

NIOSH/TC/S-005

LUMINOUS TRANSMITTANCE AND HAZE TEST PROCEDURES FOR FLEXIBLE  
FITTING GOGGLE LENSES

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## Preface

Mention of company or product names is not to be considered an endorsement by NIOSH. Equivalent equipment may be used.

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## 1. Introduction

This procedure presents the method used by the Testing and Certification Branch (TCB), Appalachian Laboratory for Occupational Safety and Health (ALOSH), National Institute for Occupational Safety and Health (NIOSH) to test a model of flexible fitting goggles with clear lens for haze and luminous transmittance.

## 2. Reference to Test Requirements

The test requirements are taken from ANSI Z87.1-1968, paragraphs 6.3.2.5, 6.3.3.3.3, 6.3.4.4, and 6.3.4.6.

## 3. Equipment Requirements

3.1 Gardner Hazemeter, model UX-10 with Gardner Digital Readout, model PG-5500.

3.2 Haze Standard with a percent haze in the range 3-6%.

3.3 Staticmaster brush

3.4 Cutting shears

3.5 Lens tissue

3.6 Distilled water

## 4. Special Precautions

4.1 Care should be taken to avoid scratching the lens surfaces during handling and washing.

4.2 Notify the laboratory supervisor when a lens fails.

## 5. Calibration Procedure

Calibration of the hazemeter should be checked before and after each series of tests by measuring the percent haze of a known standard in the range 3-6%. When properly calibrated, the hazemeter will be within + 0.2% of the known value.

## 6. Tabulation of Data

6.1 Control Number - The control number identifies the manufacturer, model, and specific sample to be tested.

6.2  $T_1$  is the incident light measured with light trap out of position and without the sample in place.

6.3  $T_2$  is the total light transmitted by the sample measured with light trap out of position and with the sample in place.

6.4  $T_3$  is the light scattered by the hazemeter measured with light trap in position and without the sample in place.

6.5  $T_4$  is the light scattered by the hazemeter and the sample measured with light trap in position and with the sample in place.

6.6  $T$  is percent luminous transmittance of the sample;

$$T = (T_2/T_1) \times 100.$$

6.7  $\bar{H}$  is percent haze of the sample;

$$H = [ T_4/T_2 - T_3/T_1 ] \times 100\%$$

6.8  $\bar{T}$  is percent luminous transmittance of the model which is calculated by averaging the luminous transmittances of the four samples and rounding to the nearest 0.1%.

6.9  $H$  is percent haze of model which is calculated by averaging the haze values of four samples, and rounding to the nearest 0.1%.

## 7. Operating Procedure

### 7.1 Specimen Preparation

7.1.1 The right and left halves from each of two lenses will be tested, making a total of four samples for a given model.

7.1.2 Cut each of the two lenses in half.

To avoid scratching do not rub the lenses when they are dry.

7.1.3 Wash samples with soap and water. Rinse with distilled water. and carefully wipe dry with a soft tissue.

### 7.2 Equipment Preparation

7.2.1 Light source "A" will be used.

7.2.2 Gain setting "3" will be used.

7.2.3 Zero the hazemeter by placing an opaque plate in the sample holder and using the zero adjust wheel. Scale expansion should be on x10. Recheck zero setting after the model has been tested and reset if A change of  $\pm 0.01\%$  is allowable; otherwise, retest.

7.2.4 Set  $T_1 = 100.0$  using the calibrate wheel. For this measurement and all others, the scale expansion should be set on whichever scale setting (X1 or X10) gives more significant figures. Recheck  $T_1$  value after every sample, and reset if necessary. A change of 0.1% is allowable; otherwise, retest.

7.3 Test each sample as follows:

7.3.1 Measure and record  $T_3$ .

7.3.2 Brush the sample with the staticmaster brush and place it in the holder.

7.3.3 Measure and record  $T_4$  and  $T_2$ .

## 8. Analysis of Data

- 8.1 Compute and record T and H for each sample.
- 8.2 Compute and record T and H for the model.
- 8.3 In order for a model to comply with the luminous transmittance requirement, T must not be less than 89.0%.
- 8.4 In order for a model to comply with the haze requirement, H must not be greater than 6.0%.

## 9. Maintenance Instructions

Before each series of tests, clean the contacts on the bulb and socket in the light source and wipe any dust or fingerprints from the glass surface of the bulb.

## 10. Glossary

- 10.1 Sample - the part of a lens cut out for testing purposes.
- 10.2 Specimen - a single, complete pair of goggles.

## 11. References

- 11.1 U.S.A Standard Practice for Occupational and Educational Eye and Face Protection. American National Standards Institute, 1430 Broadway, New York, New York 10018. Standard No. Z87.1-1968. 1968. 32 pages.
- 11.2 Haze and Luminous Transmittance of Transparent Plastics. American Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.  
ASTM Designation: D1003-61T. 1961. 8 pages.

