REPORT NUMBER: 217-MGA-2007-003

SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 217
SCHOOL BUS EMERGENCY EXITS AND WINDOW
RETENTION AND RELEASE

MID BUS INC.
2006 MID BUS GUIDE DW SCHOOL BUS
NHTSA NO.: C60901

PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105

Final Report Date: April 26, 2007

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
MAIL CODE: NVS-220
400 SEVENTH STREET, SW, ROOM 6111
WASHINGTON, D.C. 20590
This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: _____________________________
James Hansen, Project Engineer
Date: April 26, 2007

Reviewed by: _____________________________
Michael Janovicz, Program Manager
Date: April 26, 2007

FINAL REPORT ACCEPTED BY:

Date of Acceptance: April 26, 2007
Compliance tests were conducted on the subject 2006 Mid Bus Guide DW School Bus, NHTSA No. C60901 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-217-06 for the determination of FMVSS 217 compliance.

Test failures were as follows:
None
<table>
<thead>
<tr>
<th>Section</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of Compliance Test</td>
<td>1</td>
</tr>
<tr>
<td>Test Data Summary</td>
<td>2</td>
</tr>
<tr>
<td>Data Sheet 1 - Test Summary</td>
<td>3</td>
</tr>
<tr>
<td>Compliance Test Data</td>
<td>4</td>
</tr>
<tr>
<td>Data Sheet 2 - Provision of Emergency Exits</td>
<td>5</td>
</tr>
<tr>
<td>Data Sheet 3 - Emergency Exit Door Operational Requirements</td>
<td>7</td>
</tr>
<tr>
<td>Data Sheet 4 - Emergency Exit Identification and Labeling</td>
<td>8</td>
</tr>
<tr>
<td>Data Sheet 5 - Tape Reflectivity Test</td>
<td>11</td>
</tr>
<tr>
<td>Data Sheet 6 - Force Tests to Unlatch the Emergency Exit</td>
<td>12</td>
</tr>
<tr>
<td>Data Sheet 7 - Force Tests for Open the Emergency Exit</td>
<td>14</td>
</tr>
<tr>
<td>Data Sheet 8 - Emergency Exit Extension</td>
<td>16</td>
</tr>
<tr>
<td>Data Sheet 9 - Window Retention Test</td>
<td>17</td>
</tr>
<tr>
<td>Instrumentation and Equipment List</td>
<td>19</td>
</tr>
<tr>
<td>Photographs</td>
<td>20</td>
</tr>
<tr>
<td>Test Plots</td>
<td>36</td>
</tr>
</tbody>
</table>
Tests were conducted on a MY2006 Mid Bus Guide DW School Bus, NHTSA No. C60901, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-217-06 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 217, “School Bus Emergency Exits and Window Retention and Release”.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-02-D-01057.
Based on the tests performed, the MY2006 Mid Bus Guide DW School Bus, NHTSA No. C60901 appeared to meet the requirements of FMVSS 217. See Data Sheet 1 for Test Summary on the following page.
### GENERAL VEHICLE IDENTIFICATION

<table>
<thead>
<tr>
<th>Model Year/Mfr. /Make/Model:</th>
<th>2006 Chevrolet Mid Bus Guide DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHTSA No.:</td>
<td>C60901</td>
</tr>
<tr>
<td>GVWR:</td>
<td>5,579 kg / 12,300 lbs</td>
</tr>
<tr>
<td>Build Date for Bus Chassis:</td>
<td>04/06</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBJG31U461237309</td>
</tr>
<tr>
<td>Chassis VIN:</td>
<td>1GBJG31U461237309</td>
</tr>
<tr>
<td>Seating Capacity:</td>
<td>(1 Driver, 27 Passengers)</td>
</tr>
<tr>
<td>Type of Bus:</td>
<td>School Bus</td>
</tr>
<tr>
<td>Tire Pressure from tire placard (at capacity):</td>
<td>Front: 450 kPa</td>
</tr>
<tr>
<td>Odometer Reading:</td>
<td>450 Miles</td>
</tr>
</tbody>
</table>

