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National Personal Protective Technology Laboratory
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DETERMINATION OF HAZE AND LUMINOUS TRANSMITTANCE PROPERTIES AND ABRASION RESISTANCE PROPERTIES ON THE PRIMARY LENS SYSTEM MATERIAL FOR FULL FACEPIECE RESPIRATORY PROTECTIVE DEVICES (RPD) STANDARD TEST PROCEDURE (STP)

1. PURPOSE

- 1.1. The purpose of this test is to quantify the haze and luminous transmittance (LT) and abrasion resistance properties of the primary lens system material of a full facepiece RPD.
- 1.2. This procedure incorporates the applicable provisions of American Society for Testing and Materials (ASTM) test methods *ASTM D 1003-00, Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics* and *ASTM D 1044-99, Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion*. This procedure describes the method to test the material that is used in the actual full facepiece RPD with either a primary single visor-type lens or a dual primary eyepiece lens system.
- 1.3. The identified ASTM test methods provide additional detailed procedures used in this STP. Lens material test specimens will not be taken from the facepiece but will be independently provided in specific dimension plaques from the applicant.
- 1.4. The test requirements in this procedure take precedence over the requirements stated in *ASTM D 1003-00* and *ASTM D 1044-99*. However, additional details of specific methods and parameters not provided in this STP are available in *ASTM D 1003-00, Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics* and *ASTM D 1044-99, Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion*. These two test methods must be available to conduct the test.

Approvals:	1 st Level	2 nd Level	3 rd Level
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2. GENERAL

This STP describes the determination of haze and luminous transmittance (LT) properties and abrasion resistance properties on the primary lens system material for full facepiece respiratory protective devices (RPD) test in sufficient detail that a person knowledgeable in the appropriate technical field can conduct the test and determine whether or not the product meets the test requirements.

3. EQUIPMENT.

3.1. Test equipment.

3.1.1. Taber Abrasive Machine or equivalent. Figure 1 illustrates a Taber, Model 5130 with a modified vacuum pickup nozzle (11mm nozzle openings), including the applicable weights and CS-10F (Type IV) abrasive wheels.

3.1.1.1 CS-10F (type IV) abrading wheels are described as brown in color, 'Easy Glide' plastic hub, label including print area for lot code and expiration date, and identified by production lots that begin with the letters: AT, AW, AX, AY, AZ, BA ...

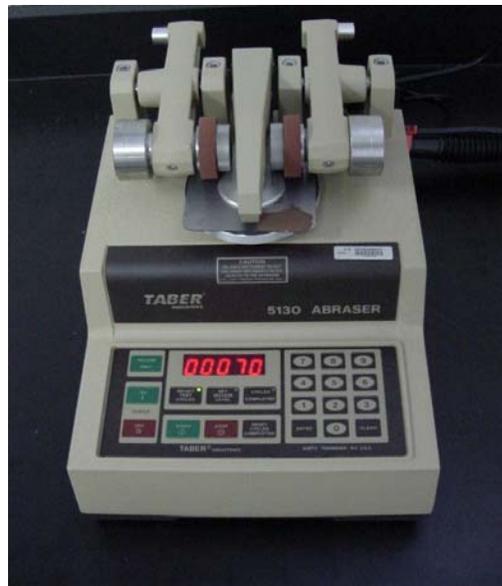


Figure 1. Taber Abrasive Machine.

3.1.2. Haze-gard Hazemeter or equivalent. Figure 2 illustrates a BYK-Gardner, Model HB-4727 and the mounted Taber Abrasion Holder (BYK-Gardner, Model EA-HB-4735).

