

REPORT NUMBER: TWG-KAR-20-003

**SIDE AIRBAG OCCUPANT RISK PROGRAM
OCCUPANT OUT-OF-POSITION TESTS**

**NISSAN MOTOR CO., LTD.
2020 NISSAN KICKS 5-DOOR HATCHBACK**

NHTSA NUMBER: M20205202TWG2

**PREPARED BY:
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AUGUST 25, 2020

FINAL REPORT

**PREPARED FOR:
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This final test report was prepared for the U.S. Department of Transportation, Alpha Technology Associate, Inc., in response to Contract Number DTNH22-13-D-00311L.

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16. Abstract A side airbag out of position test was conducted on the subject 2020 Nissan Kicks 5-Door Hatchback 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 18, 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 22.1°C. The Nij and Upper Neck Tension exceeded the limits. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: center;">Section 3.3.5.1 - HIII 3-Year Old Child Dummy - P2</th> </tr> <tr> <th style="width: 35%;">Measurement Description</th> <th style="width: 10%;">Units</th> <th style="width: 25%;">IARV</th> <th style="width: 30%;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>723</td> <td>46.4</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1.89</td> </tr> <tr> <td>Upper Neck Tension</td> <td>N</td> <td>1490</td> <td>1817.1</td> </tr> <tr> <td>Upper Neck Compression</td> <td>N</td> <td>1820</td> <td>-438.7</td> </tr> </tbody> </table>				Section 3.3.5.1 - HIII 3-Year Old Child Dummy - P2				Measurement Description	Units	IARV	Result	Head Injury Criteria (HIC ₁₅)	N/A	723	46.4	Nij	N/A	1	1.89	Upper Neck Tension	N	1490	1817.1	Upper Neck Compression	N	1820	-438.7
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17. Key Words New Car Assessment Program (NCAP) Side Airbag Out-of-position 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 Kicks 5-door Hatchback 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 18, 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 3-year old anthropomorphic test device (ATD) was placed in the right front passenger seating position, along the outboard edge of foam block, facing inboard, and spine aligned with deployment trajectory of airbag according to the dummy placement instructions (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 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 3-year old dummy was with the dummy facing inboard. The seat is set 60 mm rearward from the full forward position. The seat was not tested in the forwardmost position in order to maximize the interaction and contact between the dummy and curtain airbag. The dummy was placed with its arms hanging at its sides on the foam block facing inboard with its legs extended. The dummy's pelvis is slid outboard until contact is made with the door panel while keeping the head in a neutral orientation. The center of gravity of the head is centered in the deployment trajectory of the airbag. The dummy's arms are bent at the elbow until the fingers just touch the booster seat. This orientation complies with section 3.3.3.1 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 3-year old dummy's visible contact points were as follows: The ATD's head contacted the curtain airbag. The ATD's torso contacted the torso/pelvis and curtain airbag.

The occupant data is summarized below:

Measurement Description	Units	Passenger ATD (HIII 3YO)	
		IARV	Result
Head Injury Criteria (HIC15)	N/A	723	46.4
Upper Neck Nij	N/A	1	1.89
Upper Neck Peak Tension	N	1490	1817.1
Upper Neck Peak Compression	N	1820	-438.7

The Nij and Upper Neck Tension exceeded the limits.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback NHTSA No.: M20205202TWG2
Test Program: TWG 3.3.3.1 Test Date: 08/18/20

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 Kicks 5-Door HatchbackNHTSA No.: M20205202TWG2Test Program: TWG 3.3.3.1Test Date: 08/18/20**TEST DUMMY INFORMATION**

Description	Passenger Seat
Dummy Type / Serial No.	3-year old / 044
Head Contact	Curtain Airbag
Chest Contact	N/A
Abdomen Contact	N/A
Pelvis Contact	Torso/Pelvis Airbag
Left Knee Contact	N/A
Right Knee Contact	N/A

VIDEO COVERAGE

Description	Quantity
High Speed Digital	3
Real Time	1
Total	4

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 Kicks 5-Door Hatchback NHTSA No.: M20205202TWG2
 Test Program: TWG 3.3.3.1 Test Date: 08/18/20

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20205202
Model Year	2020
Make	Nissan
Model	Kicks
Body Style	5-Door Hatchback
VIN	3N1CP5BV2LL484746
Body Color	Gun Metallic
Odometer Reading (km / mi)	153 / 95
Engine Displacement (L)	1.6
Type / No. of Cylinders	4 Cylinder
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	No
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	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
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	Nov-19
Vehicle Type	Passenger Car

GVWR (kg)	1640
GAWR Front (kg)	870
GAWR Rear (kg)	770

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				385.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				44.8

A

B

A-B

*Vehicle underwent New Car Assessment Program Side MDB Impact Testing on February 27, 2020.

DATA SHEET NO. 2 ... (CONTINUED)

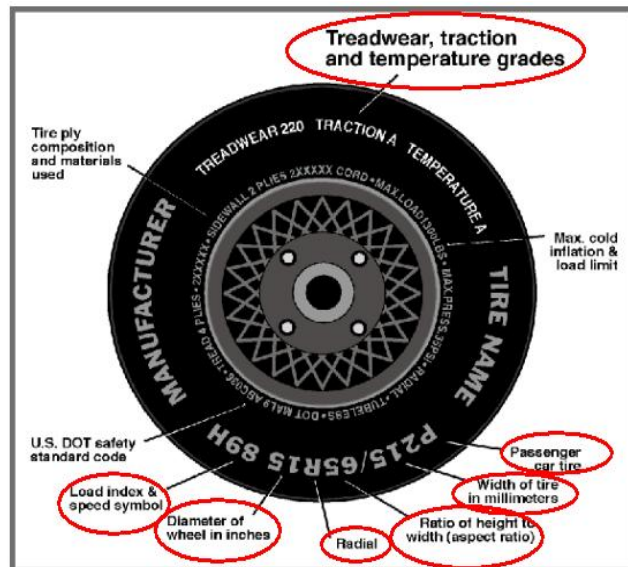
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback

NHTSA No.: M20205202TWG2

Test Program: TWG 3.3.3.1

Test Date: 08/18/20



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	205/60R16	205/60R16
Tire Size on Vehicle	205/60R16	205/60R16
Tire Manufacturer	Firestone	Firestone
Tire Model	FT140	FT140
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	V6XW FT0 4419	V6XW FT0 4419
DOT Safety Code Right	V6XW FT0 4419	V6XW FT0 4419

DATA SHEET NO. 3

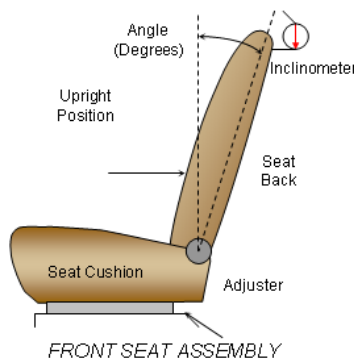
SEAT ADJUSTMENTS

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

NHTSA No.: M20205202TWG2
 Test Date: 08/18/20

SEAT BACK ANGLE

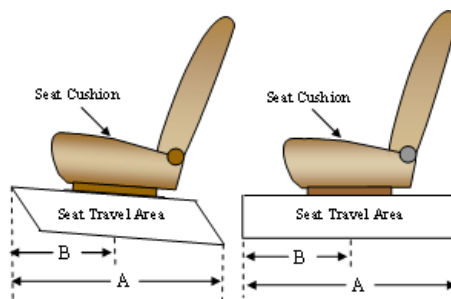
The passenger seat back is positioned per section 3.3.3.1 of the TWG recommendation in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags. Seat back angle is measured at the headrest post.



Seating Position	Degrees
Passenger Seat	6.2

SEAT FORE / AFT POSITIONING

The passenger seat track travel is set per section 3.3.3.1 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	240	25	60	6

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the uppermost position. 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	4	H

DATA SHEET NO. 4**DUMMY POSITIONING AND AIRBAG DIMENSIONS**Test Vehicle: 2020 Nissan Kicks 5-Door HatchbackNHTSA No.: M20205202TWG2Test Program: TWG 3.3.3.1Test Date: 08/18/20**DUMMY POSITIONING**

Code	Measurement Description	Passenger	
		Length (mm)	Angle (°)
SA	Seat Back Angle		6.2
AN	Top of Airbag Module to Head/Neck Junction	125	90.0
HD	Head CG to Door Panel/ Window	122	0.0
HSC	Head to Seat Back Centerline	160	0.0
HB	Head to B-Pillar (measured from bridge of nose)	150	0.0
HZ	Head to Roof (Z)	412	90.0
HH	Head to Side Header	498	42.5
ND	Nose to Dash	596	14.8
NS	Nose to Seat Back	220	0.0
NR	Nose to Header	503	43.3
CD	Chest to Dash	572	0.8
CS	Chest to Seat Back (measured to centerline)	186	0.0
RACL	Right Arm to Seat Back Centerline	225	0.0
LACL	Left Arm to Seat Back Centerline	55	0.0
RA	Right Arm to Door Panel	30	0.0
LA	Left Arm to Door Panel	270	0.0
KK	Knee to Knee	130	0.0
TT	Toe to Toe	132	0.0
KSCR	Right Knee to Seat Cushion Centerline	145	0.0
KSCL	Left Knee to Seat Cushion Centerline	0	0.0
	Head Level (X Direction)		22.1
	Head Level (Y Direction)		13.9

AIRBAG DIMENSIONS

Code	Measurement Description	Airbag
		Length (mm)
AMW	Curtain Airbag Module Diameter	30
AML	Curtain Airbag Module Length	300
ABW	Curtain Airbag Width	1870
ABL	Curtain Airbag Length	470
AMW	Torso/Pelvis Airbag Module Diameter	25
AML	Torso/Pelvis Airbag Module Length	140
ABW	Torso/Pelvis Airbag Width	540
ABL	Torso/Pelvis Airbag Length	290

DATA SHEET NO. 5

DUMMY INJURY CRITERIA AND PERFORMANCE DATA

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback

NHTSA No.: M20205202TWG2

Test Program: TWG 3.3.3.1

Test Date: 08/18/20

HEAD PEAK ACCELERATIONS / CHEST DEFLECTIONS						
Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Head CG	X	g	41.0	7.0	-27.5	10.1
Head CG	Y	g	4.4	42.9	-25.5	10.4
Head CG	Z	g	54.3	10.1	-32.5	7.1
Head CG Resultant	N/A	g	60.8	10.1		

