FMVSS 301 Type Side MDB Impact 53.93 kph
TRC Inc. Test No. 190619

Prepared By:
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Final Report
June 2019

Prepared for:
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Test Performed by: Mike Postle, Engineering Technician

Report Approved June 25, 2019

Kristi Hill-Smith
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Section 1

Test Summary

Purpose and Test Procedure

Purpose

The purpose of this test was to determine the response of the subject vehicle, a 2019 Chevrolet Silverado, relative to the performance requirements of FMVSS 301 Type, “Fuel System Integrity” in the 53.91 kph (target speed) impact test mode.

Test Procedure

This test was conducted according to instructions provided by All Terrain Conversions, LLC., using NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-214D-09 as a guide. Data was obtained relative to FMVSS 301 Type, “Fuel System Integrity” performance.

This vehicle crash test was conducted for All Terrain Conversions, LLC. by Transportation Research Center Inc. (TRC Inc.) to determine vehicle response in the FMVSS 301 Type left side moving deformable barrier impact mode.

The subject vehicle, 2019 Chevrolet Silverado was equipped with a 6-cylinder inline engine and an auto transmission. The vehicle's test weight was 2529.2 kg. The vehicle was impacted by the moving deformable impactor on June 19, 2019. The moving deformable impactor’s impact speed was 53.93 km/h. The moving deformable impactor’s weight was 1367.8 kg. The moving deformable impactor was equipped with a Plascore barrier face.

The vehicle was instrumented to record data from one (1) longitudinal axis accelerometers, eleven (11) lateral axis accelerometers and one (1) vertical axis accelerometers.

The moving deformable barrier was instrumented to record data from two (2) longitudinal axis accelerometers, two (2) lateral axis accelerometers and one (1) vertical axis accelerometers.

The test was filmed by eight (8) high-speed digital motion picture cameras operating at 1000 frames per second and one (1) real time panning camera operation at 30 frames per second.

Following the impact, 0 ounces of fluid spilled from the vehicle's fuel system prior to the static rollover test or during the static rollover test.

Section 1.0 contains the general test and vehicle information. Section 2.0 contains the motion picture camera information. Appendix A contains the pre-test and post-test still photographs. Appendix B contains data plots. Appendix C contains the barrier certification.

Data Acquisition Explanations

Left Lower A-Pillar AY Y-axis acceleration data channel failed to record any valid data throughout the event.

Left Middle A-Pillar AY Y-axis acceleration data channel failed to record any valid data after approximately 13.0 milliseconds.

Left Sill B-Pillar AY Y-axis acceleration data channel failed to record any valid data after approximately 181.0 milliseconds.

Left Middle B-Pillar AY Y-axis acceleration data channel failed to record any valid data after approximately 106.0 milliseconds.

Front Seat Track AY Y-axis acceleration data channel failed to record any valid data throughout the event.

Crash Test Summary

Test Type:	FMVSS 301 Type Side Impact		
Test Date:	June 19, 2019		
Test Time:	11:07		
Ambient Temperature at Impact Area:	21.8° C (71.2° F)		
Vehicle:	2019 Chevrolet Silverado		
Vehicle Test Weight:	2529.2 kg		
Impact Angle: [1]	27°		
Impact Velocity: [2]	Primary	33.51 mph	53.93 kph
	Secondary	33.50 mph	53.92 kph
Number of Cameras:			
High-speed:	8		
Real Time Documentary:	1		

[1] With respect to tow track centerline

[2] Speed trap measurement (±: .08 km/h accuracy)

Test Vehicle Information

Vehicle Manufacturer:		General Motors LLC		
Year/Make/Model:		2019 Chevrolet Silverado		
Body Style:		Truck		
VIN:		1GCRWAEH5KZ215902		
Color:		White		
Engine Data:				
Type:		V		
Cylinders:		6		
Displacement (L):		4.3		
Transmission Data:		6 Speed Automatic		
		Rear Wheel Drive		
Date vehicle received:		6/10/2019		
Odometer reading (mi):		244		
Accessories:				
Power steering		Yes	Automatic transmission	Yes
Power brakes		Yes	Automatic speed control	No
Power seats		No	Tilting steering wheel	Yes
Power windows		Yes	Telescoping steering wheel	No
Tinted glass		Yes	Air conditioning	Yes
AM/FM Radio		Yes	Anti-lock brakes	Yes
Clock		Yes	Rear window defroster	No
Other:		None		
Certification data from unmodified vehicle's label: [1]				
Vehicle manufactured by:		General Motors LLC		
Date of manufacture:		N/A		
VIN:		1GCRWAEH5KZ215902		
GVWR:		N/A		
GAWR:	Front	N/A		
	Rear:	N/A		

[1] Vehicle does not have a certification data label

Test Vehicle Information, Continued

Tires on vehicle (mfr., line, size):	Front:	General, Grabber, 255/70R17
	Rear:	General, Grabber, 255/70R17
	Spare:	General, Grabber, 255/70R17
Tire pressure with maximum capacity vehicle load (kPa):	Front:	N/A
	Rear:	N/A
Type of seats:	Front:	Bucket
	Rear:	N/A
Type of seat backs:	Front:	Manual Adjustable
	Rear:	N/A
Location of "Recommended Tire Pressure" label: [1]		N/A
Data from unmodified vehicle's "Recommended Tire Pressure" label:		
Recommended tire size:	Front:	N/A
	Rear:	N/A
	Spare:	N/A
Recommended cold tire pressure (kPa):	Front:	N/A
	Rear:	N/A
	Spare:	N/A
Seating capacity:[2]	Front:	N/A
	Rear	N/A
	Total	N/A
"As tested" tire pressure (kPa):	Front:	248
	Rear:	248
Vehicle capacity weight (kg): [1]	N/A	

[1] Vehicle does not have a recommended tire pressure label

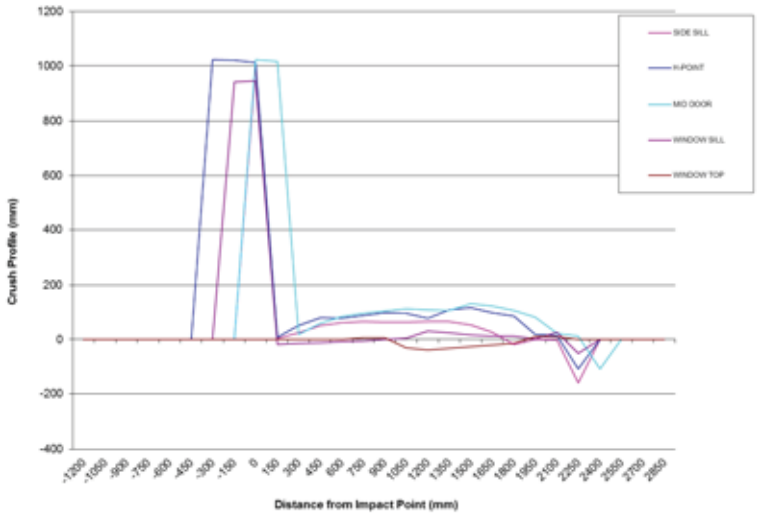
[2] Seating Capacity and Vehicle capacity weight per certification label, All-Terrain Conversions LLC has altered the vehicle to 2 in the front with wheelchair accessibility.

Weight of test vehicle as received:			
Right front (kg):	611.4	Right rear (kg):	459.0
Left front (kg):	708.8	Left rear (kg):	533.8
Total front weight (kg):	1320.2	57.1% of total vehicle weight	
Total rear weight (kg):	992.8	42.9% of total vehicle weight	
Total test weight (kg):	2313.0		
Weight of test vehicle with required dummies:			
Right front (kg):	837.2	Right rear (kg):	317.2
Left front (kg):	512.2	Left rear (kg):	862.6
Total front weight (kg):	1349.4	53.4% of total vehicle weight	
Total rear weight (kg):	1179.8	46.6% of total vehicle weight	
Total test weight (kg):	2529.2		
Location of ballast secured in vehicle:		Steel plate mounted in cargo bed	
Weight of ballast secured in vehicle:		117.6 kg	
Components removed to meet target test weight:		None	

Post-Impact Vehicle Data

Vehicle:	2019 Chevrolet Silverado	
Door Opening:		
	Left	Right
Front:	No	No
Rear:	No	No
MDB IMPACT POINT DATA:		
Horizontal Offset	1 mm up	
Vertical Offset	4 mm left	
Seat Movement:		
	Seat back failure	Seat shift
Front:	None	None
Rear:	N/A	N/A
Glazing Damage:		
Windshield:	None	
Side window:	Driver shattered out	
Rear window:	Broken during front impact performed on 6/17/2019	
Pillar Separation:	None	
Sill Separation:	None	
Other Notable Impact Effects:	Restrike vehicle 3rd impact	

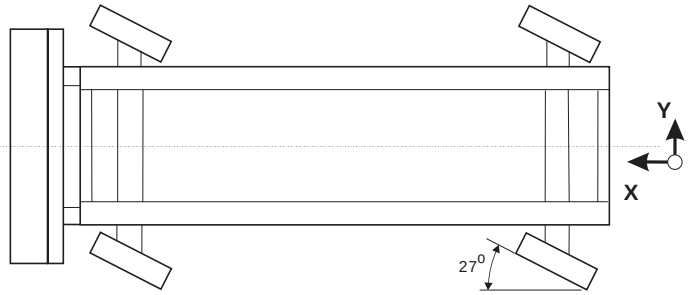
Vehicle Exterior Crush



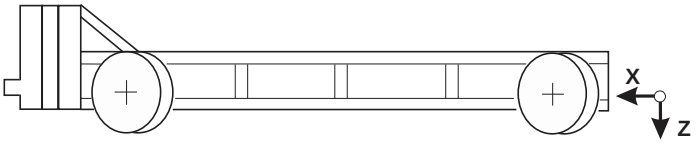
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-300		1022					---[1]					---[1]			
-150		1021		940			---[1]		---[1]			---[1]		---[1]	
0	997	1012	1022	945		---[1]	---[1]	---[1]	---[1]		---[1]	---[1]	---[1]	---[1]	
150	971	1005	1016	958		966	997	---[1]	977		5	8	---[1]	-19	
300	958	1005	1006	946		933	953	988	961		25	52	18	-15	
450	958	1008	1004	943		906	929	944	956		52	79	60	-13	
600	959	1011	1006	960		897	933	921	969		62	78	85	-9	
750	959	1014	1008	965	706	894	926	912	971	700	65	88	96	-6	6
900	959	1016	1011	971	725	894	918	906	972	718	65	98	105	-1	7
1050	958	1017	1012	976	739	894	922	900	972	771	64	95	112	4	-32
1200	957	1018	1013	982	742	892	940	905	952	782	65	78	108	30	-40
1350	955	1015	1013	984	745	890	907	906	959	778	65	108	107	25	-33
1500	950	1012	1011	984	747	898	897	881	967	773	52	115	130	17	-26
1650	945	1009	1008	983	747	920	910	885	970	767	25	99	123	13	-20
1800	939	1004	1004	983	746	958	919	896	971	761	-19	85	108	12	-15
1950	938	998	999	982	741	938	980	918	980	732	0	18	81	2	9
2100	907	969	993	946	712	909	955	970	919	701	-2	14	23	27	11
2250	922	986	964	972		1081	1094	953	1022		-159	-108	11	-50	
2400			983					1092					-109		

[1] Missing measurements post test

MDB Test Information



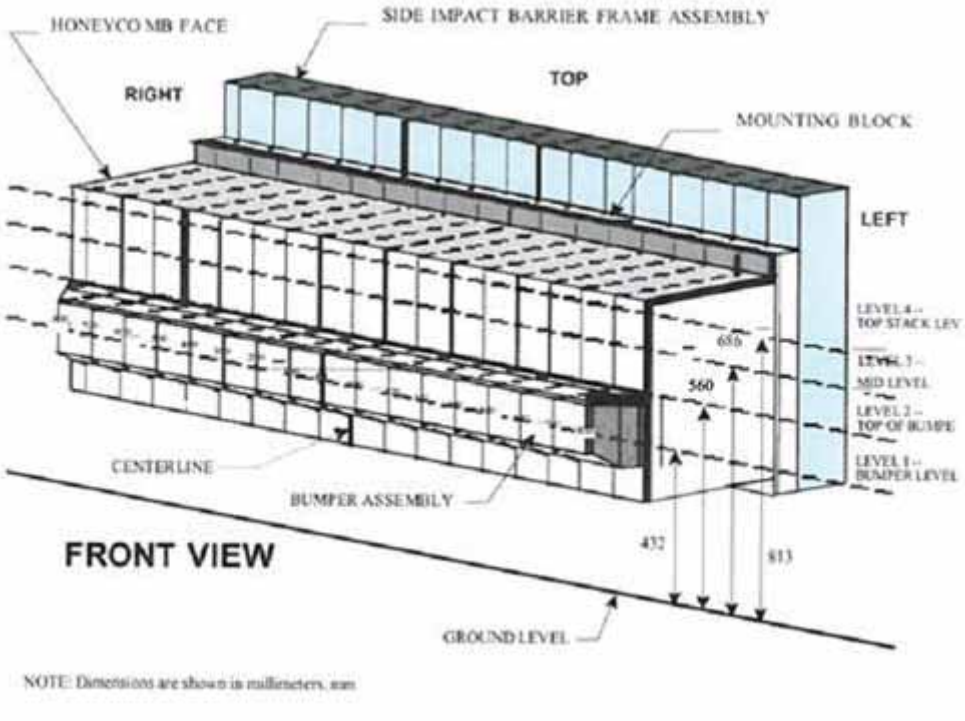
TOP VIEW



SIDE VIEW

Test Setup:		
Temperature (°F)	71.2	
Velocity (mph)	Intended: 53.91 +/- 0.5	
	Actual: 53.93	
Tire Pressure (kPa)	207	
Weight of Moving Barrier (kg):	Right Front:	453.4
	Left Front:	332.2
	Right Rear:	233.4
	Left Rear:	348.8
	Total Front Weight	785.6
	Total Rear Weight	582.2
	Total Test Weight:	1367.8
Moving Barrier Center of Gravity (mm)	1103	
Vehicle Track Width (mm)	1252	
Vehicle Wheelbase (mm)	2591	

Exterior Static Crush for Impactor Face



	Distance Right of Center								C/L	Distance Left of Center							
Stack Level	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Level 1	202	182	159	141	129	127	127	125	123	121	121	120	120	120	133	164	166
Level 2	132	119	94	81	75	72	70	69	67	66	66	65	65	65	68	88	107
Level 3	97	59	55	56	44	43	17	14	14	13	13	15	21	27	36	60	101
Level 4	124	63	59	36	38	52	77	48	31	30	32	34	40	42	54	81	118

Reference: + X = Forward
+ Y = To Right
+ Z = Down

Vehicle Accelerometer Locations and Data Summary

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	3525	10	---[2]				
	Longitudinal (g)				18.40	26.40	-14.37	22.08
	Lateral (g)				38.06	22.00	-16.25	62.00
	Vertical (g)				14.64	28.80	-23.51	10.96
	Resultant (g)				40.67	22.00		
2	Left Floor Sill	4042	-812	---[2]				
	Lateral (g)				95.46	11.52	-44.39	19.36
3	Left Sill A-Pillar	4282	-820	---[2]				
	Lateral (g)				55.10	4.96	-26.21	26.00
4	Left Lower A-Pillar	4373	-890	---[2]				
	Lateral (g)				---[1]	---[1]	---[1]	---[1]
5	Left Middle A-Pillar	4418	-870	---[2]				
	Lateral (g)				---[1]	---[1]	---[1]	---[1]
6	Left Sill B-Pillar	3102	-812	---[2]				
	Lateral (g)				---[1]	---[1]	---[1]	---[1]
7	Left Lower B-Pillar	3170	-825	---[2]				
	Lateral (g)				152.37	2.48	-41.00	9.76
8	Left Middle B-Pillar	3170	-825	---[2]				
	Lateral (g)				---[1]	---[1]	---[1]	---[1]
9	Front Seat Track	3453	-275	---[2]				
	Lateral (g)				---[1]	---[1]	---[1]	---[1]
10	Right Roof	3500	655	---[2]				
	Lateral (g)				22.55	26.32	-10.76	66.40
11	Right Floor Sill	3780	790	---[2]				
	Lateral (g)				30.14	18.08	-18.07	63.04

*Reference: X = Rear Bumper (+ Forward)
Y = Vehicle Centerline (+ To Right)
Z = Ground Level (+ Down)

[1] See data acquisition explanations
[2] Measurements not recorded

Fuel System Data

Fuel system info:	
Make/model/body style:	Chevrolet/Silverado/Truck
Fuel system capacity (liters):[1]	90.8
Required Test volume (liters): (91%-94% of usable capacity)	82.6 to 85.4
Actual test volume (liters):	84.4
Test fluid type:	Stoddard
Specific gravity:	0.764
Kinematic viscosity:	0.99 centistoke
Test fluid color:	Purple
Did electric fuel pump operate with ignition switch "on" and the engine not operating?	Yes
Details of fuel system:	Fuel tank is located in front of rear axle and between left frame rail and prop shaft. Filler neck enters on top of tank. Filler cap is located on left front bed side. Fuel lines run along on inside of left frame rail.

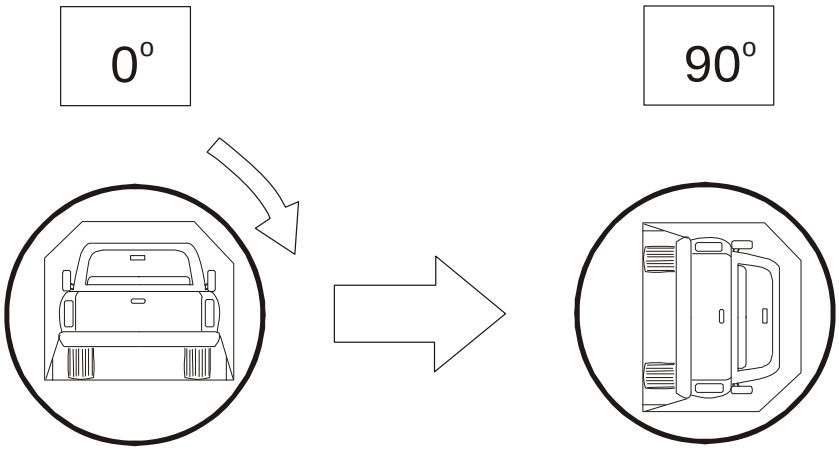
[1] Fuel system capacity was supplied by customer.

