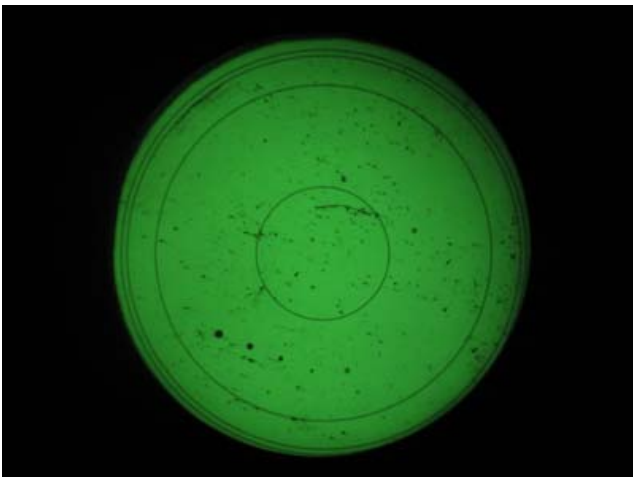


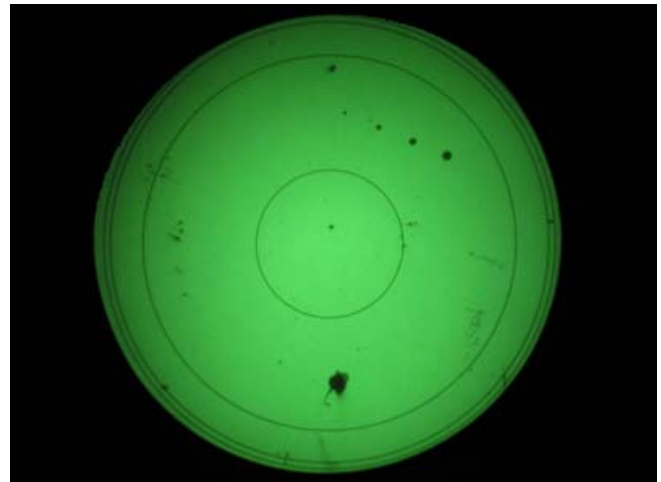
Black Spots

Black Spots are cosmetic blemishes that may originate from fixed particles inside the I2 tube or in the fiber optic. Small size black spots in the I2 tube are inherent to the manufacturing process and do not affect the performance or reliability of the device. However, some manufacturers produce I2 tubes with excessive black spots that will obstruct a large portion of the image, significantly reducing a soldier's situational awareness and consequently his ability to perform the mission. Black spots can be acceptable as long as they do not interfere with the viewing of the image to be observed and therefore specifications of tubes should be fine-tuned to match the constraints of the end-use application 4. The image quality of night vision device for helicopters pilots or snipers shall be more demanding than that of a standard night vision goggle or monocular for situational awareness and movement. The amount of black spots has a direct consequence on the unit price of an I2 tube (the more spot the less costly) but has no influence on its actual low light or high light level performance.

Spots are always measured according to Mil-Spec at input light levels of 1 to 10 mlx for best image contrast. Spots are measured by comparing to calibrated target spots of given size, and are classified in quantity and per zones of the useful diameter of the tube.



Badly spotted tube



Spotted tube

A typical black spot table for a high end [XR5™](#) for aviator's night vision goggles is given below.

Spots diameter in Micrometers	Zone 1 Diameter 5.6mm	Zone 2 Diameter 5.6mm - 14.7mm	Zone 3 Diameter 14.7 m - 17.5mm
> 300	0	0	0
230 - 300	0	0	0
150 - 230	0	1	1
75 - 150	0	2	2
<75	Minimal	Minimal	Minimal

Maximum number of dark spots (contrast over 30%)