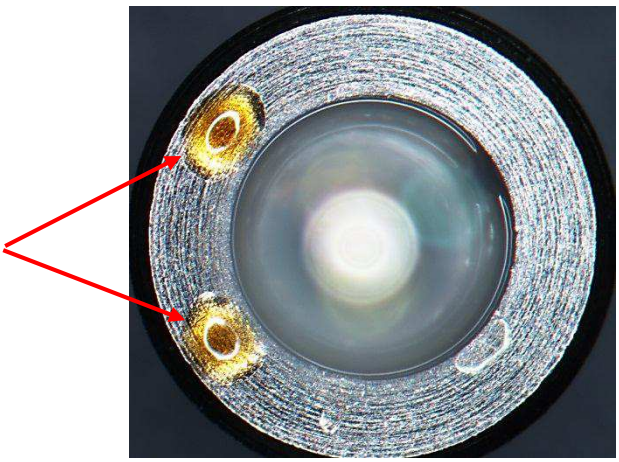
1. Residual epoxy, having no color (clear), on the top surface of the shroud shoulder is considered acceptable. The ball lens subassembly is to be rejected when the residual epoxy turns amber in color. The amber color indicates the thickness of the residual epoxy is enough that it may interfere with the function of the termini. The lens subassembly can be reworked by carefully removing the residual epoxy from the shoulder with a pick or precision hobby knife. If the plating is inadvertently damaged due to the rework attempt, the subassembly must be rejected. See Figure 22 and 23.



ACCEPTABLE

Acceptable epoxy on top shoulder of shroud. Epoxy is so thin, it has no color.

Figure 22



NOT ACCEPTABLE

Amber color indicates residual epoxy is too thick on top shoulder of shroud. (Subassemblies can be reworked by carefully removing the residual epoxy.)

Figure 23