FMVSS 301 Post-Impact Test Data

Test Date:		June 19, 2019	
Vehicle:		2019 Chevrolet Silverado	
Test Requirements:		Test vehicle fuel tank filled with 84.4 liters of Stoddard.	
Test Vehicle Impact Type:			
	Frontal (48.3 km/h)		
X	Oblique (53.93 km/h) with barrier face first contacting driver side		
	Rear moving barrier (81.3 km/h)		
	Lateral rollover (48.5 km/h)		
Fuel System Fluid Spillage Measurements:			
		Test Results	Maximum Allowable Weight
1.	From impact until vehicle motion ceases (g)	0.0	28
2.	5-minute period after vehicle motion ceases (g)	0.0	142
3.	Next 25 minutes after 5-minute period (g/minute)	0.0	28
Fuel System Fluid Spillage Location(s):		None	

FMVSS 301 Test Data

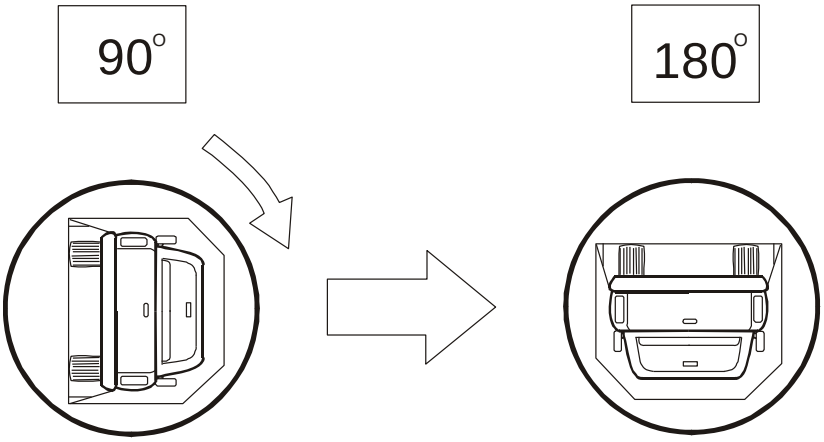
Test phase



Static Rollover Machine Rotation Time Information: (specified range is 1-3 minutes)		
Time required for machine to rotate 90°	2 minutes	0 seconds
FMVSS 301 position hold time	5 minutes	0 seconds
Total	7 minutes	0 seconds
Next whole minute interval	7 minutes	

Fuel System Fluid Spillage Measurements:			
0° to 90° rotation (fuel filler cap down)		Test Results	Maximum Allowable Weight
1.	First five minutes from onset of rotation (g)	0.0	142
2.	Sixth minute from onset of rotation (g)	0.0	28
3.	Seventh minute from onset of rotation (g)	0.0	28
Fuel System Fluid Spillage Location(s):	None		

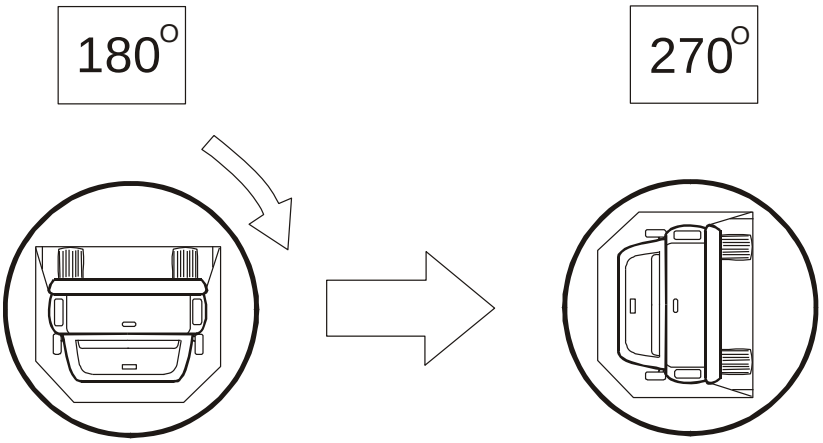
Test phase



Static Rollover Machine Rotation Time Information: (specified range is 1-3 minutes)		
Time required for machine to rotate 90°	2 minutes	0 seconds
FMVSS 301 position hold time	5 minutes	0 seconds
Total	7 minutes	0 seconds
Next whole minute interval	14 minutes	

Fuel System Fluid Spillage Measurements:			
90° to 180° rotation		Test Results	Maximum Allowable Weight
1.	First five minutes from onset of rotation (g)	0.0	142
2.	Sixth minute from onset of rotation (g)	0.0	28
3.	Seventh minute from onset of rotation (g)	0.0	28
Fuel System Fluid Spillage Location(s):	None		

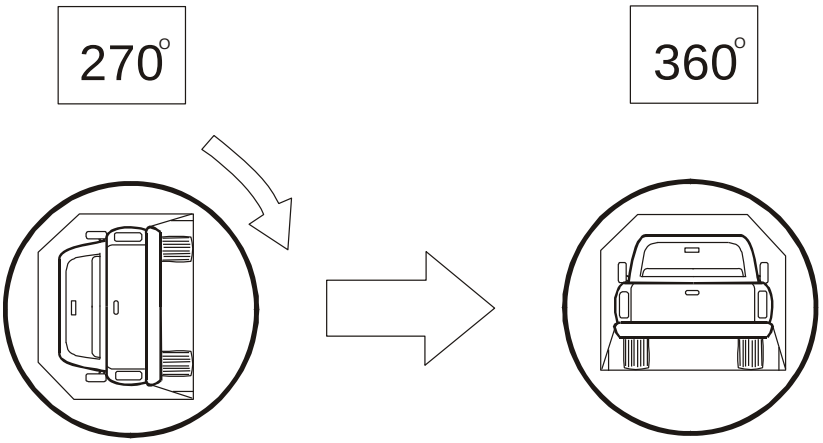
Test phase



Static Rollover Machine Rotation Time Information: (specified range is 1-3 minutes)		
Time required for machine to rotate 90°	2 minutes	0 seconds
FMVSS 301 position hold time	5 minutes	0 seconds
Total	7 minutes	0 seconds
Next whole minute interval	21 minutes	

Fuel System Fluid Spillage Measurements:			
180° to 270° rotation		Test Results	Maximum Allowable Weight
1.	First five minutes from onset of rotation (g)	0.0	142
2.	Sixth minute from onset of rotation (g)	0.0	28
3.	Seventh minute from onset of rotation (g)	0.0	28
Fuel System Fluid Spillage Location(s):	None		

Test phase



Static Rollover Machine Rotation Time Information: (specified range is 1-3 minutes)		
Time required for machine to rotate 90°	2 minutes	0 seconds
FMVSS 301 position hold time	5 minutes	0 seconds
Total	7 minutes	0 seconds
Next whole minute interval	28 minutes	

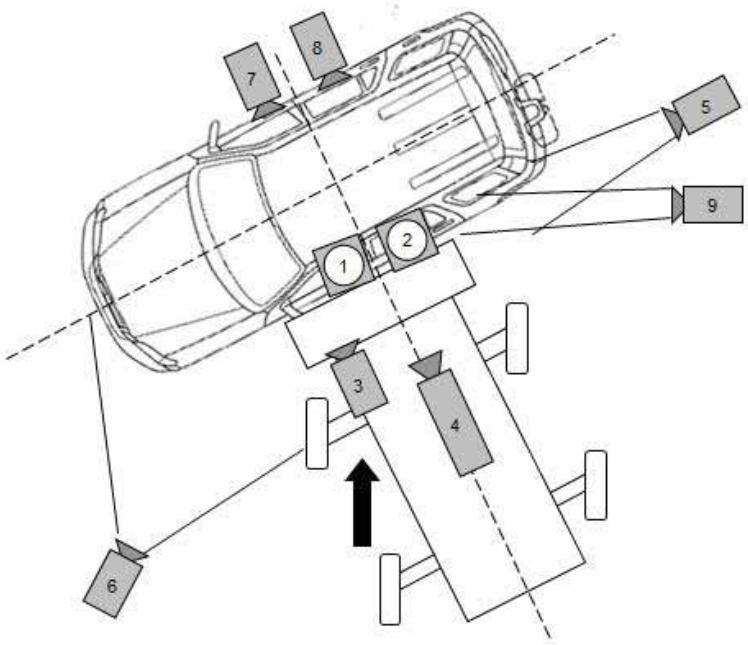
Fuel System Fluid Spillage Measurements:			
270° to 360° rotation		Test Results	Maximum Allowable Weight
1.	First five minutes from onset of rotation (g)	0.0	142
2.	Sixth minute from onset of rotation (g)	0.0	28
3.	Seventh minute from onset of rotation (g)	0.0	28

Fuel System Fluid Spillage Location(s):	None

Section 2.0

Camera Information

Camera Positions



Camera Information

No.	Location	Type	Lens (mm)	Speed (frames/s)	Purpose of Camera Data
1	Overhead Overall	Forza	8.5	1000	Vehicle Dynamics
2	Overhead Close-up	Forza	25	1000	Vehicle Dynamics
3	Impact Point Close-up (MDB)	Forza	25	1000	Impact Alignment
4	Centerline of Impact (MDB)	Forza	12.5	1000	Impact Alignment
5	Right Side View	Forza	20	1000	Vehicle Dynamics
6	Left Side View	Forza	20	1000	Vehicle Crush
7	Front Seat Occupant – Side View (OB)	Forza	12.5	1000	Vehicle Crush
8	Rear Passenger – Side View (OB)	Forza	12.5	1000	Vehicle Crush
9	Real Time Coverage	Canon	Zoom	30	Documentary

Appendix A

Photographs

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Figure A-1 Pre-Test Front View of Test Vehicle

