



Course Notes

SPIE Education Services

SC1017

Optics Surface Inspection Workshop

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SAMPLE PAGES ONLY. DOES NOT INCLUDE COMPLETE COURSE NOTES USED IN CLASS.



SC1017 Advanced Scratch and Dig Workshop Learning Outcomes

- ▶ Review the basics of cleaning optics
- ▶ Perform a visual review of the surface
- ▶ Create a surface map
- ▶ Conduct a visibility inspection according to MIL-PRF-13830B, ANSI and ISO 14997 standards
- ▶ Conduct a dimensional inspection by microscope according to ANSI and ISO 14997 standards
- ▶ Apply the accumulation rules
- ▶ Evaluate a surface and determine if a surface passes or fails



Drag wipe (flats and mild curves)¹

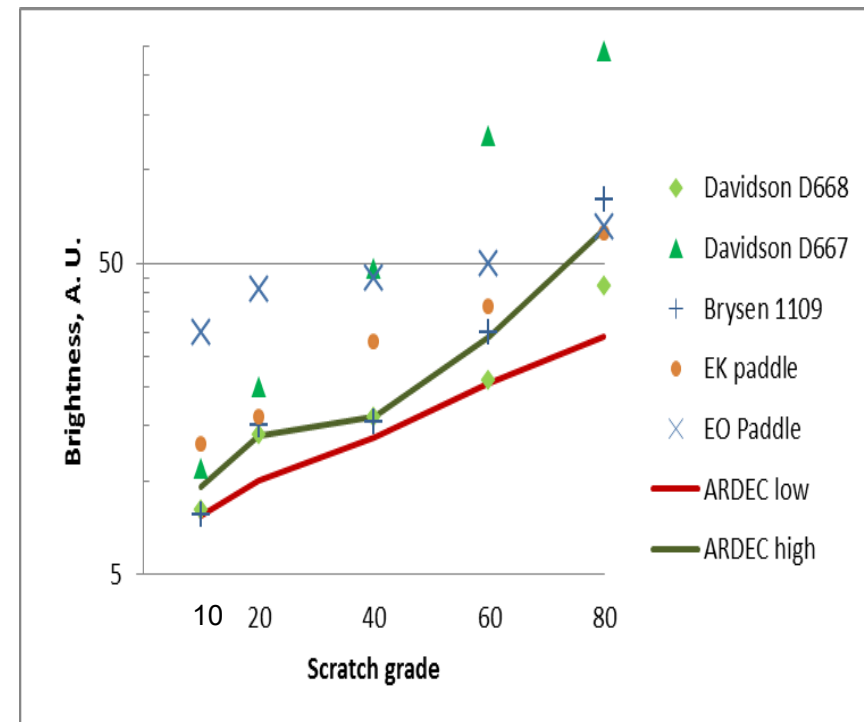
- ▶ Set the component on the work surface
- ▶ If necessary, place tweezers between you and the part to keep it from sliding
- ▶ Place tissue over the component, about half way
- ▶ Add one drop of methanol per inch diameter
 - In a line across the tissue, in the middle of the part
- ▶ Slowly pull the tissue towards you, letting the methanol wick back along the tissue
 - Use a continuous motion; don't stop
- ▶ When the tissue is dry, it will pop off of the surface





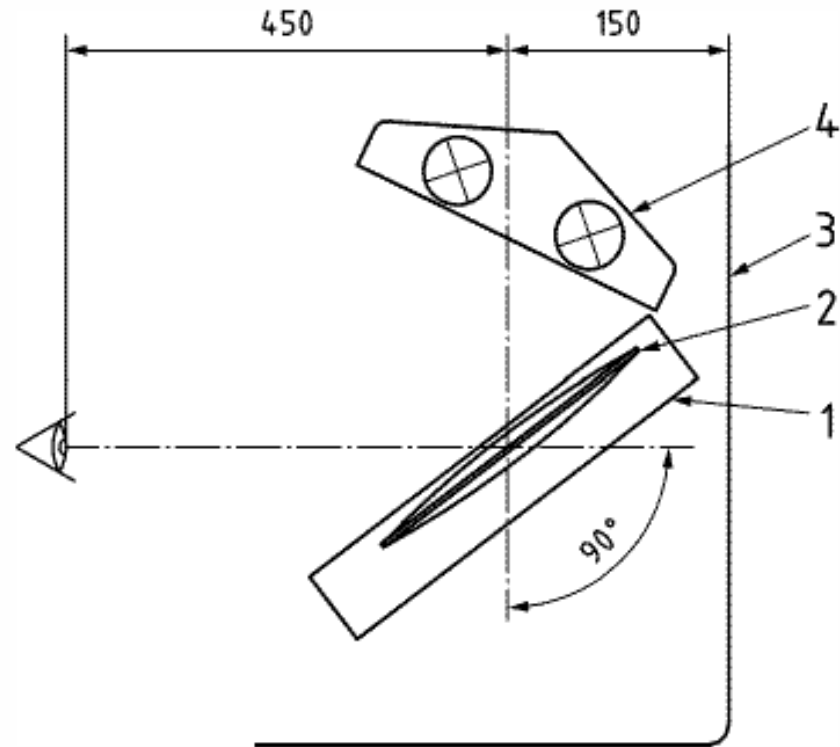
Inspection for visibility method⁶

- ▶ Both MIL-PRF-13830B and OP1.002 reference the same drawing, C7641866
 - Sets issued by the Army are “made” to this drawing
 - Davidson Optronics also offers D-668 comparison standards that are approved for military contracts
- ▶ ISO 10110-7 allows any comparison standard referenced on the drawing
- ▶ Other alternatives
 - Davidson D667
 - Brysen Optical, now discontinued
 - “Kodak” paddle, now discontinued
 - Edmund and Thor Labs scratch and dig paddle, now discontinued





Reflected Light Inspection Method⁷ ISO 14997 Annex A, figure A.3⁸



Key

- 1 comparison standard
- 2 element under inspection
- 3 matte black background
- 4 lamp selected to provide the required illuminance

The illuminance shall be at least 1000 lx and not more than 2800 lx. Imperfection is viewed in dark field, against a matte black background.



That's it! Now let's learn by doing!

- ▶ Wear your gloves
- ▶ Review specifications
- ▶ Blow off surface dust
- ▶ Clean if necessary
- ▶ Inspect
- ▶ Make a map

Specification	Scratches	Digs
MIL-PRF-13830	Brightness comparison	Apparent size
ISO 14997 visibility method	Brightness comparison	Apparent size
ISO 14997 dimensional method	Width comparison or measure	Size comparison or measure
ANSI OP1.002 visibility method	Brightness comparison	Apparent size
ANSI OP1.002 dimensional method	Width comparison or measure	Size comparison or measure

- ▶ Compare imperfections in map to specification
 - Use accumulation rules to determine if the part passes or fails