

Performance Requirements for Sealed Beam Motor Vehicle Headlamps

1. Scope

This SAE Recommended Practice is intended as a guide toward standard practice and is subject to change to keep pace with experience and technical advances. This document establishes performance requirements, material requirements, design requirements, and design guidelines for sealed beam headlamps.

1.1 Rationale

Proposed SAE J2595 [Modified Sections of J1383]:

- a. SAE J2595 has been created as a result of rewriting SAE J1383. The intent is to remove all sealed beam information from SAE J1383 and place it in this new SAE J2595 document.
- b. Removed all text, figures and tables from J1383 that apply to sealed beam.
Ref. Text Sections – 3.3, 3.20, 4.4, 5.0, 5.1.2, 5.6, 5.7.5, 5.8, 5.8.1, 5.8.2, 5.8.3, 5.8.4, 5.8.5, 5.12.3, 5.13, 5.13.1, 5.13.2, 5.13.3, 5.14, 5.14.1, 5.14.2, 5.14.3, 6.1.2, 6.7, 6.7.1, 6.7.2, 6.9, 6.14, 6.15, 6.22.3.4, 6.22.3.5, 6.22.3.6, 6.22.3.7, 6.22.8, 6.22.9, 6.22.10, 7.3, 7.4 items c and d, 7.6, 8.0 through 8.4.2.10 [entire section of “Replaceable Bulb Filament Dimensions and Location Tests”].
Ref. Figures – 9, 10, 19, and 33 through 82B.
Ref. Tables – 1 and 2.
- c. Revised numerical order of definitions, identification code designation, tests, performance requirements and guidelines.
- d. Figures 13 through 27 were redrawn for clarity.
- e. Removed Tables 4, 6, 7 and 8 and combined them into one new Table 2.
- f. Removed Table 9 [test classification]. Was redundant and not used.
- g. Removed the 56 x 75mm “J” lamp [Figures 29 and 30] and associated criteria. Not used.
- h. Corrected the 55 x 135 lamp drawings [Figures 31 and 32]. The current drawings depicted do not meet the specifications of the original concept.
- i. Changed the identification whereas the 55 x 135 lamps were referred to as “LK” and “UK”. These lamps were not adopted by NHTSA as sealed beams and therefore were not officially assigned lamp codes.
- j. Maintained the sections pertaining to VHAD in effort to meet the aiming needs of the 55 x 135 lamp.
Ref. Sections 3.19, 5.10, 6.11.3, 6.11.4 and 6.22.6 through 6.22.7.3.3.

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- k. Removed the Luminous Flux Test [5.6] and relocated 5.6.1 and 5.6.2 under the Luminous Flux Maintenance Test [5.7]. Revised the text in 5.7.1, 5.7.2, 5.7.3 and 5.7.4.
- l. Removed the 1G1, 2G1 and 2H1 lamps [Figures 28A and 28B] and associated criteria. These lamps were never introduced into the commercial market.
- m. Added note to Figure 2 [Face of headlamp Assembly] in order to clarify the picture of the inward force test being conducted with a lamp and not a lens.
- n. Re-numbered figures and tables to provide continuity to this new document.
- o. Corrected Humidity Test to clarify test requirements (Section 5.16.8).
- p. Revised Sealed Beam definition to include plastic lens units (Section 3.2).
- q. Included interchangeability requirement for Type E (Figure 22) and Type F (Figure 23) in Sections 6.18.1 and 6.18.2.
- r. Added Seal test (Section 5.18) and Seal Requirements (Section 6.18).

2. References

2.1 Applicable Publications

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J575—Tests for Motor Vehicle Lighting Devices and Components

SAE J576—Plastic Materials for Use in Optical Parts Such as Lenses and Reflectors of Motor Vehicle Lighting Devices

SAE J578—Color Specification

SAE J599—Lighting Inspection Code

SAE J600—Headlamp Testing Machines

SAE J602—Headlamp Aiming Device for Mechanically Aimable Sealed Beam Headlamp Units

SAE J759—Lighting Identification Code

SAE J387—Terminology—Motor Vehicle Lighting

2.1.2 IES PUBLICATION

Available from IESNA, 120 Wall Street, Floor 17, New York, NY 10005-4001, Tel: 212-248-5000, www.iesna.org.

Procedure LM-45—IES Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps, IES Lighting Handbook, Reference Volume

2.1.3 ASTM PUBLICATION

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 471-79—Reference Fuel “D”

2.2 Related Publication

The following publication is provided for information purposes only and is not a required part of this document.

2.2.1 FEDERAL PUBLICATION

Available from the Superintendent of Documents, U. S. Government Printing Office, Mail Stop SSOP, Washington, DC 20402-9320.

49CFR571.108—Lamps, Reflective Devices and Associated Equipment (FMVSS 108)

3. Definitions

3.1 Headlamp

A lighting device providing an upper beam and/or a lower beam designed to provide illumination forward of the vehicle.

3.2 Sealed Beam Headlamp

A lamp unit comprised of a reflector system, a lens system and one or more light sources which has been sealed when manufactured and which can not be dismantled without rendering the unit completely unusable.

3.3 Sealed Beam Headlamp Assembly

A headlamp assembly that includes one or more sealed beam headlamps.

3.4 Mechanically Aimable Headlamp

A headlamp having three pads on the lens, forming an aiming plane or an aiming ring, the aiming plane or aiming ring being used for laboratory photometric testing and for inspecting the aim of the headlamp when installed on the vehicle.

3.5 Aiming Plane

A plane defined by the surface of the three aiming pads on the headlamp lens or by the forward surface of an aiming ring.

3.6 Headlamp Mechanical Axis

The line formed by the intersection of a horizontal and a vertical plane through the light source parallel to the longitudinal axis of the vehicle. If the mechanical axis of the headlamp is not at the geometric center of the lens, then the location will be indicated by the manufacturer on the headlamp.

3.7 Horizontal – Vertical (H-V) Axis

A line from the center of the principal filament (lower beam filament of two filament bulbs) formed by the intersection of the horizontal (H) and vertical (V) planes which intersect the filament and are perpendicular to the test screen (see Figure 1).

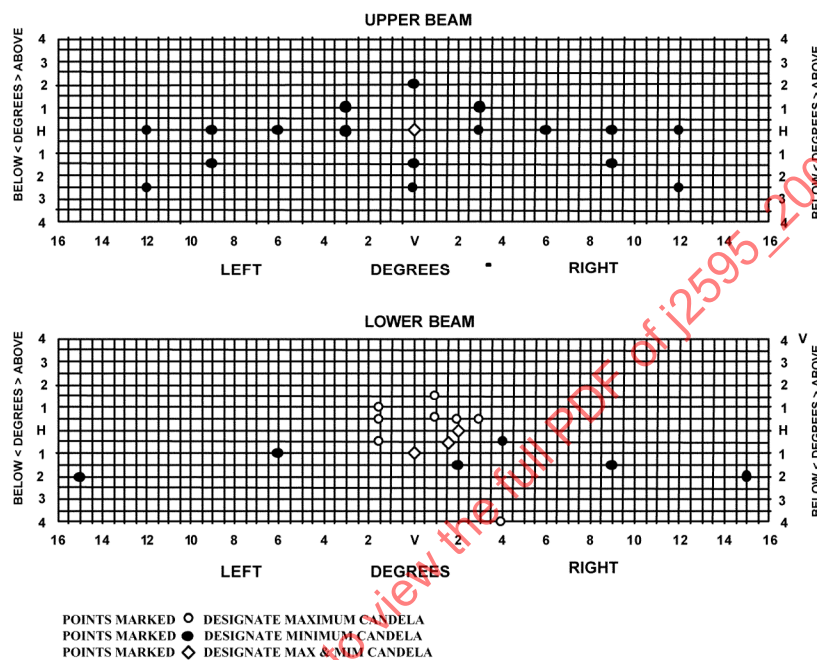


FIGURE 1—PHOTOMETRIC TABLES

3.8 Seasoning

Process of energizing the filament of a bulb at design voltage for a period of time equal to 1% of design life or 10 h maximum, whichever is shorter.

3.9 Design Voltage

The voltage used for design purposes.

3.10 Test Voltage

The specified voltage and tolerance to be used when conducting a test.

3.11 Rated Voltage

The nominal circuit or vehicle electrical system voltage classification. (Example: 12 V headlamp.)

3.12 Headlamp Test Fixture

Device specifically designed to support a headlamp in the test position during laboratory testing. Mounting hardware and components shall be representative of those necessary to operate the headlamp in its normal manner.

3.13 Mounting Ring

The adjustable ring upon which the sealed beam bulb is mounted and which forces the sealed beam bulb to seat against the aiming ring or retaining ring when assembled into a sealed beam headlamp assembly.

3.14 Retaining Ring

The clamping ring that holds the sealed beam bulb against the mounting ring.

3.15 Aiming Ring

The clamping ring that retains the sealed beam bulb against the mounting ring, and that provides an interface between the bulb's aiming/seating pads and the headlamp aimer adapter (locating plate). It also describes and is coincident with the aiming plane.

3.16 Aiming Screws

Screws with self-locking features used for adjusting horizontal and vertical aim and to retain the headlamp unit in the proper position.

3.17 Vehicle Headlamp Aiming Device (VHAD)

An aiming device incorporated in a headlamp system which allows for inspection and adjustment of headlamp aim in both vertical and horizontal axes without the use of aim measuring equipment external to the vehicle.

3.18 Upper Beam

A beam intended primarily for distant illumination and for use when not meeting or following other vehicles.

3.19 Lower Beam

A beam intended to illuminate the road ahead of the vehicle when meeting or following another vehicle.

3.20 Upper Beam Filament

Filament coil designed to provide upper beam function.

3.21 Lower Beam Filament

Filament coil designed to provide lower beam function.

3.22 Filament Rotation

Any non-parallelism of either coil with respect to the centerline of the design nominal filament location or any additional width of the end view of the filament in excess of the outside diameter of the first full turn.

3.23 Rated Average Lab Life

An average life in hours which is obtained by laboratory life testing of bulbs at the specified test voltage over a long period of production time. It is meant to partially describe a manufactured product recognizing that individual lifetimes vary greatly. It is not the same as service life which is generally shorter due to environmental conditions such as vibration, voltage fluctuations, and temperature.

3.24 Design Life

An operational time objective in hours of a headlamp filament at the test voltage.

3.25 Aiming Reference Plane

A plane which is perpendicular to the longitudinal axis of the vehicle and tangent to the forwardmost aiming pad on the headlamp or, where such a plane would intersect the surface of the lens between the aiming pads, a plane which is perpendicular to the longitudinal axis of the vehicle and is located forward of and as close to the lens as possible without causing interference.

4. Identification Code Designation

4.1 SAE J759 Lighting Identification Code

4.2 Headlamp Marking Requirements

Headlamps shall be marked with the following markings:

- a. Manufacturer's name and/or trademark shall appear on the lens.
- b. Voltage and part number or trade number shall appear on the headlamp.
- c. The face of letters, numbers, or other symbols molded on the surface of the lens shall not be raised more than 0.5 mm (0.020 in).

4.3 Headlamp Type Identification Code

- 4.3.1 Headlamp lenses shall be marked with a two or three character code.
- 4.3.2 The marking shall be molded in the lens and shall be 6.35 mm (0.25 in) or greater in size.
- 4.3.3 The first character (a number) of the three-character identification code indicates the number of beams in the headlamp. All headlamps marked with a "1" are aimed on the upper beam and all headlamps marked with a "2" are aimed on the lower beam.