UPPER NECK PEAK FORCES AND MOMENTS						
Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Neck Force	X	N	739.3	15.7	-46.5	298.8
Neck Force	Y	N	368.5	38.9	-205.1	8.6
Neck Force	Z	N	1817.1	37.2	-438.7	7.3
Neck Force Resultant	N/A	N	1849.7	37.1		
Neck Moment	X	Nm	8.3	16.9	-5.9	39.1
Neck Moment	Y	Nm	41.8	15.6	-28.5	36.6
Neck Moment	Z	Nm	7.3	37.4	-10.0	17.9
Neck Moment Resultant	N/A	Nm	43.2	15.6		

LOWER NECK PEAK FORCES AND MOMENTS						
Location	Axis	Units	3 Year Old			
			Max	Time	Min	Time
Neck Force	X	N	1013.1	15.8	-52.4	5.2
Neck Force	Y	N	293.5	39.2	-229.2	11.4
Neck Force	Z	N	844.7	37.0	-339.9	5.8
Neck Force Resultant	N/A	N	1034.7	15.8		
Neck Moment	X	Nm	32.2	38.4	-10.9	13.7
Neck Moment	Y	Nm	7.0	299.9	-74.9	37.0
Neck Moment	Z	Nm	2.3	232.9	-13.6	19.5
Neck Moment Resultant	N/A	Nm	81.6	37.2		

HEAD INJURY CRITERIA (HIC15)				
Location	3 Year Old			
	HIC15	T ¹	T ²	Avg G
Head CG	46.4	24.2	39.2	24.9

UPPER NECK NIJ VALUES				
Location	3 Year Old			
	Ntf	Nte	Ncf	Nce
Upper Neck	0.75	1.89	0.48	0.04

DATA SHEET NO. 6**HIGH SPEED CAMERA LOCATIONS AND DATA**Test Vehicle: 2020 Nissan Kicks 5-Door HatchbackNHTSA No.: M20205202TWG2Test Program: TWG 3.3.3.1Test Date: 08/18/20**CAMERA LOCATIONS**

No.	Camera View	Location (mm)			Angle (Deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	High Speed Side View	0	2900	1170	4.1	35	1000
2	High Speed 3/4 View	3070	1420	1590	5.5	50	1000
3	High Speed Front View	2630	120	1570	9.8	50	1000
4	Real Time	0	2900	1310	4.1	24.0	1000

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)

