

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE AIRBAG OUT-OF-POSITION TEST**

**NISSAN MOTOR CO., LTD.
2020 NISSAN SENTRA 4-DOOR SEDAN**

NHTSA NUMBER: M20205210TWG3

**PREPARED BY:
APPLUS+ IDIADA KARCO ENGINEERING, LLC.
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ADELANTO, CA 92301**

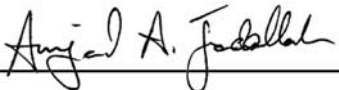


SEPTEMBER 14, 2020

FINAL REPORT

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OFFICE OF CRASHWORTHINESS STANDARDS
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Approval Date: September 14, 2020

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NHTSA, Office of Crashworthiness Standards

Date: _____

COR, New Car Assessment Program
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16. Abstract A side airbag out of position test was conducted on the subject 2020 Nissan Sentra 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards SAB OOP NCAP Laboratory Test Procedure for the generation of consumer information on vehicle side airbag protection. The test was conducted at the Applus+ IDIADA KARCO Engineering, LLC. facility in Adelanto, California on August 28, 2020. The curtain and torso/pelvis side airbags were deployed and responses were measured on a Hybrid III 3-year old child dummy. Three high speed cameras, and one real time camera recorded the event. The ambient temperature at the time of airbag deployment was 21.1°C																							
Section 3.3.3.3 - HIII 3-Year Old Dummy - P3																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 35%;">Measurement Description</th> <th style="width: 10%;">Units</th> <th style="width: 20%;">IARV</th> <th style="width: 35%;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>723</td> <td>330.1</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.45</td> </tr> <tr> <td>Upper Neck Tension</td> <td>N</td> <td>1490</td> <td>326.9</td> </tr> <tr> <td>Upper Neck Compression</td> <td>N</td> <td>1820</td> <td>-584.3</td> </tr> </tbody> </table>				Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₁₅)	N/A	723	330.1	Nij	N/A	1	0.45	Upper Neck Tension	N	1490	326.9	Upper Neck Compression	N	1820	-584.3
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17. Key Words New Car Assessment Program (NCAP) Side Airbag Out-of-position (OOP) Technical Working Group (TWG)		18. Distribution Statement Copies of this report are available from the following: National Highway Traffic Safety Administration Technical Information Services 1200 New Jersey Ave, SE Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833																					
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This occupant out-of-position static side airbag deployment test is part of the Technical Working Group Occupant Injury Risk from Deploying Side Airbags Testing Program sponsored by Alpha Technology Associate, Inc. under Contract No. DTNH22-13-D-00311L. The purpose of this test was to obtain occupant injury data for a side airbag deployment.

The occupant out-of-position (OOP) side airbag test was conducted in accordance with the Technical Working Group Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

SUMMARY

The effects of a roof mounted curtain airbag and a seat mounted torso/pelvis airbag deployment in a 2020 Nissan Sentra 4-Door Sedan with an out-of-position Hybrid III 3-year old crash test dummy were evaluated. The test was performed at Applus+ IDIADA KARCO Engineering, LLC. on August 28, 2020. Pre- and post-test photographs of the vehicle and dummy can be found in Appendix A.

Three (3) high-speed digital cameras and one (1) real time camera were used to document the deployment of the airbags. Camera locations and other pertinent camera information can be found on Data Sheet No.1 and Data Sheet No.6.

A Hybrid III 3-year old anthropomorphic test device (ATD) was placed in the right rear passenger seating position with the ATD lying across the seat with the head on door panel trim. The Center of Gravity of the ATD's head was placed such that it crosses the vertical centerline of the airbag module installed in the seatback. A foam wedge was placed on the outboard portion of the seat as shown in Figure 3.3.3.3.1 in the July 2003 Revision of the Technical Working Group's 'Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags'.

The Hybrid III 3-year old ATD was instrumented with head tri-axial accelerometers, upper and lower neck force, and moment transducers.

The airbags were deployed and fifteen (15) channels of data were recorded using a data acquisition system. Appendix B contains dummy response data traces. Appendix C contains the instrumentation data channel assignments. Appendix D contains ATD calibration sheets.

Orientation of the Hybrid III 3-year old dummy was with the dummy facing inboard. The center of gravity of the head was centered in the deployment trajectory of the airbag. This orientation complies with section 3.3.3.3 of the Technical Working Group (TWG) recommendation in the Recommended procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags.

The passenger side door remained closed during the test and was operable after the airbag deployed.

The Hybrid III 3 year old dummy's visible contact points were as follows: The ATD's head contacted the Torso/Pelvis Airbag.

The occupant data is summarized below:

Measurement Description	Units	Passenger ATD H3 3Y Old	
		IARV	Result
Head Injury Criteria (HIC15)	N/A	723	330.1
Upper Neck Nij	N/A	1	0.45
Upper Neck Peak Tension	N	1490	326.9
Upper Neck Peak Compression	N	1820	-584.3

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No.: M20205210TWG3
Test Program: TWG 3.3.3.3 Test Date: 08/28/20

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in ²	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

DATA SHEET NO. 1

TEST SUMMARY

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan

NHTSA No.: M20205210TWG3

Test Program: TWG 3.3.3.3

Test Date: 08/28/20

TEST DUMMY INFORMATION

Description	Passenger Seat
Dummy Type / Serial No.	3 Year Old / 044
Head Contact	Torso/Pelvis Airbag
Chest Contact	N/A
Abdomen Contact	N/A
Pelvis Contact	N/A
Left Knee Contact	N/A
Right Knee Contact	N/A

VIDEO COVERAGE

Description	Quantity
High Speed Digital	2
Real Time	1
Total	3

DATA CHANNELS

Description	Quantity
Head Accelerometers	3
Upper Neck Transducers	6
Lower Neck Transducers	6
Total	15

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No.: M20205210TWG3
 Test Program: TWG 3.3.3.3 Test Date: 08/28/20

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20205210TWG3
Model Year	2020
Make	Nissan
Model	Sentra
Body Style	4-Door Sedan
VIN	3N1AB8V7LY216446
Body Color	Gun Metallic
Odometer Reading (km / mi)	77 / 48
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	Yes
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	No

Does Owner's Manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co., Ltd.
Date of Manufacture	01/20
Vehicle Type	Passenger Car

GVWR (kg)	1795
GAWR Front (kg)	960
GAWR Rear (kg)	840

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				400.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				59.8

A
B
A-B

*Vehicle underwent New Car Assessment Program Side Pole Impact Testing on May 13, 2020.

DATA SHEET NO. 2 ... (CONTINUED)

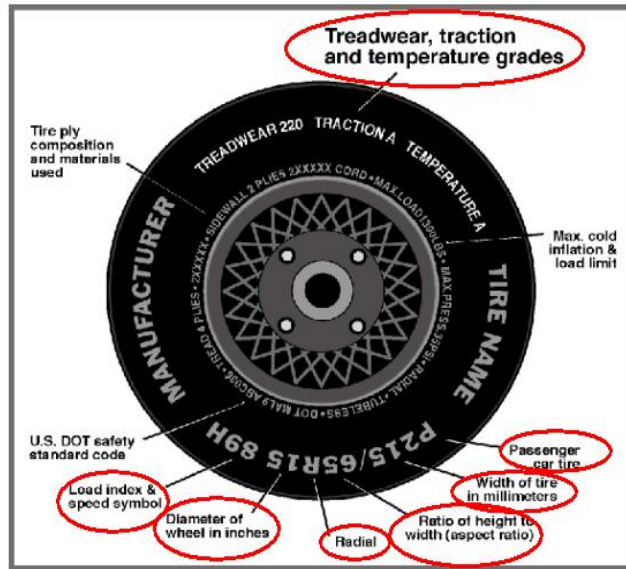
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan

NHTSA No.: M20205210TWG3

Test Program: TWG 3.3.3.3

Test Date: 08/28/20



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	205/60R16	205/60R16
Tire Size on Vehicle	205/60R16	205/60R16
Tire Manufacturer	Firestone	Firestone
Tire Model	FT 140	FT 140
Treadware	560	560
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	92H	92H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	1V6 XWFT01 3219	1V6 XWFT01 3219
DOT Safety Code Right	1V6 XWFT01 3219	1V6 XWFT01 3219

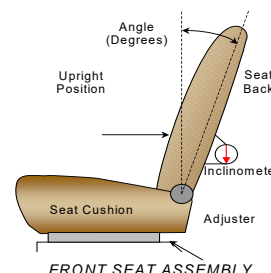
DATA SHEET NO. 3
SEAT ADJUSTMENTS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
Test Program: TWG 3.3.3.3

NHTSA No.: M20205210TWG3
Test Date: 08/28/20

SEAT BACK ANGLE

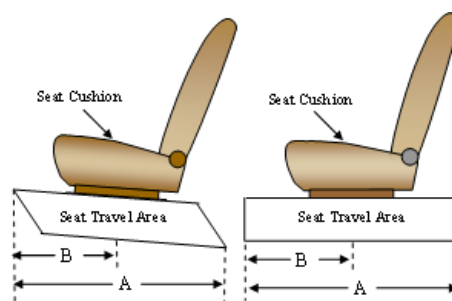
The right rear passenger seat back is positioned per section 3.3.3.3 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. The Seat back angle was fixed and measured along the seatback length.