Figure A-2 Post-Test Front View of Test Vehicle

Figure A-3 Pre-Test Left Front 3-4 View of Test Vehicle

Figure A-4 Post-Test Left Front 3-4 View of Test Vehicle

Figure A-5 Pre-Test Left Side View of Test Vehicle

Figure A-6 Post-Test Left Side View of Test Vehicle

Figure A-7 Pre-Test Left Rear 3-4 View of Test Vehicle

Figure A-8 Post-Test Left Rear 3-4 View of Test Vehicle

Figure A-9 Pre-Test Rear View of Test Vehicle

Figure A-10 Post-Test Rear View of Test Vehicle

Figure A-11 Pre-Test Right Side View of Test Vehicle

Figure A-12 Post-Test Right Side View of Test Vehicle

Figure A-13 Pre-Test Impact Point Close-up View

Figure A-14 Post-Test Impact Point Close-up View

Figure A-15 Pre-Test Front View of MDB

Figure A-16 Post-Test Front View of MDB

Figure A-17 Pre-Test Left Side View of MDB

Figure A-18 Post-Test Left Side View of MDB

Figure A-19 Pre-Test Right Side View of MDB

Figure A-20 Post-Test Right Side View of MDB

Figure A-21 Pre-Test Front MDB Face View

Figure A-22 Post-Test Front MDB Face View

Figure A-23 Pre-Test Left Side MDB Face View

Figure A-24 Post-Test Left Side MDB Face View

Figure A-25 Pre-Test Right Side MDB Face View

Figure A-26 Post-Test Right Side MDB Face View

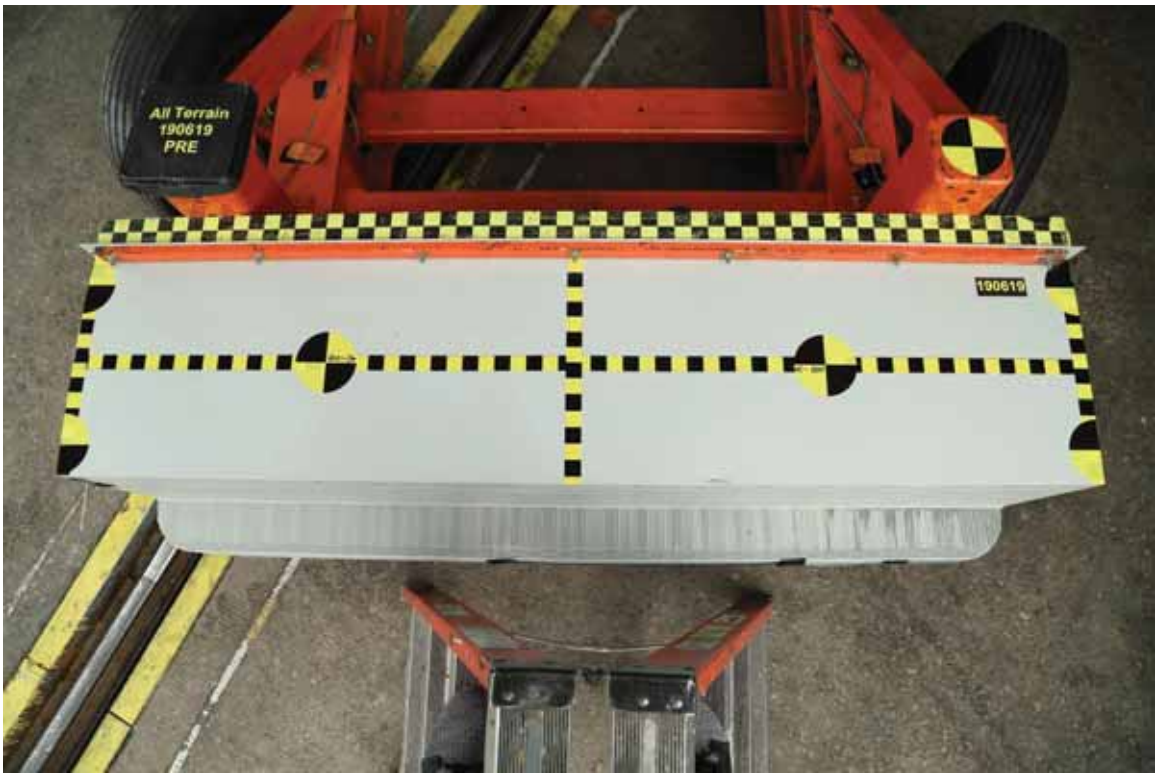


Figure A-27 Pre-Test Overhead MDB Face View

Figure A-28 Post-Test Overhead MDB Face View

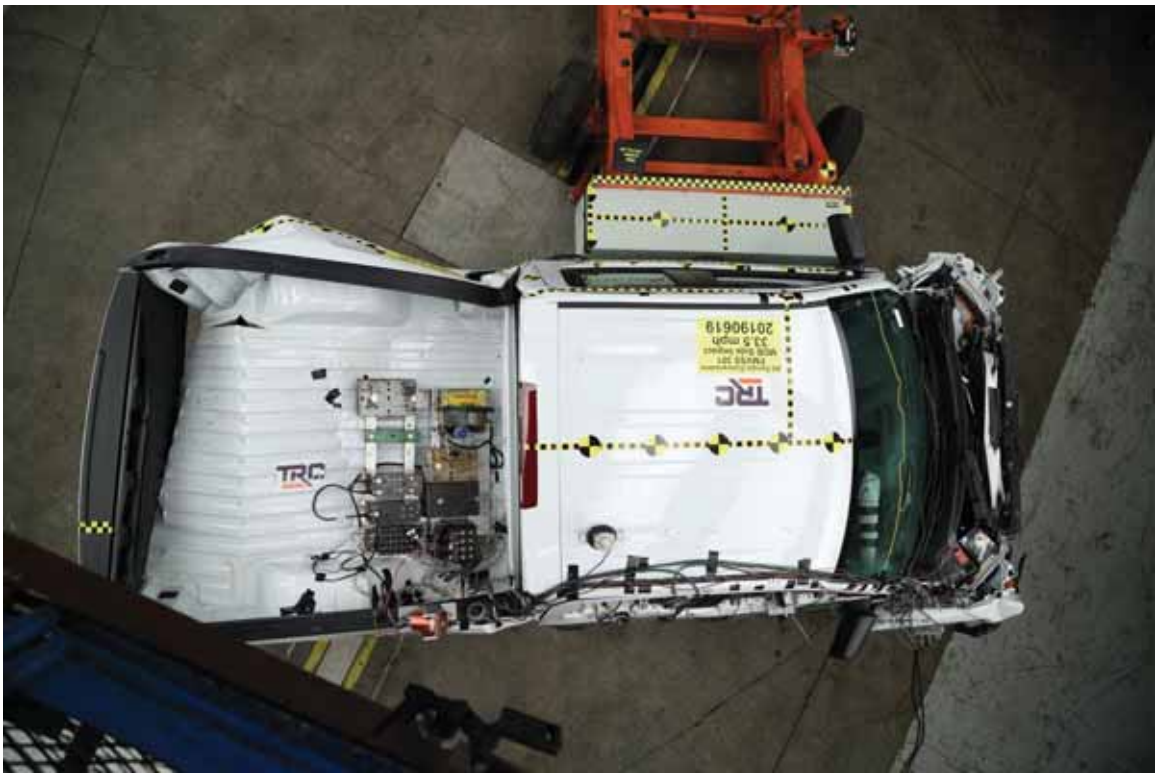


Figure A-29 Pre-Test Overhead View of Test Area

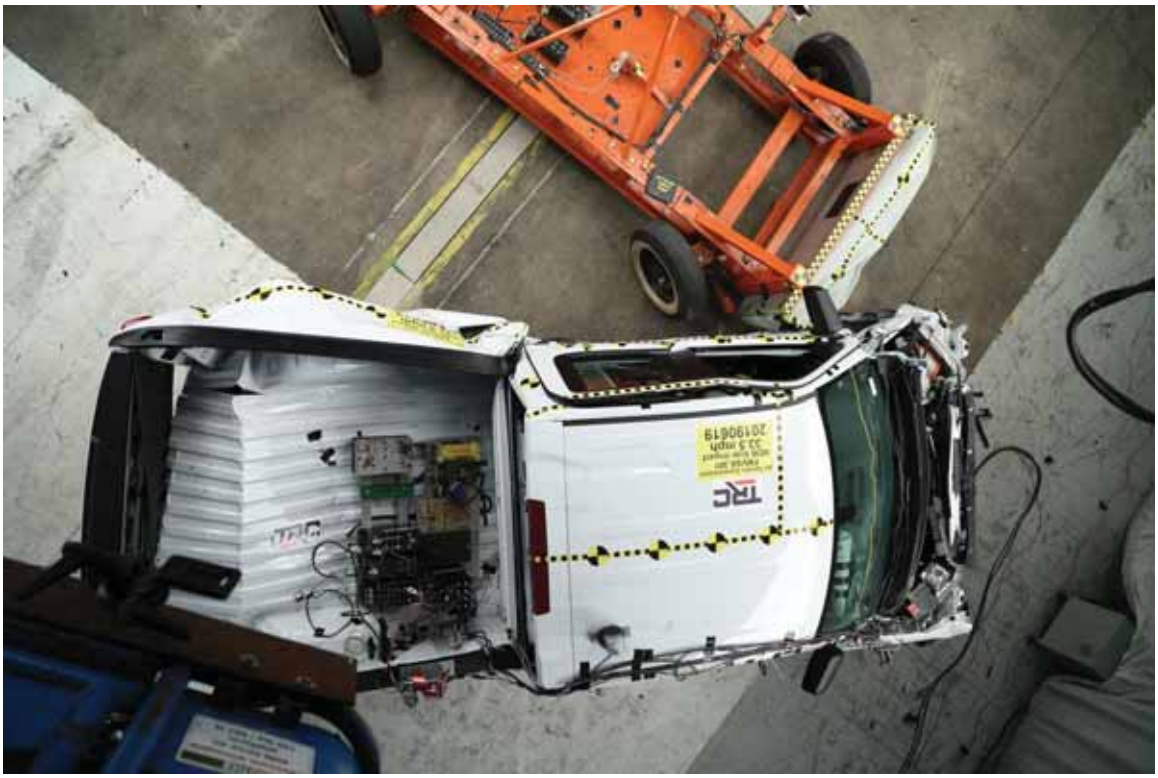


Figure A-30 Post-Test Overhead View of Test Area

Figure A-31 T (0) Impact Event Panning

INTENTIONALLY LEFT BLANK

Figure A-32 Pre-Test Driver Inner Door Panel View

Figure A-33 Post-Test Driver Inner Door Panel View

Figure A-34 Pre-Test Rear Passenger Inner Door Panel View

Figure A-35 Post-Test Rear Passenger Inner Door Panel View

Figure A-36 Post-Test Front View of MDB and Test Vehicle

Figure A-37 Post-Test Left Front 3-4 View of MDB and Test Vehicle

Figure A-38 Post-Test Rear View of MDB and Test Vehicle

Figure A-39 Post-Test Left Rear 3-4 View of MDB and Test Vehicle

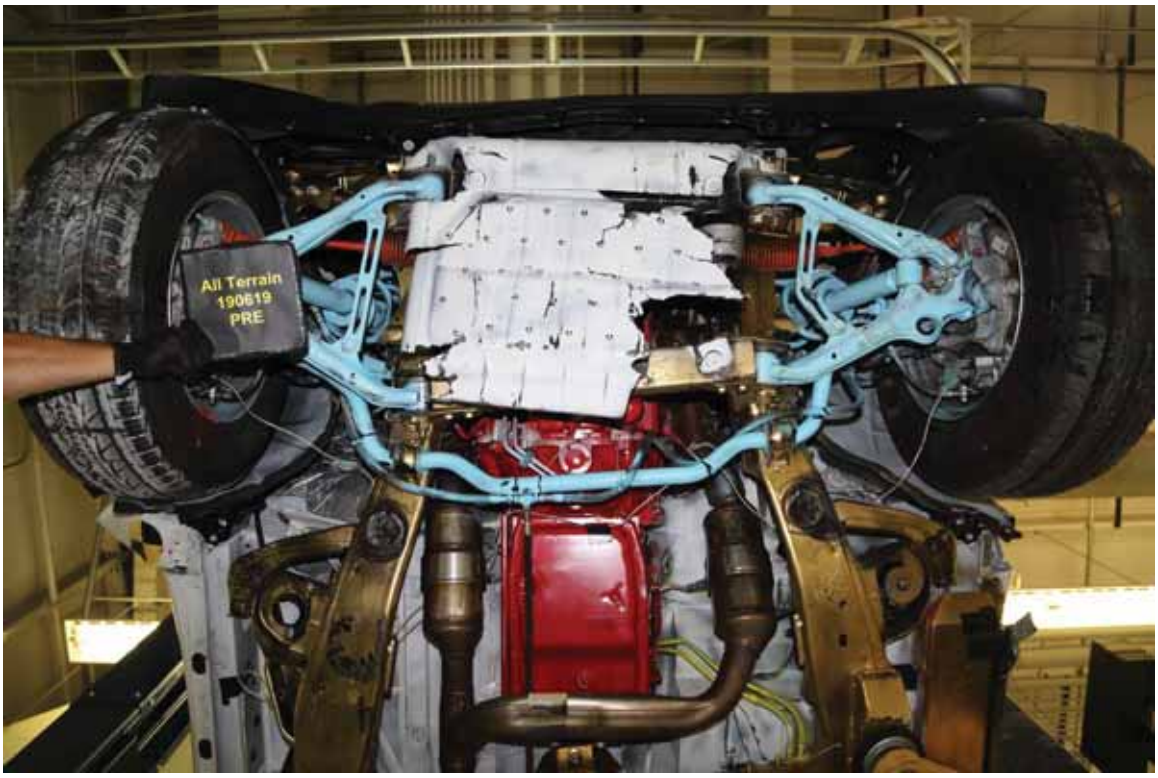


Figure A-40 Pre-Test Underbody Front View

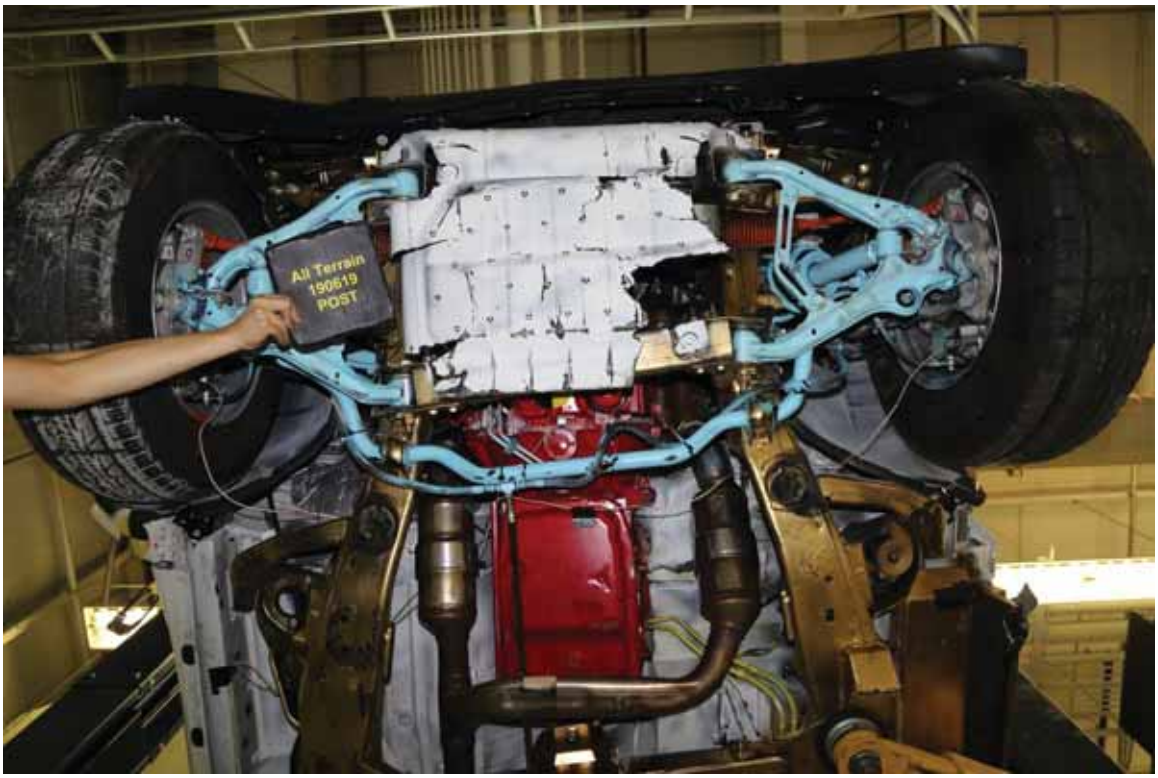


Figure A-41 Post-Test Underbody Front View

