REPORT NUMBER: 201P-CAL-09-01

SAFETY COMPLIANCE TESTING FOR FMVSS 201
RIGID POLE SIDE IMPACT TEST

HYUNDAI MOTOR COMPANY
2009 HYUNDAI ELANTRA GLS
4-DOOR SEDAN

NHTSA NUMBER: C90511

CALSPAN TEST NUMBER: 8880-01

CALSPAN
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225

Test Date: May 6, 2009

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220, West Building 4th Floor
1200 New Jersey Avenue, SE
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9. Performing Organization Name and Address Calspan 4455 Genesee Street Buffalo, New York 14225		*10. Work Unit No.*
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15. Supplementary Notes

16. Abstract

A rigid pole side impact test was conducted on the subject 2009 Hyundai Elantra GLS 4-Door Sedan in accordance with FMVSS 201, "Occupant Protection in Interior Impact, S6.2(b)(3) and the Office of Vehicle Safety Compliance Test Procedure No. TP-201P-02 "Rigid Pole Side Impact Test". The test was conducted at the Calspan's facility in Buffalo, New York on May 6, 2009

The impact velocity of the vehicle was 28.0 kph, and the ambient temperature at the struck side of the target vehicle at the time of impact was 22°C. The post test maximum crush was 370 mm at level 3. The test vehicle's performance follows:

Measurement Description	**Threshold**	**P1 (905)**
Head Injury Criteria (HIC- 36 ms)	1000	162.5

Test Failures: None

The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during side impact event.

17. Key Words Compliance Testing Rigid Pole Side Impact Test FMVSS 201	*18. Distribution Statement* Copies of this report are available from: NHTSA Technical Information Services National Highway Traffic Safety Admin. 1200 New Jersey Avenue, SE Washington, DC 20590		
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TABLE OF CONTENTS

LIST OF DATA SHEETS

SECTION 1

PURPOSE AND TEST PROCEDURE

This side impact test is part of the FY 2009 FMVSS 201 "Occupant protection in interior impact" compliance test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-06-C-00031. The purpose of this test was to evaluate the dynamic head protection system in a 2009 Hyundai Elantra GLS 4-Door Sedan, NHTSA Number: C90511. The rigid pole side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-201P-02, dated October 21, 2001).

SECTION 2

SUMMARY OF RIGID POLE SIDE IMPACT TEST

A rigid pole side impact test was conducted on a 2009 Hyundai Elantra GLS 4-Door Sedan. The subject vehicle was towed into the rigid pole at a velocity of 28.0 kph. The test was conducted by Calspan in Buffalo, New York, on May 6, 2009.

Pretest and post test photographs of the test vehicle, and the side impact dummy (SID/HIII) are included in Appendix A of this report.

One SID/HIII was placed in the L front outboard designated seating position according to instructions specified in TP201P-02 dated (October 21, 2001). The side impact event was documented by thirteen (13) cameras. Camera locations and other pertinent camera information are included in this report.

The SID/HIII was instrumented with the following accelerometers:

1. Head CG triaxial accelerometers
2. Upper neck 6 channel load cell (X,Y and Z force and moment)
3. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
4. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
5. Lower Thoracic Spine (T12) uniaxial accelerometer (Y-direction)
6. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

Appendix B contains the vehicle and dummy response data traces. A summary of the side impact dummy (SID/HIII) configuration and performance verification test data is shown in Appendix C. Dummy and vehicle instrumentation calibration data can be found in Appendix D of this report.

The following table summarizes the results of the test.

INJURY CRITERIA	P1 SID/HIII (905)
HIC (≤1000)	162.5
TTI (g)[1]	45
Pelvic (g)[1]	31
Neck X Force (N)[1]	-206.2
Neck Y Force (N)[1]	-310.0
Neck Z Force (N)[1]	-509.1
Neck X Moment (N-m)[1]	-48.7
Neck Y Moment (N-m)[1]	-25.0
Neck Z Moment (N-m)[1]	18.4

[1] Information purposes only.

SECTION 3

SIDE IMPACT DUMMY (SID/HIII) AND VEHICLE TEST DATA

DATA SHEET 1
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Vehicle Manufacturer: Hyundai Motor Company

Year/Make/Model/Body Style: 2009 Hyundai Elantra GLS 4-Door Sedan

Vehicle Body Color: Silver VIN: KMHDU46D99U594774

Vehicle NHTSA No.: C90511 Month & Year of Manufacture: 10/08

Engine Data: 4 Cylinders; - CID; 2.0 Liters; - cc

Engine Placement: - Longitudinal; or X Lateral

Transmission: 5 Speed; X Manual; - Automatic; - Overdrive

Final Drive: - Rear Wheel Drive; X Front Wheel Drive; - Four Wheel Drive

Odometer Reading 138 km

Options: X A/C; X Power Steering; X Power Brakes; X Power Windows

DATA FROM TIRE PLACARD

Tire Pressure* (at capacity); 220 kPa FRONT

220 kPa REAR

Recommended Tire Size: P195/65R15

Tires on Test Vehicle: P195/65R15 ; Manufacturer: Hankook

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; - 3rd Seat; 5 Total

Type of Front Seats: X Bucket; - Bench; - Split Bench

Type of Front Seat Back: - Fixed; X Adjustable with X Lever or - Knob

Vehicle Max Capacity Loading = 385.0 kg (A)

No. of Occupants x 68.04 kg. = 340.20 kg (B)

Vehicle Cargo Capacity = 44.80 kg (A-B)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

	LEFT SIDE (kg)	RIGHT SIDE (kg)	TOTAL (kg)	PERCENT
FRONT =	410.0	400.0	810.0	62.7%
REAR=	246.0	236.5	482.5	37.3%

TOTAL DELIVERED WEIGHT (UVW) : 1292.5 kg

* Tire pressure used in test.

DATA SHEET 1
GENERAL TEST AND VEHICLE PARAMETER DATA (Continued)

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Test Vehicle Delivered Weight with Max. Fluids	=	1292.5	kg (A)
Maximum Cargo Carrying Capacity of Test Vehicle	=	44.8	kg (B)
Weight of instrumented SID/HIII (81.2 kg)	=	81.2	kg (C)
TEST VEHICLE TARGET WEIGHT:	=	1418.5	kg (A+B+C)

FULLY LOADED TEST VEHICLE (UVW + SID/HIII + CARGO):

	LEFT SIDE	RIGHT SIDE (kg)	TOTAL (kg)	PERCENT
FRONT =	445.5	407.5	853.0	60.1%
REAR=	297.5	269.5	567.0	39.9%

TOTAL FULLY LOADED WEIGHT : 1420.0 kg

AS TESTED WEIGHT OF TEST VEHICLE (1 SID/HIII + CARGO + EQUIPMENT)

	LEFT SIDE	RIGHT SIDE (kg)	TOTAL (kg)	PERCENT
FRONT =	427.5	414.0	841.5	59.6%
REAR=	292.5	279.0	571.5	40.4%

TOTAL TEST WEIGHT: 1413.0 kg

TEST VEHICLE ATTITUDE;

	As Delivered	Fully Loaded	Ready for Test
Left Front (mm)	682	673	679
Left Rear (mm)	684	661	666
Right Front (mm)	683	680	681
Right Rear (mm)	685	667	668
Front Bumper Angle	0	0	0.1
Left Door Sill Angle	0.5	0.2	0.4
Rear Bumper Angle	0.1	0.2	0.2
Right Door Sill	-0.4	-0.1	-0.4

Bumper Angle: Right to left side pitched upward (positive)
Door Sill Angle: Rear to front pitched upward (positive)

Test Vehicle Wheelbase: 2654 millimeters
C.G. = 1073.4 millimeters rearward of front wheel centerline

DATA SHEET 1
GENERAL TEST AND VEHICLE PARAMETER DATA (Continued)

TOTAL VEHICLE LENGTH: (Pre Test)

Right Side = 4399 mm
Centerline = 4485 mm
Left Side = 4394 mm

FRONT SEAT CUSHION PLACEMENT:

Total Length of Adjustment Travel = 280 mm
Total Number of Adjustment Positions or Detents = 24

As-Tested Position:

Detent: 12
Distance from full forward: 140 mm

FRONT SEAT BACK ADJUSTMENT POSITION:

Seat Back Torso Angle = 13 degrees

As-Tested Position:

Seat Back Torso Angle = 11 * degrees

* To attain the 50 mm clearance

ADJUSTABLE STEERING COLUMN POSITION:

Detent: N/A
Test Angle: 23.5 deg

WINDOW POSITIONS:

Right Front= Open Right Rear= Open
Left Front = Open Left Rear = Open

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Capacity= 45.0 L
Test Volume = 42.0 L (92% to 94% of Useable Capacity)

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase = 2654 mm
Impact Reference Line is 1358 mm rearward of front axle centerline

DATA SHEET 2
TEST VEHICLE SUMMARY OF RESULTS

VEHICLE IDENTIFICATION:

Vehicle Year/Make/Model: 2009 Hyundai Elantra GLS

Body Style: 4-Door Sedan VIN: KMHDU46D99U594774

NHTSA No.: C90511 Test Date: May 6, 2009

Overall Length = 4485 millimeters; Overall Width = 1749 millimeters

VEHICLE TEST WEIGHT (Pre-Test):

Left Front	=	427.5 kg	Left Rear	=	292.5 kg
Right Front	=	414.0 kg	Right Rear	=	279.0 kg
TOTAL FRONT	=	841.5 kg	TOTAL REAR	=	571.5 kg

TOTAL VEHICLE WEIGHT 1413.0 kg

Wheelbase = 2654 millimeters

Longitudinal C.G. from Center of Front Axle = 1073.4 millimeters

Impact Angle with Respect to Impactor = 90 degrees

ACTUAL IMPACT POINT

Actual Impact Point is 2 mm rearward of nominal impact ref. line (Lateral)

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (	253 mm above ground)	=	352 millimeters
2. LEVEL 2 (	522 mm above ground)	=	362 millimeters
3. LEVEL 3 (	619 mm above ground)	=	370 millimeters
4. LEVEL 4 (	896 mm above ground)	=	326 millimeters
5. LEVEL 5 (	1415 mm above ground)	=	112 millimeters

Maximum Post-Test Intrusion = 370 millimeters

OCCUPANTS: Left Front (Driver):

Dummy Identification 905

Restraints Used 3-point belt system, Curtain airbag, Seat side Torso airbag

INSTRUMENTATION:

Number of Vehicle Data Channels:		=	24
Number of Cameras:	Onboard	=	3
	Offboard	=	10
	TOTAL	=	13

DATA SHEET 3
POST TEST OBSERVATIONS

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511

VISIBLE DUMMY CONTACT POINTS:

	SID/HIII
Head:	Side curtain Airbag
Upper Torso:	Side seat torso airbag
Lower Torso:	Arm Rest
Left Knee:	Door Trim
Right Knee:	Top of knee to steering column

DOOR OPENING:

	LEFT DOOR		LEFT DOOR
Front:	Closed / Inoperable	Front:	Closed / Inoperable
Rear:	N/A	Rear:	N/A

ARM REST LOCATIONS:

Front: Intact

Rear: Intact

SEAT MOVEMENT:

Front: None

Rear: None

GLAZING DAMAGE:

Windshield: Severe damage to left side

Window: Shattered – window was in the closed position during impact

PILLAR PERFORMANCE:

Intact

SILL SEPARATION:

None

AIR BAG DEPLOYMENT STATUS:

	DRIVER	FRONT PASSENGER	REAR PASSENGER
FRONT	NO	NO	N/A
SIDE	YES	NO	N/A

OTHER NOTABLE IMPACT EFFECTS:

None

SECTION 4

OCCUPANT AND VEHICLE INFORMATION

DATA SHEET 4
SID/HIII INSTRUMENTATION DATA

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511

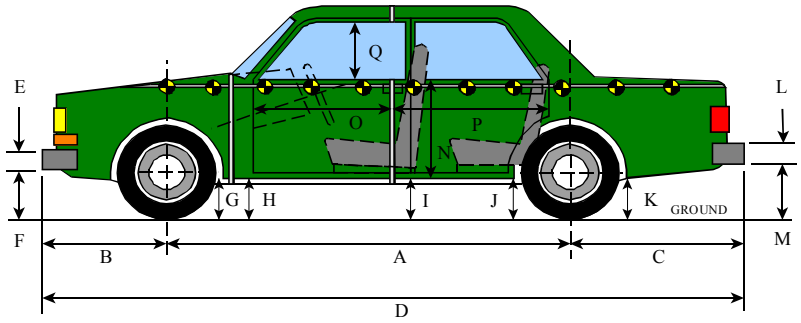
	Front Dummy ID# 905			
	Pos. Direction		Neg. Direction	
	Max	Time	Max	Time
HEAD ACCELERATIONS:	(g)	(msec)	(g)	(msec)
Longitudinal X	2.9	209	-15.7	70
Lateral Y	35.5	62	-4.3	187
Vertical Z	10.2	35	-4.5	64
Resultant Resultant	36.8	62	0.1	20
HIC	162.5			
NECK LOADS:	(N)	(msec)	(N)	(msec)
Longitudinal X	108.1	205	-206.2	71
Lateral Y	153.5	42	-310	77
Vertical Z	390.3	35	-509.1	64
Resultant R	544.7	64	6.1	0
NECK MOMENTS:	(N-m)	(msec)	(N-m)	(msec)
Longitudinal X	9.4	117	-48.7	61
Lateral Y	16.8	85	-25	69
Vertical Z	18.4	71	-6.3	132
Resultant R	52.9	62	0.3	18
RIB ACCELERATIONS:	(g)	(msec)	(g)	(msec)
Upper Rib Lateral Y	50.9	30	-16.9	36
Upper Rib Lateral Y(R)	52.4	30	-19.1	36
Lower Rib Lateral Y	45.4	31	-8.4	37
Lower Rib Lateral Y(R)	46.7	31	-10.5	37
SPINE ACCELERATIONS:	(g)	(msec)	(g)	(msec)
Lower Lateral Y	38.6	35	-4.5	64
Lower Lateral Y(R)	38.5	35	-4.5	64
PELVIC ACCELERATIONS:	(g)	(msec)	(g)	(msec)
Lateral Y	31.2	37	-8.2	76
Lateral Y(R)	31.2	37	-8.2	76

REFERENCE: Positive Direction –
Longitudinal (X) = forward
Lateral (Y) = to right
Vertical (Z) = down

Note: Above data has been FIR filtered, Y(R) denotes redundant Y direction accelerometer.
Head Accelerations are filtered at SAE Class 1000, Neck Force uses Class 1000, Neck Moment uses Class 600

DATA SHEET 5
VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



LEFT SIDE VIEW

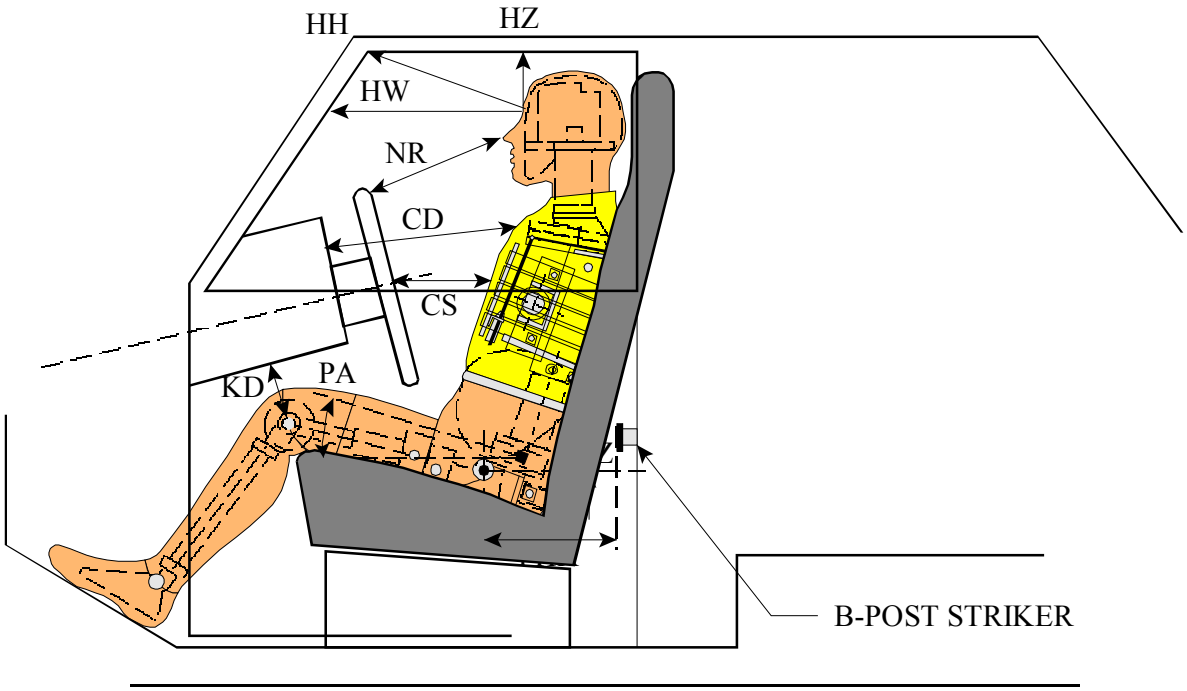
NOTE: all dimensions are in millimeters with tolerance of ±3 mm

	PRE-TEST (as delivered)	PRE-TEST (as tested)	POST-TEST (as tested)	∆ CHANGE
A	2654	2654	2573	-81
B	855	855	876	21
C	977	977	995	18
D	4485	4485	4489	4
E	107	-	107	0
F	392	392	410	18
G	197	187	183	-4
H	192	182	170	-12
I	202	183	202	19
J1	182	163	186	23
J2	204	183	206	23
K	268	242	275	33
L	325	-	325	0
M	293	266	280	14
N	699	-	698	-1
O	907	-	896	-11
P	961	-	948	-13
Q	470	-	439	-31
R	4399	-	4395	-4
S	4394	-	4342	-52
T	1749	-	1441	-308

D = Length at Centerline E&L = Bumper Thickness R = Right Side Length S = Left Side Length
T = Width at B-Pillar J1 = To Pinch Weld J2 = To Sill

DATA SHEET 6
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



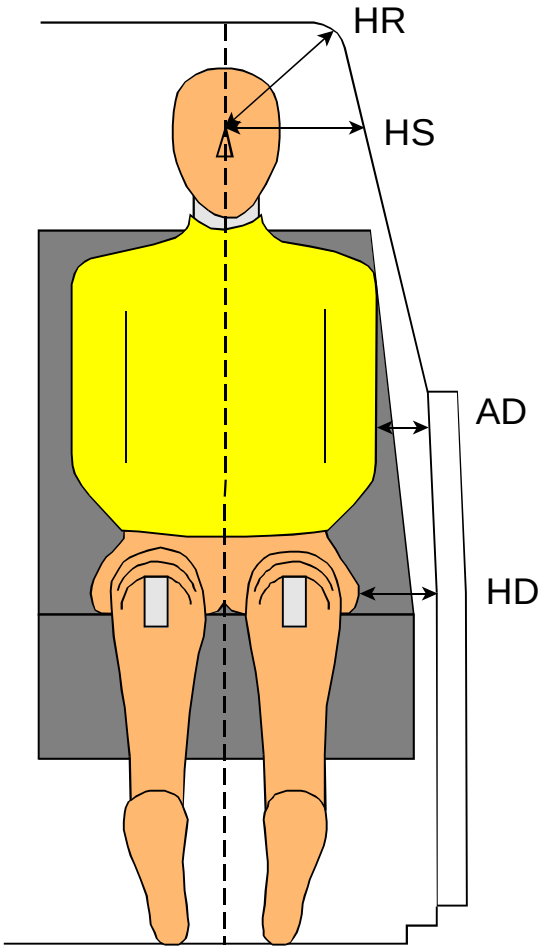
LEFT SIDE VIEW

NOTE: All dimensions are in millimeters with tolerance of ±3 mm

	SID/HIII ID# 905
HH	295
HW	544
HZ	152
NR/NB	391
CD/CB	521
CS	271
KDL(KDA°)	185 / (28 °)
KDR(KBA°)	128 / (25 °)
PA°	24.8 °
PHX	227
PHZ	188

DATA SHEET 7
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



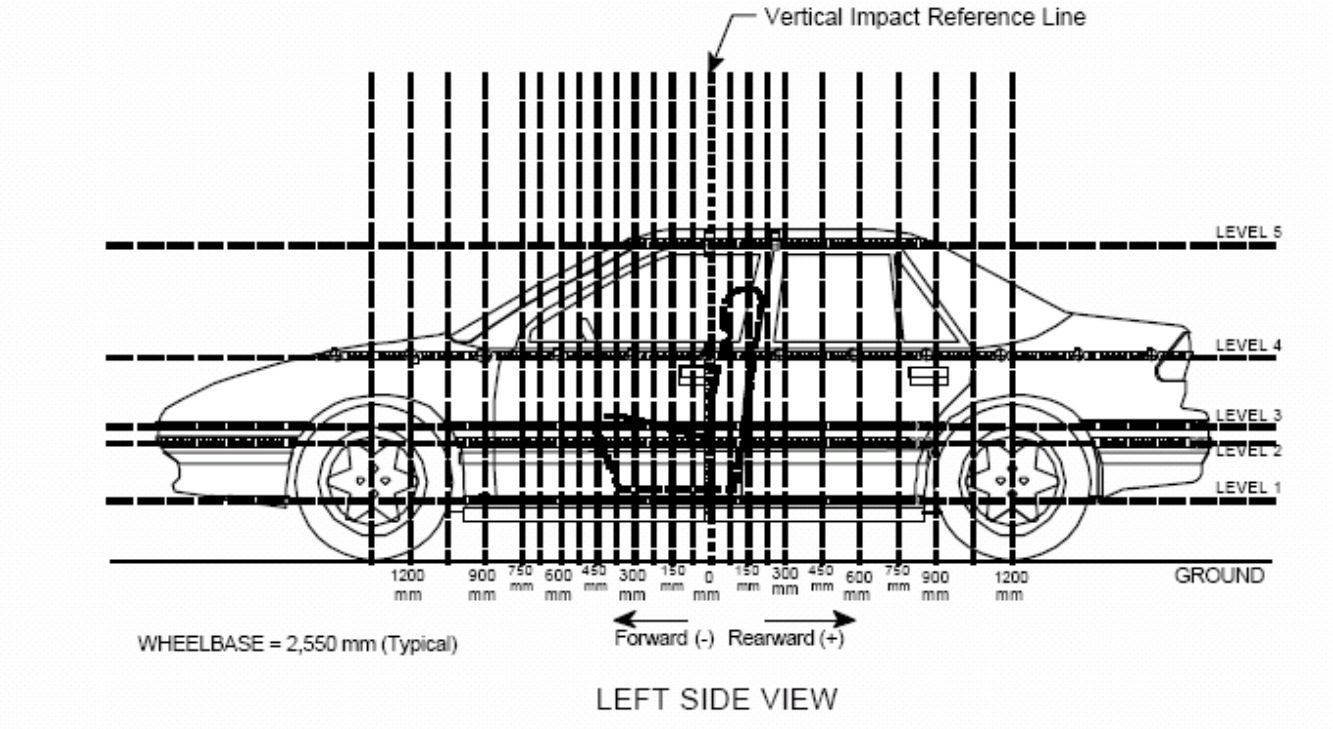
NOTE: All dimensions are in millimeters with tolerance of ±3 mm

	SID HIII ID # 905			
HR	206			
HS	335			
AD*	LOWER:	135	UPPER:	150
HD	181			

* Lower measurement is taken laterally at the center of the lower rib accelerometer height from the arm to the closest part of the vehicle side. Upper measurement is taken laterally at the center of the upper rib accelerometer height from the arm to the closest part of the vehicle side.

DATA SHEET 8
VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



LEFT SIDE VIEW

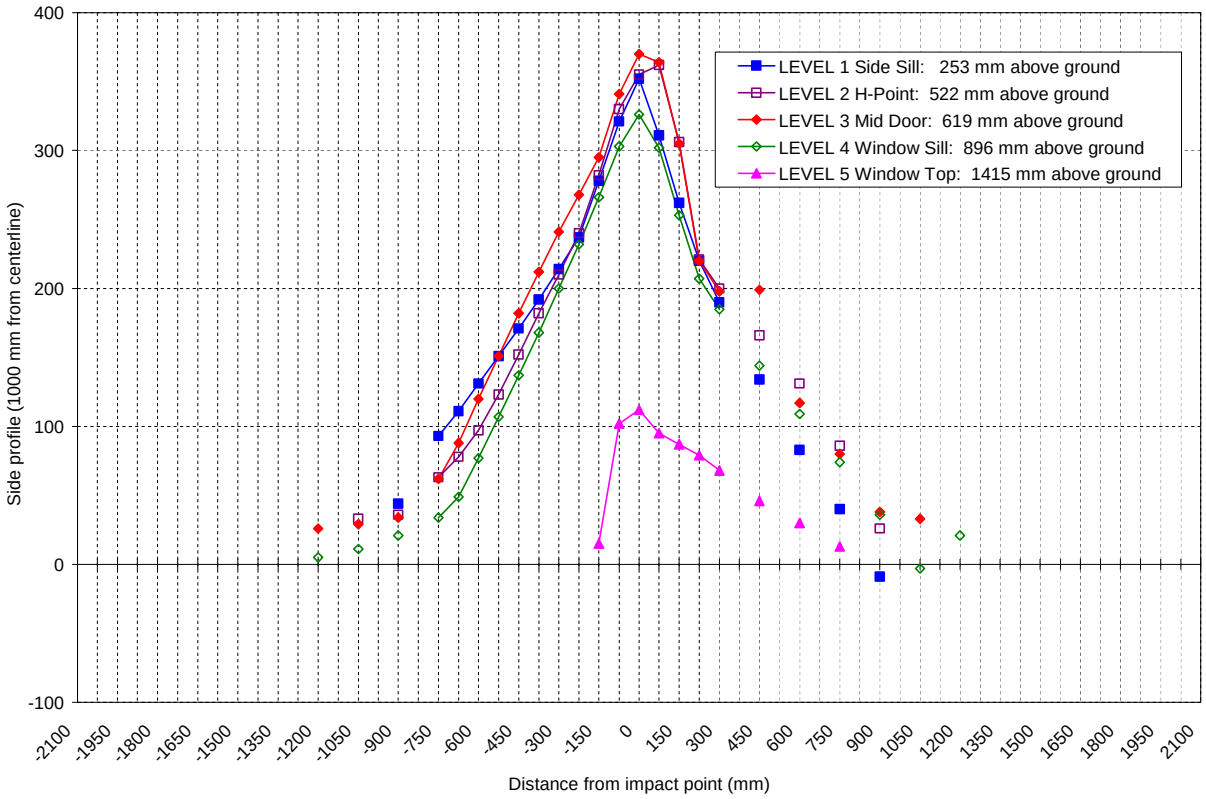
MEASUREMENTS ARE TAKEN WHEN THE VEHICLE IS IN THE "AS TESTED" CONFIGURATION.

Measurements Along the Vertical 0 mm Line Shown Above:

Level 5 @ Window Top	=	1415	millimeters
Level 4 @ Window Sill	=	896	millimeters
Level 3 @ Mid Door	=	619	millimeters
Level 2 @ Occupant H-Point	=	522	millimeters
Level 1 @ Sill Top Height	=	253	millimeters

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

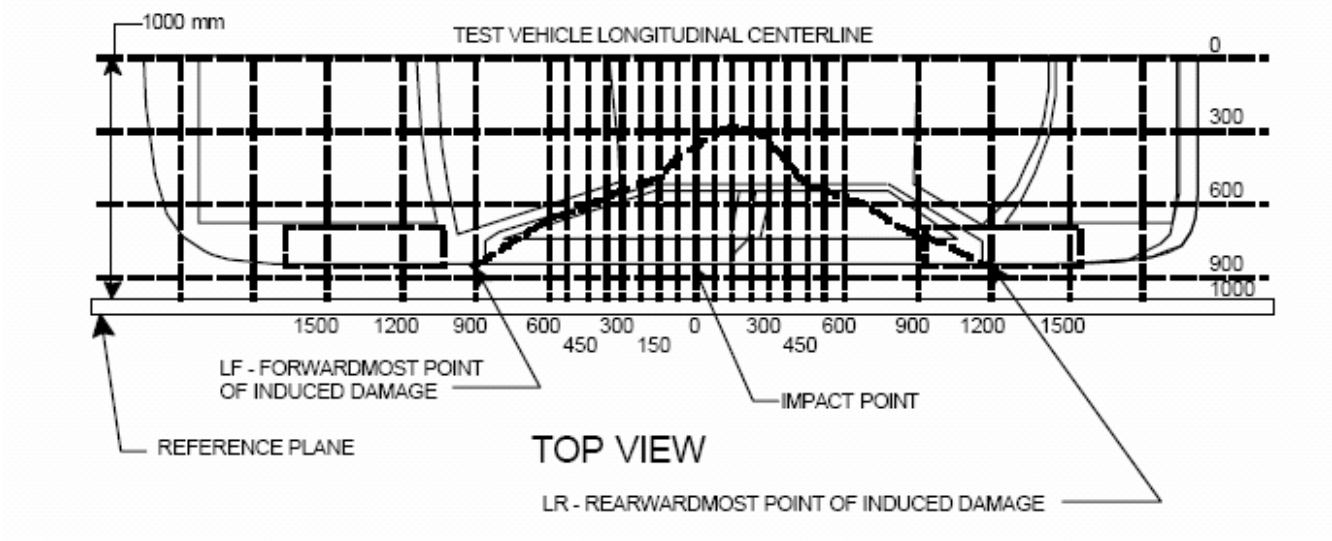
Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



			DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																						
LEVEL	HEIGHT (mm)		-1125	-1050	-900	-750	-675	-600	-525	-450	-375	-300	-225	-150	-75	0	75	150	225	300	450	600	750	900	1050
LEVEL 1	253	PRE	--	--	172	171	171	170	170	170	169	169	169	169	169	169	169	169	169	169	169	169	169	168	--
SIDE		POST	--	--	216	264	282	301	321	341	361	383	406	447	490	521	480	431	389	359	303	252	209	159	--
SILL		CRUSH	N/A	N/A	44	93	111	131	151	171	192	214	237	278	321	352	311	262	220	190	134	83	40	-9	N/A
LEVEL 2	522	PRE	--	126	130	132	132	133	134	134	134	134	134	134	134	134	134	133	133	132	131	130	128	127	--
H		POST	159	159	166	195	210	230	257	286	316	344	374	416	464	489	496	439	354	332	297	261	214	153	--
POINT		CRUSH	N/A	33	36	63	78	97	123	152	182	210	240	282	330	355	362	306	221	200	166	131	86	26	N/A
LEVEL 3	619	PRE	--	122	124	125	126	126	127	127	127	127	128	128	128	127	127	127	126	126	125	124	123	122	119
MID		POST	--	151	158	187	214	246	278	309	339	368	396	423	469	497	491	432	346	324	324	241	203	160	152
DOOR		CRUSH	N/A	29	34	62	88	120	151	182	212	241	268	295	341	370	364	305	220	198	199	117	80	38	33
LEVEL 4	896	PRE	--	191	187	184	182	180	178	177	176	175	174	173	172	172	172	171	170	169	168	166	163	161	158
WINDOW		POST	--	202	208	218	231	257	285	314	344	375	406	439	475	498	474	424	377	354	312	275	237	197	155
SILL		CRUSH	N/A	11	21	34	49	77	107	137	168	200	232	266	303	326	302	253	207	185	144	109	74	36	-3
LEVEL 5	1415	PRE	--	--	--	--	--	--	--	--	--	--	--	579	432	414	412	409	406	407	408	409	420	--	--
WINDOW		POST	--	--	--	--	--	--	--	--	--	--	--	594	534	526	507	496	485	475	454	439	433	--	--
TOP		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15	102	112	95	87	79	68	46	30	13	N/A	N/A

DATA SHEET 10
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



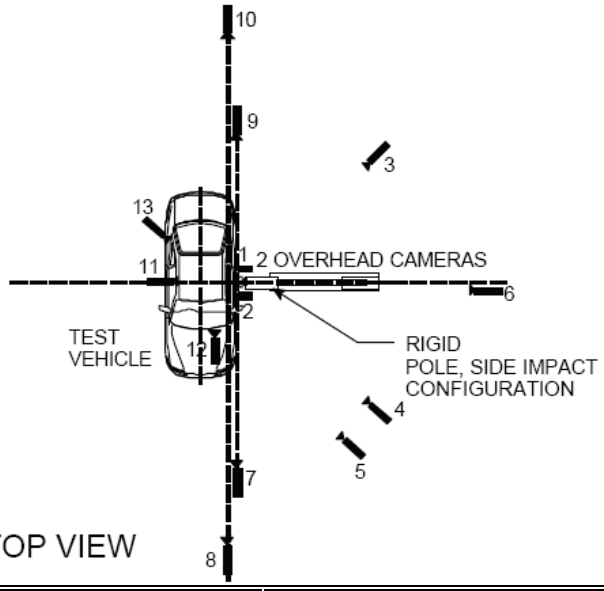
MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (-).
Rearward of the impact point (toward rear of vehicle) is considered positive (+).

NOTE: All dimensions are in millimeters with tolerance of ±3 mm.

DPD MEASUREMENTS (mm)		POST TEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
1 (LR)	300	332	132	200
2	90	479	127	352
3	-120	441	128	313
4	-330	356	127	229
5	-540	317	170	147
6 (LF)	-750	264	171	93

DATA SHEET 11
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



Camera No.	View	Coordinates (millimeters)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	970	180	-4375	90	8	1000
2	Overhead closeup view of impact plane	390	180	-4375	90	28	1000
3	Left side 45° – rearward pole view	-3004	2850	1249	-4	24	1000
4	Left side 45° – forward pole view	2017	2370	1852	-14	24	1000
5	Real time (30 fps) film coverage of test	-	-	-	-	-	30
6	Left side – rear pole view	1010	1605	2205	-31	24	1000
7	Front ground level – vehicle/pole impact	8741	453	1152	-2	50	1000
8	Front ground level – vehicle roof targets and vehicle/pole impact	8181	-816	894	-2	28	1000
9	Rear ground level – vehicle/pole impact	-9308	303	1201	-4	50	1000
10	Rear ground level – view of rear roof targets	-7885	-644	963	-2	24	1000
11	Test vehicle onboard -- side view of SID H3	-154	-1715	1065	-4	12.5	1000
12	Test vehicle onboard– front view of SID H3	1537	-162	1350	-8	25	1000
13	Test vehicle onboard– 3/4 rear view of SID H3	-704	-1705	1145	-3	12.5	1000

* Reference (from point of impact); all measurements accurate to within ±6 mm.