Photo Not Available

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

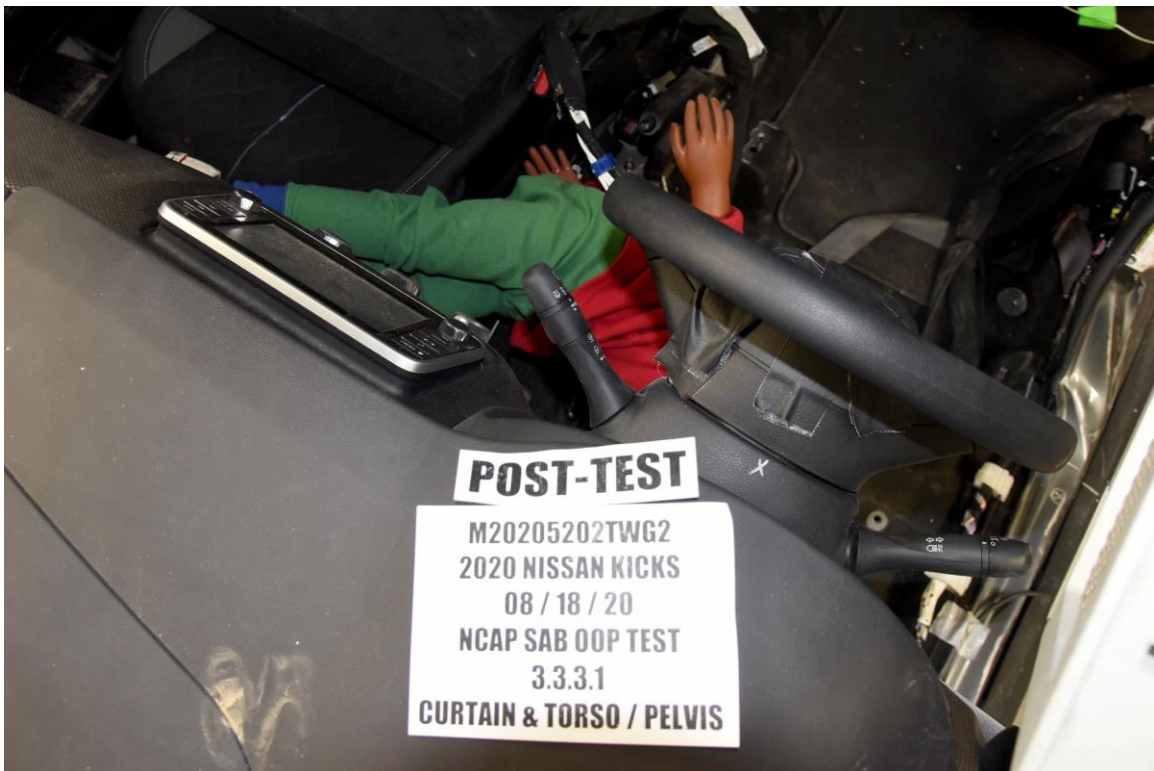


FIGURE 14. Post-Test Dummy Left $\frac{3}{4}$ View



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

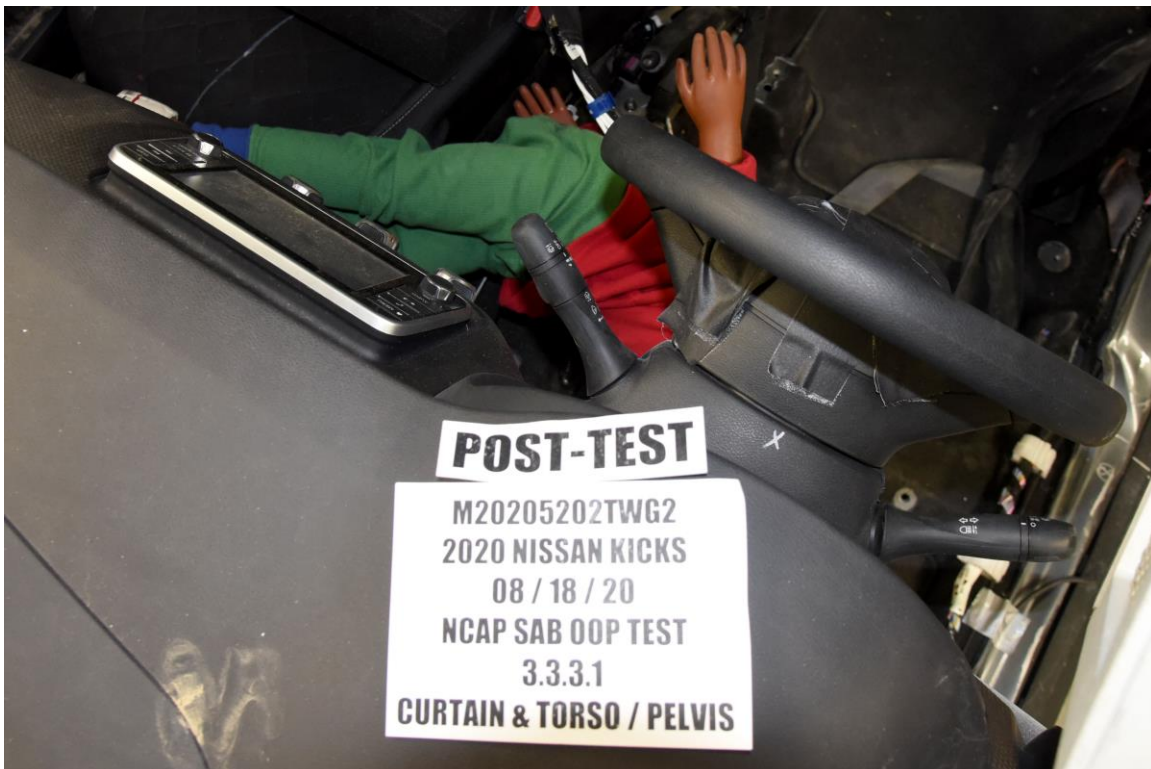


FIGURE 16. Post-Test Dummy Front Left $\frac{3}{4}$ Close-Up View



FIGURE 17. Pre-Test Dummy Front View

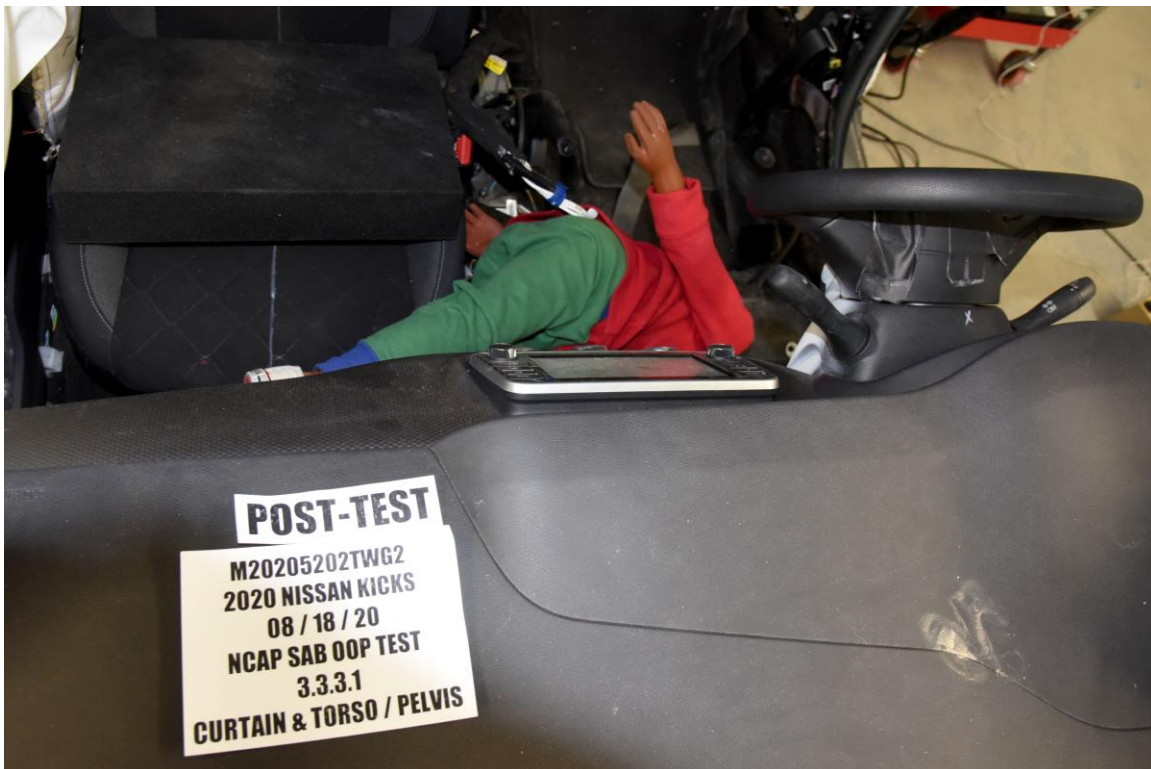


FIGURE 18. Post-Test Dummy Front View



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

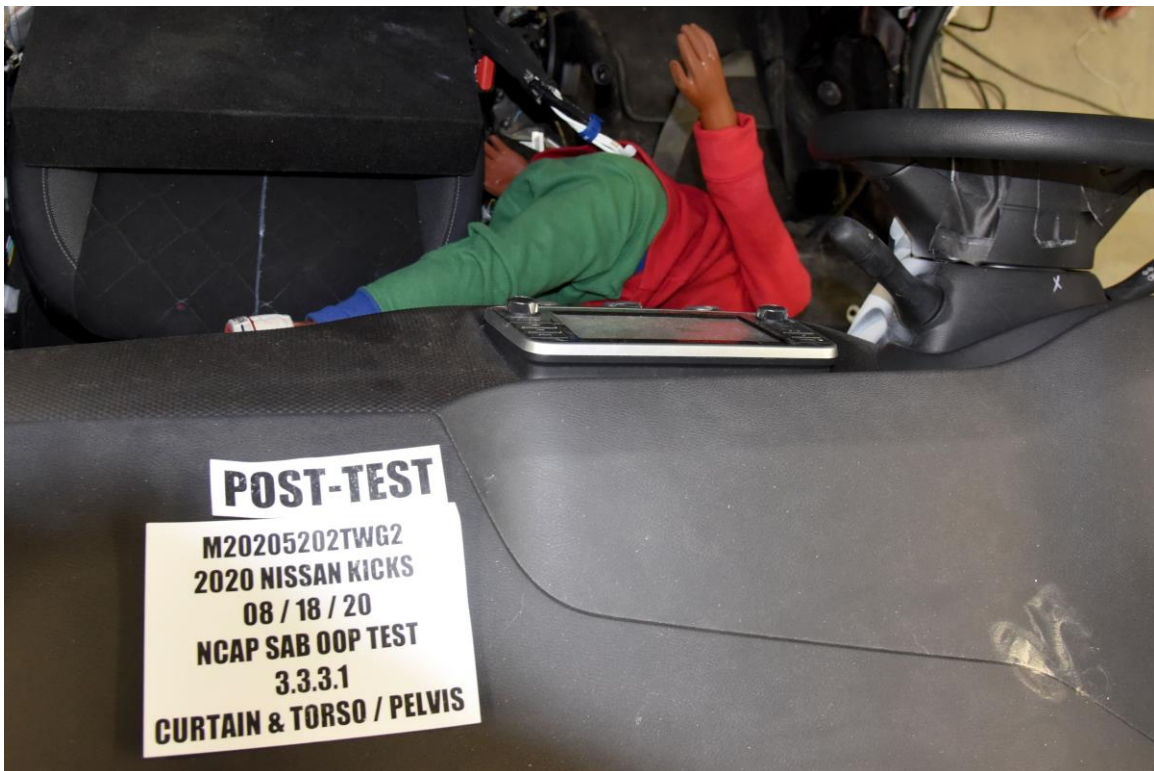


FIGURE 20. Post Test Dummy Front Close-up View



FIGURE 21. Pre-Test Dummy Right $\frac{3}{4}$ View



FIGURE 22. Post-Test Dummy Right $\frac{3}{4}$ 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



FIGURE 28. Post-Test Curtain Air Bag Front View

Photo Not Available

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

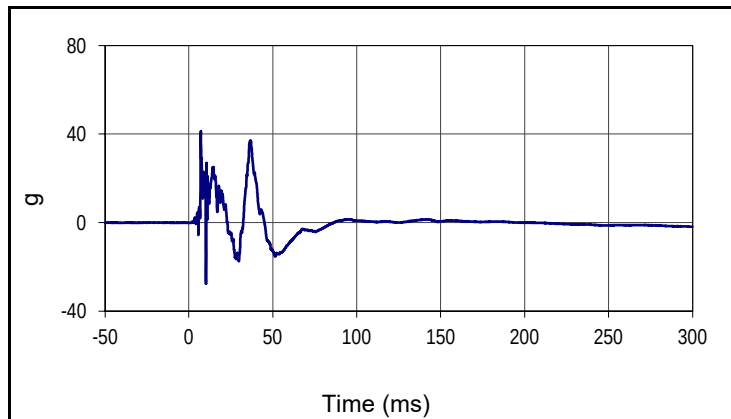
APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

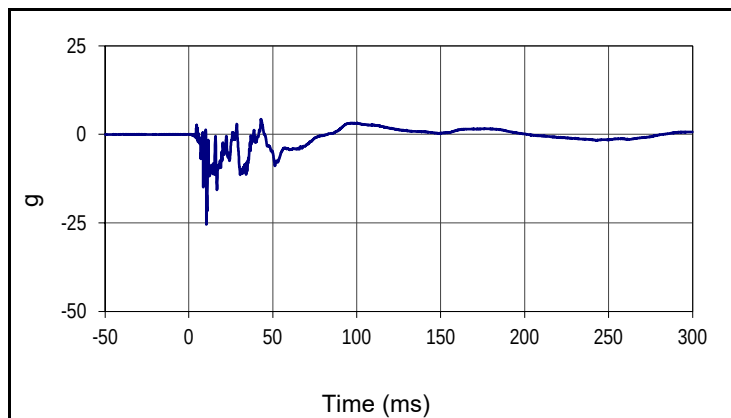
Plot		Page
1	3 Yr. Old Head Acceleration X	B-1
2	3 Yr. Old Head Acceleration Y	B-1
3	3 Yr. Old Head Acceleration Z	B-1
4	3 Yr. Old Head Acceleration Resultant	B-1
5	3 Yr. Old Upper Neck Force X	B-2
6	3 Yr. Old Upper Neck Force Y	B-2
7	3 Yr. Old Upper Neck Force Z	B-2
8	3 Yr. Old Upper Neck Force Resultant	B-2
9	3 Yr. Old Upper Neck Moment X	B-3
10	3 Yr. Old Upper Neck Moment Y	B-3
11	3 Yr. Old Upper Neck Moment Z	B-3
12	3 Yr. Old Upper Neck Moment Resultant	B-3
13	3 Yr. Old Lower Neck Force X	B-4
14	3 Yr. Old Lower Neck Force Y	B-4
15	3 Yr. Old Lower Neck Force Z	B-4
16	3 Yr. Old Lower Neck Force Resultant	B-4
17	3 Yr. Old Lower Neck Moment X	B-5
18	3 Yr. Old Lower Neck Moment Y	B-5
19	3 Yr. Old Lower Neck Moment Z	B-5
20	3 Yr. Old Lower Neck Moment Resultant	B-5
21	Driver Nij	B-6

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

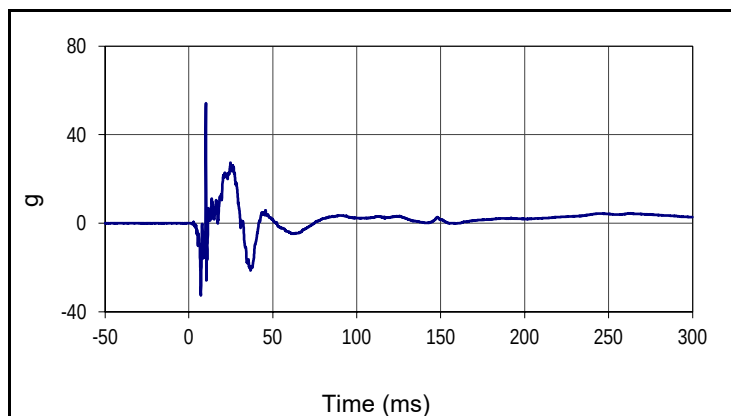
Test Date: 08/18/20
 NHTSA No.: M20205202TWG2



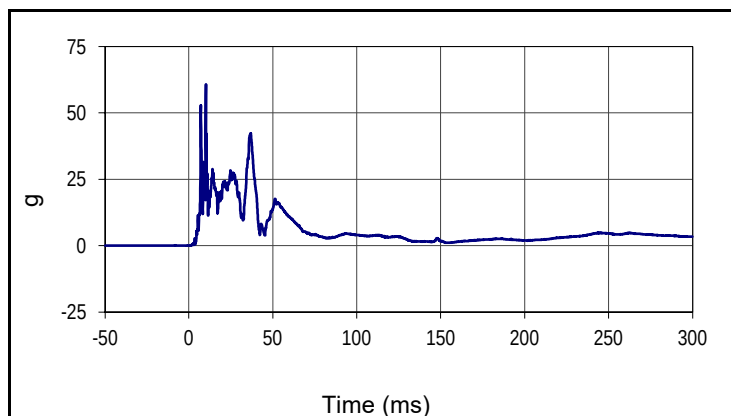
Curve Description			
3 YO Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
41.0	7.0	-27.5	10.1



Curve Description			
3 YO Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
4.4	42.9	-25.5	10.4



