

Coating Thickness Measurement on Polymeric Substrates Using Microtome Sample Preparation and Transmitted Light Optical Measurements

Application

This test method is used to determine the coating layer thickness on polymeric substrates. Individual layers of multilayer systems can be measured and photographed.

Apparatus and Materials Required

Microtome, capable of producing slices with thickness of 10μ or less

Transmitted Light Optical Microscope, with magnification minimum 400x and image capture software

Glass slides and cover glass, standard microscope sample preparation

Immersion oil

Tweezers

Scissors or Scalpel

Test Panel Properties

The location of the layer thickness measurement on the part should be selected so that the location is representative of the part or section of the part. If required, additional locations should be identified and measured which show minimum and maximum layer thicknesses.

Conditioning and Test Conditions

For best results, samples should be tested at least 72 hours after production or painting. Samples are to be stored a minimum of 24 hours in 23 °C and 50% relative humidity before testing. Materials which absorb water, such as polyamide 6, may require slightly different conditioning.



Figure 1: Tools for preparing microtome samples

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Test Procedure

1.) Preparation of Cross Sections

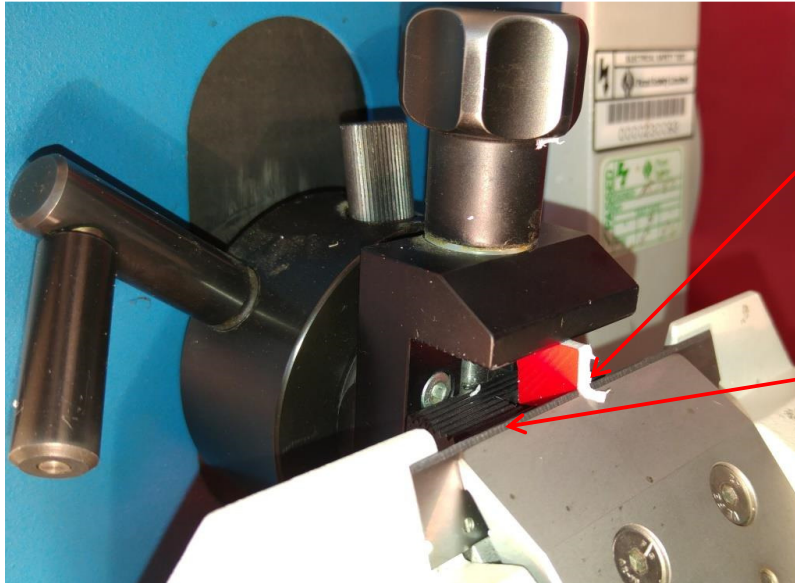


Figure 2. Sample shown clamped in the microtome sample holder.

Microtome blade

- The coated sample should be mounted onto the microtome sample holder such that the resulting cross-section slice is as close as possible to 90° to the coating surface (See Figures 2 and 3)

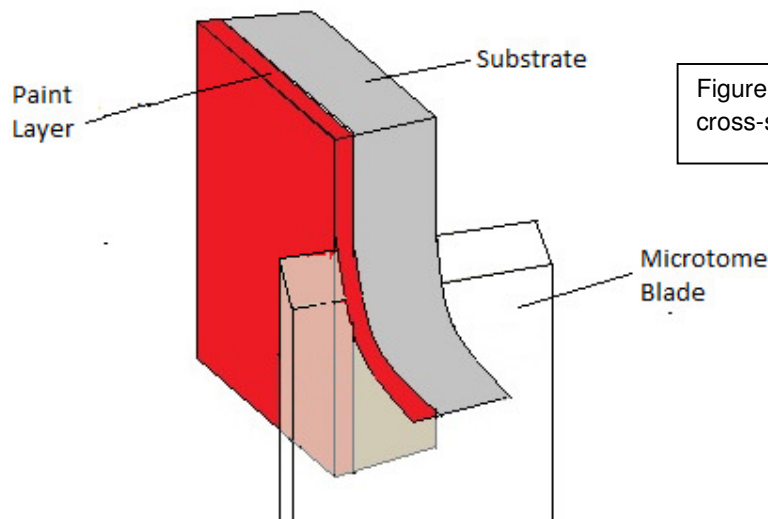


Figure 3: Schematic of cutting of cross-section slice

- Slices are cut with the microtome blade. It is generally necessary to cut numerous slices until obtaining an optimal slice. Thinner slices are easier to evaluate with the microscope, but more difficult to cut. Approximately 10μ thickness is recommended as starting point, but depending on material and color other thicknesses may be more suitable.
- The resulting slice should be flat or can be made flat by applying slight force. Handling of the slices is best done using tweezers.
- All wrinkles, deformed, torn or raised material, etc. should be removed with a scalpel or scissor