+X = Impact point to film plane in the vehicle's longitudinal plane (forward of impact point)
+Y = Impact point to film plane in the vehicle's lateral plane (to the left of impact point)
+Z = Ground to Film Plane (Excluding moving cart height)

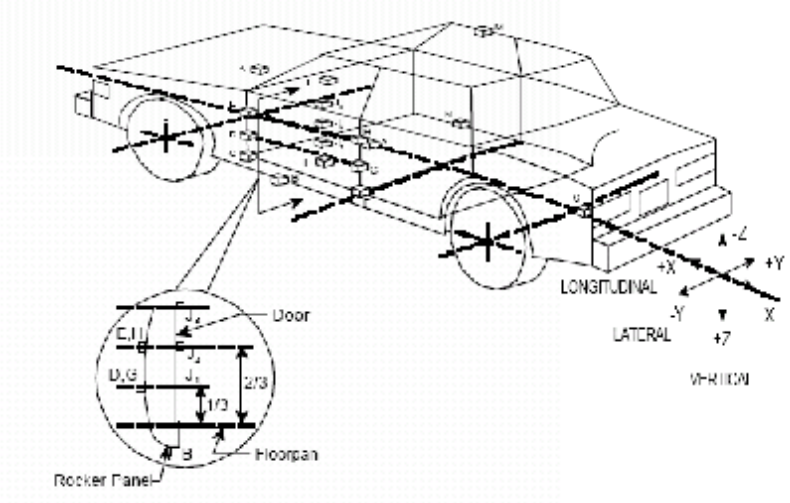
DATA SHEET 12
DUMMY DAMAGE CHECKLIST – SID/HIII

Dummy Serial No. 905 Date: May 4, 2009

OK	Damaged	(Begin with general cleaning)
X	-	Outer skin on entire dummy (gashes, rips, etc.)
X	-	Head - Check that ballast is secure
X	-	Gashes, rips, general appearances, etc
X	-	Neck - Broken or cracks in rubber
X	-	Check that upper neck bracket is firmly attached to lower neck
X	-	Check for looseness at the condyle joint
X	-	Nodding blocks – cracked or out of position
X	-	Spine - Broken or cracks in rubber
X	-	Ribs - Check all ribs and rib supports for damage (bent or broken)
X	-	Check damping material or separation or cracks
X	-	Three rubber bumpers in place
X	-	Lateral Shock Absorber - Bent or broken
X	-	Transducer Leads - Torn cables
X	-	Accelerometer Mountings - (head, ribs, spine, and pelvis) - Check for secure mounting).
X	-	Knees- Check outer skin, insert and casting (without removing insert)
X	-	Limbs- Check for normal movement and adjustment
X	-	Head / Neck bracket attachment - Check to see if cracked or broken

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511



Accelerometer Location		Pre-Test (mm)		
		X	Y	Z
A	Vehicle CG X,Y,Z	2392	42	417
B	Struck Side Front Sill Y	2799	-674	305
C	Struck Side A-Pillar Sill Y	3141	-660	343
D	Struck Side Lower A-Pillar Y	3189	-650	473
E	Struck Side Middle A-Pillar Y	3087	-654	989
F	Struck Side B-Pillar Sill Y	2146	-673	312
G	Struck Side Lower B-Pillar Y	2129	-659	486
H	Struck Side Middle B-Pillar Y	2056	-656	935
I	Front Outboard Seat Track Y at H-point X	2325	-566	310
J1	Front Door Y (1) – 480 mm forward of impact	2763	-751	510
J2	Front Door Y (2) – 480 mm forward of impact	2766	-666	684
J3	Front Door Y (3) – 480 mm forward of impact	2758	-715	909
K	Top of Engine X,Y	3898	143	801
L	Center of Firewall Y	3569	50	858
M	Unstruck Side Roof Rail Y at impact line	2267	563	1427
N	Unstuck Side Floor Sill Y at impact line	2318	677	299
O	Rear Axle Floorpan X,Y	1232	-29	468

*Reference: X - Rear Bumper (Positive Forward)
Y - Vehicle Centerline (Positive To Right)
Z - Ground Level (Positive Up)

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY (Continued)

Test Vehicle: 2009 Hyundai Elantra GLS 4-Door Sedan NHTSA No. C90511

		Longitudinal		Lateral		Vertical		Resultant	
Accelerometer		Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)	Max (g)	Time (msec)
A	Pos.	29.3	64	98.1	62	51.5	64	105.8	63
	Neg.	-12.4	68	-46.1	37	-52.9	59	0	0
B	Pos.			54.1	16				
	Neg.			-39.4	40				
C	Pos.			21.5	65				
	Neg.			-8.3	261				
D	Pos.			19.1	28				
	Neg.			-4.3	82				
E	Pos.			25.4	29				
	Neg.			-9.4	25				
F	Pos.			112.7	15				
	Neg.			-76.3	20				
G	Pos.			76.8	10				
	Neg.			-56.0	16				
H	Pos.			66.9	7				
	Neg.			-44.9	33				
I	Pos.			50.9	24				
	Neg.			-5.8	57				
		J1 (Lateral)		J2 (Lateral)		J3 (Lateral)			
	Pos.	117.1	11	58.0	7	38.4	13		
	Neg.	-104.6	17	-61.9	17	-17.2	20		
K	Pos.	4.9	82	11.1	96				
	Neg.	-4.3	40	-4.4	202				
L	Pos.			19.1	63				
	Neg.			-1.1	271				
M	Pos.			26.9	40				
	Neg.			-1.8	283				
N	Pos.			12.2	66				
	Neg.			-1.2	71				
O	Pos.	4.3	21	12.1	32				
	Neg.	-2.2	13	-0.8	204				

SECTION 5

FMVSS NO. 301 DATA

DATA SHEET 14
SUMMARY OF FMVSS NO. 301 DATA

NHTSA TEST No.: C90511 TEST DATE: May 6, 2009

VEHICLE MAKE/MODEL: 2009 Hyundai Elantra GLS 4-Door Sedan

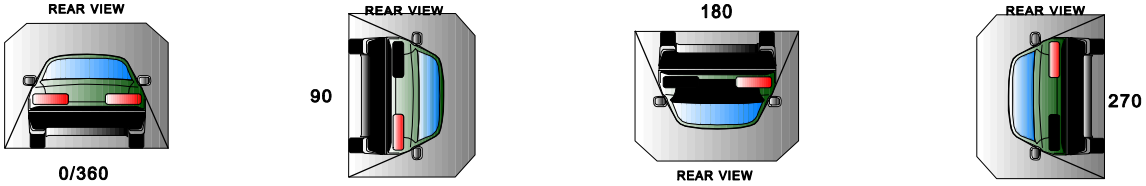
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

FUEL SPILLAGE MEASUREMENT:

Time Interval	Amount	Maximum Allowable Spillage
Impact Until Motion Ceases		**28 g**
First Five Minutes Following Impact		**142 g**
Next 25 Minutes		**28 g / 1 minute**

SOLVENT SPILLAGE DETAILS: None

FMVSS 301 STATIC ROLLOVER DATA



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0º - 90º	1	minutes	19	seconds	5	minutes	6	minutes	19	seconds	7	minutes
90º - 180º	1	minutes	10	seconds	5	minutes	6	minutes	10	seconds	7	minutes
180º-270º	1	minutes	05	seconds	5	minutes	6	minutes	5	seconds	7	minutes
270º-360º	1	minutes	14	seconds	5	minutes	6	minutes	14	seconds	7	minutes

II. FMVSS 301 REQUIREMENTS: (Maximum allowable solvent spillage):

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
142 g	28 g	28 g	28 g

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

Rollover Stage	First 5 minutes from onset of rotation (g)	6th min. (g)	7th min. (g)	8th min. (if required) (g)
0º - 90º	0	0	0	N/A
90º - 180º	0	0	0	N/A
180º-270º	0	0	0	N/A
270º-360º	0	0	0	N/A

Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S):

Rollover Stage	Spillage Location
0º - 90º	None
90º - 180º	None
180º-270º	None
270º-360º	None

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (continued)

Figure A-1: As Received Left Front ¾ View

Figure A-2: As Received Right Rear ¾ View

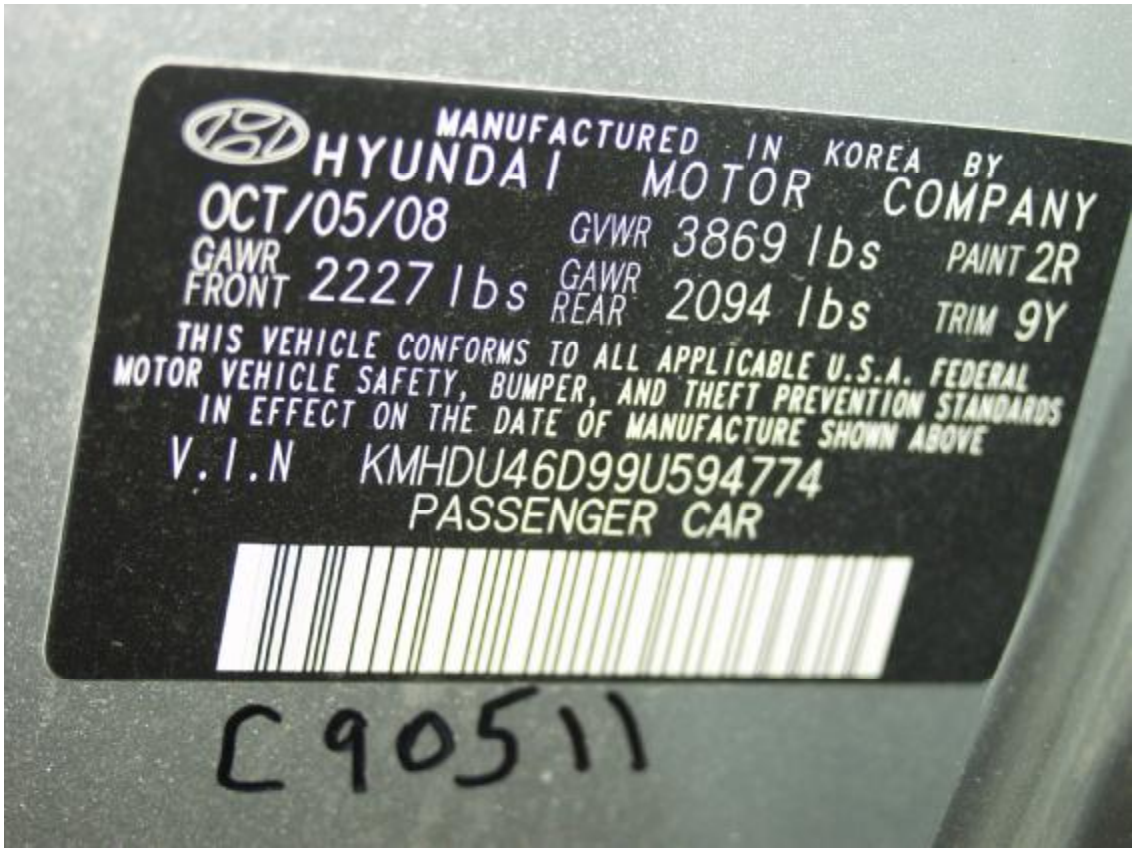


Figure A-3: Vehicle Certification Label

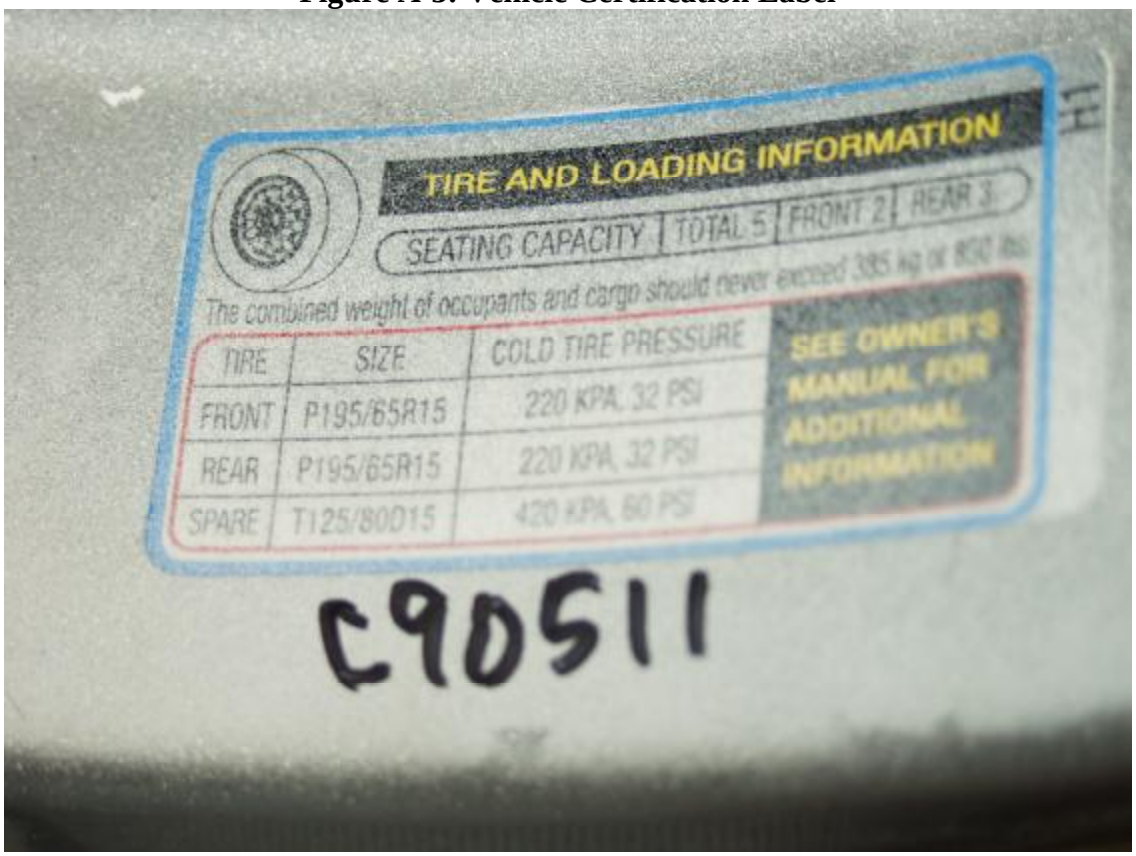


Figure A-4: Vehicle Tire Placard Label

Figure A-5: Pre-Test Front View

Figure A-6: Post-Test Front View

Figure A-7: Pre-Test Left Front ¾ View

Figure A-8: Post-Test Left Front ¾ View

Figure A-9: Pre-Test Left Side View

Figure A-10: Post-Test Left Side View

Figure A-11: Pre-Test Left Rear ¾ View

Figure A-12: Post-Test Left Rear ¾ View

Figure A-13: Pre-Test Rear View

Figure A-14: Post-Test Rear View

Figure A-15: Pre-Test Right Rear ¾ View

Figure A-16: Post-Test Right Rear ¾ View

Photograph Not Available

Figure A-17: Pre-Test Right Side View

Figure A-18: Post-Test Right Side View

Figure A-19: Pre-Test Right Front ¾ View

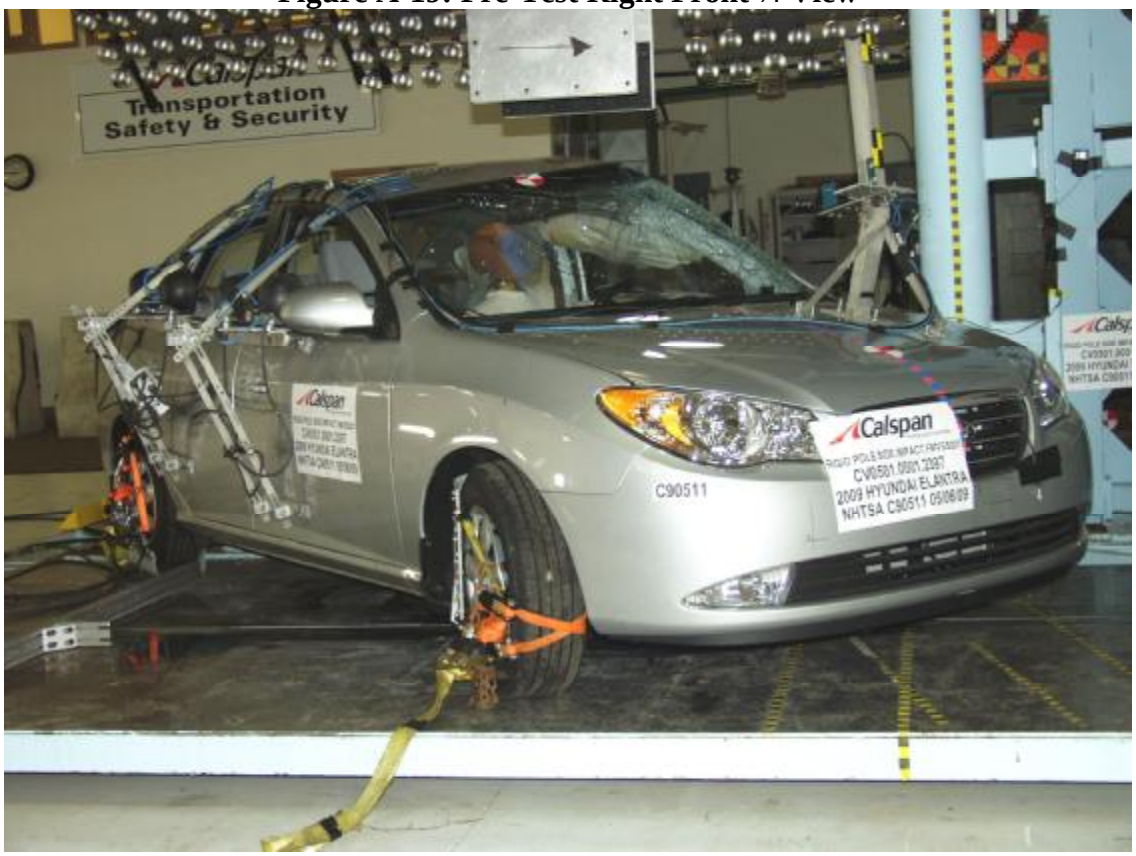


Figure A-20: Post-Test Right Front ¾ View

Figure A-21: Pre-Test Left Side View of Aligned Vehicle and Pole

Figure A-22: Pre-Test Right Side View of Aligned Vehicle and Pole

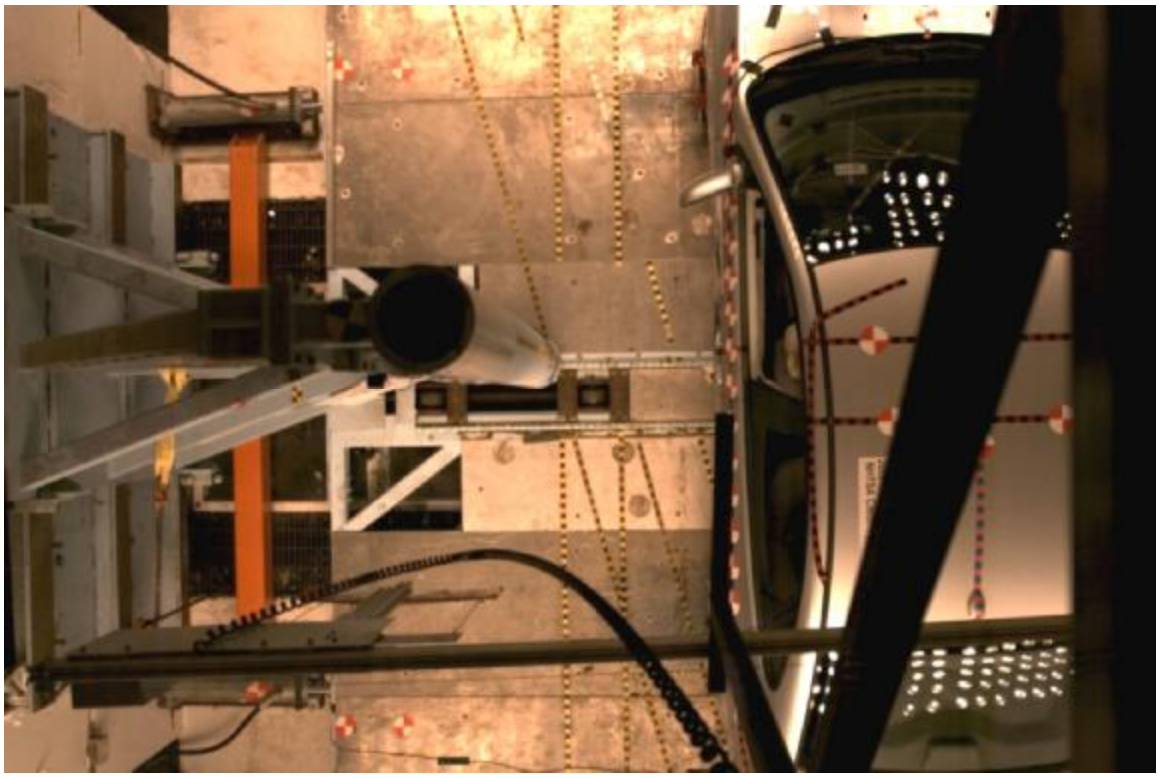


Figure A-23: Pre-Test Overhead View of Aligned Vehicle and Pole

Figure A-24: Post-Test Overhead View of Vehicle and Pole

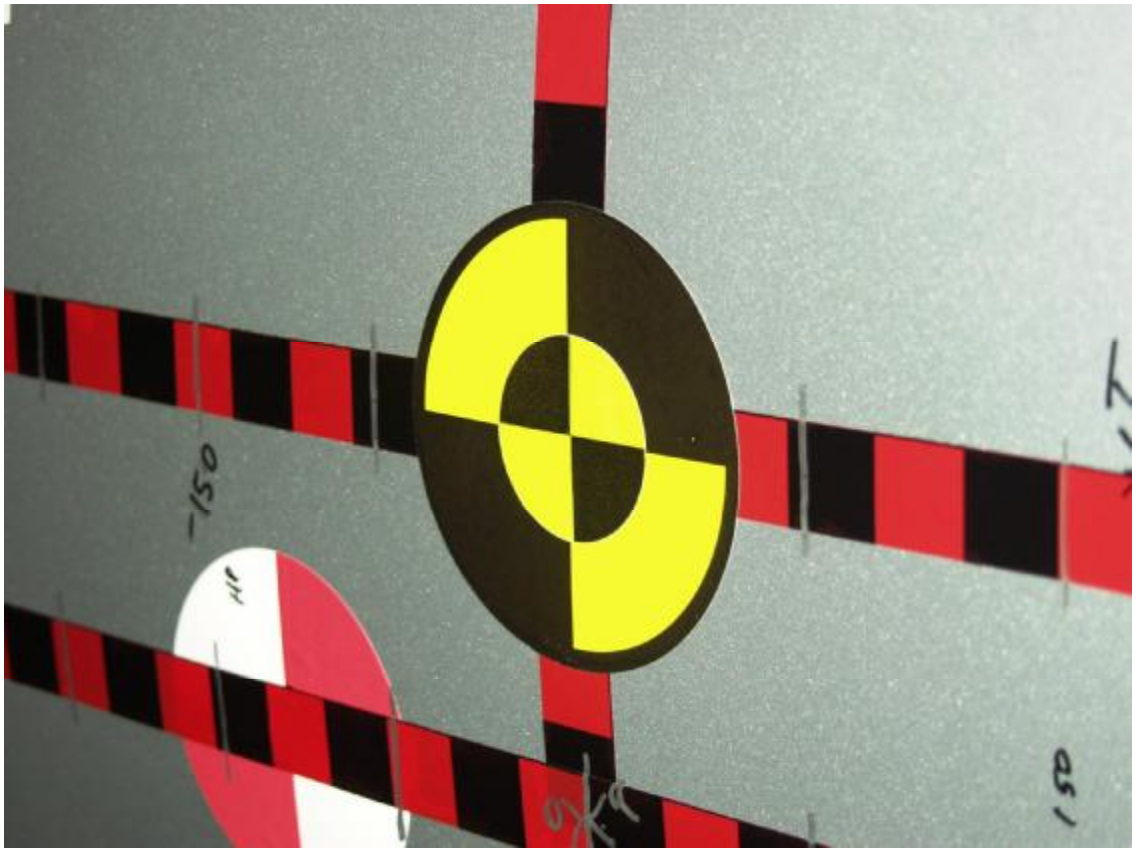


Figure A-25: Pre-Test Close-Up View of Impact Point Target

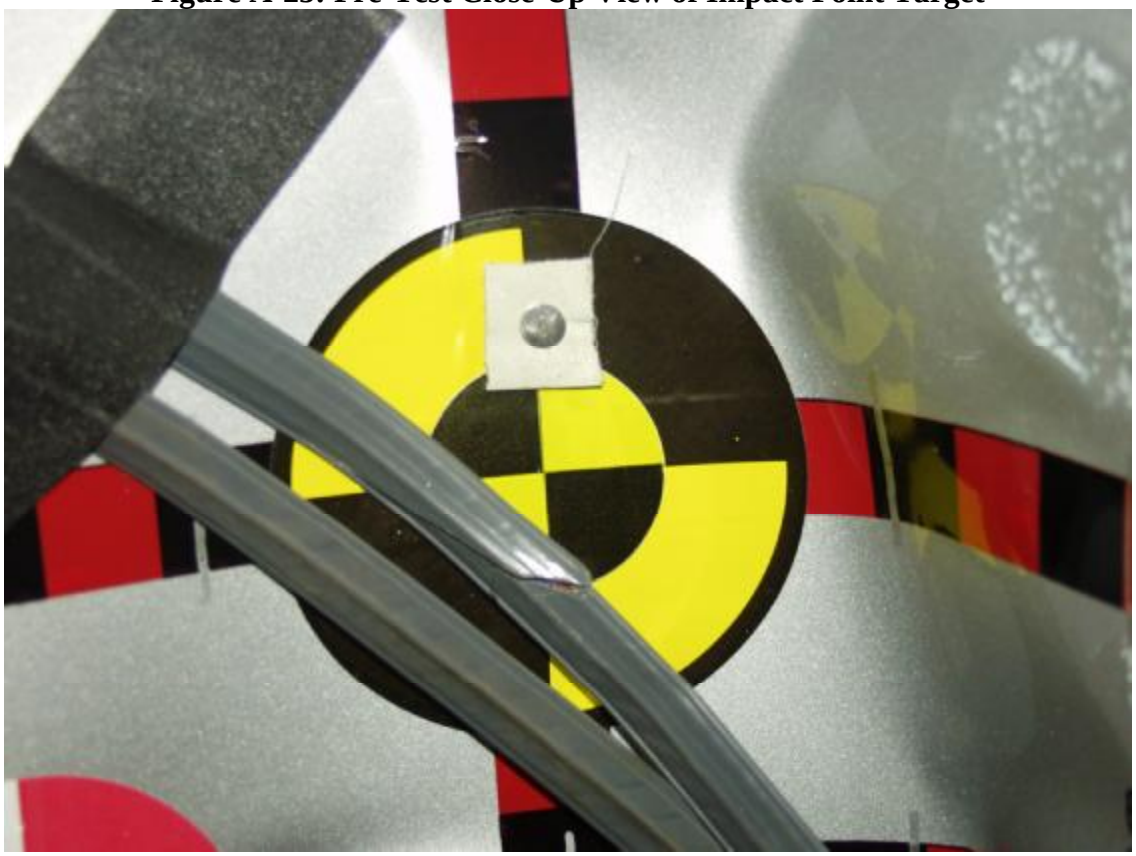


Figure A-26: Post-Test Close-Up View of Impact Point Target

Figure A-27: Pre-Test Opposite Side View of SID/HIII

Figure A-28: Post-Test Opposite Side View of SID/HIII

Figure A-29: Pre-Test Impact Side View of SID/HIII with Door Open

Figure A-30: Pre-Test Impact Side View of SID/HIII

Photograph Not Available

Figure A-31: Post-Test Impact Side View of SID/HIII

Figure A-32: Pre-Test Dummy Shoulder and Door Top View

Figure A-33: Post-Test Dummy Shoulder and Door Top View

Figure A-34: Pre-Test Impact Side Front Interior Trim

Figure A-35: Post-Test Impact Side Front Interior Trim

Figure A-36: Pre-Test Left Front ¾ View of Impact Zone

Figure A-37: Post-Test Left Front ¾ View of Impact Zone

Figure A-38: Pre-Test Left Rear ¾ View of Impact Zone

Figure A-39: Post-Test Left Rear ¾ View of Impact Zone

Figure A-40: Rollover 90 Degrees

Figure A-41: Rollover 180 Degrees

Figure A-42: Rollover 270 Degrees

Figure A-43: Rollover 360 Degrees

Figure A-44: Impact Photo

APPENDIX B

SID/HIII AND VEHICLE RESPONSE DATA

(SAE sign convention)

DATA CHANNEL FILTER CLASS SUMMARY

Data Type	SAE Filter Class
Dummy Head Accelerations	CFC 1000
Rib Accelerations	FIR 100
Spine Accelerations	FIR 100
Pelvis Accelerations	FIR 100

DATA CHANNEL TITLE KEY

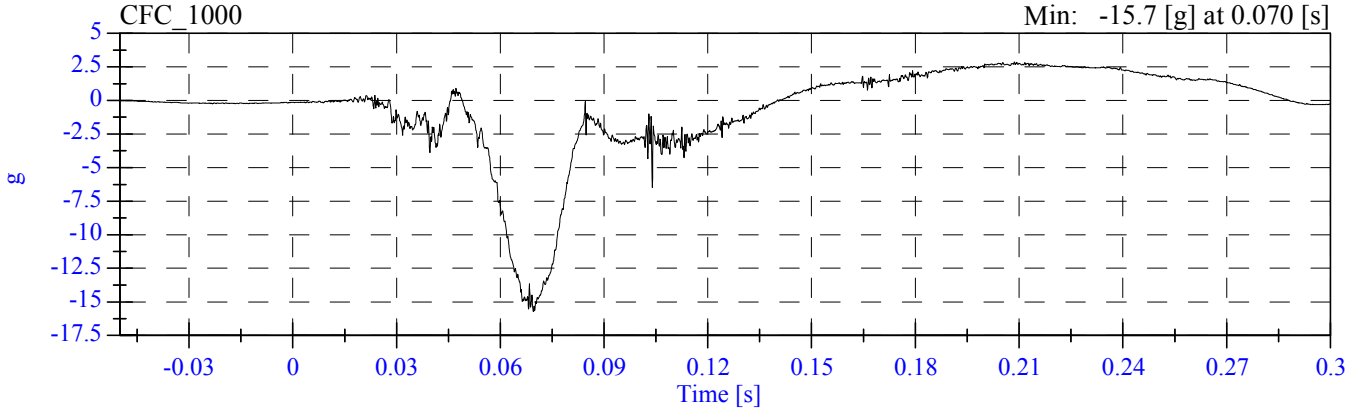
Prefix	Suffix
V1 = Vehicle 1 (Test Vehicle)	Ax = Acceleration, X-direction
P1 = Left Front Seating Position (Driver)	Ay = Acceleration, Y-direction
A1-A17 = Accelerometer Location Number	Az = Acceleration, Z-direction
	Fx = Force, X-direction
	Fy = Force, Y-direction
	Fz = Force, Z-direction
	Mx = Moment about X
	My = Moment about Y
	Mz = Moment about Z
	Vx = Velocity, X-direction
	Vy = Velocity, Y-direction
	Vz = Velocity, Z-direction
	R = Redundant

TABLE OF DATA PLOTS

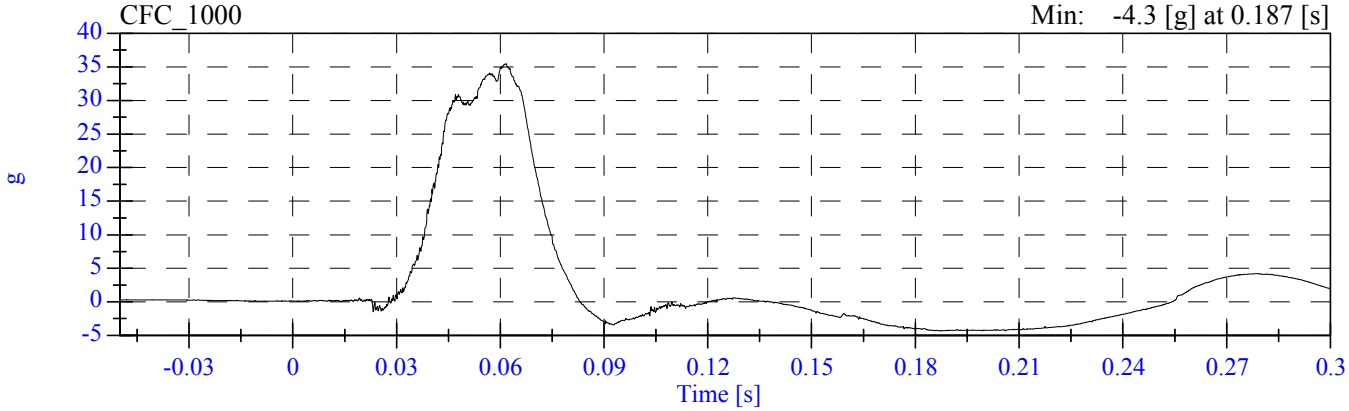
TABLE OF DATA PLOTS (continued)

FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

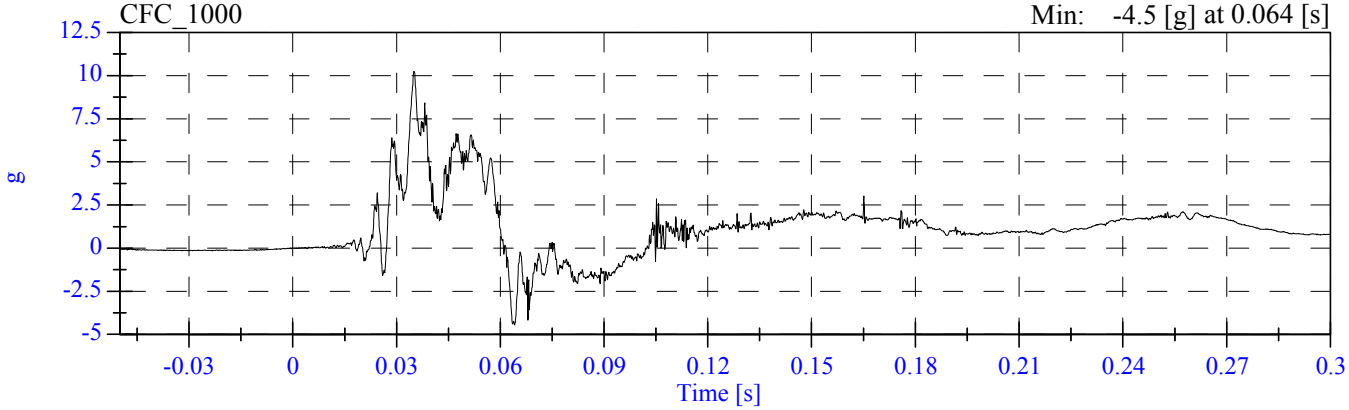
V1P1 Head x
CFC_1000
Max: 2.9 [g] at 0.209 [s]
Min: -15.7 [g] at 0.070 [s]



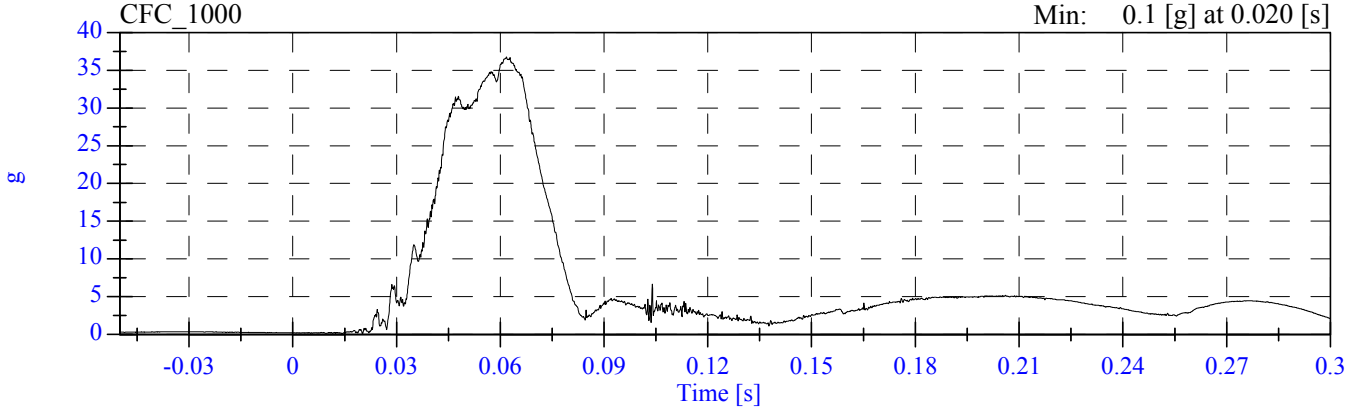
V1P1 Head y
CFC_1000
Max: 35.5 [g] at 0.062 [s]
Min: -4.3 [g] at 0.187 [s]



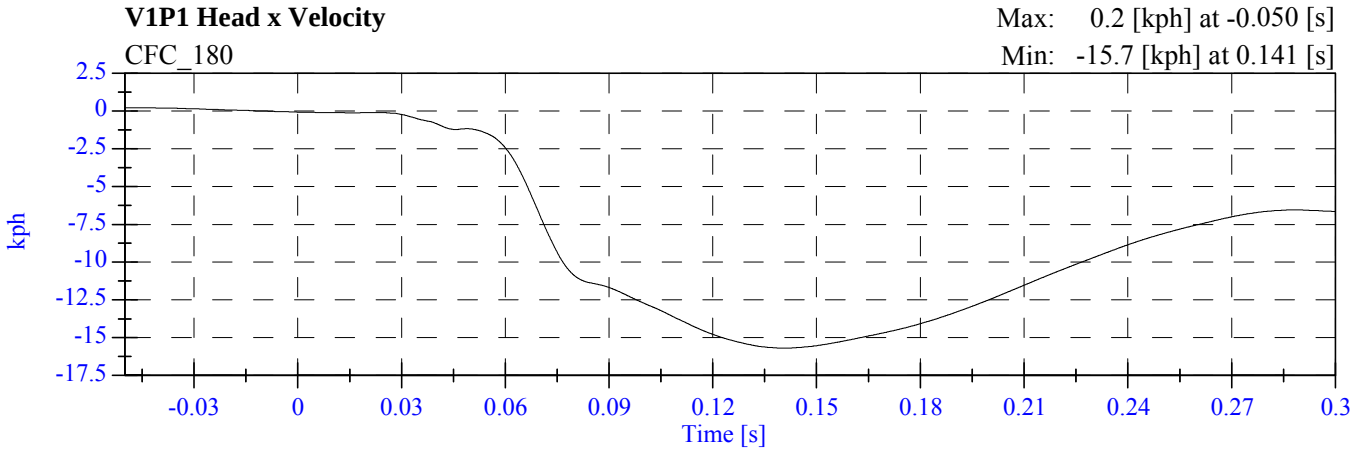
V1P1 Head z
CFC_1000
Max: 10.2 [g] at 0.035 [s]
Min: -4.5 [g] at 0.064 [s]

