STD.ASME B56.11.6-ENGL 1992 ■ 0759670 0620049 080 ■

ASME B56.11.6-1992

POWERED AND NONPOWERED INDUSTRIAL TRUCKS

REAFFIRMED 2000

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PLEASE SEE ASME MANUAL AS-11

Evaluation of Visibility from Powered Industrial Trucks

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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STD.ASME B56.11.6-ENGL 1992 ■ 0759670 0620050 8T2 ■

AN AMERICAN NATIONAL STANDARD

POWERED AND NONPOWERED INDUSTRIAL TRUCKS

Evaluation of Visibility from Powered Industrial Trucks

ASME B56.11.6-1992

The American Society of Mechanical Engineers

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FOREWORD

(This Foreword is not part of ASME B56.11.6-1992.)

Work on this Standard, originally designated as MH11.6M, was begun by the MH11 Committee. With the consolidation of the activities of the MH11 and B56 Committees, the MH11 Committee became the B56.11 Subcommittee, under the jurisdiction of the B56 Committee. The B56.11 Subcommittee continued the development of this Standard, redesignated as B56.11.6.

After letter ballot approval by the B56.11 Subcommittee and the B56 Committee, and public review, the Standard was approved by the Sponsor. After obtaining such approval, the Standard was submitted to the American National Standards Institute, Inc. (ANSI). ANSI approval to issue the Standard as an American National Standard was granted on August 6, 1992.

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Powered and Nonpowered Industrial Trucks

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POWERED AND NONPOWERED INDUSTRIAL TRUCKS

GENERAL

This Standard is one of a series that has been formulated with the American Society of Mechanical Engineers as Sponsor in accordance with the Accredited Organization method, the procedures accredited by the American National Standards Institute, Inc., and the following scope.

> Establishment of the safety requirements relating to the elements of design, operation, and maintenance; standardization relating to principal dimensions to facilitate interchangeability, test methods, and test procedures of powered and nonpowered industrial trucks (not including vehicles intended primarily for earth moving or over-the-road hauling); and maintenance of liaison with the International Organization for Standardization (ISO) in all matters pertaining to powered and nonpowered industrial trucks.

One purpose of the Standard is to serve as a guide to governmental authorities having jurisdiction over subjects within the scope of the Standard. It is expected, however, that the Standard will find a major application in industry, serving as a guide to manufacturers, purchasers, and users of the equipment.

For convenience, Standards for Powered and Nonpowered Industrial Trucks have been divided into separate volumes:

Safety Standards

B56.1	Low Lift and High Lift Trucks
B56.5	Guided Industrial Vehicles
B56.6	Rough Terrain Forklift Trucks
B56.7	Industrial Crane Trucks
B56.8	Personnel and Burden Carriers
B56.9	Operator Controlled Industrial Tow Tractors
B56.10	Manually Propelled High Lift Industrial Trucks

Standardization Standards

B56.11.1	Double Race or Bi-Level Swivel and Rigid Industrial Casters
B56.11.3	Load Handling Symbols for Powered Industrial Trucks
B56.11.4	Hook-Type Forks and Fork Carriers for Powered Industrial Forklift Trucks
B56.11.5	Measurement of Sound Emitted by Low Lift, High Lift, and Rough Terrain Powered Industrial Trucks
B56.11.6	Evaluation of Visibility From Powered Industrial Trucks

Safety standards that were previously listed as B56 volumes but now have different identification due to a change in standards development assignments are as follows.

NFPA 505	Fire Safety Standard for Powered Industrial Trucks — Type Designations, Areas of Use, Maintenance and Operation (formerly B56.2)
UL 583	Standard for Safety for Electric-Battery-Powered Industrial Trucks (formerly B56.3)
UL 558	Standard for Safety for Internal Combustion Engine-Powered Industrial Trucks (formerly B56.4)

If adopted for governmental use, the references to other national standards in the specific volumes may be changed to refer to the corresponding governmental regulations.

The use of powered and nonpowered industrial trucks is subject to certain hazards that cannot be completely eliminated by mechanical means, but the risks can be minimized by the exercise of intelligence, care, and common sense. It is therefore essential to have competent and careful operators, physically and mentally fit, and thoroughly trained in the safe operation of the equipment and the handling of the loads. Serious hazards are overloading, instability of the load, obstruction to the free passage of the load, collision with objects or pedestrians, poor maintenance, and use of equipment for a purpose for which it was not intended or designed.

Suggestions for improvement of these volumes, especially those based on actual experience in their application, shall be submitted to the Secretary of the B56

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Committee, ASME, United Engineering Center, 345 East 47th Street, New York, NY 10017.

Comments shall be written in accordance with the following format:

(a) specify paragraph designation of the pertinent volume;

(b) indicate suggested change (addition, deletion, revision, etc.);

(c) briefly state reason and/or evidence for suggested change;

(d) submit suggested changes to more than one paragraph in the order in which they appear in the volume.

The appropriate B56 Subcommittee will consider each suggested revision at its first meeting after receipt of the suggested revision(s).

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EVALUATION OF VISIBILITY FROM POWERED INDUSTRIAL TRUCKS

1 SCOPE

This Standard establishes the conditions, procedures, equipment, and acceptability criteria for evaluating visibility from powered industrial trucks. It applies to internal combustion engine powered and electric high lift, counterbalanced, sit-down rider industrial trucks up to and including 10 000 kg (22,000 lb) capacity.

Visibility is evaluated by using an array of lamps, centered at the theoretical eye level of a seated operator, and observing light and shadow areas on a vertical screen in specific locations around the truck. The light source array simulates the normal range of position of the seated operator's eyes with typical head movement. The light and shadow areas describe what can and can not be seen by the operator. Traveling mode visibility is evaluated with the screen 4000 mm (157.48 in.) to the front of and to the rear of the truck. For maneuvering mode visibility, the screen is positioned at 1200 mm (47.24 in.) from the truck to the front, rear, and both sides. Acceptable visibility is based on measurements of dark shadows cast on the screen in each of the test conditions.

