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School buses - body joint strength

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School buses - body joint strength

1- Scope

This standard specifies the technical requirements and test procedures for the strength of the body panel joints in school bus bodies.

2- Complementary References

2.1 ASTM E8/E8M "Standard Test Methods for Tension Testing of Metallic Materials".

3- Terms and definitions

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

3.1 School bus

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

3.2 Body component

A part of a bus body made from a single piece of homogeneous material or from a single piece of composite material such as plywood.

3.3 Body panel

A body component used on the exterior or interior surface to enclose the bus' occupant space.

3.4 Body panel joint

The area of contact or close proximity between the edges of a body panel and another body component, including but not limited to floor panels, and body panels made of composite materials such as plastic or plywood, excluding trim and decorative parts which do not contribute to the strength of the bus body, members such as rub rails which are entirely outside of body panels, ventilation panels, components provided for functional purposes, and engine access covers.

3.5 Bus body

That portion of a bus that encloses the bus occupant space, including the floor, but excluding the bumpers and chassis frame and any structure forward of the passenger compartment.

3.6 Maintenance access panel

A body panel which must be moved or removed to provide access to one or more serviceable component(s).

3.7 Passenger compartment

Space within the school bus interior that is between a vertical transverse plane located 762 mm in front of the forwardmost passenger seating reference point and including a vertical transverse plane tangent to the rear interior wall of the bus at the vehicle centerline.

3.8 Serviceable component

Any part of the bus, of either a mechanical or electrical nature, which is explicitly identified by the bus chassis and/or body manufacturer in the owner's manual or factory service manual as requiring routine maintenance actions at intervals of one year or less. Tubing, wires and harnesses are considered to be serviceable components only at their attachments.

4- Technical requirements

4.1 When each body panel joint, including small, curved, and complex joints, are tested in accordance with the test procedures described in item (5) shall hold the body panel to the member to which it is joined when subjected to a force of 60 % of the tensile strength of the weakest joined body panel determined according to 5.2, except the following requirements:

(a) Any interior maintenance access panel or joint which lies forward of the passenger compartment.

(b) Any interior maintenance access panel within the passenger compartment that does not exceed 305 mm when measured across any two points diametrically on opposite sides of the opening.

(c) Trim and decorative parts which do not contribute to the strength of the joint, support members such as rub rails which are entirely outside of body panels, doors and windows, ventilation panels, and engine access covers.

4.1.1 Body panels attached to each other shall have no unattached segment at the joint longer than 203 mm.

5- Test procedures

5.1 Preparation of the test specimen

5.1.1 If a body panel joint is 203 mm or longer, cut a test specimen that consists of any 203 mm segment of the joint, together with a portion of the bus body whose dimensions are those specified in Figure (1), so that the specimen's centerline is perpendicular to the joint at the midpoint of the joint segment.

Where the body panel joint is not fastened continuously, select the segment so that it does not bisect a spot weld or a discrete fastener.

Support members which contribute to the strength of a body panel joint, such as rub rails on the outside of body panels or underlying structure attached to joint members, shall remain attached to the test specimen, except that material may be removed from the support members as necessary to clear the gripping areas of the joint members being tested.

5.1.2 If a joint is less than 203 mm long, cut a test specimen with enough of the adjacent material to permit it to be held in the tension testing machine specified in item 5.3.

5.1.3 Prepare the test specimen in accordance with the preparation procedures specified in ASTM E8/E8M.

5.2 Determination of minimum allowable strength

For purposes of determining the minimum allowable joint strength, determine the tensile strengths of the joined body components as follows:

(a) If the mechanical properties of a joint component material are specified in ASTM E8/E8M, the lowest value of that material's thickness and tensile strength per unit of area shown in that source shall be used.

(b) If the mechanical properties of a material are not specified in ASTM E8/E8M, determine its tensile strength by cutting a sheet specimen from outside the joint region of the bus body in accordance with Figure (1) of ASTM E8/E8M, and by testing it in accordance with 5.3.

Bibliography

[1] 49 Subtitle B-Chapter V-Part 571-Subpart B Section 221 (FMVSS 571.221) “School bus body joint strength.”