4.3.4 The second character (a letter) stands for the size and number of headlamps used on the vehicle:

- A—100 x 165 mm rectangular, four lamp system
- B—142 x 200 mm rectangular, two lamp system
- C—146 mm round, four lamp system
- D—178 mm round, two lamp system
- E—100 x 165 mm rectangular, two lamp system
- F—92 x 150 mm rectangular, four lamp system
- * —55 x 135 mm rectangular, four lamp system

NOTE—* Unspecified

4.3.5 The third character (a number) indicates the photometric specification that applies to the headlamp. Headlamps designed to Tables 1A and B have "1" as the third character. Headlamps types 2A1 and 2C1 have upper beams which are designed to the specifications for the upper beams of two filament lamps for four lamp systems. The photometry values are dedicated and had the 1A1 or 1C1 lamps as the upper beam principal components.

4.3.6 The lens markings of headlamps designed to UF and LF specifications shall meet the following criteria.

- a. The first character indicates the upper (high) or lower beam function.
- b. The second character indicates the size and number of headlamps used on the vehicle.

4.3.7 HEADLAMP TYPE IDENTIFICATION

See Table 2.

TABLE 1A—PHOTOMETRY LOWER BEAM

Lower Beam	Min.	Max
10U to 90U, 45° R to 45° R		125cd
8L to 8R, H to 4U	64cd	
4L to 4R, H to 2U	125	
1U -- 1½ L to L		700
½ U -- 1½ L to L		1000
½ D -- 1½ L to L		3000
1½ U -- 1R to R		1400
½ U -- 1R, 2R, 3R		2700
½ D -- 1½R	8000	20 000
1D -- 6L	750	
1½ D -- 2R	15 000	
1½ D -- 9L and 9R	750	
2D -- 15L and 15R	700	
4D -- 4R ⁽¹⁾		8000

1. For L lamps 12500 cd Maximum.

TABLE 1B—PHOTOMETRY UPPER BEAM

Upper Beam	Type 1 or U		Type 2A or 2C	
	Min.	Max	Min.	Max
2U -- V	1500 cd		750	
1U -- 3R and 3L	5000		2000	
H -- V	20 000	75 000	7000	15 000
H -- 3R and 3L	10 000		3000	
H -- 6R and 6L	3250		2000	
H -- 9R and 9L	2000		1000	
H -- 12R and 12L	500		750	
1D -- V	5000			
1 ½ D -- V			2000	
1 ½ D -- 9R and 9L ⁽¹⁾	1500		750	
2 ½ D -- V ⁽²⁾	2000		1000	
2 ½ D -- 12R and 12L ⁽²⁾	750		400	
4D -- V		12 500		2500
Maximum Beam Candela ⁽³⁾	30 000			

1. 55 x 135 minimum 1000 cd.

2. Applies to 55 x 135 lower beam.

3. The highest candela reading found in the beam pattern.

4.4 Beam Pattern Location Marking

4.4.1 Headlamps designed to be aimed by fractional balance means shall be marked with the letter "B".

4.4.2 Following the letter designation will be two, two-digit numbers indicating first, the "H-2 degree right," and second, the "V-1 degree down" fractional balance percentage values chosen to represent the design aim of the headlamp.

4.4.3 The two numbers may be separated by a space, dash (-), or slash mark (/), (e.g., B25-35 or B25/35).

4.4.4 Lens marking will be no less than 3 mm in height and imprinted indelibly on the lens.

4.5 Mechanical Axis Mark

If the mechanical axis of the headlamp is not at the geometric center of the lens, then the location shall be indicated by the manufacturer on the headlamp lens. This mark is also recommended for headlamps which are to be optically aimed.

5. Tests

The test procedures and test requirements specified in this document were developed emphasizing extreme conditions in the headlamp environment. Separate headlamps shall be used for each test.

Bulbs—Unless otherwise specified, bulbs used in the tests shall be representative of bulbs in regular production. Testing shall be conducted on lot sizes established by the manufacturer. The manufacturer shall obtain and be able to supply the data.

5.1 SAE J575 Tests for Motor Vehicle Lighting Devices and Components

The following tests are applicable with the modifications as indicated.

5.1.1 VIBRATION TEST

The headlamp shall be seasoned and photometered to the test points in Tables 1A and B before and after the vibration test. The filament shall not be operated during the test. (See 5.1.3)

TABLE 2

Headlamp Type & Ident. Code	Trade Number	Lamps/ System	Size/ mm	Flange Thickness	Ref. Dimensional Specs.	Retaining & Mtg. Ring Dimensions	Des. Watts U.B.	Des. Watts L.B.	Des. Life U.B.	Des. Life L.B.
2C1	4000	2 of 4	146 Dia.	11.7mm	Figure 19	Figure 12	37.5	60	200	320
2C1	4040	2 of 4	146 Dia.	11.7mm	Figure 19	Figure 12	37.5	60	200	320
2C1	H5006	2 of 4	146 Dia.	11.7mm	Figure 19	Figure 12	35	35	200	320
1C1	4001	2 of 4	146 Dia.	11.7mm	Figure 18	Figure 12	37.5	-	200	-
1C1	H4001	2 of 4	146 Dia.	11.7mm	Figure 18	Figure 12	37.5	-	200	-
1C1	5001	2 of 4	146 Dia.	11.7mm	Figure 18	Figure 12	50	-	200	-
1C1	H5001	2 of 4	146 Dia.	11.7mm	Figure 18	Figure 12	50	-	200	-
2D1	6014	2 of 2	178 Dia.	11.7mm	Figure 20	Figure 13	50	50	200	320
2D1	H6014	2 of 2	178 Dia.	11.7mm	Figure 20	Figure 13	60	50	200	320
2D1	6015	2 of 2	178 Dia.	11.7mm	Figure 20	Figure 13	60	50	320	320
2D1	6016	2 of 2	178 Dia.	11.7mm	Figure 20	Figure 13	60	50	300	500
2D1	H6017	2 of 2	178 Dia.	11.7mm	Figure 20	Figure 13	60	35	200	320
1A1	4651	2 of 4	100 x 165	33.9mm	Figure 15	Figure 10	50	-	200	-
1A1	H4651	2 of 4	100 x 165	33.9mm	Figure 15	Figure 10	50	-	200	-
2A1	4652	2 of 4	100 x 165	33.9mm	Figure 16	Figure 10	40	60	200	320
2A1	H4656	2 of 4	100 x 165	33.9mm	Figure 16	Figure 10	35	35	200	320
2A1	H4662	2 of 4	100 x 165	33.9mm	Figure 16	Figure 10	40	45	200	320
2A1	H4739	2 of 4	100 x 165	33.9mm	Figure 16	Figure 10	40	50	500	2000
2B1	6052	2 of 2	142 x 200	10.1mm	Figure 17	Figure 11	65	55	150	320
2B1	H6052	2 of 2	142 x 200	10.1mm	Figure 17	Figure 11	65	55	150	320
2B1	H6054	2 of 2	142 x 200	10.1mm	Figure 17	Figure 11	65	35	150	320
2E1	H4666	2 of 2	100 x 165	33.9mm	Figure 21	Figure 10	65	45	150	320
UF	H4701	2 of 4	92 x 150	9.6mm	Figure 22	Figure	65	-	150	-
LF	H4703	2 of 4	92 x 150	9.6mm	Figure 22	Figure	-	55	-	320
55 x 135 U	H4352	2 of 4	55 x 135	9.6mm	Figure 23	Figure 14	65	-	150	-
55 x 135 L	H4351	2 of 4	55 x 135	9.6mm	Figure 24	Figure 14	-	55	-	500

5.1.2 CORROSION TEST

5.1.2.1 The headlamp shall be seasoned and photometered to the test points in Tables 1A and 1B before and after the corrosion test.

5.1.2.2 The test period shall be 240 h consisting of 10 cycles of 23 h exposure followed by 1 h drying.

5.1.3 PHOTOMETRY

5.1.3.1 Test samples shall be new, unused headlamps manufactured from production tooling and assembled by means of production processes.

5.1.3.2 The headlamp shall be seasoned and photometered at the appropriate test points as listed in Tables 1A and 1B. The headlamp shall be in operation a minimum of 5 min prior to photometry.

5.1.3.3 Photometric tests shall be made with the photometer sensor at a distance of at least 18.3 m from the headlamp.

5.1.3.4 The headlamp shall be aimed mechanically with the aiming plane at the design angle(s) to the photometer axis and the mechanical axis of the headlamp coincident with the photometer axis.

5.1.3.5 *Test Voltage*

The voltage for the photometric test shall be $12.8\text{ V} \pm 20\text{ mV}$, DC as measured at the terminals of the headlamp.

5.2 Color Test

SAE J578 is a part of this report.

5.3 Plastic Materials

SAE J576 is a part of this report except, Luminous Transmittance Test.

5.4 Beam Pattern Location Test

This test applies only to headlamps designed to be aimed by the fractional balance method. (Headlamps do not have VHADs.)

5.4.1 Headlamps designed to be aimed on upper beam shall be seasoned and photometered to find the location of maximum intensity. (See 5.1.3.)

5.4.2 Headlamps designed to be aimed on lower beam shall be seasoned and photometered at the test points H-2R and 1D-V (see 5.1.3). The highest intensity within the beam pattern shall also be measured and recorded.

5.5 Wattage Test

5.5.1 The wattage of each filament shall be determined at $12.8\text{ V} \pm 20\text{ mV DC}$.

5.5.2 Filaments shall be seasoned prior to wattage measurement.

5.6 Luminous Flux Test

5.6.1 Each filament shall be seasoned and photometered at $12.8\text{ V} \pm 20\text{ mV DC}$ to determine luminous flux.

5.6.2 The tests shall be conducted in accordance with IES Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps, IES Lighting Handbook, Reference Volume, Illuminating Engineering Society, New York, NY. Procedure LM-45.

5.7 Luminous Flux Maintenance Test

5.7.1 The luminous flux for each filament shall be determined as follows.

5.7.2 Each filament shall be seasoned and photometered at $12.8\text{ V} \pm 20\text{ mV DC}$ to determine luminous flux.

5.7.3 The tests shall be conducted in accordance with IES Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps, IES Lighting Handbook, Reference Volume, Illuminating Engineering Society, New York, NY. Procedure LM-45.

5.7.4 The bulb shall then be energized in a horizontal or its normal burning position.

5.7.5 The test voltage shall be $14.0\text{ V} \pm 0.1\text{ V DC}$. 5.7.6 The luminous flux of a filament shall be measured after burning for 70% of the design life.

5.8 Impact Test

This test applies to headlamps with plastic lenses or outer covers.

5.8.1 The headlamp shall be rigidly mounted in a test fixture on the seating plane with the lens facing up.

5.8.2 The seating plane of the test fixture shall consist of 13 mm thick oak wood. The test fixture shall rest on an oak wood base.

5.8.3 One impact shall be delivered to the headlamp lens along the mechanical axis using a 23 mm diameter steel sphere (approximately 50 g) dropped freely, without side forces, from a distance of 40 cm above the lens.

5.9 Aiming Adjustment Test for 55 x 135 Lamp

5.9.1 When making the aiming adjustment test, an accurate measurement technique shall be used. This may consist of:

- Attaching a device such as a spot projector to the headlamp or
- Replacing the headlamp with a mirror along with a separate light source or
- Other equally accurate means

5.9.2 When conducting the test, the headlamp shall be mounted in the design position with the unit at nominal aim (0,0).

5.9.3 The vertical aiming screw shall be turned to the upper and lower extremes of its range and the vertical angle between the mechanical and H-V axes shall be measured in each position. Any change in vertical angle throughout the horizontal aim range shall also be recorded.

5.9.4 The horizontal aiming screw shall be turned to the left and right extremes of its range and the horizontal angle between the mechanical and H-V axes shall be measured in each position. Any change in vertical angle throughout the horizontal aim range shall also be recorded.