Seating Position	Degrees
Passenger Seat	26.7

SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.3.3 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. The first or forward most position is counted as zero (0)



Seating Position	Total Fore-Aft Travel		Placed in Position	
	mm	Detents	mm	Detents
Passenger Seat	Fixed	Fixed	Fixed	Fixed

SEAT BELT UPPER ANCHORAGE

Position "H" is the uppermost position, followed by position "M1". Position "L" is the lowermost position.

Seating Position	Total No. of Positions	Placed in Position
Passenger Seat	Fixed	

DATA SHEET NO. 4

DUMMY POSITIONING AND AIRBAG DIMENSIONS

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No.: M20205210TWG3
 Test Program: TWG 3.3.3.3 Test Date: 08/28/20

DUMMY POSITIONING

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		26.7
AN	Top of Airbag Module to Head/Neck Junction	100	90.0
HD	Head CG to Door Panel/ Window	110	0.0
HSC	Head to Seat Back Centerline	175	0.0
HB	Head to B-Pillar (measured from bridge of nose)	520	0.0
HZ	Head to Roof (Z)	526	90.0
HHD	Head to Side Header		
ND	Nose to Dash		
NS	Nose to Seat Back	230	0.0
NR	Nose to Header		
CD	Chest to Dash		
CS	Chest to Seat Back (measured to centerline)	205	0.0
RACL	Right Arm to Seat Back Centerline	200	0.0
LACL	Left Arm to Seat Back Centerline	125	0.0
RA	Right Arm to Door Panel	190	0.0
LA	Left Arm to Door Panel	190	0.0
KK	Knee to Knee	100	0.0
TT	Toe to Toe	95	0.0
KSCR	Right Knee to Seat Cushion Centerline	210	0.0
KSCL	Left Knee to Seat Cushion Centerline	205	0.0
	Head Level (X Direction)		26.1
	Head Level (Y Direction)		0.7

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	30
AML	Curtain Airbag Module Length	320
ABW	Curtain Airbag Width	1860
ABL	Curtain Airbag Length	460
AMW	Torso/Pelvis Airbag Module Diameter	30
AML	Torso/Pelvis Airbag Module Length	160
ABW	Torso/Pelvis Airbag Width	460
ABL	Torso/Pelvis Airbag Length	260

DATA SHEET NO. 5

DUMMY INJURY CRITERIA AND PERFORMANCE DATA

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No.: M20205210TWG3
 Test Program: TWG 3.3.3.3 Test Date: 08/28/20

HEAD PEAK ACCELERATIONS / CHEST DEFLECTIONS						
Location	Axis	Units	Hybrid III 3-Year Old			
			Max	Time	Min	Time
Head CG	X	g	67.1	6.0	-3.8	31.6
Head CG	Y	g	161.0	6.1	-5.7	27.4
Head CG	Z	g	66.7	6.1	-7.8	8.1
Head CG Resultant	N/A	g	184.9	6.1		

UPPER NECK PEAK FORCES AND MOMENTS						
Location	Axis	Units	Hybrid III 3-Year Old			
			Max	Time	Min	Time
Neck Force	X	N	154.7	8.3	-131.1	7.6
Neck Force	Y	N	5.8	85.4	-506.2	14.8
Neck Force	Z	N	326.9	16.4	-584.3	8.2
Neck Force Resultant	N/A	N	672.3	8.2		
Neck Moment	X	Nm	16.6	11.1	-14.3	22.4
Neck Moment	Y	Nm	5.1	39.9	-5.5	7.5
Neck Moment	Z	Nm	5.1	6.4	-11.1	9.1
Neck Moment Resultant	N/A	Nm	17.7	9.1		

LOWER NECK PEAK FORCES AND MOMENTS						
Location	Axis	Units	Hybrid III 3-Year Old			
			Max	Time	Min	Time
Neck Force	X	N	27.4	5.8	-257.6	14.7
Neck Force	Y	N	22.7	5.6	-547.4	13.0
Neck Force	Z	N	230.9	16.7	-319.9	8.6
Neck Force Resultant	N/A	N	595.7	13.0		
Neck Moment	X	Nm	1.4	86.6	-48.3	15.1
Neck Moment	Y	Nm	16.5	21.6	-2.9	150.2
Neck Moment	Z	Nm	3.5	89.4	-6.6	44.0
Neck Moment Resultant	N/A	Nm	49.7	15.1		

HEAD INJURY CRITERIA (HIC15)				
Location	Hybrid III 3-Year Old			
	HIC15	T ¹	T ²	Avg G
Head CG	330.1	5.2	14.6	65.6

UPPER NECK NIJ VALUES				
Location	Hybrid III 3-Year Old			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.13	0.25	0.18	0.45

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan NHTSA No.: M20205210TWG3
Test Program: TWG 3.3.3.3 Test Date: 08/28/20

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	2000	2050	1180	10.8	35	1000
2	High Speed 3/4 View	1430	1710	1170	8.5	20	1000
3	High Speed Front View						
4	Real Time	2000	2050	1300	10.8	Zoom	60

Coordinates: +X = forward of vehicle relative to dummy's head CG
+Y = right of vehicle relative to dummy's head CG
+Z = into ground

**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. Right Front ¾ View, As Received



FIGURE 2. Vehicle Certification Label



FIGURE 3. Pre-Test Vehicle Left Side View (as prepared for NCAP crash test)



FIGURE 4. Post-Test Vehicle Left Side View (as prepared for NCAP crash test)



FIGURE 5. Pre-Test Vehicle Location of Air Bag 1
(vehicle headliner for curtain air bag)



FIGURE 6. Pre-Test Vehicle Location of Air Bag 2
(vehicle a-pillar for curtain air bag)

Photo Not Available

FIGURE 7. Pre-Test Vehicle Location of Air Bag 3
(vehicle seat or door for torso air bag)

Photo Not Available

FIGURE 8. Pre-Test Vehicle Seat Back Angle (put inclinometer on headrest)



FIGURE 9. Pre-Test Dummy Left Side View



FIGURE 10. Post-Test Dummy Left Side View



FIGURE 11. Pre-Test Dummy Left Side Close-up View



FIGURE 12. Post-Test Dummy Left Side Close-up View



FIGURE 13. Pre-Test Dummy Left $\frac{3}{4}$ View



FIGURE 14. Post-Test Dummy Left $\frac{3}{4}$ View



FIGURE 15. Pre-Test Dummy Front Left $\frac{3}{4}$ Close-Up View



FIGURE 16. Post-Test Dummy Front Left $\frac{3}{4}$ Close-Up View



FIGURE 17. Pre-Test Dummy Front View



FIGURE 18. Post-Test Dummy Front View



FIGURE 19. Pre-Test Dummy Front Close-up View



FIGURE 20. Post Test Dummy Front Close-up View



FIGURE 21. Pre-Test Dummy Right ¾ View



FIGURE 22. Post-Test Dummy Right ¾ View



FIGURE 23. Pre-Test Dummy Right Side View



FIGURE 24. Post-Test Dummy Right Side View

Photo Not Available

FIGURE 25. Post-Test Dummy Right Side View (Door Open)



FIGURE 26. Post-Test Curtain Air Bag Left Side View



FIGURE 27. Post-Test Curtain Air Bag Front Left $\frac{3}{4}$ View

Photo Not Available

FIGURE 28. Post-Test Curtain Air Bag Front View

Photo Not Available

FIGURE 29. Post-Test Curtain Air Bag Right Side View (Door Open)