Figure A-42 Pre-Test Underbody Mid Front View

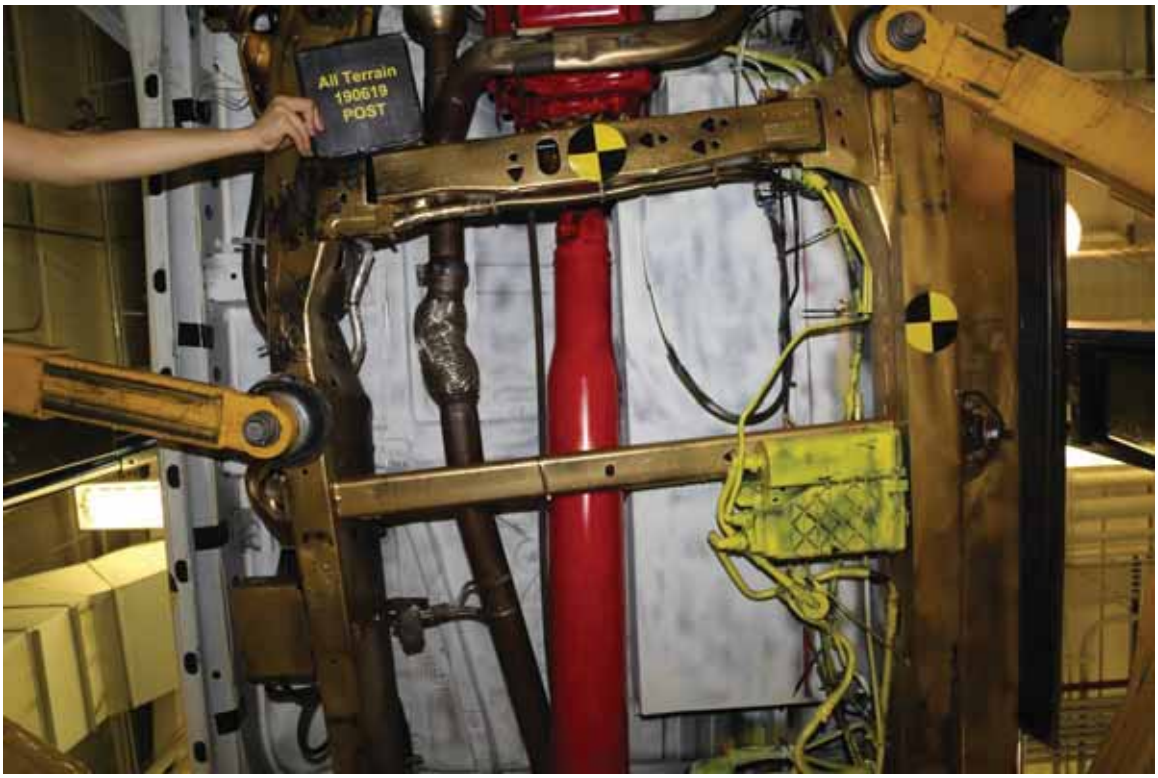


Figure A-43 Post-Test Underbody Mid Front View

Figure A-44 Pre-Test Underbody Mid View

Figure A-45 Post-Test Underbody Mid View

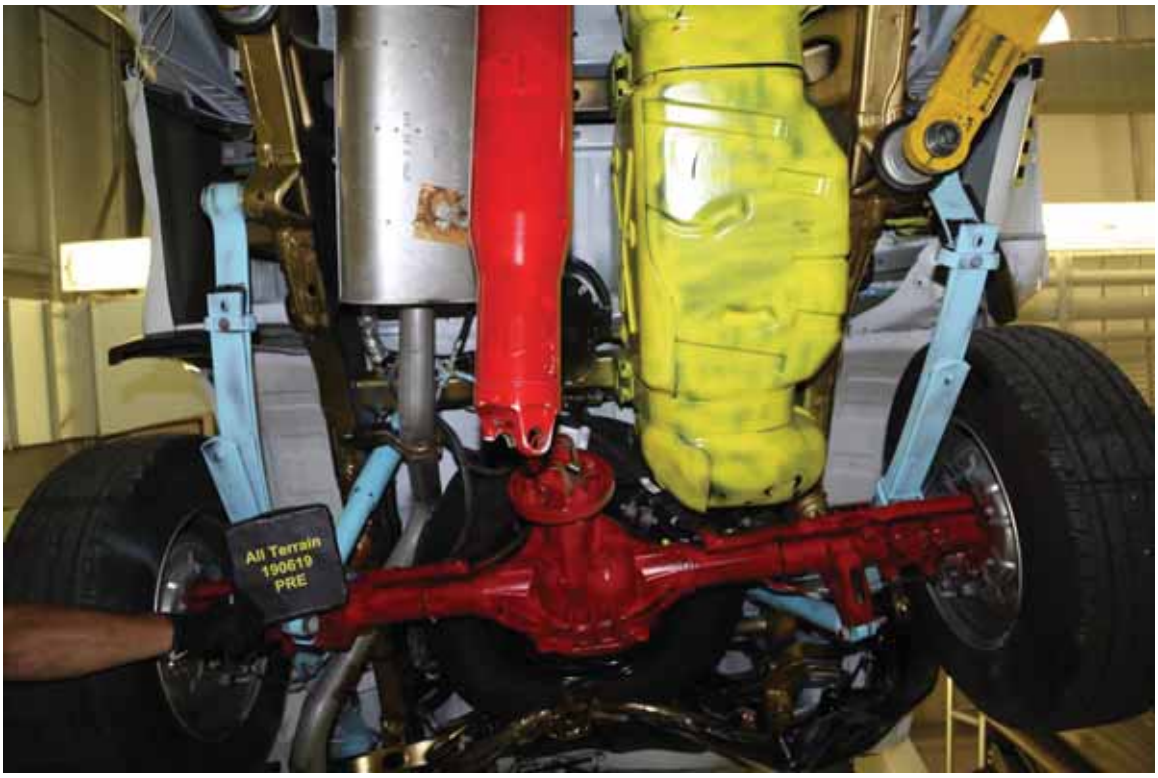


Figure A-46 Pre-Test Underbody Mid Rear View

Figure A-47 Post-Test Underbody Mid Rear View

Figure A-48 Pre-Test Underbody Rear View

Figure A-49 Post-Test Underbody Rear View

Figure A-50 Pre-Test Fuel Tank View

Figure A-51 Post-Test Fuel Tank View

Figure A-52 Pre-Test Fuel Filler Neck View

Figure A-53 Post-Test Fuel Filler Neck View

Figure A-54 Pre-Test Fuel Filler Cap View

Figure A-55 Post-Test Fuel Filler Cap View

Figure A-56 Pre-Test Ballast View 1

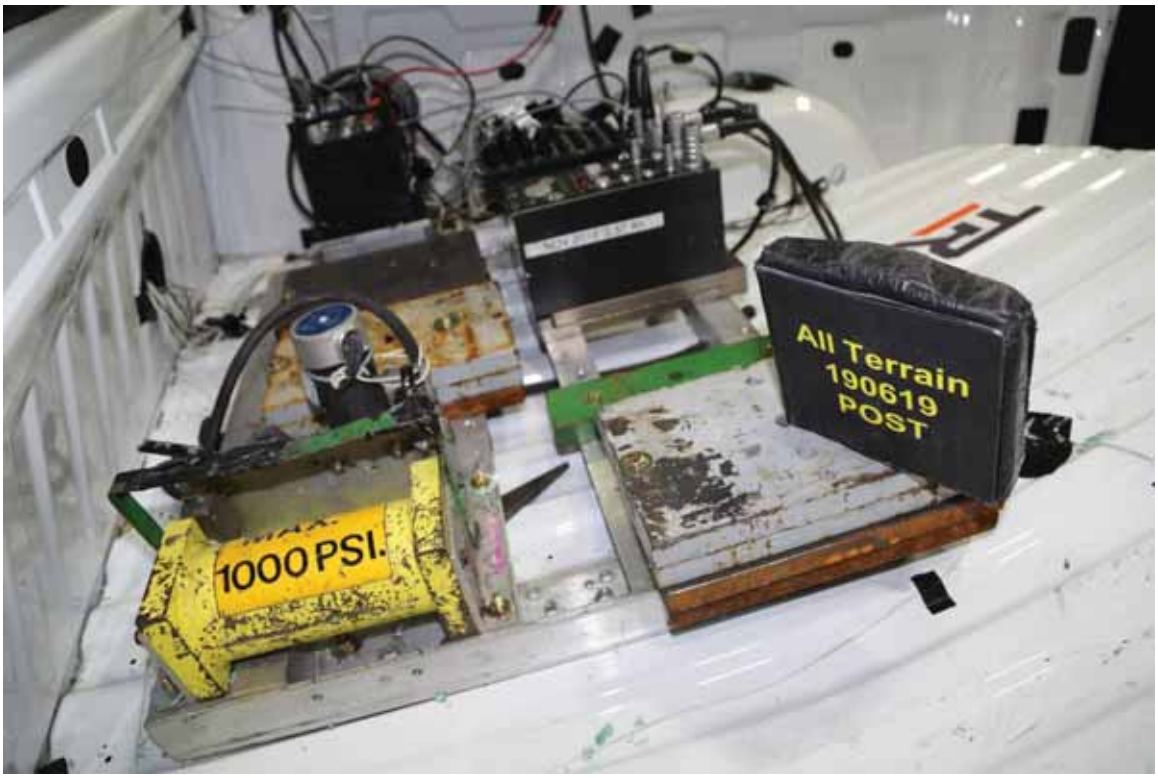


Figure A-57 Post-Test Ballast View 1

Figure A-58 Pre-Test Ballast View 2

Figure A-59 Post-Test Ballast View 2

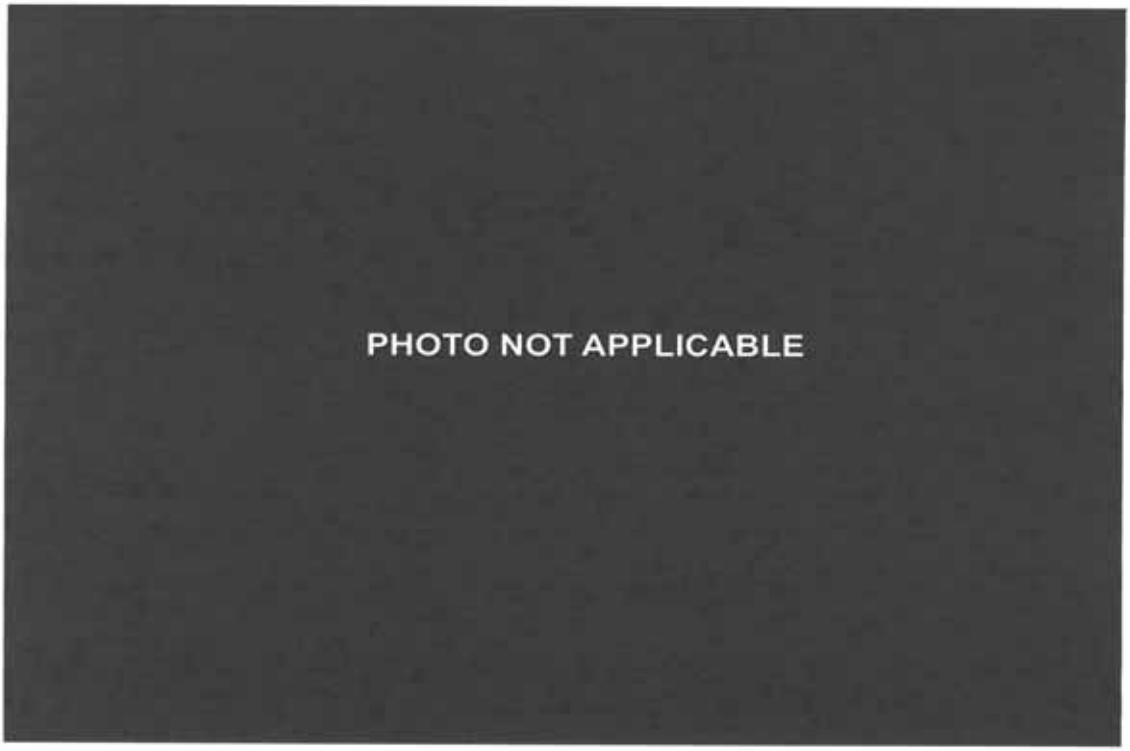


Figure A-60 Vehicle Certification Label

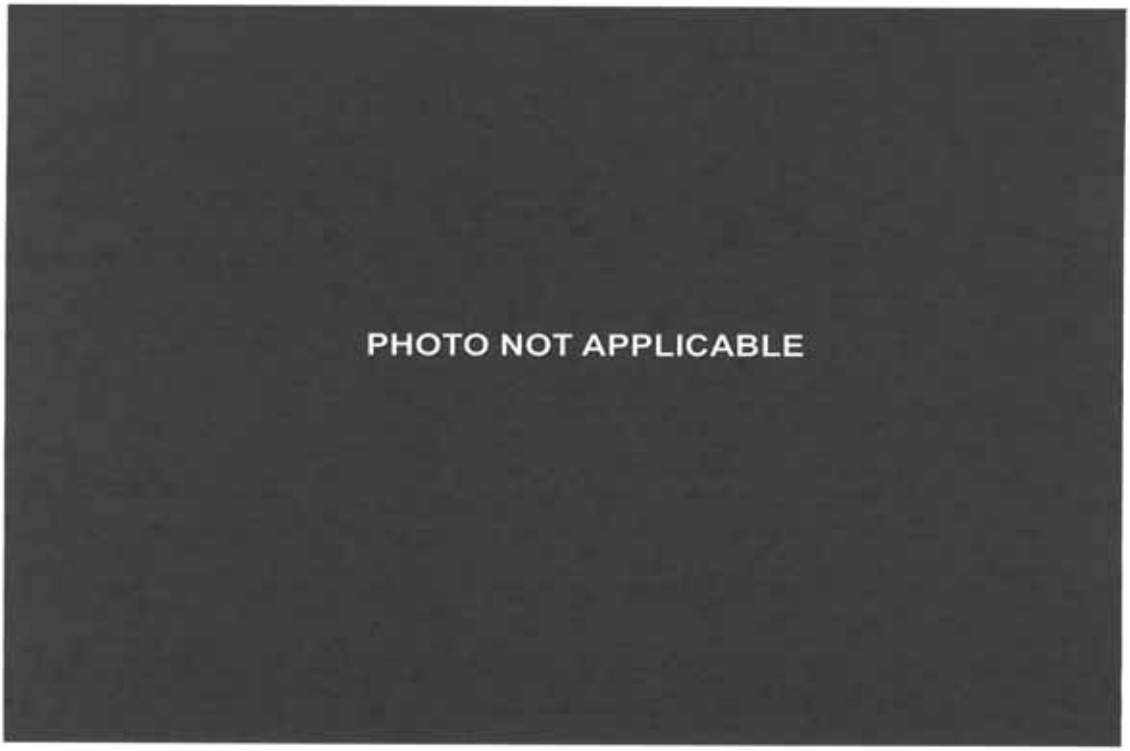


Figure A-61 Vehicle Tire Pressure Label

Figure A-62 Vehicle at 0° on Static Rollover Device

Figure A-63 Vehicle at 90° on Static Rollover Device

Figure A-64 Vehicle at 180° on Static Rollover Device

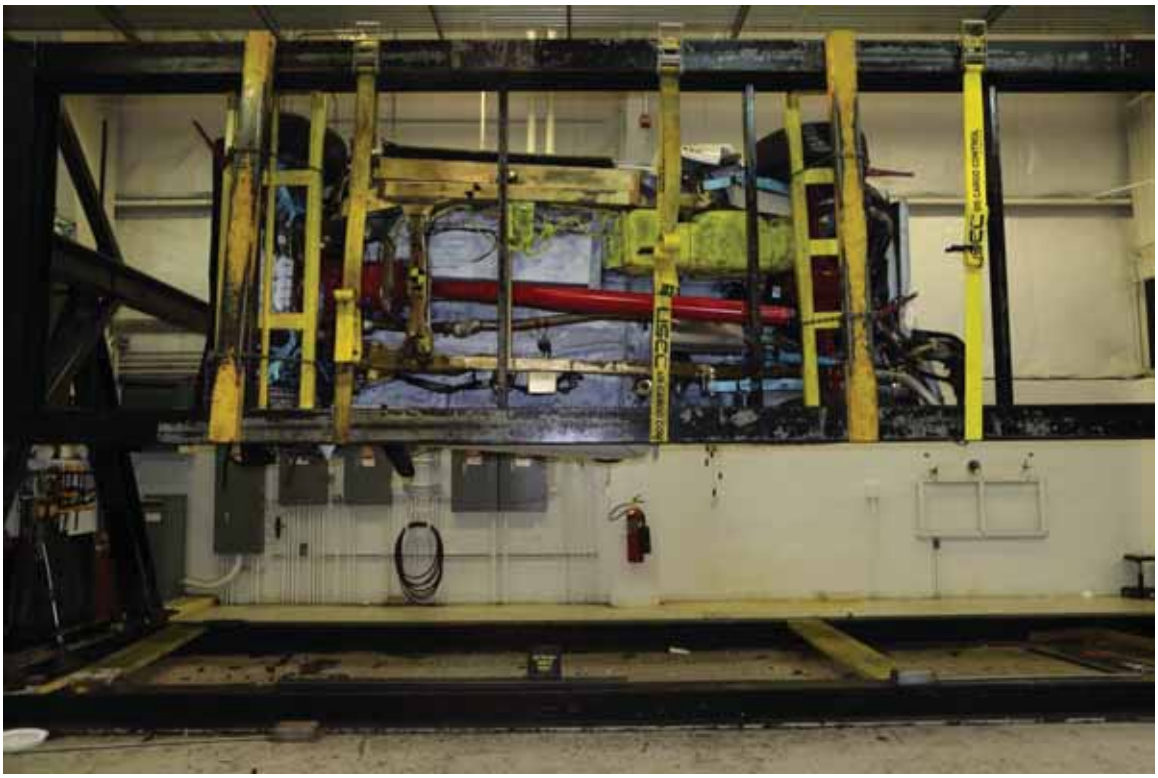


Figure A-65 Vehicle at 270° on Static Rollover Device

Figure A-66 Vehicle at 360° on Static Rollover Device

Figure A-67 Post-Test Damage View 1

Figure A-68 Post-Test Damage View 2

Appendix B

Data Plots

FMVSS 301 MDB Side Impact 33.5 mph

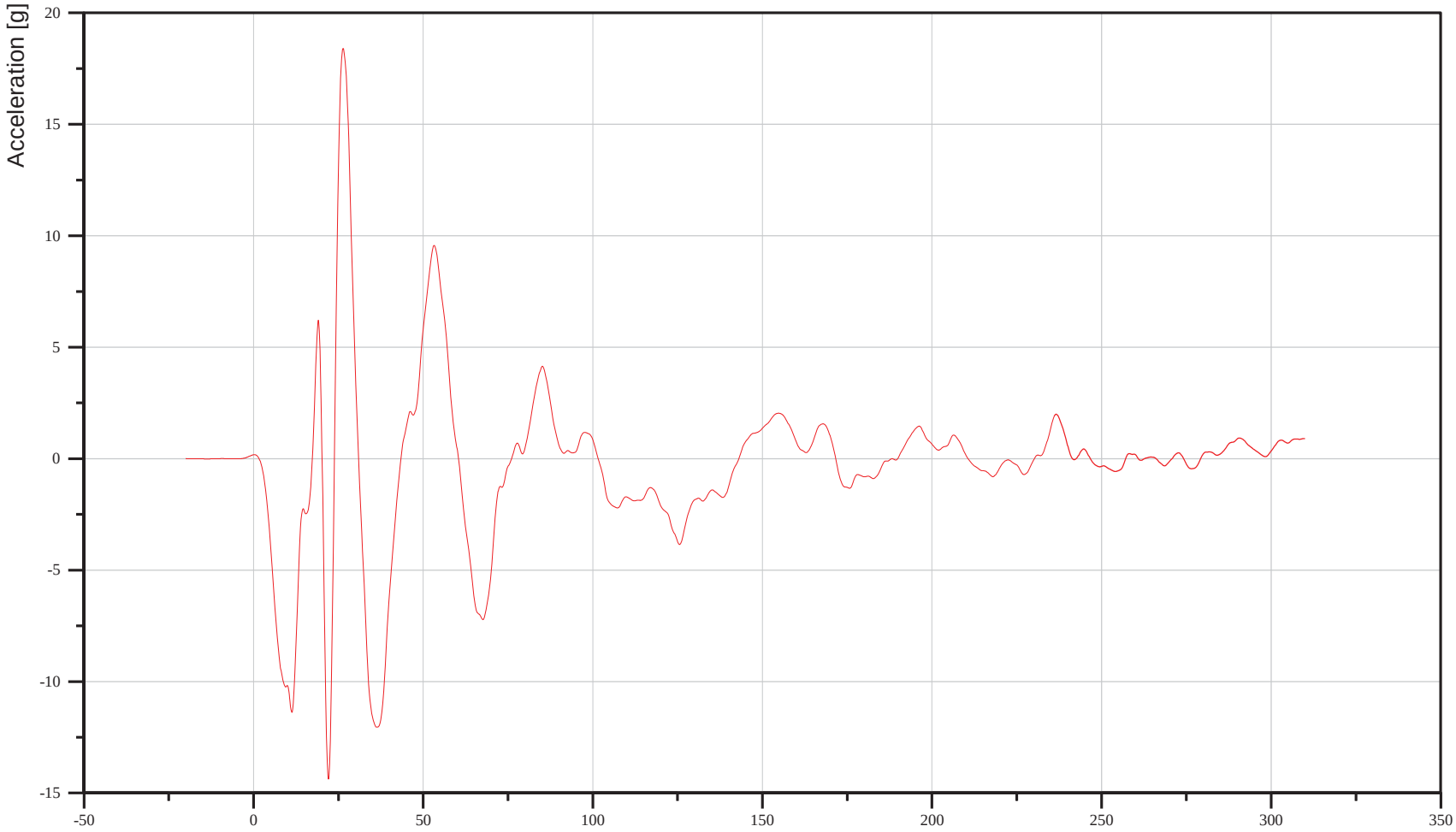
Vehicle CG AX

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11VEHCCG0000ACXD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-14.37 g at 22.08 ms

Max. Value
18.40 g at 26.40 ms

FMVSS 301 MDB Side Impact 33.5 mph

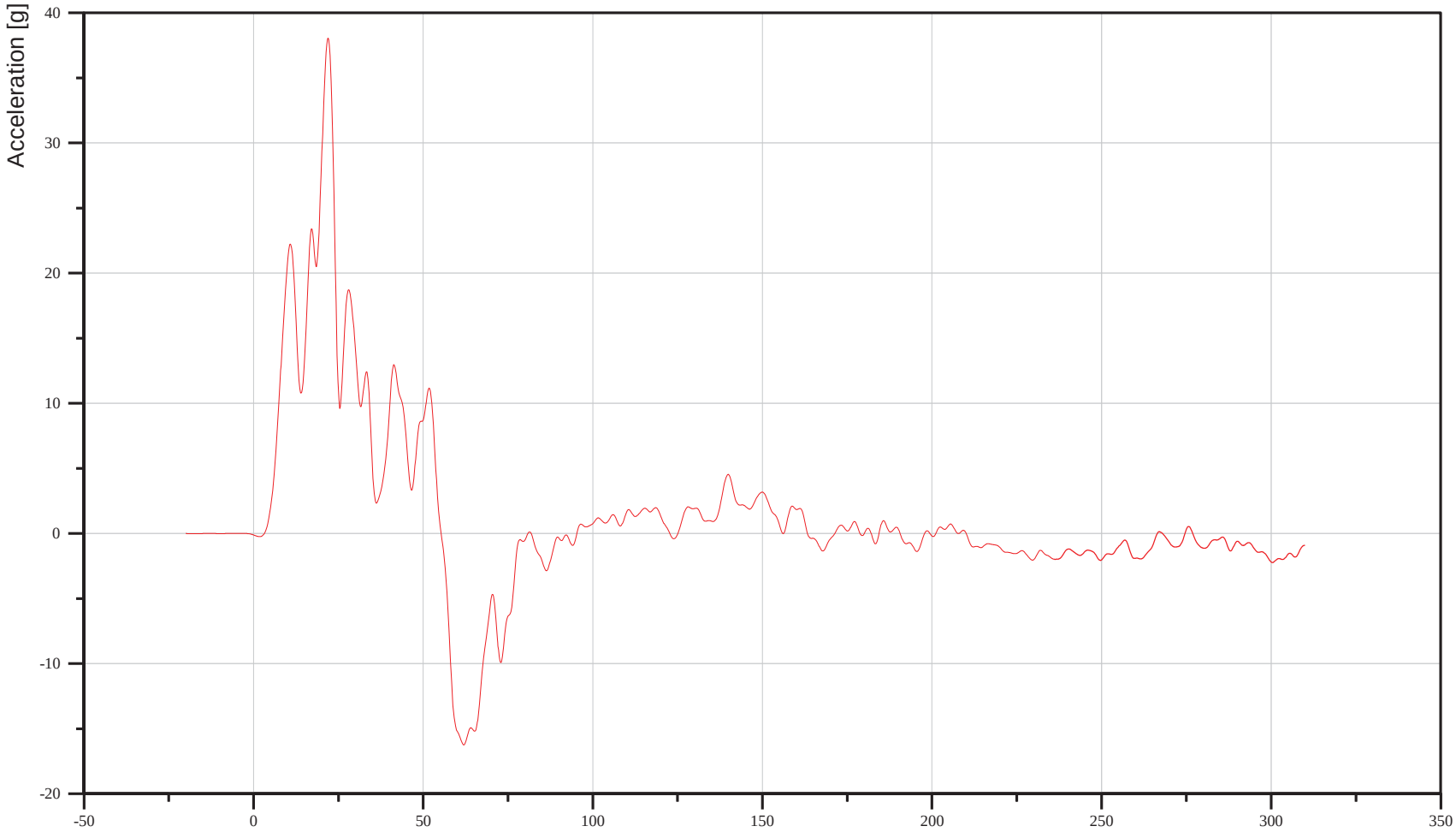
Vehicle CG AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11VEHCCG0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-16.25 g at 62.00 ms

Max. Value
38.06 g at 22.00 ms

FMVSS 301 MDB Side Impact 33.5 mph

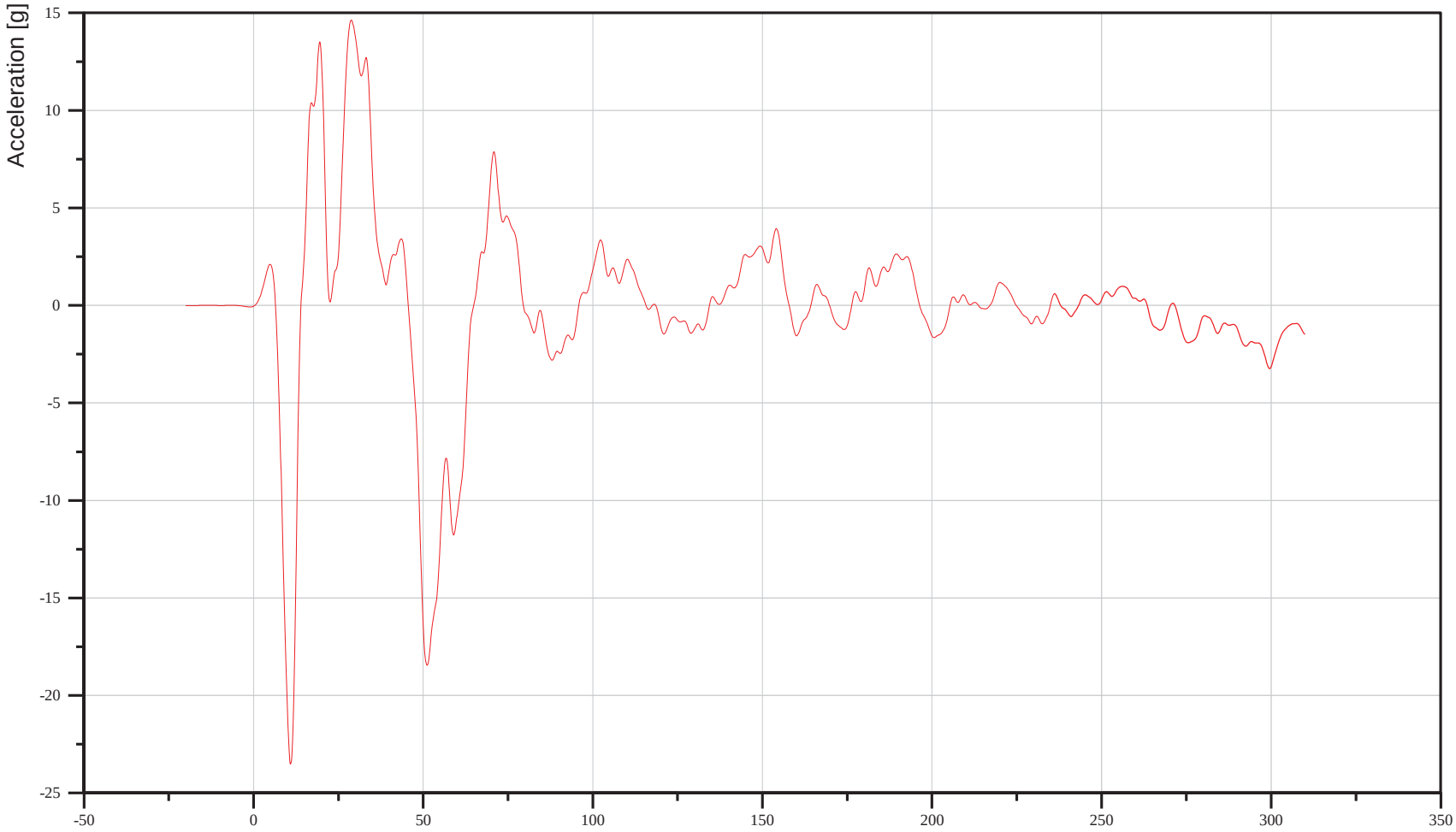
Vehicle CG AZ

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11VEHCCG0000ACZD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-23.51 g at 10.96 ms

