REPORT NUMBER: 221-MGA-2011-002

SAFETY COMPLIANCE TESTING FOR FMVSS NO.: 221 SCHOOL BUS BODY JOINT STRENGTH

2011 GIRARDIN MICRO BIRD SCHOOL BUS
NHTSA NO.: CB0903

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

TEST DATES: NOVEMBER 8, 2011 AND DECEMBER 15, 2011

FINAL REPORT DATE: JANUARY 18, 2012

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Prepared by: _____ Date: January 18, 2012
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FINAL REPORT ACCEPTED BY:

Edward E. Chan

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15. Supplementary Notes

16. Abstract

Compliance tests were conducted on the subject 2011 Girardin Micro Bird School Bus, NHTSA No.: CB0903, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No.: TP-221-03 for the determination of Compliance with FMVSS 221 requirements.

Test Failure: During the body joint test, sample MLRCMI182BAH, removed from the interior mid roof panel, failed to hold the body panel to the member it was joined when subjected to a force of 60 percent of the tensile strength of the weakest joined body panel, as required by S5.1 of FMVSS 221. With the approval of the COTR, a second sample was provided by the manufacturer. This sample, representative of the same section of the vehicle was provided with the manufacturers proposed remedy applied. This sample was tested according to FMVSS 221 and met the minimum performance requirements.

Note: See Test Summary Section for complete details under which compliance was determined.

17. Key Words Compliance Testing Safety Engineering FMVSS 221		*18. Distribution Statement* Copies of this report are available from: NHTSA, Technical Information Services (TIS) Mail Code: NPO-411 1200 New Jersey Avenue, S.E. Washington, D.C. 20590 FAX No.: (202) 493-2833 E-mail: tis@dot.gov	
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Form DOT F1700.7 (8-72)

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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2011 Girardin Micro Bird School Bus, NHTSA No.: CB0903, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-221-03 to determine compliance with the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 221, “School Bus Body Joint Strength”.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No.: DTNH22-08-D-00075.

SECTION 2
TEST PROCEDURE

The 2011 Girardin Micro Bird School Bus, NHTSA No.: CB0903 was subjected to FMVSS 221 testing.

The joint samples were selected in conjunction with the Contract Officer's Technical Representative (COTR). One 12 x 48 inch sample was selected from the Bus. The sample was removed from the bus using a metal shear and/or SawzAll type of cutter. A second sample, identified as 'remedy sample', was provided by the manufacturer with the proposed remedy applied to it and at the approval of the COTR.

After the sample was removed from the bus, the sample was cut to the specific selected dimensions. The specimen was carefully shaped to the final size using supports as specified in FMVSS 221. Additionally, temperature monitoring stickers were placed at the specified locations of the samples to ensure the sample temperature did not exceed 140°F during the shaping operation.

The samples were tested using the MGA 50,000 pound tensile tester. The force applied was measured directly at the upper clamp. The upper clamp was attached to the load cell and the lower clamp was attached to the load frame.

The gripping devices were fabricated from 3 x 3 inch angle iron. Slots were milled on the face that mounted to the machine, in order to allow for fore and aft movement of the clamps. This allowed the specimens to be fixtured so that the axis of the test specimen coincided with the centerline axis of the tensile tester heads.

The test specimens were inserted in between the grips, and the grips were then bolted together using 7 size ½ inch bolts. The bolts were inserted through one grip, through the test specimen, and then through the other grip. This prevented any slipping of the test sample in the grips, while fully distributing the clamping force across the entire end width of the test sample.

The rate of load application was ¼ inch per minute. The force and displacement were recorded and displacement vs. time was plotted to monitor the displacement rate.

SECTION 3
TEST DATA SUMMARY

Two samples were tested for this vehicle. One test sample was selected from the interior middle section of the roof. A second sample, identified as 'remedy sample', was provided by the manufacturer with the proposed remedy applied to it and at the approval of the COTR.

Joint Location	Joint Specimen I.D.	Maximum Load (N)	60% of Material Strength (N)	PASS/FAIL
Interior Roof (Middle)	MLRCMI182BAH	8,660	31,054	**FAIL**
Interior Roof (Middle)	Remedy Sample	44,369	27,193	**PASS**

The maximum forces measured, and the displacement rate used, are provided in Section 7.
The photographs taken from the sample are provided in Section 6 and Section 8.

SECTION 4
COMPLIANCE TEST DATA

The following data sheets document the results of FMVSS 221 testing on the 2011 Girardin Micro Bird School Bus, NHTSA No.: CB0903.

DATA SHEET 1

ADMINISTRATIVE DATA SHEET

Test Vehicle:	**2011 Girardin Micro Bird School Bus**	NHTSA No.:	**CB0903**
Test Lab:	**MGA Research Corporation**	Test Dates:	**11/08/11 – 12/15/11**

INCOMPLETE VEHICLE (IF APPLICABLE)

Manufacturer:	Ford Motor Company
VIN:	1FDEE3FLXBDA10617
Certification Date:	09/10

COMPLETED VEHICLE (SCHOOL BUS)

Manufacturer:	Corp. Micro Bird, Inc.
Make/Model:	Girardin
VIN:	1FDEE3FLXBDA10617
NHTSA No.:	CB0903
Color:	Yellow
GVWR:	5,216 kg / 11,500 lb
Build Date:	11/10
Certification Date:	11/10

DATES

Vehicle Receipt:	12/09/10
Start of Compliance Test:	11/08/11
Completion of Compliance Test:	12/15/11

COMPLIANCE TEST:
All tests were performed in accordance with the references outlined in TP-221-03.