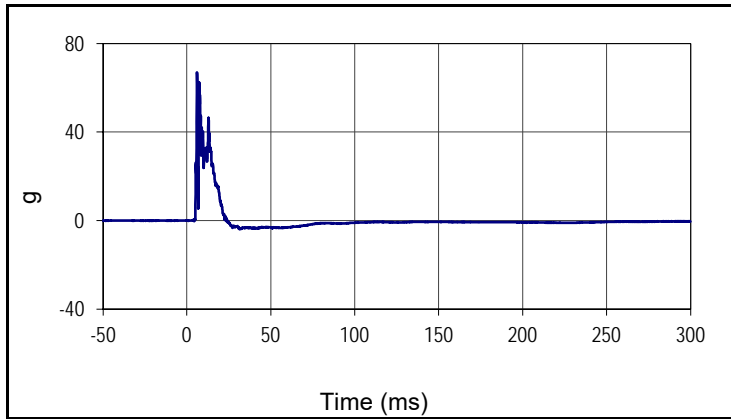
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

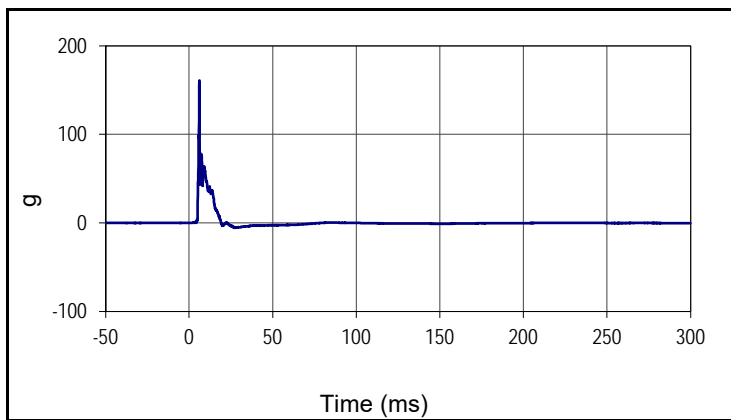
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10	Hybrid III 3-Year Old Upper Neck Moment Y	B-3
11	Hybrid III 3-Year Old Upper Neck Moment Z	B-3
12	Hybrid III 3-Year Old Upper Neck Moment Resultant	B-3
13	Hybrid III 3-Year Old Lower Neck Force X	B-4
14	Hybrid III 3-Year Old Lower Neck Force Y	B-4
15	Hybrid III 3-Year Old Lower Neck Force Z	B-4
16	Hybrid III 3-Year Old Lower Neck Force Resultant	B-4
17	Hybrid III 3-Year Old Lower Neck Moment X	B-5
18	Hybrid III 3-Year Old Lower Neck Moment Y	B-5
19	Hybrid III 3-Year Old Lower Neck Moment Z	B-5
20	Hybrid III 3-Year Old Lower Neck Moment Resultant	B-5
21	Driver Nij	B-6

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

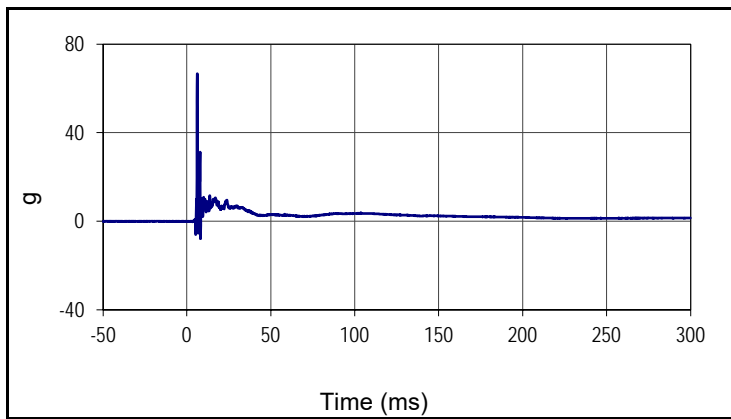
Test Date: 08/28/20
 NHTSA No.: M20205210TWG3



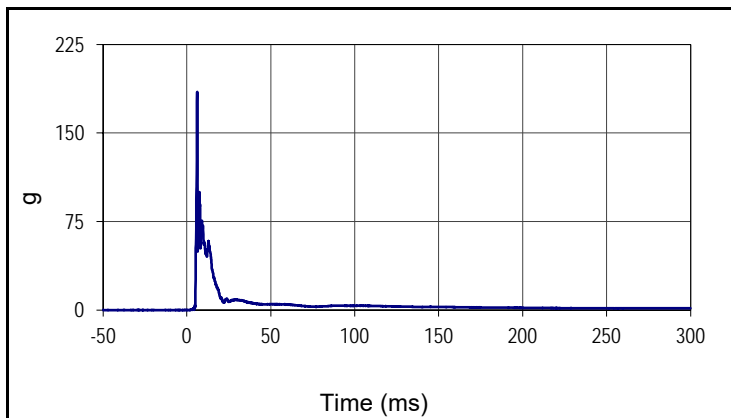
Curve Description			
3 YO Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
67.1	6.0	-3.8	31.6



Curve Description			
3 YO Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
161.0	6.1	-5.7	27.4



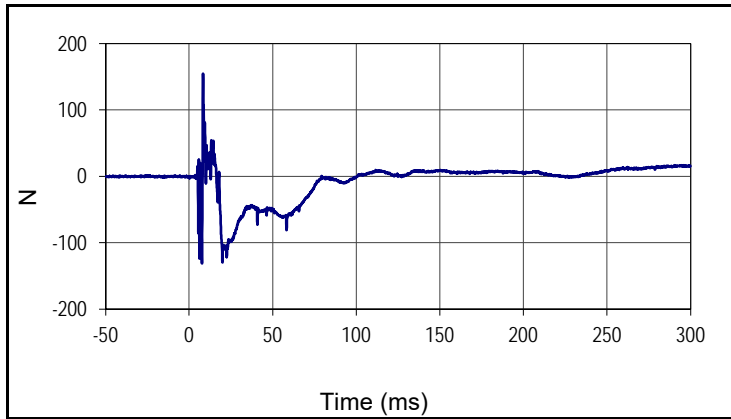
Curve Description			
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Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
66.7	6.1	-7.8	8.1



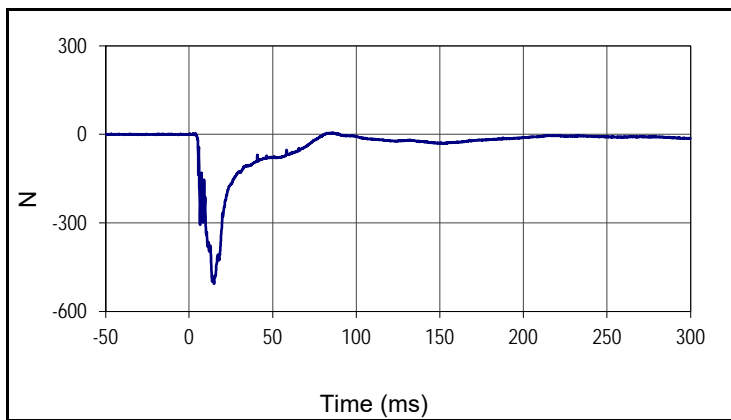
Curve Description			
3 YO Head Acceleration Primary Resultant			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
184.9	6.1	0.0	1.9

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

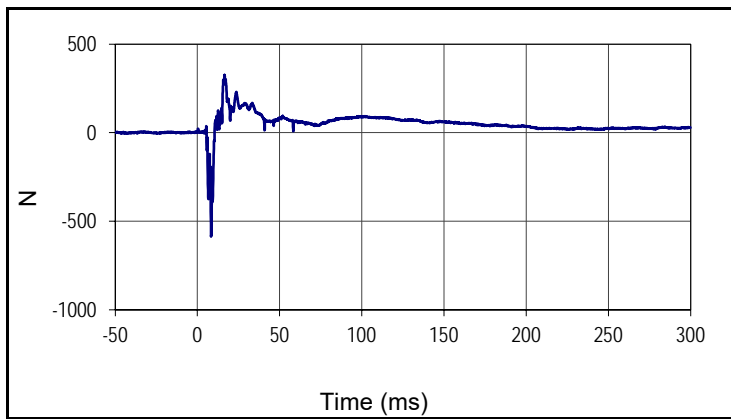
Test Date: 08/28/20
 NHTSA No.: M20205210TWG3