2 REFERENCES

2.1 International Organization for Standardization

ISO 5353-1978 (E), Earth-Moving Machinery — Seat Index Point

ISO/TC 110/SC 2 N 258, Draft proposal April 1982, Powered Industrial Trucks — Visibility Test Methods and Requirements

3 DEFINITIONS

Refer also to terminology in Appendix B of ASME/ANSI B56.1.

acceptable visibility — test results from a complete series of tests conducted in accordance with this volume which meet or exceed the acceptability criteria established for each test condition

dark shadow — an area on the screen which is not directly illuminated by any of the lamps of the light source array

light area — an area on the screen which is directly illuminated by at least one lamp on the light source array

light source array — a device, consisting of 26 lamps configured as shown in Fig. 1, used to provide light from the range of positions of the operator's eyes to a screen. The light source array can be rotated to five positions, as shown in Fig. 1, to evaluate visibility to the front, rear, left, and right.

maneuvering — refers to precise movement of the truck as it is being used to move materials, or passing objects close by, at slow speeds

operator's eye level — a theoretical horizontal plane at 650 mm (25.59 in.) above the SIP, representing an average operator

screen — a flat vertical surface used to measure light areas and dark shadows for the tests in this volume. A large stationary screen, sketch (a) of Fig. 3, or a smaller movable screen, sketch (b) of Fig. 3, may be used. The surface should be white or light in color and it is advisable to mark it in 100 mm (3.94 in.) squares.

Seat Index Point (SIP) — a specific point relative to the operator's seat. The SIP is determined by using the Seat Index Point fixture, Fig. 2.

Seat Index Point fixture — a device used to determine the SIP and to locate the light source array for this visibility standard. It is configured as shown in Fig. 2. Also refer to ISO 5353-1978, Earth-Moving Machinery — Seat Index Point.

traveling — movement of the truck over relatively long distance and open areas at faster speeds than maneuvering

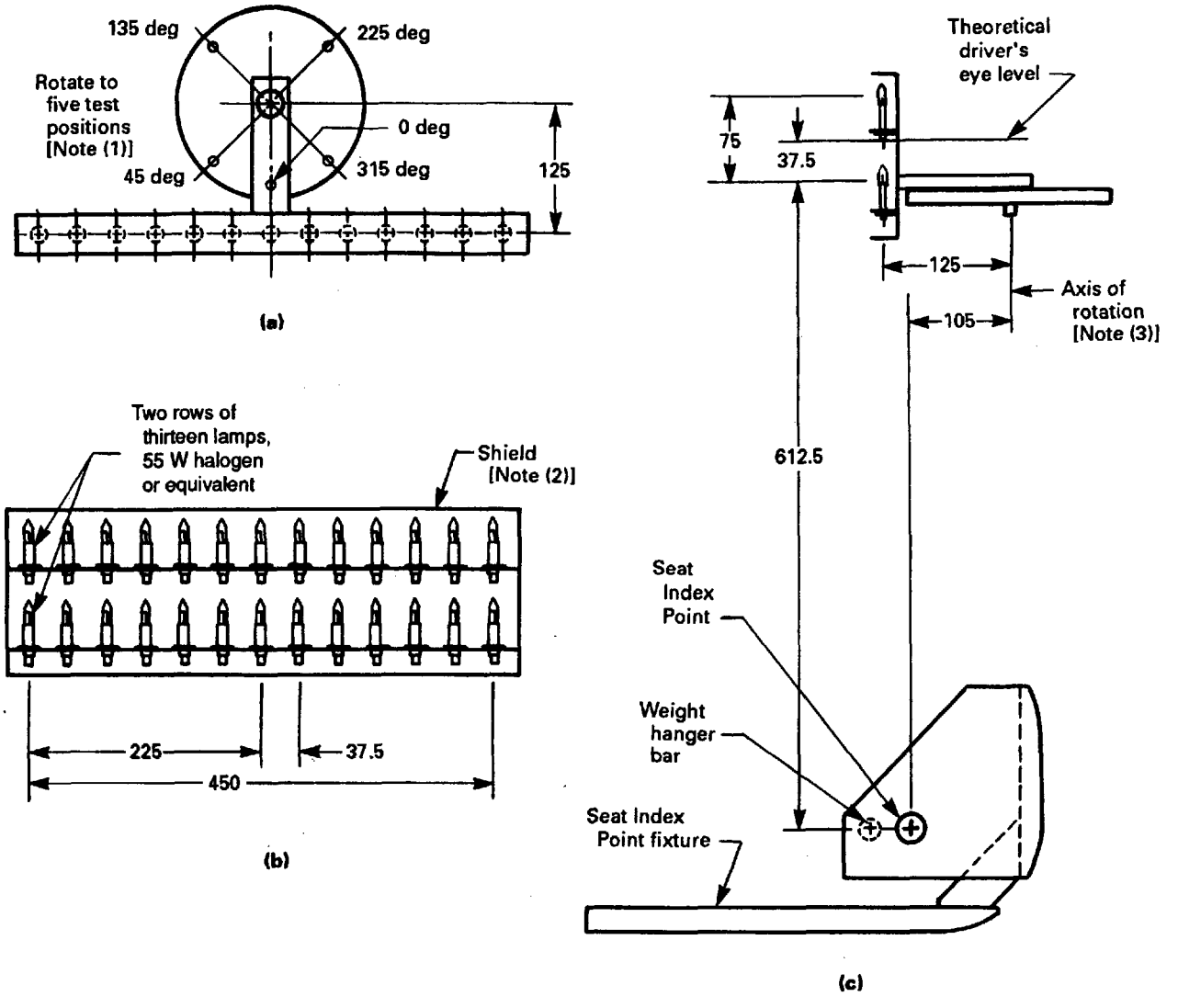
4 GENERAL REQUIREMENTS

4.1 Test Facility

The visibility tests should be conducted in an area where all other sources of light can be eliminated and only light from the light source array shines on the screen

