



Scientific Working Group on Digital Evidence

Guidelines for the Use of Macro Photography in Forensic Science

24-P-001-1.0

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1. Purpose

The purpose of this document is to provide guidelines for the use of macro photography in forensic science. Macro photography techniques may be used to capture fine detail. The resulting images may be used for comparative analysis of evidence.

2. Scope

Macro photography is extreme close-up photography where the reproduction ratio at the camera sensor is 1:1 or greater. This document will provide an overview of macro photography equipment, techniques, and considerations for its use in forensic science.

3. Equipment

Please reference *SWGDE Photographic Equipment and Infrastructure Recommendations* before the implementation of new equipment or procedures.

- Digital Single Lens Reflex or Mirrorless Interchangeable Lens Camera
- Dedicated Macro Lens
- Tripod or Copy stand
- Shutter Release Cable or Remote
- Forensic scales or other visual measurement reference
- Angle Finder or Digital Inclinator
- Focus Rail

4. Camera Settings and Techniques

In macro photography, margins for error in getting a properly exposed and focused image are reduced. Taking that into consideration with capturing the highest quality images possible, the following camera settings and techniques are recommended.

- Verify camera settings including, but not limited to: time/date, image file format, and image size. Images should be captured uncompressed, or using lossless compression (e.g. RAW or TIFF). Refer to *SWGDE Digital Image Compression and File Formats Guidelines*.
- Use the lowest native ISO of the camera sensor.
- Deactivate image stabilization.
- Use the Manual or Aperture Priority modes to have more control over the exposure and depth of field.
- Select the correct white balance for the lighting conditions, or use the custom white balance function to ensure accurate color reproduction.
- The scale should be oriented along the long edge of the frame whenever possible.



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- Position the camera so that the sensor plane is parallel to the subject; using an angle finder/inclinometer can be beneficial. Measuring from both sides of the lens to the subject can also help ensure that the sensor plane is parallel.



Figure 1

- Choose the correct orientation to best fit the subject to be photographed by filling the frame.



Figure 2. Not filling the frame.

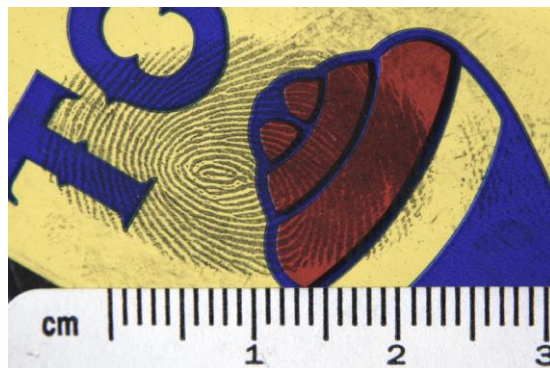


Figure 3. Properly filling the frame.

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- Select an f/stop that ensures sufficient depth of field without introducing diffraction. Keep in mind that depth of field in macro photography is severely limited.

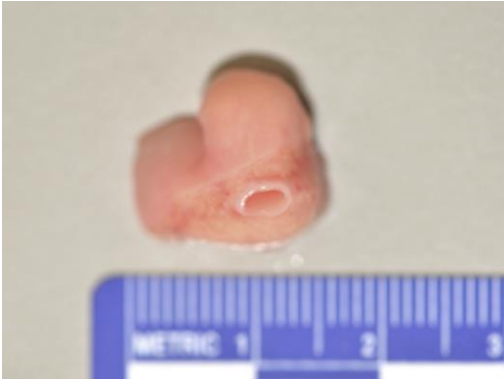


Figure 4. f/5.6



Figure 5. f/22

- Ensure critical focus is set on the intended area of interest. Zooming in while using live view or after the photo is taken may be used to verify critical focus.

