Guidelines to Ultra-thin AP3 Window Inspection

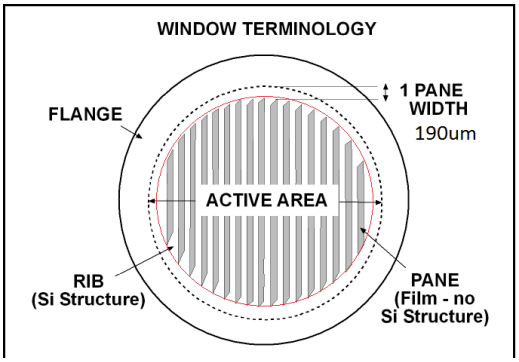

Figure 1 Terminology of Structure on Window

Figure 2 Particle size is less than 1/2 the width of the pane area therefore, acceptable.

Figure 3 Particle size is greater than 1/2 the width of the pane area therefore, rejected.

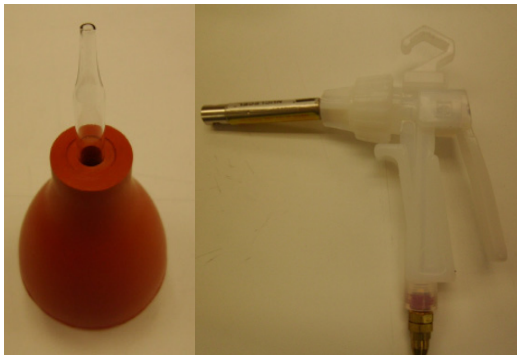

Figure 4 Puff bulb and N2 gun

AP3 Ultra-thin Polymer Windows manufactured at Moxtek® receive two quality inspections before being shipped to customers, once before installation into various mounts and once at final inspection directly before packaging and after helium leak check. Our first quality inspection includes a microscope inspection at 50X with both reflected and transmitted light. The second inspection includes a 100X inspection with both reflected and transmitted light. Additionally some customers inspect the windows before installing them into their products.

The following is a guideline for inspecting thin AP3 windows with some examples of what Moxtek has found are acceptable and not acceptable for suitable reliability of the window. Included are examples of defects that Moxtek has found on windows and what are considered acceptable levels or sizes of defects.

For additional handling information, please refer to WIN-TECH-1005, Handling DuraBeryllium, AP3 and Ultra-thin Polymer Windows Technical Note.

Definitions

The terminology describing specific features on the window is defined below (See Figure 1).

Rib: Silicon rib structure that supports the thin film in the open active area

Pane: Open area between ribs

Flange: Area outside of the active area

Active Area: Area including ribs and panes and an additional circular area surrounding the ribs and panes that is one pane wide (190nm) or the edge of the epoxy glue line whichever is closest.

Specks (Particles)

Speck defects (particles) are generally on the front or back surface of the window film and can be generated and deposited on the surface in various ways. AP3 Windows are manufactured in a Class 100 clean room where an active program of monitoring airborne particles helps to ensure a clean environment. Very small particulates can collect on the surface from other sources including manufacturing, shipping and at customer sites.

Parts will be rejected for specks if the particle size is greater than ½ the width of the window pane and positioned on the front surface as viewed in reflected light or any sized particles defined as 10 or more in the 100x field of view on the backside of the film as seen under transmitted light. Any particles that may be internal to the film are rejected at Moxtek. Figure 2 shows an example of an acceptable speck on the front surface while Figure 3 shows an example of an unacceptable speck on the front surface.

It is possible to blow off specks if they are not adhered tightly to the film surface. Specks can be blown off with either a *low flow* clean N2 gun *with filter* or a cleaning puff bulb, see Figure 4.

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Light Leak

Light leak defects are found by inspecting with transmitted light and can be the cause of a pin hole vacuum leak through the film. Possible causes are accelerated particles puncturing the film after venting parts under vacuum. Figure 5 shows a light leak example. All light leaks are rejected at Moxtek.