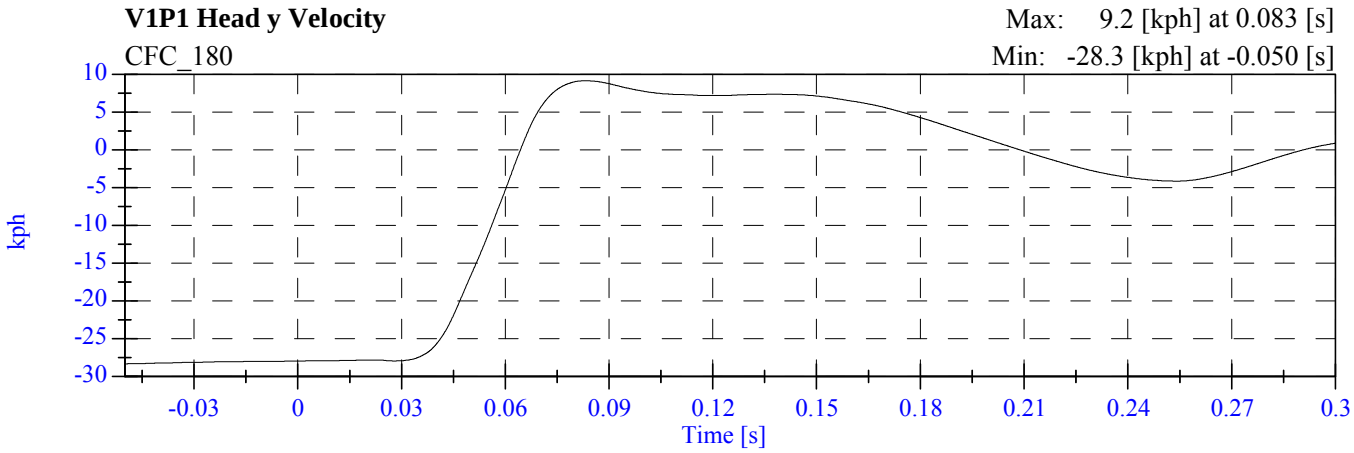


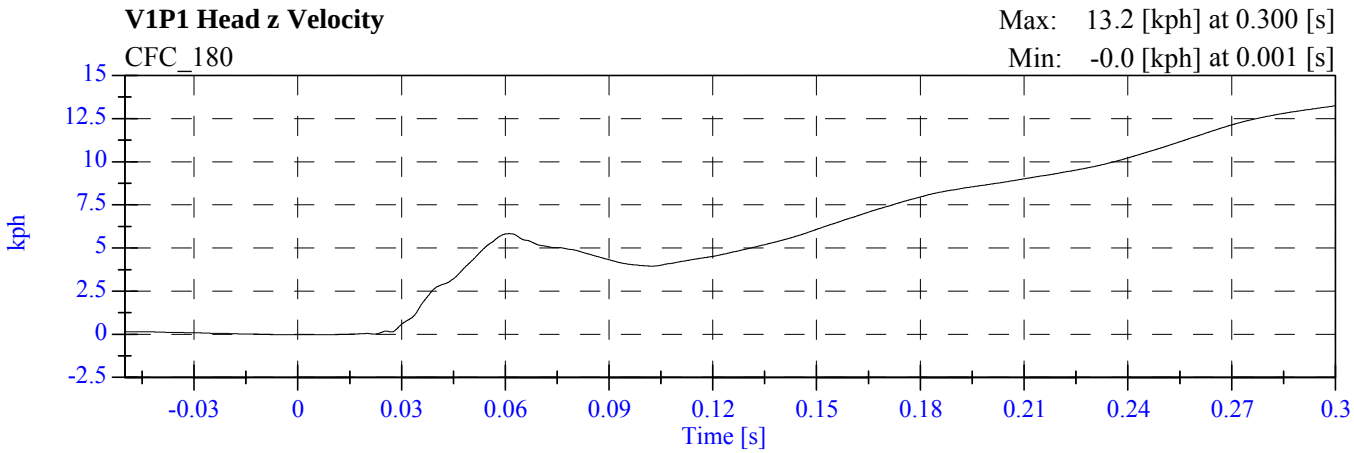
V1P1 Head Resultant
CFC_1000
Max: 36.8 [g] at 0.062 [s]
Min: 0.1 [g] at 0.020 [s]



FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

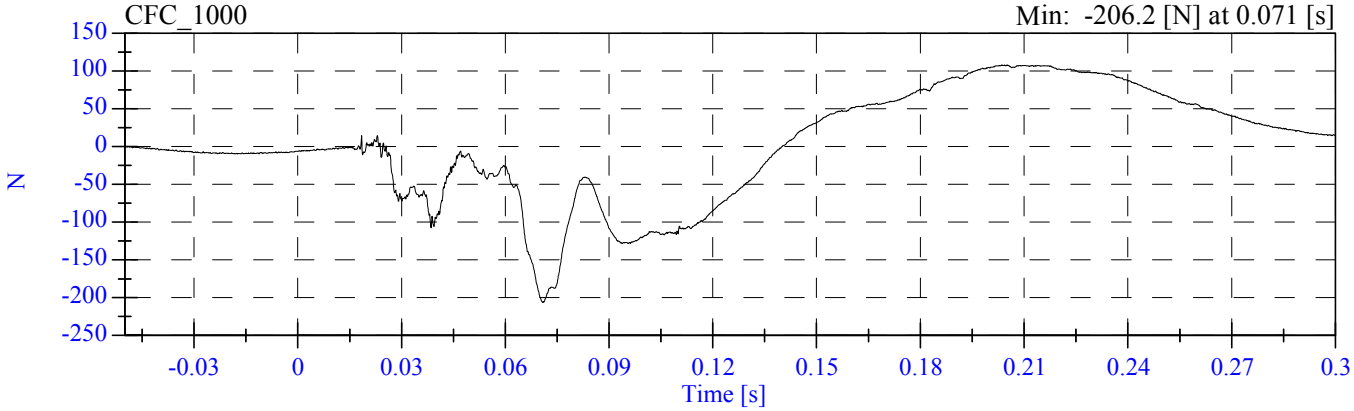




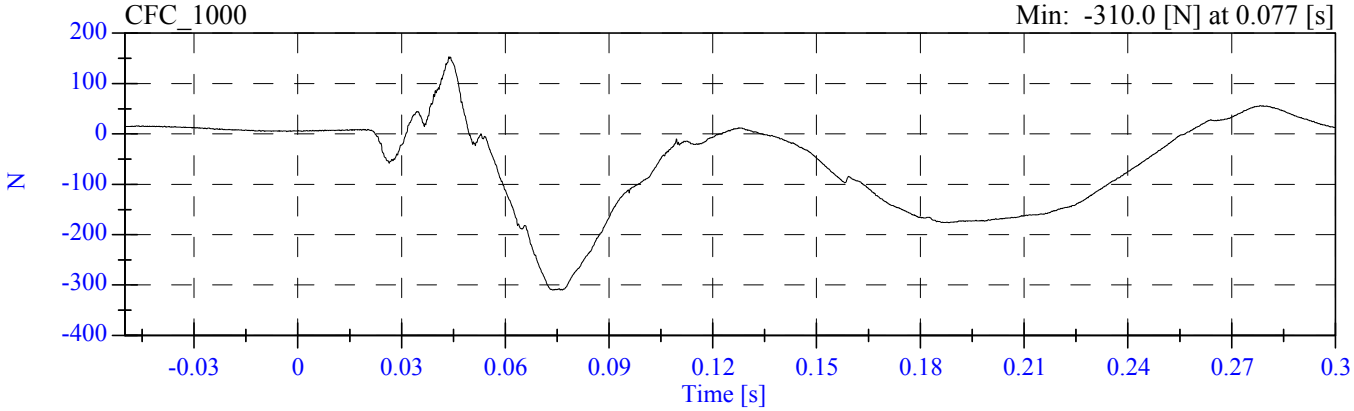


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

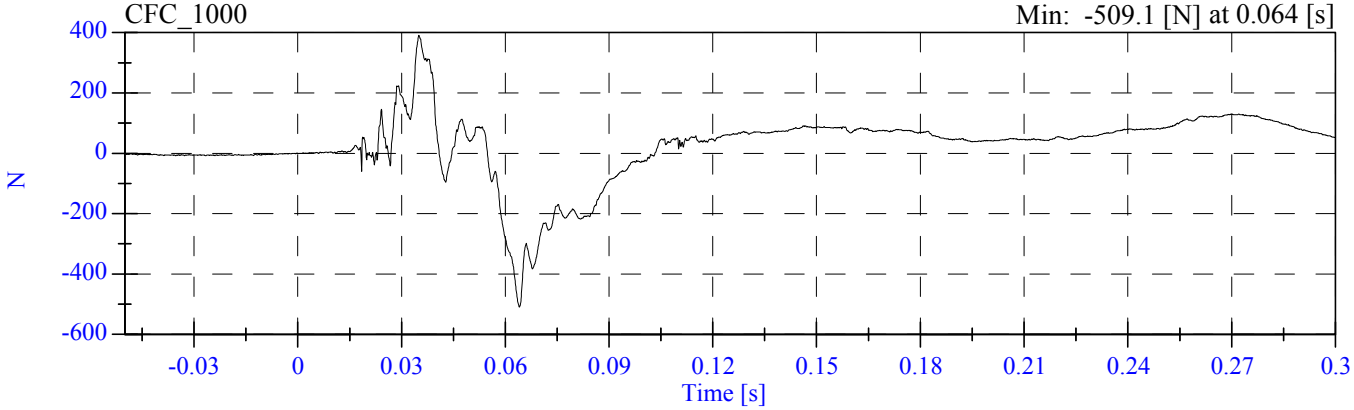
V1P1 Upper Neck Fx
CFC_1000
Max: 108.1 [N] at 0.205 [s]
Min: -206.2 [N] at 0.071 [s]



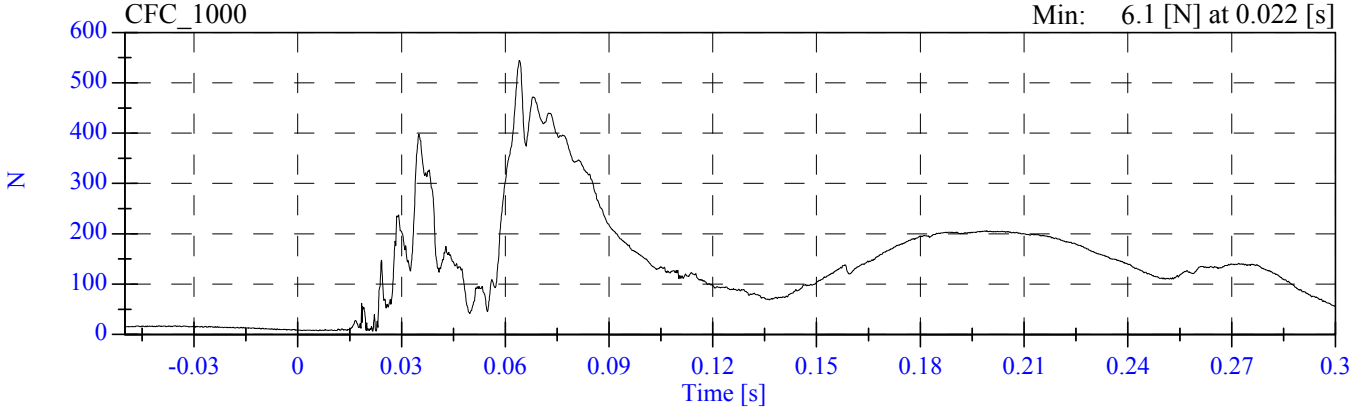
V1P1 Upper Neck Fy
CFC_1000
Max: 153.5 [N] at 0.044 [s]
Min: -310.0 [N] at 0.077 [s]



V1P1 Upper Neck Fz
CFC_1000
Max: 390.3 [N] at 0.035 [s]
Min: -509.1 [N] at 0.064 [s]

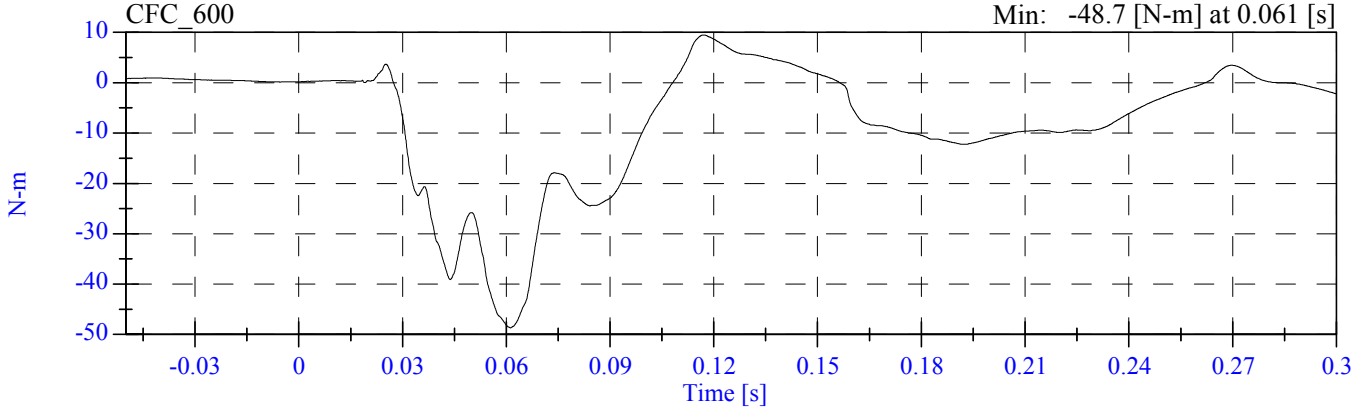


V1P1 Upper Neck F Resultant
CFC_1000
Max: 544.7 [N] at 0.064 [s]
Min: 6.1 [N] at 0.022 [s]

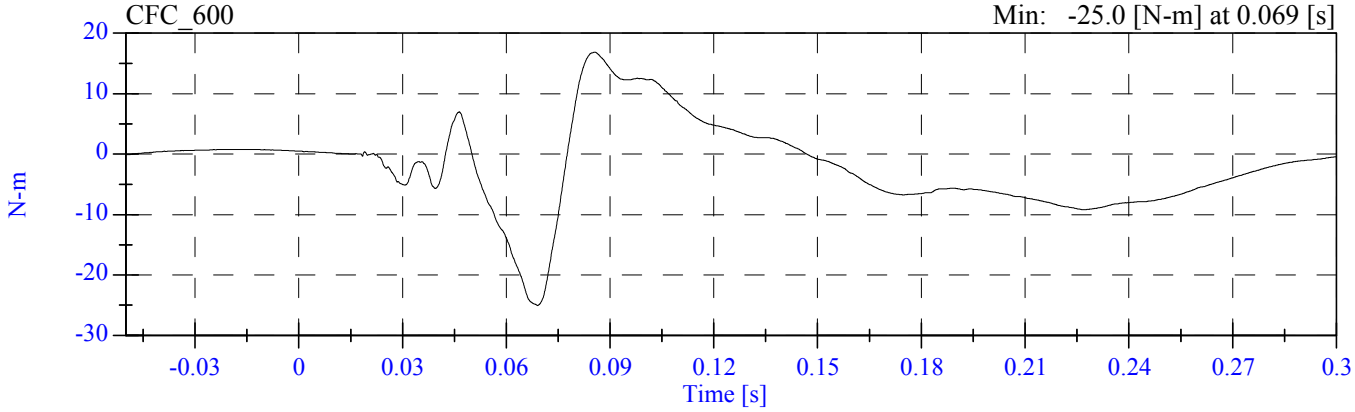


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

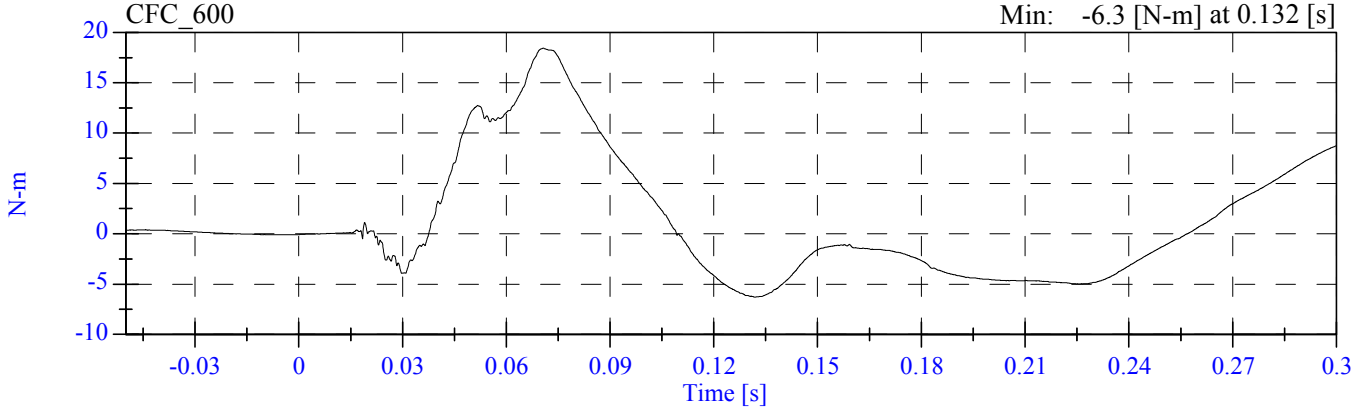
V1P1 Upper Neck Mx
CFC_600
Max: 9.4 [N-m] at 0.117 [s]
Min: -48.7 [N-m] at 0.061 [s]



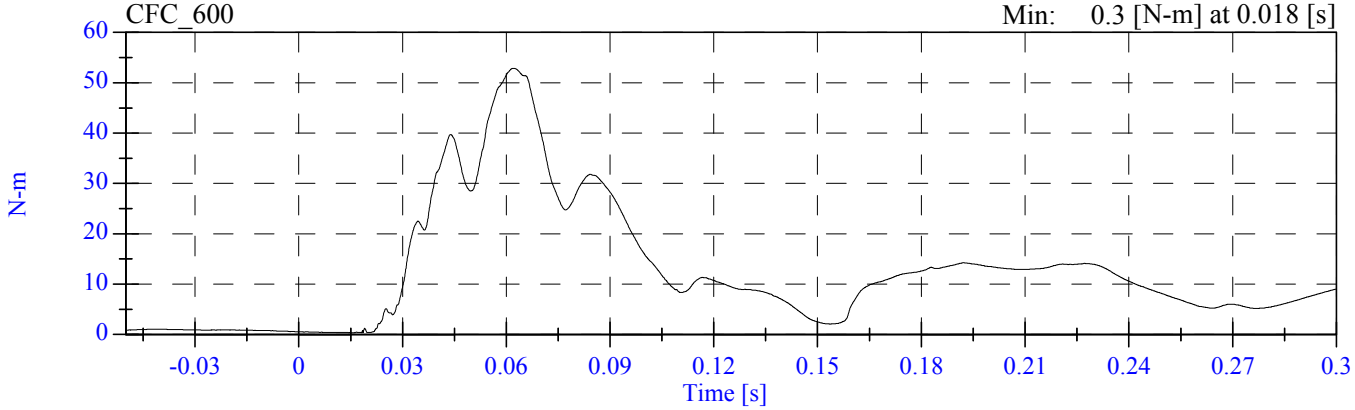
V1P1 Upper Neck My
CFC_600
Max: 16.8 [N-m] at 0.085 [s]
Min: -25.0 [N-m] at 0.069 [s]



V1P1 Upper Neck Mz
CFC_600
Max: 18.4 [N-m] at 0.071 [s]
Min: -6.3 [N-m] at 0.132 [s]

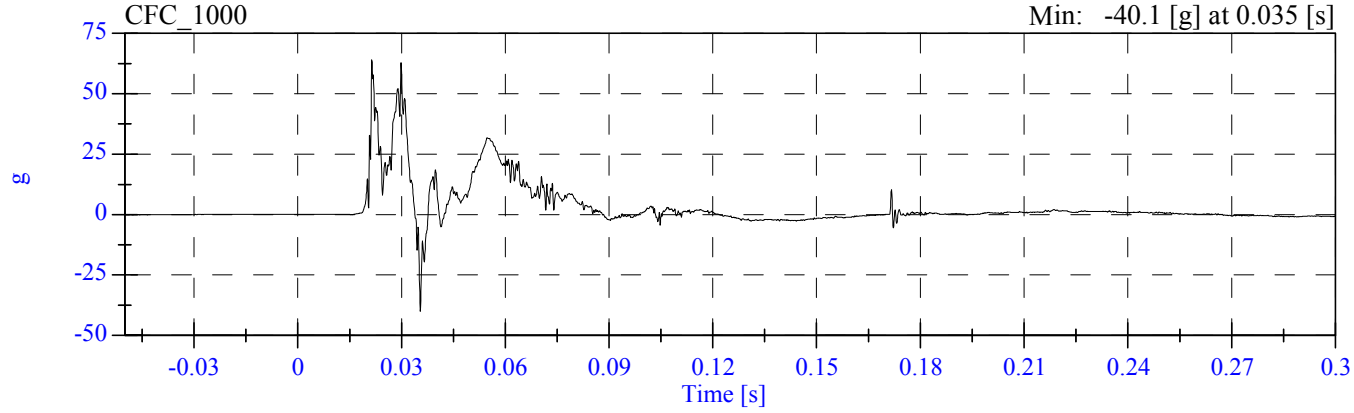


V1P1 Upper Neck M Resultant
CFC_600
Max: 52.9 [N-m] at 0.062 [s]
Min: 0.3 [N-m] at 0.018 [s]

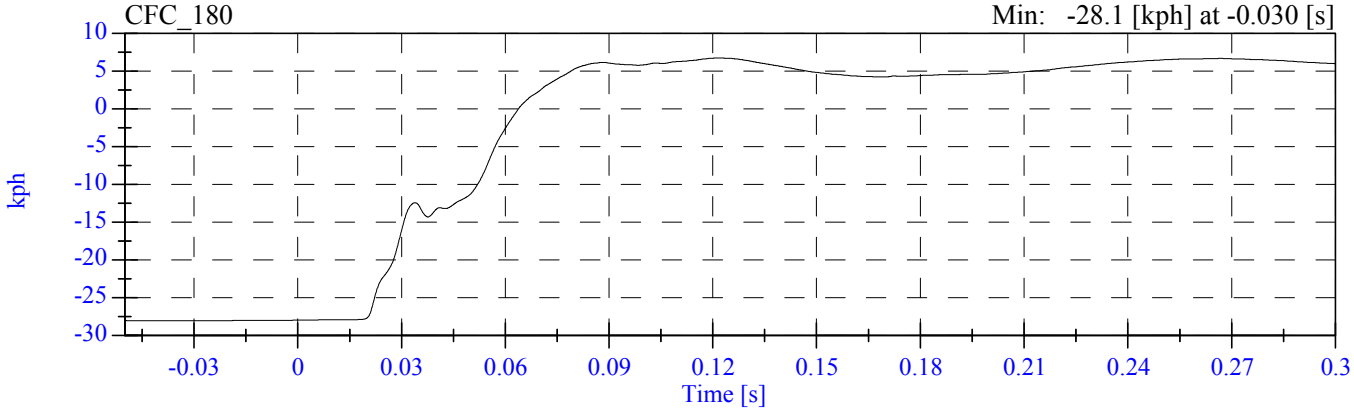


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

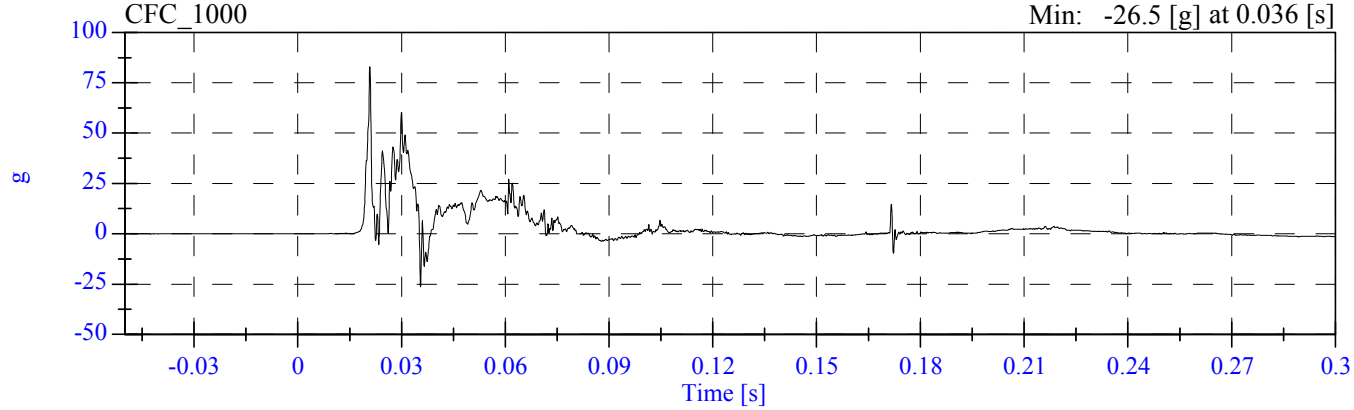
V1P1 Upper Rib y
CFC_1000
Max: 64.0 [g] at 0.021 [s]
Min: -40.1 [g] at 0.035 [s]



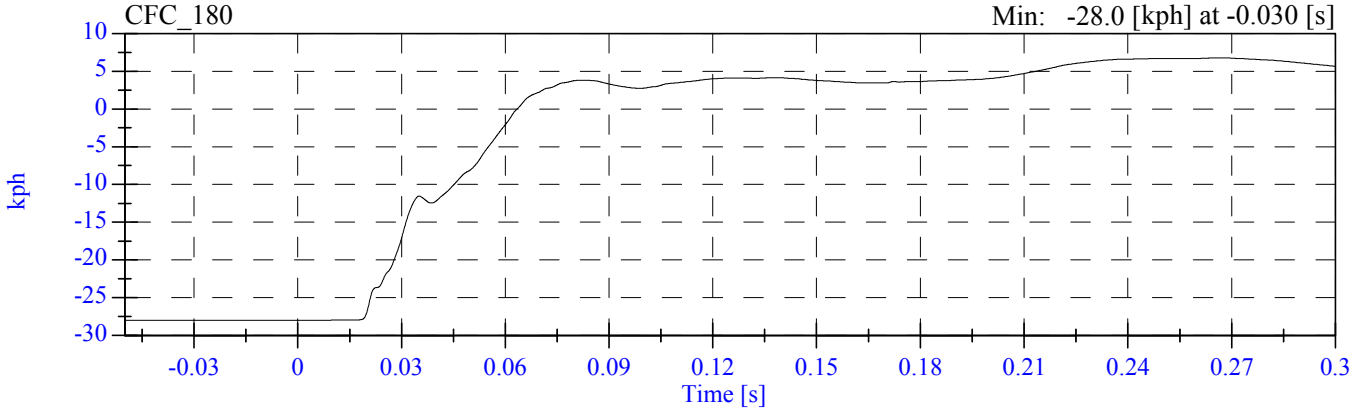
V1P1 Upper Rib y Velocity
CFC_180
Max: 6.7 [kph] at 0.122 [s]
Min: -28.1 [kph] at -0.030 [s]



V1P1 Lower Rib y
CFC_1000
Max: 83.0 [g] at 0.021 [s]
Min: -26.5 [g] at 0.036 [s]

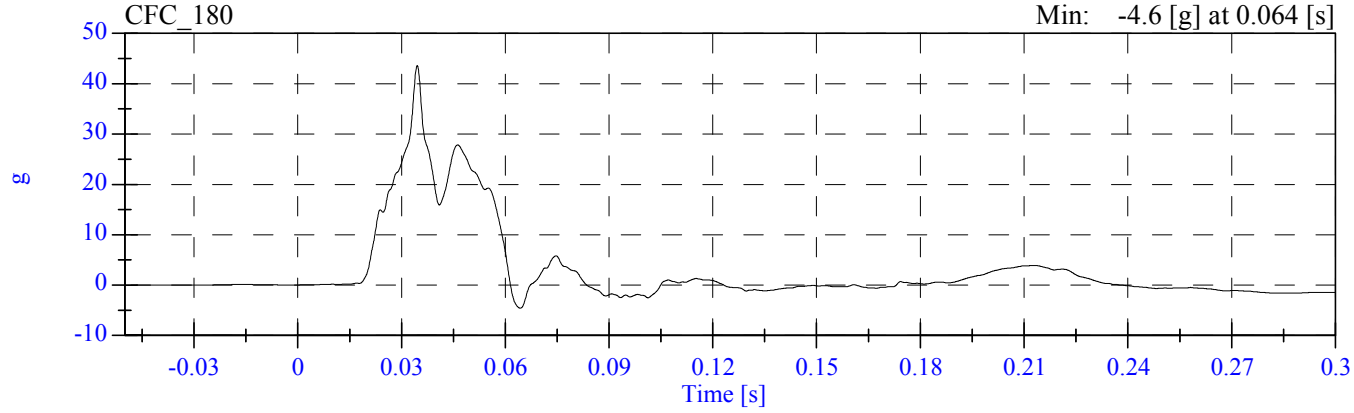


V1P1 Lower Rib y Velocity
CFC_180
Max: 6.8 [kph] at 0.266 [s]
Min: -28.0 [kph] at -0.030 [s]

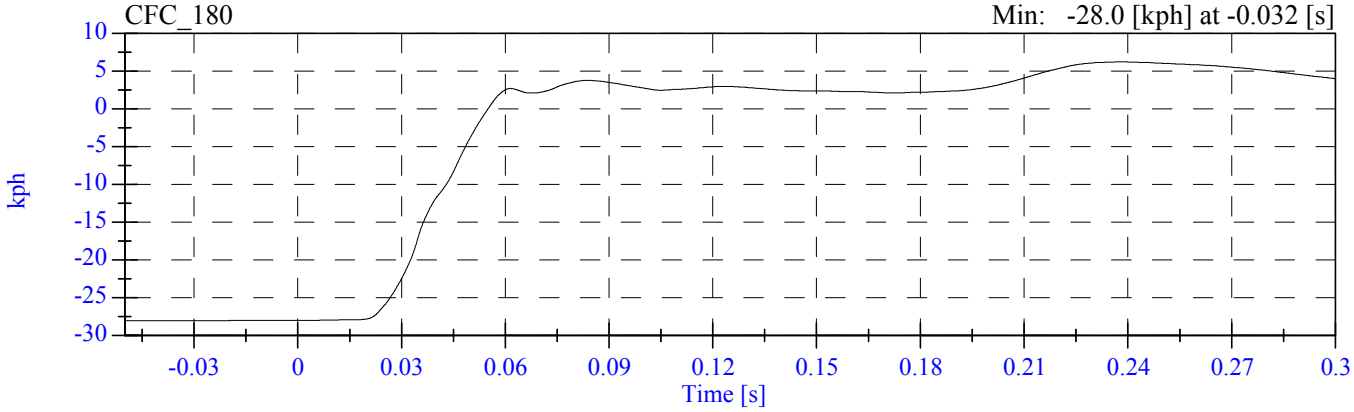


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

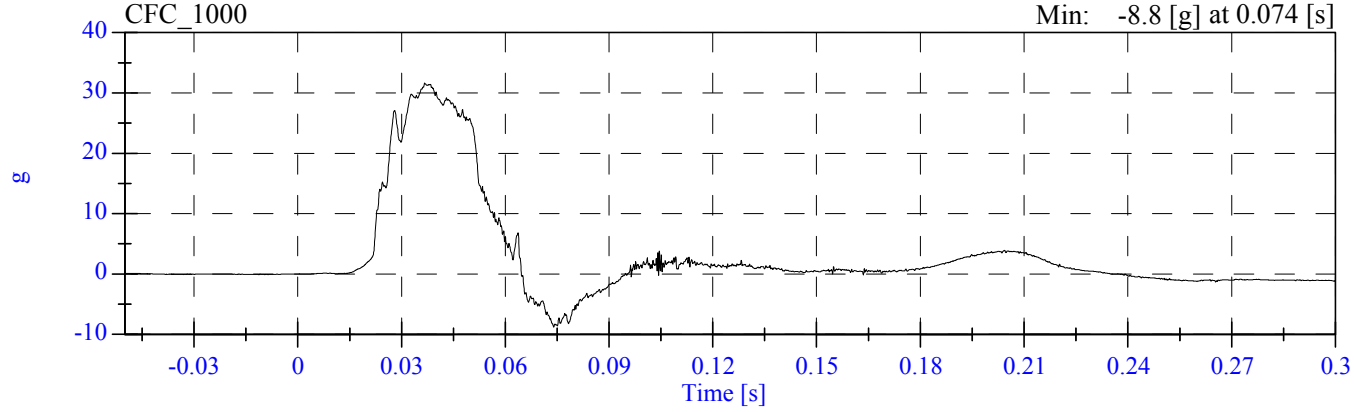
V1P1 Lower Spine y
CFC_180
Max: 43.6 [g] at 0.035 [s]
Min: -4.6 [g] at 0.064 [s]



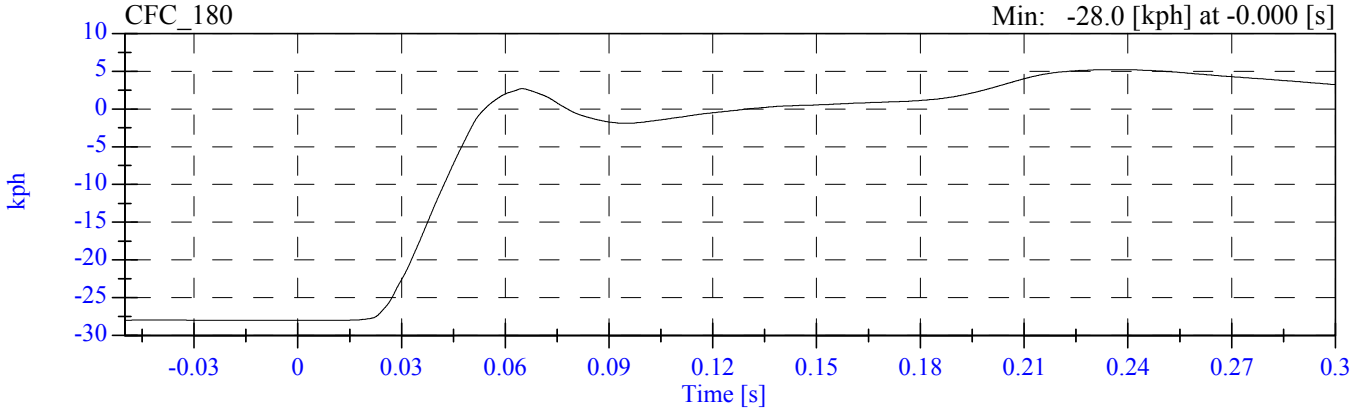
V1P1 Lower Spine y Velocity
CFC_180
Max: 6.2 [kph] at 0.238 [s]
Min: -28.0 [kph] at -0.032 [s]



V1P1 Pelvic y
CFC_1000
Max: 31.6 [g] at 0.037 [s]
Min: -8.8 [g] at 0.074 [s]

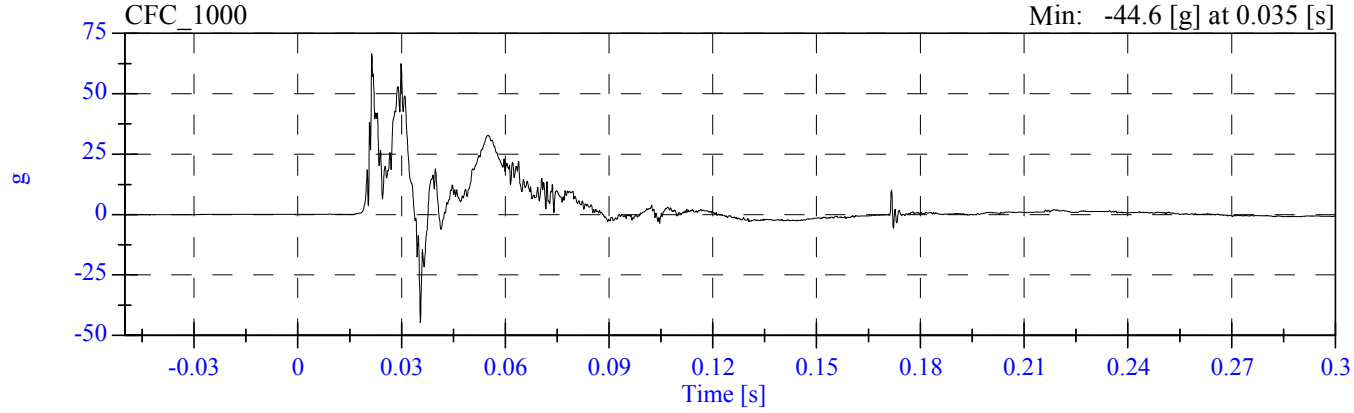


V1P1 Pelvic y Velocity
CFC_180
Max: 5.2 [kph] at 0.238 [s]
Min: -28.0 [kph] at -0.000 [s]