Max. Value
14.64 g at 28.80 ms

FMVSS 301 MDB Side Impact 33.5 mph

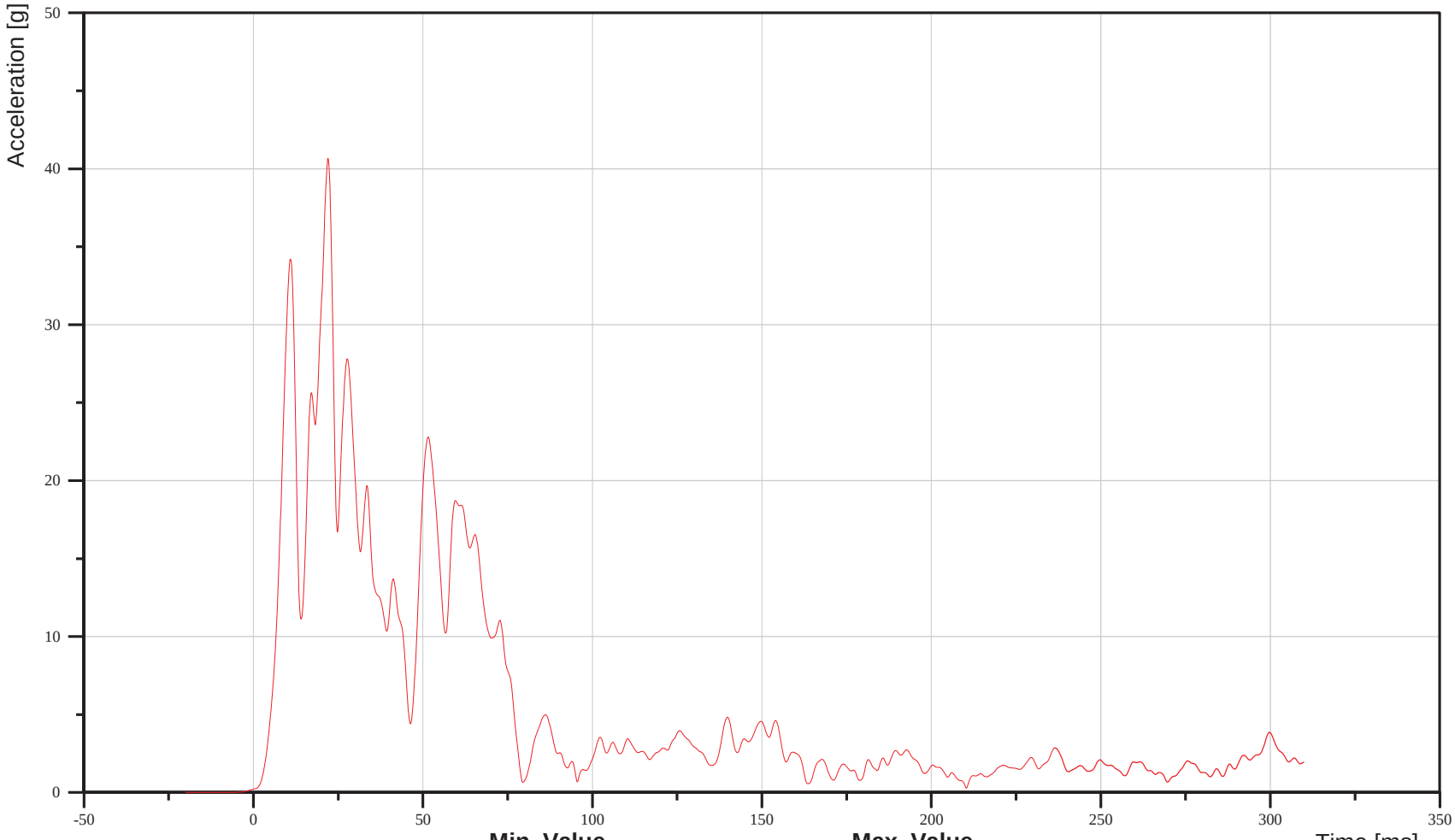
Vehicle CG Resultant

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11VEHCCG0000ACRD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
0.00 g at -11.12 ms

Max. Value
40.67 g at 22.00 ms

FMVSS 301 MDB Side Impact 33.5 mph

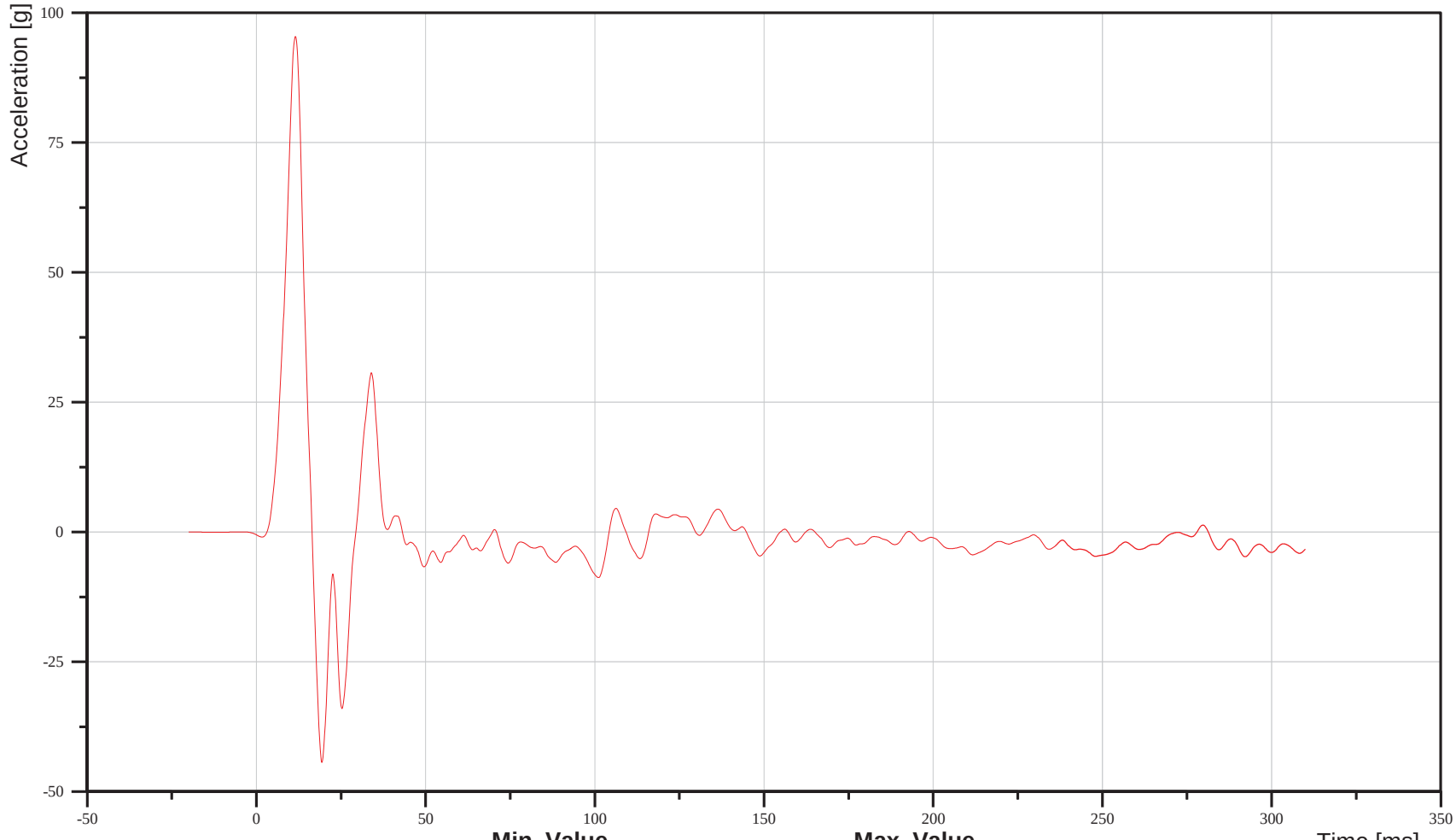
Left - Floor Sill AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11SILBFL0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-44.39 g at 19.36 ms

Max. Value
95.46 g at 11.52 ms

FMVSS 301 MDB Side Impact 33.5 mph

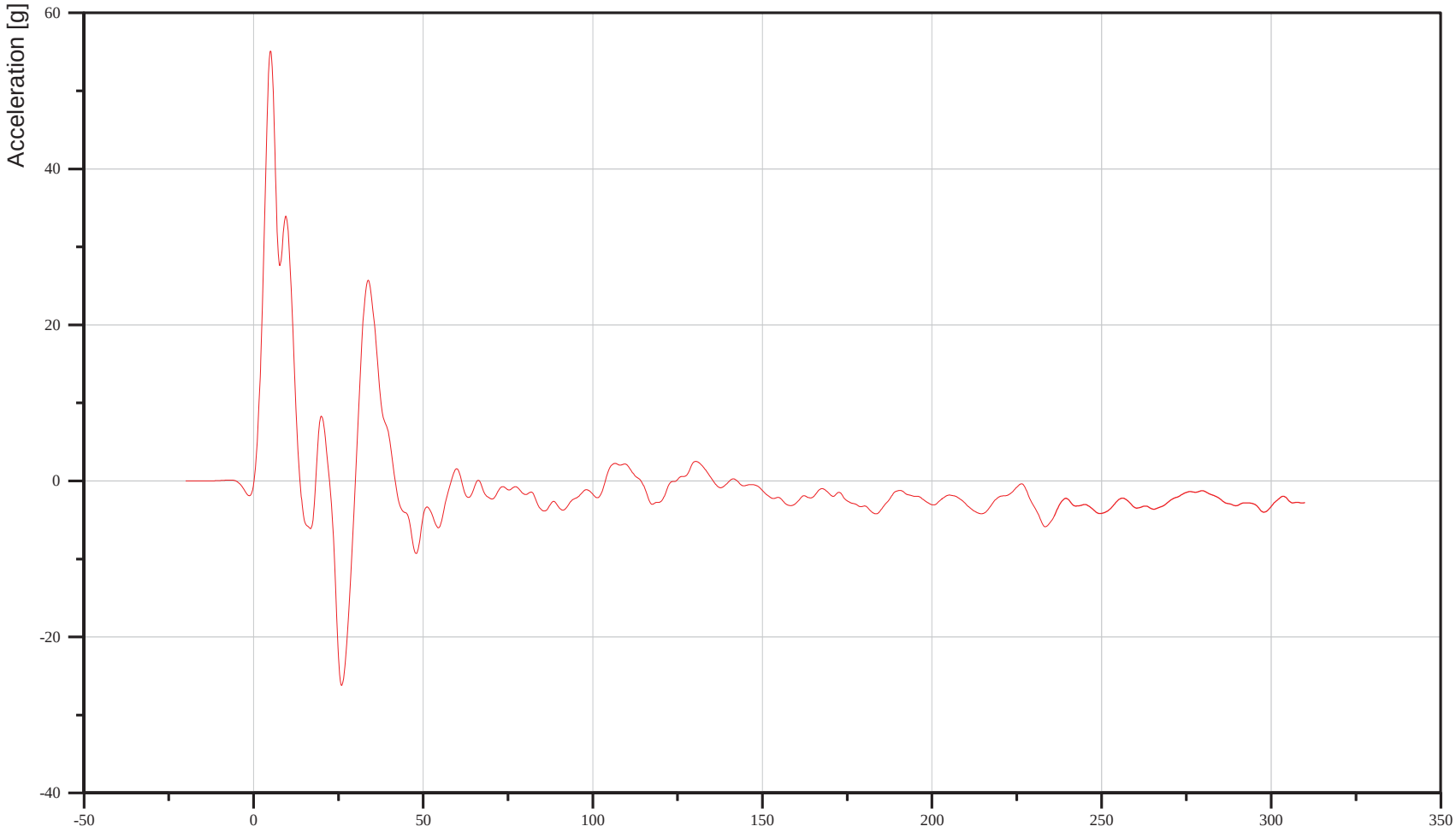
Left Sill A-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11APILSI0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-26.21 g at 26.00 ms

Max. Value
55.10 g at 4.96 ms

FMVSS 301 MDB Side Impact 33.5 mph

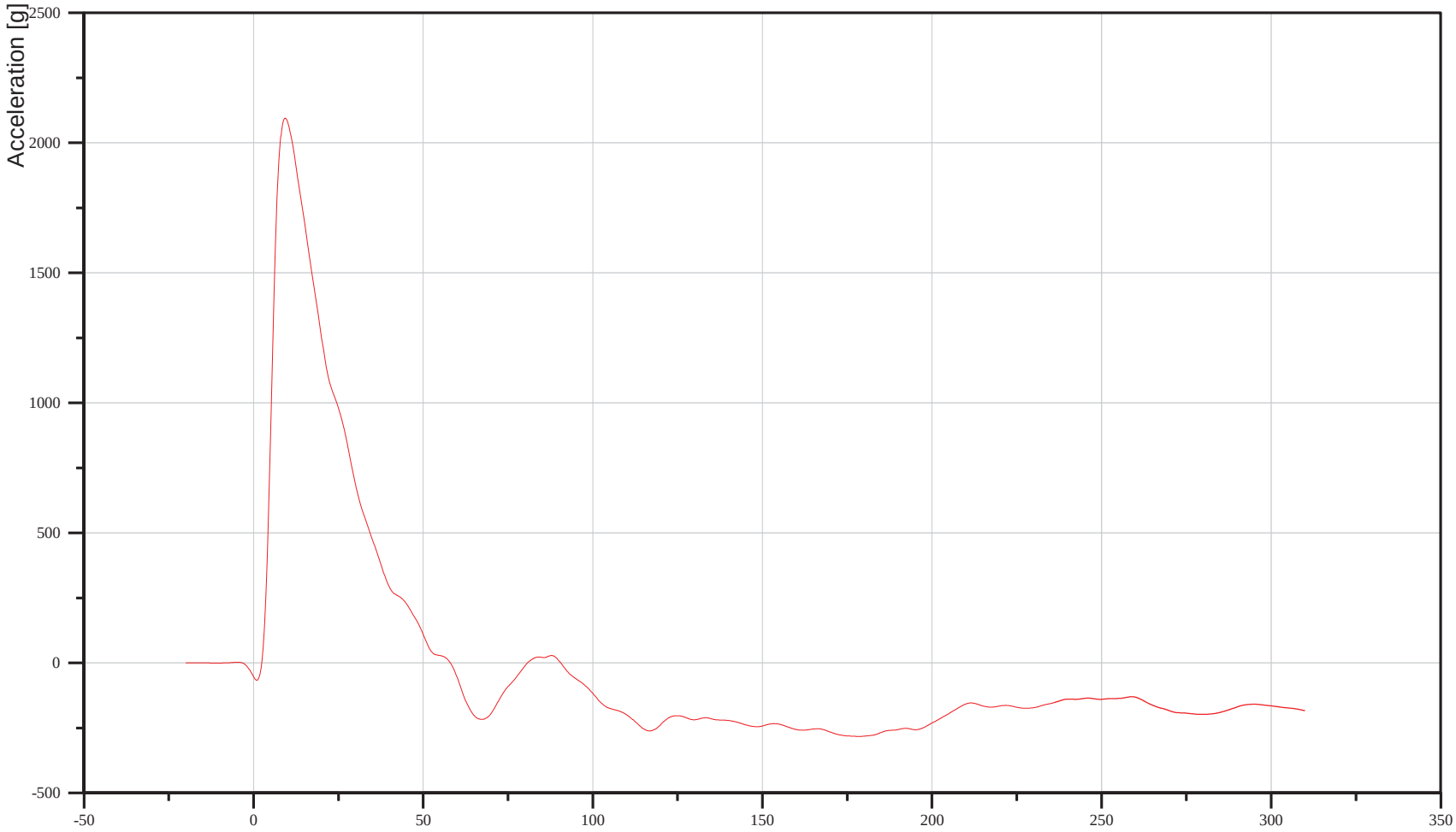
Left Lower A-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11APILLO0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-282.45 g at 178.48 ms

Max. Value
2,095.02 g at 9.28 ms

FMVSS 301 MDB Side Impact 33.5 mph

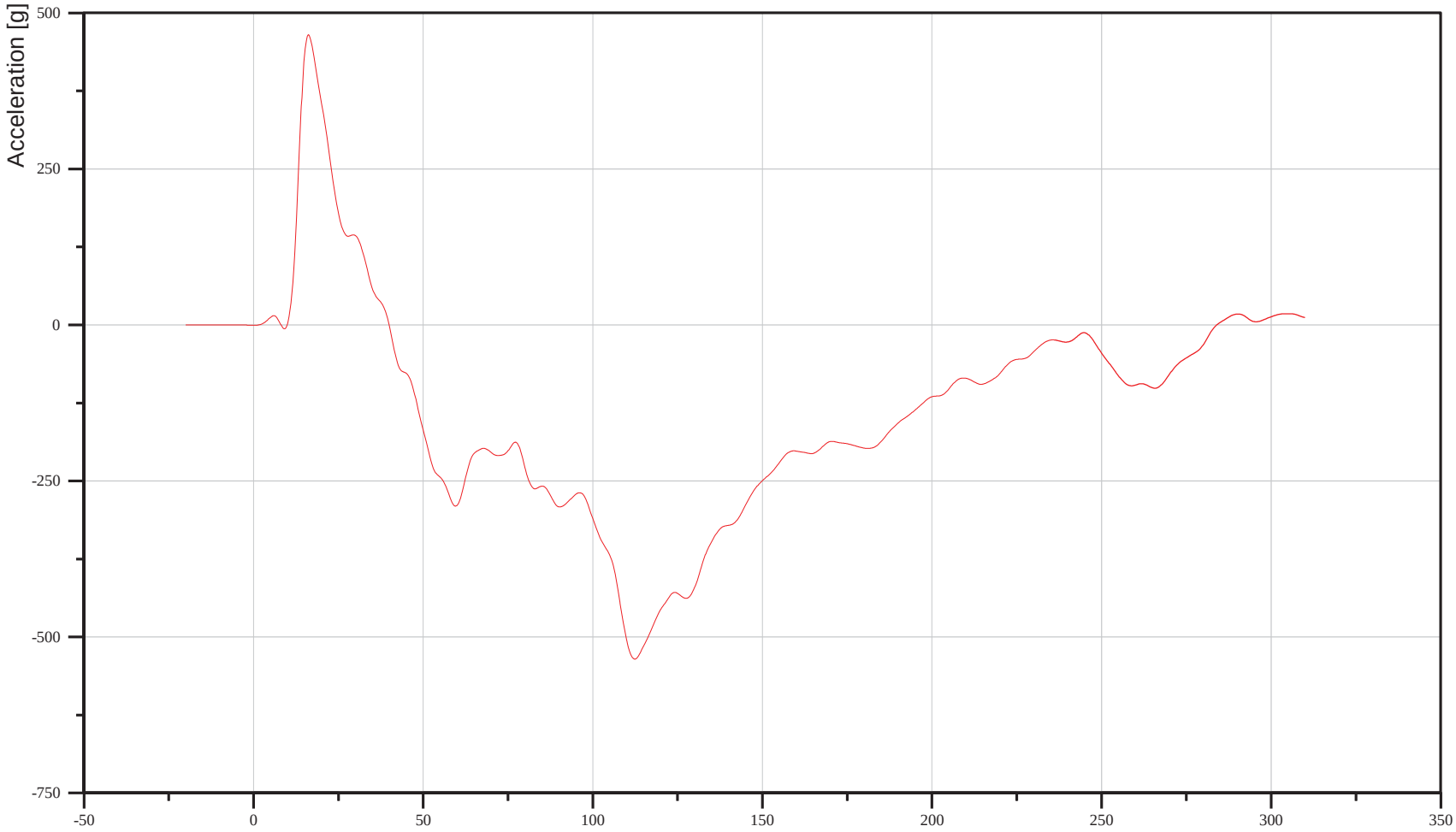
Left Middle A-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11APILMI0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-535.39 g at 112.40 ms