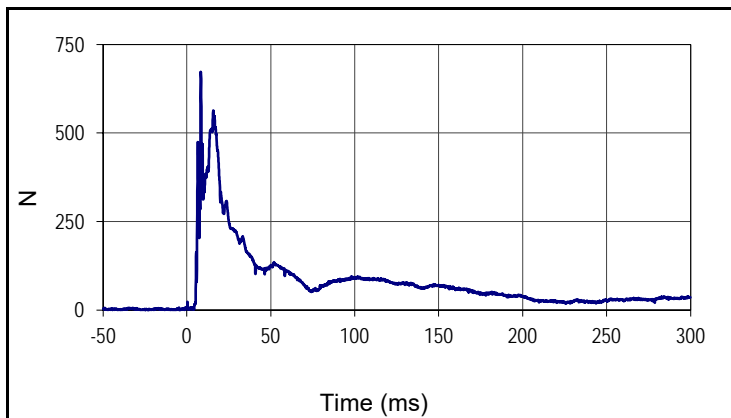
Curve Description			
3 YO Upper Neck Force X			
Plot No.		SAE Class	Units
005		1000	N
Max	Time	Min	Time
154.7	8.3	-131.1	7.6



Curve Description			
3 YO Upper Neck Force Y			
Plot No.		SAE Class	Units
006		1000	N
Max	Time	Min	Time
5.8	85.4	-506.2	14.8



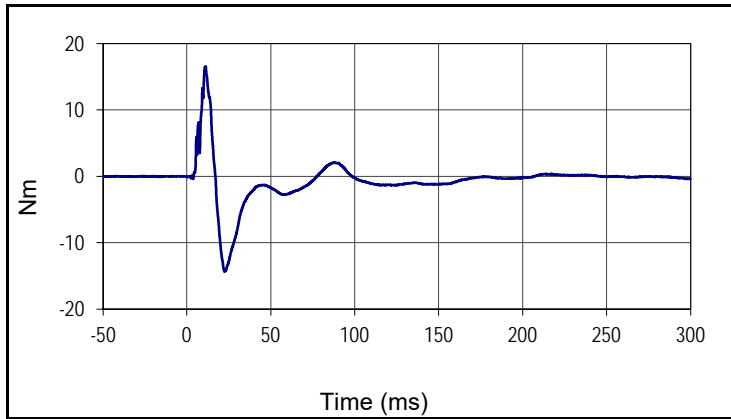
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3 YO Upper Neck Force Z			
Plot No.		SAE Class	Units
007		1000	N
Max	Time	Min	Time
326.9	16.4	-584.3	8.2



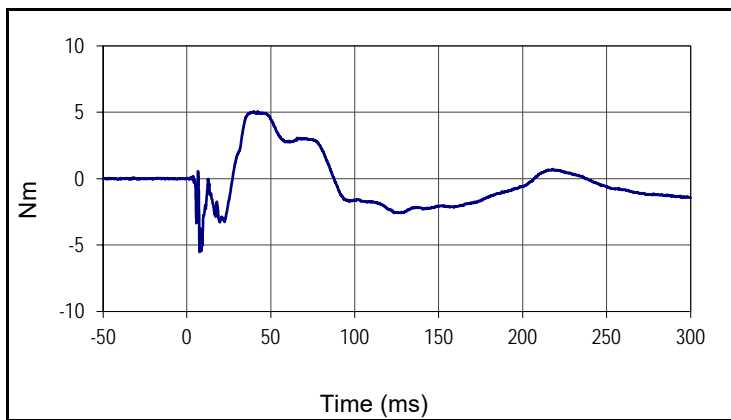
Curve Description			
3 YO Upper Neck Force Resultant			
Plot No.		SAE Class	Units
008		1000	N
Max	Time	Min	Time
672.3	8.2	1.7	0.6

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

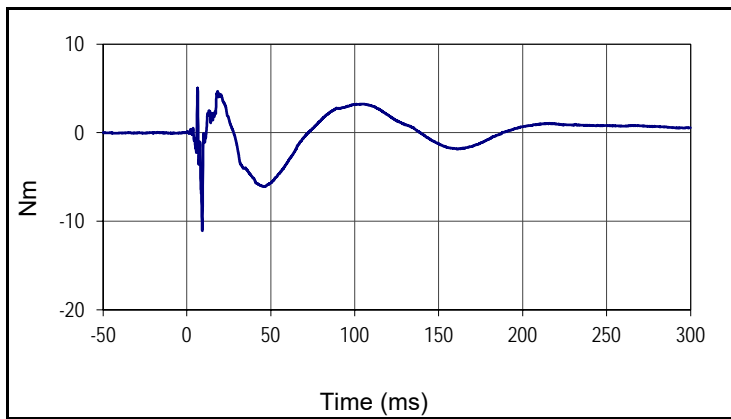
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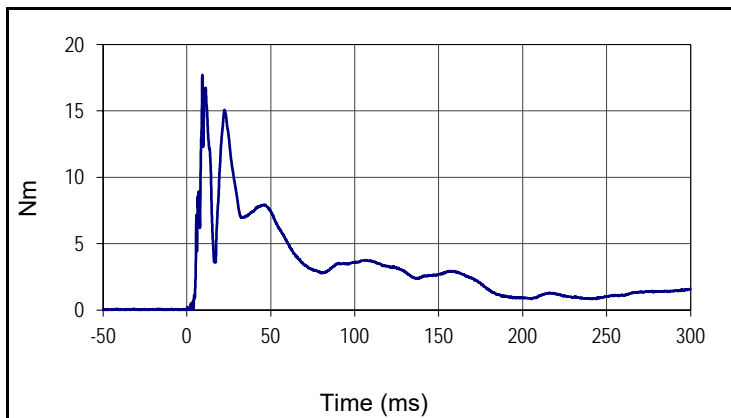
Curve Description			
3 YO Upper Neck Moment X			
Plot No.		SAE Class	Units
009		600	Nm
Max	Time	Min	Time
16.6	11.1	-14.3	22.4



Curve Description			
3 YO Upper Neck Moment Y			
Plot No.		SAE Class	Units
010		600	Nm
Max	Time	Min	Time
5.1	39.9	-5.5	7.5



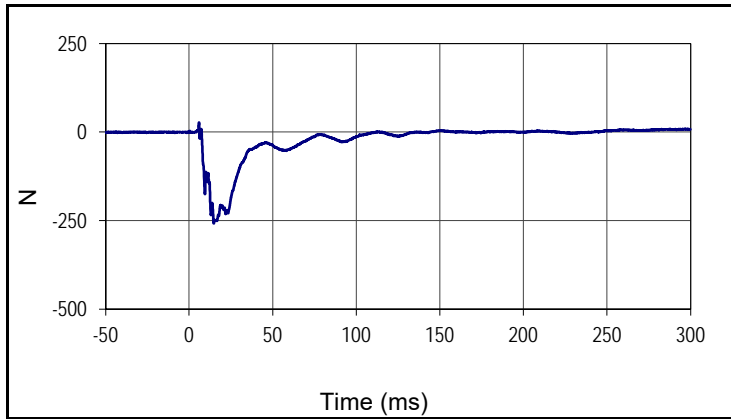
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Plot No.		SAE Class	Units
011		600	Nm
Max	Time	Min	Time
5.1	6.4	-11.1	9.1



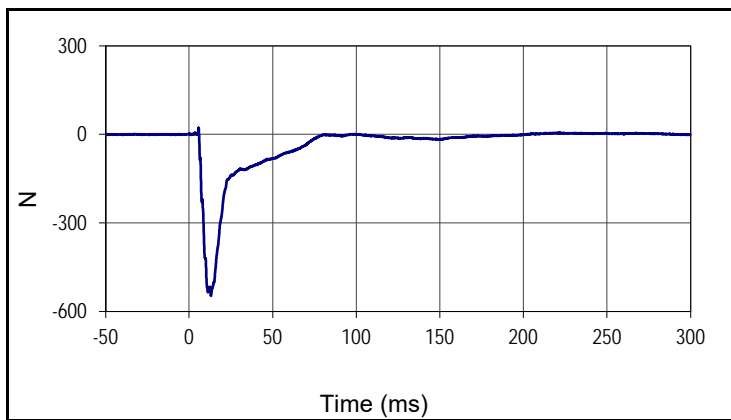
Curve Description			
3 YO Upper Neck Moment Resultant			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
17.7	9.1	0.0	2.8