### TEST SUMMARY

<table>
<thead>
<tr>
<th>S5.1 WINDOW RETENTION</th>
<th>PASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5.2 PROVISION OF EMERGENCY EXITS</td>
<td>PASS</td>
</tr>
<tr>
<td>Meets minimum exit provisions</td>
<td>PASS</td>
</tr>
<tr>
<td>Meets all other exit requirements</td>
<td>PASS</td>
</tr>
<tr>
<td>Meets requirements for additional exits</td>
<td>PASS</td>
</tr>
<tr>
<td>S5.2.3.1.A EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS</td>
<td>PASS</td>
</tr>
<tr>
<td>S5.3 EMERGENCY EXIT RELEASE</td>
<td>PASS</td>
</tr>
<tr>
<td>Forces to unlatch the emergency exits</td>
<td>PASS</td>
</tr>
<tr>
<td>Forces to open the emergency exits</td>
<td>PASS</td>
</tr>
<tr>
<td>S5.4 EMERGENCY EXIT OPENING</td>
<td>PASS</td>
</tr>
<tr>
<td>S5.5 EMERGENCY EXIT LABELING AND IDENTIFICATION</td>
<td>PASS</td>
</tr>
<tr>
<td>S5.5 TAPE REFLECTIVITY (49CFR 571.131)</td>
<td>NOT TESTED</td>
</tr>
</tbody>
</table>

**COMMENTS:** NONE
SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2006 Mid Bus Guide DW School Bus, NHTSA No. C60901.
DATA SHEET 2
PROVISION OF EMERGENCY EXITS

Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
NHTSA No.: C60901
Test Lab: MGA RESEARCH CORPORATION
Test Date: 03/02/2007

Seating Capacity: 28 (Including Driver)

<table>
<thead>
<tr>
<th>Number</th>
<th>Door Type</th>
<th>Height (mm)</th>
<th>Width (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear Exit Door</td>
<td>1415</td>
<td>925</td>
</tr>
</tbody>
</table>

Bus meets minimum emergency exit provision, based upon Table 1

PASS

COMMENTS: NONE
## DATA SHEET 2 (CONTINUED)
### PROVISION OF EMERGENCY EXITS

<table>
<thead>
<tr>
<th></th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PASS</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Comments: None

Recorded By: ___________________________
Approved By: _________________________  DATE: 03/02/2007
### DATA SHEET 3
**EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS**

<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2006 MID BUS GUIDE DW SCHOOL BUS</th>
<th>NHTSA No.:</th>
<th>C60901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Lab:</td>
<td>MGA RESEARCH CORPORATION</td>
<td>Test Date:</td>
<td>03/02/2007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>PASS</td>
</tr>
<tr>
<td>3</td>
<td>PASS</td>
</tr>
<tr>
<td>4</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**Comments:** NONE

---

Recorded By:______________________________  
Approved By:______________________________  DATE: 03/02/2007
DATA SHEET 4A
EMERGENCY EXIT IDENTIFICATION AND LABELING

Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007

<table>
<thead>
<tr>
<th>EMERGENCY EXIT LABELING - INTERIOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit Location</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Exit Description</td>
</tr>
<tr>
<td>Letter Height (cm)</td>
</tr>
<tr>
<td>Background Color</td>
</tr>
<tr>
<td>Location Inside</td>
</tr>
<tr>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPERATING INSTRUCTIONS - INTERIOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit Location</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Instructions</td>
</tr>
<tr>
<td>Letter Height (cm)</td>
</tr>
<tr>
<td>Letter Color</td>
</tr>
<tr>
<td>Background Color</td>
</tr>
<tr>
<td>Distance From Release (cm)</td>
</tr>
<tr>
<td>Reflective Tape Color</td>
</tr>
<tr>
<td>Reflective Tape Width (cm)</td>
</tr>
<tr>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>

COMMENTS: NONE

Recorded By: ________________________________
Approved By: ________________________________ DATE: 03/02/2007
### EMERGENCY EXIT LABELING - EXTERIOR

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Rear Door</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit Description</td>
<td>Emergency Door</td>
</tr>
<tr>
<td>Letter Height (cm)</td>
<td>5.05</td>
</tr>
<tr>
<td>Background Color</td>
<td>Yellow</td>
</tr>
<tr>
<td>Location Outside</td>
<td>Above Door</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