Max. Value
464.85 g at 16.16 ms

FMVSS 301 MDB Side Impact 33.5 mph

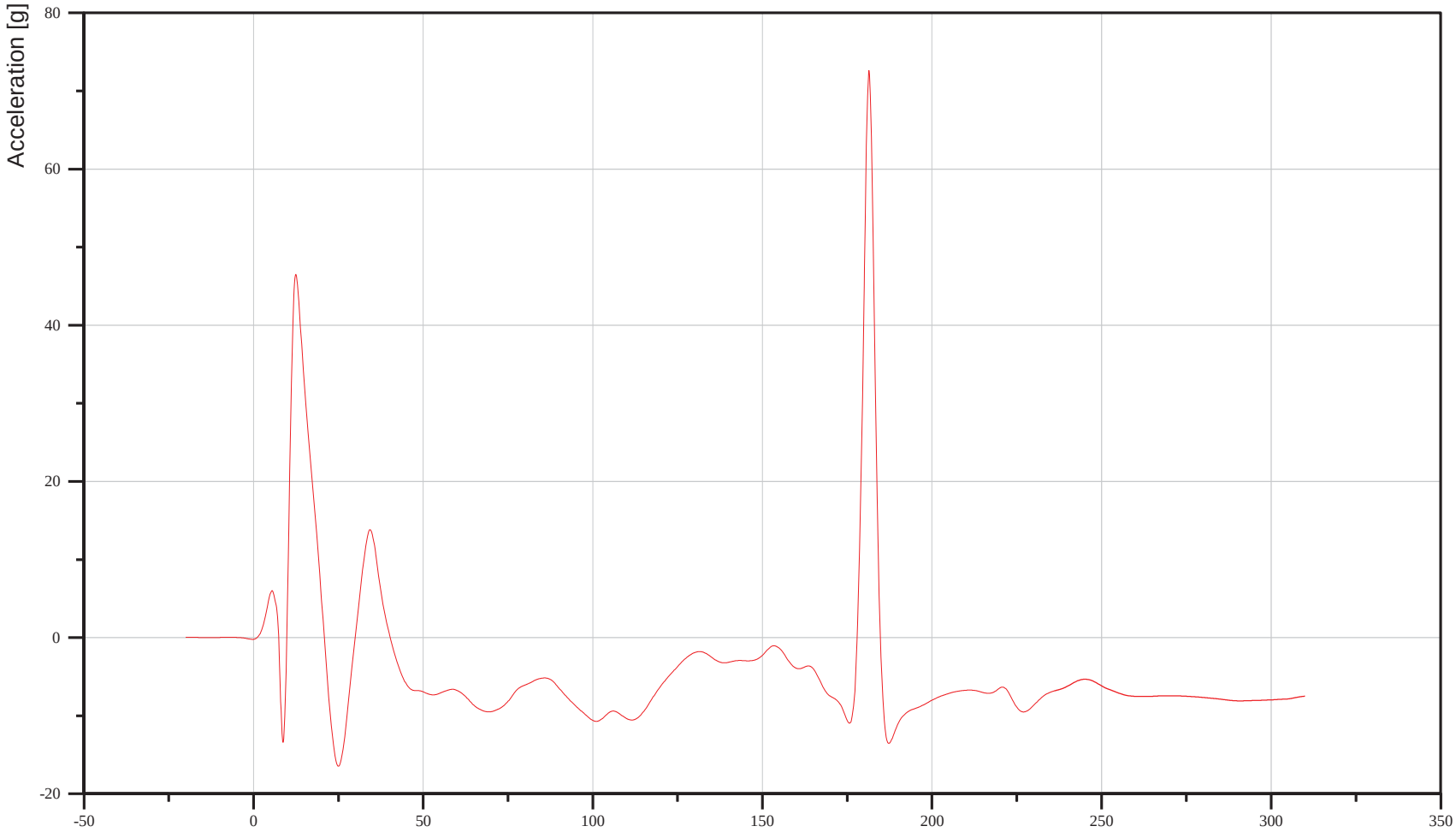
Left Sill B-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11BPILSI0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-16.47 g at 25.04 ms

Max. Value
72.61 g at 181.44 ms

FMVSS 301 MDB Side Impact 33.5 mph

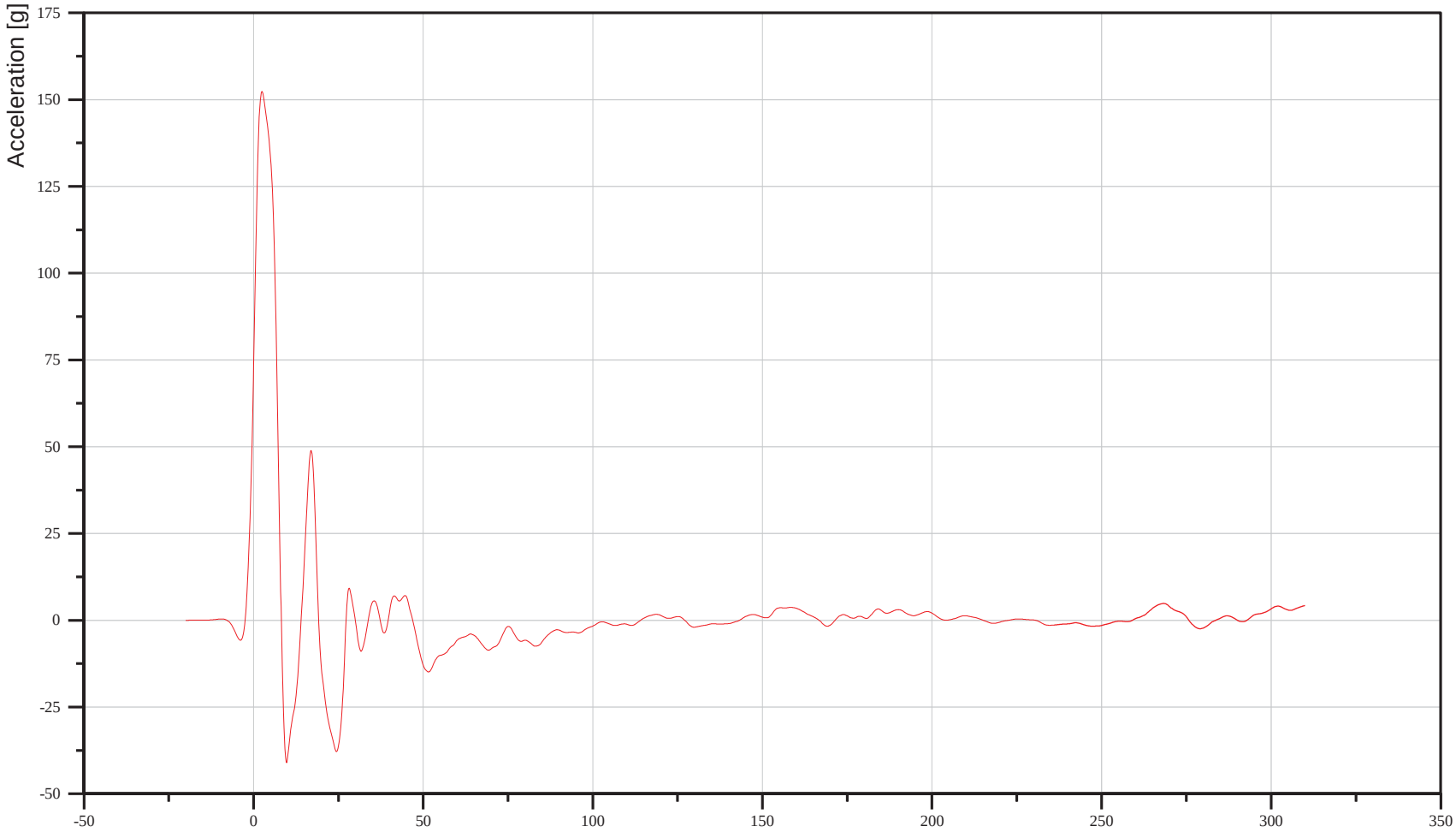
Left Lower B-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11BPILLO0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-41.00 g at 9.76 ms

Max. Value
152.37 g at 2.48 ms

FMVSS 301 MDB Side Impact 33.5 mph

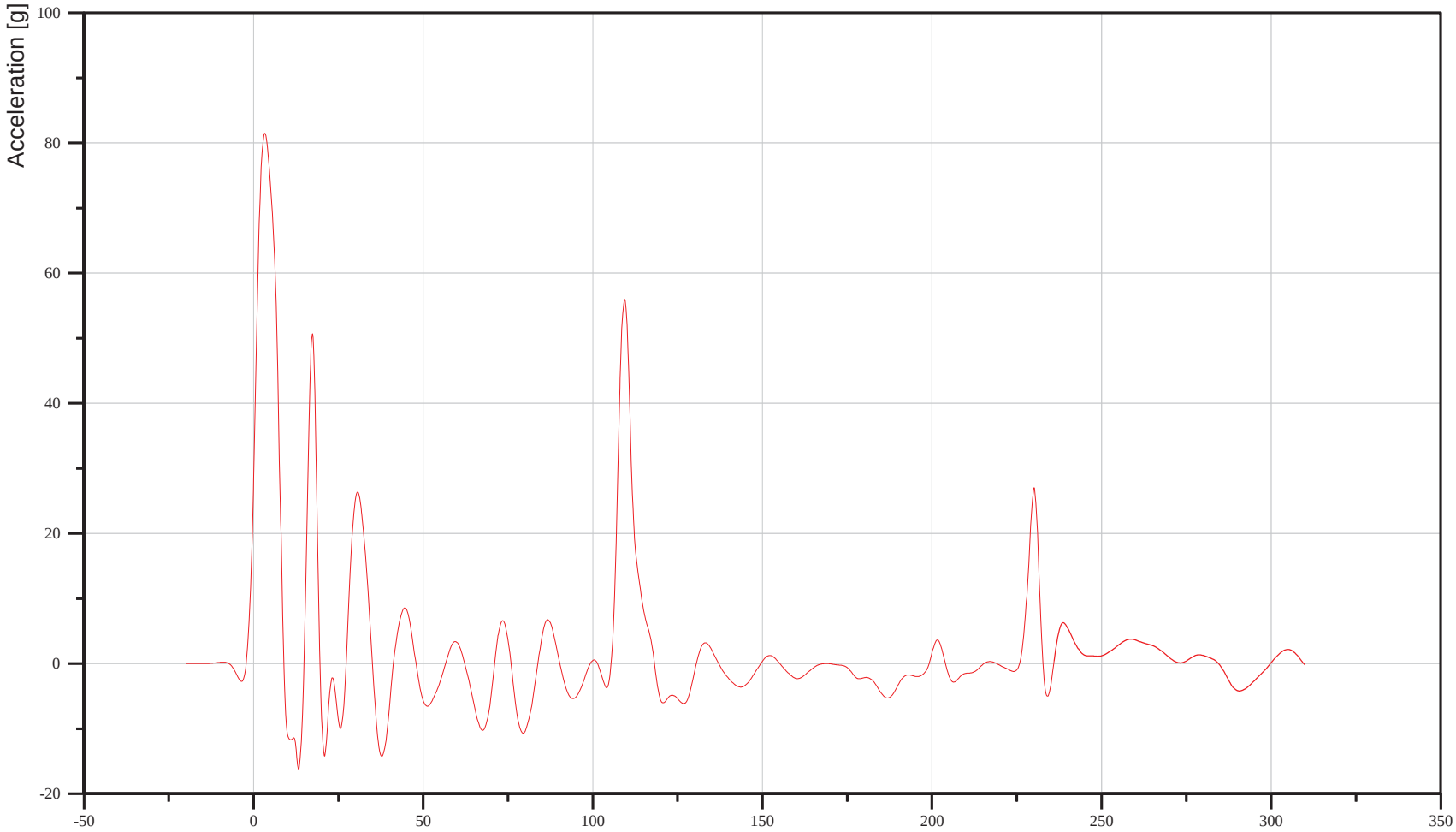
Left Middle B-Pillar AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11BPILMI0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-16.19 g at 13.28 ms

Max. Value
81.50 g at 3.28 ms

FMVSS 301 MDB Side Impact 33.5 mph

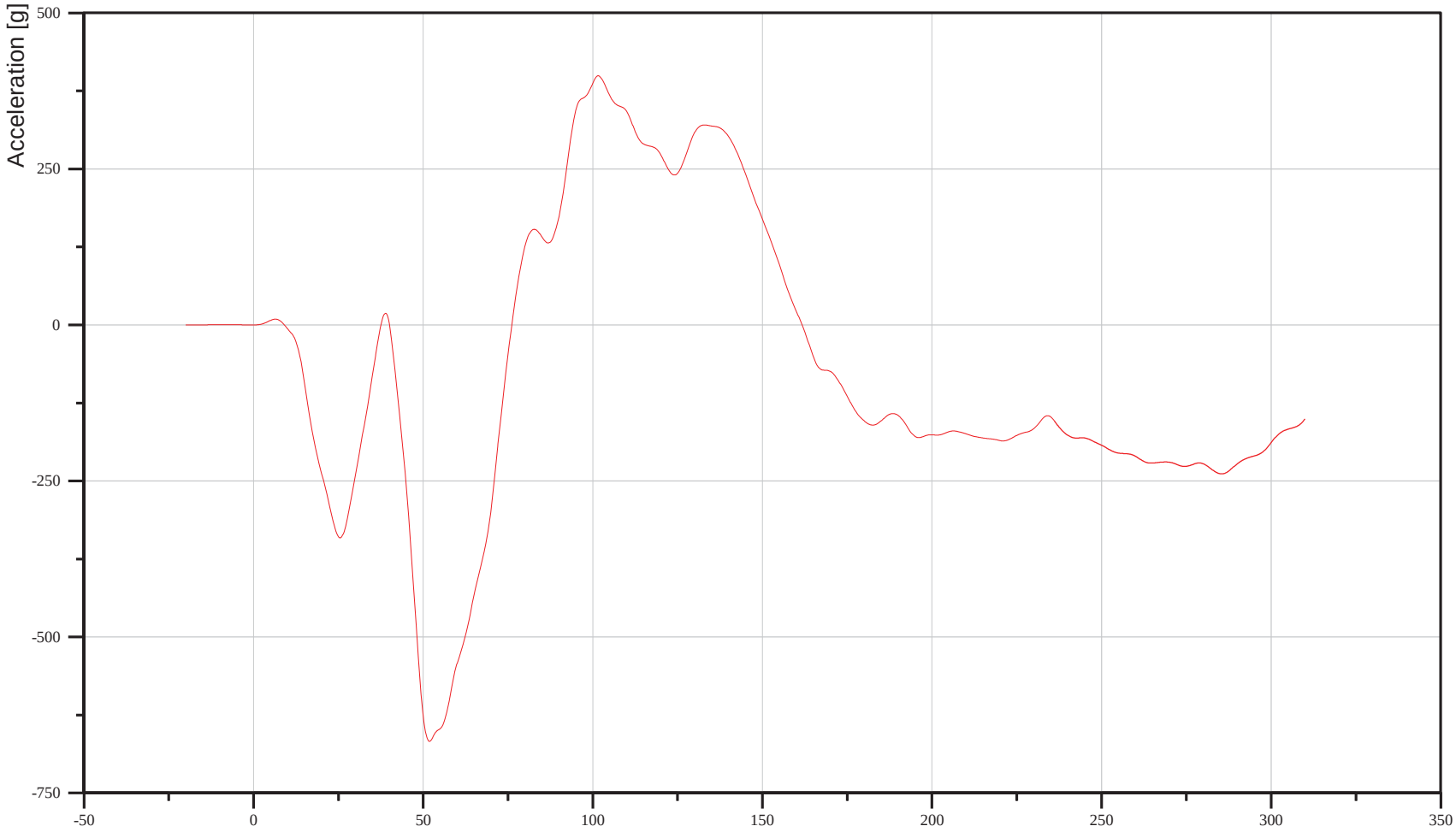
Front Seat Track AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

11SETR000000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-667.14 g at 51.84 ms

Max. Value
399.29 g at 101.60 ms

FMVSS 301 MDB Side Impact 33.5 mph

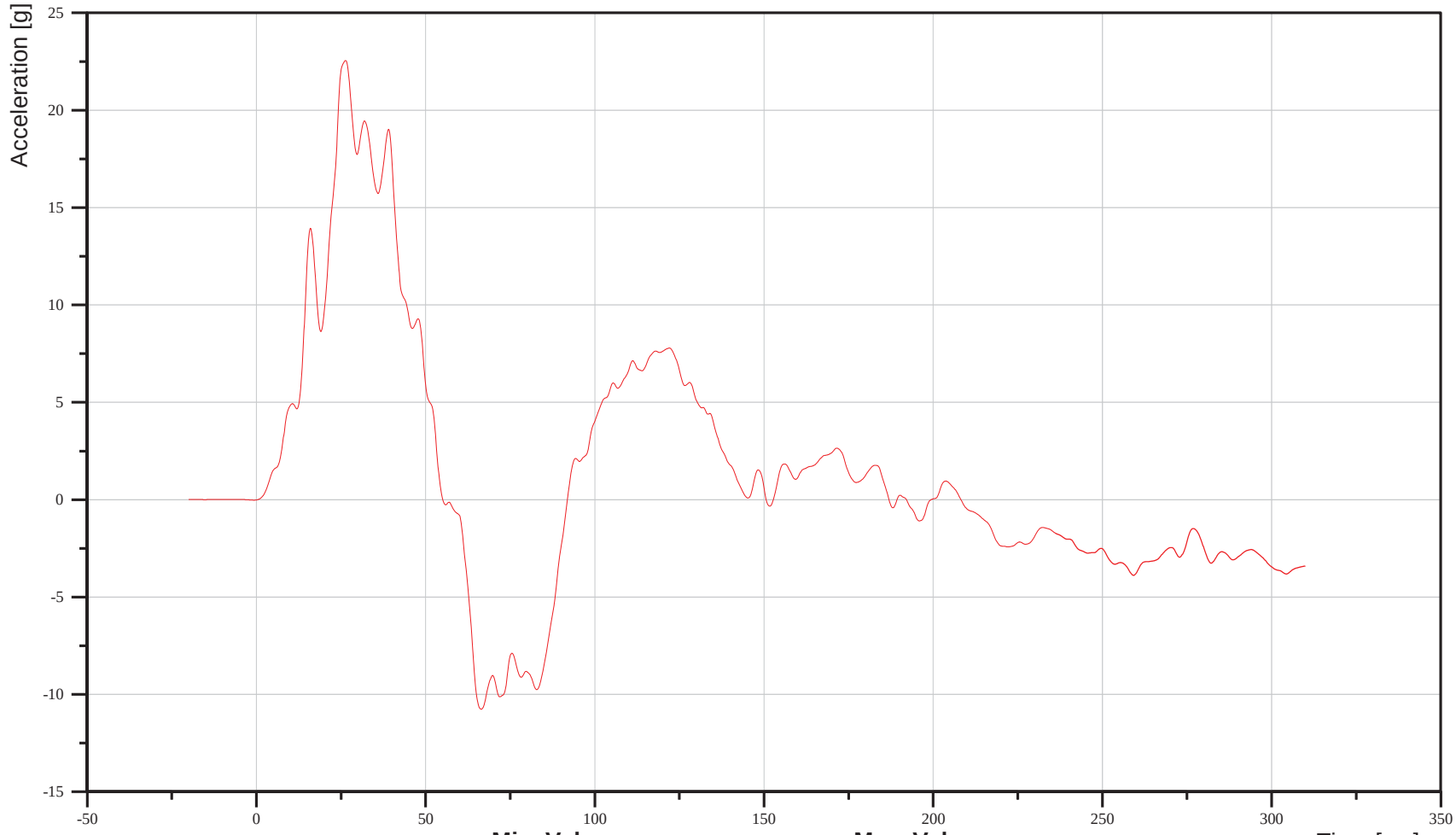
Right Roof (Y)