5.10 Inward Force Test

The headlamp assembly, including the aiming adjusters, shall be subjected to an inward force of 222 N directed normal to the headlamp aiming plane and symmetrically about the center of the headlamp assembly face. (See Figure 2.)

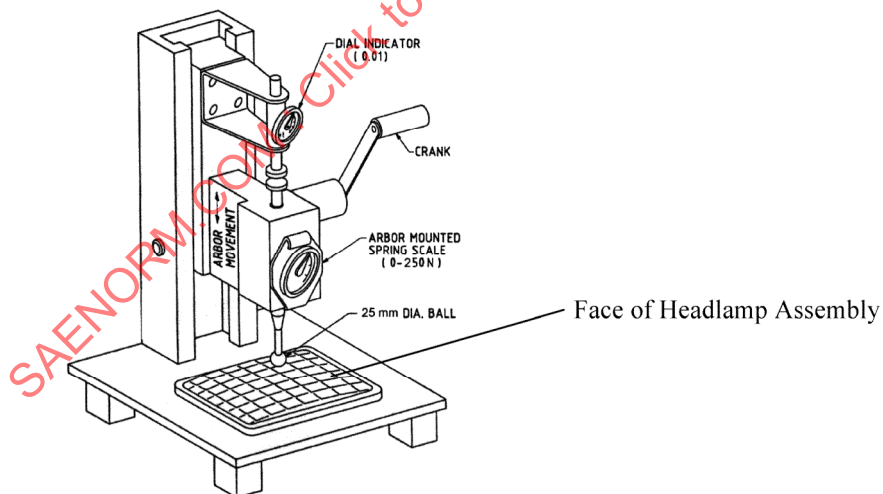


FIGURE 2—INWARD FORCE TESTER

5.11 Torque Deflection Test

Applies to headlamps that do not incorporate on-board headlamp aiming system and are not aimed solely by the fractional balance photometry method.

5.11.1 The headlamp assembly to be tested shall be mounted in design vehicle position and set at nominal aim (0,0).

5.11.2 Sealed beam headlamps shall be replaced by the appropriate deflectometer (Figures 3 to 7).

5.11.3 The torque shall be applied to the headlamp assembly through the deflectometer and a reading on the thumbwheel shall be taken. The torque shall then be removed and a second reading on the thumbwheel shall be taken.

UNIT	A DIM	B DIM
SAE 5.75	144.53	134.62
SAE 7.00	178.31	168.66

DIMENSIONS ARE *mm*

MACHINE MATERIALS:

DISC, ARM AND BRACE-ALUMINUM-*SAE-AA-6061-T6* OR EQUIV
COIL SPRING AND LEVEL CLIP-*SPRING STEEL*
SAE 1050-CADMIUM PLATE

WEIGHT AND EYE BOLT ASSEMBLY-*STEEL-CADMIUM PLATE*

SCREWS-ALUMINUM-MACHINE THREADS

MACHINED DIM ± 0.13 *mm*

SAE 146 AND SAE 178-HEADLAMP TEST FIXTURE

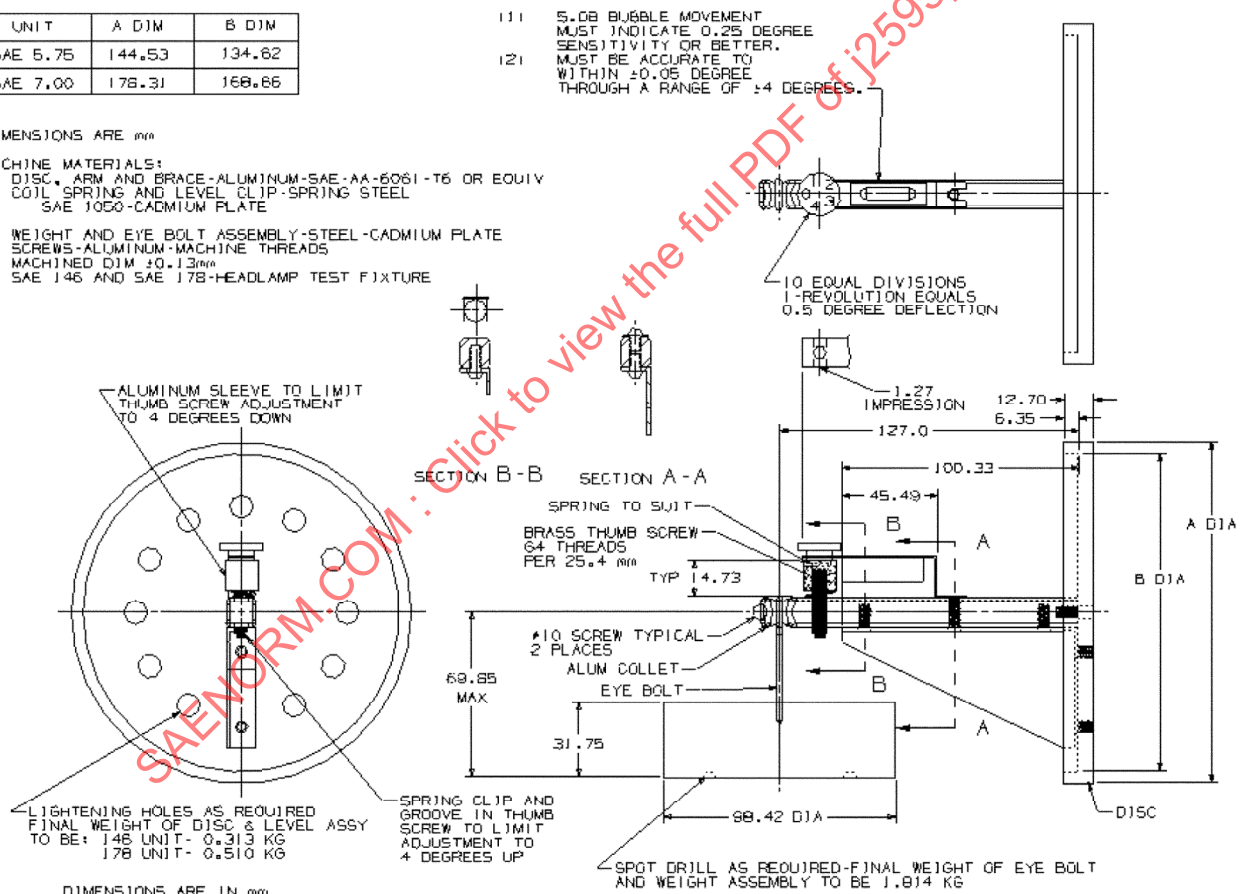


FIGURE 3—DEFLECTOMETER (ROUND UNITS)

SAE HEADLAMP TEST FIXTURE
100 X 165MM

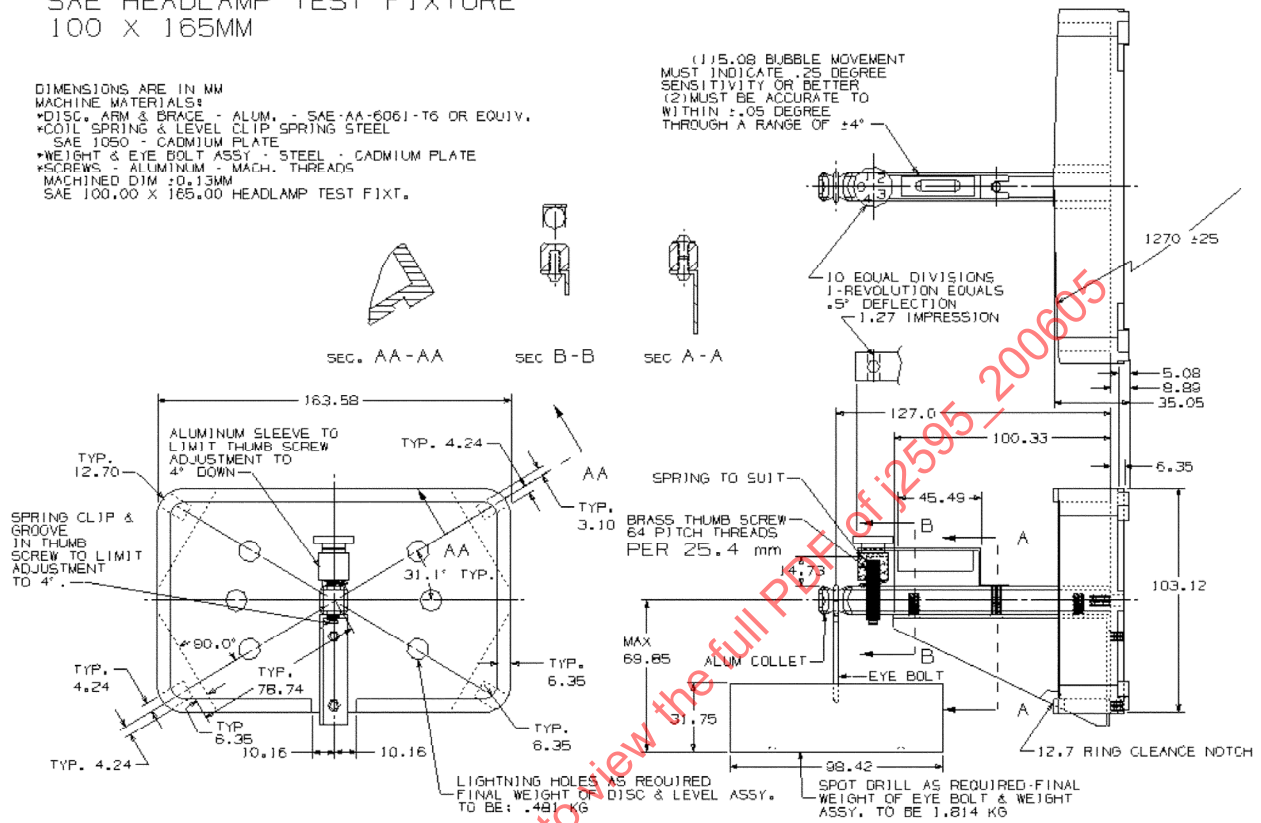


FIGURE 4—DEFLECTOMETER (100 x 165 mm)