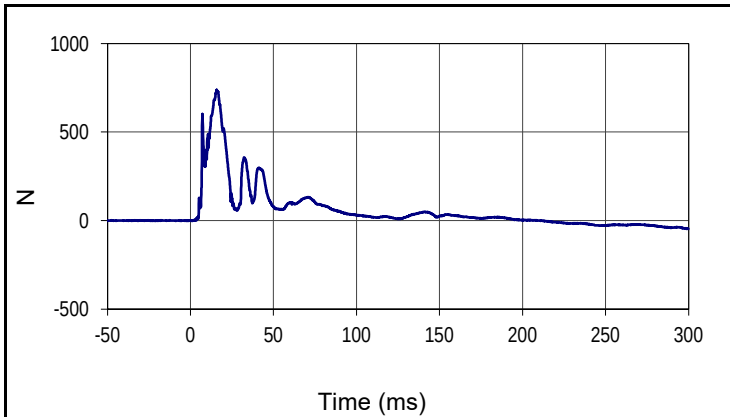
Curve Description			
3 YO Head Acceleration Z Primary			
Plot No.		SAE Class	Units
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Max	Time	Min	Time
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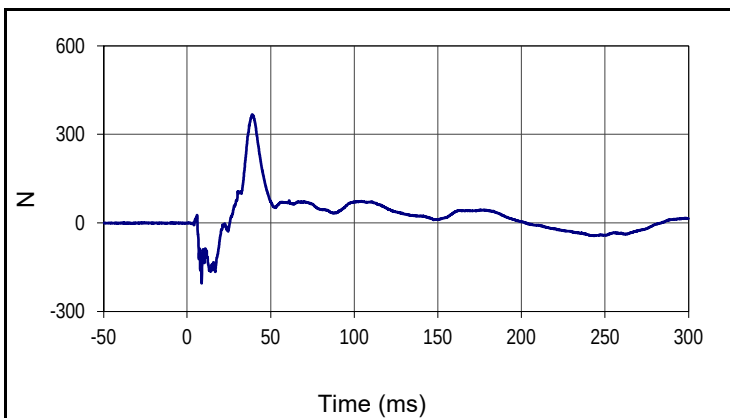
Curve Description			
3 YO Head Acceleration Primary Resultant			
Plot No.		SAE Class	Units
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60.8	10.1	0.1	0.2

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

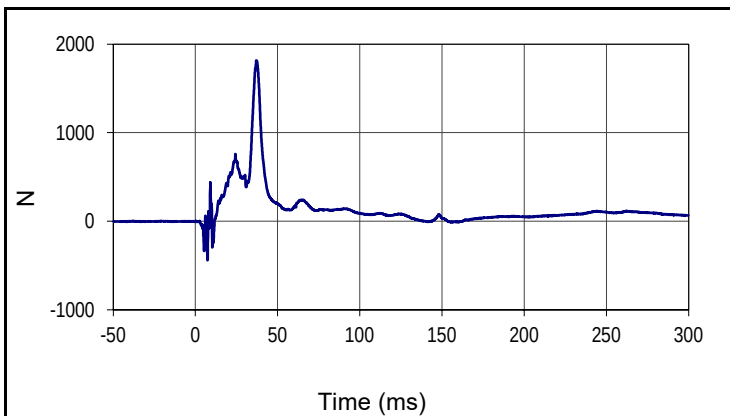
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 NHTSA No.: M20205202TWG2



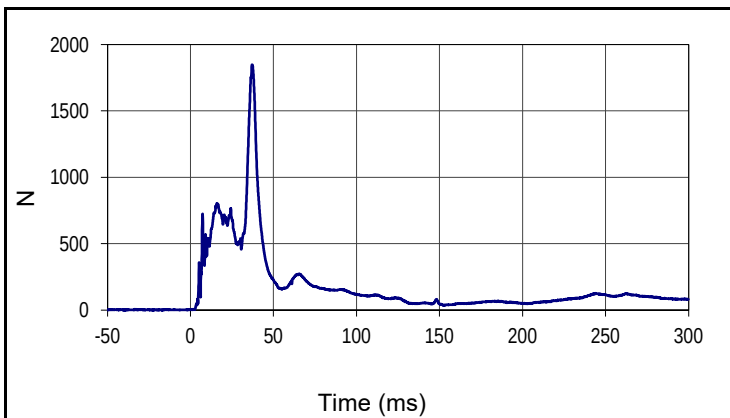
Curve Description			
3 YO Upper Neck Force X			
Plot No.		SAE Class	Units
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739.3	15.7	-46.5	298.8



Curve Description			
3 YO Upper Neck Force Y			
Plot No.		SAE Class	Units
006		1000	N
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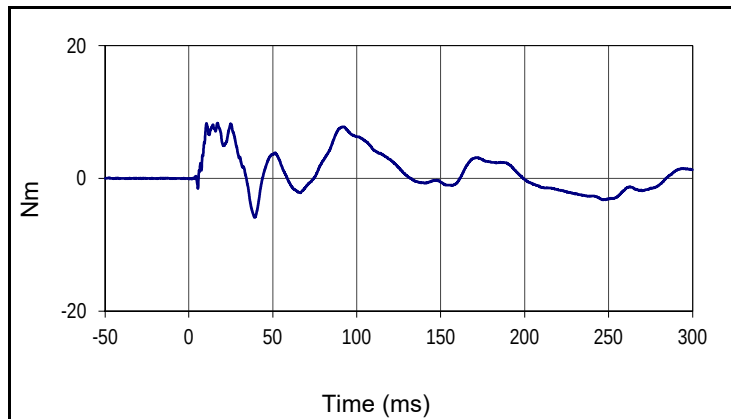
Curve Description			
3 YO Upper Neck Force Z			
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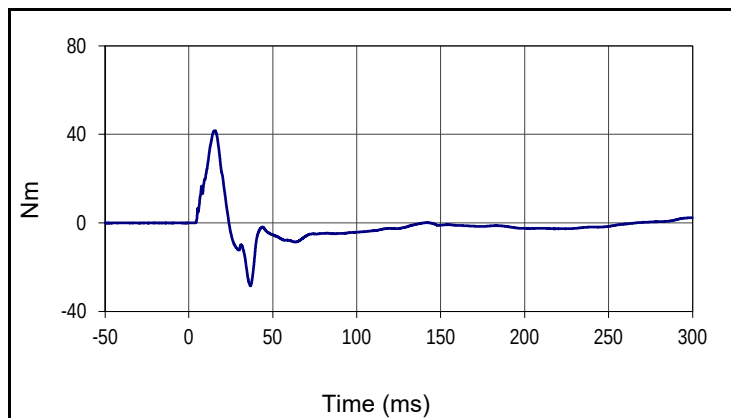
Curve Description			
3 YO Upper Neck Force Resultant			
Plot No.		SAE Class	Units
008		1000	N
Max	Time	Min	Time
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Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

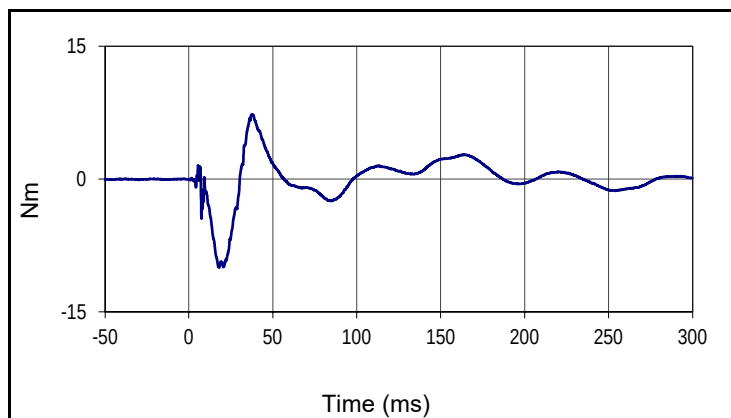
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 NHTSA No.: M20205202TWG2



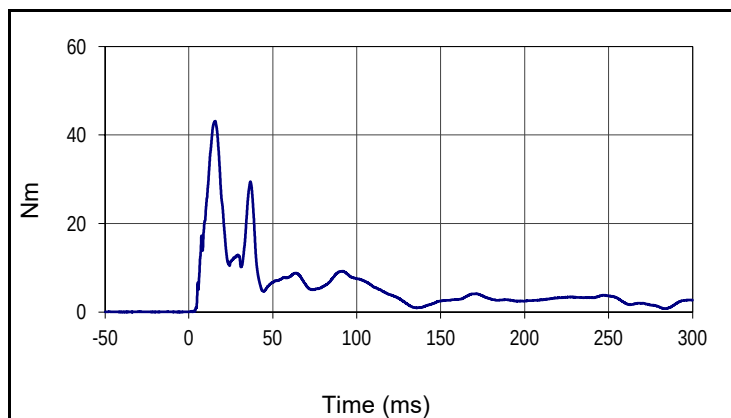
Curve Description			
3 YO Upper Neck Moment X			
Plot No.		SAE Class	Units
009		600	Nm
Max	Time	Min	Time
8.3	16.9	-5.9	39.1



Curve Description			
3 YO Upper Neck Moment Y			
Plot No.		SAE Class	Units
010		600	Nm
Max	Time	Min	Time
41.8	15.6	-28.5	36.6



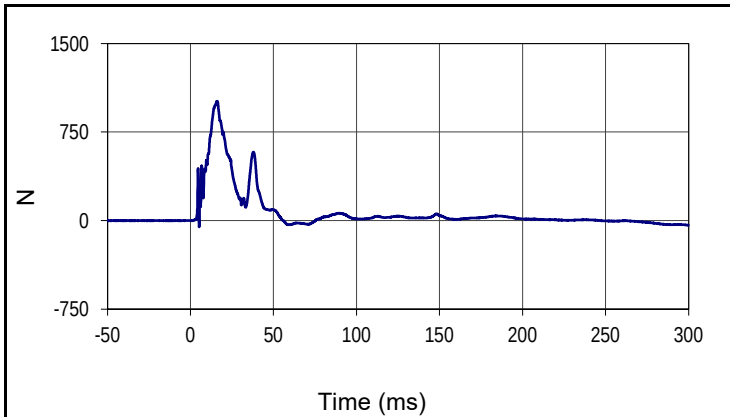
Curve Description			
3 YO Upper Neck Moment Z			
Plot No.		SAE Class	Units
011		600	Nm
Max	Time	Min	Time
7.3	37.4	-10.0	17.9