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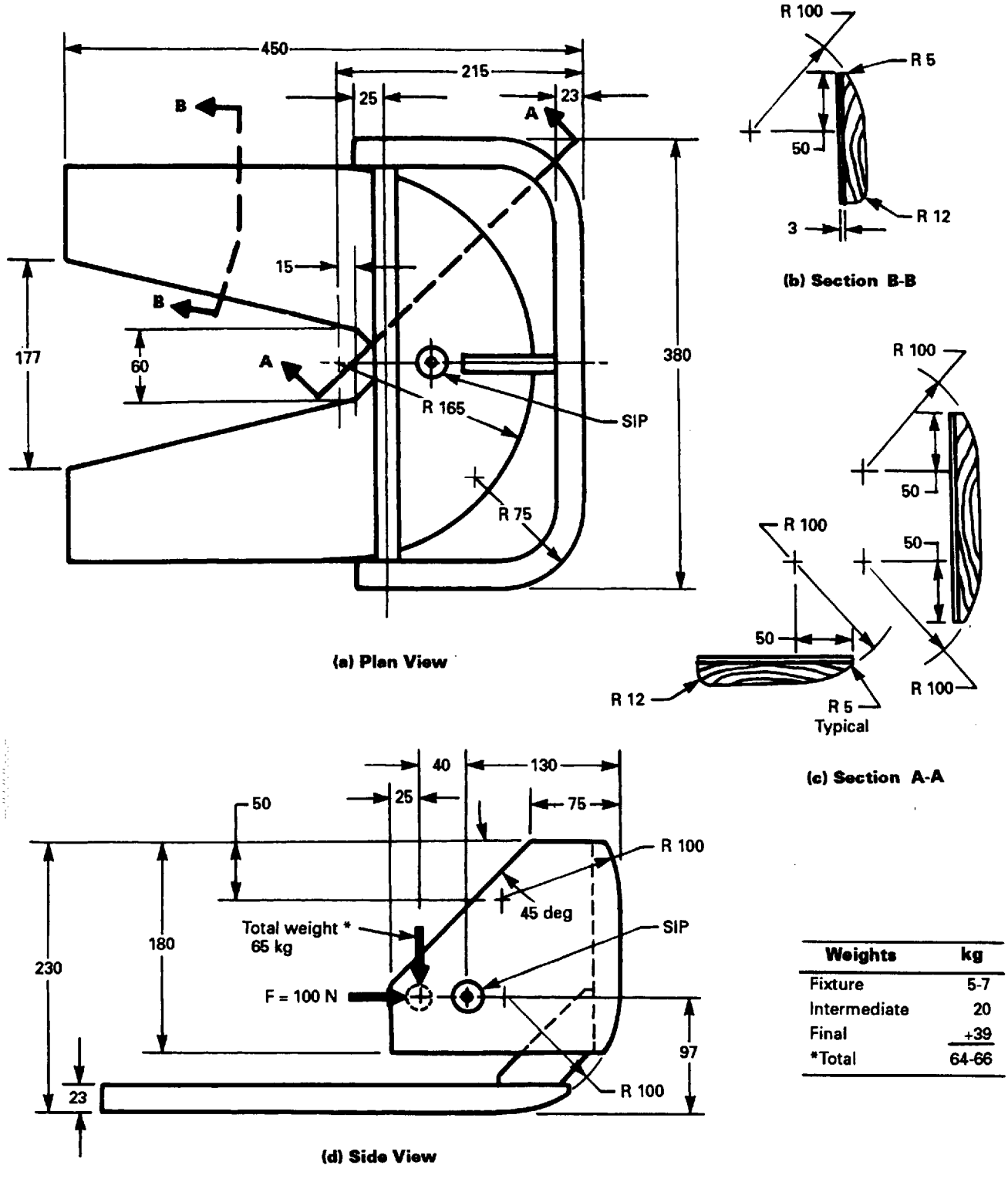


GENERAL NOTES:
(a) All dimensions are in millimeters.
(b) Provision should be made to switch "on":
(1) all 13 lamps in both rows;
(2) the center 9 lamps in both rows (2 lamps "off" at both ends of both rows).
(c) Connecting structure between SIP fixture and light source array not shown.

NOTES:
(1) The light source array is rotated to five test positions for various parts of the evaluation. Provision should be made to fix the array at each position. The array is shown here at 0 deg.
(2) The shield is not specified by this volume but may be configured to reduce indirect light. The shield must not impair light in the direction of the test.
(3) The axis of rotation must be perpendicular to the level floor and will not necessarily be perpendicular to the SIP fixture. Therefore the light array mount must be adjustable at the SIP.

