

الهيئة السعودية للمواصفات والمقاييس والجودة

Saudi Standards, Metrology and Quality Org. (SASO)



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School buses - Pedestrian safety devices

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Contents

1- Scope..... 2

2- Terms and definitions..... 2

3- Technical requirements 2

4- Test procedures 4

Bibliography 7

School buses - Pedestrian safety devices

1- Scope

This standard specifies the technical requirements and test procedures for devices that can be installed on school buses to maintain the safety of pedestrians in the vicinity of stopped school buses.

2- Terms and definitions

For the purposes of this standard, the following terms and definitions are applied:

2.1 School bus

A specially constructed vehicle that is designed to carry more than ten persons to and from school, university or related events.

2.2 Stop signal arm

A device that can be extended outward from the side of a school bus to provide a signal to other motorists not to pass the bus because it has stopped to load or discharge passengers.

2.3 Reflex reflective

Reflective of light in directions close to the direction of incident light, over a wide range of variations in the direction of incident light.

2.4 Observation angle

The angle having as its sides the line from the observation point to the center of the object to be tested and the line from the center of that object to the center of the source of illumination.

2.5 Entrance angle

The angle having as its sides the line through the center, and normal to the face, of the object to be tested, and the line from the center of the object to the center of the source of illumination.

3- Technical requirements

Each school bus shall be equipped with a stop signal arm as shown in figure (1) that meet the following requirements:

3.1 Shape

3.1.1 The stop signal arm shall be a regular octagon which is at least 450×450 mm in diameter.

3.1.2 The word "STOP" letters shall be at least 150 mm in height and the letters shall have a stroke width of at least 20 mm, except as provided in 3.3.1.1.

3.2 Color

3.2.1 The stop signal arm shall be red on both sides, except:

a) The stop signal arm shall have a white border at least 12 mm wide on both sides, except as provided in (c).

b) The stop signal arm shall have the word "STOP" displayed in both Arabic and English languages and shall be white upper-case letters on both sides, except as provided in (c).

c) When two stop signal arms are installed on a school bus, the rearmost stop signal arm shall not contain any lettering, symbols, or markings on the forward side.

3.2.2 Mounting brackets, clips, bolts, or other components necessary to the mechanical or electrical operation of the stop signal arm may not obscure more than 15 % of the border on each side of the stop arm.

3.3 Conspicuity

The stop signal arm shall comply with either 3.3.1 or 3.3.2, or both.

3.3.1 The entire surface of the stop signal arm on both sides shall be provided with Type III reflectorized material that meet the minimum specific intensity requirements according to item 4.1 and table (1), except:

3.3.1.1 The legend of the retroreflective stop arm may be illuminated in a manner such that light is emitted from the surface of each letter or from the area immediately surrounding each letter, as follows:

- a) Only red lamps may be used;
- b) They shall form the complete shape of each letter of the legend, and shall be affixed to all letters (or to the areas immediately surrounding all letters) in the legend;
- c) The shape of each letter shall remain constant and, if the lamps are contained within each letter, the net stroke width (stroke width minus the width of the lamp(s)) of each letter of the legend, specified in 3.2 (b), shall not be less than 15 mm;
- d) When the stop arm is extended, the lamps shall flash at the rate specified in 4.2.2, with a current “on” time specified in 4.2.2.1; and
- e) All lamps shall be positioned in one of the two following ways:
 - 1) Centered within the stroke of each letter of the legend, or
 - 2) Outlining each letter of the legend.

3.3.1.2 When two stop signal arms are installed on a school bus, the forward side of the rearmost stop signal arm shall not be reflectorized.

3.3.1.3 Non-reflectorized mounting brackets, clips, bolts, or other components necessary to the mechanical or electrical operation of the stop signal arm shall not obscure more than 7.5 % of the total surface area of either side of the stop signal arm.

3.3.2 Each side of the stop signal arm shall have at least two red lamps that meet the requirements of item 4.2, as follows:

3.3.2.1 The lamps shall be centered on the vertical centerline of the stop arm.

3.3.2.2 One of the lamps shall be located at the extreme top of the stop arm and the other at its extreme bottom.

3.4 Position

3.4.1 The stop signal arm shall be installed on the left side of the bus.

3.4.2 The stop signal arm shall be located when in the extended position as follow:

- a) The stop signal arm is perpendicular to the side of the bus, plus or minus five degrees;
- b) The top edge of the stop signal arm is parallel to and not more than 152.4 mm from a horizontal plane tangent to the lower edge of the frame of the passenger window immediately behind the driver's window.
- c) The vertical centerline of the stop signal arm is not less than 228.6 mm away from the side of the school bus.

3.4.3 A second stop signal arm may be installed on a school bus, and shall meet the requirements of item 3.4.1 and 3.4.2.

3.5 Operation

The stop signal arm shall be automatically extended with the passenger door open according to the following:

3.5.1 The mechanism for activating the device shall be within the reach of the driver.

3.5.2 While the device is activated, a continuous or intermittent signal audible to the driver shall sound.

3.5.3 The audible signal shall be equipped with a timing device requiring the signal to sound for at least 60 seconds.

3.5.4 If a timing device is used, it shall automatically recycle every time the service entry door is opened while the engine is running and the manual override is engaged.