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

16ROOFRI0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-10.76 g at 66.40 ms

Max. Value
22.55 g at 26.32 ms

FMVSS 301 MDB Side Impact 33.5 mph

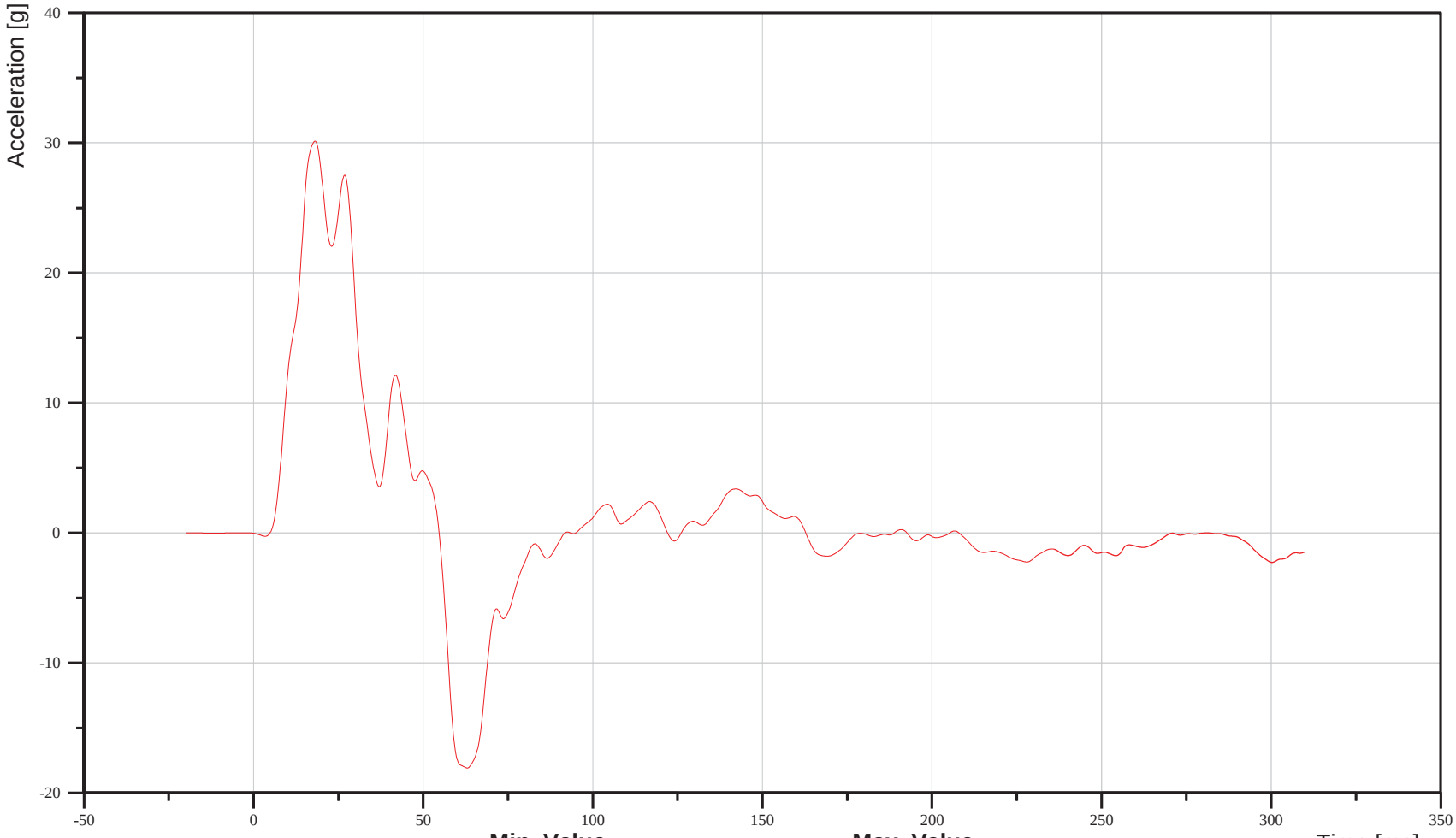
Right Floor Sill (Y)

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

13SILBFL0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-18.07 g at 63.04 ms

Max. Value
30.14 g at 18.08 ms

FMVSS 301 MDB Side Impact 33.5 mph

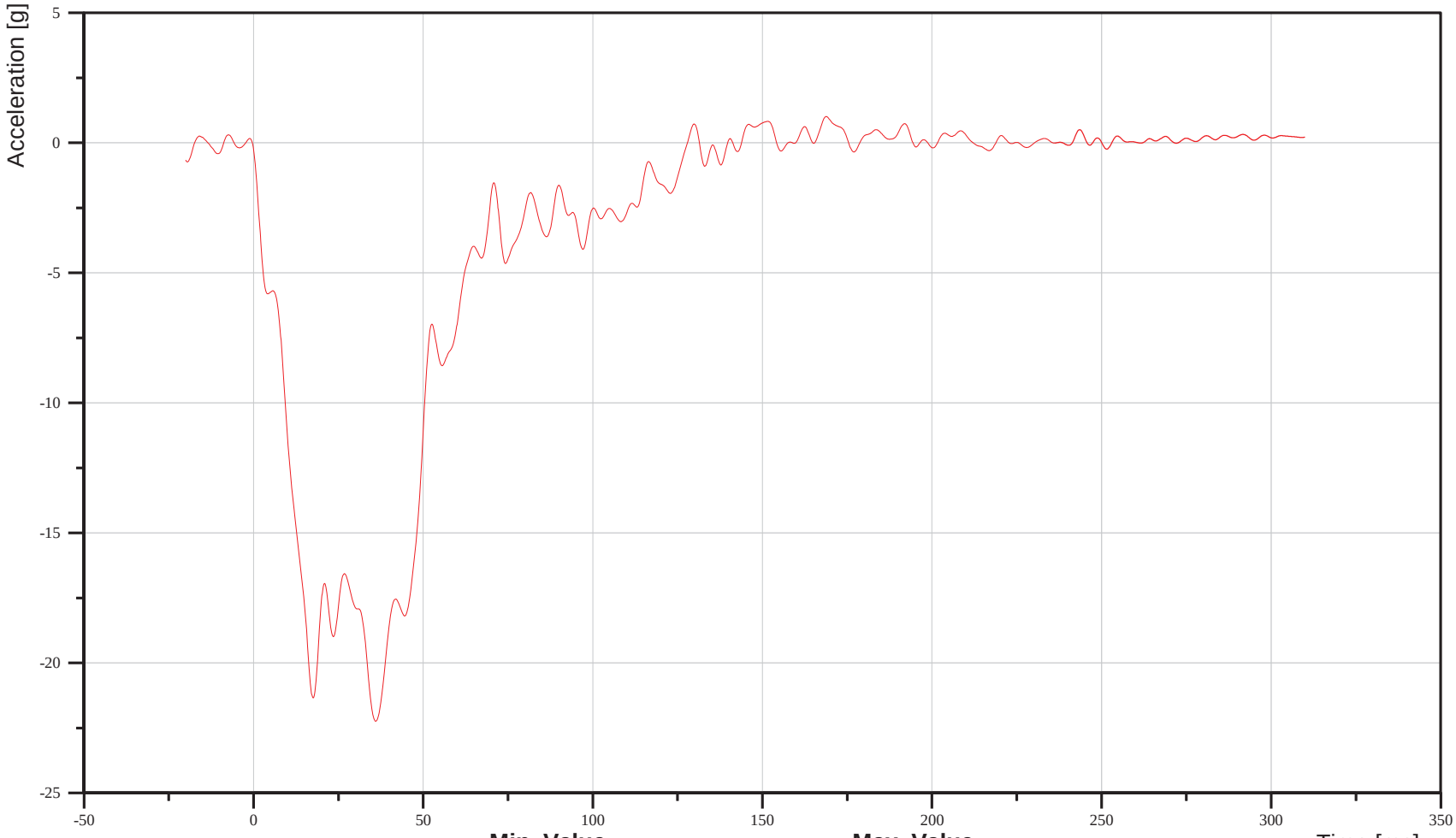
MDB CG AX

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC

M0MBARCG0000ACXD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-22.24 g at 36.00 ms

Max. Value
1.01 g at 168.80 ms

FMVSS 301 MDB Side Impact 33.5 mph

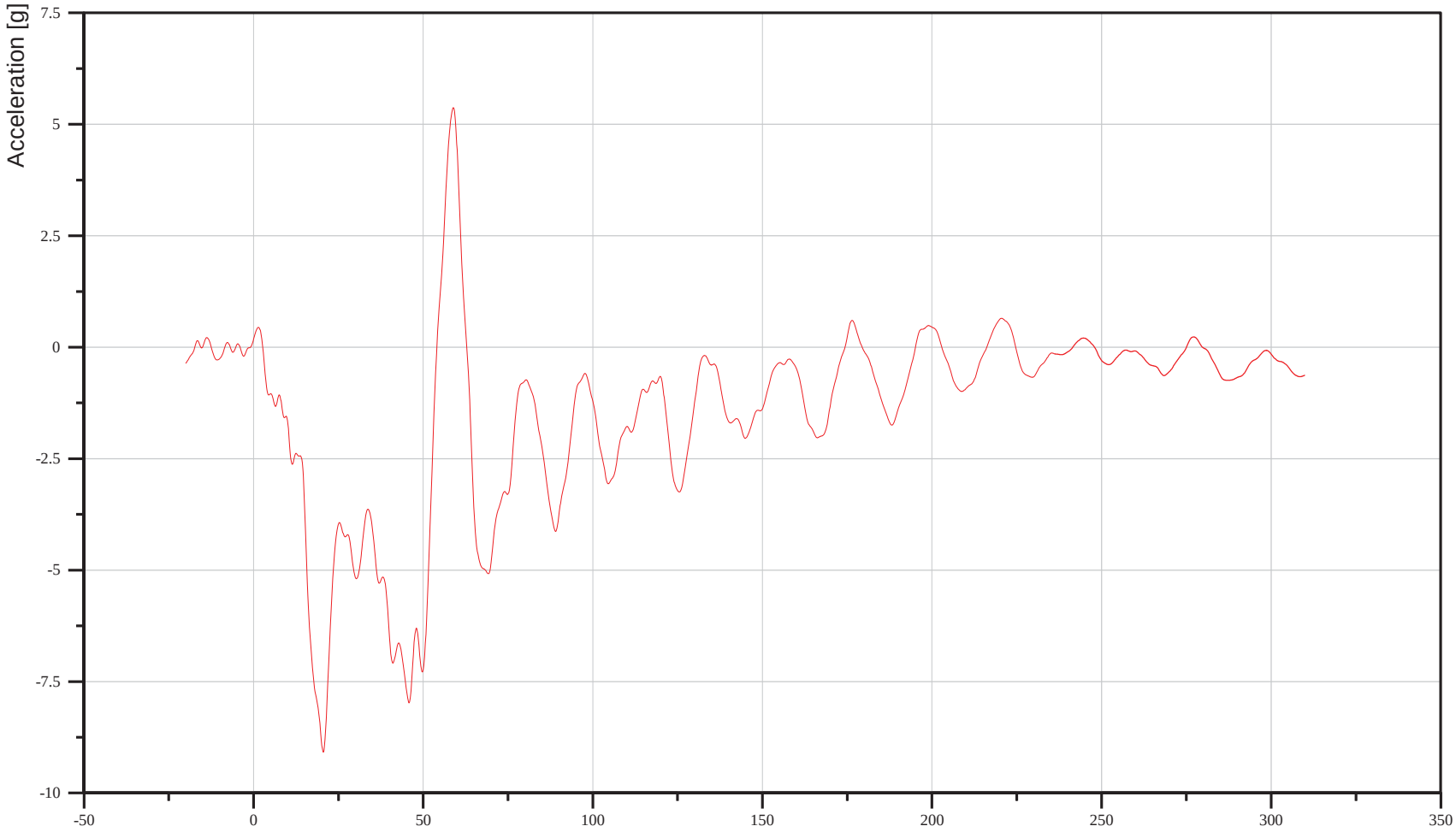
MDB CG AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC

M0MBARCG0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-9.08 g at 20.56 ms

Max. Value
5.38 g at 58.88 ms

FMVSS 301 MDB Side Impact 33.5 mph

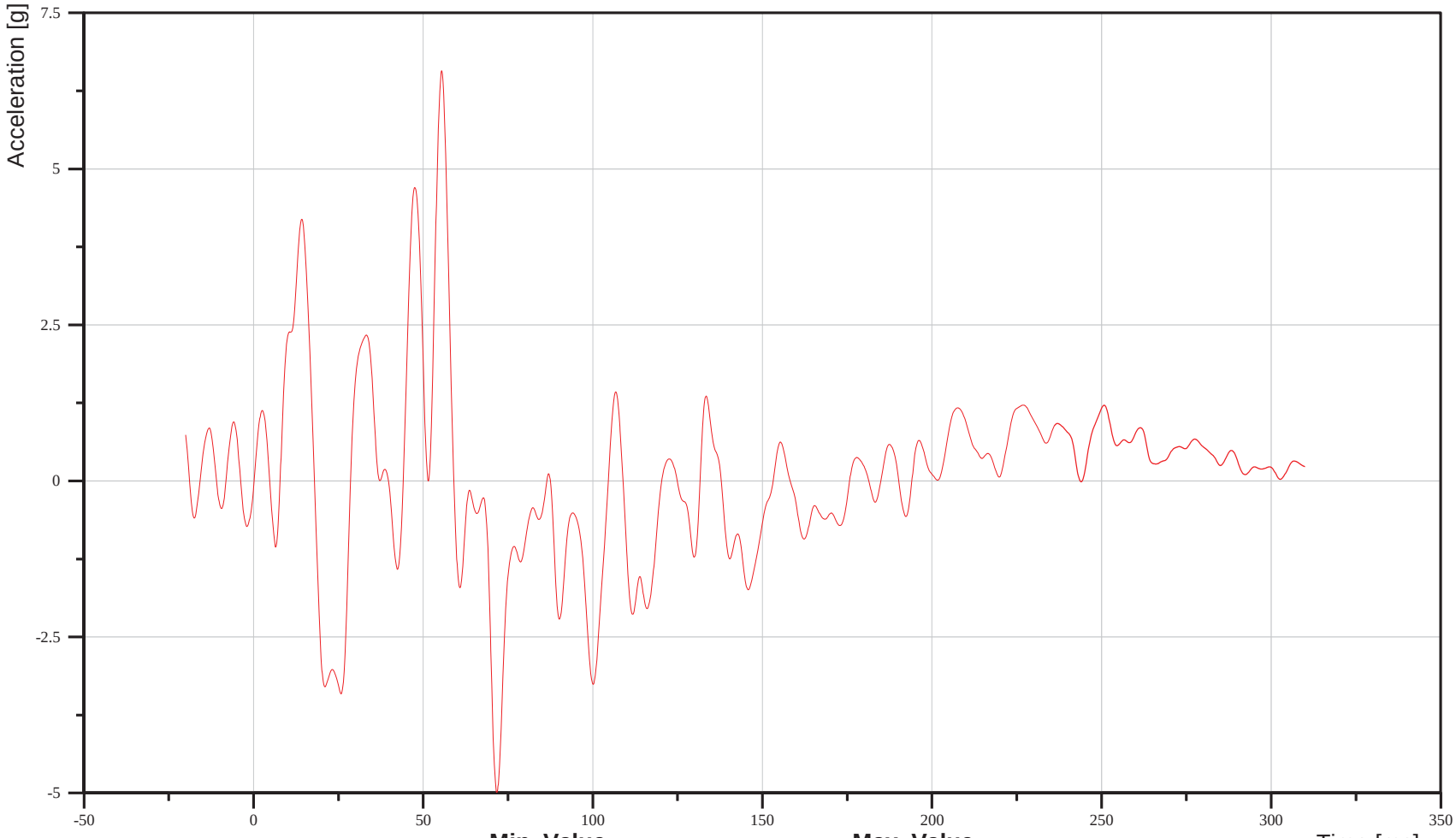
MDB CG AZ

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC

M0MBARCG0000ACZD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-4.99 g at 71.76 ms

Max. Value
6.57 g at 55.44 ms

FMVSS 301 MDB Side Impact 33.5 mph

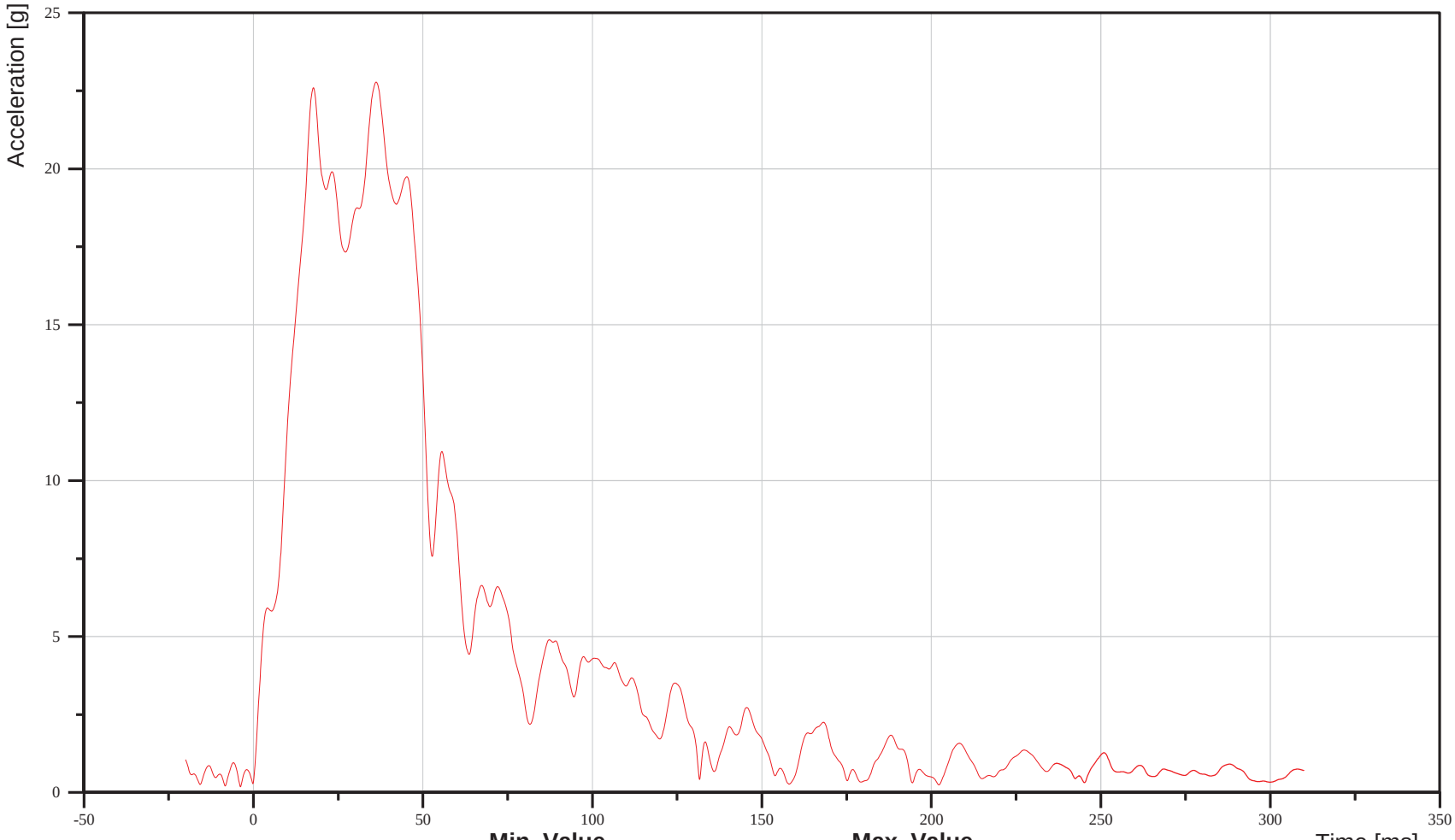
MDB CG Resultant

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC

M0MBARCG0000ACRD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
0.18 g at -3.84 ms