Recorded By:_____

Approved By:_____ Date: 12/15/11

DATA SHEET 2

SUMMARY OF DATA

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Dates: **11/08/11 and 12/15/11**

Joint Specimen I.D.	Joint Location	Joint Load Reqmt (60%) (N)	Max. Load at Joint Separation (N)	Calculated Material Strength (N)	PASS/ FAIL
MLRCMI182BAH	Interior Roof (Mid)	31,054	8,660	51,757	**FAIL**
Remedy Sample	Interior Roof (Mid)	27,193	44,369	45,322	**PASS**

Comments: None

Recorded By:_____

Approved By:_____ Date: 12/15/11

DATA SHEET 3

JOINT STRENGTH WHEN ASTM MATERIAL PROPERTIES ARE KNOWN

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/08/11**

Specimen Description:	Interior Roof (Mid)		
Joint Number:	MLRCMI182BAH	Test Number:	Q11476

	Weaker Member	Stronger Member
Material	Aluminum ASTM B19 5052-1-144	N/A
Tensile Strength (MPa)	262.0	N/A
Gage/Thickness (mm)	1.02	N/A
Fastener Holes (No./Diameter – mm.)	2 / 4.76	N/A
Net Area (Sq. mm.)	197.5	N/A
Material Strength (N)	51,757	N/A
60% of Material Strength (N)	31,054	N/A
Maximum Load From Tensile Test of Joint (N)	8,660	N/A
PASS/FAIL	FAIL	N/A

Comments: None

Recorded By:_____

Approved By:_____ Date: 11/08/11

DATA SHEET 3 (CONT.)

JOINT STRENGTH WHEN ASTM MATERIAL PROPERTIES ARE KNOWN

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **12/15/11**

Specimen Description:	Interior Roof (Mid)		
Joint Number:	Remedy Sample	Test Number:	Q11514

	Weaker Member	Stronger Member
Material	Aluminum ASTM B19 5052-1-144	N/A
Tensile Strength (MPa)	262.0	N/A
Gage/Thickness (mm)	0.99	N/A
Fastener Holes (No./Diameter – mm.)	6 / 4.76	N/A
Net Area (Sq. mm.)	173.0	N/A
Material Strength (N)	45,322	N/A
60% of Material Strength (N)	27,193	N/A
Maximum Load From Tensile Test of Joint (N)	44,369	N/A
PASS/FAIL	**PASS**	N/A

Comments: None

Recorded By:_____

Approved By:_____ Date: 12/15/11

SECTION 5

INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2011 Girardin Micro Bird School Bus** NHTSA No.: **CB0903**
Test Lab: **MGA Research Corporation** Test Date: **11/08/11**

Equipment	Description	Model / Serial No.	Cal. Date	Next Cal. Date
Load Cell	Interface	1210AF-25K-B / 137778	11/08/11	05/08/12
Linear Potentiometer	Ametek	P-25A / 1202-19368	09/02/11	03/02/12
Steel Tape	Stanley	Powerlock / 596	08/04/11	02/04/12
Temp. Stickers	McMaster Carr	60° C / 5952K21	One Time Use	---

SECTION 6

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Test Vehicle:	**2011 GIRARDIN MICRO BIRD SCHOOL BUS**	NHTSA No.:	**CB0903**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Dates:	**11/8/11 – 12/15/11**

Front View of School Bus

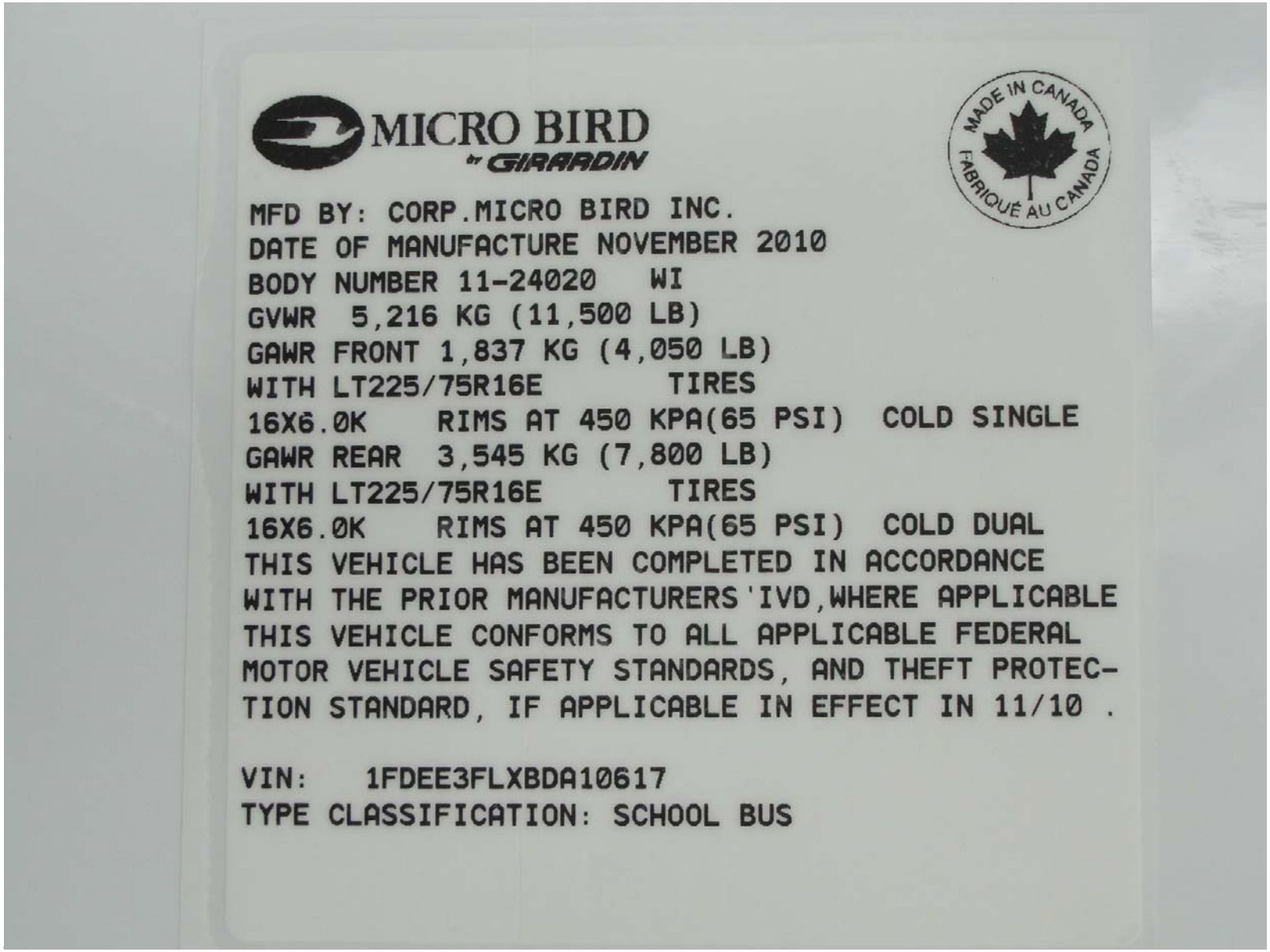
Test Vehicle:	**2011 GIRARDIN MICRO BIRD SCHOOL BUS**	NHTSA No.:	**CB0903**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Dates:	**11/8/11 – 12/15/11**