FIG. 1 LIGHT SOURCE ARRAY — CONFIGURATION AND LOCATION RELATIVE TO THE SIP

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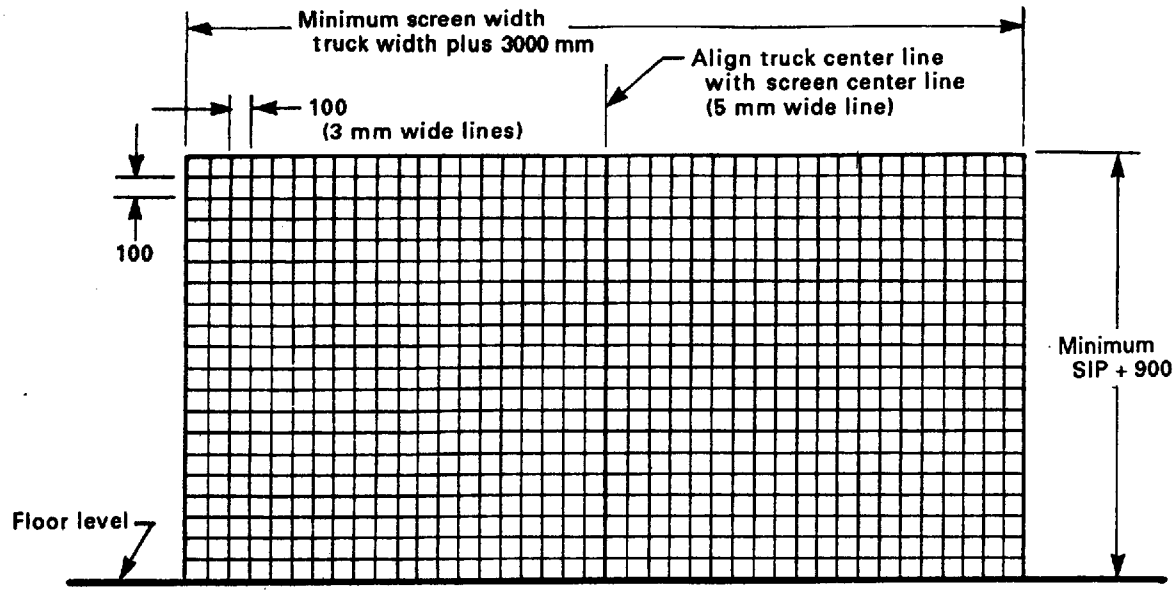


Weights	kg
Fixture	5-7
Intermediate	20
Final	+39
*Total	64-66

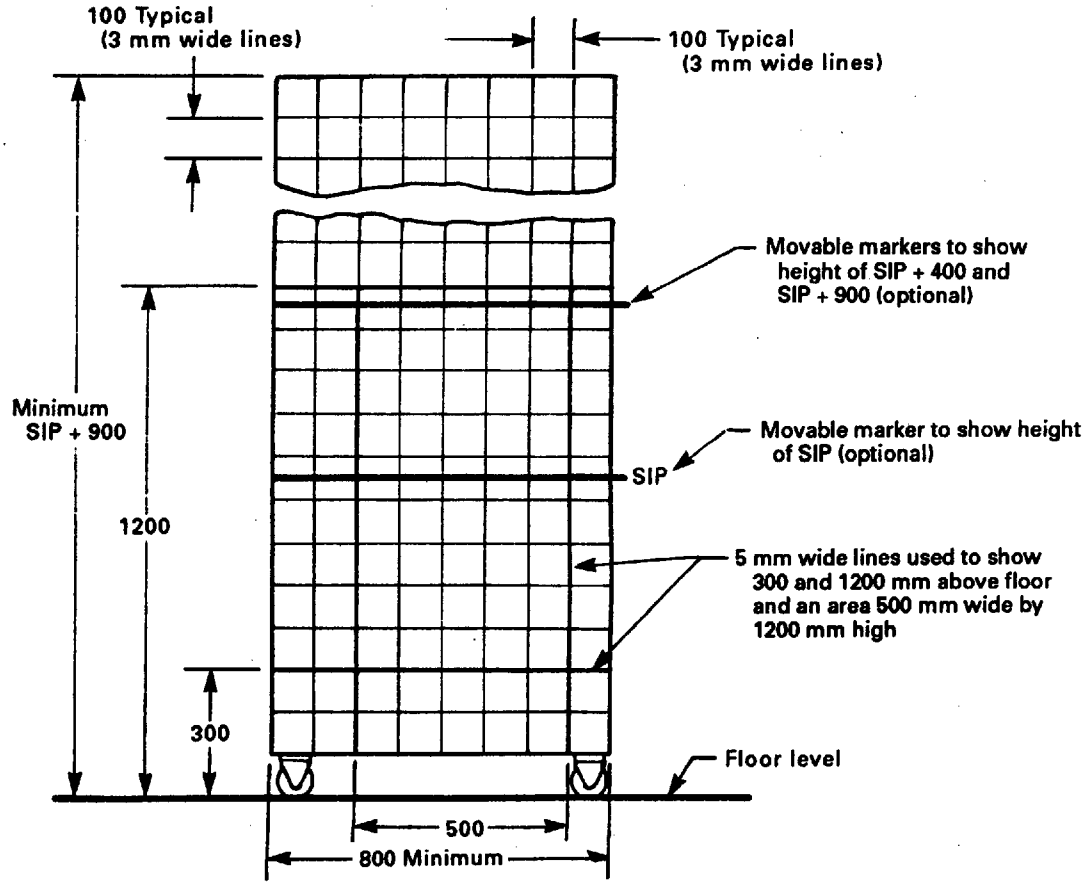
GENERAL NOTE: All dimensions are in millimeters.

FIG. 2 SEAT INDEX POINT FIXTURE

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(a) Stationary Visibility Test Screen



(b) Movable Visibility Test Screen

GENERAL NOTE: All dimensions are in millimeters.

FIG. 3 VISIBILITY SCREENS — MOVABLE OR STATIONARY

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with a minimum of reflection off other surfaces. The floor area shall be flat and level and free of obstacles.

A center line marked on the floor will aid in positioning the truck. If the stationary screen is used, the center line on the floor should be in line with the center line of the screen.

If a movable screen is used, a set of lines can be drawn on the floor for all the tests on a given truck. Fig. 4 shows the lines and the points needed to conduct all the tests without repositioning the truck.

General provisions for the two types of screens are given in Fig. 3, including optional suggestions. When a number of visibility evaluations are to be done, the movable screen used in conjunction with the floor markings will permit conducting tests in less time.

4.2 Truck Configuration

Visibility tests shall be conducted on a lift truck with conventional front end equipment for load handling forks. The evaluation shall be valid for a specific configuration. Significant differences in configuration (such as various types of masts, external fuel tanks, counterweights, cabs, etc.) will require a separate evaluation.