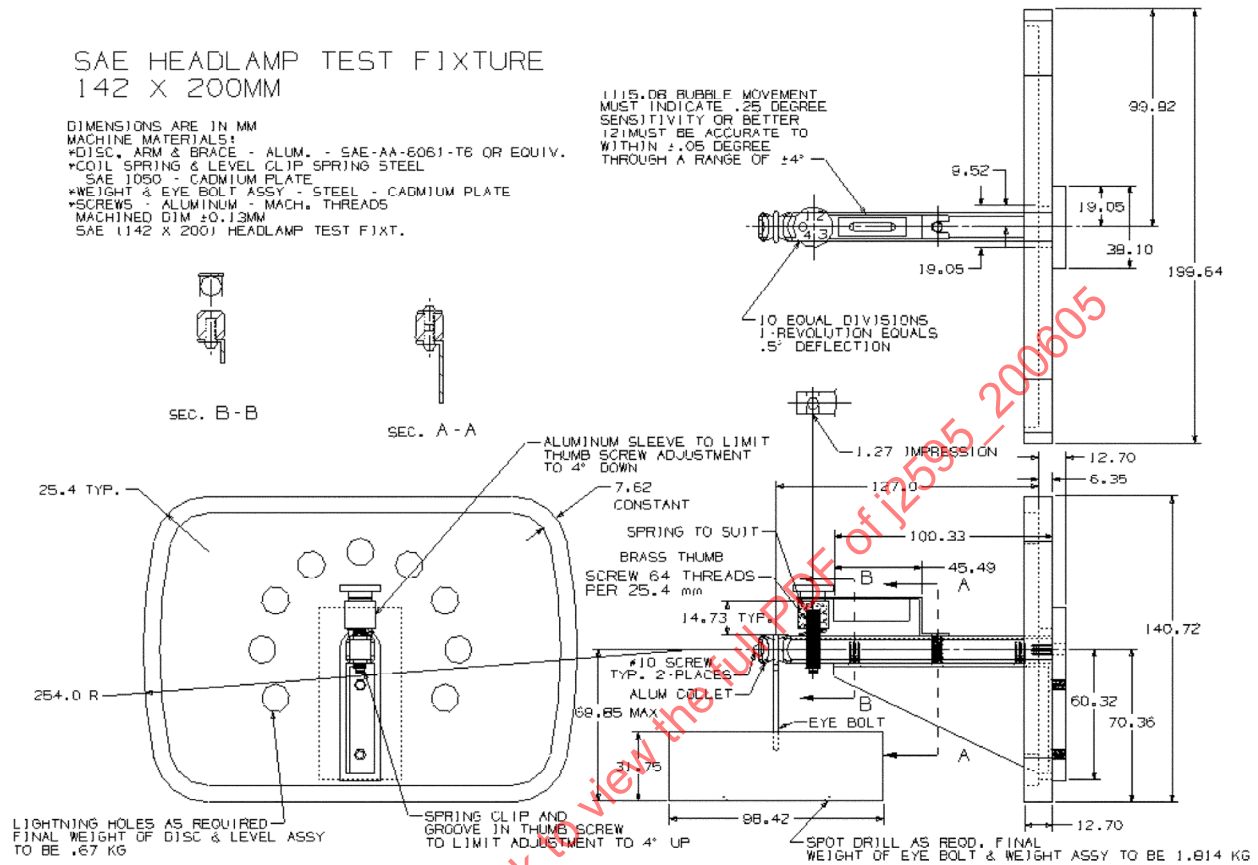


FIGURE 5—DEFLECTOMETER (142 x 200 mm)

HEADLAMP TEST FIXTURE

92 x 150 MM

DIMENSIONS ARE IN MM
MACHINE MATERIALS:
*DISC, WRENCH & CLAMP
ALUM. - SAE-AA-6061-T6 OR EQUIV.
*COIL SPRING & LEVEL CLIP
SPRING STEEL SAE 1050 - CADMIUM PLATE
WEIGHT & EYEBOLT ASM
STEEL - CADMIUM PLATE
*SCREWS - MACHINE THREADS
ALUM. - MACHINED DIMS. 20.12MM

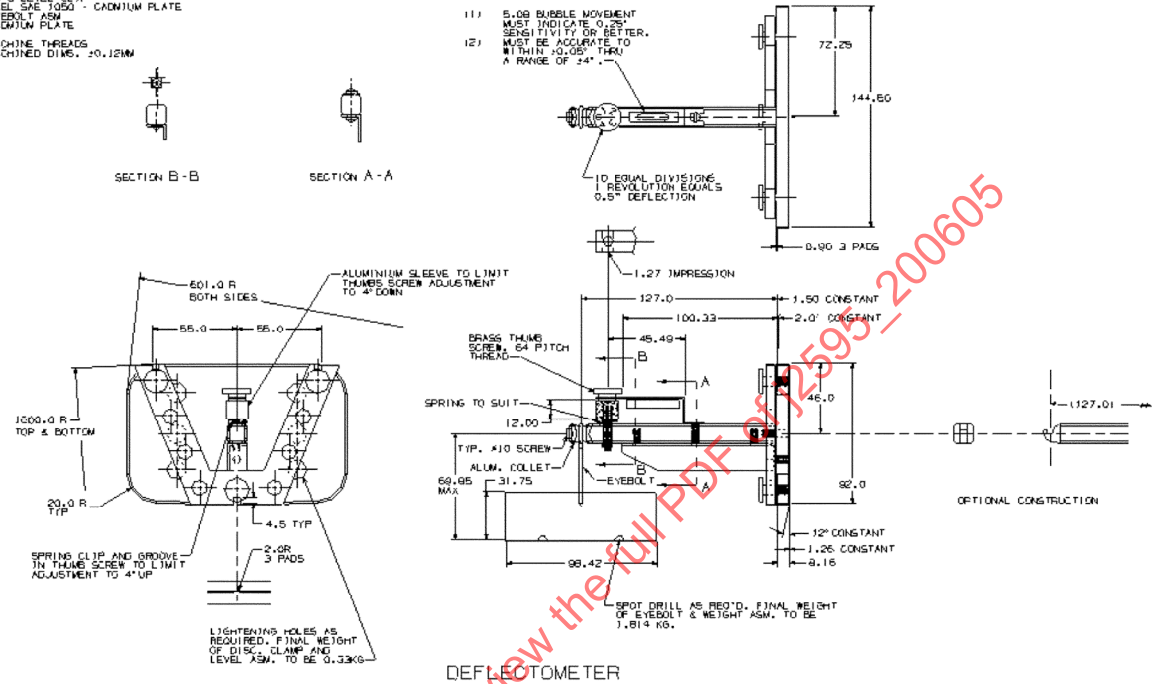


FIGURE 6—DEFLECTOMETER (92 x 150 mm)

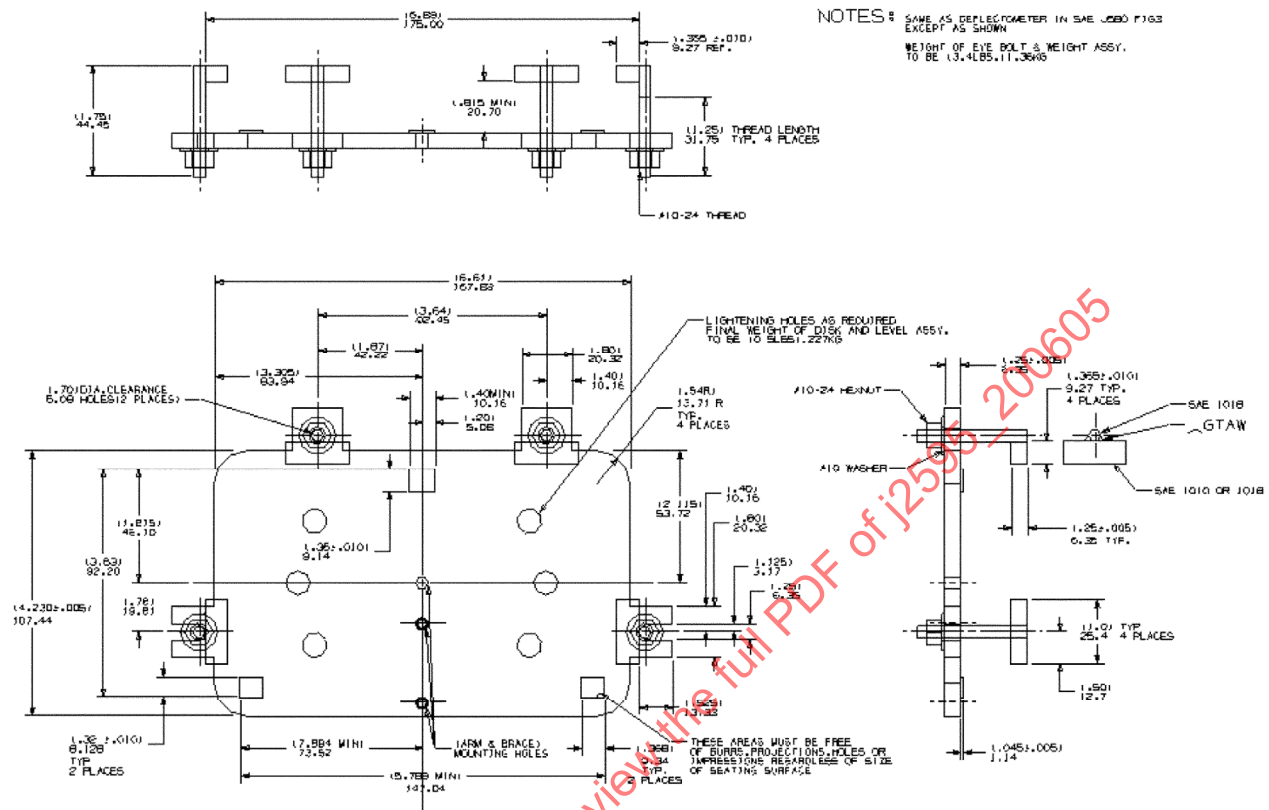


FIGURE 7—DEFLECTOMETER (107 x 175)

5.12 Chemical Resistance Test

This test applies only to headlamps with plastic lenses.

- 5.12.1 The test shall be conducted with the headlamps and the test fluids at an ambient temperature of $23^{\circ}\text{C} \pm 4^{\circ}\text{C}$.
- 5.12.2 The test headlamps shall be seasoned and photometered to the test points in Tables 1A and 1B before and after the chemical resistance test (see 5.1.3).
- 5.12.3 A separate headlamp shall be used for each of the test fluids.
- 5.12.4 The test fluids are:
 - a. Windshield washer fluid (50% concentration by volume of methanol/detergent base, 0.16% ethanolamine)
 - b. Antifreeze (50% concentration by volume of ethylene glycol in water)
 - c. Simulated unleaded gasoline (test fluid ASTM D 471-79 Reference fuel "D")
- 5.12.5 An unfixed headlamp in its design operating position and condition shall be used for the test.

- 5.12.6 A 15 cm square cotton cloth shall be folded twice to form a 7.5 cm square and placed at the bottom of a beaker.
- 5.12.7 Meter 3 mL of the test fluid onto the folded cloth.
- 5.12.8 Remove the cloth from the beaker (5 s after completion of test fluid metering for Reference Fuel "D" and windshield washer fluid, and 60 s after completion of test fluid metering for antifreeze).
- 5.12.9 Within 5 s after removal of the cloth from the beaker, wipe the lens and the top surface of the lenslamp housing joint with that cloth surface which was uppermost in the beaker. The entire exterior optical surface of the lens and top surface of the lens-lamp housing joint of the fixtured headlamp shall be wiped in three horizontal cycles (one cycle consists of one back and forth motion). The first cycle shall apply the test fluid to the upper segment of the lens and the joint, the second cycle shall apply it to the center segment of the lens and the third cycle shall apply it to the lower segment of the lens.
- 5.12.10 After applying the test fluid, the test headlamp shall be set aside for a period of 48 h where upon the headlamp shall be wiped clean with a soft, dry, cotton cloth.

5.13 Abrasion Test of Plastic Headlamp Lens Material

- 5.13.1 A 100 x 165 mm flat test specimen shall be measured for luminous transmittance before and after wiping clean after the abrasion test.
- 5.13.2 The test specimen shall be mounted in the abrasion test machine as indicated in Figure 8.