Rear View of School Bus

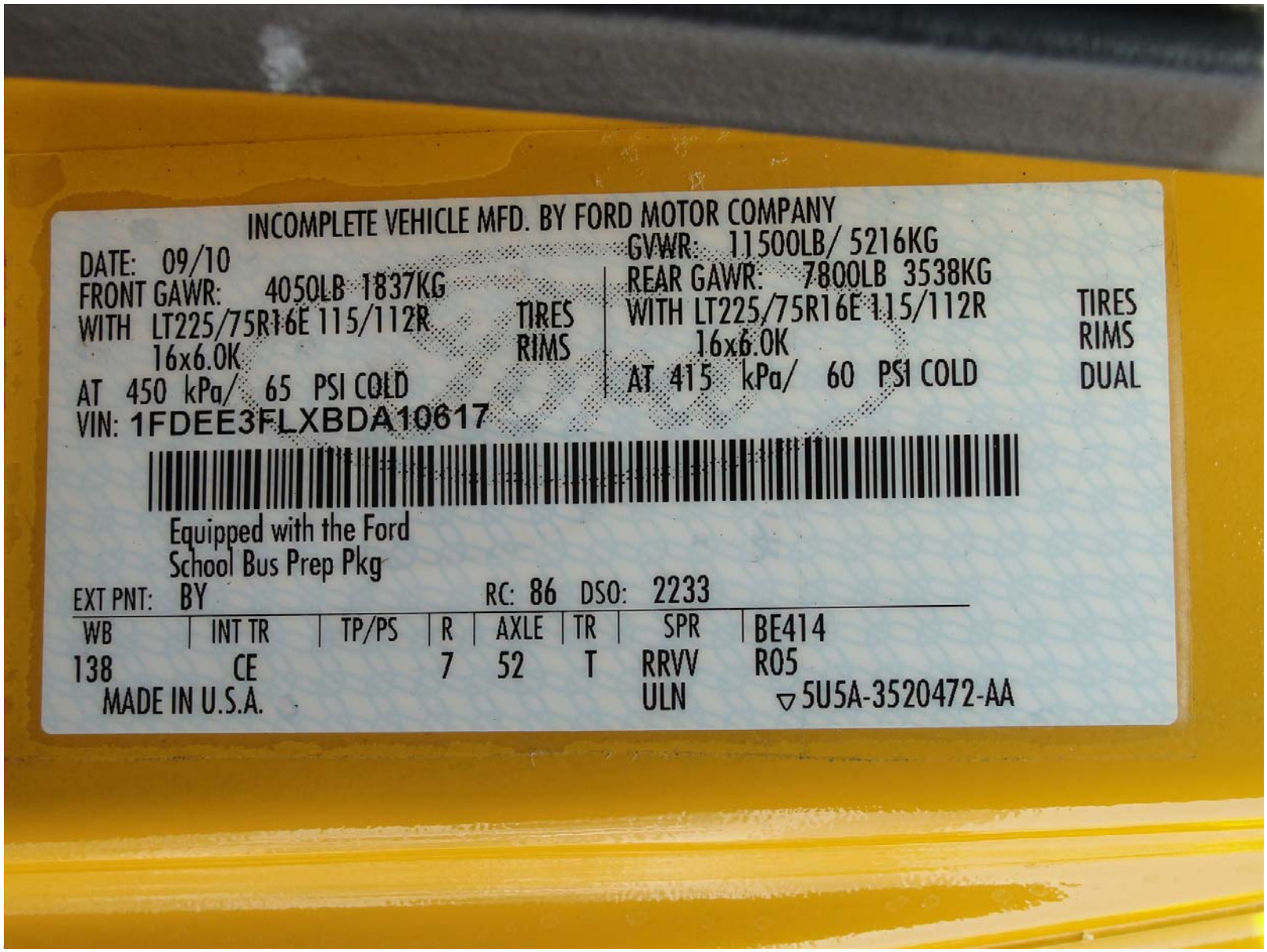
Test Vehicle:	**2011 GIRARDIN MICRO BIRD SCHOOL BUS**	NHTSA No.:	**CB0903**
Test Lab:	**MGA RESEARCH CORPORATION**	Test Dates:	**11/8/11 – 12/15/11**