### OPERATING INSTRUCTIONS - EXTERIOR

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Rear Door</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions</td>
<td>Arrow</td>
</tr>
<tr>
<td>Letter Height (cm)</td>
<td>---</td>
</tr>
<tr>
<td>Letter Color</td>
<td>---</td>
</tr>
<tr>
<td>Background Color</td>
<td>---</td>
</tr>
<tr>
<td>Distance From Release (cm)</td>
<td>---</td>
</tr>
<tr>
<td>Reflective Tape Color</td>
<td>Yellow</td>
</tr>
<tr>
<td>Reflective Tape Width (cm)</td>
<td>2.58 cm</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

COMMENTS: NONE

Recorded By: ____________________________  DATE: 03/02/2007

Approved By: ____________________________  DATE: 03/02/2007
DATA SHEET 4 (CONTINUED)
EMERGENCY EXIT IDENTIFICATION AND LABELING

<table>
<thead>
<tr>
<th></th>
<th>DESCRIPTION</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Each required Emergency Exit is labeled with the words “Emergency Exit” or “Emergency Door” as appropriate in letters at least 5 cm high (2”) of a color that contrasts with its background.</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>2</td>
<td>Emergency Doors – The designation “Emergency Exit” or “Emergency Door” is located at the top of, or directly above the exit door on both inside and outside surfaces of the bus.</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>3</td>
<td>Roof Exits – The designation for roof exits is located on an inside surface of the exit, or within 30 cm (11.8”) of the roof exit opening.</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>4</td>
<td>Emergency Window Exits – The designation is located at the top of, or directly above, or at the bottom of the emergency window exit on both the inside and outside surfaces of the bus.</td>
<td><strong>N/A</strong></td>
</tr>
<tr>
<td>5</td>
<td>Exit Operating Instructions indicate all motions required to unlatch and open the exit, in letters at least 1 cm (.39”) high and of a color that contrast with its background and shall be located within 15 cm (5.9”) of the release mechanism on the inside surface of the bus.</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>6</td>
<td>Each required Emergency Exit opening is outlined around its perimeter with a 2.5 cm (1”) wide retroreflective tape of red, white, or yellow color.</td>
<td><strong>PASS</strong></td>
</tr>
</tbody>
</table>

COMMENTS: NONE

Recorded By: _____________________________

Approved By: ____________________________  DATE: 03/02/2007
DATA SHEET 5
TAPE REFLECTIVITY TEST

Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS  NHTSA No.: C60901
Test Lab: MGA RESEARCH CORPORATION  Test Date: 03/02/2007

_____ Color of retroreflective tape (white, red, or yellow)
_____ Glass bead retroreflective element material – Fill in Part A
_____ Prismatic retroreflective element material – Fill in Part B

SPECIFIC INTENSITY PER UNIT AREA
(Candela Per Foot Candle Per Square Foot)

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>Min. Req'd Intensity</th>
<th>Recorded Intensity</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A – Glass Bead</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part B - Prismatic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This section of tape passes the REFLECTIVITY requirement.  Yes___  No___

COMMENTS: NOT TESTED

Recorded By:______________________________

Approved By:______________________________  Date:
### DATA SHEET 6A
FORCE TESTS TO UNLATCH THE EMERGENCY EXITS - INTERIOR

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Exit Description</th>
<th>High/Low Force Area</th>
<th>Maximum Force Requirement Newtons</th>
<th>Actual Force Measured (N)</th>
<th>Motion(s) required to Release Exit</th>
<th>Actual Motion(s) to Release Exit</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear Door</td>
<td>Emergency Door</td>
<td>High</td>
<td>178</td>
<td>1. 22.3</td>
<td>Straight</td>
<td>Lift Handle Upward</td>
<td>PASS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. 21.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. 21.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Average: 21.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** NONE

Recorded By: ________________________

Approved By: ________________________  DATE: 03/02/2007
## DATA SHEET 6B
### FORCE TESTS TO UNLATCH THE EMERGENCY EXITS - EXTERIOR