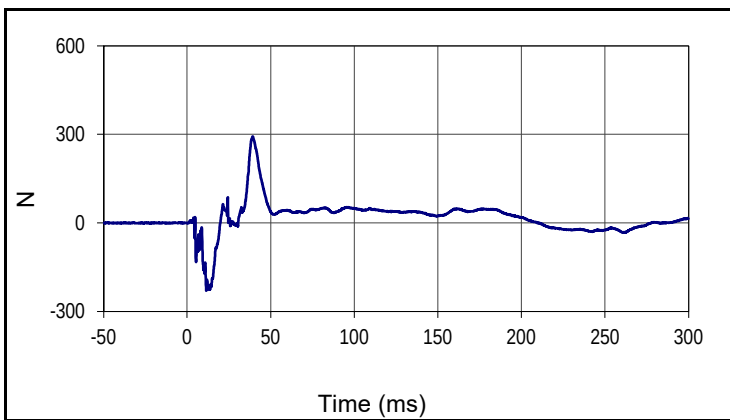
Curve Description			
3 YO Upper Neck Moment Resultant			
Plot No.		SAE Class	Units
012		600	Nm
Max	Time	Min	Time
43.2	15.6	0.0	2.3

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

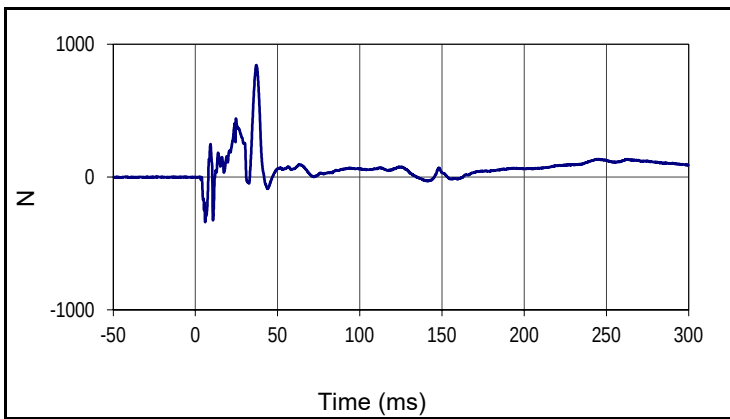
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 NHTSA No.: M20205202TWG2



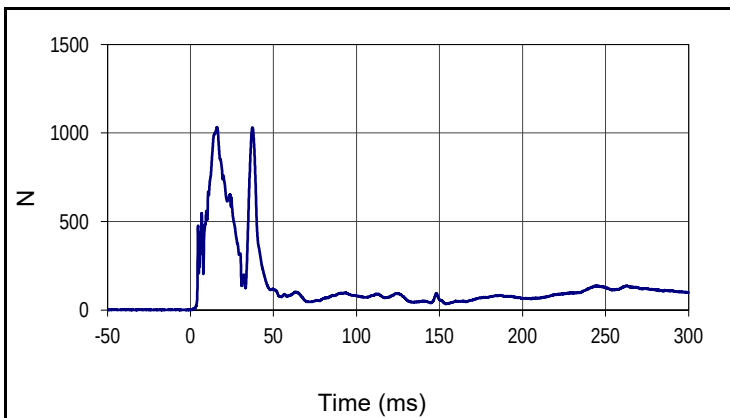
Curve Description			
3 YO Lower Neck Force X			
Plot No.		SAE Class	Units
013		1000	N
Max	Time	Min	Time
1013.1	15.8	-52.4	5.2



Curve Description			
3 YO Lower Neck Force Y			
Plot No.		SAE Class	Units
014		1000	N
Max	Time	Min	Time
293.5	39.2	-229.2	11.4



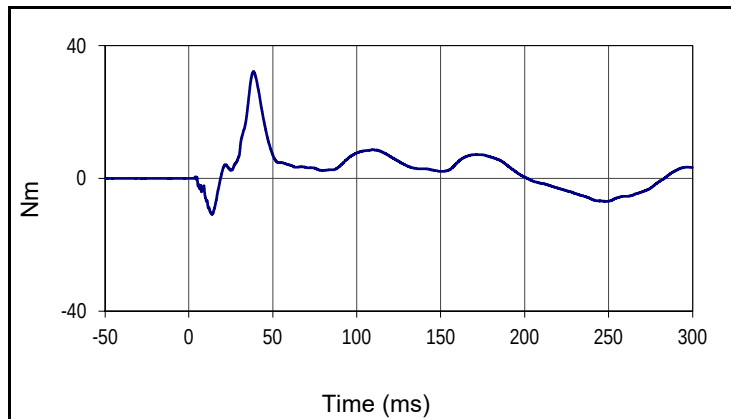
Curve Description			
3 YO Lower Neck Force Z			
Plot No.		SAE Class	Units
015		1000	N
Max	Time	Min	Time
844.7	37.0	-339.9	5.8



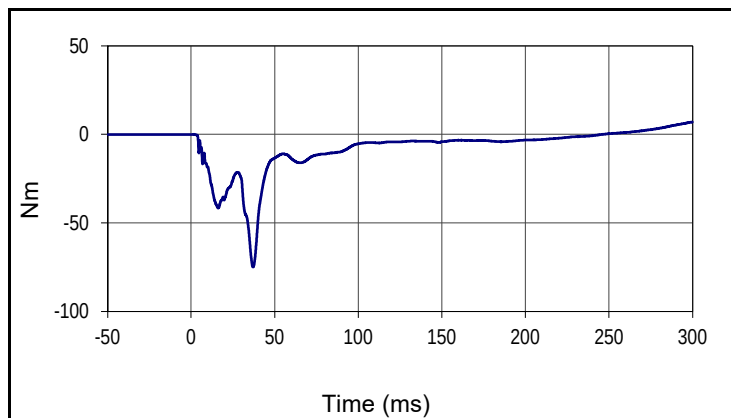
Curve Description			
3 YO Lower Neck Force Resultant			
Plot No.		SAE Class	Units
016		1000	N
Max	Time	Min	Time
1034.7	15.8	0.5	0.2

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

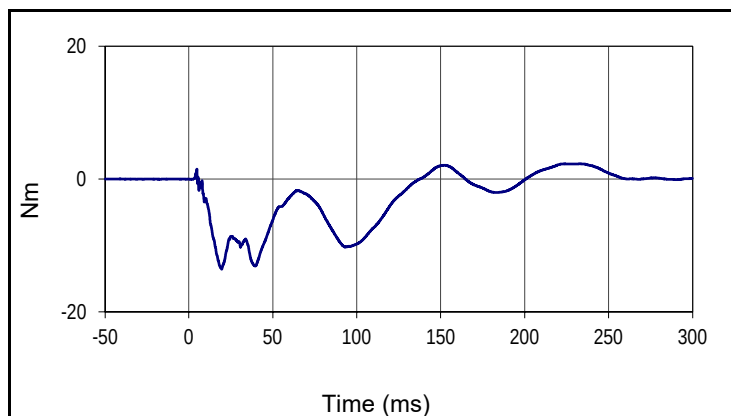
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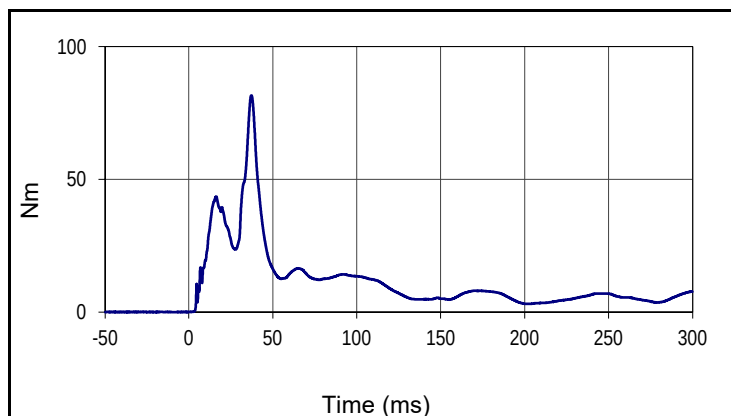
Curve Description			
3 YO Lower Neck Moment X			
Plot No.		SAE Class	Units
017		600	Nm
Max	Time	Min	Time
32.2	38.4	-10.9	13.7



Curve Description			
3 YO Lower Neck Moment Y			
Plot No.		SAE Class	Units
018		600	Nm
Max	Time	Min	Time
7.0	299.9	-74.9	37.0



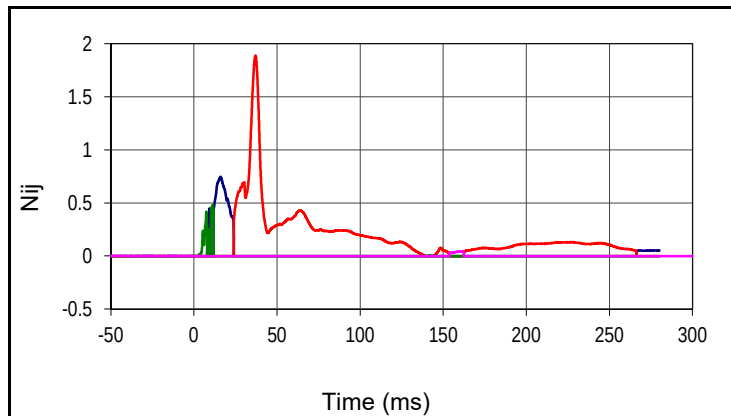
Curve Description			
3 YO Lower Neck Moment Z			
Plot No.		SAE Class	Units
019		600	Nm
Max	Time	Min	Time
2.3	232.9	-13.6	19.5



Curve Description			
3 YO Lower Neck Moment Resultant			
Plot No.		SAE Class	Units
020		600	Nm
Max	Time	Min	Time
81.6	37.2	0.0	1.1

Test Vehicle: 2020 Nissan Kicks 5-Door Hatchback
 Test Program: TWG 3.3.3.1

Test Date: 08/18/20
 NHTSA No.: M20205202TWG2



Curve Description		
Driver Nij		
Units	Max	Time
Ntf	0.75	16.0
Units	Max	Time
Nte	1.89	36.9
Units	Max	Time
Ncf	0.48	11.0
Units	Max	Time
Nce	0.04	160.4

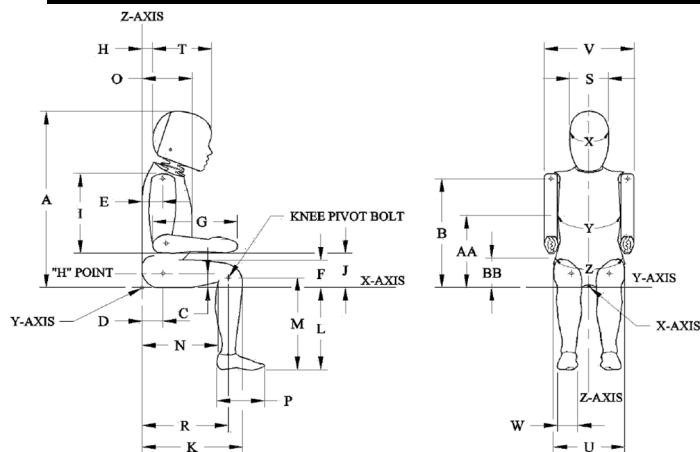
APPENDIX C
ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