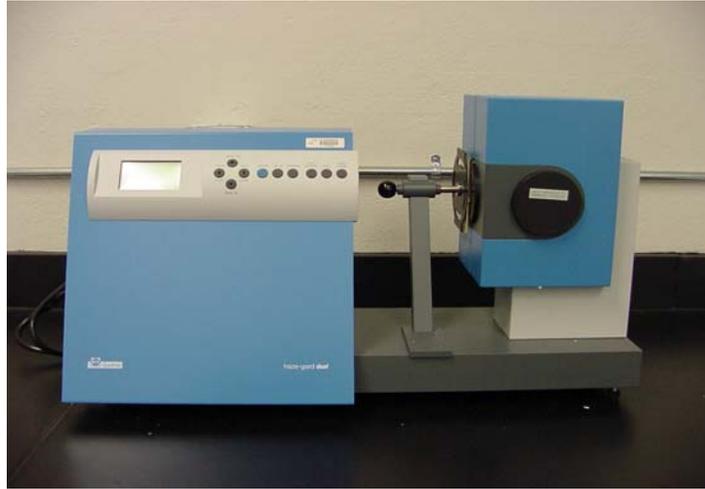


Figure 2. Hazemeter.

- 3.1.3. Taber Abrasion Holder (BYK-Gardner, Model EA-HB-4735). This holder is used exclusively with the BYK-Gardner, Haze-Gard Hazemeter model to stabilize the lens test specimen while obtaining test readings. If an equivalent is found it may be substituted. Figure 3 illustrates the Taber Abrasion Holder from BYK-Gardner (Model EA-HB-4735)

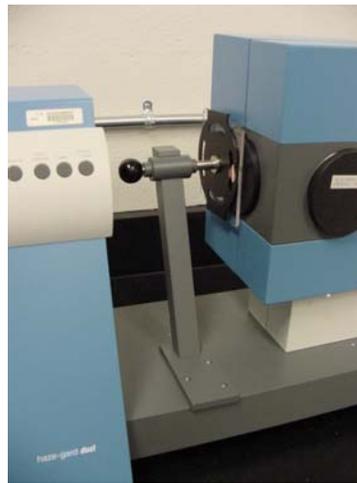


Figure 3. Taber Abrasion Holder.

- 3.1.4. .8 mm (1/32") Gap tester, feeler gauge, gage pin, or equivalent. (photo not available)

- 3.1.5. Velvet cloth or equivalent. Work station must have two pieces of velvet cloth or equivalent to prevent marring or scratching of the test specimen during handling. Cloth material should not add additional abrasion to lens specimens in any manner and should be replaceable as required to prevent surface abrasion. Two separate cloths are recommended: one for the un-abraded specimens and one for the abraded specimens. The abraded specimens will eventually accumulate left over abrasion residue, so frequent inspection is required for replacement.
- 3.1.6. Soft bristle, anti-static brush or equivalent.
- 3.1.7. Laboratory test facility: Laboratory test facility must be capable of achieving, maintaining and verifying the required standard temperature and humidity test conditions. The standard temperature and relative humidity (RH) test conditions are 23 ± 2 °C (73.4 ± 3.6 °F) and $50 \pm 5\%$ RH, respectively, as prescribed by *ASTM D 1003-00* and *ASTM D 1044-99*.

4. TESTING REQUIREMENTS AND CONDITIONS

- 4.1. Prior to beginning any testing, all measuring equipment and instruments to be used must have been calibrated using a method traceable to the National Institute of Standards and Technology (NIST) in accordance with the manufacturer's calibration procedure and schedule.
- 4.2. If the applicant desires for a particular cleaning method to be used to clean the specimens after they are abraded and before obtaining post abrasion LT and haze values, then the applicant shall have provided the cleaning method and any cleaning detergent with the test specimens for it to be used during the test; however, this cleaning method and detergent must be the same as what is recommended in the applicant's RPD User's Instructions. If the applicant does not provide a cleaning method or detergent with the test specimens then the laboratory specialist will use a soft bristle, antistatic brush to lightly brush off any debris adhered to the surface of the test specimen and use an isopropyl alcohol soaked lint free cloth to gently wipe both surfaces of the specimen.
- 4.3. If the applicant's User's Instructions require that an antifogging agent be placed on the exterior side of the lens during normal use, the applicant shall have provided the antifogging agent and applications instructions of the agent with the test specimens. The laboratory specialist shall apply the antifogging agent in accordance application instructions prior to any testing.
- 4.4. Normal laboratory safety practices must be observed. This includes safety precautions described in the current Bruceton Facility's *Laboratory Safety*

Manual, site-specific procedures and test equipment manufacturer recommended practices that are applicable to local health and safety requirements.