**Test Vehicle:** 2006 MID BUS GUIDE DW SCHOOL BUS  
**Test Lab:** MGA RESEARCH CORPORATION  
**NHTSA No.:** C60901  
**Test Date:** 03/02/2007

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Exit Description</th>
<th>High/Low Force Area</th>
<th>Maximum Force Requirement Newtons</th>
<th>Actual Force Measured (N)</th>
<th>Motion(s) required to Release Exit</th>
<th>Actual Motion(s) to Release Exit</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear Door</td>
<td>Emergency Door</td>
<td>High</td>
<td>178</td>
<td>1. 72.2</td>
<td>Rotary</td>
<td>Turn Handle Counter Clockwise</td>
<td>PASS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. 75.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. 75.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Average: 74.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:** NONE

**Recorded By:**  
**Approved By:** Michael Jarecz  
**DATE:** 03/02/2007
## DATA SHEET 7A

### FORCE TESTS TO OPEN THE EMERGENCY EXITS - INTERIOR

**Test Vehicle:** 2006 MID BUS GUIDE DW SCHOOL BUS  
**Test Lab:** MGA RESEARCH CORPORATION  
**NHTSA No.:** C60901  
**Test Date:** 03/02/2007

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Exit Description</th>
<th>High/Low Force Area</th>
<th>Maximum Force Requirement Newtons</th>
<th>Actual Force Measured (N)</th>
<th>Motion(s) required to Open Exit</th>
<th>Actual Motion(s) to Open Exit</th>
<th>Passage of Ellipsoid or Parallelepiped</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear Door</td>
<td>Emergency Door</td>
<td>High</td>
<td>178</td>
<td>1. 26.7</td>
<td>Straight</td>
<td>Push Out</td>
<td>114x61x30 Parallelepiped</td>
<td>PASS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. 22.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. 22.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Average: 23.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe in the comments section if more than one force and motion are required to unlatch the exit.

**COMMENTS:** NONE

---

Recorded By: ____________________________  
Approved By: ____________________________  DATE: 03/02/2007
## DATA SHEET 7B
FORCE TESTS TO OPEN THE EMERGENCY EXITS - EXTERIOR

**Test Vehicle:** 2006 MID BUS GUIDE DW SCHOOL BUS  
**NHTSA No.:** C60901  
**Test Lab:** MGA RESEARCH CORPORATION  
**Test Date:** 03/02/2007

<table>
<thead>
<tr>
<th>Exit Location</th>
<th>Exit Description</th>
<th>High/Low Force Area</th>
<th>Maximum Force Requirement Newtons</th>
<th>Actual Force Measured (N)</th>
<th>Motion(s) required to Open Exit</th>
<th>Actual Motion(s) to Open Exit</th>
<th>Passage of Ellipsoid or Parallelepiped</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear Door</td>
<td>Emergency Door</td>
<td>High</td>
<td>178</td>
<td>1. 23.7</td>
<td>Straight</td>
<td>Pull Out</td>
<td>114x61x30 Parallelepiped</td>
<td>PASS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. 24.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. 23.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Average:</strong> 23.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe in the comments section if more than one force and motion are required to unlatch the exit.

**COMMENTS:** NONE

Recorded By: ________________________________  
Approved By: ________________________________  
DATE: 03/02/2007
<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exit(s) can be extended by a single person.</td>
</tr>
<tr>
<td>2</td>
<td>Each emergency exit door is equipped with a positive door opening device that meets the requirements (outlined in Section S5.4.1 (3) of FMVSS 217).</td>
</tr>
<tr>
<td>3</td>
<td>There is a 30 cm (11.81&quot;) wide clear aisle space for each side emergency door exit.</td>
</tr>
<tr>
<td>4</td>
<td>For flip-up seat adjacent to the side emergency door exit it automatically assumes and retain a vertical position when not in use, so that no portion of the seat bottom is within the 30 cm (11.81&quot;) aisle clearance space</td>
</tr>
<tr>
<td>5</td>
<td>There is no seat or barrier which extend past the side door opening</td>
</tr>
<tr>
<td>6</td>
<td>There is no obstruction of door latch mechanism for the rear emergency door.</td>
</tr>
</tbody>
</table>