The mast shall be tilted fully rearward up to a maximum of 10 deg. The fork carriage shall be positioned at a height where the intersection of the load carrying surfaces of the forks is between 100 mm (3.94 in.) and 300 mm (11.81 in.) above the floor, Fig. 5. If the fork length exceeds 1200 mm (47.24 in.), the forks may be removed to conduct tests, but the height of the carriage shall be positioned as if the forks were installed.

Where adjustments are part of the seat and its suspension, the seat shall be positioned as follows prior to establishing the SIP:

(a) All seat adjustments shall be placed in their center position, or the nearest position above or to the rear of center when no center position is available.

(b) An adjustable suspension system shall be set at the midpoint of its oscillation range with the weighted SIP fixture in place. The suspension may be mechanically blocked in this position when determining the SIP.

(c) Nonadjustable suspensions shall be blocked in the vertical position attained with the weighted SIP fixture in place.

4.3 Seat Index Point Fixture

A fixture constructed as shown in Fig. 2 shall be used to locate the SIP. The weight of the fixture shall be 5–7 kg (11.0–15.4 lb). The surfaces which contact the operator's seat should be smooth to allow the fixture to be easily moved on the seat during positioning. A cloth between the seat and fixture may also aid in positioning. Removable weights are needed to bring the combined weight to an intermediate weight of 25–27 kg (55.1–59.5 lb) and then to the final weight of 64–66 kg (141.1–145.5 lb).

The procedure for using the SIP fixture to locate the SIP is as follows:

(a) Position the seat as described in para. 4.2, above. Center the SIP fixture in the seat. The SIP fixture should be in contact with the seat back and leveled laterally.

(b) Add weights to bring the total weight to 25–27 kg (55.1–59.5 lb) and readjust to level laterally.

(c) Apply and release a horizontal force of 100 N (22.5 lb) as shown in Fig. 2.

(d) Add weights to bring the total weight to 64–66 kg (141.1–141.5 lb) and readjust to level laterally.

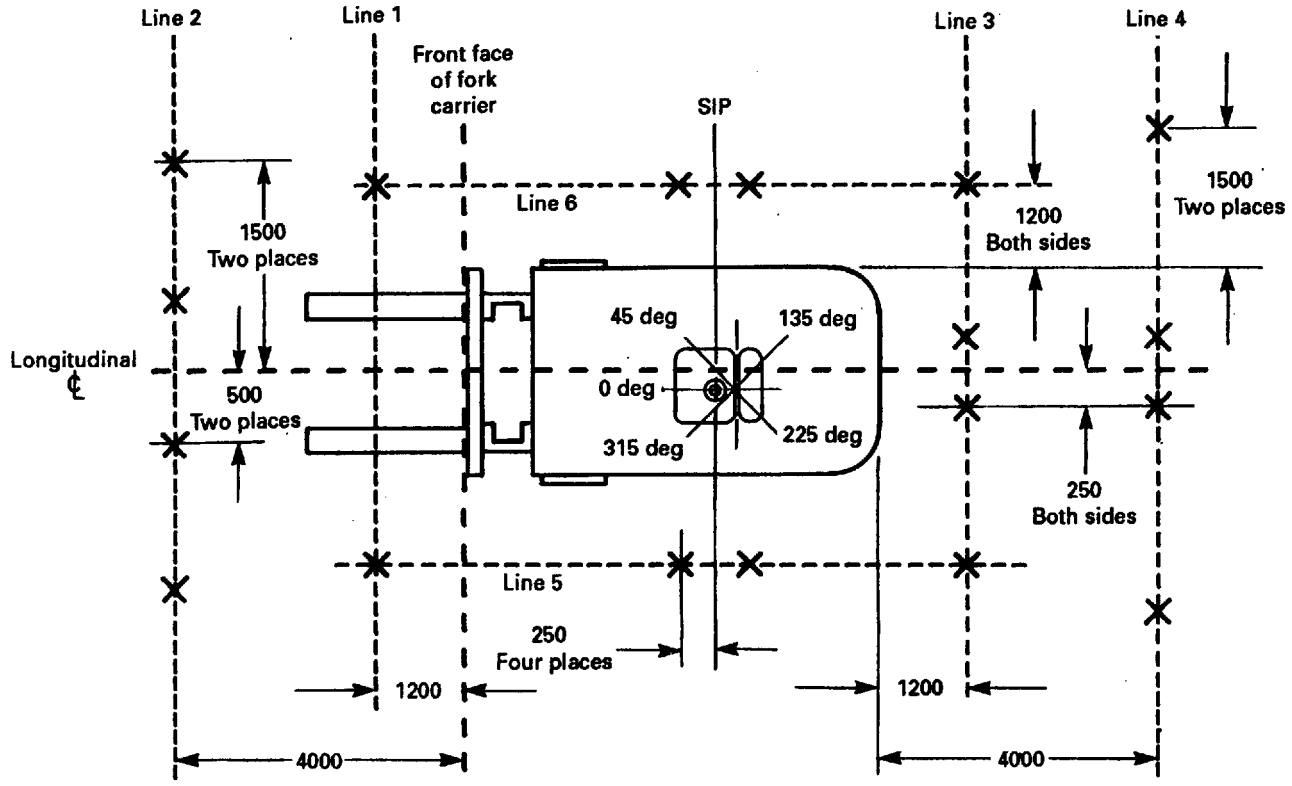
(e) Measure and record the height of the SIP from the floor level. The location of the SIP must remain constant throughout the visibility evaluation.