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

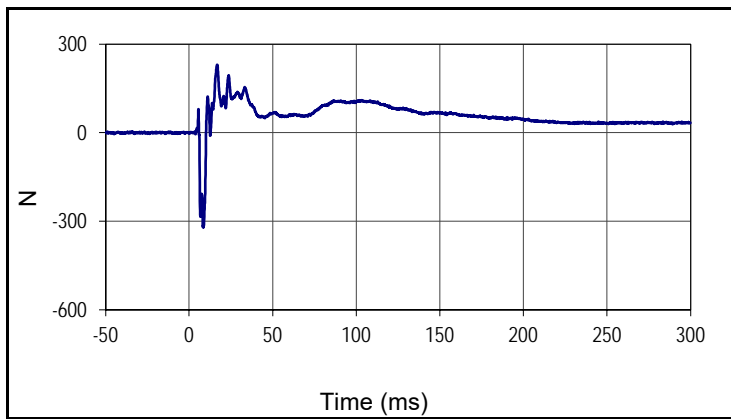
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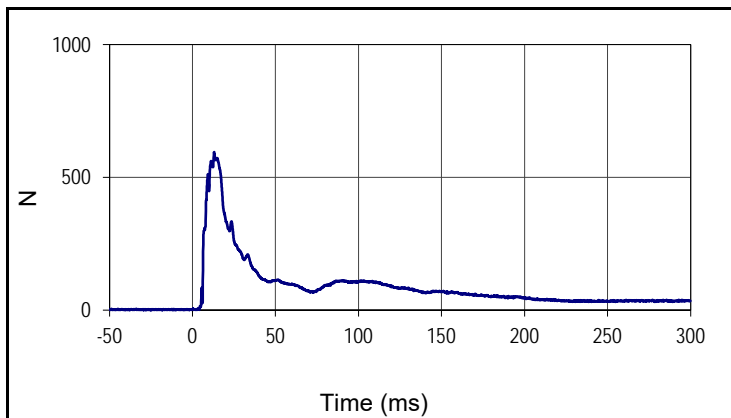
Curve Description			
3 YO Lower Neck Force X			
Plot No.		SAE Class	Units
013		1000	N
Max	Time	Min	Time
27.4	5.8	-257.6	14.7



Curve Description			
3 YO Lower Neck Force Y			
Plot No.		SAE Class	Units
014		1000	N
Max	Time	Min	Time
22.7	5.6	-547.4	13.0



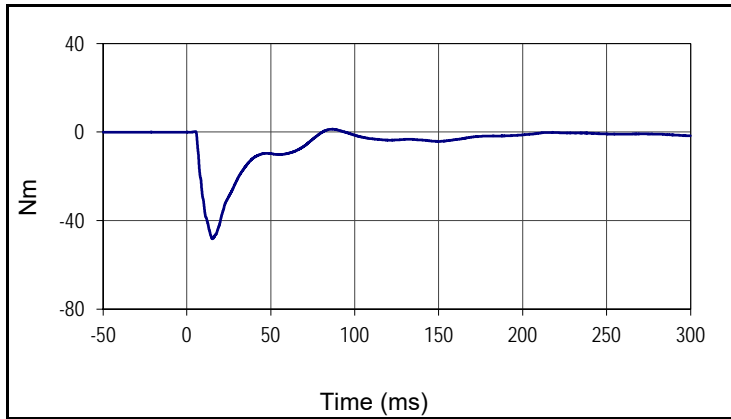
Curve Description			
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Plot No.		SAE Class	Units
015		1000	N
Max	Time	Min	Time
230.9	16.7	-319.9	8.6



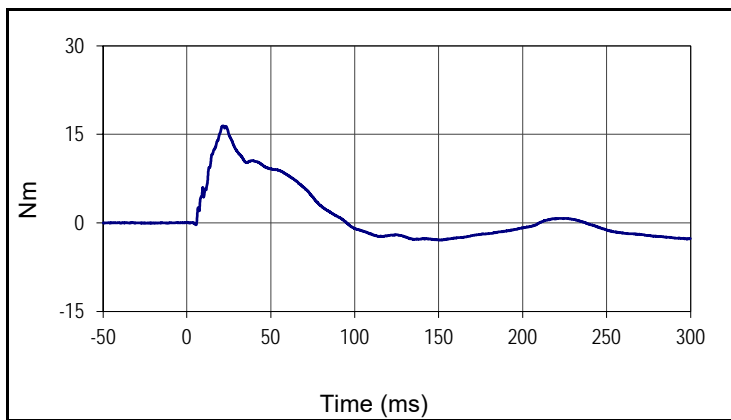
Curve Description			
3 YO Lower Neck Force Resultant			
Plot No.		SAE Class	Units
016		1000	N
Max	Time	Min	Time
595.7	13.0	0.6	4.0

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

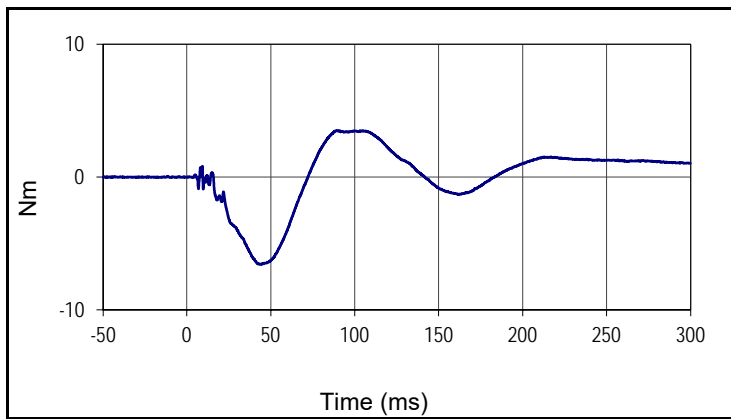
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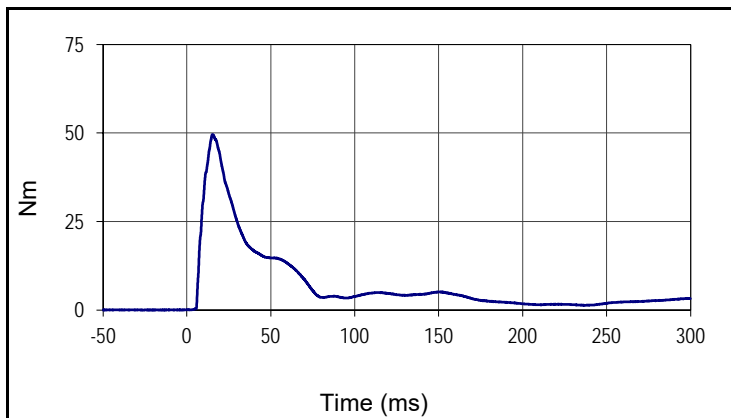
Curve Description			
3 YO Lower Neck Moment X			
Plot No.		SAE Class	Units
017		600	Nm
Max	Time	Min	Time
1.4	86.6	-48.3	15.1



Curve Description			
3 YO Lower Neck Moment Y			
Plot No.		SAE Class	Units
018		600	Nm
Max	Time	Min	Time
16.5	21.6	-2.9	150.2



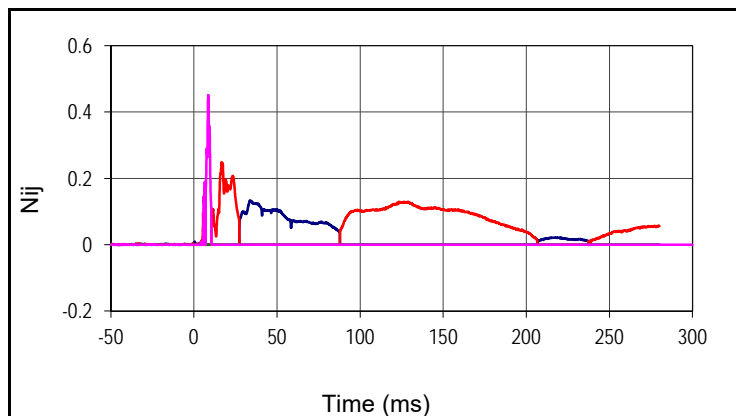
Curve Description			
3 YO Lower Neck Moment Z			
Plot No.		SAE Class	Units
019		600	Nm
Max	Time	Min	Time
3.5	89.4	-6.6	44.0



Curve Description			
3 YO Lower Neck Moment Resultant			
Plot No.		SAE Class	Units
020		600	Nm
Max	Time	Min	Time
49.7	15.1	0.0	1.4