4.4.1. Workbenches must be maintained free of clutter and non-essential test equipment.

4.4.2. Safety eyewear is required to be worn during the abrasion test.

4.5. All test specimen preconditioning and test equipment used for prescribed testing shall be in a laboratory test facility maintained at the standard temperature of 23 ± 2 °C (73.4 ± 3.6 °F) and RH at $50 \pm 5\%$. All test specimens shall have been preconditioned for a minimum of 40 hours at the standard temperature and RH test conditions before conducting any testing prescribed in this STP.

5. PROCEDURES.

NOTE: Reference Section 3. of this STP for types of test equipment, model numbers and manufacturers. For calibration purposes, use those described in the manufacturer's operation and maintenance manuals.

5.1 General.

This procedure describes the haze, luminous transmittance and abrasion resistance test for the primary lens system. This procedure describes the required sample size, test equipment, test procedure, data collection methods and the pass/fail criteria for the *Statement of Standard for Chemical, Biological, Radiological and Nuclear (CBRN) Full Facepiece Air-Purifying Respirator (APR)*, 7 March 2003, up to Revision 2; April 4, 2003.

5.2. Test Items/Specimens.

5.2.1. Test items.

Indicate, on test data sheet 1 of 4, the following general pretest incoming inspection information about the specimens:

- NIOSH application number (TN):
- Name of RPD manufacturer :
- Model number of RPD:
- Date tested:
- Condition of the six (6) specimens upon initiation of test:
- Initial observed physical anomalies such as unclear specimens, crushed etc.

5.2.2. Test specimen quantity and configuration.

Six specimens shall be used for haze and luminous transmittance assessment and the abrasion tests. The applicant shall submit three (3) specimens un-abraded and three (3) specimens abraded in accordance with the procedures prescribed by *ASTM D 1044-99*, the NIOSH applicable statement of standard and this STP. The test specimens shall be flat, 4-inch (102 mm) planar squares as prescribed by *ASTM D 1044-99* and this STP. They shall be the same material and have the same nominal thickness and within the tolerance range as the primary lens (viewing area directly in front of the eyes) of the RPD under consideration for certification. The three (3) un-abraded specimens shall first be tested for haze and luminous transmittance properties and then be tested for abrasion resistance. The three (3) abraded test specimens submitted by the applicant are used as abrasion control samples and will only be tested for haze and luminous transmittance if directed by the Respirator Branch Chief. If they are to be tested for haze and LT, they shall be numbered prescribed by the procedures defined in Section 5.2.3.2; otherwise, they shall remain packaged, exteriorly labeled and held for safekeeping.

5.2.3. Individual numbering of test specimens for light transmittance.

NOTE: Avoid any writing or numbering on the area that will become the abrasion track.

5.2.3.1. As received un-abraded: Remove all of the un-abraded test specimens from the packaging and place them on the velvet cloth to prevent marring or scratching while performing the test. Number on the exterior surface of each of the (3) un-abraded specimens in the upper right hand corner with a 1, 2, or a three, respectively. The exterior surface should have been annotated with an "E" by the applicant. If the applicant hasn't annotated the exterior surface, select either side to be the exterior surface by marking an "E" in the upper left hand corner. If applicant hasn't annotated the specimen using the circular clock method, annotate on the exterior surface by the edge of all four sides of each specimen the clockwise method of numbering with 12 at the top, 3 at the right, 6 at the bottom and 9 at the left respectively as illustrated in Figure 6.

¼" Center hole

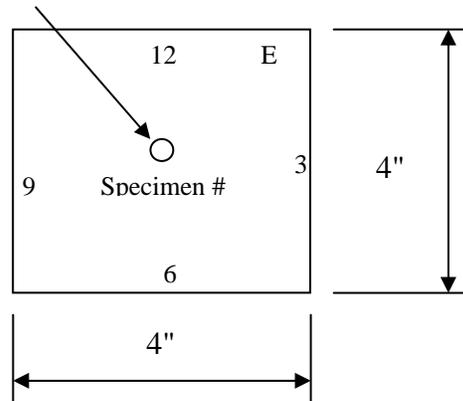


Figure 6. Four (4) reading positions/clock method.