ATD Serial No.: 044

Test Date: 2020-07-21

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
A - Total Sitting Height	mm	538.5	553.7	547	Pass
B - Shoulder Pivot Height	mm	307.4	322.6	317	Pass
C - H-Point Height	mm	34.3	44.5	40	Pass
D - H-Point Location From Backline	mm	56.9	67.1	60	Pass
E - Shoulder Pivot From Backline	mm	60.9	71.1	68	Pass
F - Thigh Clearance	mm	81.0	91.2	83	Pass
G - Back Of Elbow To Wrist Pivot	mm	247.4	262.6	256	Pass
H - Head Back To Backline	mm	48.2	58.4	54	Pass
I - Shoulder To- Elbow Length	mm	185.4	200.6	197	Pass
J - Elbow Rest Height	mm	133.6	148.8	144	Pass
K - Buttock To Knee Length	mm	284.8	300.0	296	Pass
L - Popliteal Height	mm	218.5	233.7	233	Pass
M - Knee Pivot Height	mm	241.6	256.8	255	Pass
N - Buttock Popliteal Length	mm	218.0	233.2	223	Pass
O - Chest Depth With Jacket	mm	138.5	153.7	144	Pass
P - Foot Length	mm	137.6	147.8	143	Pass
Q - Stature	mm	932.2	957.6	948	Pass
R - Buttock To Knee Pivot Length	mm	251.4	261.6	258	Pass
S - Head Breadth	mm	128.3	143.5	142	Pass
T - Head Depth	mm	167.4	182.6	173	Pass
U - Hip Breadth	mm	200.7	215.9	206	Pass
V - Shoulder Breadth	mm	236.5	251.7	248	Pass
W - Foot Breadth	mm	53.6	63.8	57	Pass
X - Head Circumference	mm	500.4	515.6	509	Pass
Y - Chest Circumference With Jacket	mm	527.1	552.5	547	Pass
Z - Waist Circumference	mm	527.1	552.5	534	Pass
AA - Ref. Location For Dimension Y	mm	248.9	259.1	253	Pass
BB - Ref. Location For Dimension Z	mm	160.0	170.2	162	Pass
Overall Test Results				Pass	Pass



Technician:

J. Hernandez

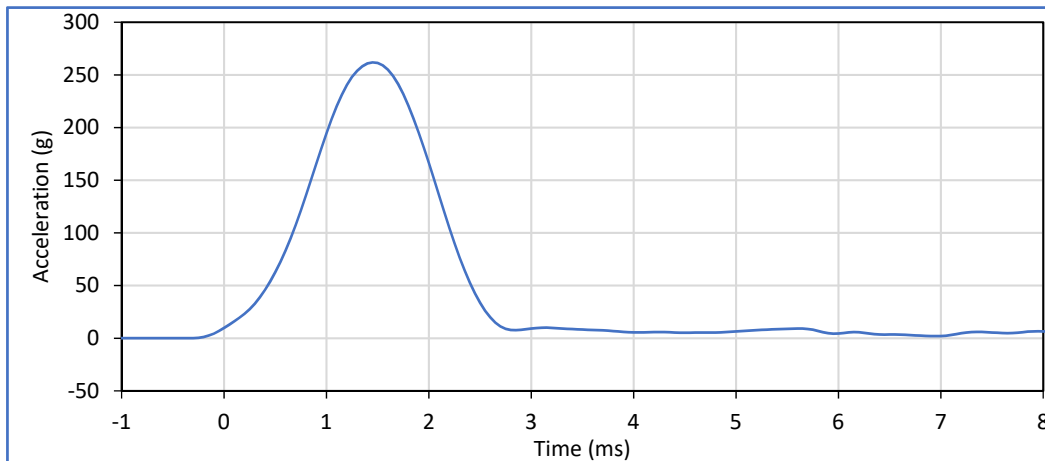
J. Hernandez

Approved By:

P. Puzzuto

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Peak Resultant Acceleration	g	250.0	280.0	261.9	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-1.7	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
			Overall Test Results	Pass	

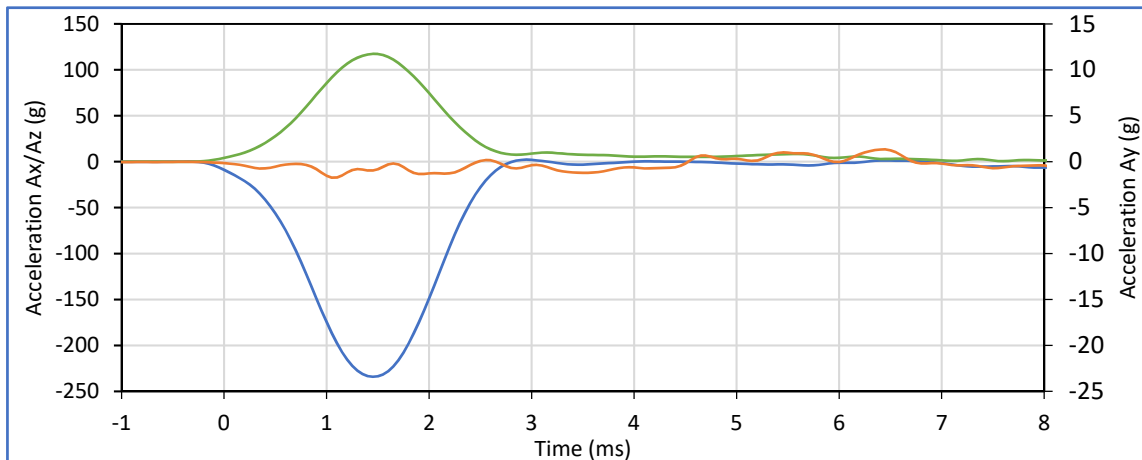


Head Resultant

Max:261.9@1.5

Min:1.1@10.0

SAE Class 1000



Head Ax

Max:2.3@3.0

Min:-234.1@1.5

SAE Class 1000

Head Ay

Max:1.3@6.5

Min:-1.7@1.1

SAE Class 1000

Head Az

Max:117.4@1.5

Min:-0.5@8.8

SAE Class 1000

Technician:

J. Hernandez

J. Hernandez

Approved By:

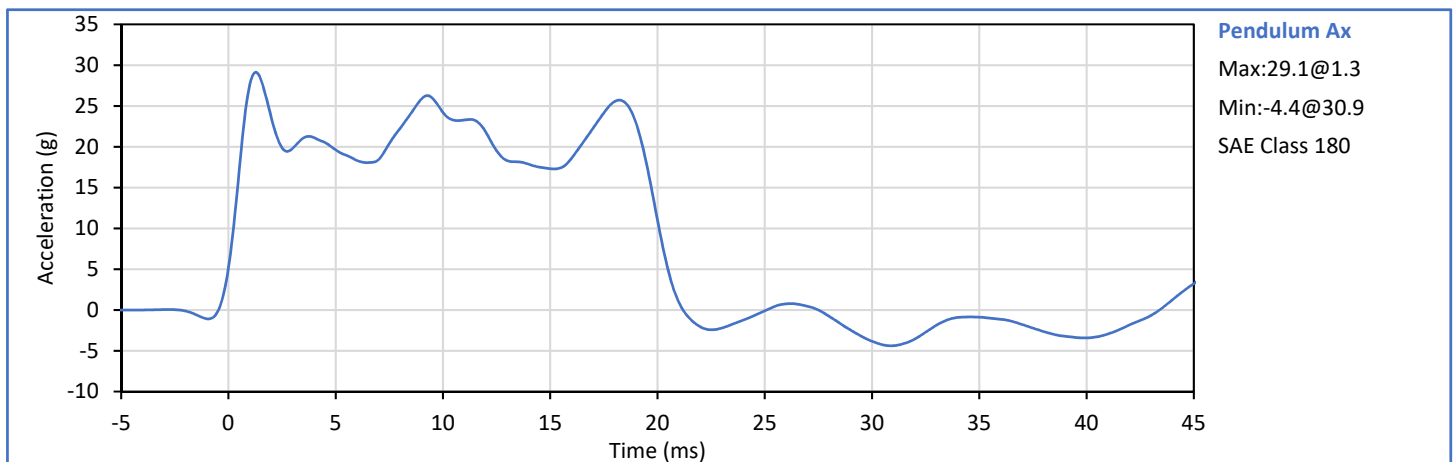
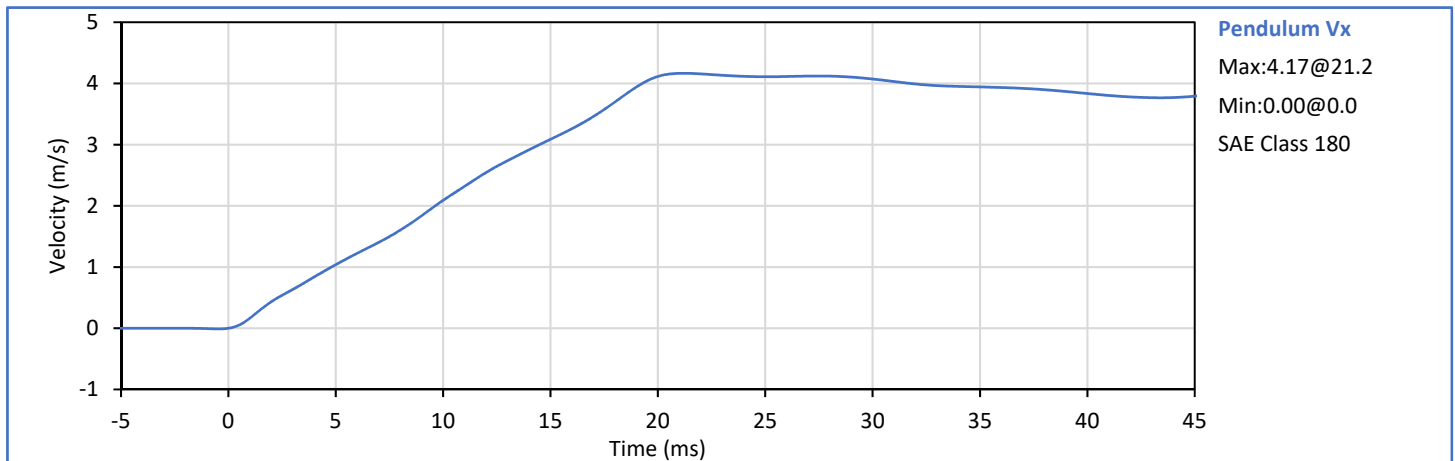
P. Puzzuto