4.4 Light Source Array

The light source array shall be constructed to position the lamps as shown in Fig. 1. Two rows of 13 lamps each are placed one above the other, 75 mm (2.95 in.) apart. The lamps in each row are spaced 37.5 mm (1.48 in.) apart, center to center. The center of the filament shall be used to locate each lamp. The lamps should be 55 W halogen, or equivalent. The center lamps shall be on the tangent point of a 125 mm (4.92 in.) radius from an axis of rotation in the horizontal plane. A shield can be placed around the lamps to allow the light to shine only in the direction away from the axis of rotation, reducing reflected light and making shadows more easily discernable. Provisions shall be made to switch off the two outermost lamps at both ends of both rows (8 lamps total) while the remaining 9 lamps (18 lamps total) are switched on.

The light source array shall be mounted to the SIP fixture to conduct tests. The light source array axis of rotation shall be located 105 mm (4.13 in.) rearward of the SIP. The lower row of lights shall be positioned 612.5 mm (24.11 in.) above the SIP. Adjust the light source array mount so the axis of rotation is vertical and the array will rotate in a horizontal plane, parallel to the floor. (When the SIP fixture has been properly located in the seat, the lower surface of the fixture will not necessarily be parallel to the floor. Therefore, the light source array mount must be adjustable to allow it to rotate in a true horizontal plane.) Provision shall be made to fix the light source array in five positions of 0 deg, 45 deg, 135 deg, 225 deg, and 315 deg. The 0 deg position places the light source array facing forward in the

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GENERAL NOTES:

(a) Truck and test area are viewed from above.

(b) All distances are in millimeters.

(c) Set up steps for use with movable screen.

(1) Draw a longitudinal center line and a line perpendicular to it for the front face of the fork carrier.

(2) Draw lines 1 and 2 as shown.

(3) Position the lift truck over the center line at the front face of the fork carrier line.

(4) Draw lines 3, 4, 5, and 6 as shown.

(5) Mark on the lines the eighteen points shown above with an "X" to indicate the horizontal screen widths.

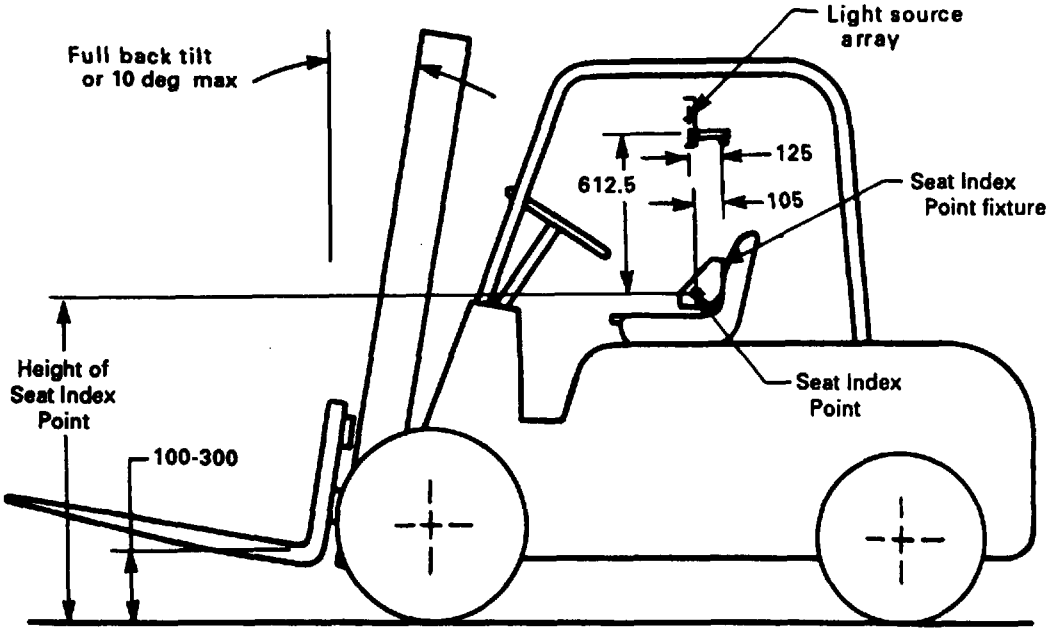
(d) The truck should remain in this position throughout the series of tests.

(e) The lines drawn for (c)(1) and (c)(2) above will be the same for all trucks.

FIG. 4 SUGGESTED SET-UP FOR USE WITH MOVABLE SCREEN

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GENERAL NOTE: All dimensions are in millimeters.

FIG. 5 TRUCK CONFIGURATION FOR VISIBILITY TESTING

truck with the two rows of lights perpendicular to the longitudinal center lines of the SIP fixture and the truck. The other four positions are clockwise from 0 deg, as viewed from above, see Figs. 1 and 4.

4.5 Test Criteria and Evaluation of Results

Each test has a specific screen location and area on the screen to evaluate. In parts (a) and (b) of Test 1, dark shadows are measured between the shadows cast by the channel vertical members of the mast. For part (c) of Test 1 and for Tests 6 and 7, a 500 mm (19.69 in.) square area is evaluated over the given screen area. For Tests 2 through 5 and 8 through 10, a two-part evaluation is done. In part (a), a 500 mm (19.69 in.) wide (horizontal) by 1200 mm (47.24 in.) high (vertical) rectangle is used at the floor level. Part (b) uses a 500 mm (19.69 in.) by 500 mm (19.69 in.) square, having horizontal and vertical sides, in the screen area above 1200 mm (47.24 in.). For both parts, the rectangular or square area is evaluated anywhere on the specified screen area. Criteria for acceptability are given for each test in para. 5.2, below.

When evaluating the amount of dark shadow or lighted area, the following guidelines are to be used.