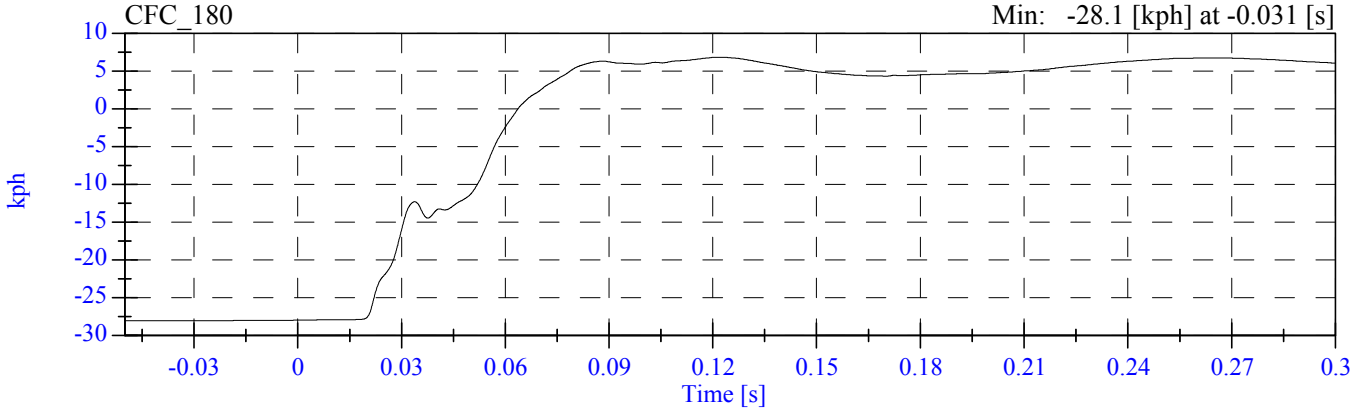


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

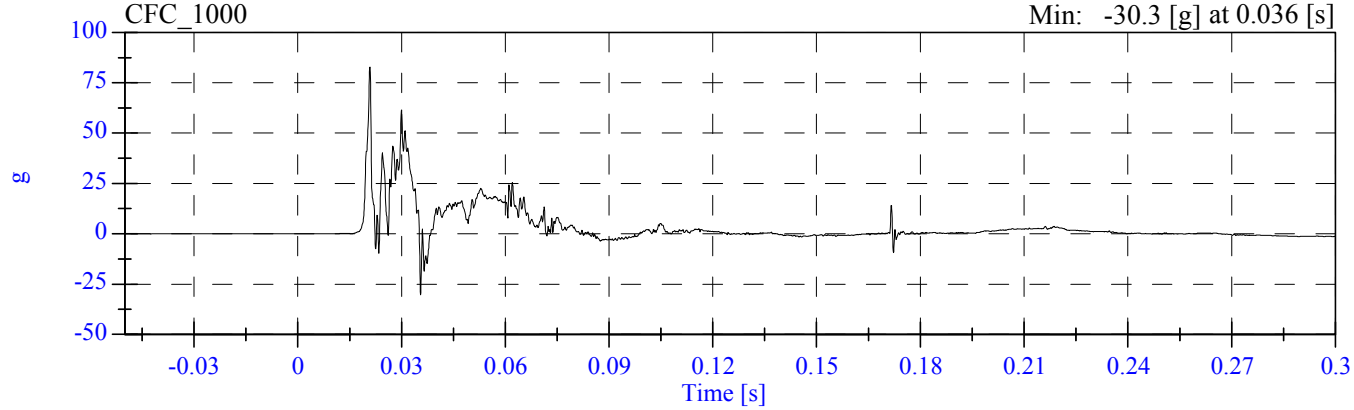
V1P1 Upper Rib Ry
CFC_1000
Max: 66.6 [g] at 0.021 [s]
Min: -44.6 [g] at 0.035 [s]



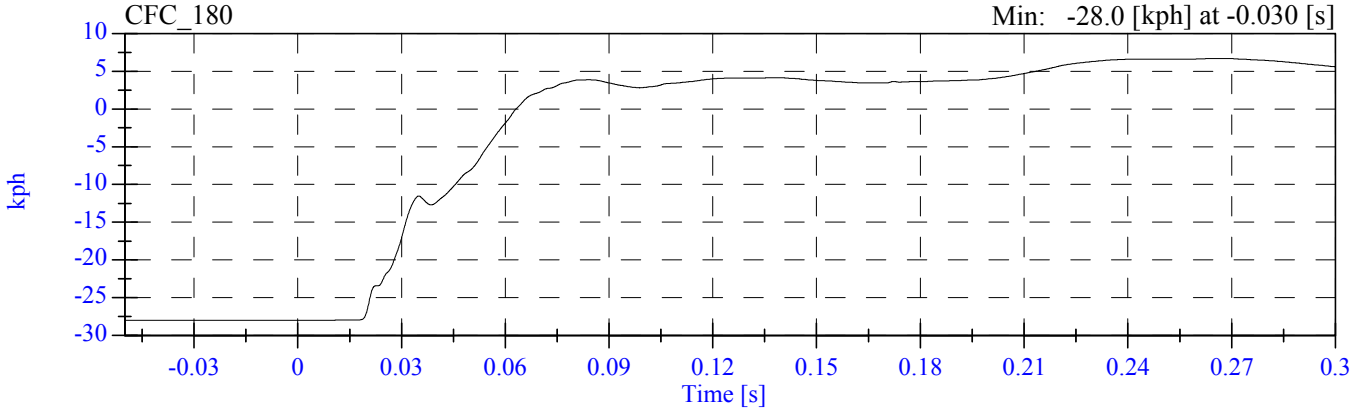
V1P1 Upper Rib Ry Velocity
CFC_180
Max: 6.8 [kph] at 0.122 [s]
Min: -28.1 [kph] at -0.031 [s]



V1P1 Lower Rib Ry
CFC_1000
Max: 82.8 [g] at 0.021 [s]
Min: -30.3 [g] at 0.036 [s]

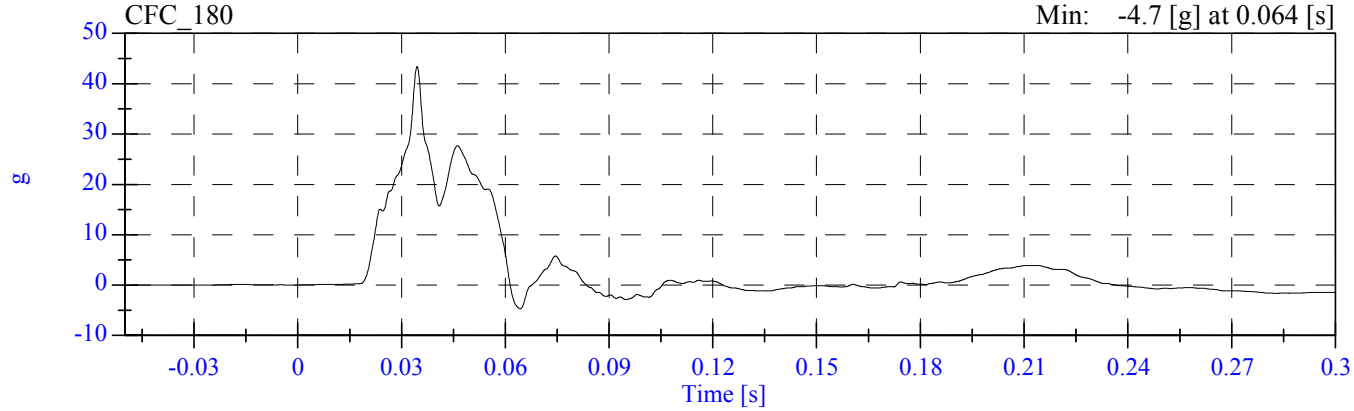


V1P1 Lower Rib Ry Velocity
CFC_180
Max: 6.7 [kph] at 0.267 [s]
Min: -28.0 [kph] at -0.030 [s]

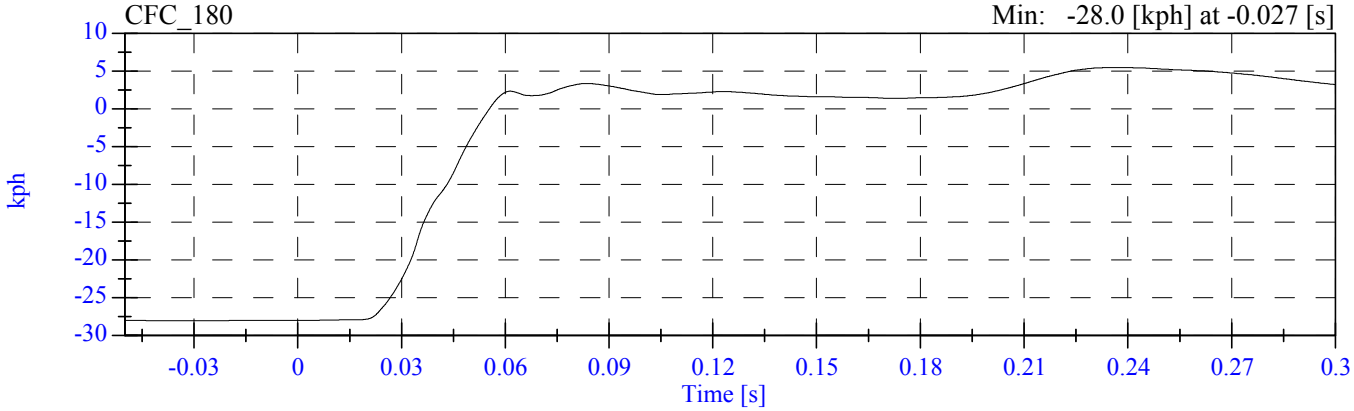


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

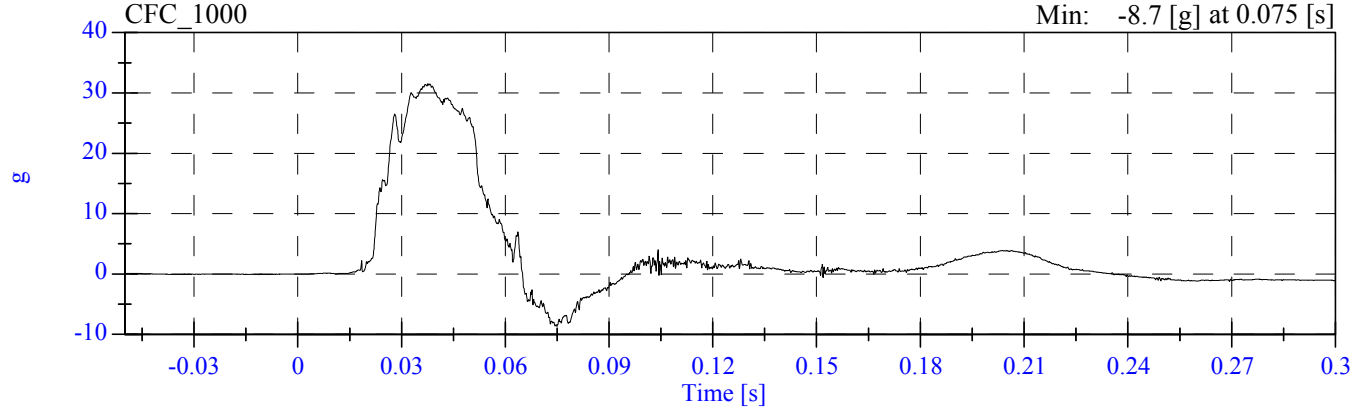
V1P1 Lower Spine Ry
CFC_180
Max: 43.4 [g] at 0.035 [s]
Min: -4.7 [g] at 0.064 [s]



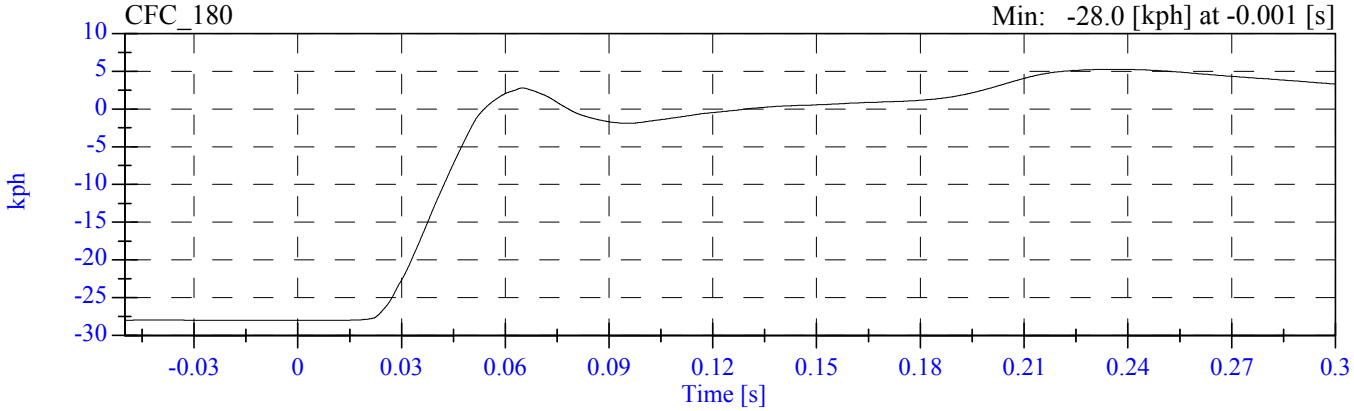
V1P1 Lower Spine Ry Velocity
CFC_180
Max: 5.5 [kph] at 0.237 [s]
Min: -28.0 [kph] at -0.027 [s]



V1P1 Pelvic Ry
CFC_1000
Max: 31.5 [g] at 0.038 [s]
Min: -8.7 [g] at 0.075 [s]

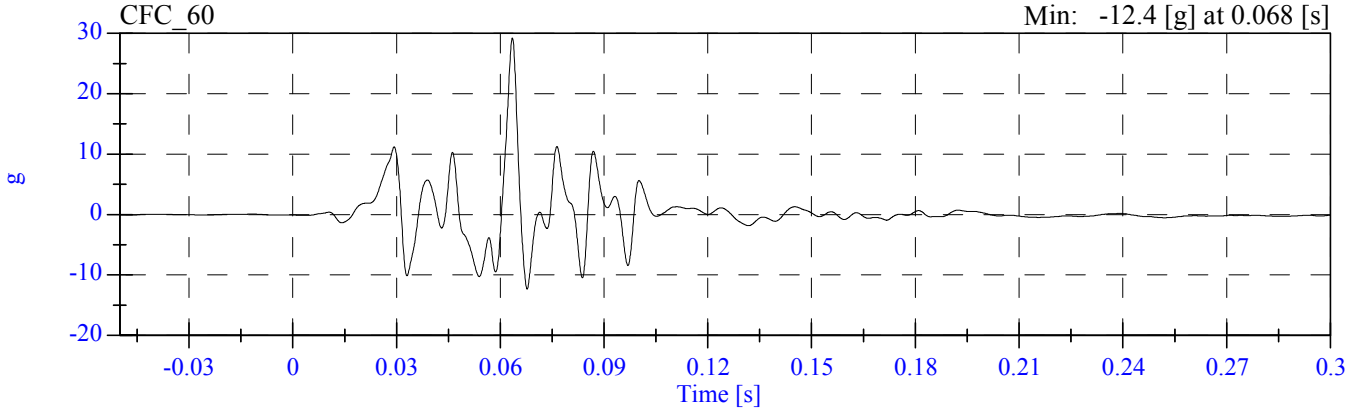


V1P1 Pelvic Ry Velocity
CFC_180
Max: 5.3 [kph] at 0.236 [s]
Min: -28.0 [kph] at -0.001 [s]

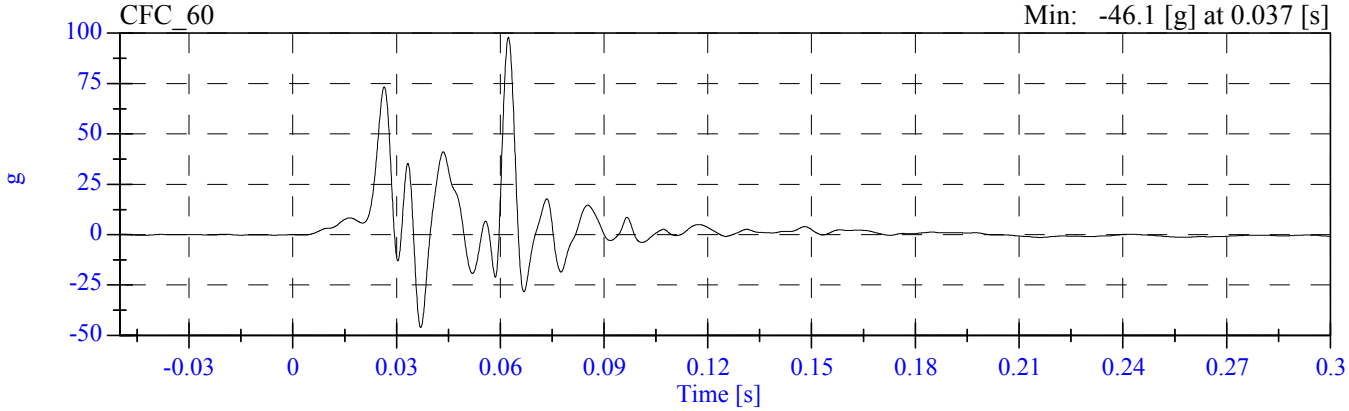


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

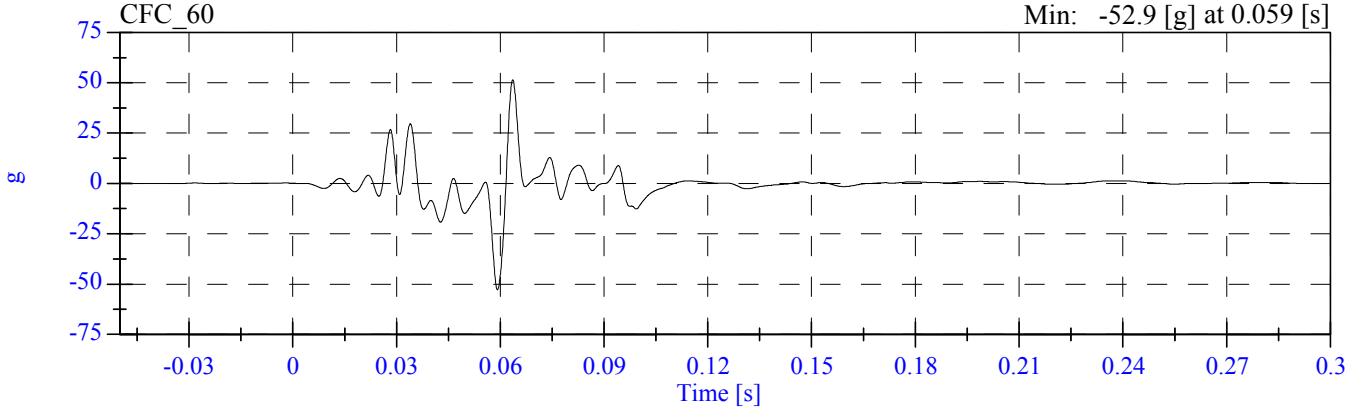
V1 A1 Vehicle CG x
CFC_60
Max: 29.3 [g] at 0.064 [s]
Min: -12.4 [g] at 0.068 [s]



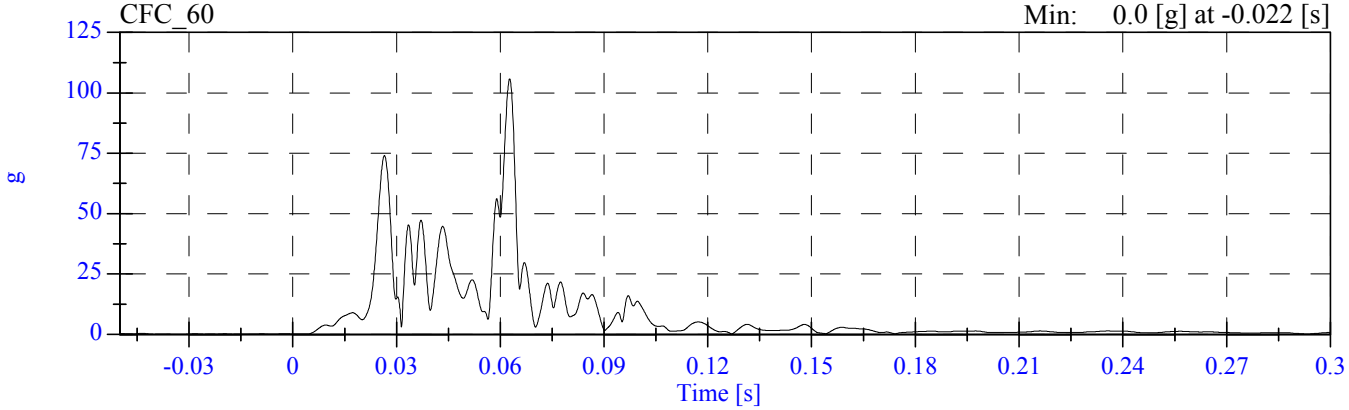
V1 A1 Vehicle CG y
CFC_60
Max: 98.1 [g] at 0.062 [s]
Min: -46.1 [g] at 0.037 [s]



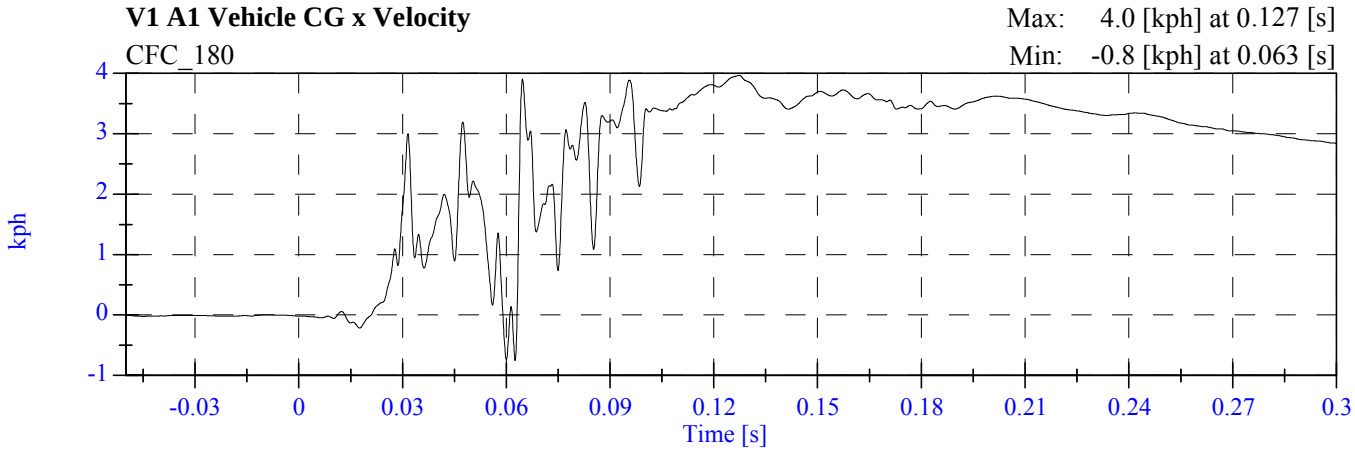
V1 A1 Vehicle CG z
CFC_60
Max: 51.5 [g] at 0.064 [s]
Min: -52.9 [g] at 0.059 [s]

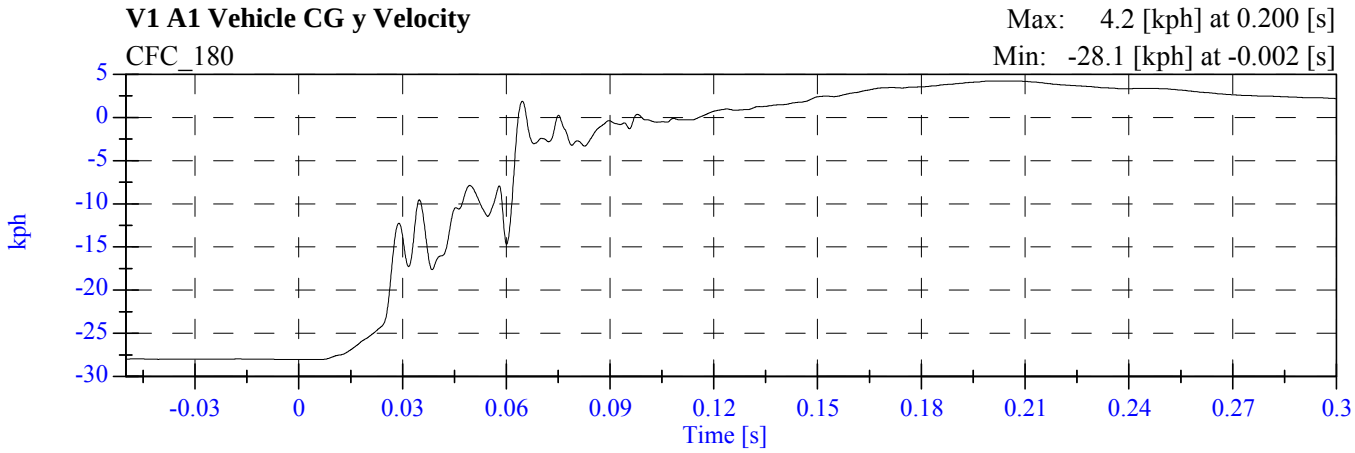


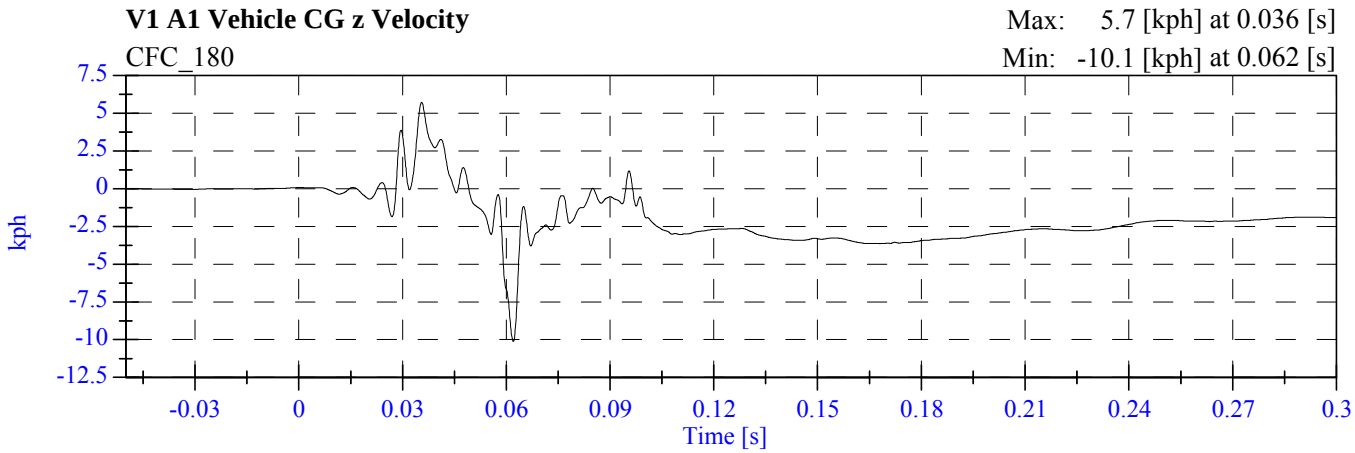
V1 A1 Vehicle CG Resultant
CFC_60
Max: 105.8 [g] at 0.063 [s]
Min: 0.0 [g] at -0.022 [s]



FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

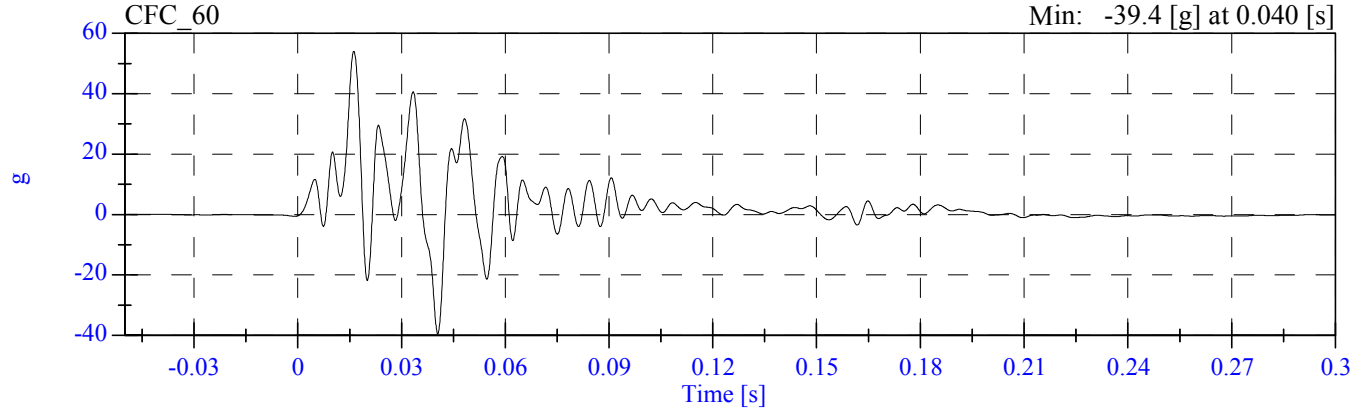




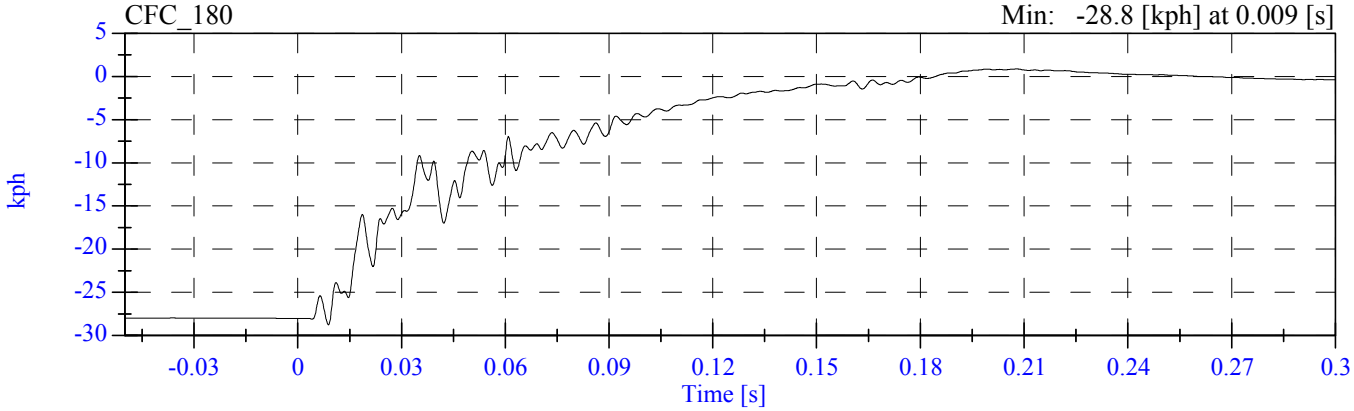


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

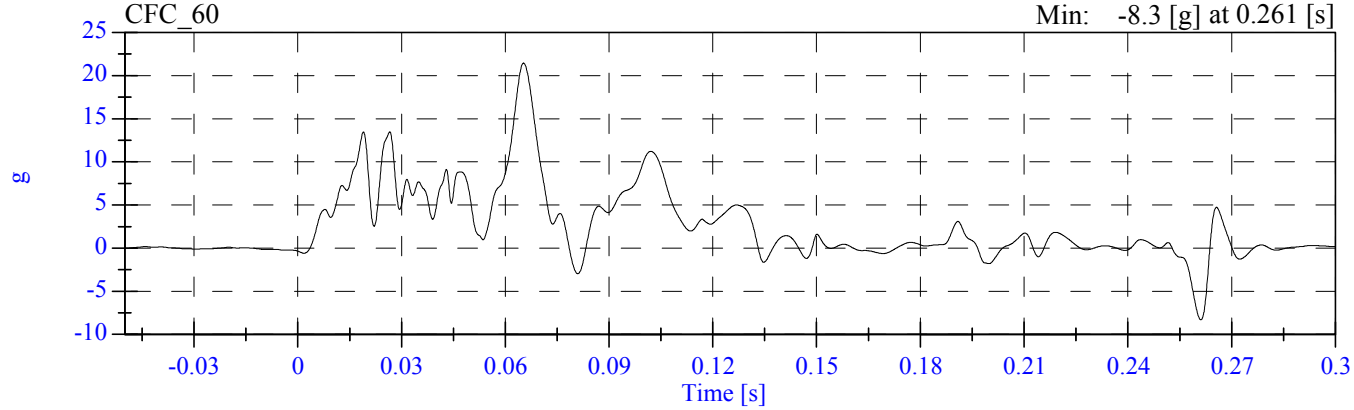
V1 A3 Left Sill y
CFC_60
Max: 54.1 [g] at 0.016 [s]
Min: -39.4 [g] at 0.040 [s]



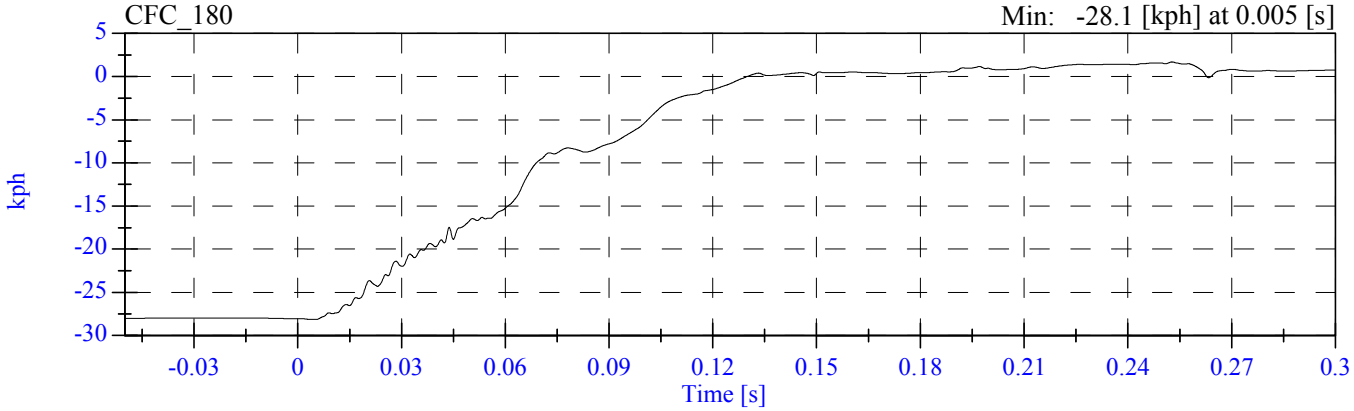
V1 A3 Left Sill y Velocity
CFC_180
Max: 0.9 [kph] at 0.208 [s]
Min: -28.8 [kph] at 0.009 [s]



V1 A4 Left Sill A Pillar y
CFC_60
Max: 21.5 [g] at 0.065 [s]
Min: -8.3 [g] at 0.261 [s]

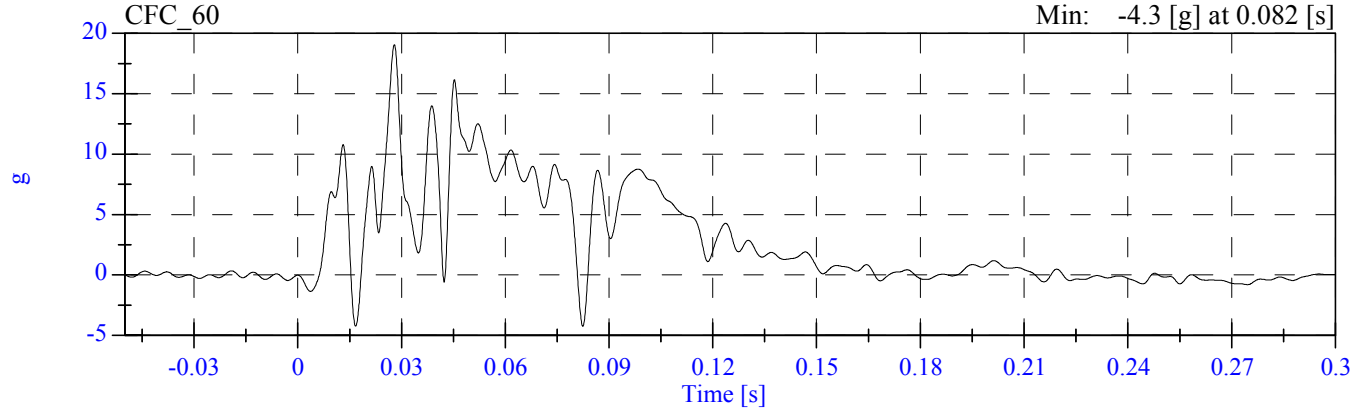


V1 A4 Left Sill A Pillar y Velocity
CFC_180
Max: 1.7 [kph] at 0.253 [s]
Min: -28.1 [kph] at 0.005 [s]