Max. Value
22.78 g at 36.24 ms

FMVSS 301 MDB Side Impact 33.5 mph

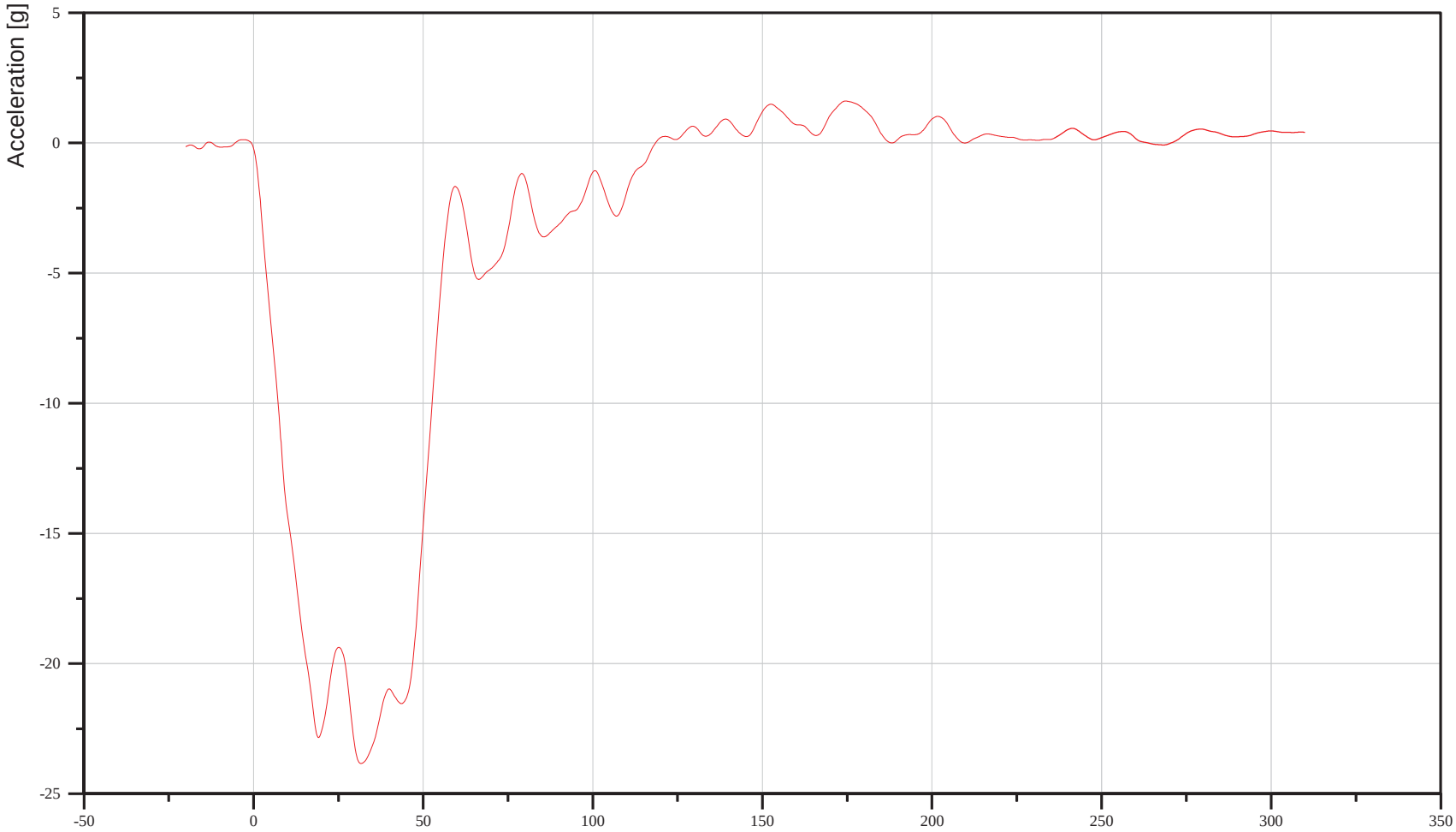
MDB Rear AX

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

M0FRAMRE0000ACXD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-23.84 g at 31.68 ms

Max. Value
1.61 g at 174.48 ms

FMVSS 301 MDB Side Impact 33.5 mph

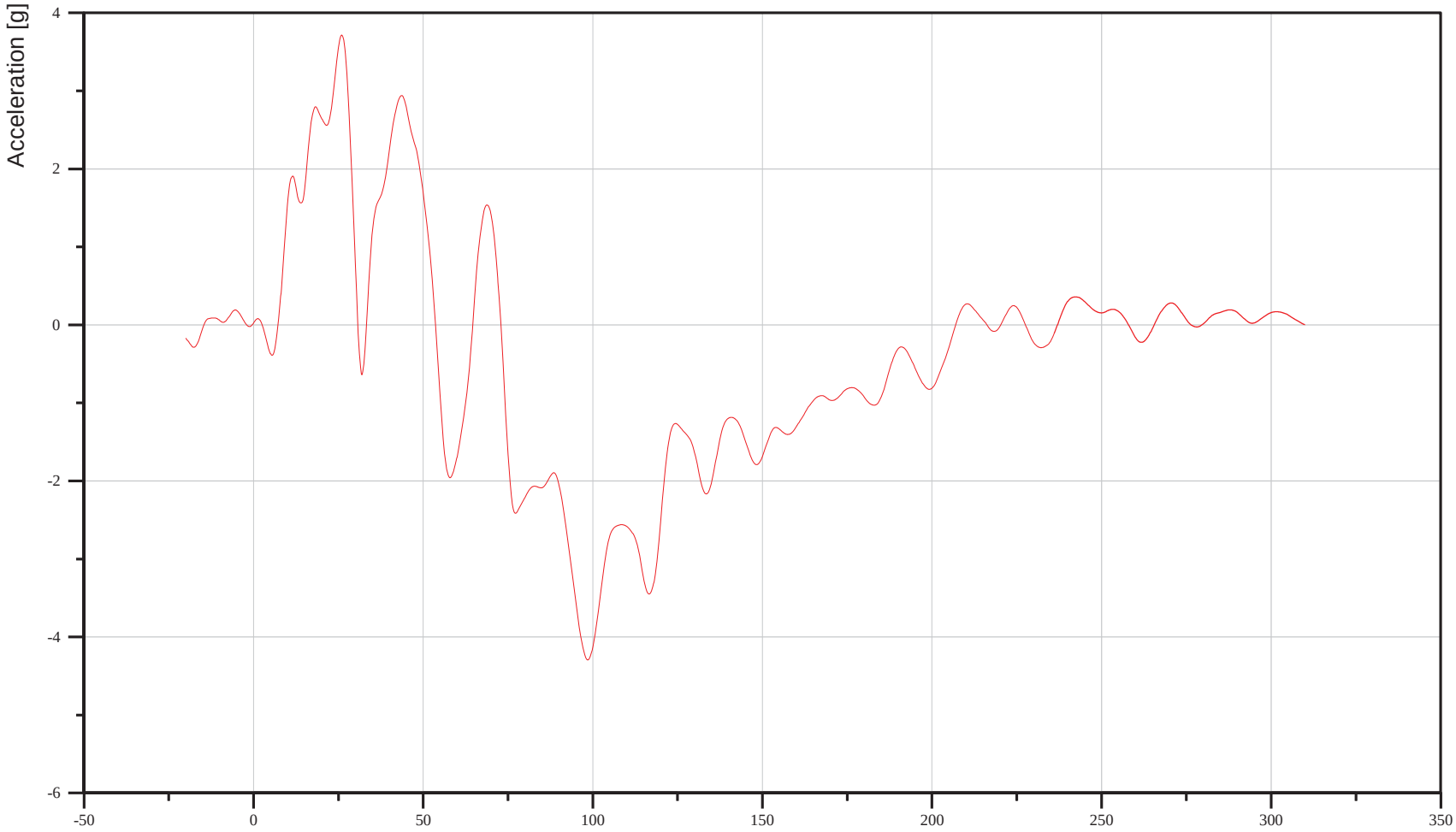
MDB Rear AY

Date: 06/19/2019
Time: 11:07

Customer: All Terrain Conversions, LLC.

M0FRAMRE0000ACYD

TRC Inc. Test Lab: CTF
Test Number: 190619



Filter: CFC_60

Min. Value
-4.29 g at 98.56 ms

Max. Value
3.72 g at 26.00 ms

Appendix C

Barrier Certification

PLASCORE®

SIDE IMPACTOR BARRIER CERTIFICATION

Date: 1/11/2016

To: TRANSPORTATION RESEARCH
SHIP & REC BLDG 50
10820 ST. ROUTE 347
ATTN: ACCOUNTS PAYABLE
EAST LIBERTY, OH 43319-0367
US

PURCHASE ORDER INFORMATION

Customer PO Number:	092437
Work Order Number:	423564
Plascore Part Number:	18723
Quantity:	**1**

CORE INFORMATION

Block Number:	534A1015	PCGA-1/4-5.2-P-3003
Block Number:	365C1215	PAMG-3/8-1.6-P-5052

Unit Number: A0116016

This is to certify that the aluminum honeycomb barrier supplied, under the unit number provided, meets the main body crush requirements of 42.5 psi – 47.5 psi (.293 MPa - .327 MPa) and the bumper crush requirements of 230 psi - 260 psi (1.587 MPa - 1.793 MPa) in accordance to US Department of Transportation, NHTSA, Lab Test Procedure for FMVSS No. 214 "Dynamic" Side Impact Protection, TP214D-09 figure 4.

QA Plascore Accept 014

Quality Assurance Representative

Mark Chartrand

REGULATION 94 WG-11 Bumper Crush AMDB Bottom (Back)

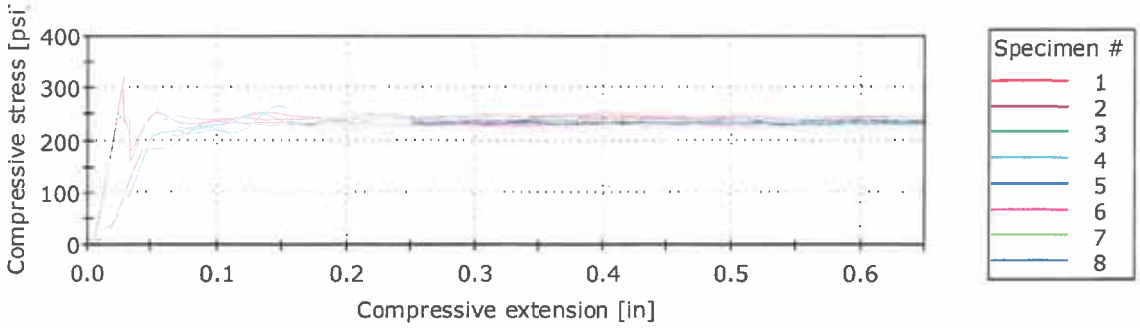
Honeycomb Type	Aluminum
Part Number	A5214P3003B.50X100
Block Number	534A1015
Slice Location	34.000
Instron	1
Operator	TK
Room Temp (F)	70.0
Humidity (%)	50.0
Rate 1	0.25000 in/min

Cell Range
.220-.240"

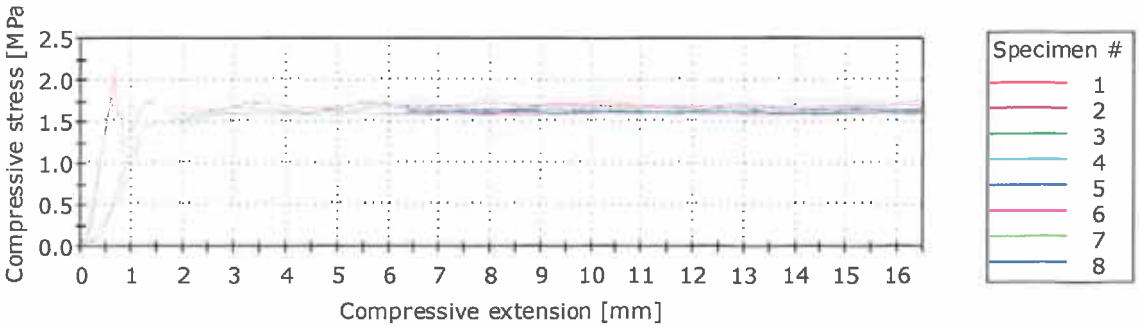
	Measured Cell (in)	Average Stress (0.25-0.38 in) [psi]	Average Stress (0.38-0.52 in) [psi]	Average Stress (0.52-0.65 in) [psi]	Test Result
1	0.220	238.64	242.96	232.87	Pass
2	0.231	231.48	232.70	234.20	Pass
3	0.233	236.15	234.85	230.46	Pass
4	0.229	241.93	242.02	239.93	Pass
5	0.240	234.37	233.82	232.70	Pass
6	0.221	247.30	246.03	245.27	Pass
7	0.225	244.81	241.80	239.12	Pass
8	0.227	235.80	236.69	236.83	Pass

	Average Stress (6.0mm-9.6mm) [MPa]	Average Stress (9.6mm-13.2mm) [MPa]	Average Stress (13.2mm-16.5mm) [MPa]
1	1.633	1.676	1.605
2	1.594	1.604	1.615
3	1.618	1.620	1.589
4	1.662	1.669	1.654
5	1.628	1.612	1.604
6	1.703	1.696	1.691
7	1.697	1.667	1.649
8	1.633	1.632	1.633

Stress vs Displacement Curve (English)



Stress vs Displacement Curve (SI)



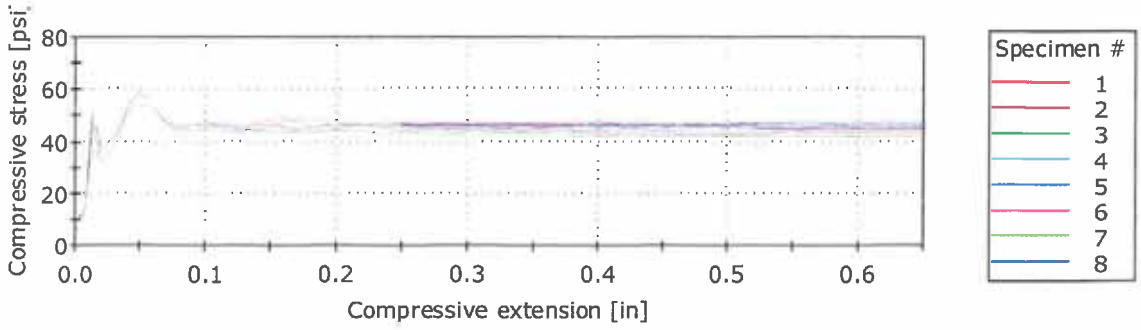
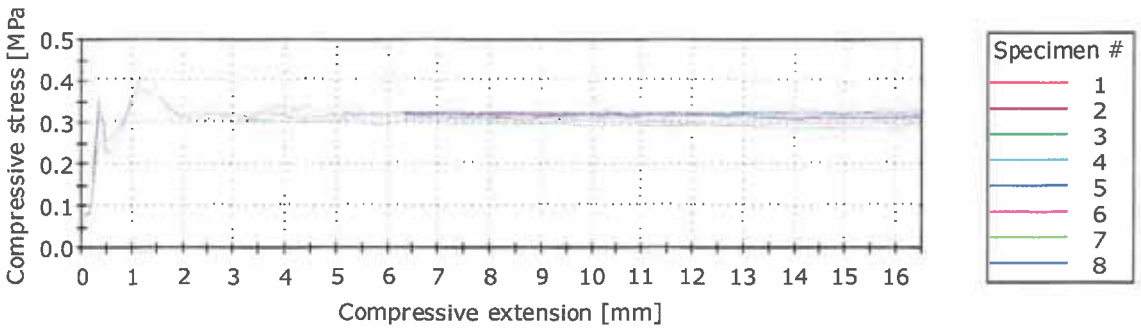
FMVSS No. 214 TP214D - NHTSA Body Crush

Honeycomb Type	Aluminum
Part Number	A1638P5052B.68X76
Block Number	365C1215
Slice Location	35.750
Instron	1
Operator	TK
Room Temp (F)	70.0
Humidity (%)	50.0
Rate 1	0.25000 in/min
Cell Range	
.328-.359	

	Measured Cell (in)	Average Stress (0.25-0.38 in) [psi]	Average Stress (0.38-0.52 in) [psi]	Average Stress (0.52-0.65 in) [psi]	Test Result
1	0.359	44.46	43.81	43.42	Pass
2	0.328	45.69	45.95	44.94	Pass
3	0.362	43.29	< 42.46	< 41.91	Exclude
4	0.341	44.44	45.82	45.28	Pass
5	0.338	46.52	46.16	45.37	Pass
6	0.328	46.93	46.66	46.58	Pass
7	0.356	45.41	45.98	46.48	Pass
8	0.333	46.58	46.83	47.32	Pass

	Average Stress (6.0mm-9.6mm) [MPa]	Average Stress (9.6mm-13.2mm) [MPa]	Average Stress (13.2mm-16.5mm) [MPa]
1	0.307	0.302	0.299
2	0.316	0.317	0.310
3	0.300	0.293	0.289
4	0.308	0.316	0.312
5	0.322	0.318	0.313
6	0.324	0.322	0.321
7	0.315	0.317	0.320
8	0.321	0.323	0.326

Stress vs Displacement Curve (English)



Stress vs Displacement Curve (SI)