NOTE: Prior to performing the haze and LT testing, all un-abraded lens specimens require a minimum of 40 hours of conditioning at 23 +/- 2 °C (73.4 +/- 3.6 °F) and 50 +/- 5% RH, respectively, as prescribed by *ASTM D 1003-00* and *ASTM D 1044-99*.

- 5.2.3.2. As received abraded: If the abraded specimens are to be tested, per direction of Respirator Branch Chief, they shall be removed from the packaging and placed on the velvet cloth in preparation for numbering. Assign an administration number to the abraded test specimens at the bottom of each specimen with a fine tip indelible pen/marker using a sequence that can be correlated to the NIOSH application number, manufacturer and test specimen number. Individually number the abraded test specimens with an indelible pen using a sequence that can be correlated to the NIOSH application number, manufacturer and test specimen number. For example, the number sequence can be “1-A-AP1”, “2-A-AP1” and “3-A-AP1” The administrative number “1-A-AP1” means test specimen #1, abraded of applicant 1, administrative number “2-A-AP1” meaning test specimen #2, abraded of applicant 1 and administrative number “3-A-AP1” meaning test specimen #3, abraded, of applicant 1. Ensure the “E” is visible and legible on these specimens.

NOTE: Abraded specimens will not be tested for haze and luminous transmittance and abrasion in this procedure unless directed by the Respirator Brach Chief. If directed, procedures

defined in Section 5.3. of this test procedure shall be followed. Immediately after numbering, the abraded test specimens shall be carefully repackaged for safekeeping.

5.3. Perform haze and luminous transmittance tests.

GENERAL: Haze and luminous transmittance (LT) values shall be obtained on three un-abraded test specimens in their original "As Received" condition by using the procedures in this specification and Procedure A in *ASTM D 1003-00*. A hazemeter shall be used to obtain the haze value and LT values. Prior to testing, the hazemeter shall be calibrated in accordance with the manufacturer's calibration instructions located in the hazemeter's instruction manual. Baseline calibration must be conducted prior to certification testing (operate with no sample present to verify reading of 0). If the hazemeter is in continuous use over the normal workday, calibrate it every eight (8) hours or at the beginning of each test sequence for that day. Calibrate the hazemeter with a calibration haze lens and a calibration LT lens that are as close to the haze and LT requirements specified in the statement of standard. Repeat Sections 5.3.1. through 5.3.9. for each un-abraded test specimen. Record the haze value and luminous transmittance value at each location for each specimen on the test data sheet 2 of 4.

- 5.3.1. Place the un-abraded test specimen in the Taber Abrasion Holder that is mounted on the BYK-Gardner Hazemeter with the specimen numbering in the upright position (12 o'clock on top) and facing the light. The first of the four (4) readings taken will be in the 3 o'clock position in reference to the numbering by way of the positioning of the specimen described in Section 5.3.2.1.
- 5.3.2. Depress the blue "Operate" button on the Hazemeter to obtain the first haze and luminous transmittance values in the 3 o'clock position. Record the haze value and luminous transmittance value for the specimen on the test data sheet 2 of 4.
- 5.3.3. With the specimen still in the Taber Abrasion Holder, rotate the specimen 90 degrees counter clockwise to the 6 o'clock position by rotating the Taber Abrasion Holder bar 90 degrees counter clockwise.
- 5.3.4. Depress the blue "Operate" button on the Hazemeter to obtain the second haze and luminous transmittance value in the 6 o'clock position. Record the haze value and luminous transmittance value for the specimen on the test data sheet 2 of 4.
- 5.3.5. With the specimen still in the Taber Abrasion Holder, rotate the specimen another 90 degrees counter clockwise to the 9 o'clock position by rotating

the Taber Abrasion Holder bar 90 degrees counter clockwise.