Left Side View of School Bus

Right Side View of School Bus



Certification Label

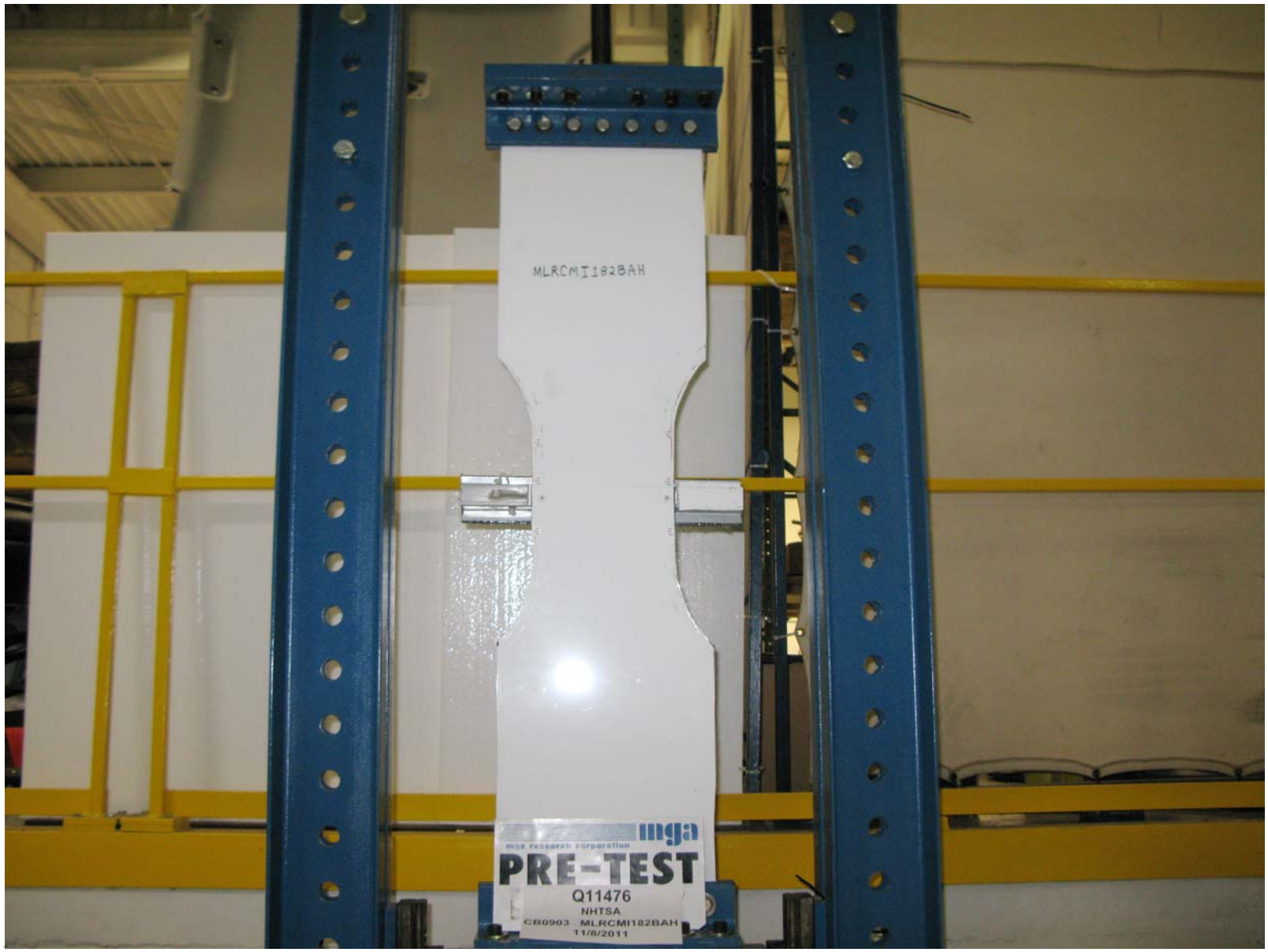


Incomplete Certification Label

Vehicle Interior View Front to Rear

Vehicle Interior View Rear to Front

Location of Joint ID Number MLRCMI182BAH



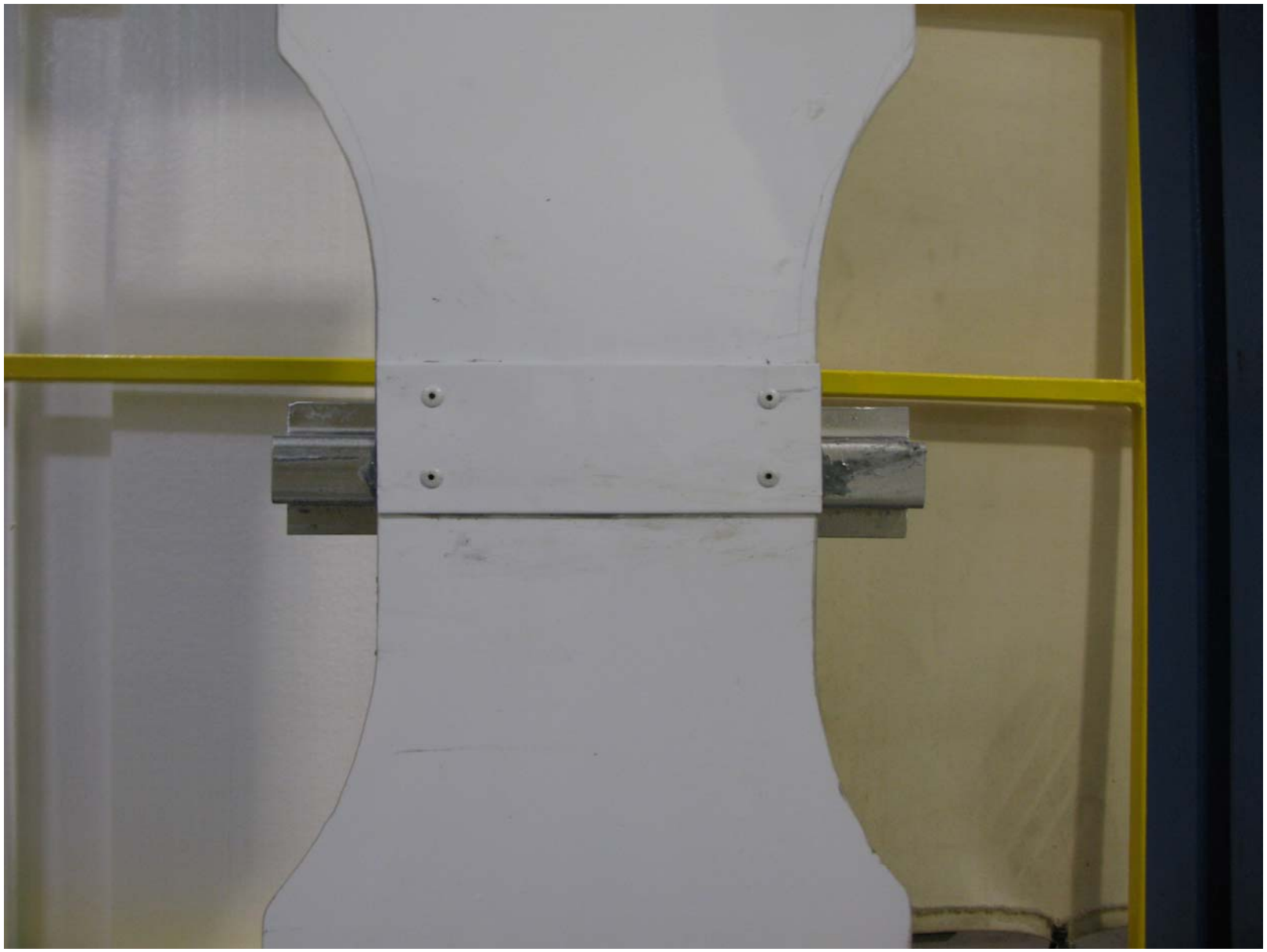
Pre-Test of Joint ID Number MLRCMI182BAH