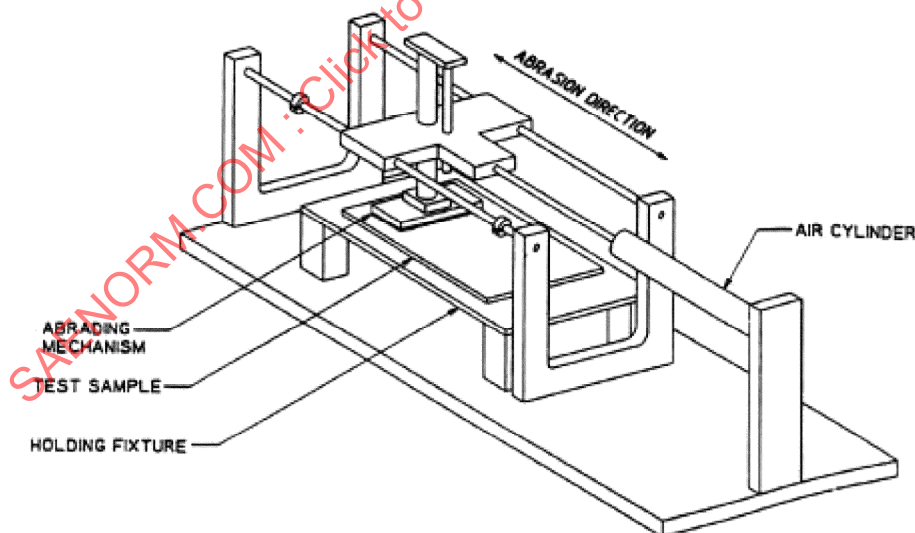


FIGURE 8—ABRASION TEST MACHINE

- 5.13.3 The size of the abrading pad shall be 25 x 100 mm constructed of 0000 steel wool and firmly attached to a pad support of equal size such that the "grain" of the pad is perpendicular to the direction of motion.

- 5.13.4 The abrading pad shall be loaded such that an average pad pressure of $14 \text{ kPa} \pm 1 \text{ kPa}$ exists normal to the surface of the test specimen.
- 5.13.5 The density of the abrading pad shall be such that when the abrading pad mounted to the pad support is resting unloaded on the test specimen, the pad support shall be no closer than 3.1 mm to the surface of the test specimen.
- 5.13.6 An abrasion cycle is one forward stroke $10 \text{ cm} \pm 2 \text{ cm}$ and one rearward stroke of the same distance. The velocity of the abrading pad shall be $10 \text{ cm/s} \pm 2 \text{ cm/s}$.
- 5.13.7 The test specimen shall be subjected to 20 abrasion cycles.

5.14 Thermal Cycle Test

This test applies only to headlamps that have a plastic lens, a plastic reflector, or both.

- 5.14.1 The headlamp shall be seasoned and photometered to the test points in Tables 1A and 1B before and after the thermal cycle test (see 5.1.3).
- 5.14.2 The headlamp shall be rigidly mounted in a test fixture on its seating plane in its design operating condition and design mounting position.
- 5.14.3 The headlamp shall be exposed to the thermal cycle profile shown in Figure 9.

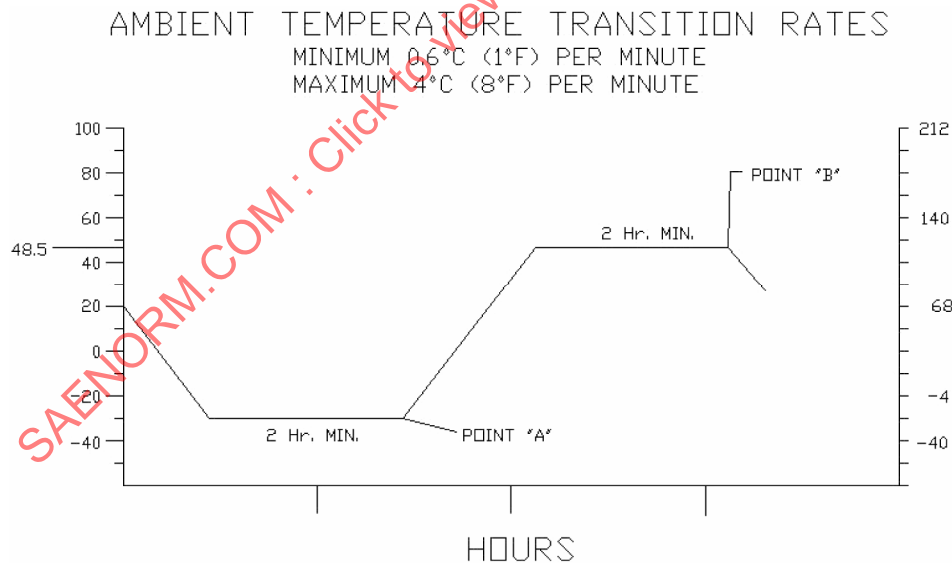


FIGURE 9—THERMAL CYCLE PROFILE

- 5.14.4 Separate or single test chambers may be used to generate the temperature environment described by the thermal cycle.

5.14.5 The headlamp shall be energized at $12.8\text{ V} \pm 20\text{ mV}$, in its highest wattage mode commencing at point "A" of Figure 9 and de-energized at point "B" of each cycle.

5.14.6 The test period shall be 10 cycles of 8 h per cycle.

5.15 Internal Heat Test

5.15.1 The headlamp shall be seasoned and photometered to the test points in Tables 1A and 1B before and after the internal heat test (see 5.1.3).

5.15.2 The headlamp shall be rigidly mounted in a test fixture on its seating plane in its design operating condition and design mounting position.

5.15.3 A dirt mixture, soluble in water, shall be sprayed uniformly on the face of the lens and allowed to dry until the light intensity at H-V is reduced by 50% of its original value.

5.15.4 The headlamp shall be energized in its highest wattage mode and placed in a chamber at $35\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

5.15.5 The test cycle shall be 30 min.

5.15.6 The test voltage for the headlamp shall be $12.8\text{ V} \pm 0.1\text{ V}$.

5.15.7 After the internal heat test, the lens face shall be wiped clean.

5.16 Humidity Test

5.16.1 The headlamp shall be seasoned and photometered to the test points in Tables 1A and 1B before and after the humidity test (see 5.1.3).

5.16.2 The headlamp shall be rigidly mounted in a test fixture on its seating plane, in its design operating condition and design mounting position.

5.16.3 The headlamp shall be placed in a controlled environment of $95\% \pm 5\%$ relative humidity at $38\text{ }^{\circ}\text{C}$.

5.16.4 The headlamp shall be energized in its highest wattage mode for a test cycle of 1 h "on" and 5 h "off".

5.16.5 The test voltage for the headlamp shall be $12.8\text{ V} \pm 0.1\text{ V}$.

5.16.6 Test Duration-24 complete cycles. The test shall end in the "off" cycle mode.

5.16.7 After completion of the 24th test cycle, the humidity shall be reduced in the test chamber to $30\% \pm 10\%$ for 1h. The headlamp shall be turned off during this period.

- 5.16.8 Within 3 min after the completion of the 1 hr. 30% relative humidity soak, the mounted assembly shall be removed, wrapped in a thermal blanket, and placed in an axial air flow chamber. The thermal blanket shall be removed when the assembly is placed in the chamber. The orientation of the assembly with respect to the airflow shall be identical to that of its position on any vehicle for which the headlamp is intended. The assembly shall be positioned in the chamber so that the center of the lens is in the center of the opening of the airflow entry duct during the test. The headlamp shall have at least 76 mm clearance on all sides, and at least 102 mm to the entry and exit ducts at the closest points. If vent tubes are used which extend below the lamp body, the clearance shall be measured from the bottom of the vent tube or its protection. The temperature of the chamber shall be $23 \pm 4/-0$ °C with a relative humidity of $30 \pm 20/-0$ %. The headlamp shall not be energized.
- 5.16.9 Before the test specified previously, the uniformity of the airflow in the empty test chamber at a plane 102 mm downstream of the air entry duct shall have been measured over a 102 mm square grid. The uniformity of airflow at each grid point shall be $\pm 7/-10$ % of the average air flow specified in the following paragraph.
- 5.16.10 The mounted assembly in the chamber shall be exposed for 1 h, to a flow having an average air speed of $1.68 \pm 0/-0.1$ m/s as measured with an air velocity measuring probe having an accuracy of ± 3 % in the 1.68m/s range. The average air speed is the average of the speed recorded at six points around the perimeter of the lens. The six points are determined as follows: Construct a horizontal plane at the center of the lens. The first two points are located in the plane, 25 mm outward from the intersection of the plane and each edge of the lens. Then, the distance between these two points are trisected, creating two new intermediate points. A vertical plane is constructed through each new point, parallel to the longitudinal axis of the vehicle. For each of the two planes, create two points, one 25 mm above the top edge of the lens and one 25 mm below the bottom edge of the lens.
- 5.16.11 After 1 h, the headlamp shall be removed and inspected for moisture. The headlamp shall then be tested immediately for photometrics. The photometric testing of the headlamp shall begin within $10 \text{ min} \pm 1 \text{ min}$ of its removal from the chamber.

5.17 Filament Rated Average Lab Life Test

- 5.17.1 The filament shall be energized at $14 \text{ V} \pm 0.1 \text{ V DC}$ in a horizontal burning position.
- 5.17.2 The filament shall be unenergized 15 min for each 24 h of testing. The off time is not part of the test time of the filament being tested.
- 5.17.3 Each filament shall be tested separately and a different bulb shall be used for each filament.
- 5.17.4 The test may be terminated at 150% of design life.

5.18 Seal Test

- 5.18.1 The unfixtured headlamp shall be Placed in its design mounting position in water at a temperature of 60 ± 3 degrees C (176 ± 5 degrees F) for one hour.

- 5.18.2 The headlamp shall be energized in its highest wattage mode, with the test voltage at 12.8 ± 0.1 V. during immersion.
- 5.18.3 The lamp shall then be de-energized and immediately submerged in its design mounting position into water at $0 +3 -0$ degrees C ($32 +5 -0$ degrees F).
- 5.18.4 The water shall be in a pressurized vessel, and the pressure shall be increased to 10 psi (70 kPa), upon placing the lamp in the water.
- 5.18.5 The lamp shall remain in the pressurized vessel for a period of thirty minutes.
- 5.18.6 Test shall be repeated for four cycles.

6. Performance Requirements

A headlamp, when tested in accordance with the test procedures specified in Section 5, shall meet the following requirements:

6.1 SAE J575, Test Requirements for Motor Vehicle Lighting Devices and Components

6.1.1 VIBRATION REQUIREMENT

- 6.1.1.1 The photometric values measured after the vibration test shall not vary more than $\pm 10\%$ from the values measured before the test.
- 6.1.1.2 There shall be no evidence of loose or broken parts, or intermittent electrical circuit.

6.1.2 CORROSION REQUIREMENT

- 6.1.2.1 The test headlamp shall show no evidence of exterior or internal corrosion or edge corrosion beyond 2 mm (0.08 in) from a sheared or cut edge.
- 6.1.2.2 The headlamp shall show no evidence of surface deterioration, fractures, color bleeding, or deterioration of bonding materials.
- 6.1.2.3 The photometric values measured after the corrosion test shall not vary more than $\pm 10\%$ from the values measured before the test.

6.2 Photometric Performance Requirement

Headlamps designed to meet the specifications of Tables 1A and 1B shall meet the photometric requirements of Table 3.

TABLE 3—HEADLAMP PHOTOMETRIC PERFORMANCE REQUIREMENTS

Test Point ⁽¹⁾	Requirement, cd
LOWER BEAM	
Type 2A1, 2B1, 2C1, 2D1, 2E1, or Equivalent	438 cd max
10 U TO 90U, 45R to 45L	Permissible within 2 degrees conical angle
1/2U, 1-1/2L	1100 max
1/2U, 1 R	3240 max
1/2U, 1-1/2R,	6400 min, 24 000 max
1 D, 6 L	600 min
UPPER BEAM	
Type 1A1 and 1C1, or Equivalent	
2U, V	800 min
H-3R and 3L	9800 min
H-V	16 000 min
2-1/2D – V	1600 min

1. A tolerance of $\pm 1/2$ -degree in location may be allowed at any test point.

6.3 Color Requirement

The color of the emanating light produced by a headlamp shall be white as specified in SAE J578.

6.4 Material Requirements

Headlamps shall meet the material requirements of SAE J576, except Luminous Transmittance, 4.2.1.