- 5.3.6. Depress the blue “Operate” button on the Hazemeter to obtain the third haze and luminous transmittance value in the 9 o’clock position. Record the haze value and luminous transmittance value for the specimen on the test data sheet 2 of 4.
- 5.3.7. With the specimen still in the Taber Abrasion Holder, rotate the specimen another 90 degrees counter clockwise to the 12 o’clock position by rotating the Taber Abrasion Holder bar 90 degrees counter clockwise.
- 5.3.8. Depress the blue “Operate” button on the Hazemeter to obtain the forth haze and luminous transmittance value in the 12 o’clock position. Record the haze value and luminous transmittance value for the specimen on the test data sheet 2 of 4.
- 5.3.9. Remove specimen from the holding area on the Taber Abrasion Holder and place it with the numbering face up on the velvet cloth for temporary safekeeping.

5.4. Abrasion Resistance Test Procedures:

5.4.1. Taber Abrasive Machine Set-Up

The Taber Abrasion Machine or equivalent as prescribed by *ASTM D 1044-99* shall be used to perform the abrasion test on the three (3) un-abraded test specimens. The Taber Abrasion Machine set-up requirements not identified in this procedure shall be in accordance with requirements of *ASTM D-1044-99*.

NOTE: Refer to the primary *Statement of Standard* for the RPD being tested: Loads, abrasive wheels and number of revolutions for conduct of the abrasion test may vary per type of RPD in accordance with the particular standard.

5.4.1.1 **LOAD:** A 500-gram standard weight load found in the calibrated weights kit for the abrader will be applied to each of the two arms that hold the abrasive wheel on the Taber Abrasion Machine in accordance with the equipment instructions.

5.4.1.2 **CYCLES:** The test specimens will be abraded for 70 cycles: Preset the Taber Abrasion Machine to perform for 70 cycles in accordance with the equipment instructions.

5.4.1.3 **VACUUM SETTINGS:** These settings are based on the new

modified vacuum pick-up nozzle with 11mm (0.438 in) openings. 1.) Refacing Stone: The vacuum suction setting shall be set to 100%, and the vacuum pick-up nozzle shall be located 1/32 (0.794 mm) - 1/16" (1.588 mm) above the surface of the ST-11 refacing stone. Use the Gap Tester to gauge the correct distance. 2.) Test Specimen: The vacuum suction setting shall be set to 50%, and the vacuum pick-up nozzle shall be located 1/32 (0.794 mm) - 1/16" (1.588 mm) above the surface of the test specimen. Use the Gap Tester to gauge the correct distance.

5.4.2. Refacing Abrasion Wheels Procedure

Before performing the abrasion test on each test specimen, the CS-10F (Type IV) wheels shall be refaced with a ST-11 refacing stone. If a Taber abrasion wheels are not used for the abrasion test, refer to the abrasion wheel manufacturer's resurfacing instructions.

- 5.4.2.1 Mount the wheels on their respective flange holders, taking care not to handle them by their abrasive surfaces.
- 5.4.2.2 Select the load to be used (500 grams on each wheel) and affix it to the abrader.
- 5.4.2.3 Mount an ST-11 refacing stone on the turntable, fine side up, and secure using the nut.
- 5.4.2.4 Lower the vacuum nozzle and adjust its height to within 0.8 to 1.6 mm (1/32 to 1/16 in) of the refacing stone.
- 5.4.2.5 Set the vacuum suction force to 100.
- 5.4.2.6 Lower the arms so the wheels contact the surface of the ST-11 refacing stone.
- 5.4.2.7 Reface the wheels before abrading each specimen for 25 cycles. Do not brush or touch the surface of the wheels after they are refaced.

NOTE: The useful life of the ST-11 Refacing Stone has been defined at 10,000 cycles (approximately 400 refacings of 25 cycles). To monitor usage, the label shown below will be included on the bottom of the container the product is shipped in. It is suggested that for each refacing, one box be checked until all boxes are full. When full, the refacing stone should be discarded and replaced.

