

**DISTORTION IN FLAT MIRRORS****Application**

This procedure is a laboratory test method used to determine the presence of distortion in inside and outside flat mirror blanks and mirror assemblies.

**Apparatus Required****Test Fixture**

With circular test pattern mounted - see Figure 2.

**Camera**

Type 35 mm SLR

**Lens**

Type 35 mm f/2 wide angle - Nikon, Minolta, Cannon or equivalent.

**Optical Comparator**

Micro VU Model H-14, or equivalent.

**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.

**Procedure**

1. Mount the mirror test piece onto the distortion test fixture, see Figure 1.
2. Obtain a sharp, clearly focused image, and photograph the reflected image, see Figure 2. The aperture should be set on the smallest aperture setting ( $f_{22}$  for the Nikon FG). The shutter speed should be set on A for automatic, or P for program depending on the model.
3. Mount the developed negative between two glass plates on the optical comparator to maintain flatness of the negative.

| Date       | Action  | Revisions                                  |
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4. Align the negative on the optical comparator slide table to obtain a clearly focused screen image.
5. Using the innermost circle on the circular test pattern, see Figure 2, as the setup reference, locate and zero out the origin point.
6. Starting with the largest completely contained circle, obtain radius measurements for the eight intersecting points.
7. Calculate the average radius (Rn) by summing the eight individual readings and dividing this total by eight:

$$R_n = \frac{R_1 + R_2 + \dots + R_8}{8}$$

8. Using the minimum (Rmin) and maximum (Rmax) radius values measured on the mirror test piece to calculate distortion (E) as follows:

$$E = \frac{R_n - R_{min}}{R_n} \times 100$$

$$E = \frac{R_{max} - R_n}{R_n} \times 100$$

The larger value of the two distortion (E) values obtained is the distortion value of that circle.

9. Repeat Steps 7 and 8 for each complete circle shown on the negative.
10. Irregular strains (distortion) found on the largest contained concentric scale or any scale within, shall be measured and the percent recorded according to Step 8.
11. The highest percent recorded found on the concentric circles is the distortion amount for the test mirror.
12. Distortion Percentages Allowable.
  - A. Exterior Mirrors +/- 3 %
  - B. Interior Mirrors
    - . Prismatic (non-parallel) +/- 2 %
    - . Sunvisor Vanity Mirror 3 maximum

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.