

Quick-Start Instructions

Strainoptics VRP-100 Polarimeter

for Measuring Near-Edge Tension in Ceramic Frit Areas of Annealed Automotive Glass (Reflective Mode)

Note: These instructions are not meant to replace the full Strainoptics VRP-100 instruction manual supplied with your polarimeter. If you are not yet familiar with the initial setup, general operation, and maintenance requirements of your instrument, or if questions arise, please refer to the complete manual for further details. Before proceeding, we recommend that you become familiar with the names of the various instrument components as shown in the illustration below.

1. Turn off unnecessary room lights, and eliminate any source of reflected light onto the surface of the glass. Clean the glass with a commercial glass cleaner to ensure that it is free of dirt, dust, or fingerprints.

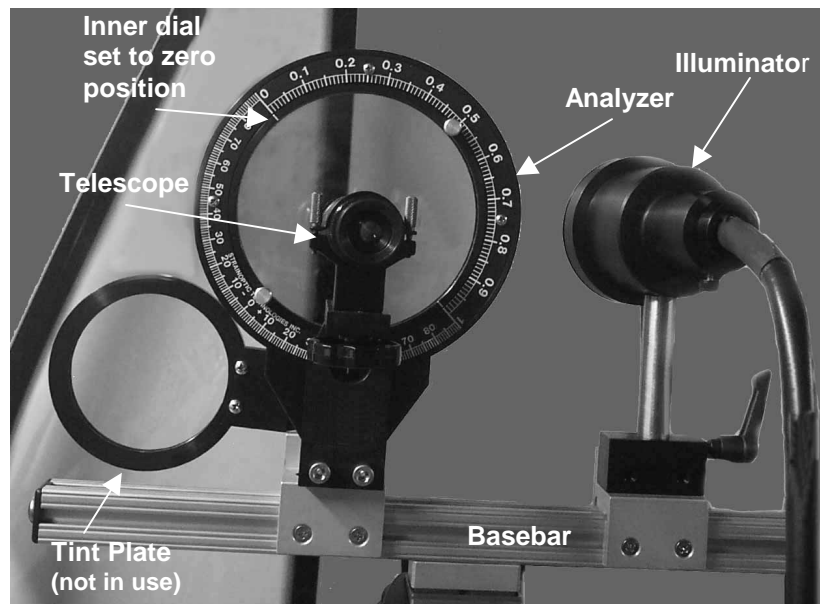


Figure 1. Typical setup for measurement in reflective mode.

2. After setting up the instrument on the tripod as described in the full instruction manual, align the basebar perpendicular to the edge of the sample at the point of interest (POI). Position the rotating analyzer dial as shown in Figure 1.
3. Rotate the sample so that the reference mark on the analyzer (Figure 2) is parallel to the nearest edge of the glass.

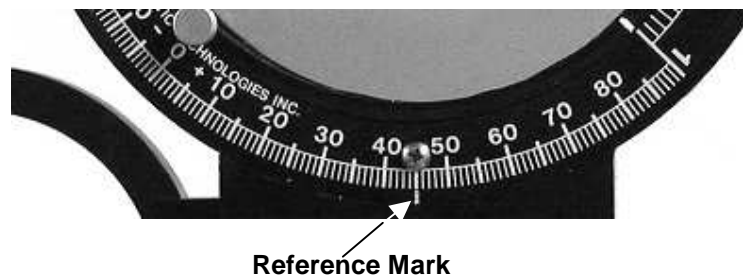


Figure 2. Bottom of analyzer dial showing reference mark for sample orientation.

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4. Turn on the illuminator. Direct the light from the illuminator to the area of interest. Adjust the focus of the light by positioning the fiberoptic cable in the illuminator so that the circle is as small as possible at the area of interest.
5. Observe the location of a black fringe near the Point of Interest (POI). It should look similar to Figure 3 below. NOTE: When using the tint plate, the black fringe will appear as a blue-red interface.)



Figure 3. Black fringe as observed through analyzer.

6. The “retardation” at the center of the black fringe (or blue-red fringe if using the tint plate) is close to zero. This so-called “zero-order” fringe separates the compressive and tensile regions of the glass.
 - a. Rotate the analyzer clockwise. The zero-order fringe will move toward the POI, first becoming dark and then lighter. When the center of the fringe passes over the POI, read the number, r , (0.0 to 1.0) on the analyzer scale. Multiply this number by 565 nm (the standard wavelength when measuring glass using white light) to arrive at a measured retardation value, R .

Example: $R = .2 \times 565 \text{ nm} = 113 \text{ nm}$

- b. Calculate the average stress using the following equation:

$$\text{Stress}_{\text{MPa}} = \frac{R_{\text{nm}}}{2t_{\text{mm}} * C_{\text{Brewster}}}$$

Where:

R = Retardation, nm

t = Thickness, mm (multiplied by 2 for reflection mode)

C = Stress-Optic Constant, Brewsters (2.65 for soda-lime float glass)

Example: $\text{Stress}_{\text{MPa}} = \frac{113_{\text{nm}}}{2 * 4_{\text{mm}} * 2.65_{\text{Brewster}}} = 5.33 \text{ MPa}$ (To convert MPa to psi, multiply result by 145.)