- 5.4.3.6. The vacuum suction setting shall be set to 50%, and the vacuum pick-up nozzle shall be located 1/32 (0.794 mm) - 1/16" (1.588 mm) above the surface of the test specimen. Use the Gap Tester to gauge the correct distance.
- 5.4.3.7. Mount the specimen on the specimen holder and subject it to abrasion for 70 cycles.
- 5.4.3.8. After subjecting a test specimen to the abrasion test, remove the residue from the test specimens using a cleaning method recommended by the applicant as stated in the "Reason for Application/Section C.9". Or use a soft bristle, antistatic brush to lightly brush off any debris adhered to the surface of the test specimen and use an isopropyl alcohol soaked lint free cloth to gently wipe both surfaces of the specimen. Place the specimen on the velvet cloth after cleaning for safekeeping.
- 5.4.3.9. Repeat steps 5.4.3.1. and 5.4.3.3. for the remaining two (2) un-abraded specimens.

5.5 Post Abrasion Haze and Luminous Transmittance Test

After abrading the three test specimens, obtain post haze and luminous transmittance values on the specimens. Repeat Sections 5.5.1. through 5.5.9. for each post-abraded test specimen.

- 5.5.1. Place the post-abraded test specimen in the Taber Abrasion Holder that is mounted on the BYK-Gardner Hazemeter with the specimen numbering in the upright position (12 o'clock on top) and facing the light source. The first of the four (4) readings taken shall be in the 3 o'clock position in reference to the numbering by way of the positioning of the specimen described in Section 5.2.3.1.

NOTE: Be sure that specimens numbers are entered consistently as their designated number throughout all three test data sheets (Test Specimen #1 on test data sheet 2 of 4 is Test Specimen #1 on test data sheet 3 of 4 and test data sheet 4 of 4)

- 5.5.2. Depress the blue "Operate" button on the hazemeter to obtain the first haze and luminous transmittance value in the 3 o'clock position. Record the haze value for the test specimen in the 3 o'clock position in the "**Haze (After Abrasion)**" column 3 on test data sheet 3 of 4. Record the luminous transmittance value for the specimen in the 3 o'clock position in

the “**LT (After Abrasion)**” column 4 on test data sheet 4 of 4.

- 5.5.3. With the test specimen still in the Taber Abrasion Holder, rotate the specimen 90 degrees counter clockwise to the 6 o’clock position by rotating the Taber Abrasion Holder bar 90 degrees counter clockwise.
- 5.5.4. Depress the blue “Operate” button on the hazemeter to obtain the second haze and luminous transmittance value in the 6 o’clock position. Record the haze value for the test specimen in the 6 o’clock position in the “**Haze (After Abrasion)**” Column 3 on test data sheet 3 of 4. Record the LT value for the specimen in the 6 o’clock position in the “**LT (After Abrasion)**” column 4 on test data sheet 4 of 4.
- 5.5.5. With the test specimen still in the Taber Abrasion Holder, rotate the specimen another 90 degrees counter clockwise to the 9 o’clock position by rotating the Taber Abrasion Holder bar 90 degrees counter clockwise.
- 5.5.6. Depress the blue “Operate” button on the hazemeter to obtain the third Haze and LT value in the 9 o’clock position. Record the haze value for the test specimen in the 9 o’clock position in the “**Haze (After Abrasion)**” column 3 on test data sheet 3 of 4. Record the LT value for the specimen in the 9 o’clock position in the “**LT (After Abrasion)**” column 4 on test data sheet 4 of 4.
- 5.5.7. With the test specimen still in the Taber Abrasion Holder, rotate the specimen another 90 degrees counter clockwise to the 12 o’clock position by rotating the Taber Abrasion Holder bar 90 degrees counter clockwise.
- 5.5.8. Depress the blue “Operate” button on the hazemeter to obtain the fourth Haze and LT value in the 12 o’clock position. Record the haze value for the test specimen in the 12 o’clock position in the “**Haze (After Abrasion)**” column 3 on test data sheet 3 of 4. Record the LT value for the specimen in the 12 o’clock position in the “**LT (After Abrasion)**” column 4 on test data sheet 4 of 4.
- 5.5.9. Remove the test specimen from the Taber Abrasion Holder and place it on the velvet cloth for temporary safekeeping.
- 5.5.10. At the completion of the test, individually assign an administration number to each un-abraded (As received) test specimens at the bottom of the specimen with a fine tip indelible pen/marker using a sequence that can be correlated to the NIOSH application number, manufacturer and test specimen number. For example, the numbering sequence can be “1U-AP1”, “2-U-AP1” and “3-U-A1”. The administrative number “1U-AP1”