Within the area of the screen selected for evaluation, no lighted area less than 50 mm (1.97 in.) in width shall be counted, except for the following:

(a) when a lighted area wider than 50 mm (1.97 in.) extends beyond the selected area, the portion of the lighted area within the selected area shall be counted, and

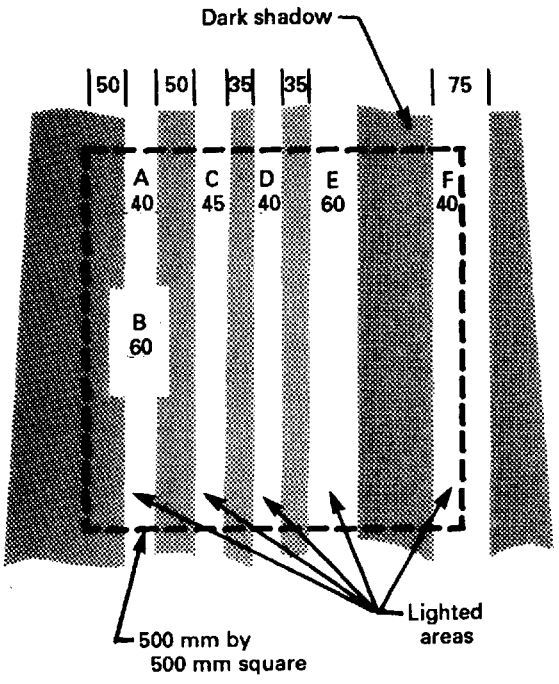
(b) for alternating bands of lighted area and dark shadow, lighted areas less than 50 mm (1.97 in.) wide may be counted if the adjacent dark shadow is narrower than the lighted area.

Examples of these guidlines are shown in Fig. 6.

A powered industrial truck shall be considered to have acceptable visibility, as defined by this volume, if the criteria of all ten tests are met or exceeded.

When the design requirements for a truck preclude meeting the visibility criteria of this volume, the manufacturer and user, in consultation with each other, may determine that ancillary devices or alternate operating procedures may be necessary to assist the operator or alert personnel in the vicinity; however, this volume is

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GENERAL NOTE: All dimensions are in millimeters.

Lighted Area	Status	Reason
A	Not counted	Width < 50 mm < width of adjacent dark shadows [Note (1)]
B	Counted	Width ≥ 50 mm
C	Not counted	Width < 50 mm < width of dark shadow between A and C [Note (2)]
D	Counted	Wider than dark shadows between C and D and between D and E
E	Counted	Width ≥ 50 mm
F	Counted	Part of lighted area of width ≥ 50 mm

NOTES:
(1) Only consider adjacent shadows within the target area.
(2) Not counted even though C is wider than dark shadow between C and D.

FIG. 6 EXAMPLES OF MINIMAL LIGHTED AREAS AND COUNTING PROVISIONS

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not an endorsement of any ancillary device. These may include but are not limited to the use of audible and visible alarms, visual aids, restriction of pedestrians from the operating area, or additional personnel to assist the operator.

5 VISIBILITY EVALUATION

5.1 Test Procedure

(a) Position the truck in the test area, as described in para. 5.2 for the specific test to be conducted, using either a stationary screen or a movable screen. When using a stationary screen, the truck must be properly positioned in relation to the screen before each test. When using a movable screen, position the screen in relation to the truck for each test.

(b) Place the SIP fixture in the seat and determine the SIP as described in para. 4.3. Record the height of the SIP above the floor and the horizontal distance from the SIP to a reference point on the truck chassis.

(c) Install the light source array on the SIP fixture and adjust to level.

(d) Before conducting each test, determine the correct number of lamps to use and the correct position of the light source array for the specific test.

(e) With the light source array turned on, record the percentage of dark shadow in the evaluation criteria (any 500 mm (19.69 in.) by 500 mm (19.69 in.) square, any 500 mm (19.69 in.) by 1200 mm (47.24 in.) rectangle, or others for forward traveling) in the given screen area. Refer to para. 4.5.

(f) Repeat steps (a) through (e) above for each of the ten tests.

5.2 Test Descriptions

For a complete visibility evaluation, a series of ten tests are conducted.

(a) Traveling. Three tests with the screen 4000 mm (157.48 in.) from the appropriate surface of the truck using the center nine lamps in both rows of the light source array (18 lamps total).

(b) Maneuvering. Seven tests with the screen 1200 mm (47.24 in.) from the appropriate surface of the truck using all 13 lamps in both rows (26 lamps total).

The ten tests are in a numerical order which, if followed when conducting the tests, will reduce the repositioning of the truck, screen, and light source array to a minimum. Table 1 is a summary of the following test descriptions.

Test 1 — Traveling, Forward

Position the screen 4000 mm (157.48 in.) in front of the front face of the fork carriage on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 0 deg and turn on 9 lamps in both rows. Evaluate a screen area 1500 mm (59.06 in.) beyond the maximum width of the truck to both sides, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, the following criteria shall be met:

(a) For the screen area between 400 mm (15.75 in.) above the SIP and 900 mm (35.43 in.) above the SIP, and 500 mm (19.69 in.) beyond the overall width of the truck to both sides, there shall be no continuous horizontal dark shadow between the shadows cast by the vertical channel members of the mast.

(b) For the screen area between 300 mm (11.81 in.) above the floor and 900 mm (35.43 in.) above the SIP and within 500 mm (19.69 in.) beyond the overall width of the truck to both sides, the total sum of heights of continuous dark shadows between the shadows cast by the vertical channel members of the mast shall not exceed 400 mm (15.75 in.).

(c) For the entire given area, at least 20% of any 500 mm (19.69 in.) by 500 mm (19.69 in.) square shall not be in dark shadow.

Test 2 — Maneuvering, Forward

Position the screen 1200 mm (47.24 in.) in front of the front face of the fork carriage on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 0 deg and turn on 13 lamps in both rows. Evaluate a screen area 1200 mm (47.24 in.) beyond the maximum width of the truck to both sides, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, the following criteria shall be met:

(a) For the screen area from the floor to 1200 mm (47.24 in.) above the floor, at least 20% of any 500 mm (19.69 in.) wide by 1200 mm (47.24 in.) high area shall not be in dark shadow.