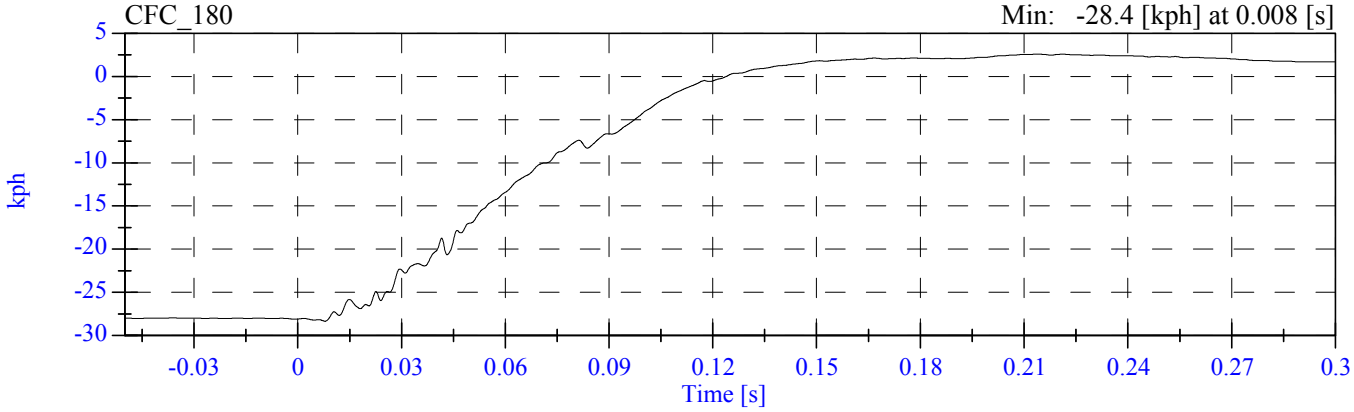


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

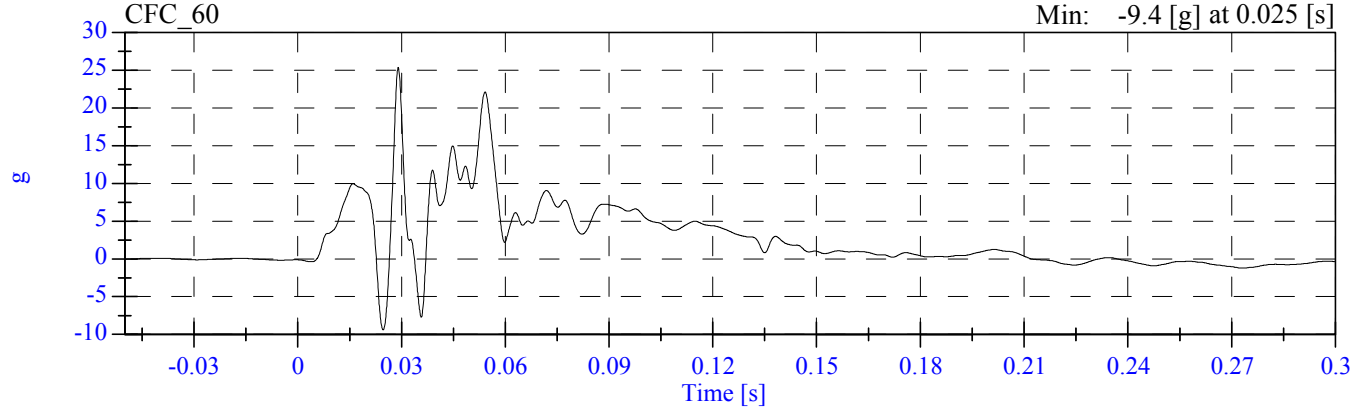
V1 A5 Left Lower A Pillar y
CFC_60
Max: 19.1 [g] at 0.028 [s]
Min: -4.3 [g] at 0.082 [s]



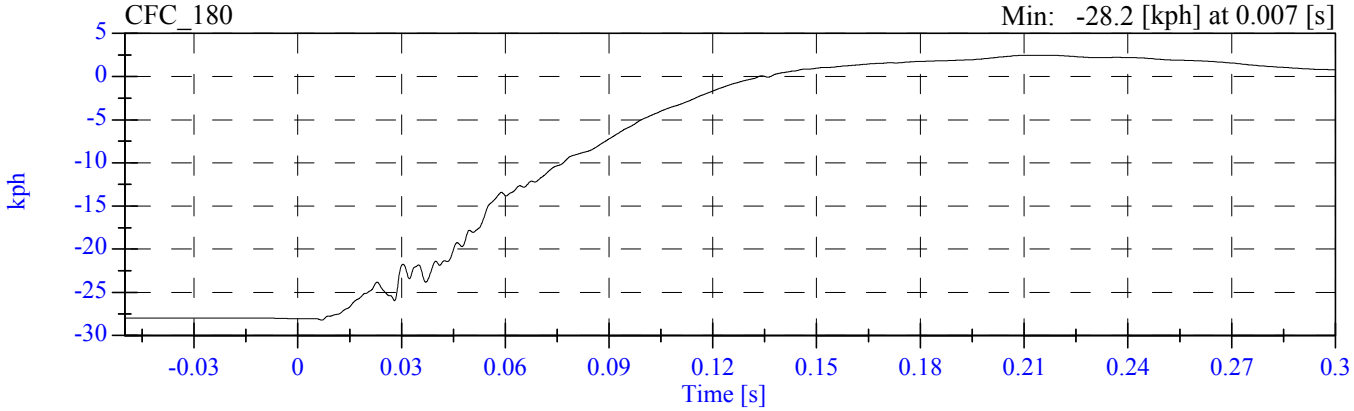
V1 A5 Left Lower A Pillar y Velocity
CFC_180
Max: 2.6 [kph] at 0.214 [s]
Min: -28.4 [kph] at 0.008 [s]



V1 A6 Left Mid A Pillar y
CFC_60
Max: 25.4 [g] at 0.029 [s]
Min: -9.4 [g] at 0.025 [s]



V1 A6 Left Mid A Pillar y Velocity
CFC_180
Max: 2.5 [kph] at 0.212 [s]
Min: -28.2 [kph] at 0.007 [s]



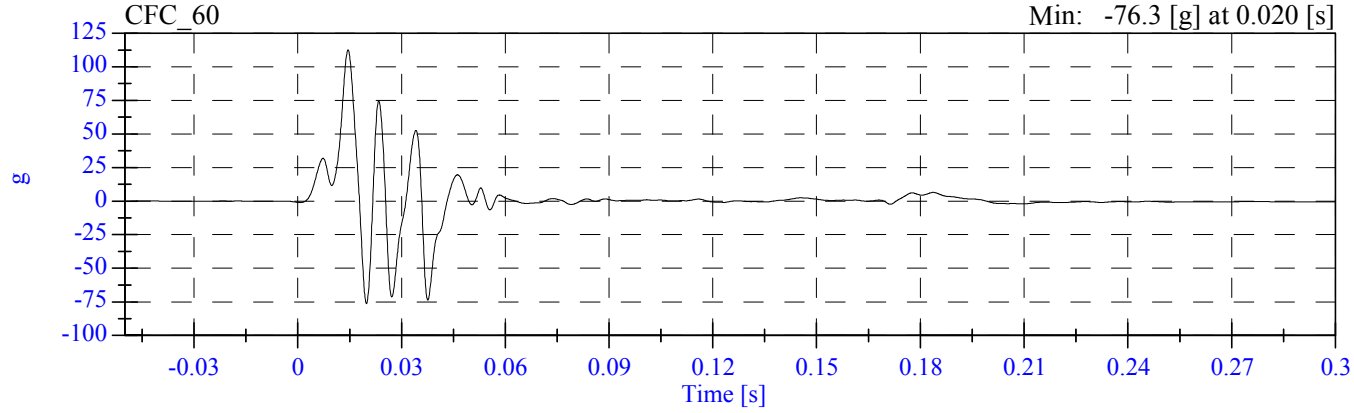
FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

V1 A7 B Pillar Sill y

CFC_60

Max: 112.7 [g] at 0.015 [s]

Min: -76.3 [g] at 0.020 [s]

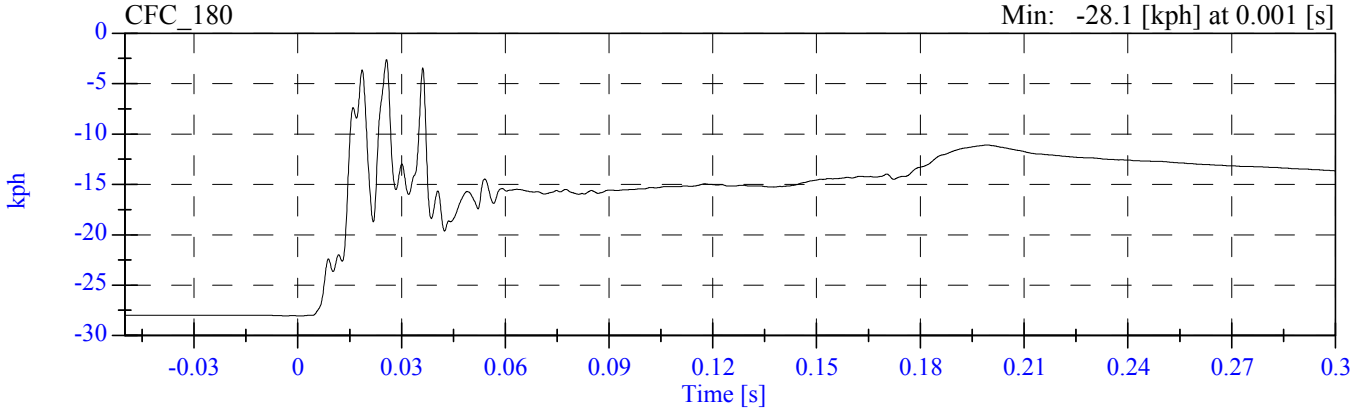


V1 A7 B Pillar Sill y Velocity

CFC_180

Max: -2.6 [kph] at 0.026 [s]

Min: -28.1 [kph] at 0.001 [s]

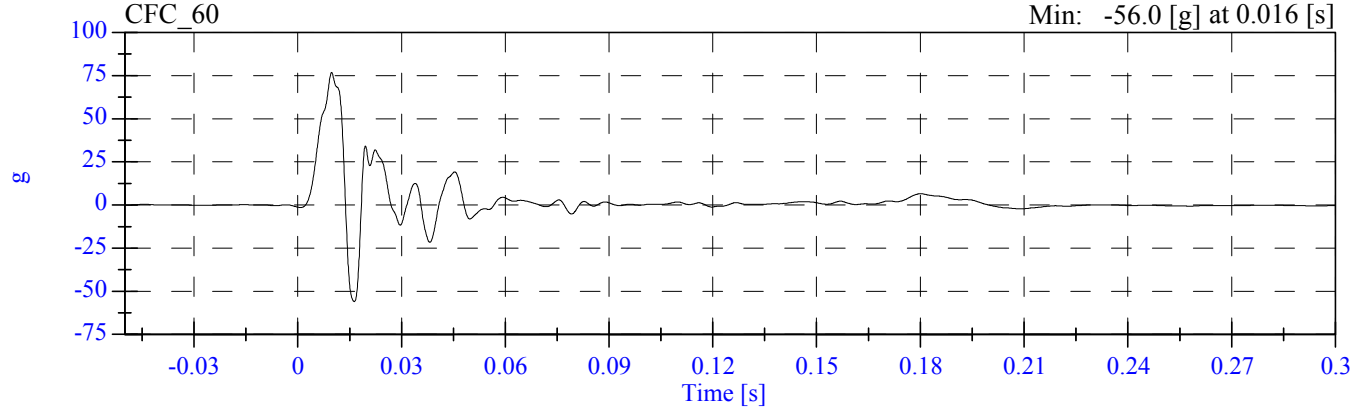


V1 A8 B Pillar Lower y

CFC_60

Max: 76.8 [g] at 0.010 [s]

Min: -56.0 [g] at 0.016 [s]

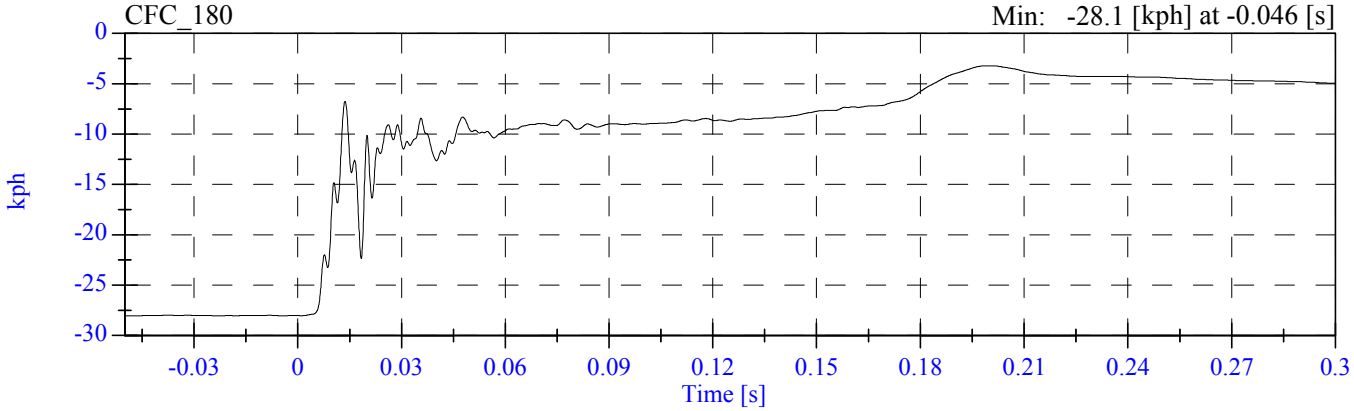


V1 A8 B Pillar Lower y Velocity

CFC_180

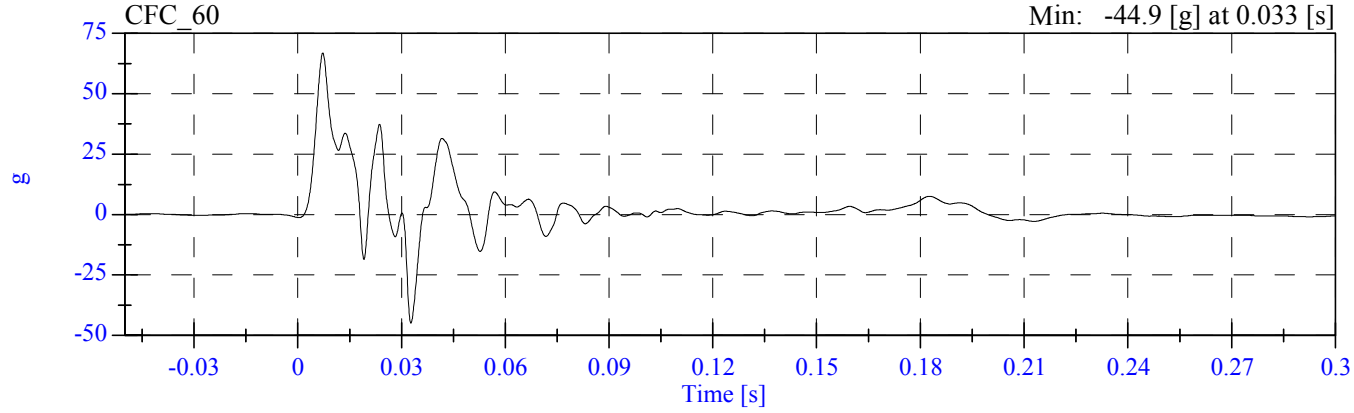
Max: -3.2 [kph] at 0.199 [s]

Min: -28.1 [kph] at -0.046 [s]

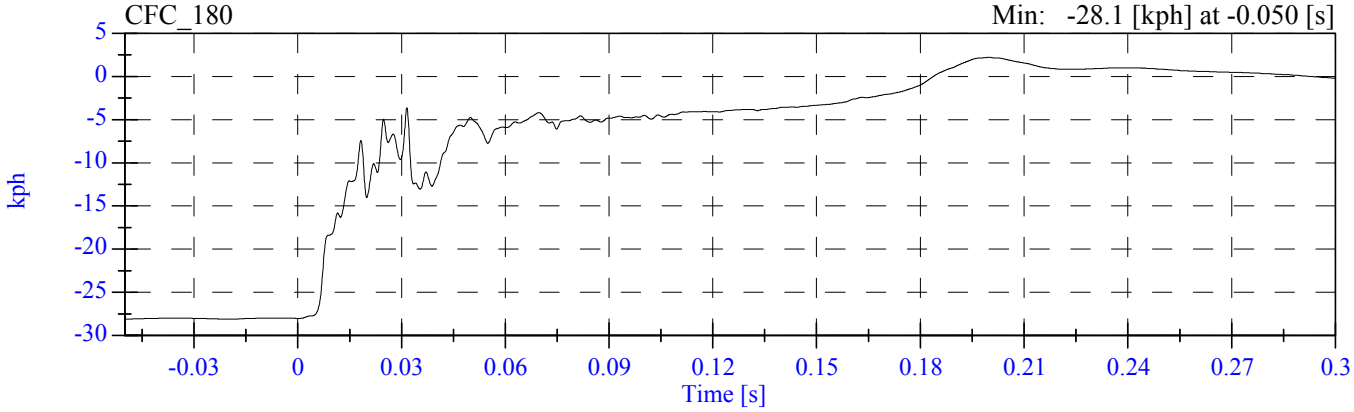


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

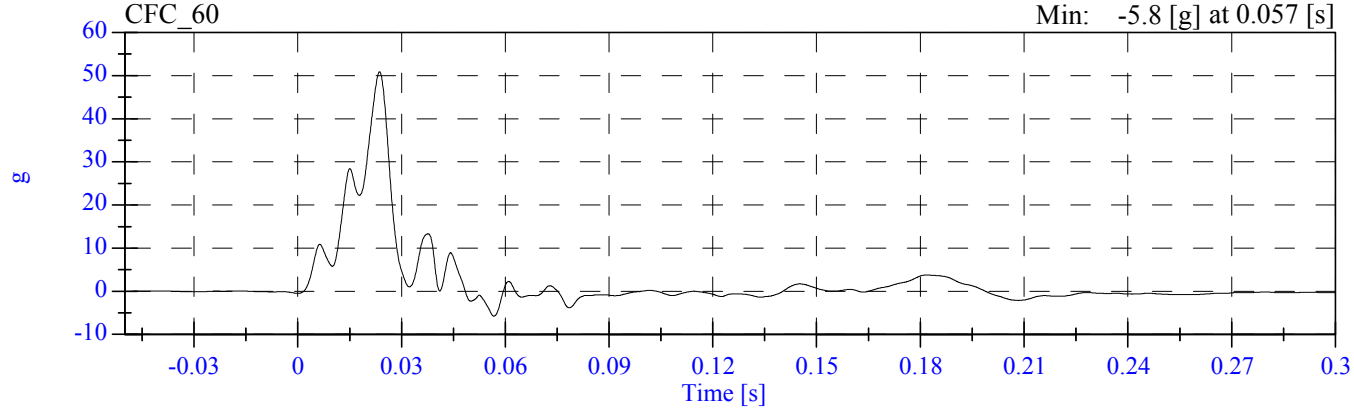
V1 A9 B Pillar Mid y
CFC_60
Max: 66.9 [g] at 0.007 [s]
Min: -44.9 [g] at 0.033 [s]



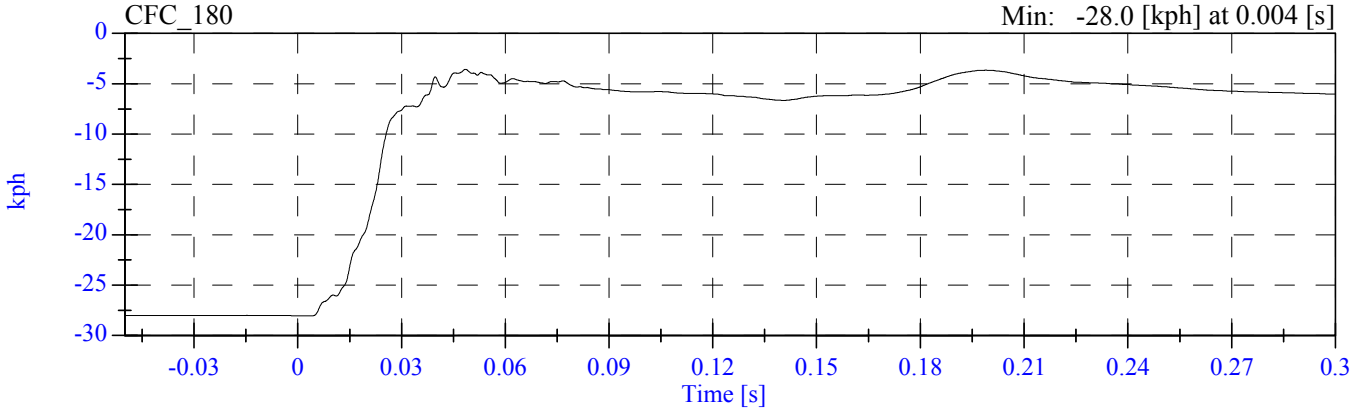
V1 A9 B Pillar Mid y Velocity
CFC_180
Max: 2.2 [kph] at 0.200 [s]
Min: -28.1 [kph] at -0.050 [s]



V1 A10 Driver Seat y
CFC_60
Max: 50.9 [g] at 0.024 [s]
Min: -5.8 [g] at 0.057 [s]

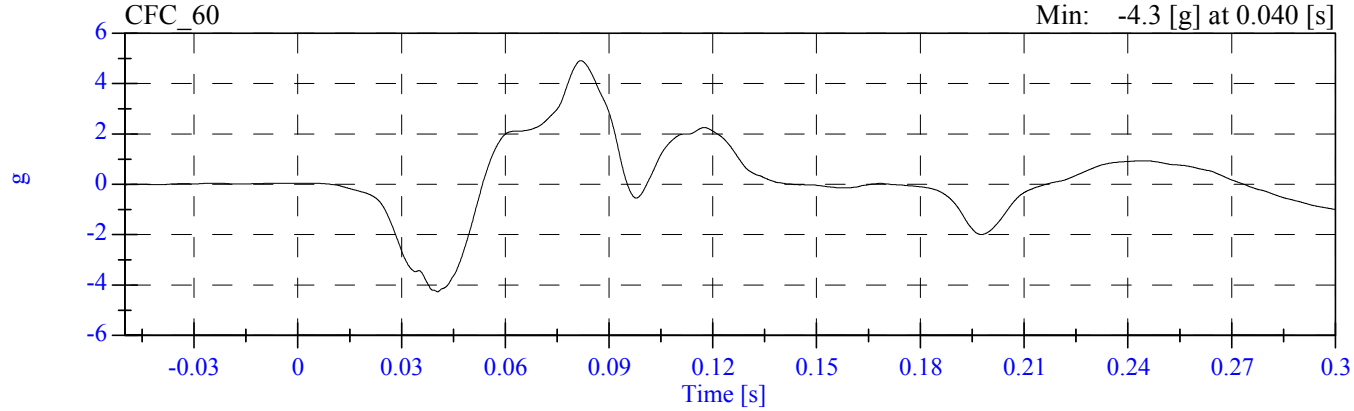


V1 A10 Driver Seat y Velocity
CFC_180
Max: -3.6 [kph] at 0.048 [s]
Min: -28.0 [kph] at 0.004 [s]

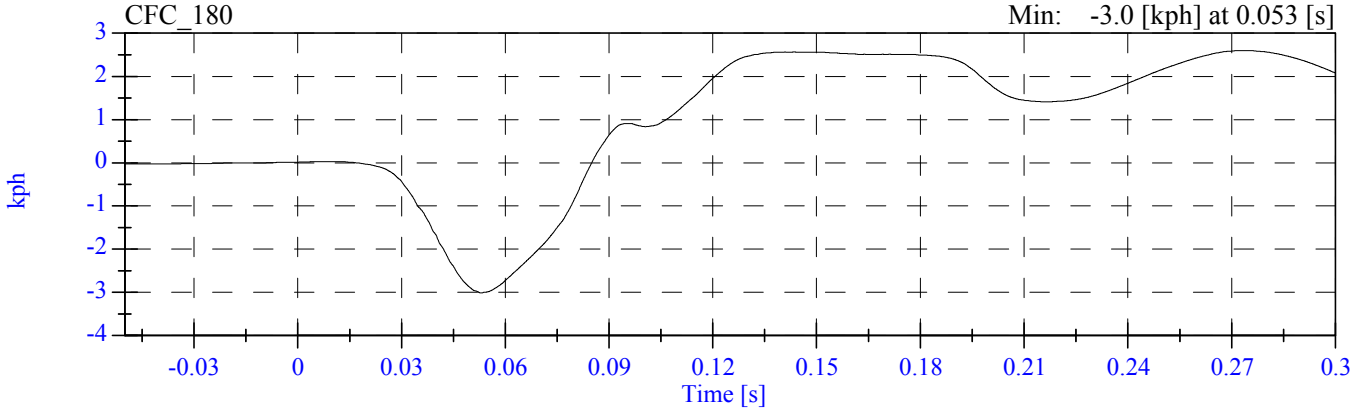


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

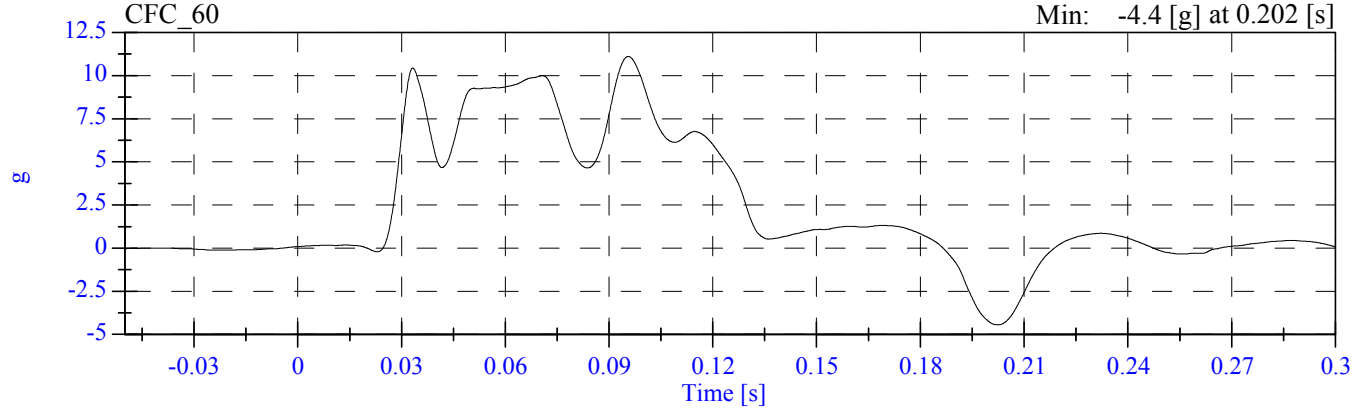
V1 A11 Engine Top x
CFC_60
Max: 4.9 [g] at 0.082 [s]
Min: -4.3 [g] at 0.040 [s]



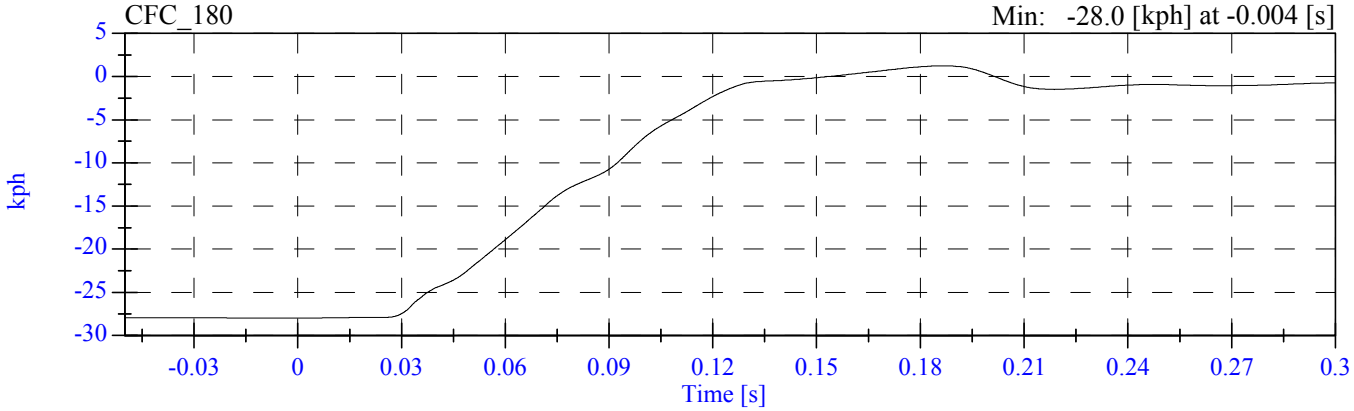
V1 A11 Engine Top x Velocity
CFC_180
Max: 2.6 [kph] at 0.274 [s]
Min: -3.0 [kph] at 0.053 [s]



V1 A11 Engine Top y
CFC_60
Max: 11.1 [g] at 0.096 [s]
Min: -4.4 [g] at 0.202 [s]

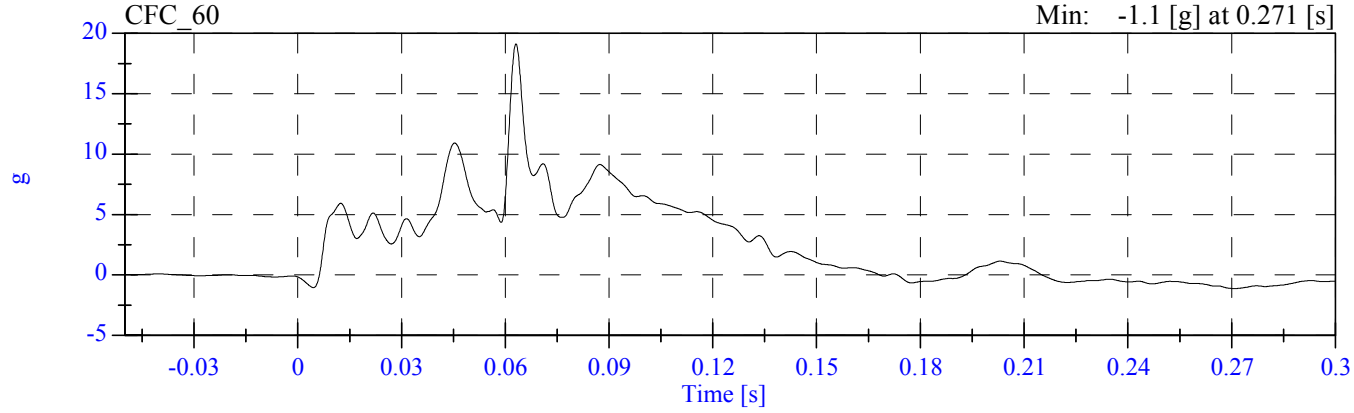


V1 A11 Engine Top y Velocity
CFC_180
Max: 1.3 [kph] at 0.187 [s]
Min: -28.0 [kph] at -0.004 [s]

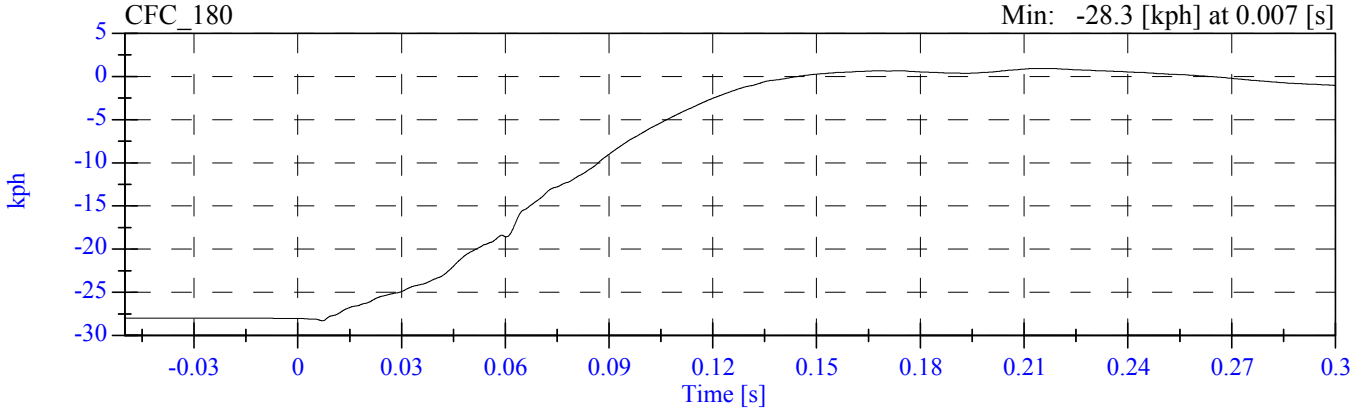


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

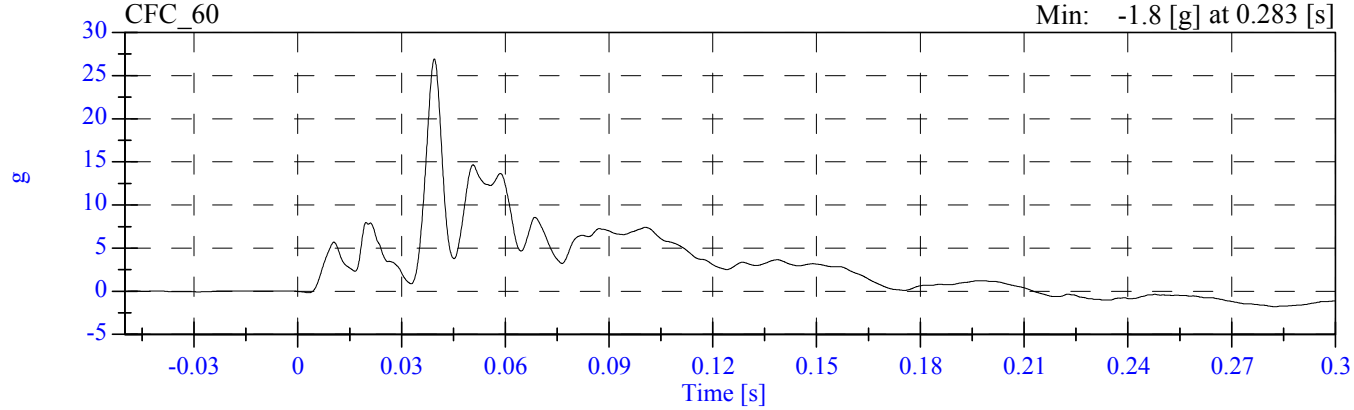
V1 A12 Firewall Center y
CFC_60
Max: 19.1 [g] at 0.063 [s]
Min: -1.1 [g] at 0.271 [s]



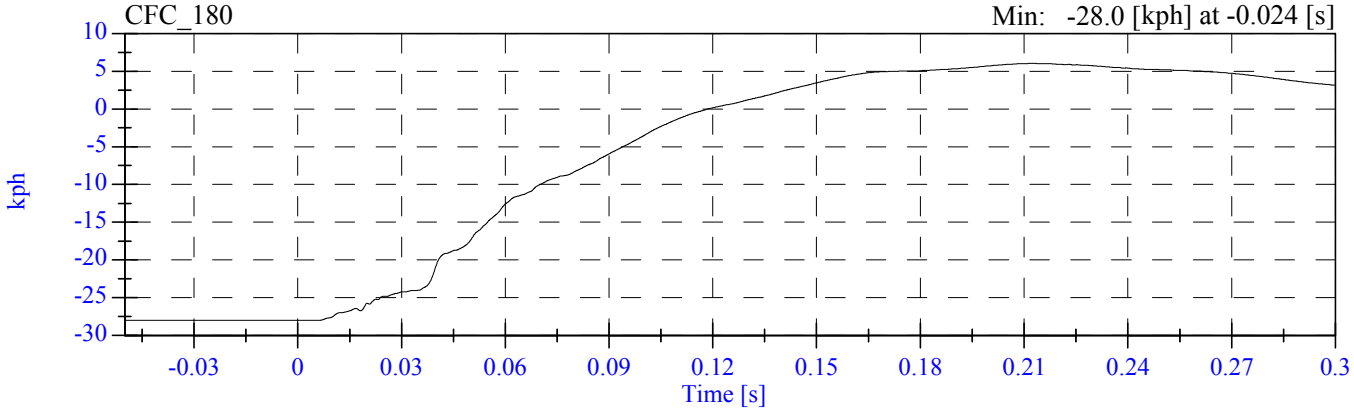
V1 A12 Firewall Center y Velocity
CFC_180
Max: 0.9 [kph] at 0.215 [s]
Min: -28.3 [kph] at 0.007 [s]