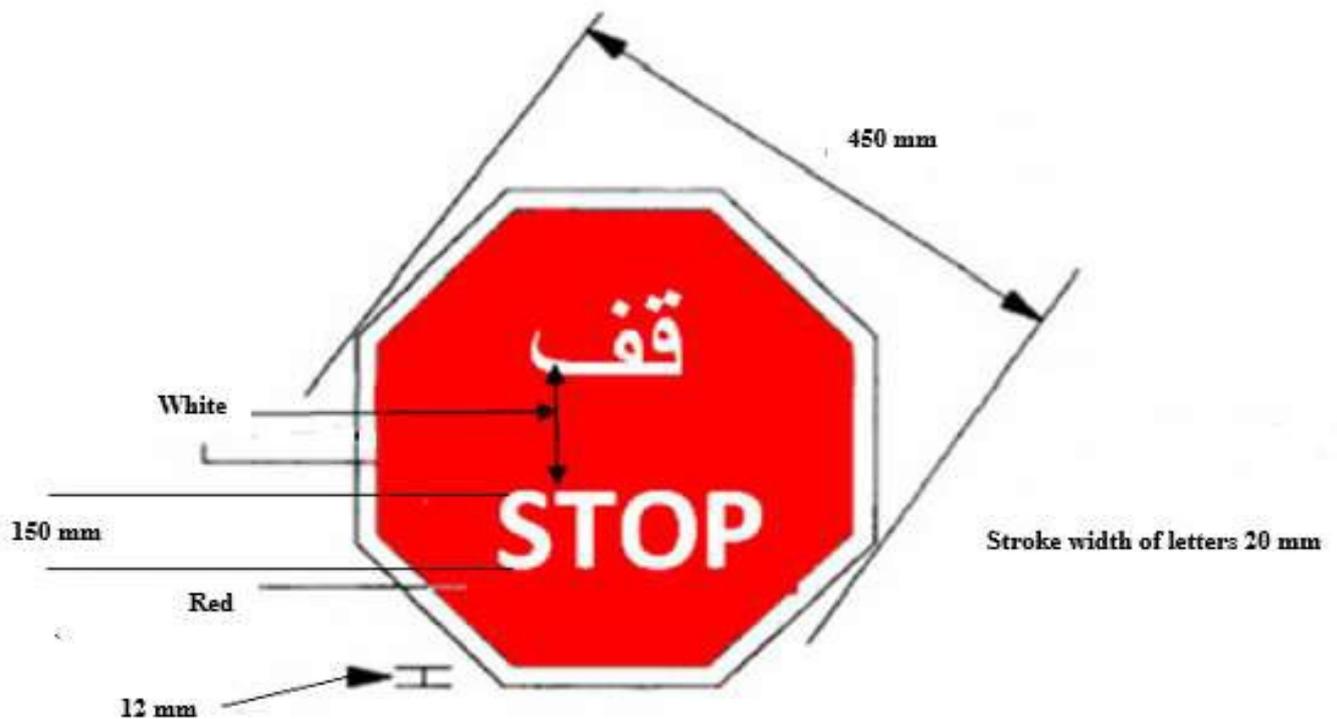


Figure (1) – characteristic of stop signal device

4- Test procedures

4.1 Reflectivity Test

The retroreflective materials shall meet the criteria specified in table (1) when tested under the conditions specified in 6.2 (b), (c), and (d) of standard⁽¹⁾.

⁽¹⁾ Follow the standard 49 CFR 571.125 until the Saudi standard is adopted.

4.2 Lighting Tests

4.2.1 Color

a) The test procedure shall be done in accordance with standard⁽²⁾.

b) When visually compared to the light emitted from a filter/source with a combination of chromaticity coordinates as explained in standard⁽²⁾ within specific boundaries;

[$y = 0.33$ (yellow boundary) and $y = 0.98 - x$ (purple boundary)]

The color of light emitted from the test object shall not be less saturated (paler), yellower, or purple.

c) The test object shall be placed perpendicular to the light source to simulate lamps on stop signal arms.

d) In making visual comparisons, the light from the test object shall light one portion of a comparison field and the light from the filter/source standard shall light an adjacent area.

e) To make a valid visual comparison, the two fields to be viewed shall be of near equal luminance.

4.2.2 Flash rate

The lamps on each side of the stop signal arm, when operated at the manufacturer's design load, shall flash alternately at a rate of 60 to 120 flashes per minute.

4.2.2.1 Lamps except those subject to 4.2.2.2, shall have a current "on" time of 30 to 75 % of the total flash cycle (except Xenon short-arc gaseous discharge lamps).

The total current "on" time for the two terminals shall be between 90 and 110 % of the total flash cycle.

4.2.2.2 Xenon short-arc gaseous discharge lamps shall have an "off" time before each flash of at least 50 % of the total flash cycle.

4.2.3 Vibration, Moisture, Dust, Corrosion, Photometry, and Warpage Tests

a) The test procedure shall be done in accordance with standard⁽³⁾.

b) The lamps and lighting components shall meet the criteria for vibration, moisture, dust, corrosion, photometry, and warpage standards with standards⁽³⁾ under the test conditions specified herein.

⁽²⁾ Follow the standard No. SAE J578 until the Saudi standard is adopted.

⁽³⁾ Follow the two standards No. SAE J575 and SAE J1133 until the Saudi standard is adopted.

Observation Angle (°)	Entrance Angle (°)	White	Red
Type III Retroreflective Element Material			
A - Glass Bead Retroreflective Element Material			
0.2	- 4	250	45
0.2	+ 30	150	25
0.5	- 4	95	15
0.5	+ 30	65	10
B - Prismatic Retroreflective Element Material			
0.2	- 4	250	45
0.2	+ 30	95	13.3
0.5	- 4	200	28
0.5	+ 30	65	10

Table 1 - Minimum Specific Intensity per Unit Area (SIA)
(CandelasperFoot-candle per SquareFoot)

Bibliography

[1] 49 Subtitle B-Chapter V-Part 571-Subpart B Section 131 (FMVSS 571.131) "School bus pedestrian safety devices".