Test Vehicle: 2020 Nissan Sentra 4-Door Sedan
 Test Program: TWG 3.3.3.3

Test Date: 08/28/20
 NHTSA No.: M20205210TWG3



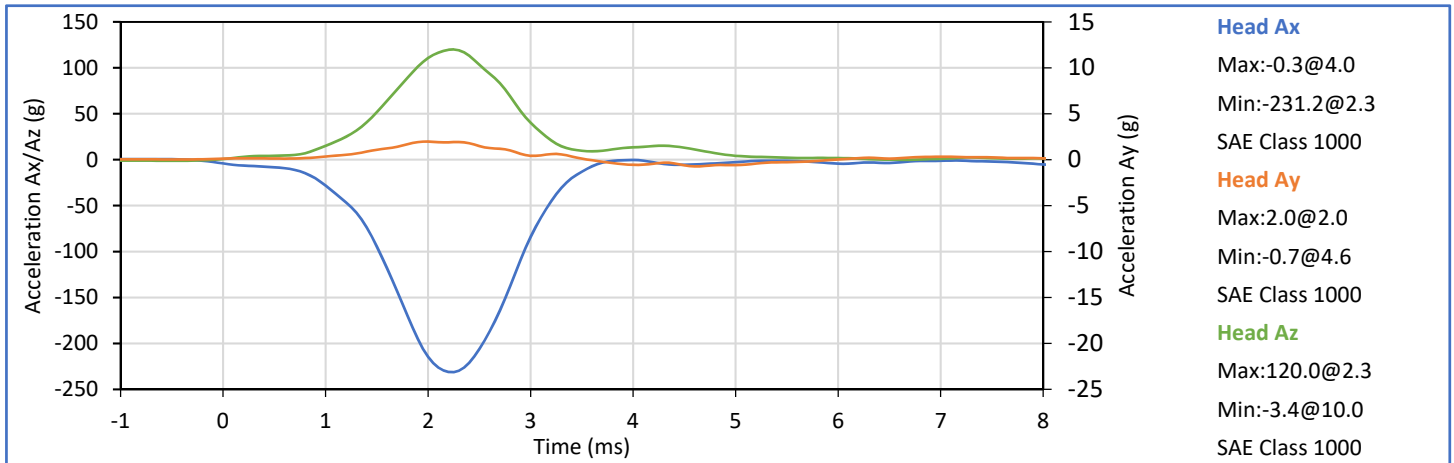
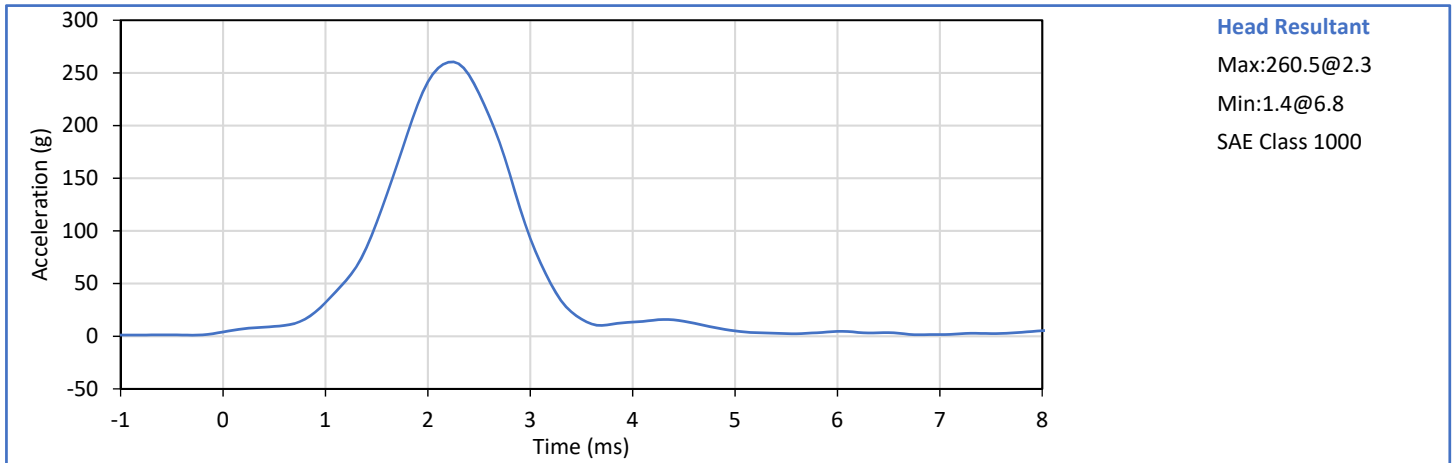
Curve Description		
Driver Nij		
Units	Max	Time
Ntf	0.13	33.6
Units	Max	Time
Nte	0.25	16.6
Units	Max	Time
Ncf	0.18	6.7
Units	Max	Time
Nce	0.45	8.5

APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA


**Pre-Test ATD Configuration And Performance Verification Data
Hybrid III 3 Year-Old Child ATD
S/N: 044**

***Head Drop, Neck Flexion, and Neck Extension**

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.7	Pass
Laboratory Humidity	%	10	70	41	Pass
Peak Resultant Acceleration	g	250.0	280.0	260.5	Pass
Peak Lateral Acceleration	g	-15.0	15.0	2.0	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



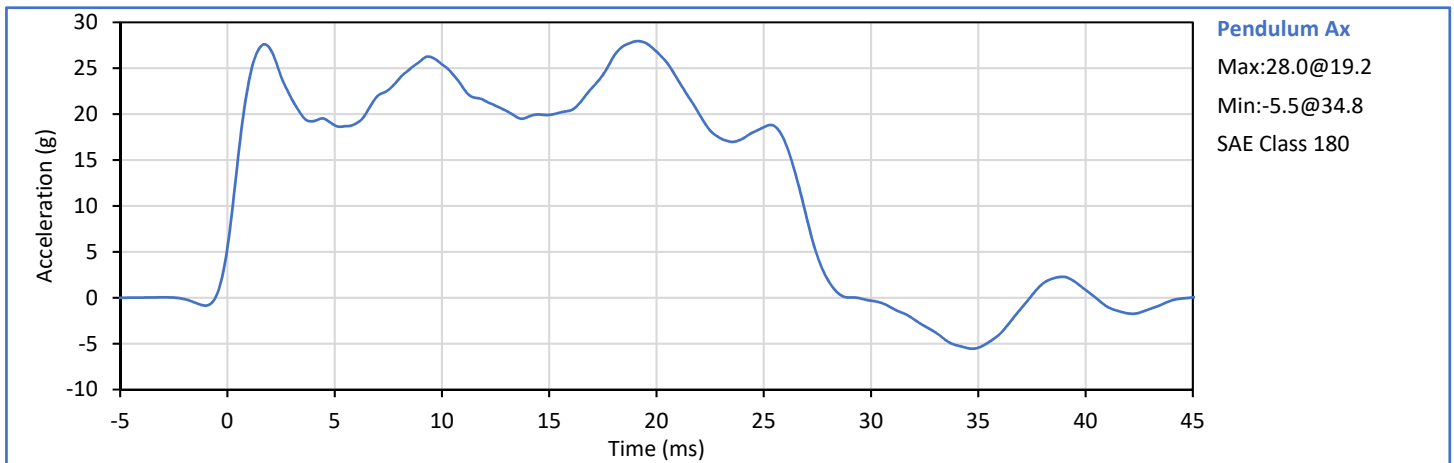
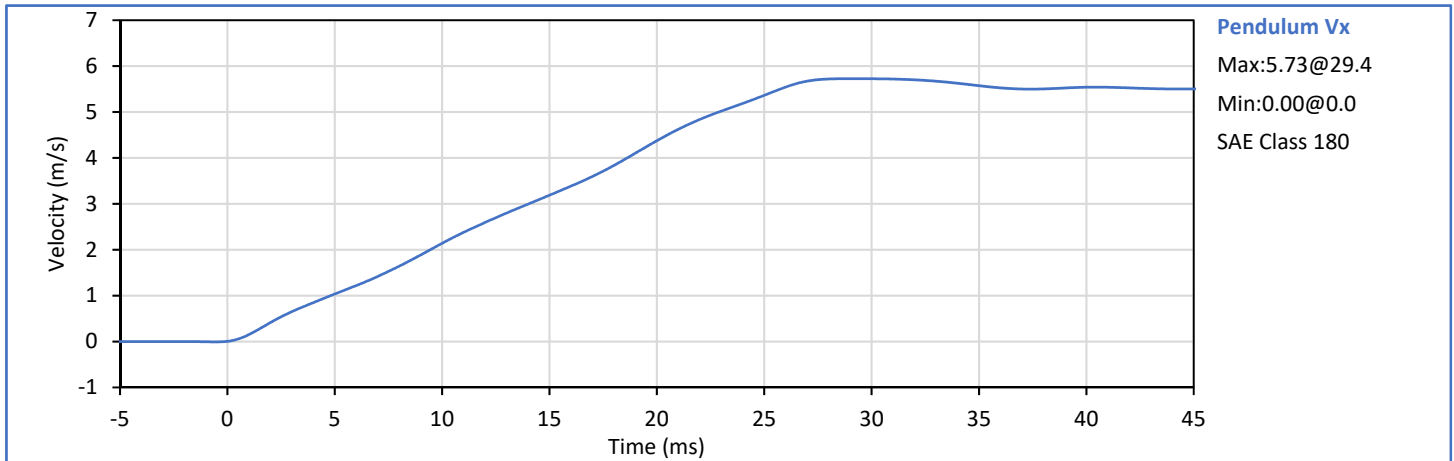
Technician: 
J. Hernandez