COMMENTS: NONE

Recorded By: __________________________

Approved By: ________________________ DATE: 03/02/2007
## DATA SHEET 9
### WINDOW RETENTION TEST

<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2006 MID BUS GUIDE DW SCHOOL BUS</th>
<th>NHTSA No.:</th>
<th>C60901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Lab:</td>
<td>MGA RESEARCH CORPORATION</td>
<td>Test Date:</td>
<td>03/02/2007</td>
</tr>
</tbody>
</table>

1. **Test Window Identification:** Rear Door Upper Glass

2. Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc.: Fixed

3. Provide the horizontal and vertical glazing dimensions for each panel: 810 mm X 516 mm

4. Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria:
   - Max Displacement was Reached PASS
   - Glazing Shattered at 1262 N

5. Did the window pass the force tests to unlatch and open the exit after the completion of the retention test?

<table>
<thead>
<tr>
<th></th>
<th>Unlatch Force Measured (N)</th>
<th>Open Force Measured (N)</th>
<th>Pass/ Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>22.2</td>
<td>11.2</td>
<td>PASS</td>
</tr>
<tr>
<td>2.</td>
<td>22.1</td>
<td>15.1</td>
<td>PASS</td>
</tr>
<tr>
<td>3.</td>
<td>21.9</td>
<td>12.3</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** NONE

Recorded By: ________________________________  
Approved By: ________________________________  DATE: 03/02/2007
## WINDOW RETENTION TEST

**Test Vehicle:** 2006 MID BUS GUIDE DW SCHOOL BUS  
**NHTSA No.:** C60901

**Test Lab:** MGA RESEARCH CORPORATION  
**Test Date:** 03/02/2007

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test Window Identification:</td>
<td>Left Window 5</td>
</tr>
</tbody>
</table>
| 2 | Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc. | Vertical Sliding  
Not Emergency Exit |
| 3 | Provide the horizontal and vertical glazing dimensions for each panel. | 593 mm X 314 mm |
| 4 | Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria: | Max Displacement was Reached **PASS**  
Glazing Shattered at 1302 N |
| 5 | Did the window pass the force tests to unlatch and open the exit after the completion of the retention test? | Unlatch Force Measured (N)  
Open Force Measured (N)  
Pass/ Fail |
|   | NA | NA | NA |
|   | NA | NA | NA |
|   | NA | NA | NA |

**COMMENTS:** NONE

Recorded By: ________________________________  
Approved By: ________________________________  
DATE: 03/02/2007
# SECTION 4
## INSTRUMENTATION AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
<th>Model/Serial No.</th>
<th>Cal. Date</th>
<th>Next Cal. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Form</td>
<td>MGA</td>
<td>217</td>
<td>When Used</td>
<td>When Used</td>
</tr>
<tr>
<td>A/D Interface</td>
<td>Metrabyte</td>
<td>DAS-1802</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Sphere</td>
<td>MGA</td>
<td>Sphere – 1A</td>
<td>When Used</td>
<td>When Used</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-62736</td>
<td>01/29/07</td>
<td>07/29/07</td>
</tr>
<tr>
<td>Inclinometer</td>
<td>Digital</td>
<td>Pro 360 / Comp</td>
<td>10/04/06</td>
<td>04/04/07</td>
</tr>
<tr>
<td></td>
<td>Protractor</td>
<td>Lab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear Potentiometer</td>
<td>Ametek</td>
<td>P40A/0504-21782</td>
<td>10/30/06</td>
<td>04/30/07</td>
</tr>
<tr>
<td>Digital Calipers</td>
<td>Mitutoyo</td>
<td>CD-6&quot; cs/ 0441288</td>
<td>09/11/06</td>
<td>09/11/07</td>
</tr>
<tr>
<td>Steel Tape</td>
<td>Stanley</td>
<td>Powerlock / 278</td>
<td>09/26/06</td>
<td>03/26/07</td>
</tr>
<tr>
<td>Camera</td>
<td>Sony</td>
<td>DSC-S75</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Ellipsoid</td>
<td>MGA</td>
<td>ELLIP – 1A</td>
<td>When Used</td>
<td>When Used</td>
</tr>
<tr>
<td>Parallelepiped</td>
<td>MGA</td>
<td>PARA – 1A</td>
<td>When Used</td>
<td>When Used</td>
</tr>
<tr>
<td>Force Gauge</td>
<td>Dillon</td>
<td>AFG/DMLC</td>
<td>09/12/06</td>
<td>03/12/07</td>
</tr>
</tbody>
</table>
# SECTION 5