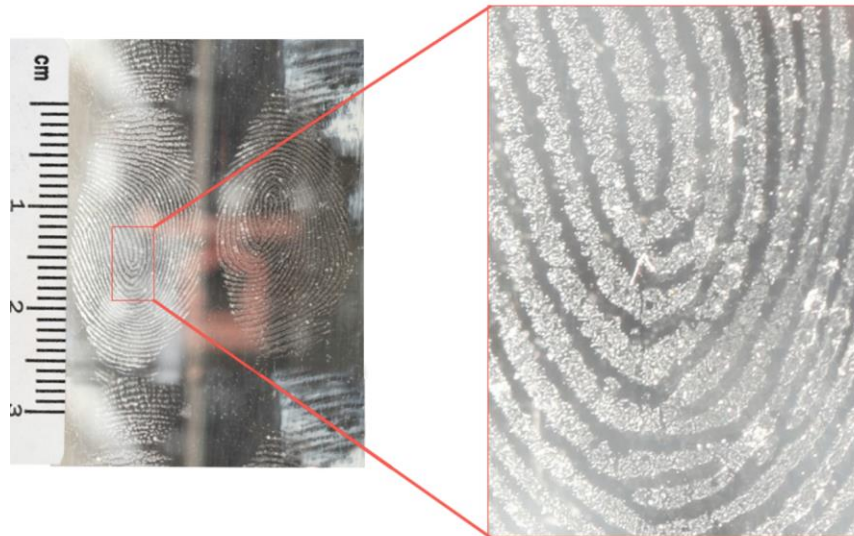


Figure 6

5. Considerations

- Working distance is the distance from the subject to the front of the lens. It is greatly reduced when taking macro photographs. This distance can be increased by increasing the focal length of the lens. This may be advantageous, allowing more space to access the object and adjust lighting.

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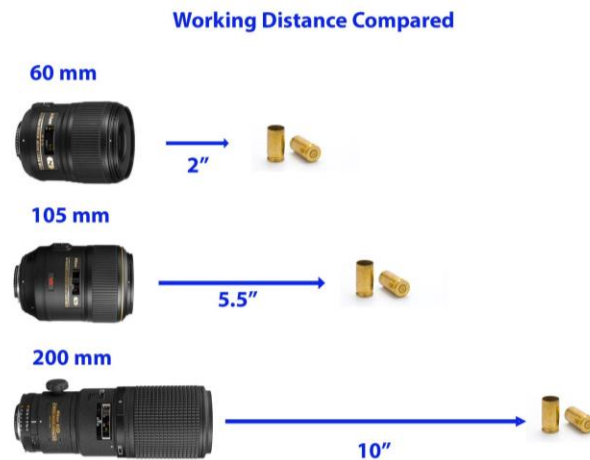


Figure 7

- Lighting setups may vary greatly from subject to subject. Depending on the properties of the item being photographed, the distance between the front of the lens and the subject, and the details you are trying to capture, the position and the angle of the light(s) should be carefully considered, and multiple setups may need to be attempted before achieving the desired result. Refer to *SWGDE Lighting Techniques in Forensic Photography v.1.0*
- The depth of field may be millimeters or less with macro photography. When details like fingerprints are on curved surfaces, set the point of focus halfway between the closest and furthest points of detail.