Film Damage

Damage to the film is usually caused by anything coming in contact with the thin film surface of the window. Moxtek takes exceptional precautions in handling these parts during manufacturing and packaging. The sensitive nature of the film dictates special handling procedures and a conscious effort to avoid contact of the film with any other surface. All film damage is rejected at Moxtek since it would cause a non-hermetic seal. Figure 6 is an example of film damage.

Contamination

Contamination is defined as anything on the surface of the film that is not a single point defect. For example any liquid, paste, gel or powder would be considered contamination. Figure 7 shows an example of contamination on the film. Any contamination is rejected at Moxtek.

Film Wrinkles

Wrinkles in the film are more of a cosmetic issue than a structural problem. These are areas where the thin film of the window folds on itself during the manufacturing process. Moxtek does not use windows with any film wrinkles that extend more than half way across the flange area. Figure 8 shows an acceptable wrinkle.

Conclusion

This technical note can be used as a general guide for inspection criteria for customers of the AP3 ultra thin polymer window. If you have specific questions on what is acceptable please contact Moxtek.

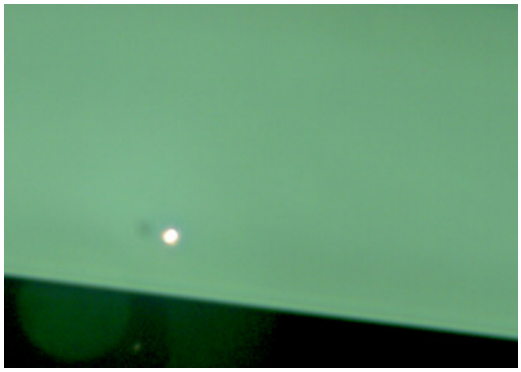

Figure 5 All light leaks are rejected at Moxtek.

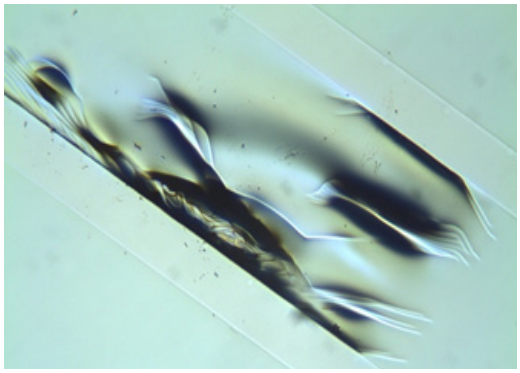

Figure 6 Film damage between two ribs due to contact of the film, rejected.

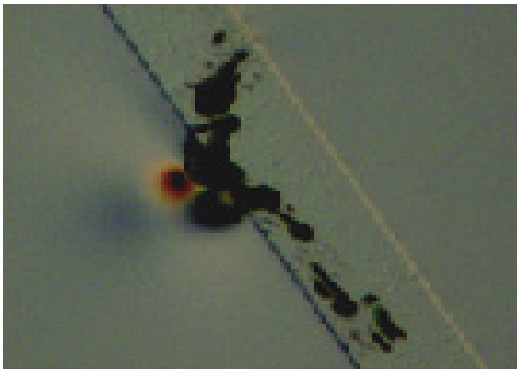

Figure 7 Contamination on a pane rib, rejected.

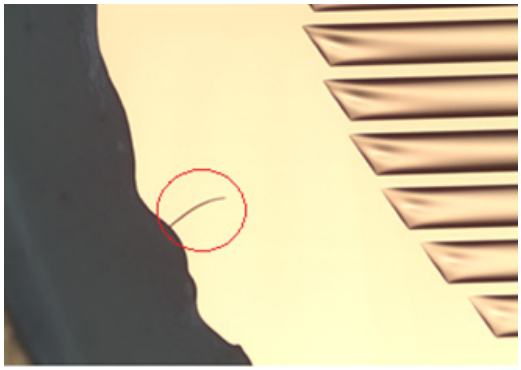

Figure 8 Wrinkle in film that is not more than half way across the flange, acceptable.

Please visit www.moxtek.com for any further questions on the proper handling of x-ray windows or call Moxtek at (801) 225-0930.

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