**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exterior Left Side View of School Bus</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>Exterior Right Front ¾ View of School Bus</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>Exterior Left Rear ¾ View of School Bus</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>Certification Label</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>Tire Placard</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td>Interior Front to Rear View Depicting Seating Arrangement</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>Interior Rear to Front View Depicting Seating Arrangement</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Rear Exit Door Identification (Outside View)</td>
<td>28</td>
</tr>
<tr>
<td>9</td>
<td>Rear Exit Door Identification (Inside View)</td>
<td>29</td>
</tr>
<tr>
<td>10</td>
<td>Rear Door Emergency Exit Parallelepiped Clearance</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>Loading Fixture</td>
<td>31</td>
</tr>
<tr>
<td>12</td>
<td>Retention Test of Left Side Window (Pre-Test)</td>
<td>32</td>
</tr>
<tr>
<td>13</td>
<td>Retention Test of Left Side Window (Post-Test)</td>
<td>33</td>
</tr>
<tr>
<td>14</td>
<td>Retention Test of Rear Door Window (Pre-Test)</td>
<td>34</td>
</tr>
<tr>
<td>15</td>
<td>Retention Test of Rear Door Window (Post-Test)</td>
<td>35</td>
</tr>
</tbody>
</table>
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Procedure: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007

Exterior Right Front ¾ View of School Bus
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Procedure: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007

Exterior Left Rear ¾ View of School Bus
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Procedure: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS  
NHTSA No.: C60901  
Procedure: MGA RESEARCH CORPORATION  
Test Date: 03/02/2007

Tire Placard

SUITABLE TIRE-RIM CHOICE
FRONT: LT225/75R16D TIRES, 16X6.5J RIMS, @ 450 KPA,
(65 PSI) COLD Single
INTERMEDIATE (1):

INTERMEDIATE (2):
REAR: LT225/75R16D TIRES, 16X6.5J RIMS, @ 450 KPA,
(65 PSI) COLD Dual
Interior Front to Rear View Depicting Seating Arrangement
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS  
NHTSA No.: C60901  
Procedure: MGA RESEARCH CORPORATION  
Test Date: 03/02/2007  

Interior Rear to Front View Depicting Seating Arrangement
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
NHTSA No.: C60901

Procedure: MGA RESEARCH CORPORATION
Test Date: 03/02/2007

Rear Exit Door Identification (Outside View)
Rear Exit Door Identification (Inside View)
Rear Door Emergency Exit Parallelepiped Clearance
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Procedure: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007

Loading Fixture
Retention Test of Left Side Window (Pre-Test)
Retention Test of Left Side Window (Post-Test)
Test Vehicle: 2006 MID BUS GUIDE DW SCHOOL BUS
Procedure: MGA RESEARCH CORPORATION
NHTSA No.: C60901
Test Date: 03/02/2007

Retention Test of Rear Door Window (Pre-Test)
Retention Test of Rear Door Window (Post-Test)
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear Emergency Door Upper Window</td>
<td>37</td>
</tr>
<tr>
<td>2</td>
<td>Left Rear Window</td>
<td>38</td>
</tr>
</tbody>
</table>
Test Desc: FMVSS 217 Window Retention
Component ID: Mid Bus
Rear Door Upper

Displacement (mm) vs. Time (sec)

Time (sec)
0 5 10 15 20 25 30 35 40
Displacement (mm)
0 5 10 15 20 25 30

Force (N) vs. Time (sec)

Time (sec)
0 5 10 15 20 25 30 35 40
Force (N)
-250 0 250 500 750 1000 1250 1500
Test Desc: FMVSS 217 Window Retention  
Component ID: Mid Bus  
Left Window 5  

![Displacement (mm) vs. Time (sec)](image1)

![Force (N) vs. Time (sec)](image2)