6.5 Beam Pattern Location Requirement

6.5.1 HEADLAMPS DESIGNED TO BE AIMED ON UPPER BEAM

The beam pattern is properly oriented to the aiming plane if the location of the maximum beam intensity point does not deviate from the H-V axis more than ± 0.5 degree vertically and ± 0.8 degree horizontally (rectangular box).

6.5.2 HEADLAMPS DESIGNED TO BE AIMED ON LOWER BEAM

The beam pattern is properly oriented to the aiming plane if the fractional values, designated by the manufacturer, are met at H - 2R and 1D - V. These fractional values are designated as percentages of the maximum intensity point in the beam pattern. Unless otherwise designated, the fractional value for H - 2R is 0.20 (20%) and the fractional value for 1D- V is 0.30 (30%).

6.5.2.1 Headlamps designed to be aimed by fractional balance means shall be marked with the letter "B."

6.5.2.2 Following the letter designation will be two, two-digit numbers indicating first, the "2 degree right: and second, the "1 degree down" fractional balance percentage values chosen to represent the design aim of the headlamp.

6.5.2.3 The two numbers may be separated by a space, dash (-), or slash mark (/), (e.g., B25-35 or B25/35).

6.5.2.4 Lens marking will be no less than 3 mm in height and imprinted indelibly on the lens.

6.6 Wattage Requirement

Measured wattage for each filament shall not exceed the design wattage listed in Table 2 by more than 7.5%.

6.7 Maintenance of Luminous Flux Requirement

When tested in accordance with 5.7. For samples from each lot tested, the average luminous flux value for single filament lamps for each filament of two-filament lamps after burning for 70% of design life shall be no less than 90% of the initial average luminous flux value.

6.8 Impact Requirement

The headlamp shall show no evidence of broken, cracked, or chipped pieces of the headlamp, coating adhesion failure, or delamination of material, or visible loosening or breaking apart of headlamp parts.

6.9 Aiming Adjustment Requirement

When tested in accordance with 5.10, the headlamp shall meet the following requirements:

- 6.9.1 For headlamps with individual horizontal and vertical aim adjustments, tested in the laboratory, a minimum aiming adjustment of ± 4.0 degrees shall be provided in the vertical plane and ± 2.5 degrees in the horizontal plane.
- 6.9.2 On headlamp assemblies with independent vertical and horizontal aiming provision, the adjustments shall be such that when tested in the laboratory, neither the vertical nor horizontal aim shall deviate more than 100 mm from horizontal or vertical planes, respectively, at a distance of 7.6 m through an angle of ± 4.0 degrees vertically and ± 2.5 degrees horizontally.
- 6.9.3 On headlamps with a VHAD tested in the laboratory, the headlamp shall be able to indicate variations in vertical aim within a range extending from 1.2 degrees above to at least 1.2 degrees below a longitudinal horizontal plane through the center of the headlamp system.
- 6.9.4 On headlamps with VHAD, photometric tests shall be performed with the vertical aiming system set to its specified design vertical aim, and with the headlamp assembly mounted to the test fixture in the same attitude as its design mounting position in the vehicle.
- 6.9.5 The self-locking devices used to hold aiming screws in position shall continue to operate satisfactorily for a minimum of 20 adjustments on each screw, over a length of screw thread of not less than 3 mm.

NOTE—Paragraphs 6.9.2 and 6.9.3 are not applicable to headlamps with ball and socket or equivalent adjusting means.

6.10 Inward Force Requirements

When subjected to the tests in 5.11, the headlamp shall meet the following requirements:

- a. The headlamp shall not permanently recede by more than 2.5 mm
- b. The aim of the headlamp shall not permanently deviate by more than 32 mm at a distance of 7.6 m

6.11 Torque Deflection Requirement

When subjected to the tests in 5.10, the difference between the two readings shall not exceed 0.30 degree.

6.12 Chemical Resistance Requirement

6.12.1 The exposed headlamp, when compared to an unexposed headlamp, shall not show surface deterioration, delamination, fractures, deterioration of bonding materials, color bleeding, or color pickup as a result of exposure to the test fluids.

6.12.2 The photometric values measured after the chemical resistance test shall not vary more than $\pm 10\%$ from the values measured before the test.

6.13 Abrasion of Plastic Headlamp Lens Material Requirements

The luminous transmittance of the abraded test specimen using CIE Illuminant A (2856D), shall show a maximum of 3% deterioration from the luminous transmittance of the unabraded control sample.

6.14 Thermal Cycle Requirement

6.14.1 The headlamp shall show no evidence of delamination, fractures, seal fractures, deterioration of bonding material, color breeding, warp, or deforming.

6.14.2 The photometric values measured after the temperature cycle test shall not vary by more than $\pm 10\%$ from values measured before the test.

6.15 Internal Heat Requirement

The photometric values measured after the internal heat test shall not vary by more than $\pm 10\%$ from the values measured before the test.

6.16 Humidity Requirement

6.16.1 At the end of the 10 min test period (see 5.17), the headlamp shall be inspected immediately and show no evidence of condensed moisture or droplets inside the headlamp.

6.16.2 The headlamp shall show no evidence of delamination, bonding, material deterioration, or seal failure.

6.16.3 The photometric values measured after the humidity test shall not vary by more than $\pm 10\%$ from the values measured before the test.

6.17 Retaining Ring Requirements

- 6.17.1 Positive means shall be provided for holding the headlamp to the mounting ring.
- 6.17.2 The fastening means shall be capable of holding the headlamp securely in its proper position at the end of 20 replacements.
- 6.17.3 When a headlamp having a flange thickness (see Table 2) is secured between the retaining ring and mounting ring, there shall be no evidence of looseness:

6.18 Seal Requirements

- 6.18.1 The lamp shall be inspected for any signs of water on its interior.
- 6.18.2 During the high temperature portion of the cycles, the lamp shall be observed for signs of air escaping from its interior.
- 6.18.3 If any water occurs on the interior or air escapes, the lamp is not a sealed lamp.

6.19 Design Requirements

6.19.1 DIMENSIONS OF MOUNTING AND RETAINING RINGS

Sealed beam headlamp mounting rings and retaining rings shall meet the dimensions marked "I" in Figures 10, 11, 12 and 13 to assure compatibility with the corresponding types of units. See Table 2. Mounting rings and retaining rings for Type LF and UF rectangular units (Figure 14) and 55 x 135 units (Figure 15) shall meet all the dimensions shown for interchangeability.

6.19.2 DIMENSIONS OF SEALED BEAM HEADLAMPS

Sealed beam headlamps shall meet the dimensions marked "I" in Figures 15, 16, 17, 18, 19 and 20 to assure interchangeability with other sealed beam headlamps of the same type. See Table 2. Type E (Figure 22), Type F (Figure 23), and Type 55 x 135 (Figure 24 and 25), shall meet all dimensions shown for interchangeability.

6.19.3 DIMENSIONS FOR MECHANICAL AIMING OF HEADLAMPS

Headlamps shall meet the following requirements to assure compatibility with mechanical aimers.

- 6.19.3.1 Type 1C1, 2C1, and 2D1 headlamps shall have no raised letters or embossing on the outside surface of the lens between the diameters of 40 and 90 mm about the lens center.
- 6.19.3.2 Type 1A1, 2A1, 2B1, 2E1, UF and LF headlamps shall have no raised letters or embossing on the outside surface of the lens within a diameter of 70 mm about the lens center.
- 6.19.3.3 Aiming pad design may vary but shall meet the limiting dimensions as shown on the figures specified in 6.18.1 and 6.18.2.

6.19.3.4 Each headlamp may be designed to use the nonadjustable Headlamp Aiming Device Locating Plates specified in SAE J602 for the 100 x 165 mm headlamp, the 142 x 200 mm headlamp, the 146 mm diameter headlamp, or the 178 mm diameter headlamp, or the 92 x 150 mm Type F headlamp, and incorporate lens mounted aiming pads as referenced in Figures 21, 22, 23 and 24.

6.19.4 HEADLAMP MOUNTING ASSEMBLY

The headlamp mounting assembly shall meet the requirements of Figures 10 to 14, Dimensions of Sealed Beam Headlamp Mounting.

6.19.5 Headlamps when mounted on a vehicle shall meet the aimer compatibility requirements described in 6.18.6 or shall meet the Vehicle Headlamp Aiming Device (VHAD) requirements described in 6.18.7.

6.19.6 AIMER COMPATIBILITY

Headlamps which do not incorporate VHAD shall be designed and installed so that they may be inspected and aimed by mechanical aimers as specified in SAE J602 without the removal of any ornamental trim rings or other parts.

6.19.7 A Vehicle Headlamp Aim Device (VHAD) shall meet the requirements specified as follows:

6.19.7.1 Aim

The VHAD shall provide for headlamp aim inspection and adjustment in both the vertical and horizontal directions.

6.19.7.2 Vertical Aim

The VHAD shall include the necessary references and scales relative to the horizontal plane to assure correct vertical aim for photometry and aiming purposes. An off-vehicle measurement of the angle of the plane of the ground is permitted. In addition, an equal number of graduations from the "0" position representing angular changes in the axis in the upward and downward directions shall be provided. The "0" position shall be marked "0" and shall be accurate to within ± 0.1 degree.

6.19.7.2.1 Each graduation shall represent a change in the vertical angle not larger than 0.19 degree (25 mm at 6.8 m). Graduations shall provide for variations in aim at least 1.2 degrees above and below the horizontal axis. For each graduation, the angle indicated by the mark or number shall be accurate to within ± 0.1 degree of the actual angle between the mark and the horizontal axis.

6.19.7.2.2 Graduations on the VHAD scale shall be spaced a minimum of 1.27 mm (0.05 in) apart. If a direct reading analog indicator is provided, it shall represent the actual aim movement in a clear, understandable format.

6.19.7.2.3 The graduations shall be legible at a distance of 0.3 m under an illumination of 30 fc maximum, measured at the top of the radiator, by an observer having 20/20 vision (Snellen).

6.19.7.3 Horizontal Aim

The VHAD shall include references and scales relative to the longitudinal axis of the vehicle necessary to assure correct horizontal aim for photometry and aiming purposes. A mark shall be used to indicate alignment of the headlamps relative to the longitudinal axis of the vehicle. The mark shall consist of the symbol '0' and shall be accurate to within ± 0.2 degree. In addition, an equal number of graduations representing equal angular changes in the leftward and rightward directions relative to the vehicle longitudinal axis shall be provided.

- 6.19.7.3.1 Each graduation shall represent a change in the horizontal angle not greater than 0.38 degree to the left and right of the longitudinal axis of the vehicle, and shall have an accuracy relative to the zero mark of equal to or better than 0.1 degree.
- 6.19.7.3.2 The graduations shall be legible at a distance of 0.3 m under an illumination of 30 fc maximum, measured at the top of the radiator, by an observer having 20/20 vision (Snellen).
- 6.19.7.3.3 The horizontal indicator shall perform through a minimum range of 0.76 degrees left and right (101.6 mm at 6.8 m); however, the indicator itself shall be capable of recalibration over an angular range of ± 2.5 degrees relative to the longitudinal axis of the vehicle to accommodate any adjustment necessary for recalibrating the indicator.

7. Guidelines

- 7.1 When in use, a headlamp shall not have any styling ornament or other feature, such as a glass cover or grille, in front of the lens.

7.2 Photometric Design Guidelines

Guidelines for the photometric design of headlamps are shown in Tables 1A and 1B.