Post-Test of Joint ID Number MLRCMI182BAH

Post-Test of Joint ID Number MLRCMI182BAH, Close Up View

Pre-Test of Joint ID Remedy Sample

Post-Test of Joint ID Remedy Sample



Post-Test of Joint ID Remedy Sample, Close Up View

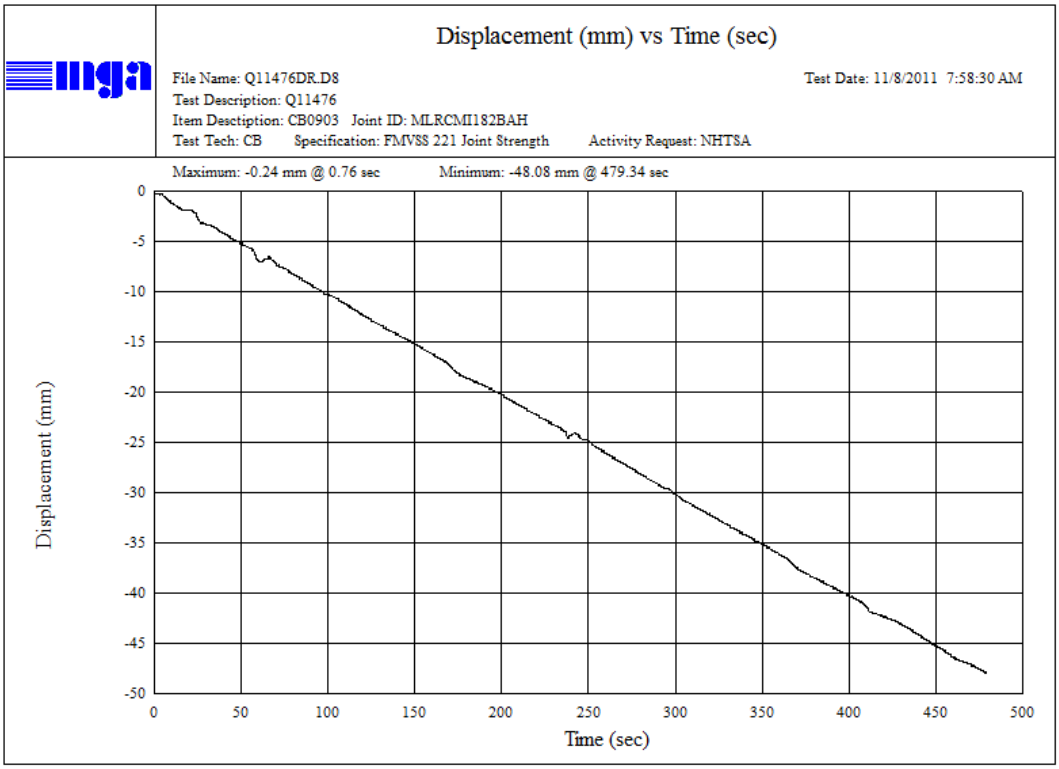
SECTION 7

TEST PLOTS

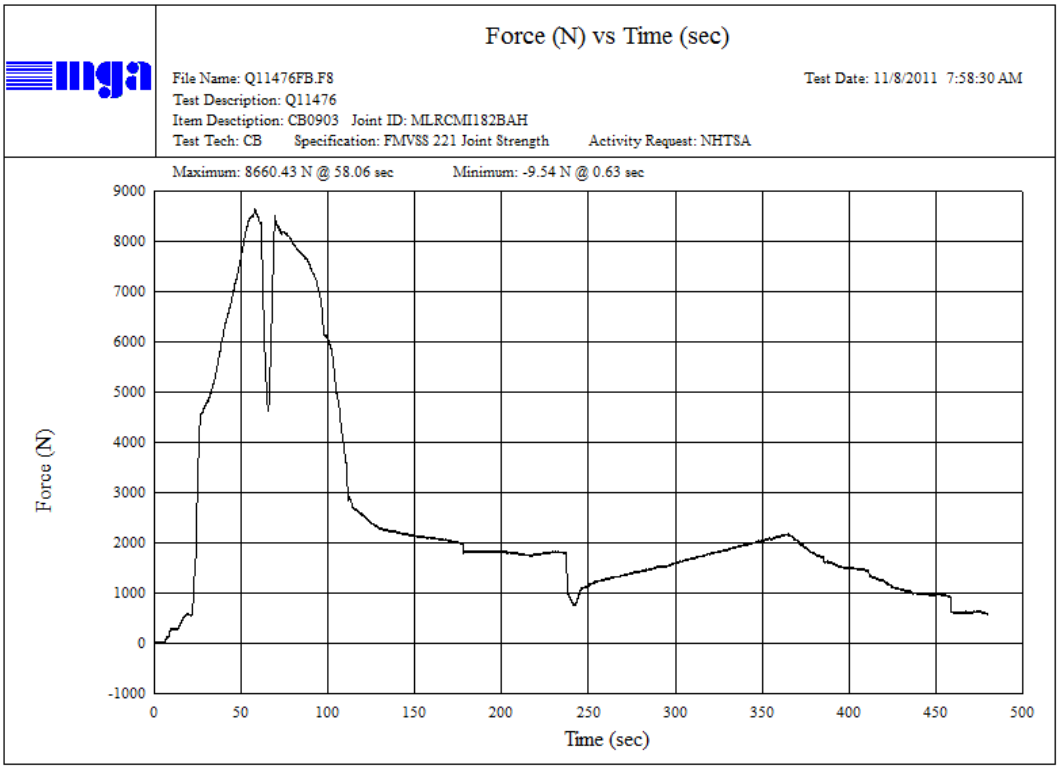
TABLE OF TEST PLOTS

SECTION 7 (CONT.)

TEST PLOTS



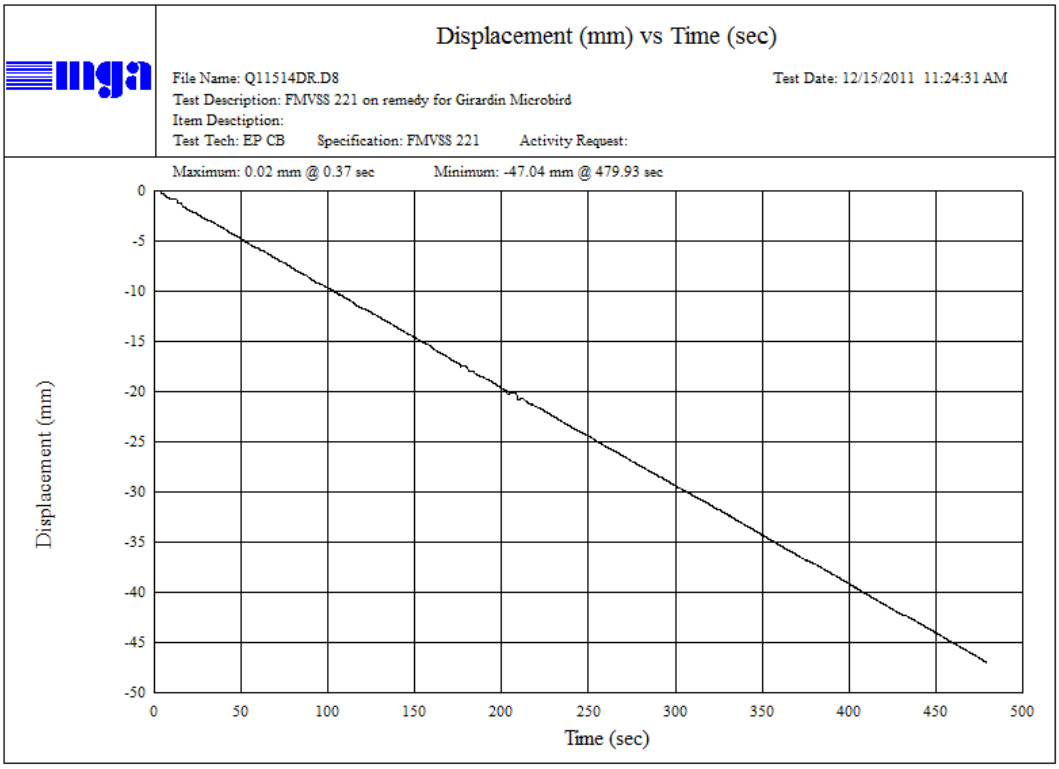
Joint Strength, ID Number MLRCMI182BAH, Displacement vs. Time