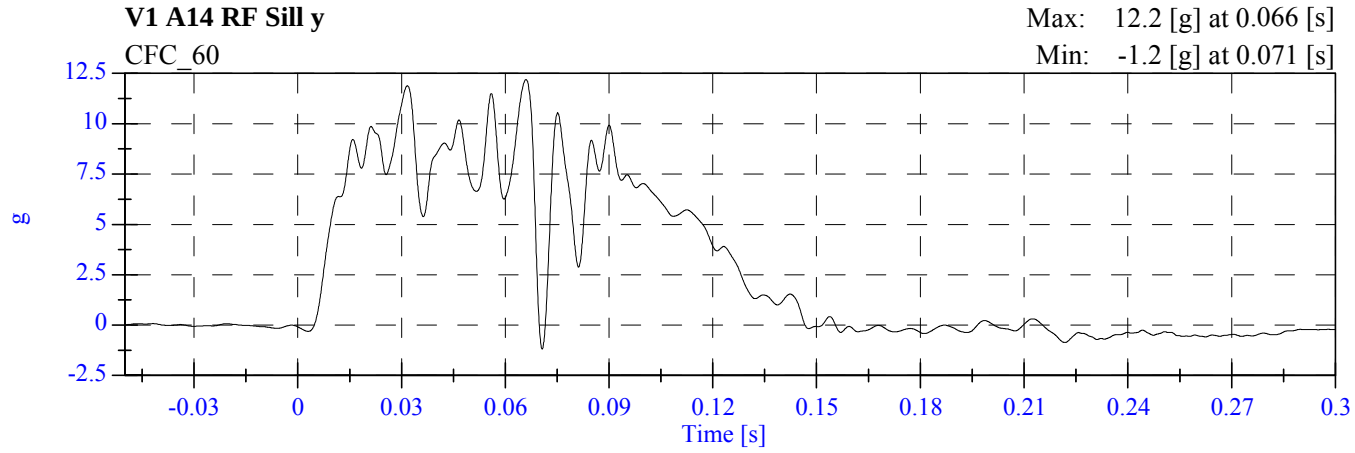
V1 A13 Right Roof y
CFC_60
Max: 26.9 [g] at 0.040 [s]
Min: -1.8 [g] at 0.283 [s]

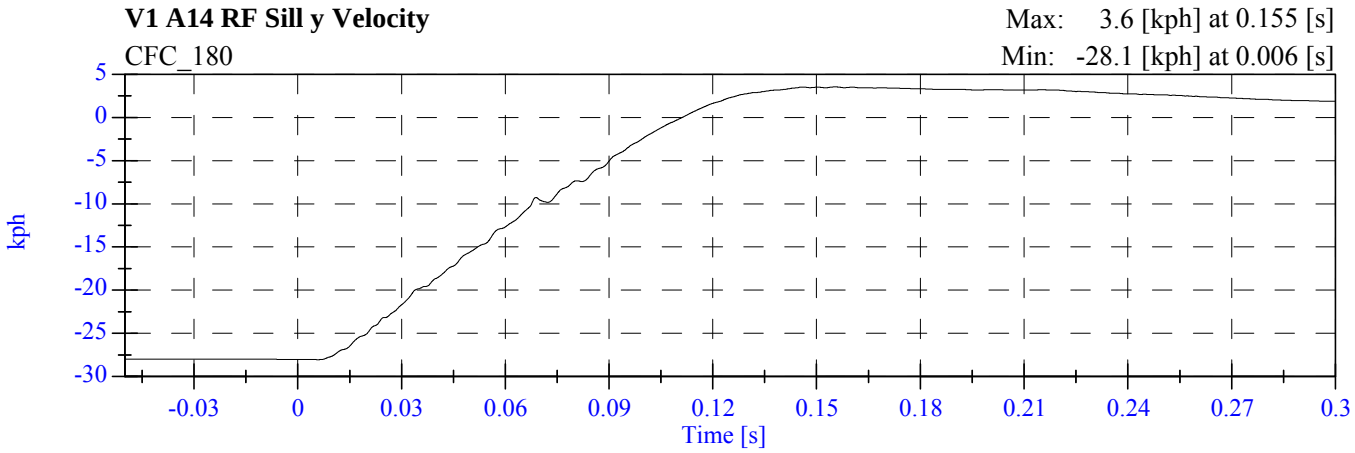


V1 A13 Right Roof y Velocity
CFC_180
Max: 6.0 [kph] at 0.213 [s]
Min: -28.0 [kph] at -0.024 [s]



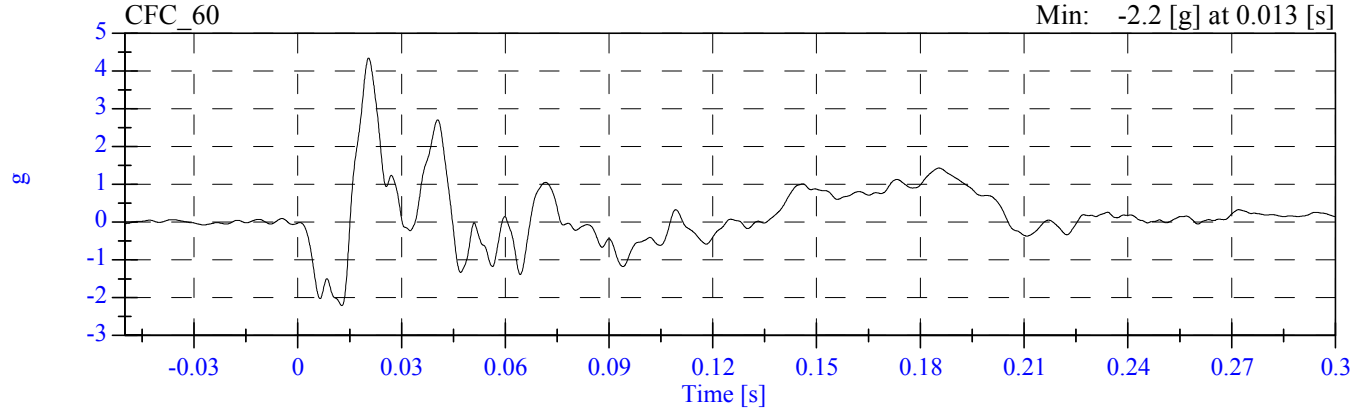
FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009



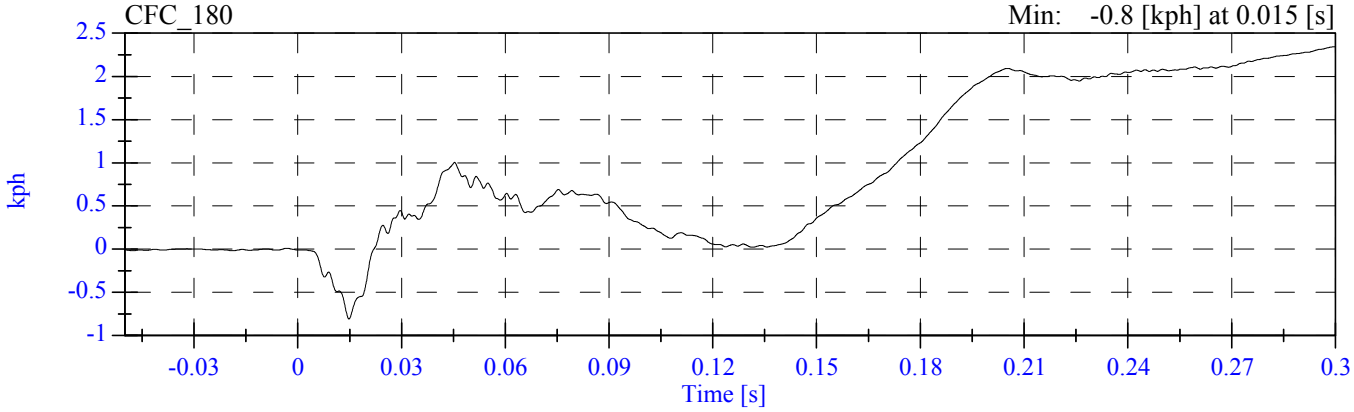


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

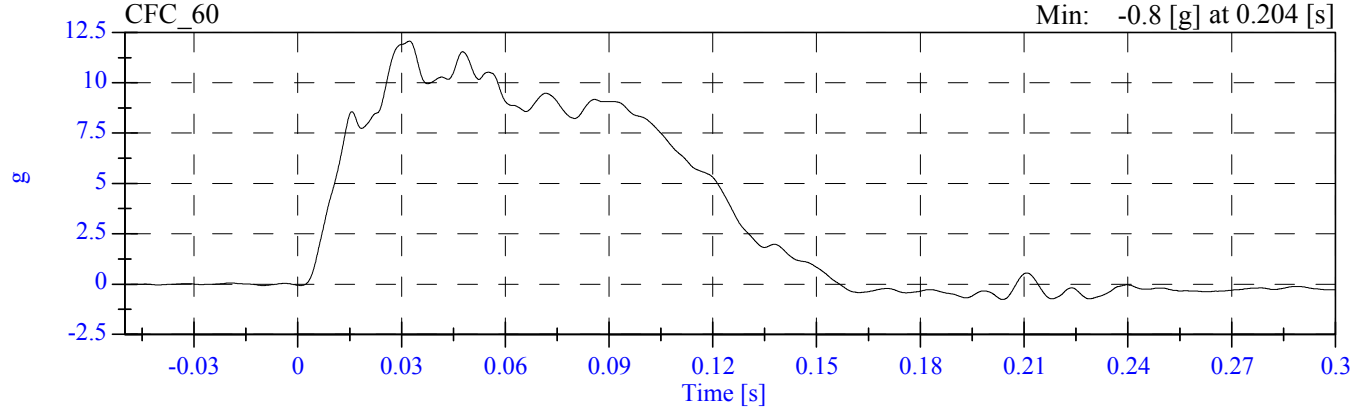
V1 A15 Rear Deck x
CFC_60
Max: 4.3 [g] at 0.020 [s]
Min: -2.2 [g] at 0.013 [s]



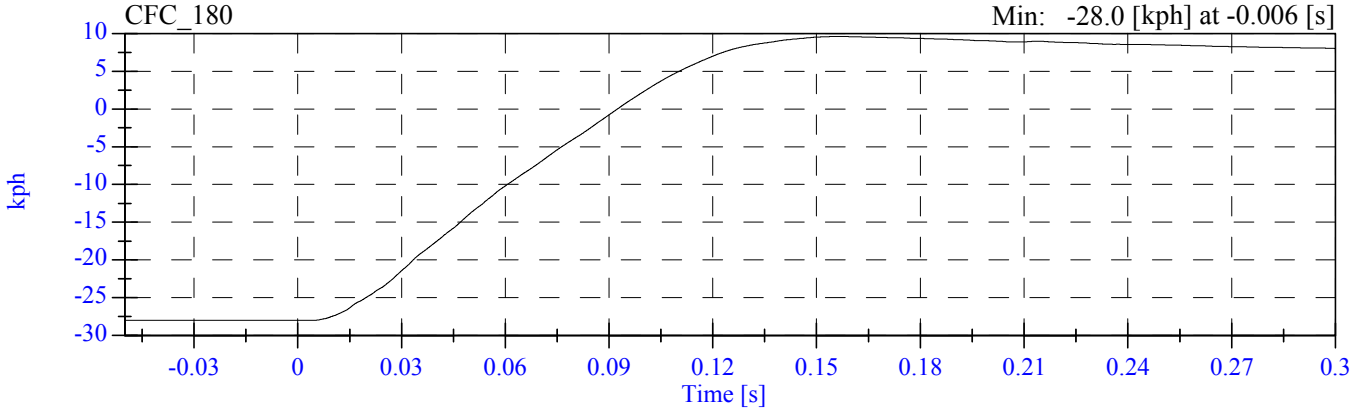
V1 A15 Rear Deck x Velocity
CFC_180
Max: 2.3 [kph] at 0.300 [s]
Min: -0.8 [kph] at 0.015 [s]



V1 A15 Rear Deck y
CFC_60
Max: 12.1 [g] at 0.032 [s]
Min: -0.8 [g] at 0.204 [s]

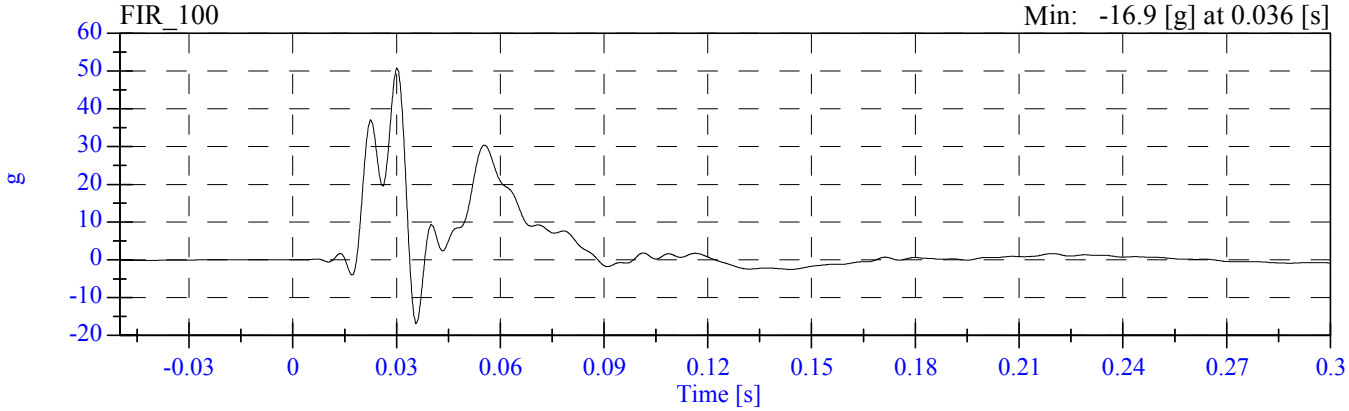


V1 A15 Rear Deck y Velocity
CFC_180
Max: 9.6 [kph] at 0.157 [s]
Min: -28.0 [kph] at -0.006 [s]

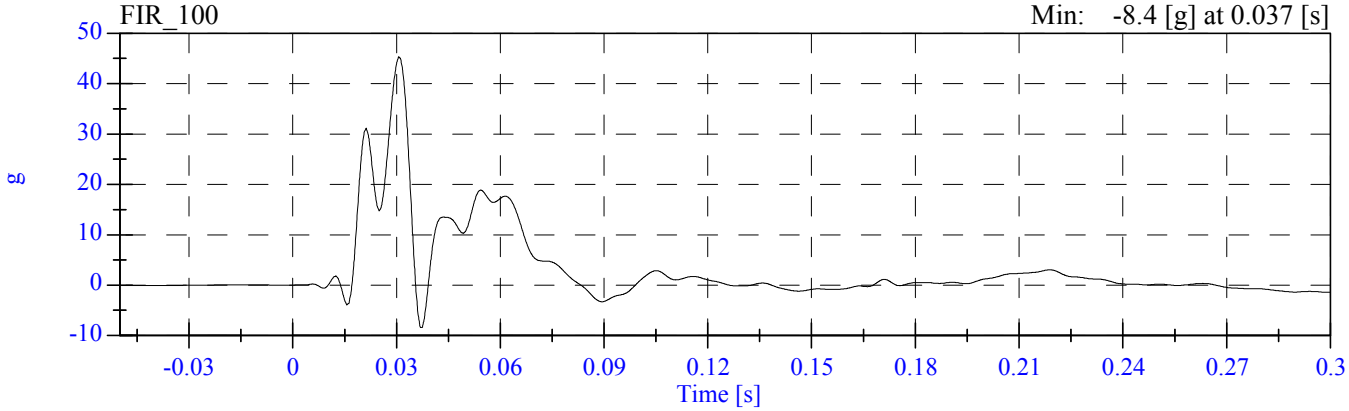


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

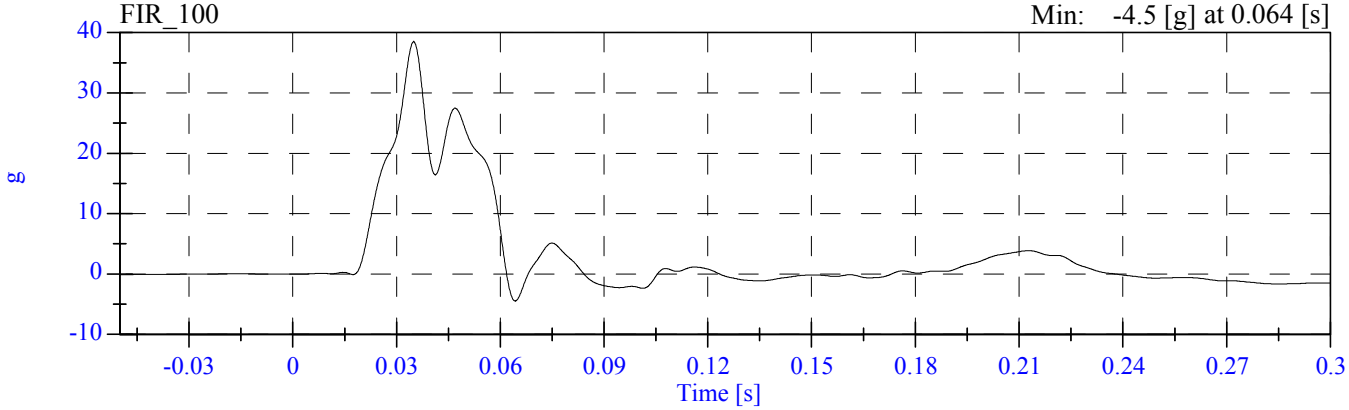
V1P1 Upper Rib y
FIR_100
Max: 50.9 [g] at 0.030 [s]
Min: -16.9 [g] at 0.036 [s]



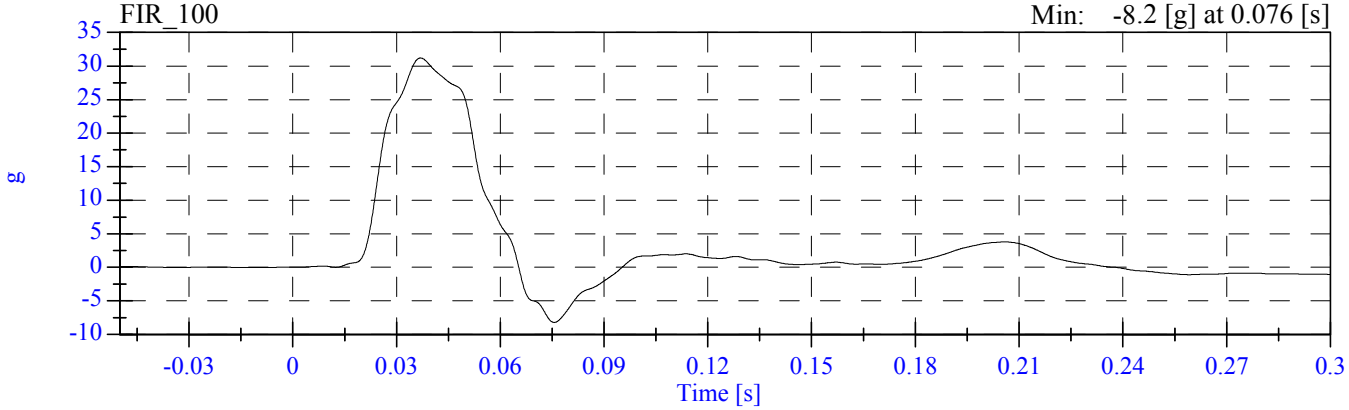
V1P1 Lower Rib y
FIR_100
Max: 45.4 [g] at 0.031 [s]
Min: -8.4 [g] at 0.037 [s]



V1P1 Lower Spine y
FIR_100
Max: 38.6 [g] at 0.035 [s]
Min: -4.5 [g] at 0.064 [s]

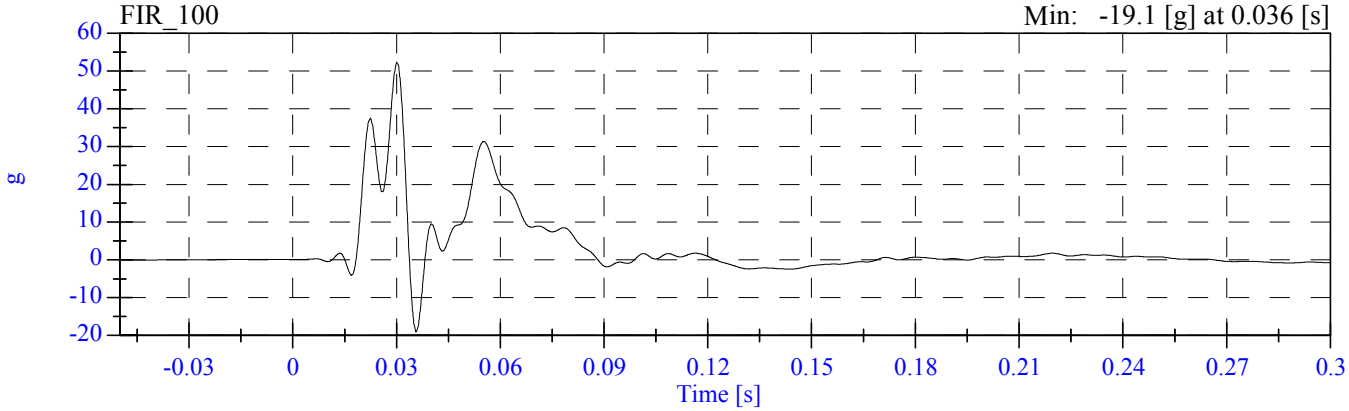


V1P1 Pelvic y
FIR_100
Max: 31.2 [g] at 0.037 [s]
Min: -8.2 [g] at 0.076 [s]

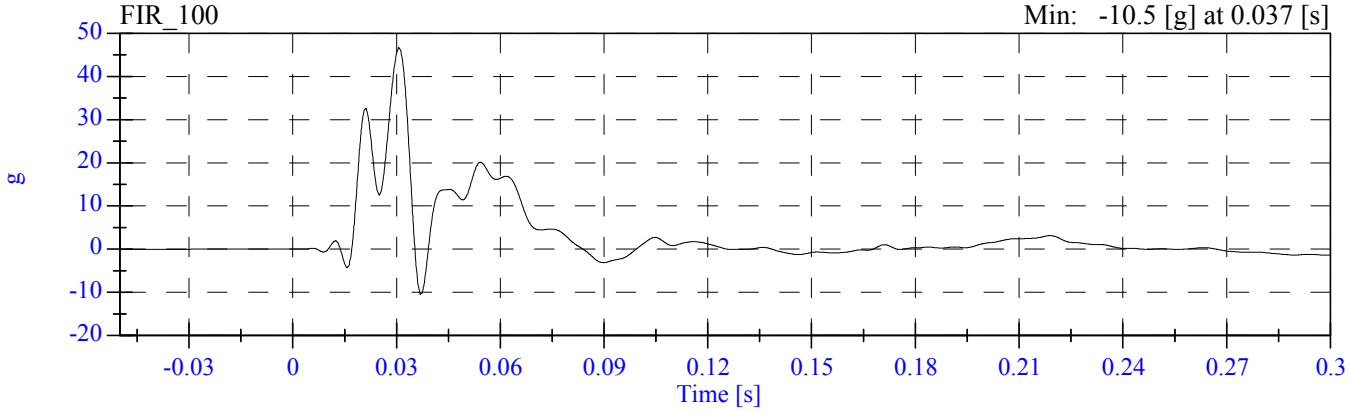


FMVSS 201P 2009 Hyundai Elantra
C90511 - May 06, 2009

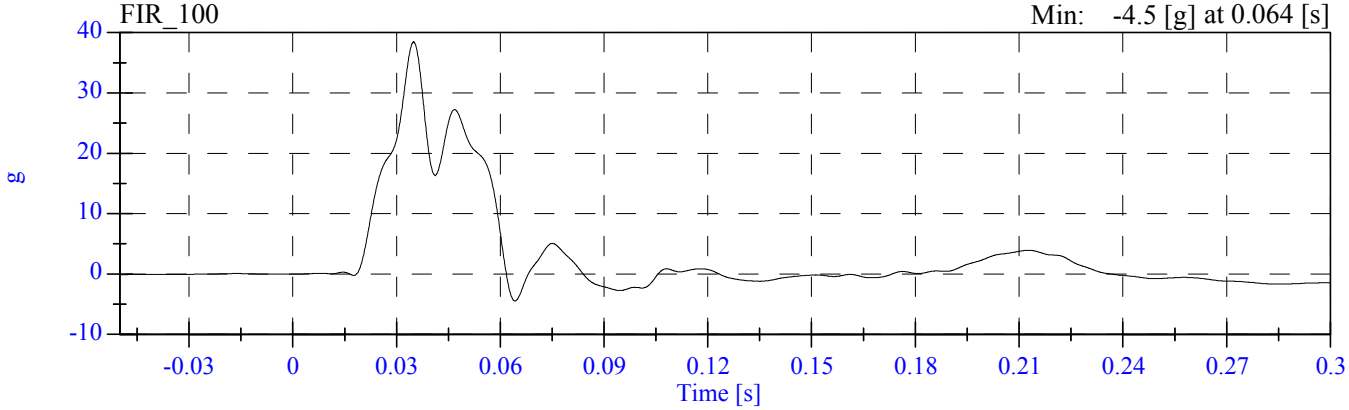
V1P1 Upper Rib Ry
FIR_100
Max: 52.4 [g] at 0.030 [s]
Min: -19.1 [g] at 0.036 [s]



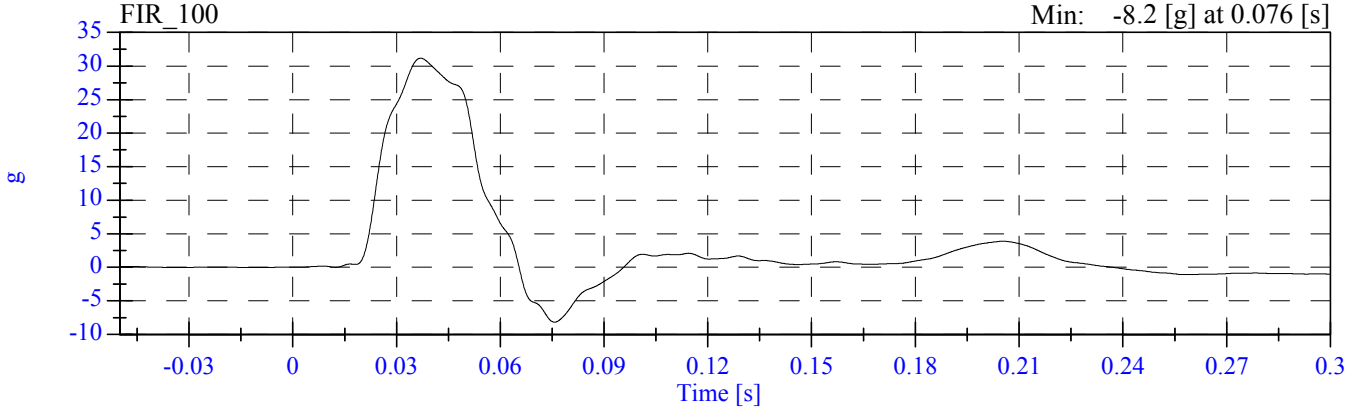
V1P1 Lower Rib Ry
FIR_100
Max: 46.7 [g] at 0.031 [s]
Min: -10.5 [g] at 0.037 [s]



V1P1 Lower Spine Ry
FIR_100
Max: 38.5 [g] at 0.035 [s]
Min: -4.5 [g] at 0.064 [s]



V1P1 Pelvic Ry
FIR_100
Max: 31.2 [g] at 0.037 [s]
Min: -8.2 [g] at 0.076 [s]



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SUMMARY
SID/HIII PRE & POST TEST CALIBRATION

CONFIGURED FOR LEFT SIDE IMPACT

Date: 12/4/08, 6/1/09 Sequential Test Number: 1
Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	SID H3 NO.: 905 PRE TEST	SID H3 NO.: 905 POST TEST
SH- Seated Height (mm)	889 - 909	899	899
RH- Rib Height (mm)	501 - 520	511	511
HP- Hip Pivot Height (mm)	99 ref.	99	99
RD- Rib from Back Line (mm)	229 - 241	239	239
KH- Knee Pivot from Back Line (mm)	511 - 526	521	521
KV- Knee Pivot to Floor (mm)	490 - 505	493	493
HW- Hip Width (mm)	356 - 391	384	384
HEAD DROP			
TEMPERATURE (C)	18.9 - 25.6	21.7	22.2
RELATIVE. HUMIDITY (%)	10 -70	23	24
PEAK RESULTANT ACCEL .	120-150 Gs	139.79	128.96
PEAK LONGITUDINAL ACCEL.	15 Gs Max	6.7	6.8
CURVE PERCENT NONMODAL	< 15%	1.71%	1.93 %
NECK TEST			
TEMPERATURE (C^o)	20.6 – 22.2	21.7	21.1
HUMIDITY (%)	10-70%	18	61
IMPACT VELOCITY (m/s)	6.89-7.13	7.00	7.00
PENDULUM DELTA V			
DELTA V at 10 ms.	1.96-2.55 m/s	2.08	2.05
DELTA V at 20 ms.	4.12-5.10 m/s	4.35	4.25
DELTA V at 30 ms.	5.73-7.01 m/s	6.18	6.08
DELTA V between 40-70 ms.	6.27-7.64 m/s	7.61	7.49
D PLANE ROTATION			
MAXIMUM ROTATION (deg.)	66.0-82.0	73.71	73.3
ROTATION ANGLE DECAY	58.0-67.0 ms	58.00	61.5
MOMENT ABOUT THE OCCIPITAL CONDYLE			
MAX OCCIPITAL MOMENT	73.0-88.0 N-m	84.78	77.85
OCCIPITAL MOMENT DECAY	49.0-64.0 ms	56.30	60.00
HEAD ROTATION TIME WITH RESPECT TO OCCIPITAL CONDYLE MOMENT			
MOMENT TO ROTATION PEAK	2.0-16.0 ms	12.00	11.20

SUMMARY
SID/HIII PRE & POST TEST CALIBRATION

CONFIGURED FOR LEFT SIDE IMPACT

Date: 12/4/08 Sequential Test Number: 1
Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	SID H3 NO.: 905 PRE TEST	SID H3 NO.: 905 POST TEST
THORAX IMPACTS			
TEMPERATURE (C)	18.9 - 25.5	21.7	22.2
RELATIVE. HUMIDITY (%)	10 -70	18	55.0
PROBE SPEED (m/s)	4.27 - 4.33	4.30	4.31
UPPER RIB (g's)	37 - 46	44.17	40.33
LOWER RIB (g's)	37 - 46	41.60	39.78
LOWER SPINE (g's)	15 -22	21.59	20.83
PELVIS IMPACT			
TEMPERATURE (C)	18.9 - 25.5	21.7	22.2
RELATIVE HUMIDITY (%)	10 - 70	18	54.0
PROBE SPEED (m/s)	4.27 - 4.33	4.31	4.30
PELVIS (g's)	40 -60	43.20	41.50
ABDOMINAL COMPRESSION TEST			
TEMPERATURE (C)	18.9 - 25.5	21.7	21.7
RELATIVE. HUMIDITY (%)	10 -70	23.0	28.0
FORCE @ 13 mm (N)	104 - 162	124.64	118.11
FORCE @ 19 mm (N)	163 – 221	182.68	174.98
FORCE @ 25 mm (N)	222 – 280	250.95	240.97
FORCE @ 33 mm (N)	325 - 391	355.71	343.04
LUMBAR FLEXION TEST			
TEMPERATURE (C)	18.9 - 25.5	21.7	22.2
RELATIVE. HUMIDITY (%)	10 -70	23.0	31.0
FORCE @ 0 deg (N)	0 – 26.7	0.78	1.30
FORCE @ 20 deg (N)	97.8 – 151.2	115.43	130.05
FORCE @ 30 deg (N)	151.2 – 204.6	165.31	170.01
FORCE @ 40 deg (N)	204.6 - 258	219.63	224.07
RETURN ANGLE	12 DEG MAX.	8.85	8.93

CALIBRATION TEST RESULTS

PRE-TEST

SID/HIII NO.: 905

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY
PRE-TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 12/4/08 Laboratory Technician: A. Rudniski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST	Passed all requirements.
LATERAL NECK BEND TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST	Passed all requirements.
LUMBAR FLEXION TEST	Passed all requirements.