7.3 Dimensional Guidelines

Guidelines for dimensions are shown in the following figures:

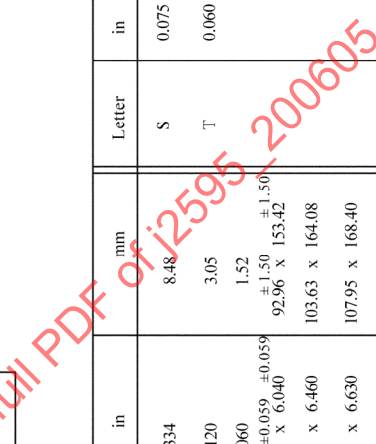
- a. Mounting and Retaining Rings—See Figures 10 to 14.
- b. Sealed Beam Headlamps—See Table 2 and Figures 15 to 25.
 - Figure 16 (20) Type 1A1 headlamp 100 x 165 mm rectangular
 - Figure 17 (21) Type 2A1 headlamp
 - Figure 18 (22) Type 2B1 headlamp 142 x 200 mm rectangular
 - Figure 19 (23) Type 1C1 headlamp 146 mm diameter
 - Figure 20 (24) Type 2C1 headlamp
 - Figure 21 (25) Type 2D1 headlamp 178 mm diameter
 - Figure 22 (26) Type 2E1 headlamp 100 x 165 mm rectangular
 - Figure 23 (27) Type "UF" and "LF" headlamps 92 x 150 mm rectangular
 - Figure 24 (31) Type 55 x 135 "Upper Beam" Rectangular headlamp unit
 - Figure 25 (32) Type 55 x 135 "Lower Beam" Rectangular headlamp unit

7.4 Filament Rated Average Lab Life Guideline

Rated Average Lab Life shall approximate design life. The Design Life for the filament(s) of each lamp type is shown in Table 2.

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OF THE SAE LIGHTING COMMITTEE

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in	mm	Letter	in
334	8.48	S	0.075
20	3.05	T	0.060
660	1.52		
$\pm 0.059 \pm 0.059$	± 1.50		
x 6.040	92.96 x 153.42		
x 6.460	103.63 x 164.08		
x 6.630	107.95 x 168.40		

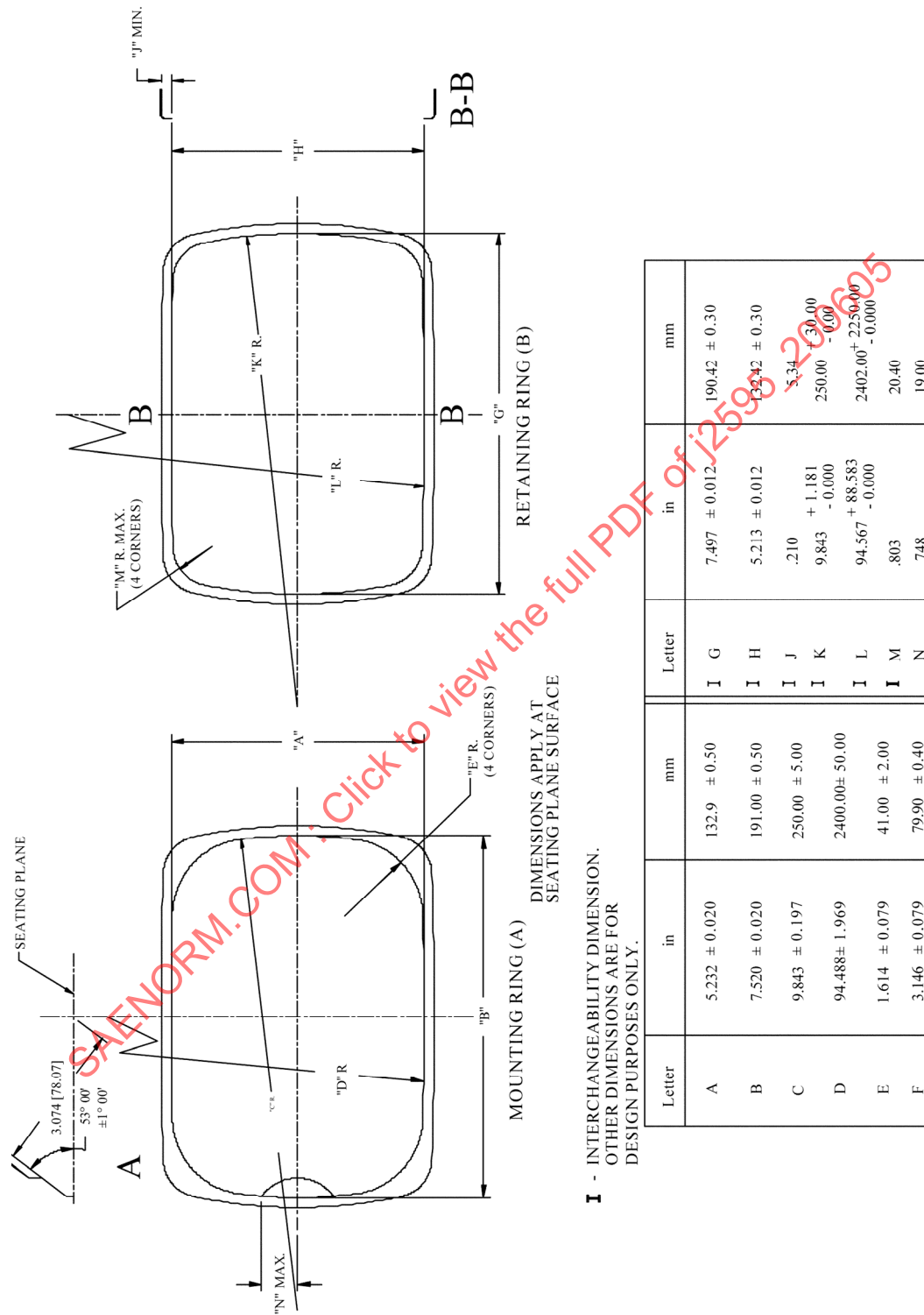


FIGURE 11—(A) FRONT VIEW OF MOUNTING RING OR LAMP BODY FOR 142 x 200 mm RECTANGULAR HEADLAMP; (B) RETAINING RING

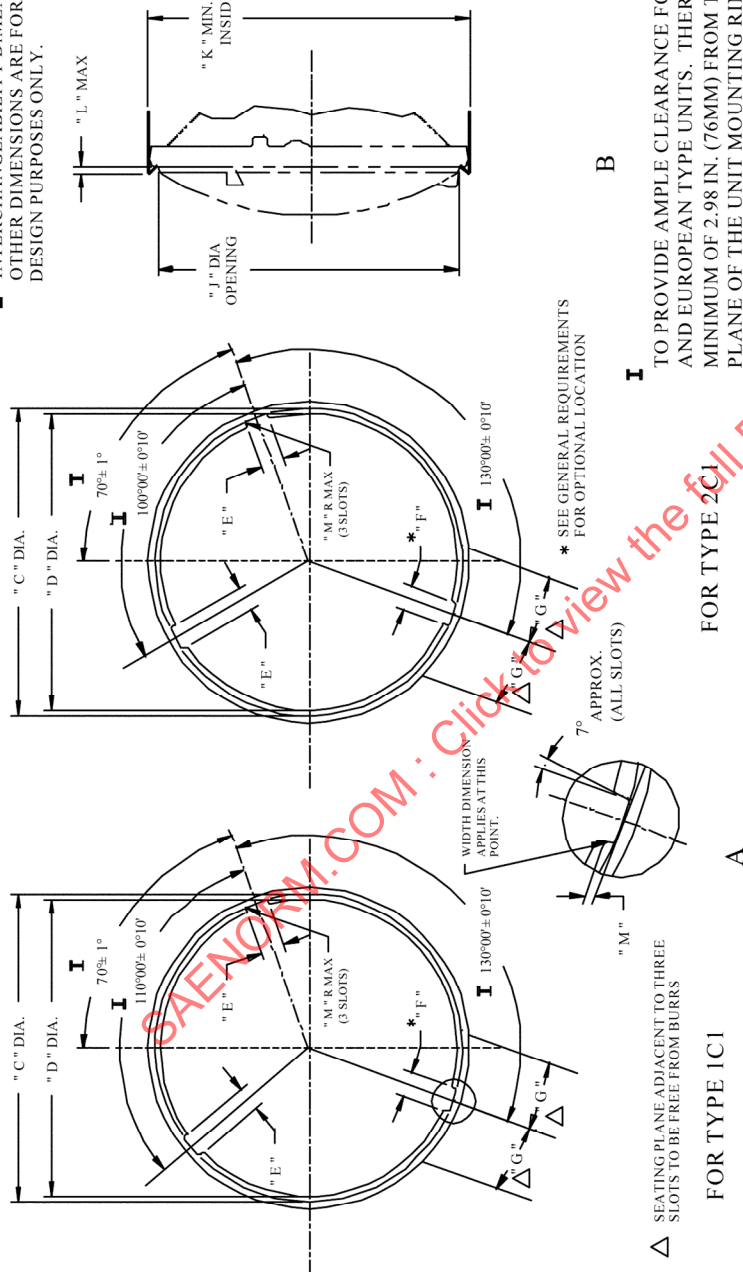


FIGURE 12—(A) FRONT VIEW OF SLOTS OR NOTCHES FOR 146 mm DIAMETER HEADLAMP

Letter	In	mm	Letter	In	mm
I C	5.450 ^{+0.010} -0.000	138.43 ^{+0.25} -0.00	G	1.20	30.48
I D	5.250 ^{-5.140}	133.35 ^{-130.55}	I J	5.400 - 5.360	137.16 - 136.14
I E	0.410 ^{+0.010} -0.000	10.41 ^{+0.25} -0.00	I K	5.710	145.03
I F	0.330 ^{+0.005} -0.000	8.38 ^{+0.12} -0.00	L	0.100	2.54
			M	0.06	1.52

I -- INTERCHANGEABILITY DIMENSION,
OTHER DIMENSIONS ARE FOR
DESIGN PURPOSES ONLY.