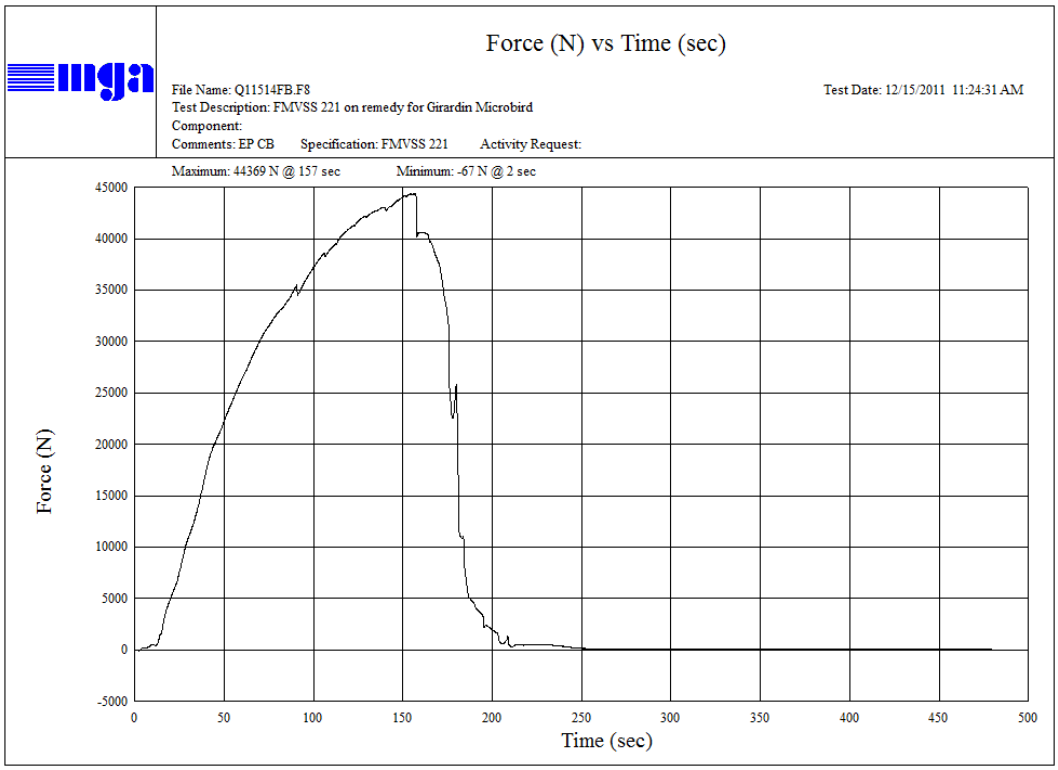
Joint Strength, ID Number MLRCMI182BAH, Force vs. Time

SECTION 7 (CONT.)