REMARKS: None

EXTERNAL DIMENSIONS
PRE-TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 12/2/08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 – 909	899
RH- Rib Height (mm)	502 – 520	511
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 – 241	239
KH- Knee Pivot from Back Line (mm)	511 – 526	521
KV- Knee Pivot to Floor (mm)	490 – 505	493
HW- Hip Width (mm)	356 - 391	384

REMARKS: None

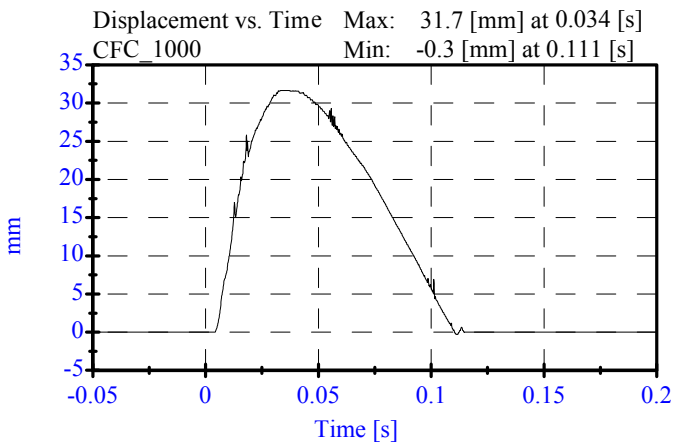
905 Shock Impact Low (3.05 m/s)
PRE TEST

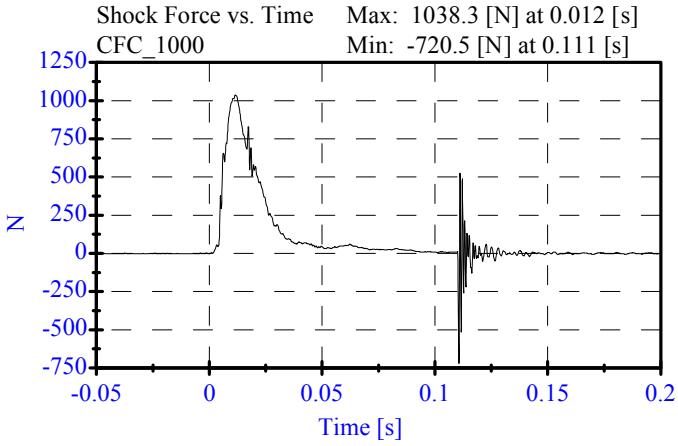
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905SL 08-13-08
Date: 08-13-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	48.00 %	Passed
Displacement:	30.00-35.00 mm	31.67 mm	Passed
Maximum Force:	836.00-1125.00 N	1038.31 N	Passed

Impact Test Velocity: 3.05 m/s
Damper Identification: 905
Damper Setting: 5





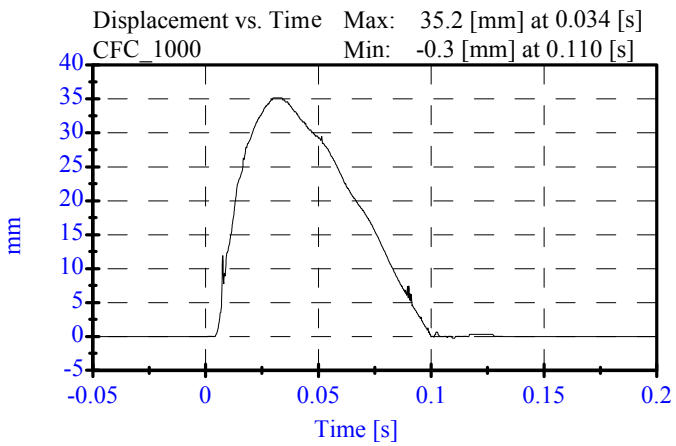
905 Shock Impact Med (4.27 m/s)
PRE TEST

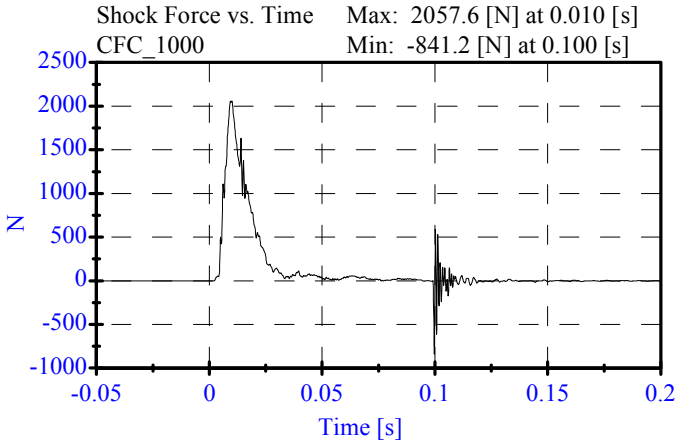
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905SM 08-13-08
Date: 08-13-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	48.00 %	Passed
Displacement:	32.00-37.00 mm	35.17 mm	Passed
Maximum Force:	1730.00-2099.00 N	2057.58 N	Passed

Impact Test Velocity: 4.27 m/s
Damper Identification: 905
Damper Setting: 5





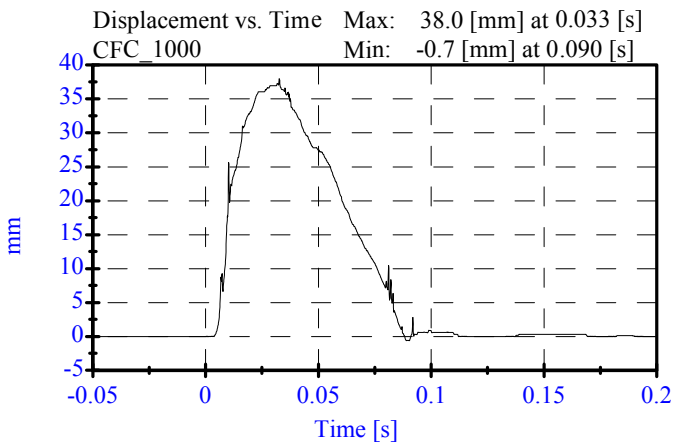
905 Shock Impact High (6.10 m/s)
PRE TEST

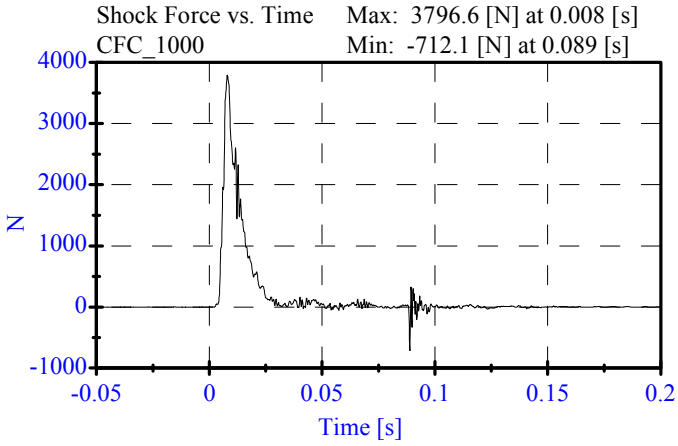
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905SH 08-13-08
Date: 08-13-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	49.00 %	Passed
Displacement:	33.00-40.00 mm	37.99 mm	Passed
Maximum Force:	3741.00-4448.00 N	3796.60 N	Passed

Impact Test Velocity: 6.10 m/s
Damper Identification: 905
Damper Setting: 5





Thorax Impact

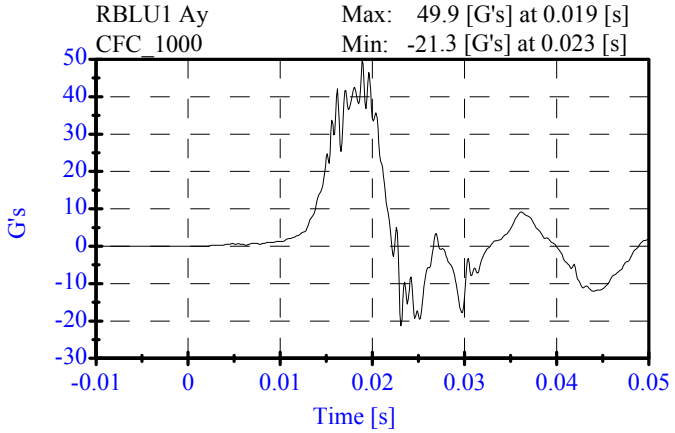
Pre-Test

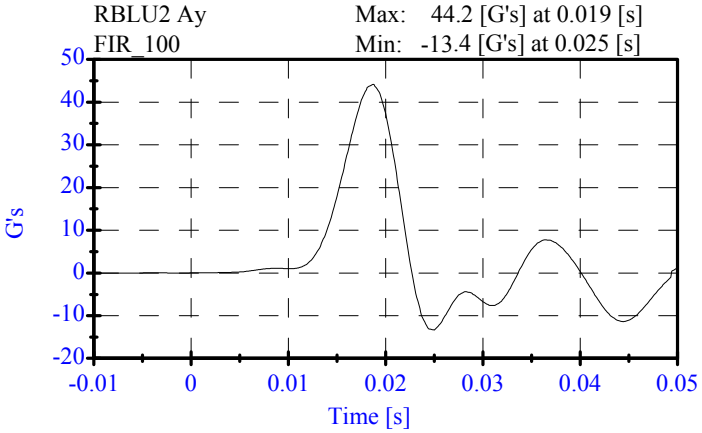
CONFIGURED FOR LEFT SIDE IMPACT

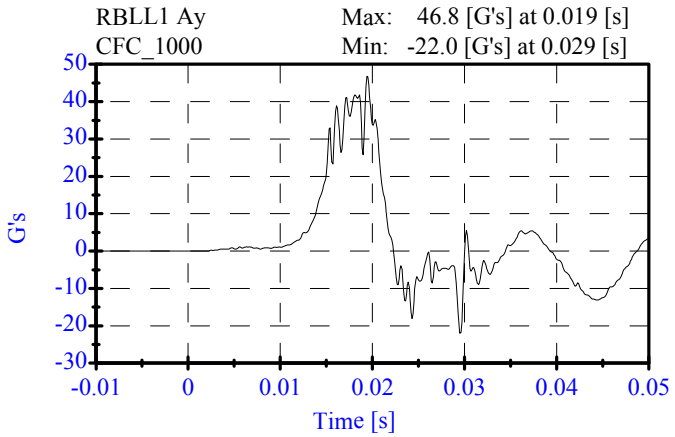
ATD Serial No: 905 Sequential Test Number: 1 File: 905T 12-03-08

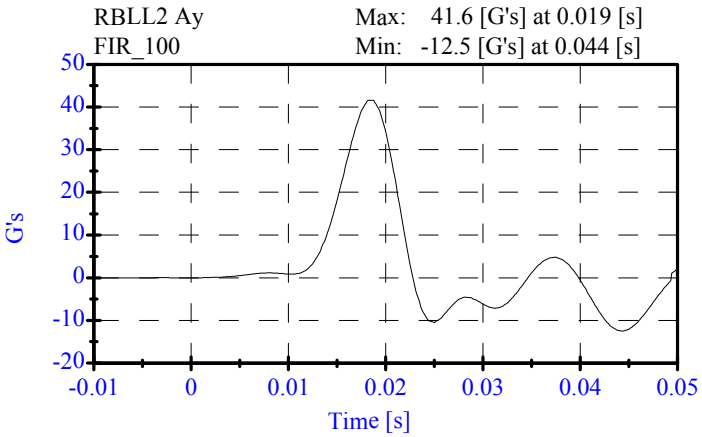
Date: 12-03-08 Laboratory Technician: A. Rudniski

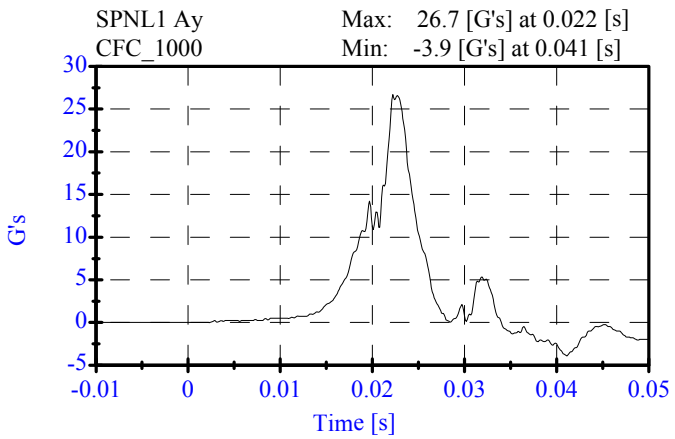
TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	18.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.32 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 G's	44.17 G's	Passed
Lower Rib Acceleration:	37.00-46.00 G's	41.60 G's	Passed
Lower Spine Acceleration:	15.00-22.00 G's	21.59 G's	Passed

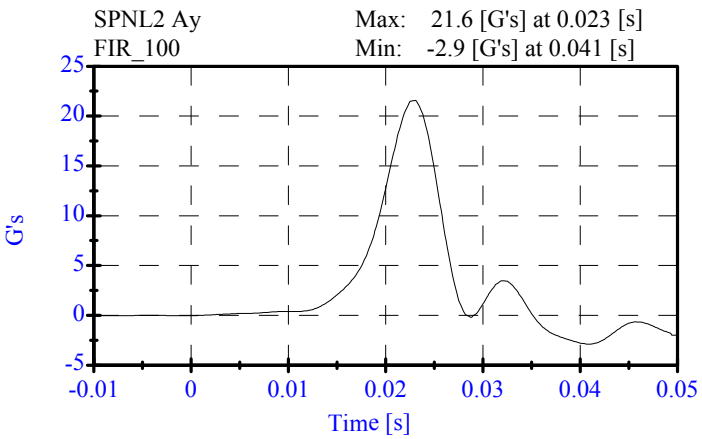












Pelvis Impact Test

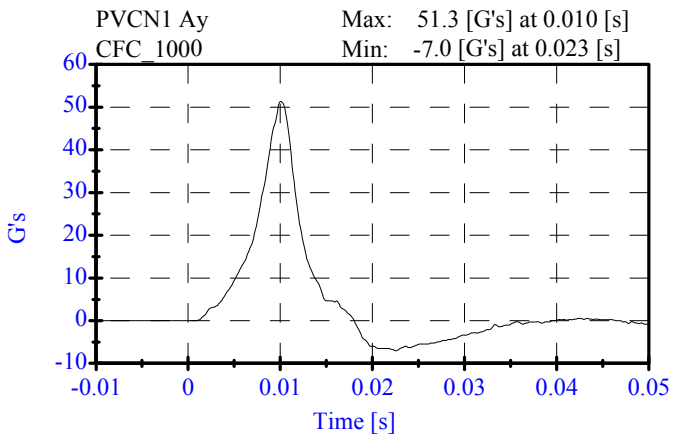
Pre-Test

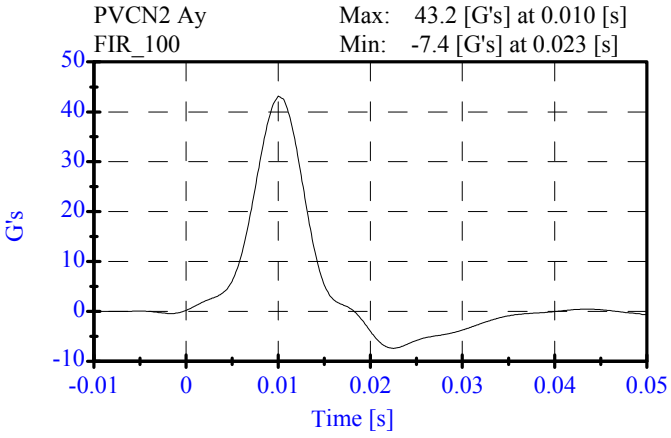
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905P 12-03-08

Date: 12-03-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	18.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.31 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 G's	43.20 G's	Passed
Time Above 20 Gs	3.0-7.0 ms	6.1 ms	Passed





Head Drop Test

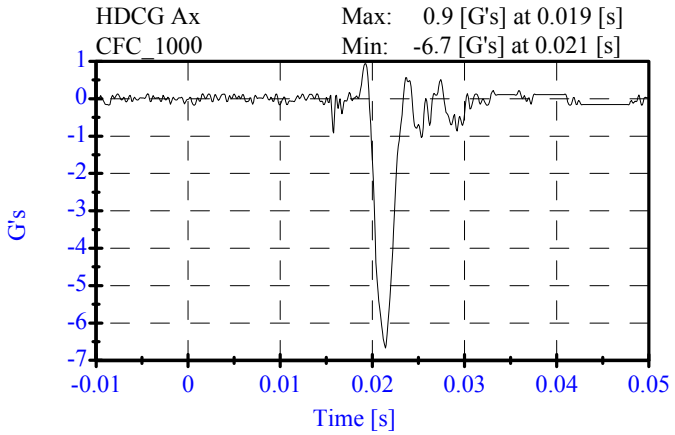
Pre-Test

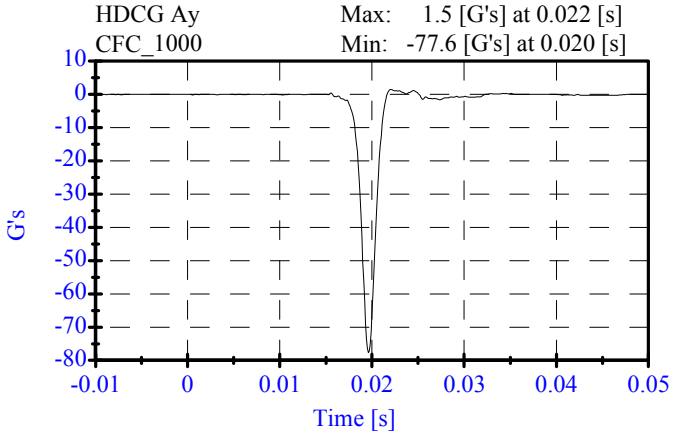
CONFIGURED FOR LEFT SIDE IMPACT

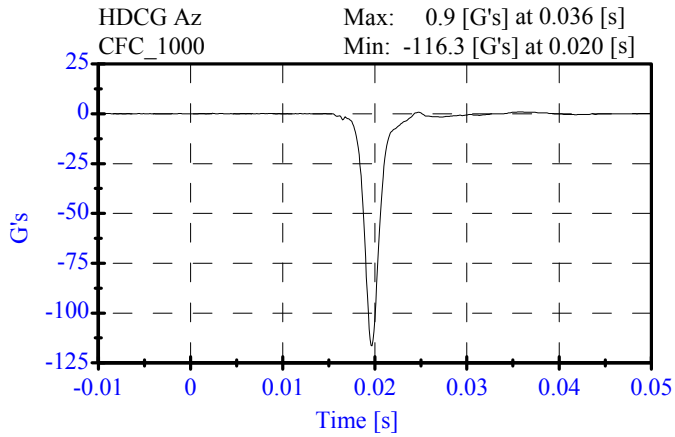
ATD Serial No: 905 Sequential Test Number: 1 File: 905H1 12-01-08

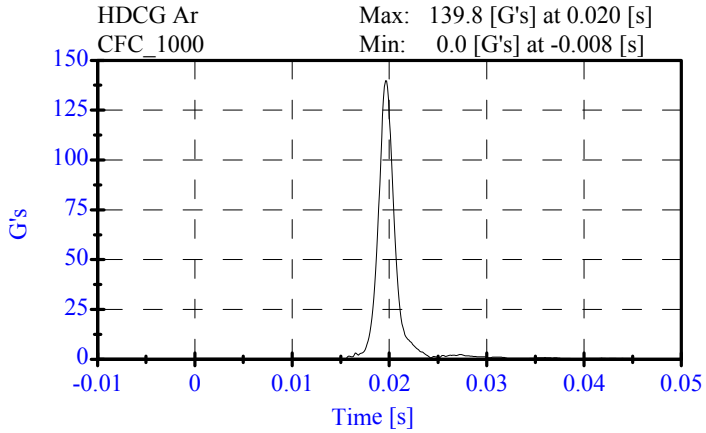
Date: 12-01-08 Laboratory Technician: A.Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.6 C	21.7 C	Passed
Lab Humidity:	10-70 %	23.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	139.79 Gs	Passed
Peak Longitudinal Accel.:	15 Gs Max	-6.7 Gs	Passed
Curve PerCent NonModal:	< 15%	1.71 %	Passed









Neck Flexion Test

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905N2 12-02-08

Date: 12-02-08 Laboratory Technician: A. Rudnski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	20.6-22.2 C	21.7 C	Passed
Lab Humidity:	10-70 %	18.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	7.00 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.08 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.35 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.18 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	7.61 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	73.71 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	58.00 ms	Failed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	84.78 N-m	Passed
Occiptal Moment Decay:	49.0-64.0 ms	56.30 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	12.00 ms	Passed

Neck Flexion Test

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

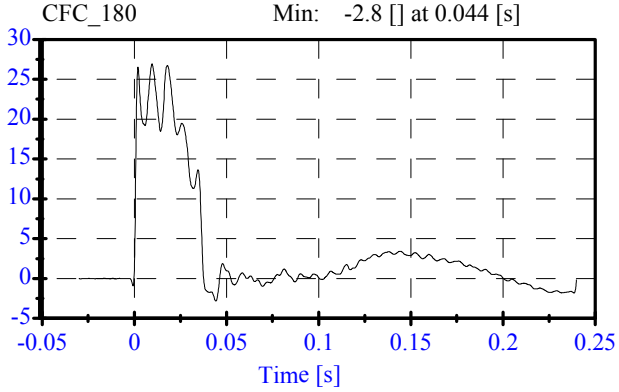
ATD Serial No: 905

Sequential Test Number: 1 File: 905N2 12-02-08

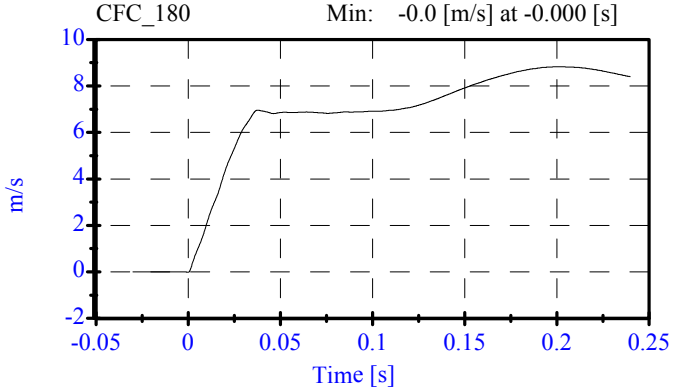
Date: 12-02-08

Laboratory Technician: A. Rudniski

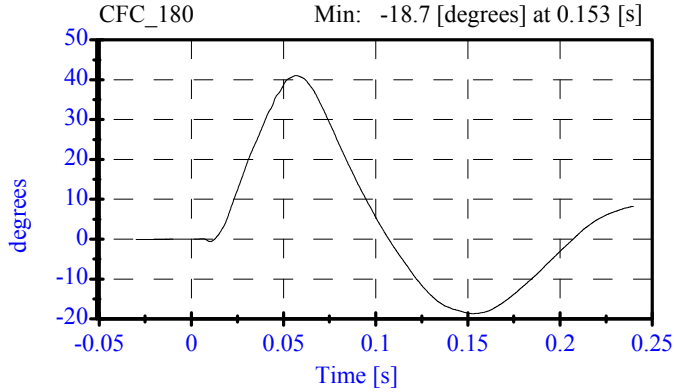
Pend Ax
CFC_180
Max: 27.0 [] at 0.010 [s]
Min: -2.8 [] at 0.044 [s]



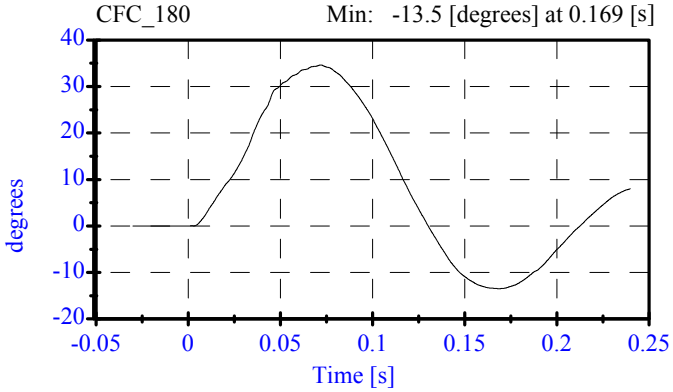
Pend Vx
CFC_180
Max: 8.8 [m/s] at 0.200 [s]
Min: -0.0 [m/s] at -0.000 [s]



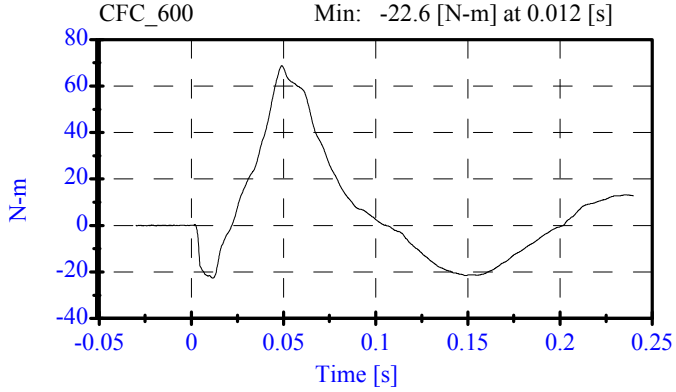
Head Rot
CFC_180
Max: 41.1 [degrees] at 0.057 [s]
Min: -18.7 [degrees] at 0.153 [s]



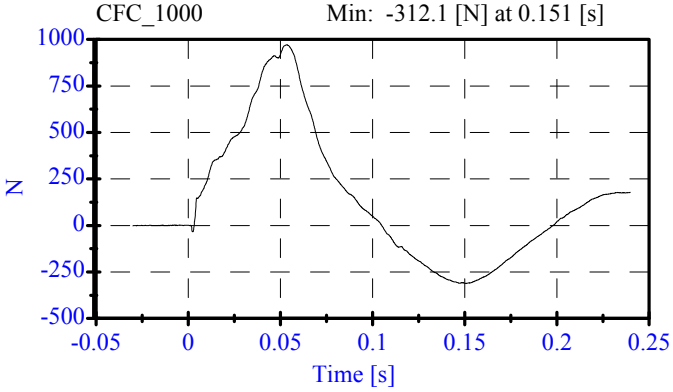
Arm Rot
CFC_180
Max: 34.6 [degrees] at 0.072 [s]
Min: -13.5 [degrees] at 0.169 [s]



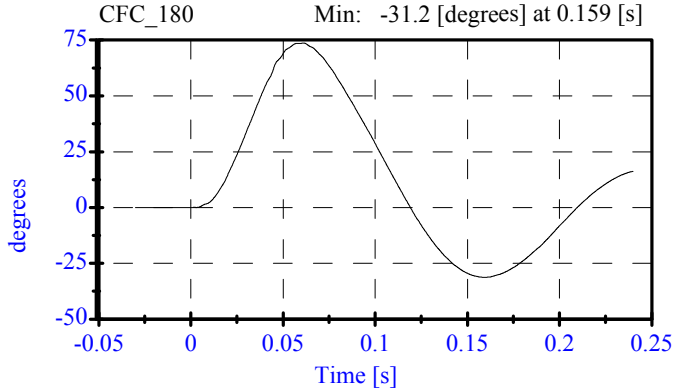
Neck Mx
CFC_600
Max: 68.8 [N-m] at 0.049 [s]
Min: -22.6 [N-m] at 0.012 [s]



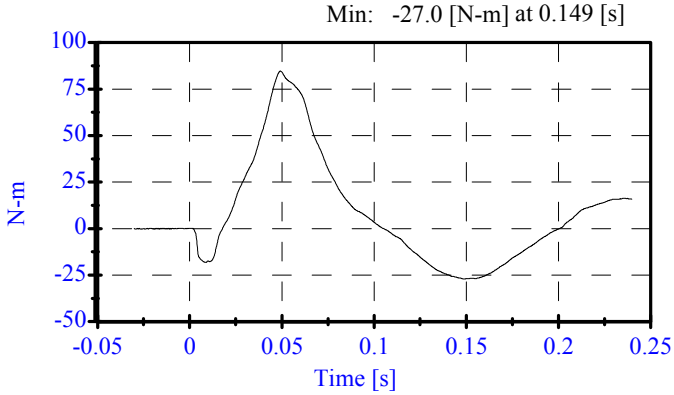
Neck Fy
CFC_1000
Max: 971.2 [N] at 0.053 [s]
Min: -312.1 [N] at 0.151 [s]



Tot Rot
CFC_180
Max: 73.7 [degrees] at 0.061 [s]
Min: -31.2 [degrees] at 0.159 [s]



MOCX
Max: 84.8 [N-m] at 0.049 [s]
Min: -27.0 [N-m] at 0.149 [s]



Abdominal Compression Test

Pre-Test

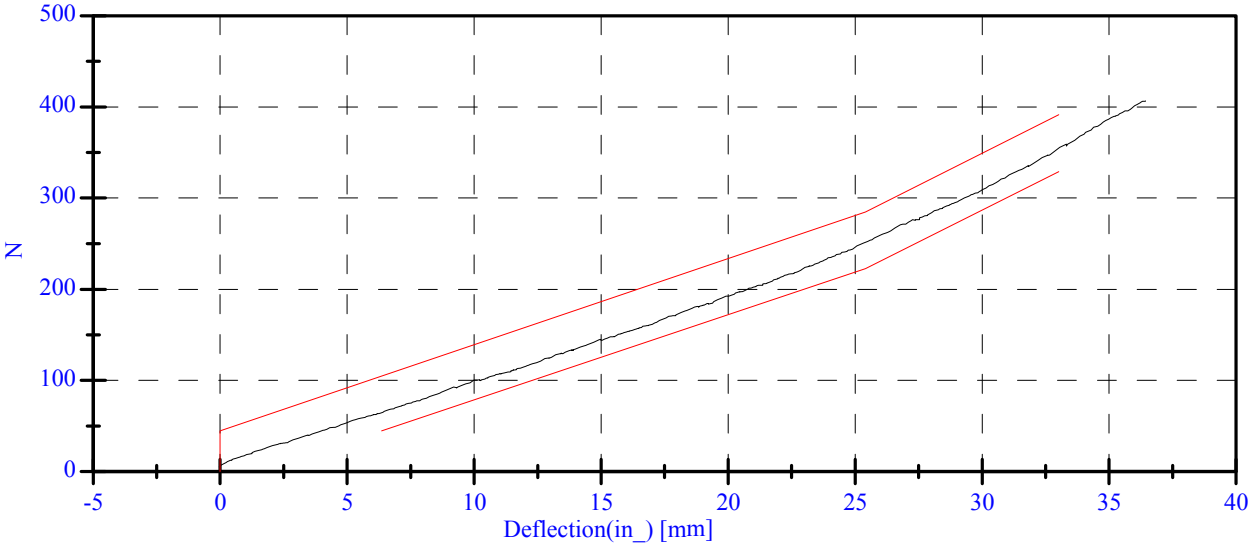
CONFIGURED FOR LEFT SIDE IMPACT

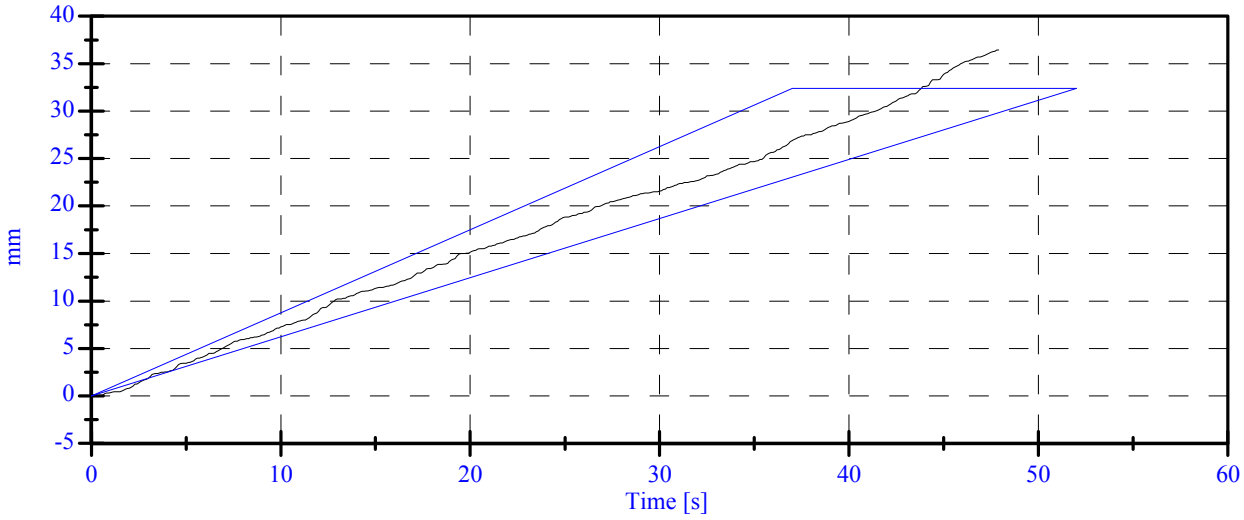
ATD Serial No: 905 Sequential Test Number: 1 File: 905 Ab 12-01-08

Date: 12-01-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	23.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	124.64 N	Passed
Force at 19.05 mm :	162.98-220.99 N	182.68 N	Passed
Force at 25.40 mm :	221.97-280.02 N	250.95 N	Passed
Force at 33.02 mm :	324.99-391.00 N	355.71 N	Passed

ABDOMINAL COMPRESSION TEST





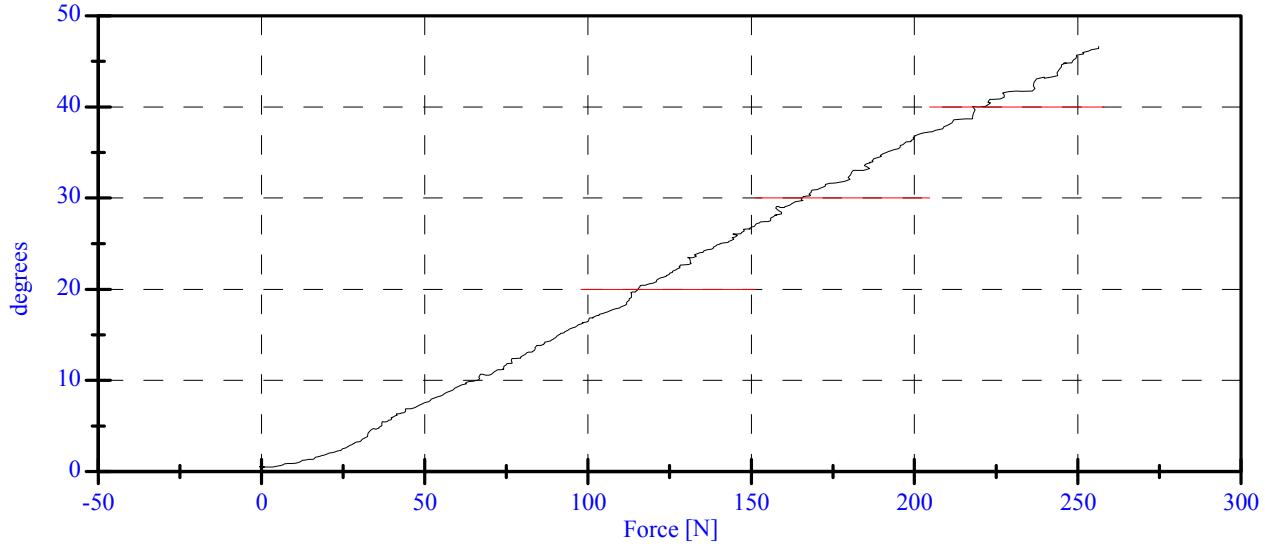
Lumbar Spine Test
Pre-Test

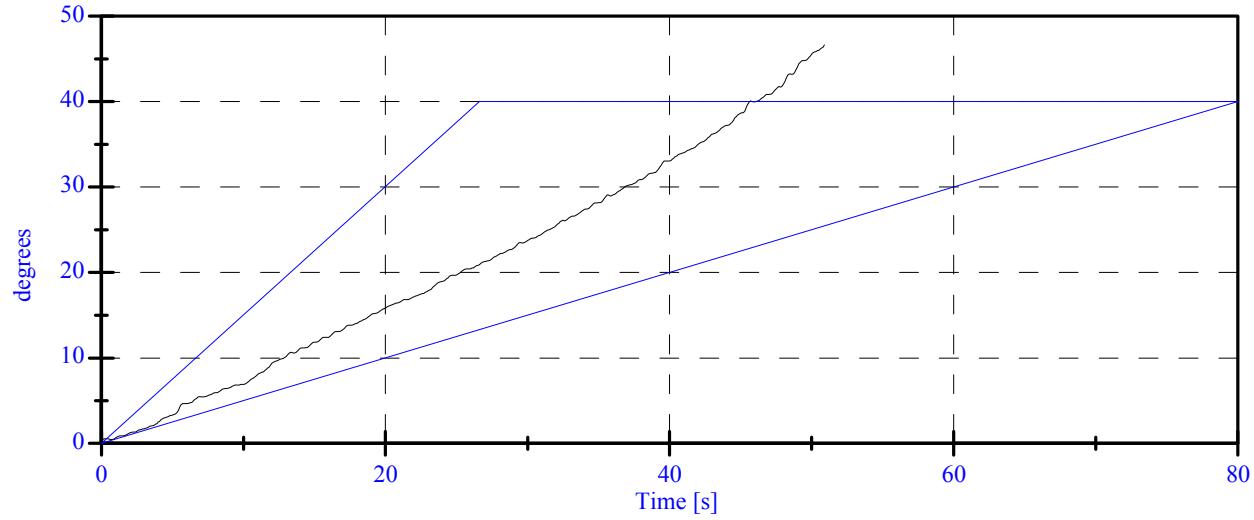
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905 Spine 12-04-08
Date: 12-04-08 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	23.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	0.78 N	Passed
Force at 20 Deg:	97.86-151.24 N	115.43 N	Passed
Force at 30 Deg	151.24-204.62 N	165.31 N	Passed
Force at 40 Deg	204.62-258.00 N	219.63 N	Passed
Return Angle	12 Deg Max	8.85 deg	Passed

LUMBAR SPINE FLEXION TEST





PRE-TEST DUMMY INSPECTION LIST

CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 12/1/08 Laboratory Technician: A. Rudniski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS

POST TEST

SID/HIII NO.: 905

CONFIGURED FOR LEFT SIDE IMPACT

CALIBRATION TEST RESULTS SUMMARY
POST TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 6/1/09 Laboratory Technician: A. Rudniski

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST	Passed all requirements.
LATERAL NECK BEND TEST	Passed all requirements.
ABDOMINAL COMPRESSION TEST	Passed all requirements.
LUMBAR FLEXION TEST	Passed all requirements.