means test specimen # 1, un-abraded of applicant 1, administrative number "2-U-AP1" means test specimen # 2, un-abraded of applicant 1 and administrative number "3-U-A1" means test specimen # 3, un-abraded, of applicant 1. Also, record the administration number of specimen on test data sheet 2 of 4 in Column 1 and on test data sheet 3 of 4 and test data sheet 4 of 4.

- 5.5.11. Upon confirmed completion of the test, ensure all equipment is clean, serviceable, covered and secured. Ensure all lens standards and weights are locked in a securable location and accounted for prior to departing area.

5.6. Data Analysis

- 5.6.1. Calculate the **Overall Average** original haze value and original luminous transmittance value and indicate the values on test data sheet 2 of 4.
- 5.6.2. Calculate the **Overall Average Increase in Haze** on test data sheet 3 of 4 by subtracting the individual original haze value (original obtained from Sheet 2 of 4) at each reading position for all specimens from the individual post abrasion haze (after abrasion) at each respective reading position for all specimens to determine the **Haze Increase** [subtracted Col 4. from Col. 3]. If a negative value is attained in any of the reading positions, it is to be treated as "no change" and a zero value is to be placed in column 5 for that particular reading. Average the 12 "**Haze Increase**" values (Col.5) to determine the **Overall Average Increase in Haze**.
- 5.6.3. Calculate the **Overall Average Decrease in Luminous Transmittance (LT)** on test data sheet 4 of 4 by subtracting the individual post abrasion (after abrasion) Luminous Transmittance (LT) value at each reading position for all specimens from the individual original LT (original value obtained from Sheet 2 of 4) at each respective reading position for all specimens to determine the **LT Decrease** [subtracted Col 4. from Col. 3]. If a negative value is attained in any of the reading positions, it is to be treated as "no change" and a zero value is to be placed in column 5 for that particular reading. Average the 12 "**LT Decrease**" values (Col.5) to determine the **Overall Average Decrease in Luminous Transmittance (LT)**.

6. PASS/FAIL CRITERIA

- 6.1. The criterion for acceptable performance for meeting the Haze requirement on the un-abraded, "As Received" test specimens is as follows:

The **Overall Average Haze Value** shall be 3% or less.

- 6.2. The criterion for acceptable performance for meeting the Luminous Transmittance (LT) requirement on the un-abraded, "As Received" test specimens is as follows:.

The **Overall Average Luminous Transmittance (LT) Value** shall be 88% or greater.

- 6.3. The criteria for acceptable performance for meeting the Abrasion Resistance requirement is as follows:

6.3.1. The **Overall Average Increase in Haze** shall not be greater than 4%.

6.3.2. The **Overall Average Decrease in Luminous Transmittance (LT)** shall not be greater than 4%.

**General Pretest Incoming Inspection Information Data Sheet
(Test Data Sheet 1 of 4)**

- NIOSH application number (TN): _____
- Name of RPD manufacturer: _____
- Model number of RPD: _____
- Date tested: _____
- Condition of packaging upon receipt: _____
- Condition of the six (6) specimens upon receipt: _____
- Initial observed physical anomalies such as unclear specimens, crushed etc. _____

**Haze and Luminous Transmittance for the "Original"
Lens Material for Full Facepiece Respiratory Protective Devices
(Test Data Sheet 2 of 4)**

NIOSH application number: _____; Date of testing: _____

Manufacturer of the RPD: _____

Hazometer Make and S/N: _____

Requirement: **Luminous Transmittance:** The Overall Average Luminous Transmittance (LT) Value shall be 88% or greater.

