A. Purpose:

1. To determine the dimensions of the class characteristics observed on the surface of a fired bullet, more specifically, the widths of the land impressions and groove impressions. These measurements will aid the examiner during the identification or elimination of a suspect firearm. If no firearm is submitted, these measurements will be used to determine the General Rifling Characteristics of the firearm involved. The widths of the land and groove impressions on a bullet can be determined with the measurement tool module on the Leica® comparison microscope.

B. Responsibility:

1. It is the examiner's responsibility to be proficient with the Leica® digital imaging software when using the Leica® comparison microscope.

C. Safety:

1. The examiner will consider the use of gloves, and other types of personal protective devices, when examining bullets that have potentially come into contact with bio-hazardous materials.

D. Procedure:

1. The Leica® comparison microscopes, adapted with digital cameras and software, are used for the macroscopic measurement of bullets.
2. Mount the bullet on the microscope stage.
3. Adjust the microscope to bring the bullet into focus with the optimum lighting value.
4. Land and groove impression dimensions can be captured in one of two ways: live image or by photograph.

To Measure By Live Image:

a. Click the "Measure" tab.

To Measure by Photograph:

a. Capture an image of the bullet by clicking on the "Acquire" button.

b. Click the "Distance Line Tool."

b. Once the image has been captured and saved, information about the bullet examined can be merged onto the image in the form of annotations.

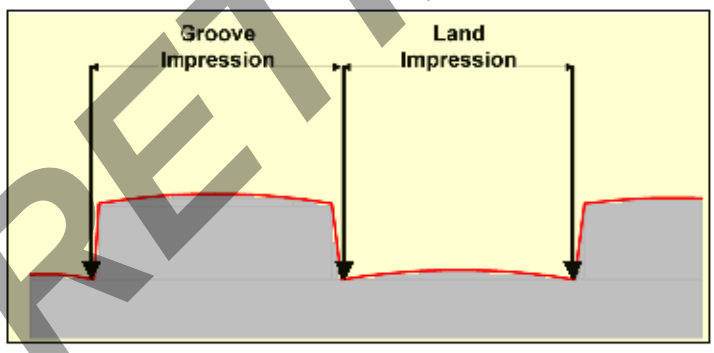
c. Measure the dimensions of the land or groove impression from shoulder to shoulder (see diagram below).

c. Use the Leica® digital imaging software extended annotation measurement tool to measure the land and groove areas of the bullet.

d. Record data in case notes.

e. Measure the dimensions of the land or groove impression from shoulder to shoulder (see diagram below).

f. Merge the measurement annotations onto the image of the bullet.



Above Example of Areas of Measurement for Land and Groove of Bullet

E. Interpretation of Results:

1. Insert the land and groove dimensions, as well as the other measured class characteristics of the bullet, into the general rifling characteristics file to determine the type and caliber of the firearm from which it may have been fired.

F. References:

1. AFTE procedures manual
2. AFTE glossary
3. Laboratory safety manual
4. Leica® Application Suite software V3.5.0
5. FBI General Rifling Characteristic File
6. RDS General Rifling Characteristic File, Vol. 10.3 JS Doyle, FirearmsID.com

G. Appropriate Appendices:

1. Appendix 1 -- Worksheets