

FILM THICKNESS MEASUREMENT FOR ANODIZED ALUMINUM**Application**

This method describes the use of the light section microscope for the non-destructive measurement of anodised aluminum film thickness.

Apparatus and Materials Required**Zeiss Light Section Microscope**

This instrument has its design based upon the light section principle, and has been found to be adaptable to the measurement of thin film thicknesses of any transparent coating over both magnetic and non-magnetic surfaces.

The basic light section microscope unit (see drawing) consists of the following major components:

A microscope with built-in illumination device, built-in measuring eyepiece and two pairs of objectives for 200X and 400X total magnification respectively.

A Stand with Stage Plate**Mechanical Stage**

With Vee blocks for positioning relatively small test samples.

Flat Glass Reference Surface

A flat glass reference surface is required for proper alignment of the slit image. Dimensions approx 50 x 50 mm and a minimum thickness of 0.8 mm.

Sample Holder

A clamping device (or equivalent) compatible with the size and shape of the samples to be tested, which will facilitate positioning the test sample so that the test area is very nearly normal to the axis of the microscope.

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

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Procedure

A. Instrument Set-up

1. Place the instrument on a flat and relatively vibration-free surface.
2. Switch the power supply unit on by setting the knob provided to any mark between 1 and 8 on the graduated disc. This setting may later be changed to obtain a desired level of illumination.

B. Initial Focus and Alignment

1. Focus the cross lines, visible through the eyepiece, as outlined in the instrument manual (supplied by the manufacturer).
2. Place the flat glass reference surface on the stage plate. The surface of this glass piece must be thoroughly clean (free of fingerprints, grease film, etc.).
3. Looking into the eyepiece, lower the microscope body by turning the vertical drive knob slowly, to obtain a well focused light band.
4. This light band must be parallel to the horizontal portion of the cross-lines. If it is not parallel, it must be aligned accordingly by means of the knob provided, as outlined in the instrument manual. Once this light band has been properly aligned, the aligning knob should not be touched in the course of instrument operation.
5. By means of the vertical drive knob elevate the microscope body to a safe clearing distance between objectives and stage plate.
6. Remove the glass reference surface from the stage plate.

C. Selecting the Objectives

1. Select the 400X total magnification pair of objectives. At this level of magnification each division on the measuring drum is equivalent to 0.5 microns. Anodic film thicknesses up to 200 microns are easily measured at this magnification level. For measurements of thicker films, the 200X total magnification pair of objectives are used, in which case each division on the measuring drum will be equivalent to 1.0 microns.

D. Coating Thickness Measurement

1. Clean the surface of the test sample thoroughly free of fingerprints, grease film, etc.
2. Place the test sample directly below the microscope objectives. A relatively small sample may be placed on the stage plate. For measurements on larger samples, the microscope body can be swiveled through 180 deg about its vertical axis.