(b) For the screen area from 1200 mm (47.24 in.) above the floor to a height of 900 mm (35.43 in.) above the SIP, at least 20% of any 500 mm (19.69 in.) by 500 mm (19.69 in.) square shall not be in dark shadow.

NOTE: For Tests 2–5 and 8–10, the acceptability criteria are the same. Descriptions for Tests 3–5 and 8–10 will refer to criteria (a) and (b) given above.

Test 3 — Maneuvering, Lateral-Right, Forward

Position the screen 1200 mm (47.24 in.) from the truck's right side outermost surface on a line parallel to the longitudinal center line of the truck. Position the light

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TABLE 1 SUMMARY OF VISIBILITY TESTS (SEE PARA. 5.2)

Test	Angle of Lights, deg	Lights Per Row (Total)	Screen Location, mm	Horizontal Screen Area, mm	Vertical Screen Area, mm	Criteria Minimum Not in Dark Shadow, mm
1 — Traveling, Forward	0	9 (18)	4000 forward of carriage face	Between shadows cast by vertical members of mast up to truck width + 500 to either side	SIP + 400 to SIP + 900	No continuous horizontal dark shadow
					Floor + 300 to SIP + 400	Sum of heights of continuous horizontal dark shadows shall not exceed 400
				Truck width + 1500 to either side	Floor to SIP + 900	20% of any 500 by 500 area
2 — Maneuvering, Forward	0	13 (26)	1200 forward of carriage face	Truck width + 1200 to either side	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
3 — Maneuvering, Lateral-Right, Forward	45	13 (26)	1200 to right of truck	250 behind SIP to 1200 forward of carriage face	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
4 — Maneuvering, Lateral-Right, Rearward	135	13 (26)	1200 to right of truck	250 forward of SIP to 1200 rearward of truck	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
5 — Maneuvering, Rearward-Right	135	13 (26)	1200 rearward of truck	250 left of center line to 1200 right of truck	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
6 — Traveling, Rearward-Right	135	9 (18)	4000 rearward of truck	250 left of center line to 1500 right of truck	Floor to SIP + 900	20% of any 500 by 500 area
7 — Traveling, Rearward-Left	225	9 (18)	4000 rearward of truck	250 right of center line to 1500 left of truck	Floor to SIP + 900	20% of any 500 by 500 area
8 — Maneuvering, Rearward-Left	225	13 (26)	1200 rearward of truck	250 right of center line to 1200 left of truck	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
9 — Maneuvering, Lateral-Left, Rearward	225	13 (26)	1200 to left of truck	250 forward of SIP to 1200 rearward of truck	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area
10 — Maneuvering, Lateral-Left, Forward	315	13 (26)	1200 to left of truck	250 behind SIP to 1200 forward of carriage face	Floor to 1200	20% of any 500 by 1200 area
					1200 to SIP + 900	20% of any 500 by 500 area

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source array at 45 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) forward of the fork carriage face to 250 mm (9.84 in.) rearward of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

Test 4 — Maneuvering, Lateral-Right, Rearward

Position the screen 1200 mm (47.24 in.) from the truck's right side outermost surface on a line parallel to the longitudinal center line of the truck. Position the light source array at 135 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, to 250 mm (9.84 in.) forward of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

Test 5 — Maneuvering, Rearward-Right

Position the screen 1200 mm (47.24 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 135 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) right of the truck's right side outermost surface to 250 mm (9.84 in.) left of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

Test 6 — Traveling, Rearward-Right

Position the screen 4000 mm (157.48 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 135 deg and turn on 9 lamps in both rows. Evaluate a screen area from 1500 mm (59.06 in.) right of the truck's right side outermost surface to 250 mm (9.84 in.) left of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, over the entire given area, at least 20% of any 500 mm (19.69 in.) by 500 mm (19.69 in.) square shall not be in dark shadow.

Test 7 — Traveling, Rearward-Left

Position the screen 4000 mm (157.48 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 225 deg and turn on 9 lamps in both rows. Evaluate a screen area from 1500 mm (59.06 in.) left of the truck's left side outermost surface to 250 mm (9.84 in.) right of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, over the entire given area, at least 20% of any 500 mm (19.69 in.) by 500 mm (19.69 in.) square shall not be in dark shadow.

Test 8 — Maneuvering, Rearward-Left

Position the screen 1200 mm (47.24 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, on a line perpendicular to the longitudinal center line of the truck. Position the light source array at 225 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) left of the truck's left side outermost surface to 250 mm (9.84 in.) right of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

Test 9 — Maneuvering, Lateral-Left, Rearward

Position the screen 1200 mm (47.24 in.) from the truck's left side outermost surface on a line parallel to the longitudinal center line of the truck. Position the light source array at 225 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) rearward of the rear surface of the truck, not including protuberances such as towing hooks or trailer hitches, to 250 mm (9.84 in.) forward of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

Test 10 — Maneuvering, Lateral-Left, Forward

Position the screen 1200 mm (47.24 in.) from the truck's left side outermost surface on a line parallel to the longitudinal center line of the truck. Position the light source array at 315 deg and turn on 13 lamps in both rows. Evaluate a screen area from 1200 mm (47.24 in.) forward of the fork carriage face to 250 mm (9.84 in.) rearward of the SIP, from the floor to a height of 900 mm (35.43 in.) above the SIP. For acceptable visibility, criteria (a) and (b) of Test 2 shall be met.

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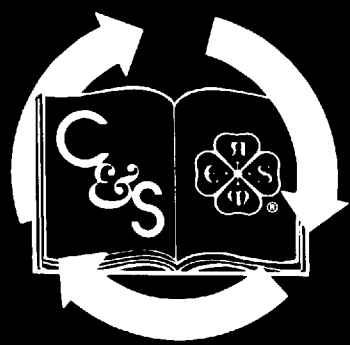
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