Approved By: 
P. Puzzuto


ATD Serial No.: 044

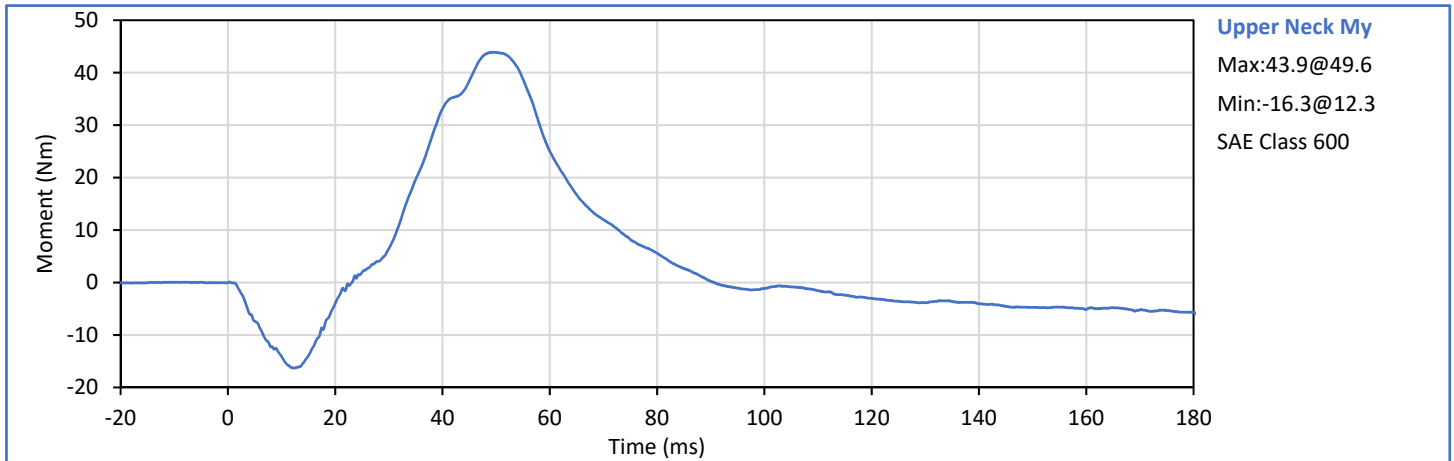
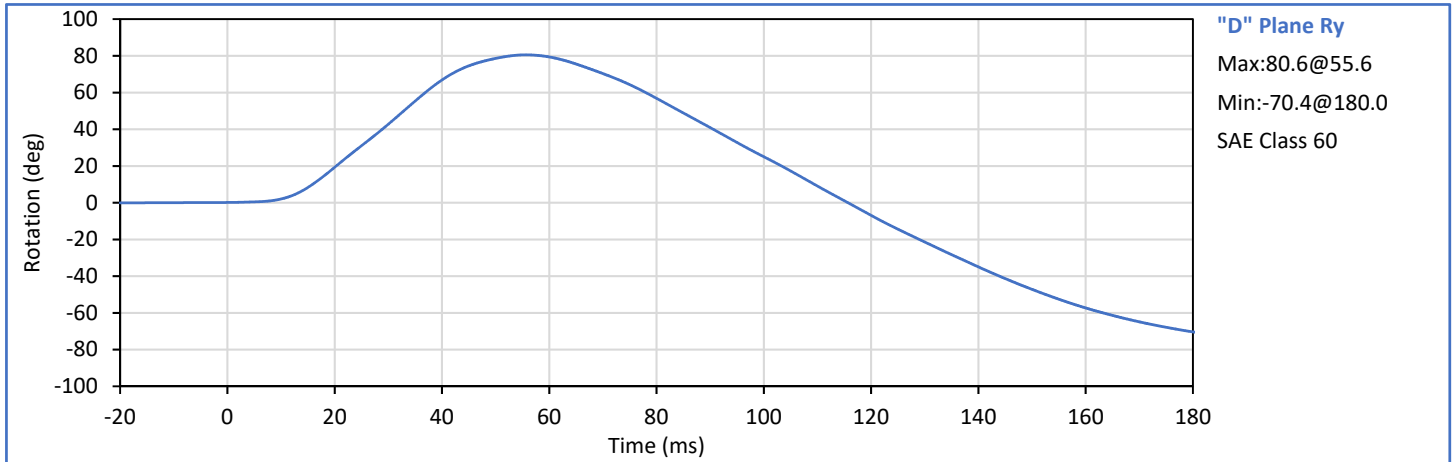
Test Date: 2020-08-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	37	Pass
Pendulum Velocity	m/s	5.40	5.60	5.51	Pass
Pendulum Velocity at 10 ms	m/s	2.00	2.70	2.14	Pass
Pendulum Velocity at 15 ms	m/s	3.00	4.00	3.19	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.10	4.38	Pass
Peak Neck Negative My during Ry ≥70 to ≤82 deg.	Nm	42.0	53.0	43.9	Pass
	deg	70.0	82.0	78.4	Pass
Positive Neck My Decay to 10 Nm	ms	60.0	80.0	72.8	Pass
Overall Test Results					Pass



Technician: 
J. Hernandez

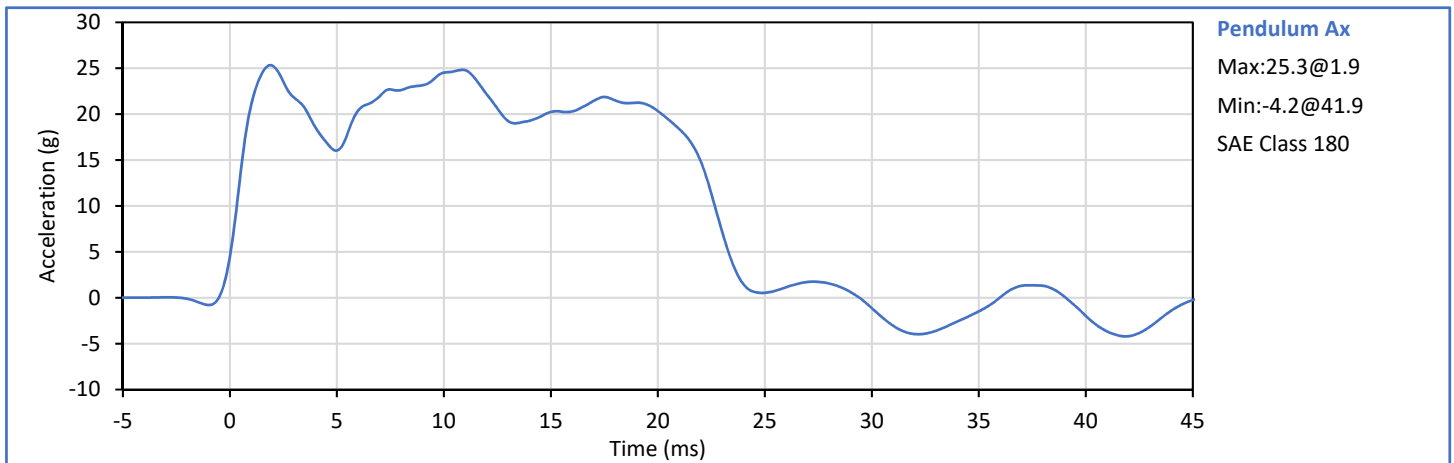
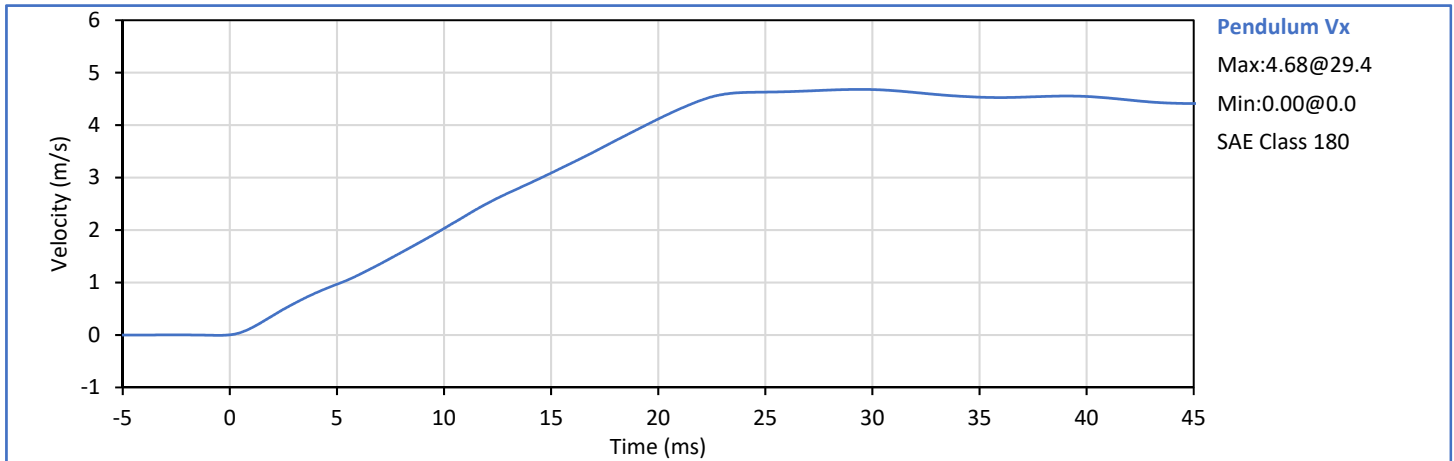
Approved By: 
P. Puzzuto