Haze: The Overall Average Haze Value shall be 3% or less.

Results:

Haze and Luminous Transmittance for the "Original" Lens Material			
Specimen Number	Reading Position	Luminous Transmittance (LT)	Haze
Specimen 1 Admin #	3:00		
	6:00		
	9:00		
	12:00		
Specimen 2 Admin #	3:00		
	6:00		
	9:00		
	12:00		
Specimen 3 Admin #	3:00		
	6:00		
	9:00		
	12:00		
Overall Average Value		LT =	Haze =

PASS FAIL

Comments: _____

Laboratory Specialist Signature:

DATE:

Laboratory Supervisor Signature:

DATE:

**Abrasion Resistance for Full Facepiece Respiratory Protective Devices
(Test Data Sheet 3 of 4)**

NIOSH application number: _____ Dates of testing: _____

Manufacturer of the RPD: _____

Hazometer Make and S/N: _____

Abrasion Machine Make and S/N: _____

NOTE: Subtract the individual original haze value (original obtained from Sheet 2 of 4) at each reading position for all specimens from the individual post abrasion haze (after abrasion) at each respective reading position for all specimens to determine the **Haze Increase** [Subtracted Col 4. from Col. 3]. Average the 12 "**Haze Increase**" values (Col.5) to determine the **Overall Average Increase in Haze**.

Requirement: Abrasion resistance. The **Overall Average Increase in Haze** shall not be greater than 4%.

Abrasion Resistance: Increase in the Overall Average Haze of Lens Material				
Specimen Number	Reading Position	(Col. 3) Haze (After Abrasion)	(Col. 4) Haze (Original from Sheet 2 of 6)	(Col. 5) Haze Increase *
Specimen 1 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Specimen 2 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Specimen 3 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Overall Average Increase in Haze =				

* If a negative value is attained in any of the reading positions, it is to be treated as "no change" and a zero value is to be placed in column 5 for that particular reading.

PASS FAIL

Comments: _____

Laboratory Specialist Signature:

DATE:

Laboratory Supervisor Signature:

DATE:

**Abrasion Resistance for Full Facepiece Respiratory Protective Devices
(Test Data Sheet 4 of 4)**

NIOSH application number: _____; Date of testing: _____

Manufacturer of the RPD: _____

Hazometer Make and S/N: _____

Abrasion Machine Make and S/N: _____

NOTE: Subtract the individual post abrasion (after abrasion) Luminous Transmittance (LT) value at each reading position for all specimens from the individual original LT (original value obtained from Sheet 2 of 4) at each respective reading position for all specimens to determine the **LT Decrease** [Subtracted Col 4. from Col. 3].. Average the 12 "**LT Decrease**" values (Col.5) to determine the **Overall Average Decrease in Luminous Transmittance (LT)**.

Requirement: Abrasion resistance. The **Overall Average Decrease in Luminous Transmittance (LT)** shall not be greater than 4%.

Abrasion Resistance: Decrease in the Overall Average Luminous Transmittance (LT)				
Specimen Number	Reading Position	(Col 3) LT (original from Sheet 2 of 6)	(Col. 4) LT (After Abrasion)	(Col. 5) LT Decrease *
Specimen 1 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Specimen 2 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Specimen 3 Admin #	3:00			
	6:00			
	9:00			
	12:00			
Overall Average Decrease in Luminous Transmittance (LT) =				

* If a negative value is attained in any of the reading positions, it is to be treated as "no change" and a zero value is to be placed in column 5 for that particular reading.

PASS FAIL

Comments: _____

Laboratory Specialist Signature:

DATE:

Laboratory Supervisor Signature:

DATE:

Revision History

Revision	Date	Reason for Revision
0.0	7 March 2002	Historic document
1.0	12 May 2005	Taber Inc. the manufacture of the abrasion equipment initiated several equipment design changes. Modifications to the vacuum pickup nozzles, vacuum gap, abrasion wheel formula and the lens cleaning method as per Taber Inc. required this STP revision.
1.1	24 October 2005	Update header and format to reflect lab move from Morgantown, WV No changes to method