

MICROSCOPIC PROCEDURE FOR DETERMINING WEATHERSTRIP COATING THICKNESS

Application

This procedure is used to determine the coating layer thickness of exterior weatherstrips using an optical microscope.

Apparatus and Materials Required

Single Edge Utility Knife Blade,



Self-Healing Cutting Mat, with grid lines to use for precision cutting of weatherstrip specimens

Digital Microscope, with a minimum magnification capability of 500X and image capture software. Software capable of focus stacking or Z-stack capability is recommended for more accurate measurements.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.

Procedure

- Before beginning any sample preparation, define the areas of interest on the weatherstrip with the customer. This should include areas along the length of the weatherstrip as an entire part as well as areas along the weatherstrip profile. Figure 1 provides examples of typical weatherstrip profiles.

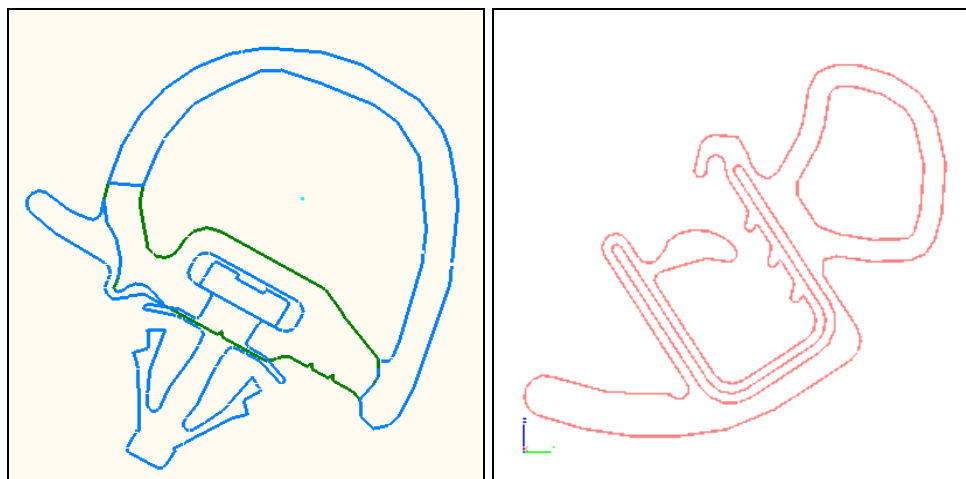


Figure 1: Example profiles of a primary (left) and secondary (right) weatherstrip

Date	Action	Revisions	Rev. 1
2016 11 07	Editorial	Clarified the type of microscope and the number of measurements required in evaluation section 2iii.	K. Waugh, G. Eaton, NA
2016 08 09	Released		K. Waugh, G. Eaton, NA

2. Before cutting any specimens, make sure that all metal is removed from the weatherstrip in the areas of interest.
3. Section the weatherstrip in the area(s) of interest along its length. One to two inch sections should be removed to ensure enough area is available for further sectioning. Use proper labelling to document location of the sections (photos may be required).
4. From each sectioned piece, cut two specimens from each profile location of interest and properly label or bag the specimens. Final specimen dimensions should be approximately 5 mm in length and 1 mm in height (specimen thickness will be weatherstrip-dependent).

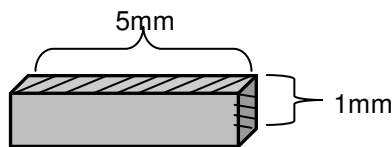


Diagram of desired specimen (lines indicate cut edges)

5. Specimens should be cut using a sharp blade on a cutting mat with a grid to ensure parallel cuts. Place the blade on the surface of the weatherstrip and push straight down to perform the cut. Avoid using a back and forth slicing motion as this tends to produce uneven cuts. The final specimen should be able to stand freely under a microscope on one of the cut edges and not exhibit significant curvature or tilt. The second specimen should be at least 1 mm away from the first specimen. Blades used for cutting specimens should be cleaned with alcohol prior to use. Utility knife blades should be frequently replaced to ensure a sharp edge for cutting.
6. Place the specimen underneath the microscope so that the cut edge on the long side faces the lens. Inspect the specimen and verify that it is sitting flat without significant leaning or curving.
7. Using low magnification, move the outside edge of the weatherstrip into view and focus. The coated edge should be positioned horizontally and near the center of the microscope view.
8. Magnify the image to the appropriate magnification and focus the image. The magnification required to see the coating will depend on the thickness and consistency of the coating. Typical magnifications used will range from 200 – 500X. (Note: This step will vary depending on the microscope and imaging software being used. If available, use a Z-stack feature to produce the final image of the coating. This focus stacking technique produces an image with a greater depth of field that can be more accurately measured.)
9. Confirm that a scale bar is included on the images produced.

Evaluation

1. *Determining the presence of weatherstrip coating:*

Before performing any measurements, the presence of coating must be confirmed. Figure 2 provides an example of a weatherstrip specimen known to have coating on the surface and Figure 3 provides an example of a weatherstrip known to *not* have a coating on the surface.