TEST PLOTS



Joint Strength, ID Remedy Sample, Displacement vs. Time

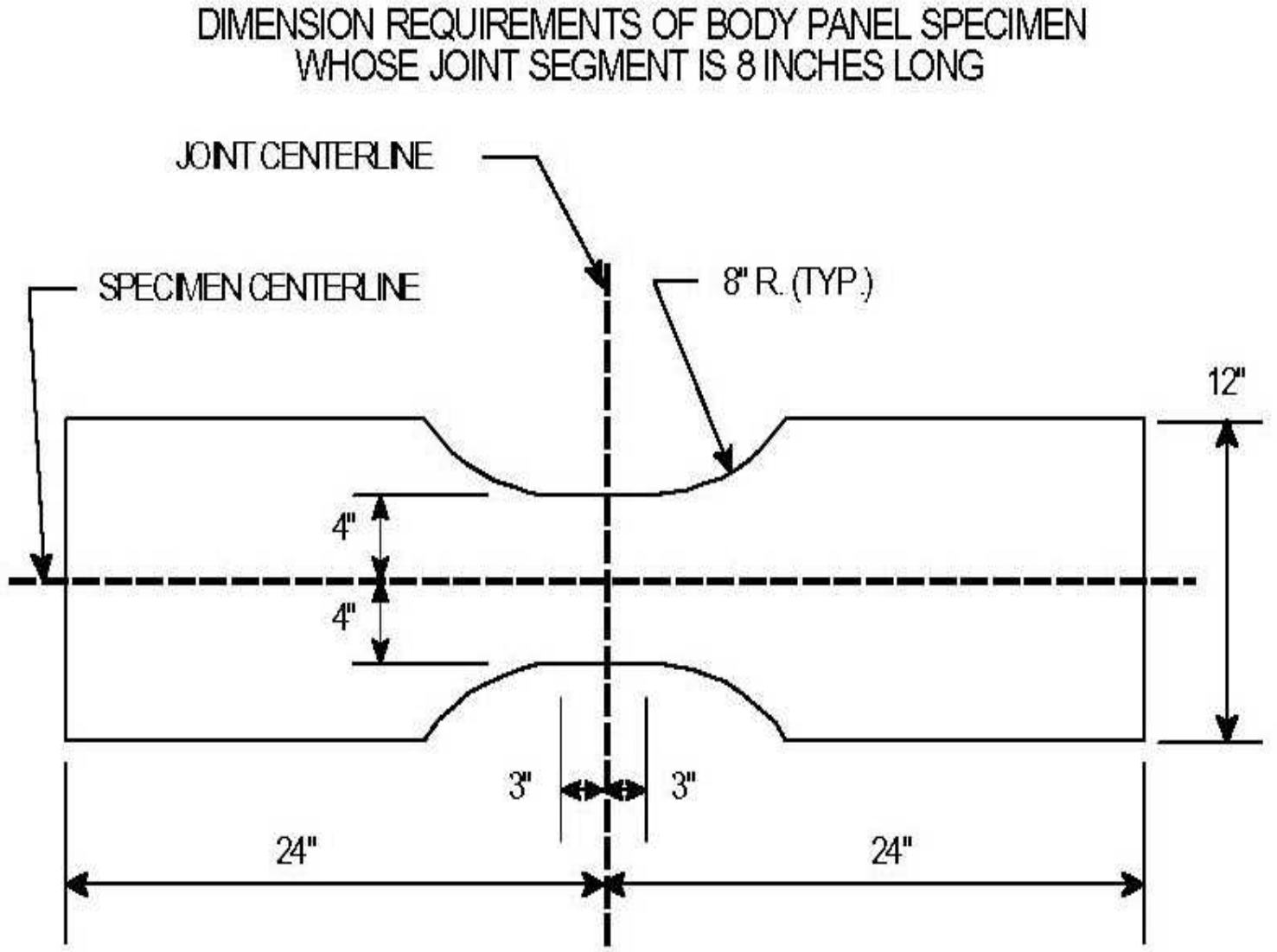


Joint Strength, ID Remedy Sample, Force vs. Time

SECTION 8

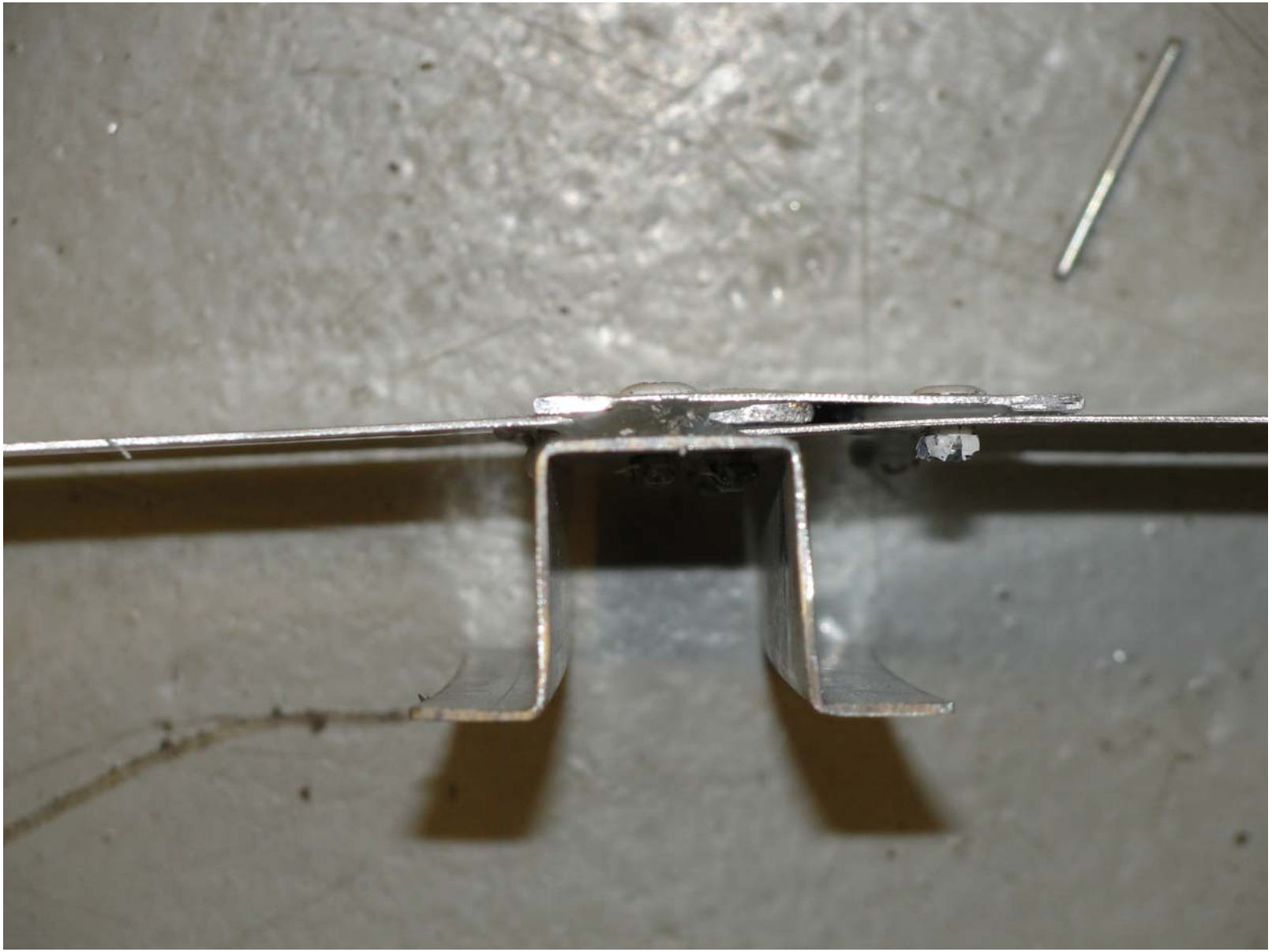
JOINT CONFIGURATIONS

TABLE OF PHOTOGRAPHS



Typical Test Sample Configuration

View of Joint ID Number MLRCMI182BAH



View of Joint ID Remedy Sample

SECTION 9

LABORATORY NOTICE OF TEST FAILURE TO OVSC

mga research corporation

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	FMVSS 221	Test Date:	11/8/2011
Test Vehicle:	2011 Girardin Micro Bird	Test Lab:	MGA Research Corp.
NHTSA No.:	CB0903	Project Engineer:	Eric Peschman
Contract No.:	DTNH22-08-D-00075	Delivery Order No.:	3
MFR.:	Girardin	VIN:	1FDEE3FLXBDA10617
Build Date:	11/2011		

TEST FAILURE DESCRIPTION

During the body joint test, sample MLRCMI182BAH, removed from the interior mid roof panel, failed to hold the body panel to the member it was joined when subjected to a force of 60 percent of the tensile strength of the weakest joined body panel, as required by S5.1 of FMVSS 221.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S5.1: Except as provided in S5.2, each body panel joint, including small, curved, and complex joints, when testing in accordance with the procedure of S6, shall hold the body panel to the member to which it is joined when subjected to a force of 60 percent of the tensile strength of the weakest joined body panel determined pursuant to S6.2.

Remarks: No remarks.

Notification to NHTSA (COTR): Edward Chan

Date: 11/8/11

By: _____