ATD Serial No.: 044

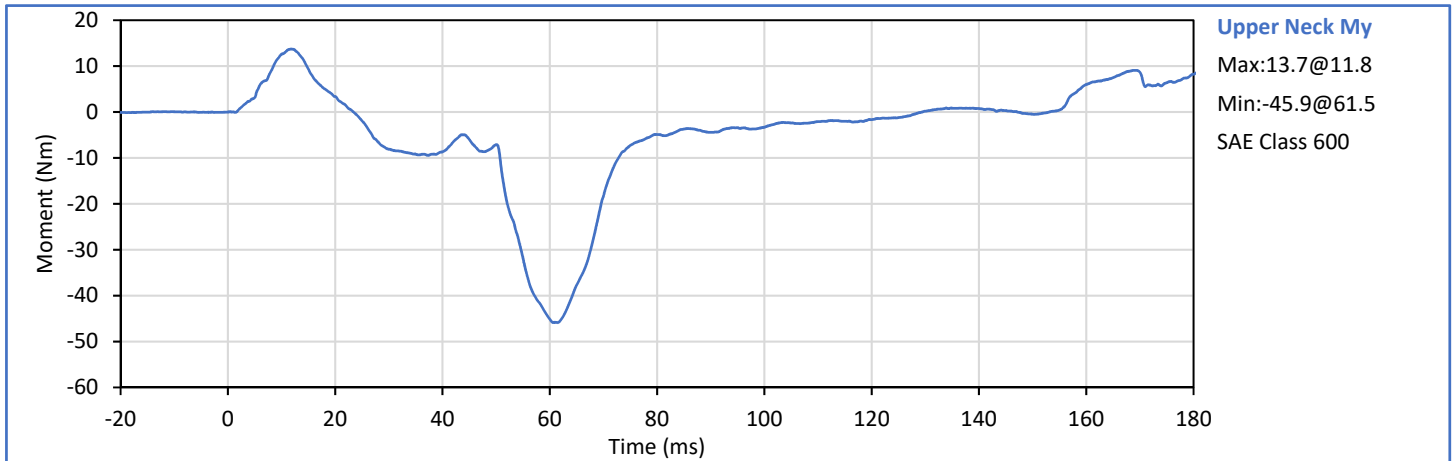
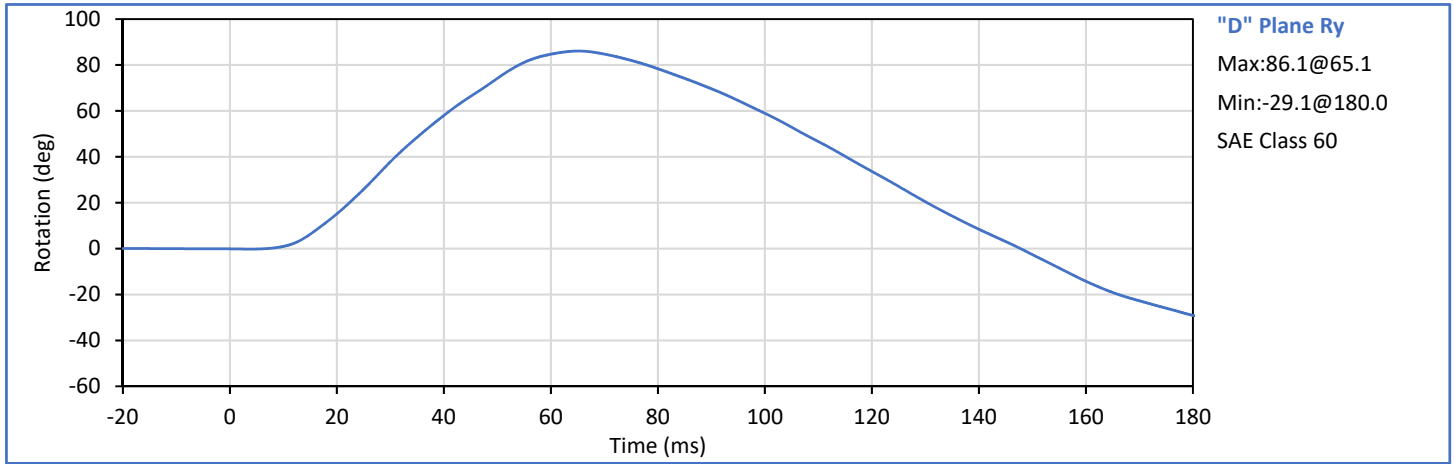
Test Date: 2020-08-19

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	38	Pass
Pendulum Velocity	m/s	3.55	3.75	3.73	Pass
Pendulum Velocity at 6 ms	m/s	1.00	1.40	1.14	Pass
Pendulum Velocity at 10 ms	m/s	1.90	2.50	2.03	Pass
Pendulum Velocity at 14 ms	m/s	2.80	3.50	2.89	Pass
Peak Neck Negative My during Ry ≥83 to ≤93 deg.	Nm	-53.3	-43.7	-45.9	Pass
	deg	83.0	93.0	85.3	Pass
Negative Neck My Decay to -10 Nm	ms	60.0	80.0	72.7	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*
J. Hernandez

Approved By: *P. Puzzuto*
P. Puzzuto



APPENDIX D
INSTRUMENTATION DATA CHANNEL ASSIGNMENTS

Table 1 - ATD Instrumentation

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P51630	Endevco	7264C-2k	2020-07-23
Head Acceleration Y Primary	P52151	Endevco	7264C-2k	2020-07-23
Head Acceleration Z Primary	P49241	Endevco	7264C-2k	2020-07-23
Upper Neck Force X	212 Fx	R.A. Denton	3303	2020-07-17
Upper Neck Force Y	212 Fy	R.A. Denton	3303	2020-07-17
Upper Neck Force Z	212 Fz	R.A. Denton	3303	2020-07-17
Upper Neck Moment X	212 Mx	R.A. Denton	3303	2020-07-17
Upper Neck Moment Y	212 My	R.A. Denton	3303	2020-07-17
Upper Neck Moment Z	212 Mz	R.A. Denton	3303	2020-07-17
Lower Neck Force X	93 Fx	R.A. Denton	3303	2020-07-20
Lower Neck Force Y	93 Fy	R.A. Denton	3303	2020-07-20
Lower Neck Force Z	93 Fz	R.A. Denton	3303	2020-07-20
Lower Neck Moment X	93 Mx	R.A. Denton	3303	2020-07-20
Lower Neck Moment Y	93 My	R.A. Denton	3303	2020-07-20
Lower Neck Moment Z	93 Mz	R.A. Denton	3303	2020-07-20