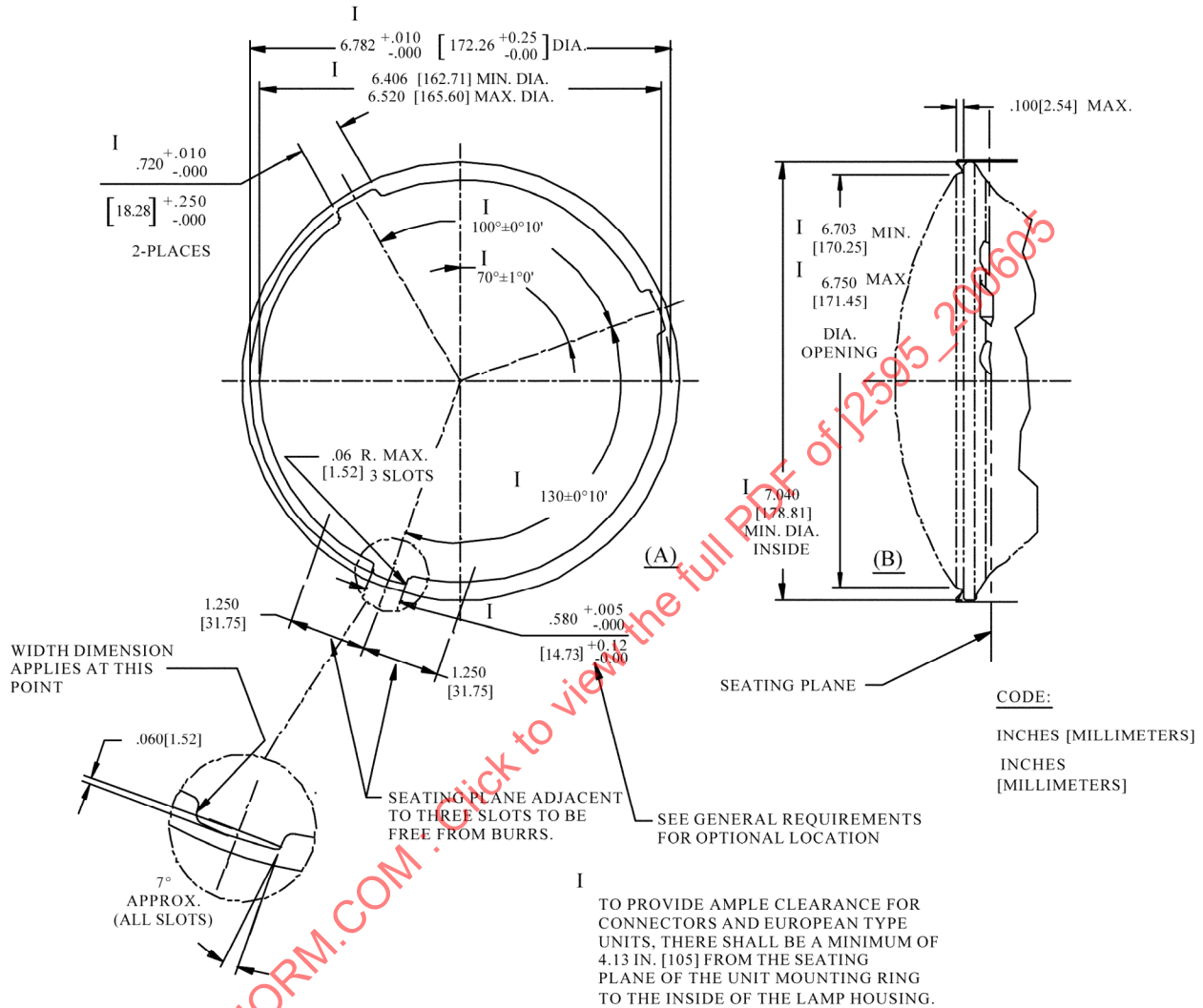
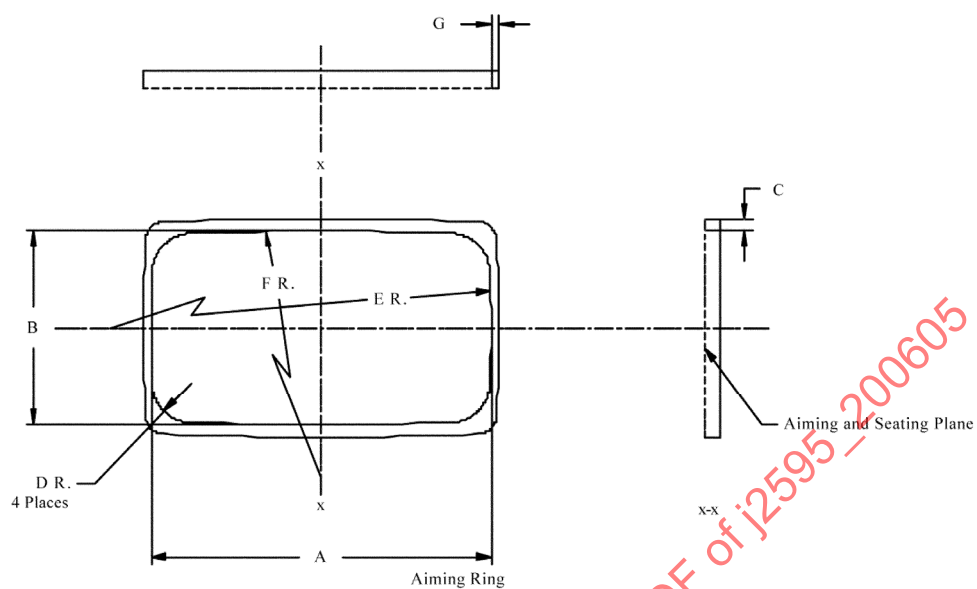


FIGURE 13--(A) FRONT VIEW OF SLOT OR NOTCHES FOR 178 mm DIAMETER HEADLAMP MOUNTING RING OR LAMP BODY; (B) 178 mm HEADLAMP RETAINING RING.

FIGURE 13—(A) FRONT VIEW OF SLOT OR NOTCHES FOR 178 mm DIAMETER HEADLAMP MOUNTING RING OR LAMP BODY; (B) 178 mm HEADLAMP RETAINING RING



Letter	in	mm
A	5.721 ± 0.006	145.30 ± 0.30
B	3.284 ± 0.006	83.40 ± 0.30
C	.213 MIN.	5.40 MIN.
D	.670 MAX.	17.00 MAX.
E	23.700 ± 2.000	602.20 ± 50.00
F	63.000 ± 3.930	1600.00 ± 100.50
G	1.34 MIN.	3.40 MIN.

FIGURE 14—AIMING / SEATING RING FOR TYPE LF AND UF
RECTANGULAR SEALED BEAM HEADLAMP UNITS

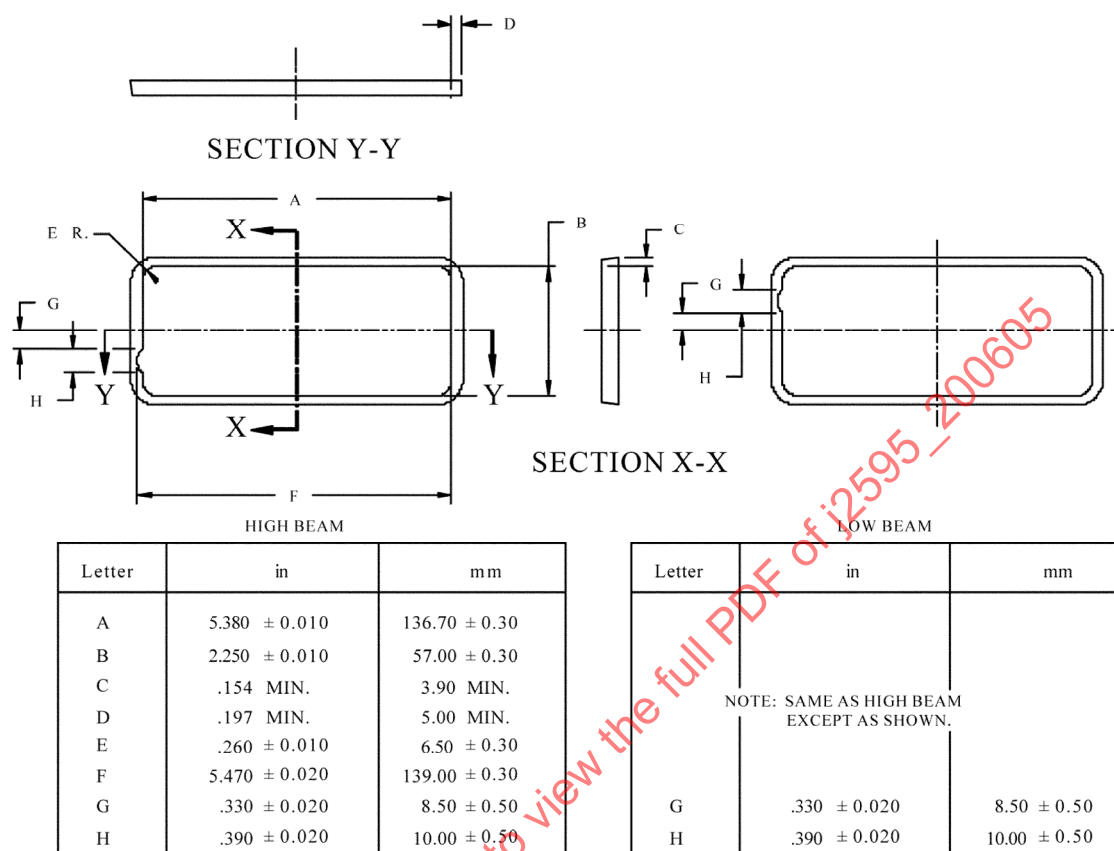


FIGURE 15—AIMING RING – 55 x 135

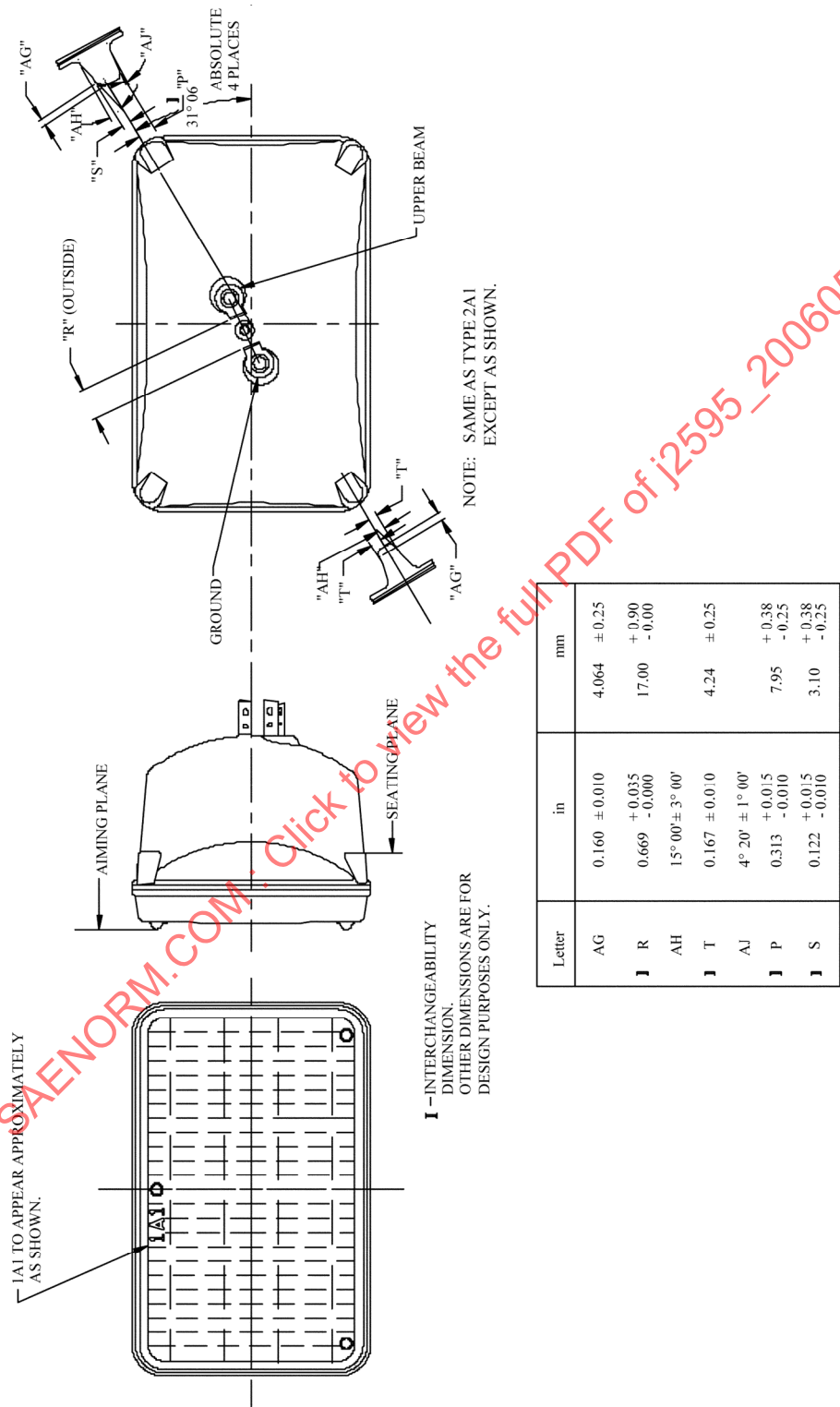


FIGURE 16—TYPE 1A1 HEADLAMP 100 x 165 mm RECTANGULAR