Figure 8

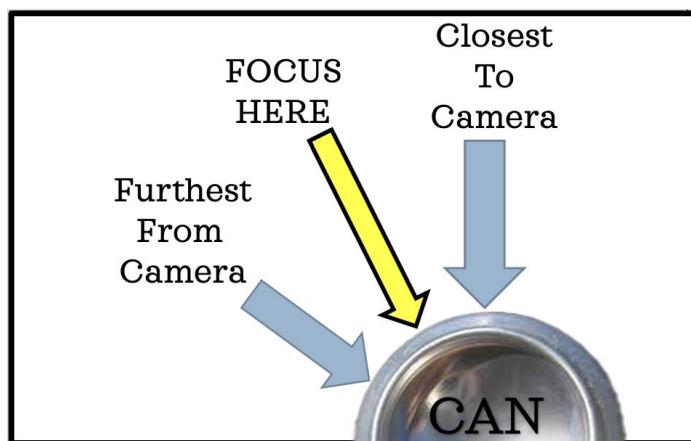


Figure 9

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- The effects of motion will become exaggerated when taking macro photographs, therefore a stable mount such as a tripod or copy stand should be used in addition to a remote shutter release. If the effects of motion are still perceived in the images, a faster shutter speed and more light may be necessary.
- Whenever possible, evidence should be photographed on a neutral background.
- Scales should be placed on the same plane as the item being documented. If it is not possible to include a scale with the item, a separate image of just a scale should be taken at the same focal distance.
- Bracketing exposures will ensure details are captured in the highlights and shadows.
- Choosing a shallower depth of field can aid in visualizing evidence on transparent surfaces with a distracting background or trace materials on the opposing side.

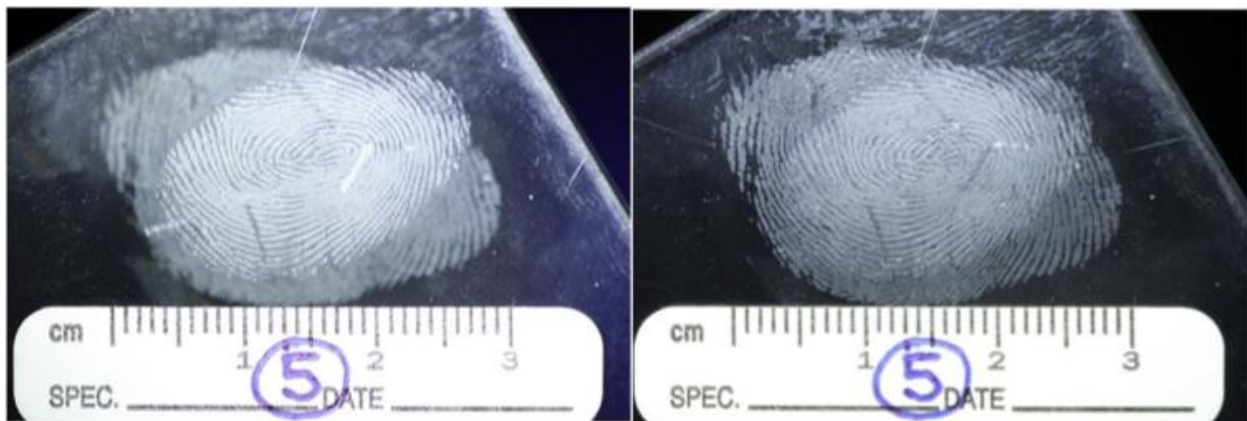


Figure 10. f/2.8

f/11

6. Special Techniques

- Focus Stacking is a technique of taking multiple photographs of the same subject at different focus points from the closest to the farthest point of detail and blending those images to create one composite image with an increased depth of field. Several software applications are available for this purpose.
- Focusing rails allow for the minute adjustment of camera position and are very helpful in macro photography. They may also be necessary to make the incremental adjustments required to create a series of images for focus stacking.
- The use of a bellows or extension tube will move the lens further from the sensor thereby increasing magnification.



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7. References

1. SWGDE 16-P-001-2.0 Photographic Equipment and Infrastructure Recommendations
2. 2022-06-09 SWGDE Lighting Techniques in Forensic Photography v.1.0



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8. History

Revision	Issue Date	History
1.0 DRAFT	1/9/2024	Initial draft created and moved forward for SWGDE vote to release as a Draft for Public Comment.
1.0 DRAFT	3/1/2024	Formatted for posting after SWGDE membership voted to release as a Draft for Public Comment.
1.0	5/16/2024	No public comments received. Moved forward for SWGDE membership vote to release as a Final Approved Document.
1.0	8/2/2024	SWGDE voted to approve as a Final Approved Document. Formatted for release as a Final Approved Document.