REMARKS: None

EXTERNAL DIMENSIONS
POST TEST

CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 5/20/09 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	899
RH- Rib Height (mm)	502 - 520	511
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	239
KH- Knee Pivot from Back Line (mm)	511 - 526	521
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	384

REMARKS: None

Thorax Impact Test

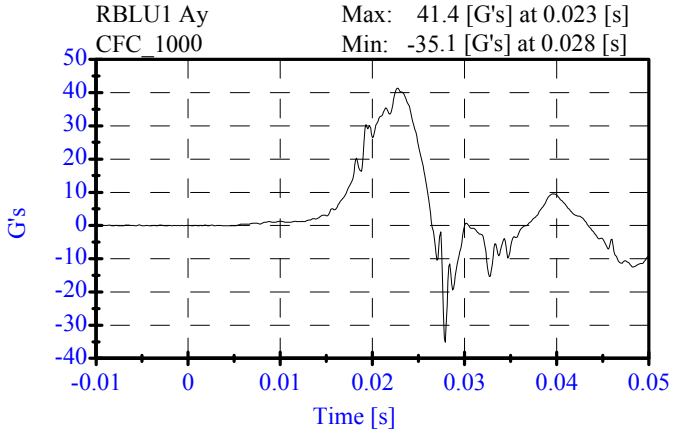
Post-Test

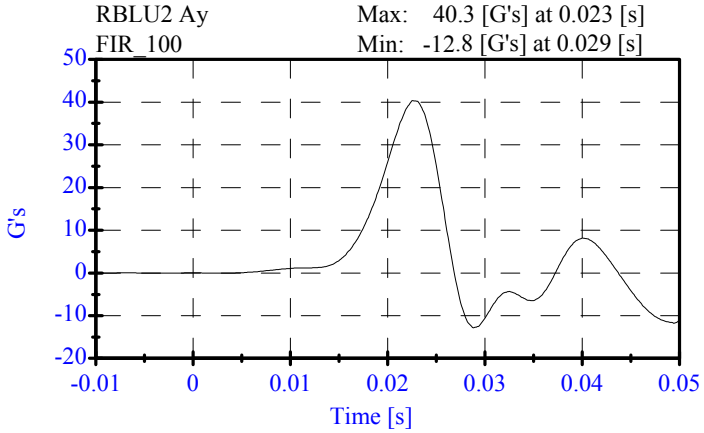
CONFIGURED FOR LEFT SIDE IMPACT

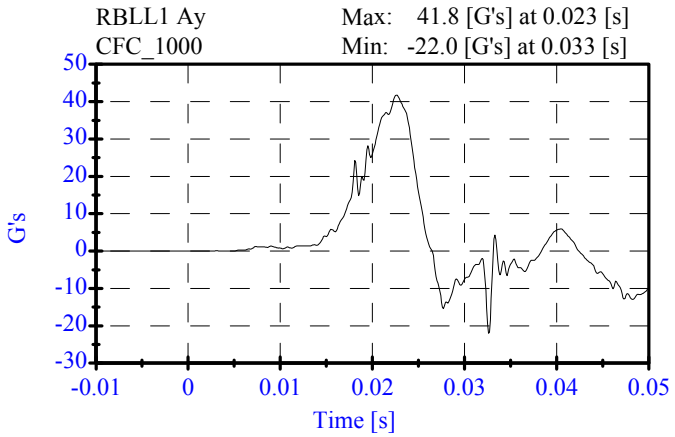
ATD Serial No: 905 Sequential Test Number: 1 File: 905T1 05-29-09

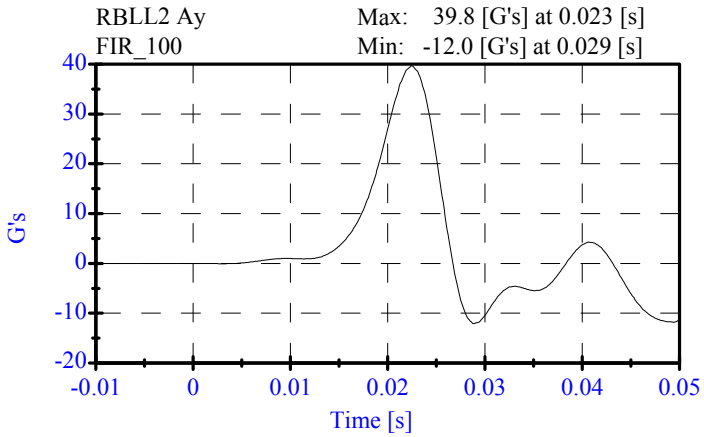
Date: 05-29-09 Laboratory Technician: A. Rudniski

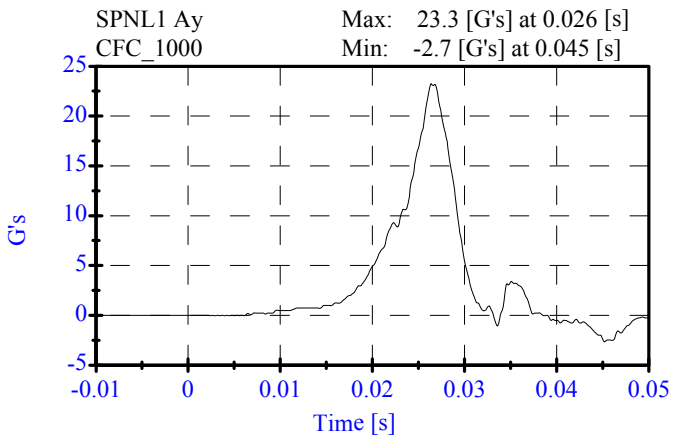
TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	55.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.31 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 G's	40.33 G's	Passed
Lower Rib Acceleration:	37.00-46.00 G's	39.78 G's	Passed
Lower Spine Acceleration:	15.00-22.00 G's	20.83 G's	Passed

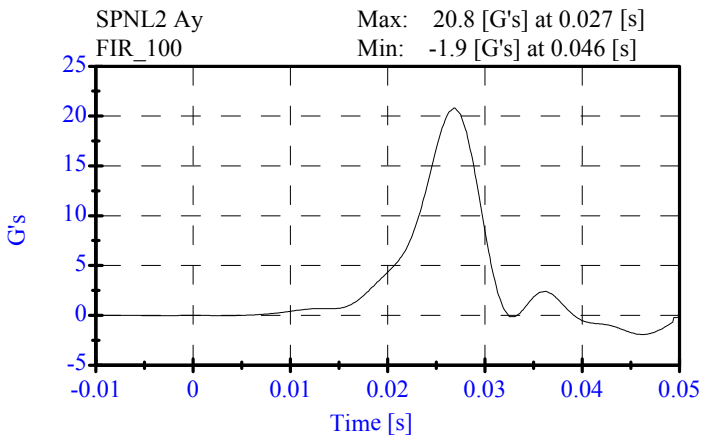












Pelvis Impact Test

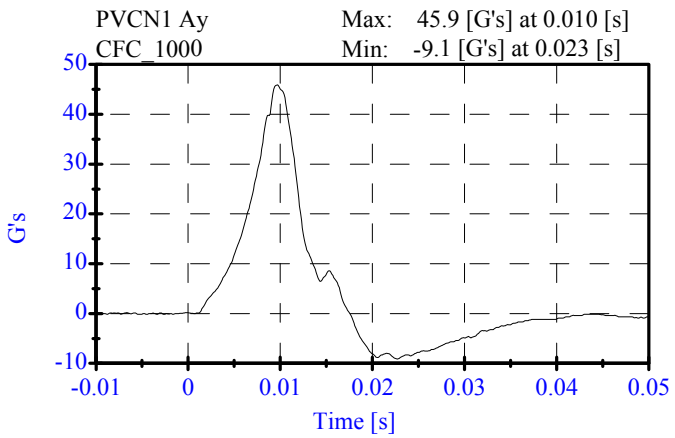
Post-Test

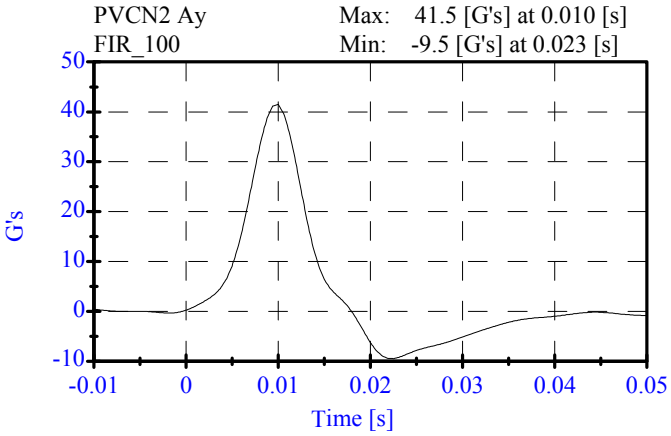
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905P 05-29-09

Date: 05-29-09 Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	54.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.30 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 G's	41.50 G's	Passed
Time Above 20 Gs	3.0-7.0 ms	6.4 ms	Passed





Head Drop Test

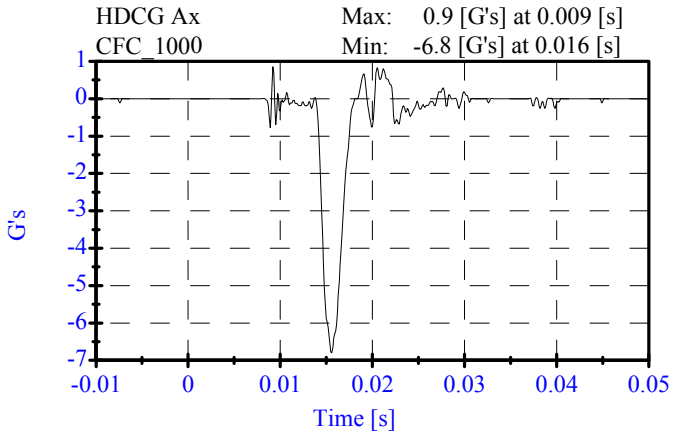
Post-Test

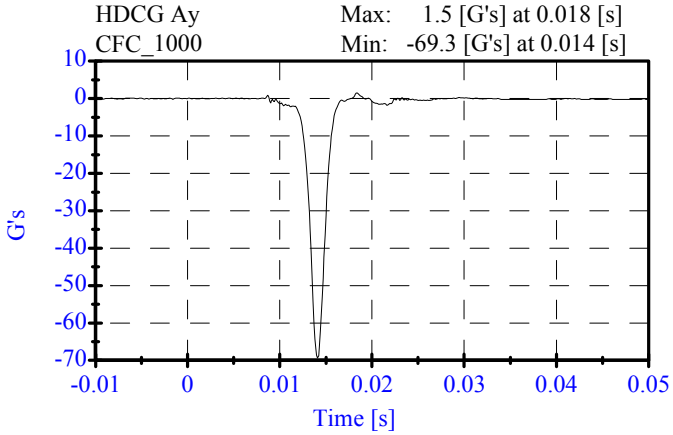
CONFIGURED FOR LEFT SIDE IMPACT

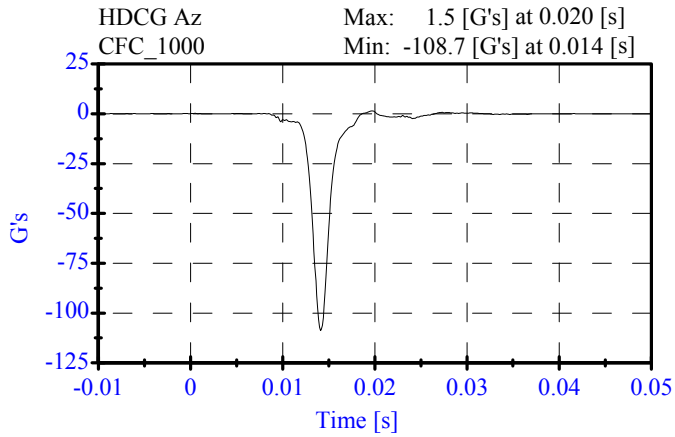
ATD Serial No: 905 Sequential Test Number: 1 File: 905H2 05-20-09

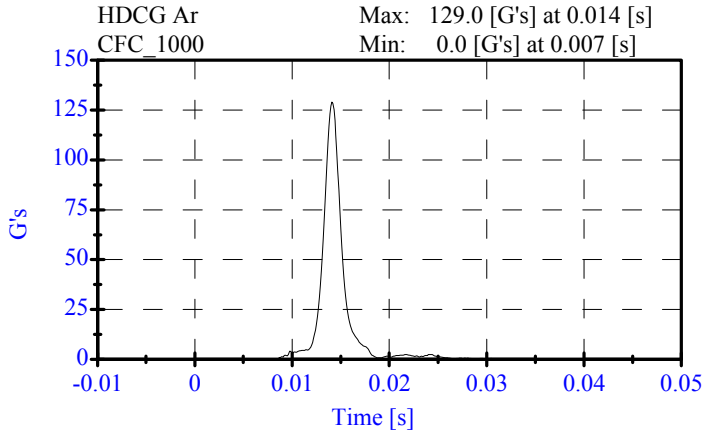
Date: 05-20-09 Laboratory Technician: A.Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.6 C	22.2 C	Passed
Lab Humidity:	10-70 %	24.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	128.96 Gs	Passed
Peak Longitudinal Accel.:	15 Gs Max	-6.8 Gs	Passed
Curve PerCent NonModal:	< 15%	1.93 %	Passed









Neck Flexion Test

Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 905 Sequential Test Number: 1 File: 905N 09-15-09

Date: 09-15-09 Laboratory Technician: A. Rudnski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	61.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	7.00 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.05 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.25 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.08 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	7.49 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	73.30 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	61.50 ms	Passed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	77.85 N-m	Passed
Occiptal Moment Decay:	49.0-64.0 ms	60.00 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	11.20 ms	Passed

Neck Flexion Test

Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

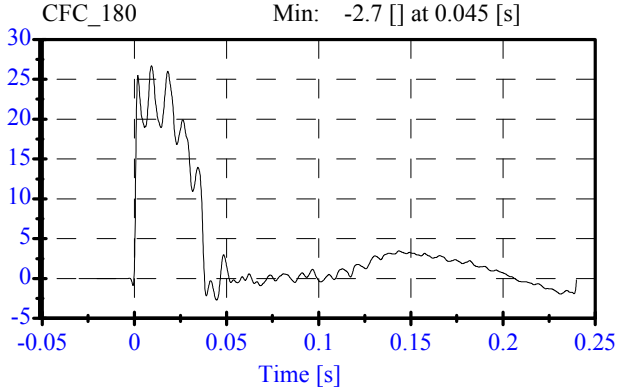
ATD Serial No: 905

Sequential Test Number: 1 File: 905N 09-15-09

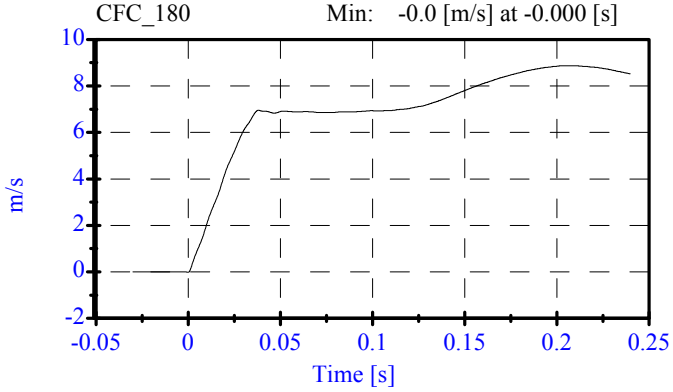
Date: 09-15-09

Laboratory Technician: A. Rudniski

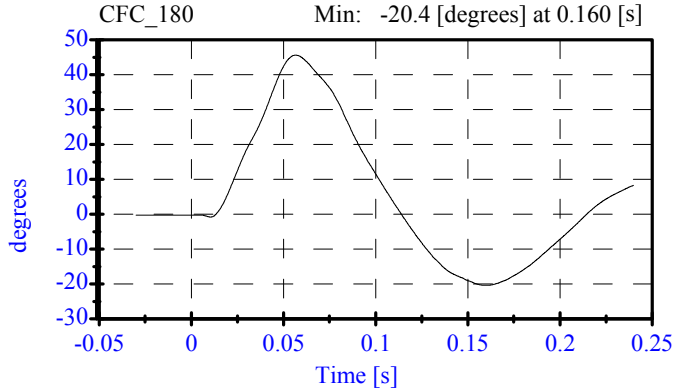
Pend Ax
CFC_180
Max: 26.7 [] at 0.009 [s]
Min: -2.7 [] at 0.045 [s]



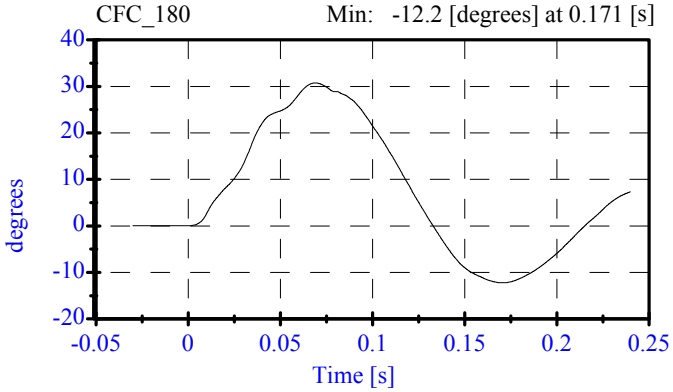
Pend Vx
CFC_180
Max: 8.9 [m/s] at 0.206 [s]
Min: -0.0 [m/s] at -0.000 [s]



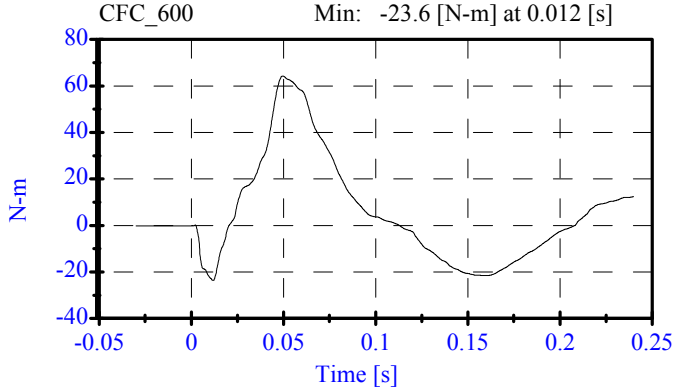
Head Rot
CFC_180
Max: 45.6 [degrees] at 0.057 [s]
Min: -20.4 [degrees] at 0.160 [s]



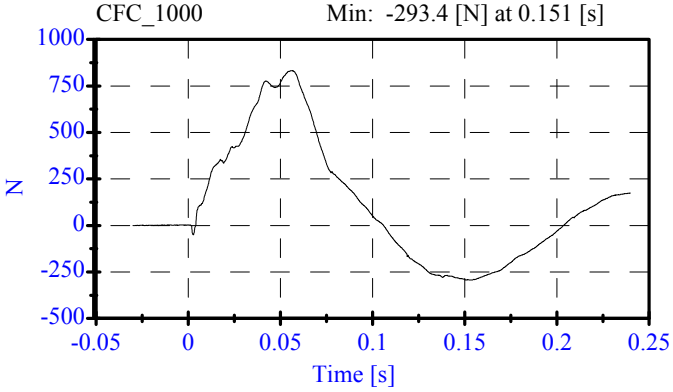
Arm Rot
CFC_180
Max: 30.7 [degrees] at 0.069 [s]
Min: -12.2 [degrees] at 0.171 [s]



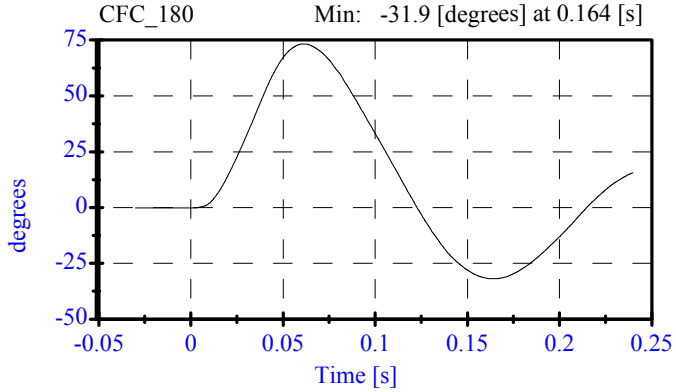
Neck Mx
CFC_600
Max: 64.3 [N-m] at 0.050 [s]
Min: -23.6 [N-m] at 0.012 [s]



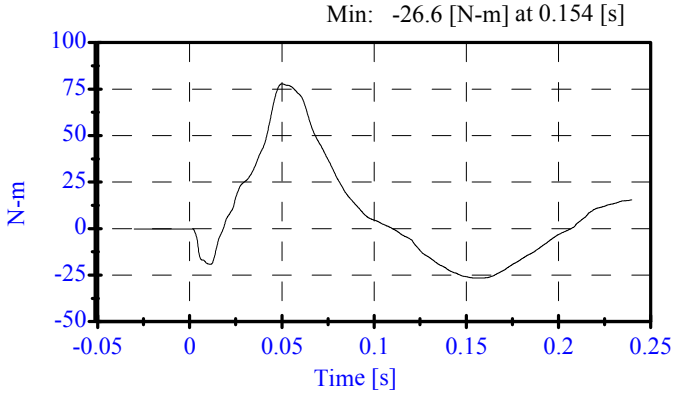
Neck Fy
CFC_1000
Max: 832.1 [N] at 0.056 [s]
Min: -293.4 [N] at 0.151 [s]



Tot Rot
CFC_180
Max: 73.3 [degrees] at 0.061 [s]
Min: -31.9 [degrees] at 0.164 [s]



MOCX
Max: 77.9 [N-m] at 0.050 [s]
Min: -26.6 [N-m] at 0.154 [s]



Abdominal Compression Test
Post-Test

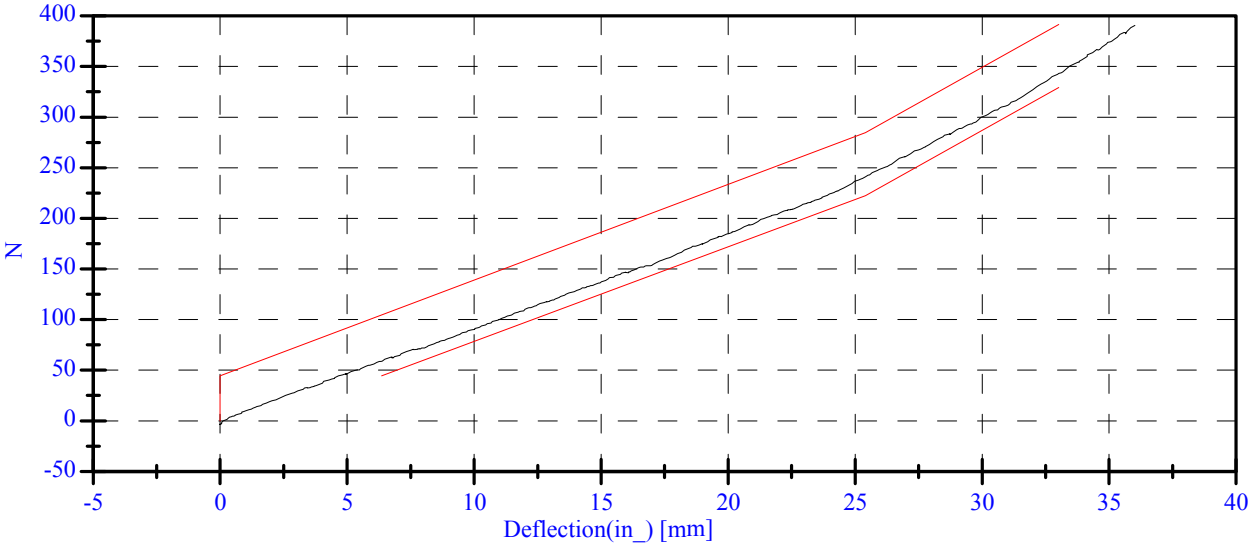
CONFIGURED FOR LEFT SIDE IMPACT

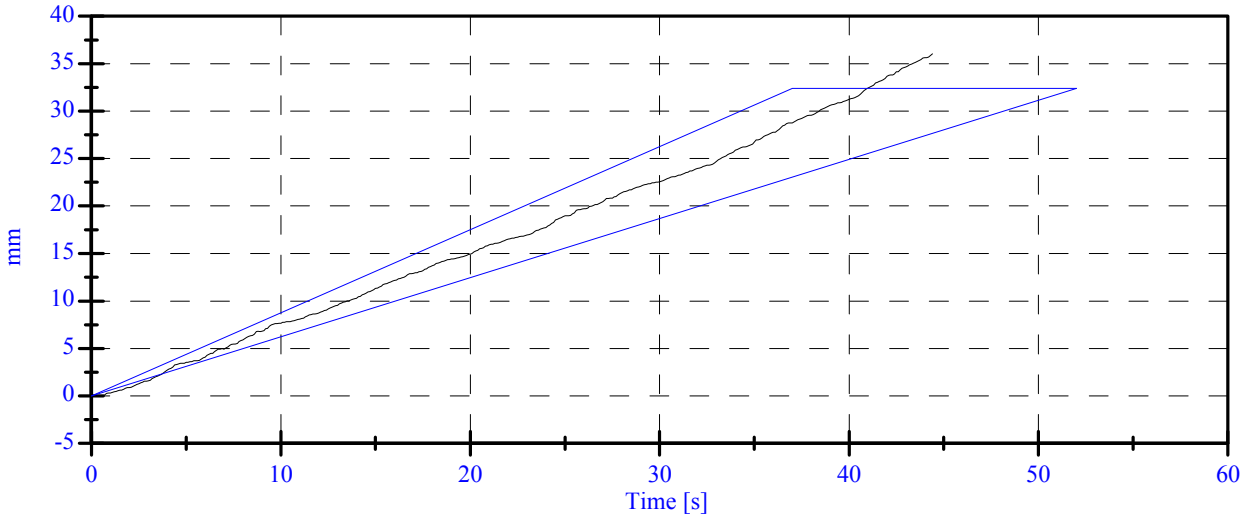
ATD Serial No: 269
Date: 05-21-09

Sequential Test Number: 1 File: 905Ab 05-21-09
Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	28.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	118.11 N	Passed
Force at 19.05 mm :	162.98-220.99 N	174.98 N	Passed
Force at 25.40 mm :	221.97-280.02 N	240.97 N	Passed
Force at 33.02 mm :	324.99-391.00 N	343.04 N	Passed

ABDOMINAL COMPRESSION TEST





Lumbar Spine Test
Post-Test

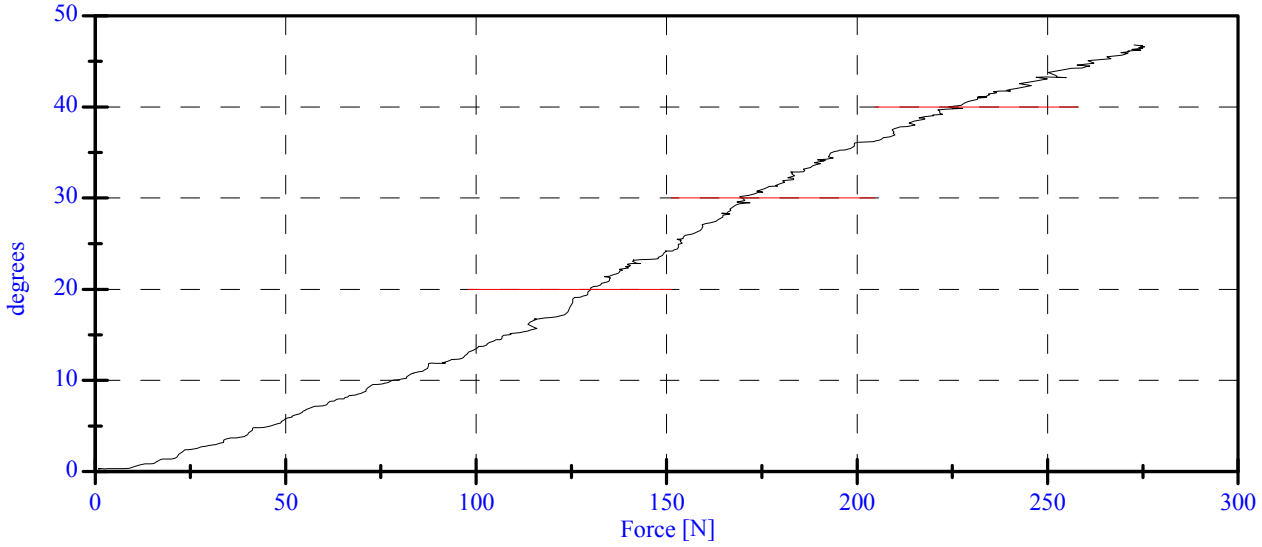
CONFIGURED FOR LEFT SIDE IMPACT

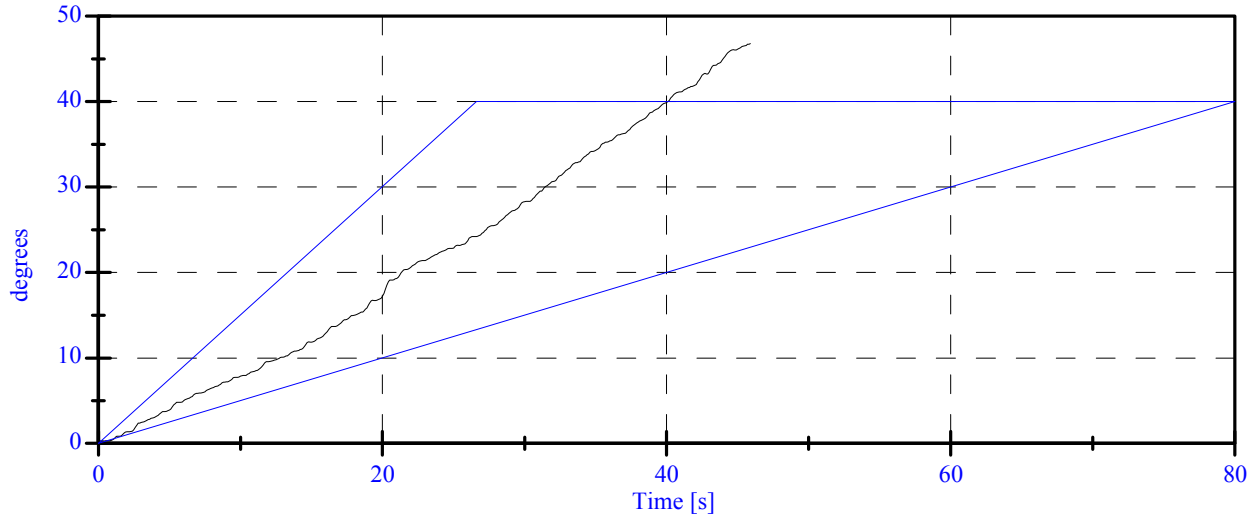
ATD Serial No: 905
Date: 06-01-09

Sequential Test Number: 1 File: 905 Spine 06-01-09
Laboratory Technician: A. Rudniski

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	31.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	1.30 N	Passed
Force at 20 Deg:	97.86-151.24 N	130.05 N	Passed
Force at 30 Deg	151.24-204.62 N	170.01 N	Passed
Force at 40 Deg	204.62-258.00 N	224.07 N	Passed
Return Angle	12 Deg Max	8.93 deg	Passed

LUMBAR SPINE FLEXION TEST





POST TEST DUMMY INSPECTION LIST

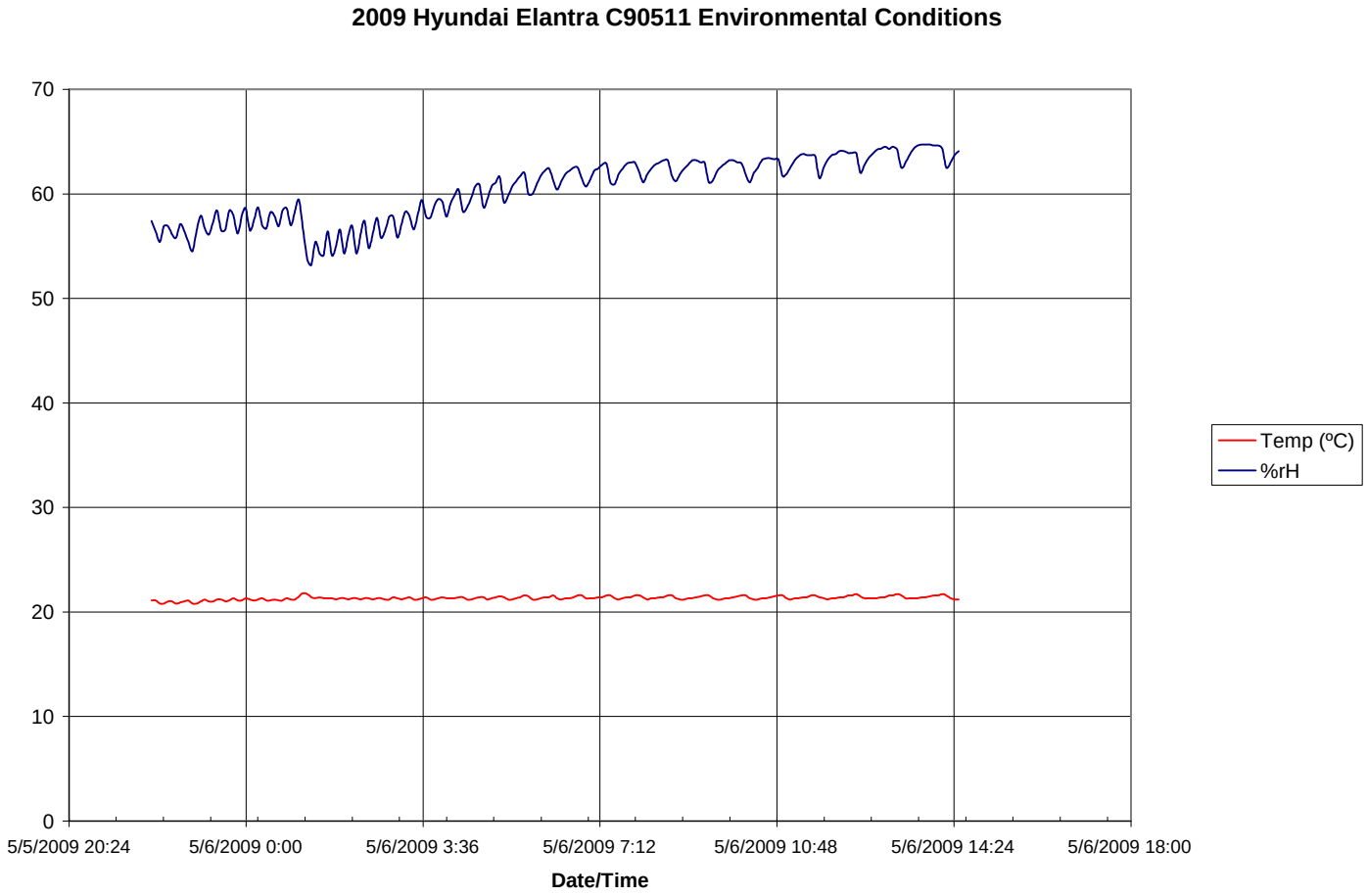
CONFIGURED FOR LEFT SIDE IMPACT

SID/HIII Serial No.: 905 Sequential Test Number: 1
Date: 5/20/09 Laboratory Technician: A. Rudniski

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

TEMPERATURE TRACE



APPENDIX D

TEST EQUIPMENT AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

SID/HIII INSTRUMENTATION

	SID/HIII NO.: 905		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-P58757	ENDEVCO	25-Feb-09
HEAD AY	AC-P58911	ENDEVCO	25-Feb-09
HEAD AZ	AC-P58887	ENDEVCO	25-Feb-09
HEAD AX (REDUNDANT)	AC-P58791	ENDEVCO	25-Feb-09
HEAD AY (REDUNDANT)	AC-P58888	ENDEVCO	25-Feb-09
HEAD AZ (REDUNDANT)	AC-P58904	ENDEVCO	25-Feb-09
UPPER NECK FX	LC-1647Fx	DENTON	20-Apr-09
UPPER NECK FY	LC-1647Fy	DENTON	20-Apr-09
UPPER NECK FZ	LC-1647Fz	DENTON	20-Apr-09
UPPER NECK MX	LC-1647Mx	DENTON	20-Apr-09
UPPER NECK MY	LC-1647My	DENTON	20-Apr-09
UPPER NECK MZ	LC-1647Mz	DENTON	20-Apr-09
UPPER RIB	AC-P59010	ENDEVCO	27-Feb-09
LOWER RIB	AC-P58981	ENDEVCO	27-Feb-09
LOWER SPINE	AC-P59017	ENDEVCO	27-Feb-09
PELVIS	AC-P58788	ENDEVCO	27-Feb-09
UPPER RIB REDUNDANT	AC-P58981	ENDEVCO	27-Feb-09
LOWER RIB REDUNDANT	AC-P59017	ENDEVCO	27-Feb-09
LOWER SPINE REDUNDANT	AC-P58788	ENDEVCO	27-Feb-09
PELVIS REDUNDANT	AC-P59019	ENDEVCO	27-Feb-09

REMARKS: None

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

VEHICLE INSTRUMENTATION

	VEHICLE AND MDB INSTRUMENTS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
VEHICLE CG (AX)	AC-A13829	ENDEVCO	03-Apr-09
VEHICLE CG (AY)	AC-P35793	ENDEVCO	03-Apr-09
VEHICLE CG (AZ)	AC-P16841	ENDEVCO	03-Apr-09
VEHICLE CG RATE (VX)	ARS-0323	ATA	05-Oct-08
VEHICLE CG RATE (VY)	ARS-0336	ATA	05-Oct-08
VEHICLE CG RATE (VZ)	ARS-0321	ATA	05-Oct-08
STRUCK SIDE SILL (AY)	AC-P17242	ENDEVCO	27-Feb-09
A-PILLAR SILL (AY)	AC-APF89	ENDEVCO	27-Feb-09
A-PILLAR LOWER (AY)	AC-P18785	ENDEVCO	27-Feb-09
A-PILLAR MIDDLE (AY)	AC-P16862	ENDEVCO	27-Feb-09
B-PILLAR SILL (AY)	AC-P32204	ENDEVCO	02-Mar-09
B-PILLAR LOWER (AY)	AC-P23873	ENDEVCO	02-Mar-09
B-PILLAR MIDDLE (AY)	AC-P16576	ENDEVCO	27-Feb-09
SEAT TRACK HP (AY)	AC-P26269	ENDEVCO	27-Feb-09
DOOR LOWER (AY)	AC-P16645	ENDEVCO	03-Mar-09
DOOR MIDDLE (AY)	AC-J25745	ENDEVCO	03-Mar-09
DOOR UPPER (AY)	AC-P13323	ENDEVCO	27-Feb-09
ENGINE (AX)	AC-P35803	ENDEVCO	02-Mar-09
ENGINE (AY)	AC-P35811	ENDEVCO	02-Mar-09
FIREWALL (AY)	AC-P18639	ENDEVCO	02-Mar-09
OPPOSITE SIDE ROOF (AY)	AC-J37854	ENDEVCO	02-Mar-09
OPPOSITE SIDE SILL (AY)	AC-P19359	ENDEVCO	27-Feb-09
TRUNK (AX)	AC-P23885	ENDEVCO	02-Mar-09
TRUNK (AY)	AC-P16671	ENDEVCO	02-Mar-09

REMARKS: None