P. Puzzuto

ATD Serial No.: 044

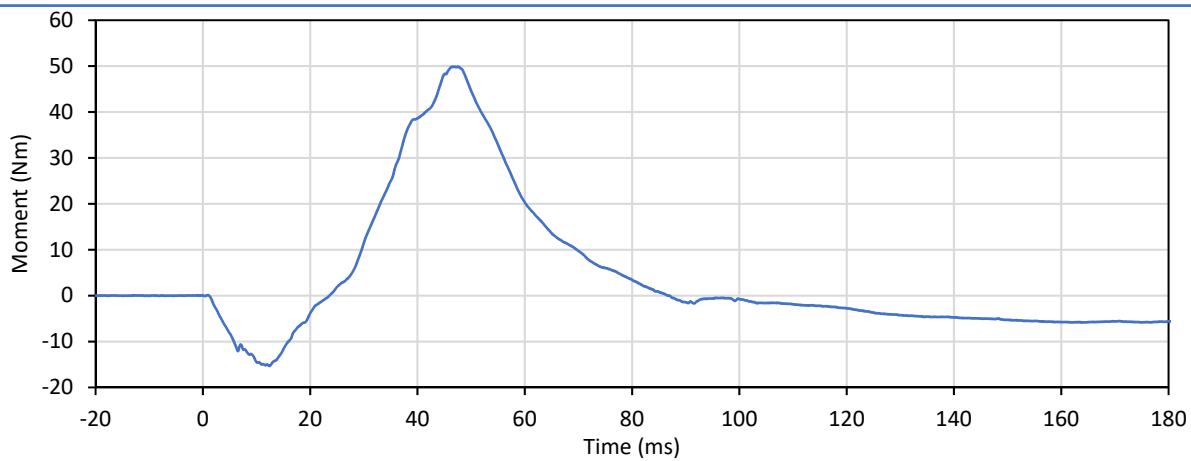
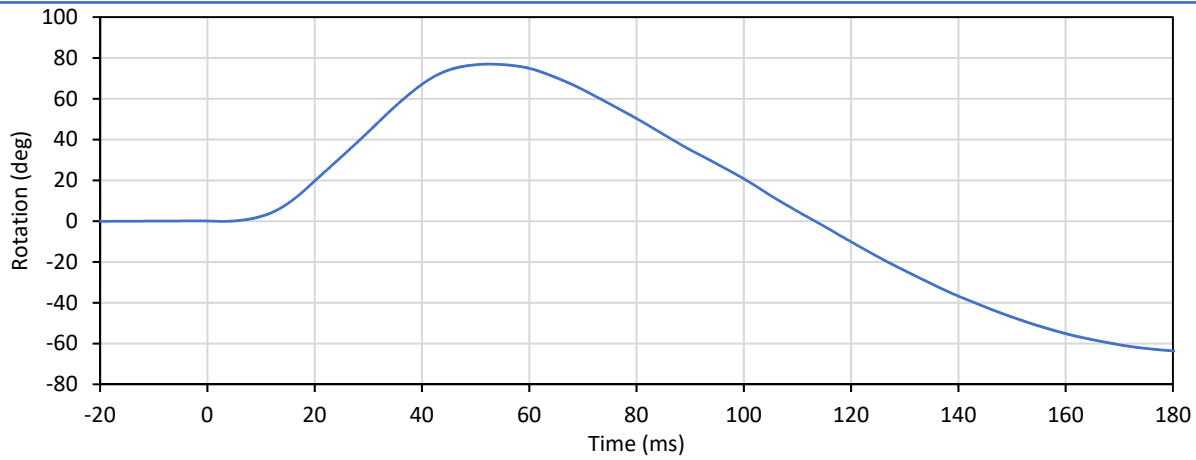
Test Date: 2020-07-21

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Pendulum Velocity	m/s	5.40	5.60	5.45	Pass
Pendulum Velocity at 10 ms	m/s	2.00	2.70	2.09	Pass
Pendulum Velocity at 15 ms	m/s	3.00	4.00	3.09	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.10	4.11	Pass
Peak Neck Negative My during Ry ≥70 to ≤82 deg.	Nm	42.0	53.0	49.9	Pass
	deg	70.0	82.0	75.8	Pass
Positive Neck My Decay to 10 Nm	ms	60.0	80.0	69.7	Pass
Overall Test Results				Pass	

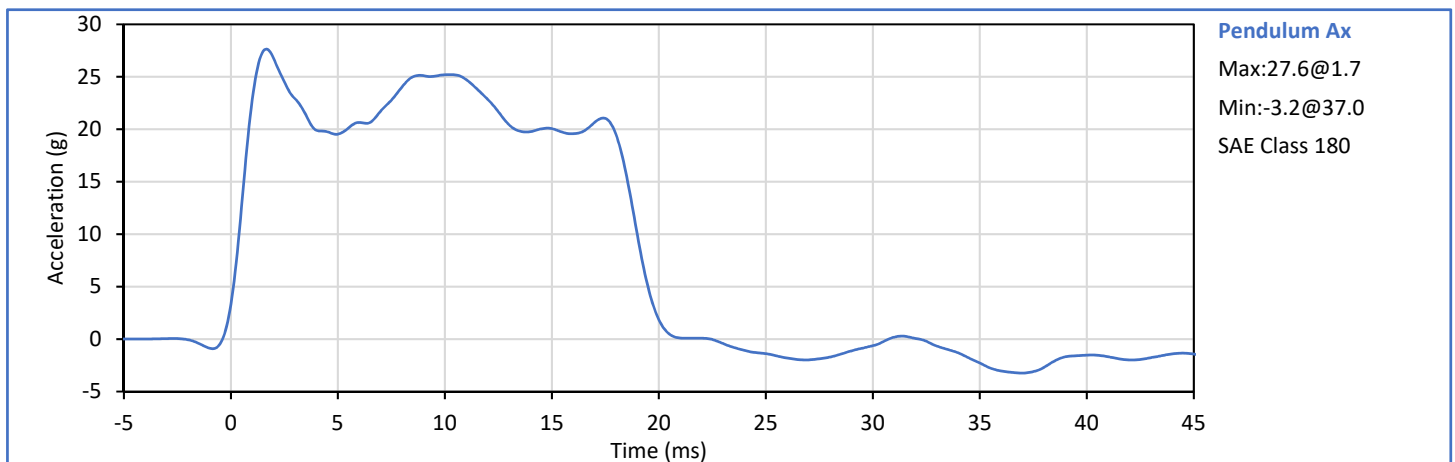
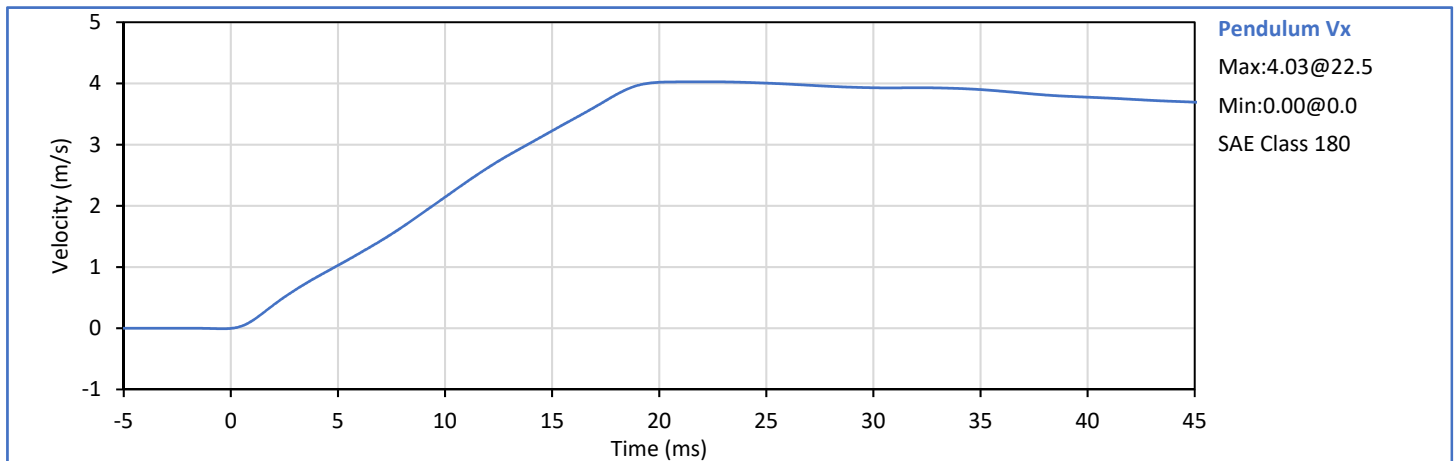


Technician: J. Hernandez

Approved By: P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	40	Pass
Pendulum Velocity	m/s	3.55	3.75	3.72	Pass
Pendulum Velocity at 6 ms	m/s	1.00	1.40	1.22	Pass
Pendulum Velocity at 10 ms	m/s	1.90	2.50	2.14	Pass
Pendulum Velocity at 14 ms	m/s	2.80	3.50	3.03	Pass
Peak Neck Negative My during Ry ≥83 to ≤93 deg.	Nm	-53.3	-43.7	-45.2	Pass
	deg	83.0	93.0	87.4	Pass
Negative Neck My Decay to -10 Nm	ms	60.0	80.0	69.3	Pass
Overall Test Results				Pass	



Technician:

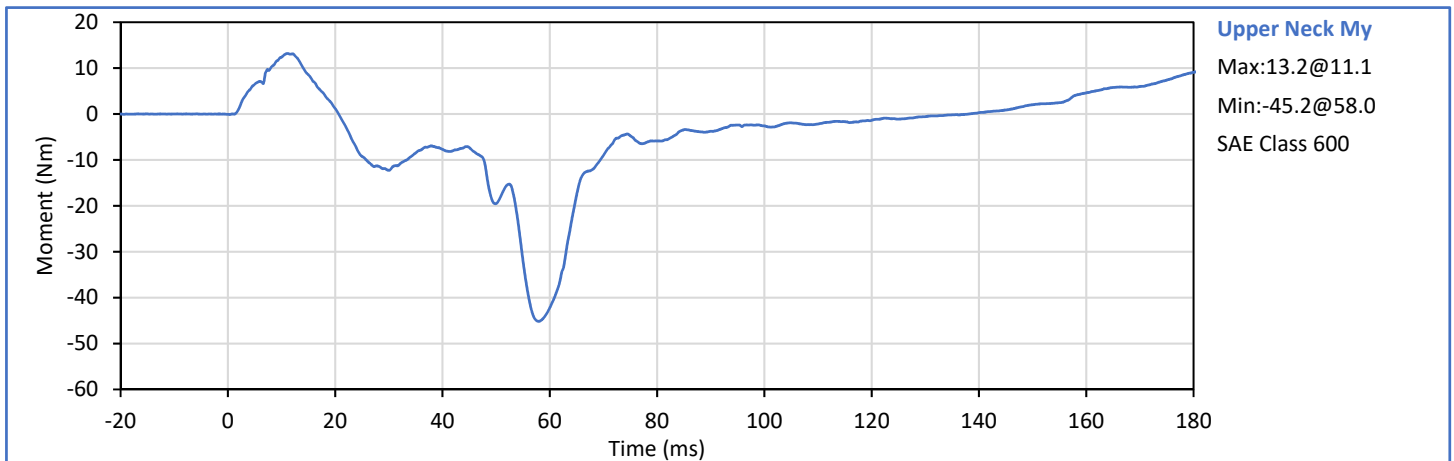
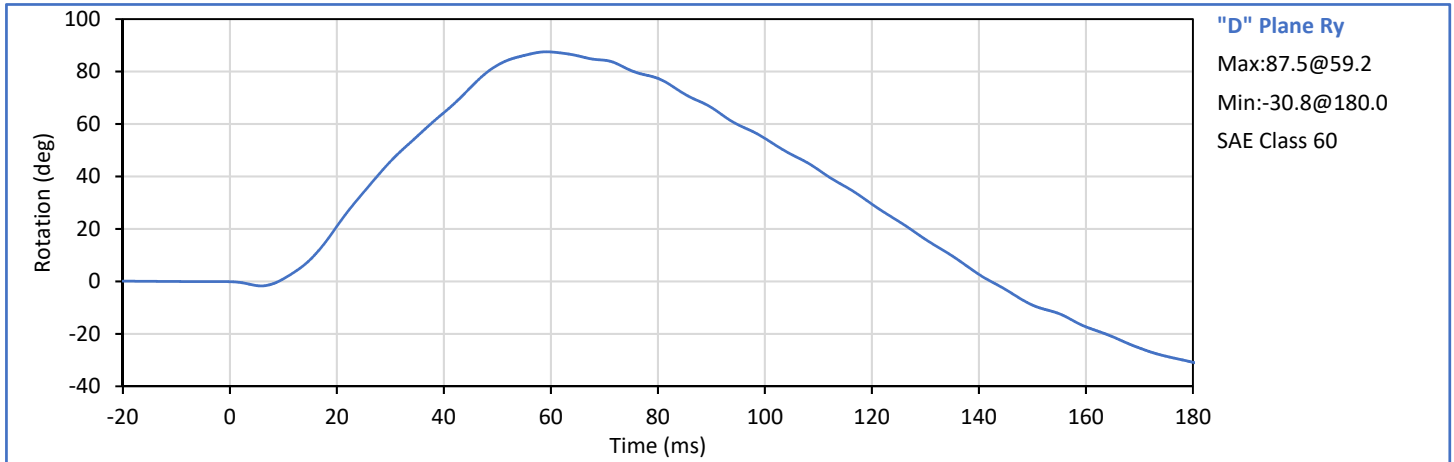
J. Hernandez

J. Hernandez

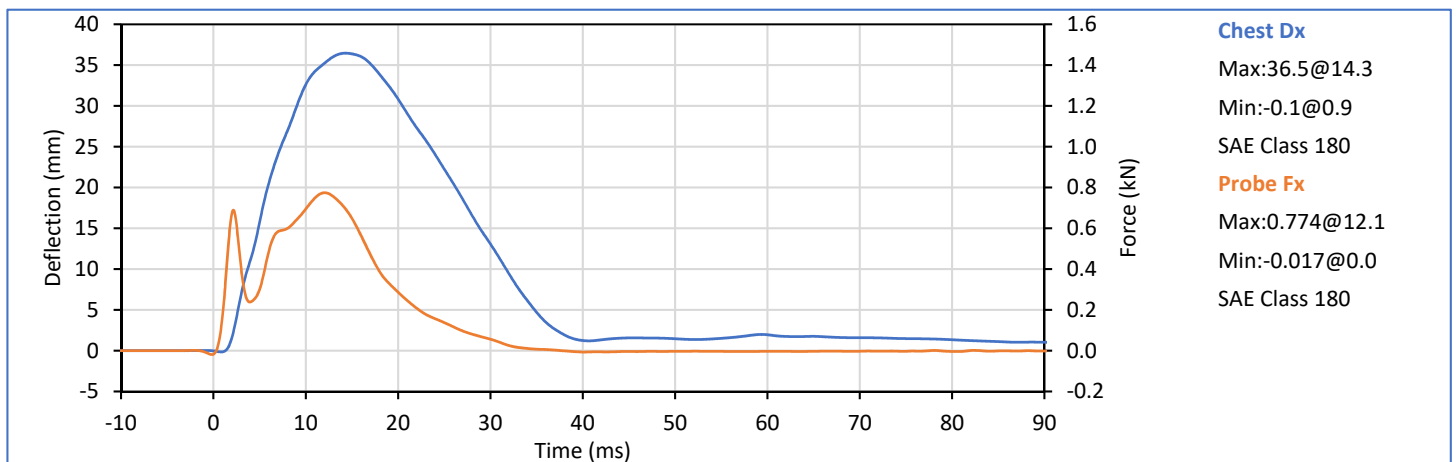
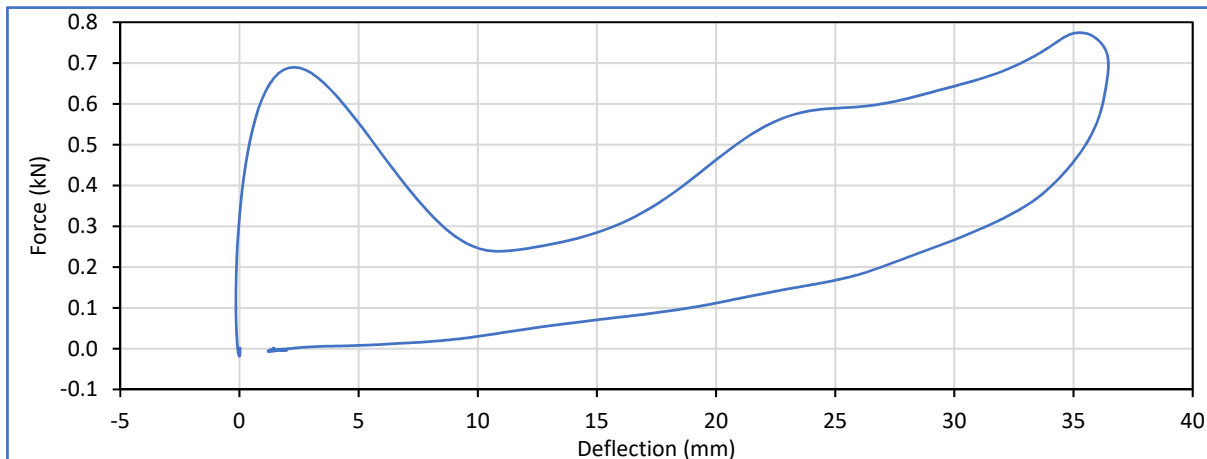
Approved By:

P. Puzzuto

P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	43	Pass
Probe Velocity	m/s	5.90	6.10	5.95	Pass
Peak Chest Deflection	mm	32.0	38.0	36.5	Pass
Peak Force from 32.0 to 38.0 mm	kN	0.680	0.810	0.774	Pass
Peak Force from 12.5 to 32.0 mm	kN	0.000	0.910	0.681	Pass
Internal Hysteresis	%	65.0	85.0	72.6	Pass
Overall Test Results				Pass	



Technician:

J. Hernandez

J. Hernandez

Approved By:

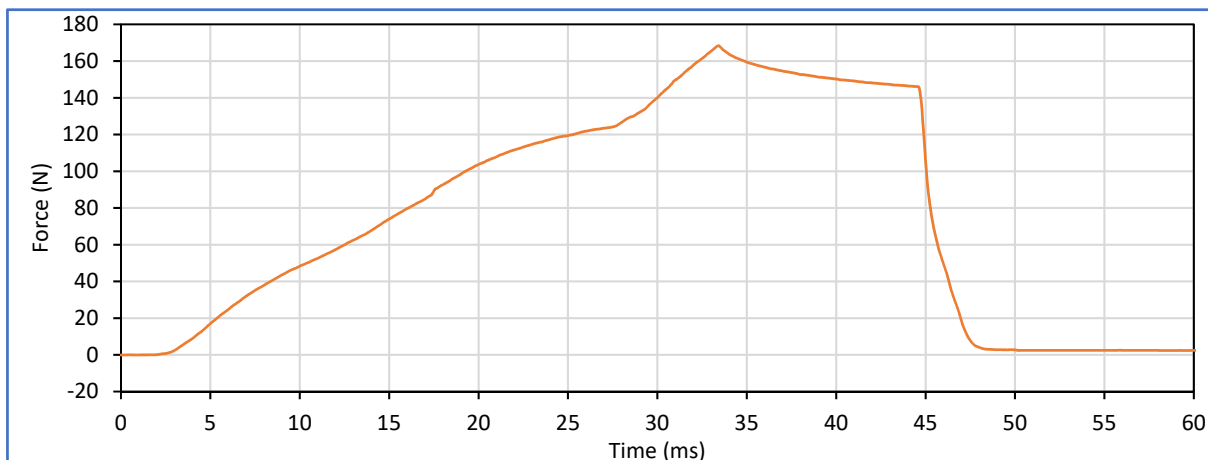
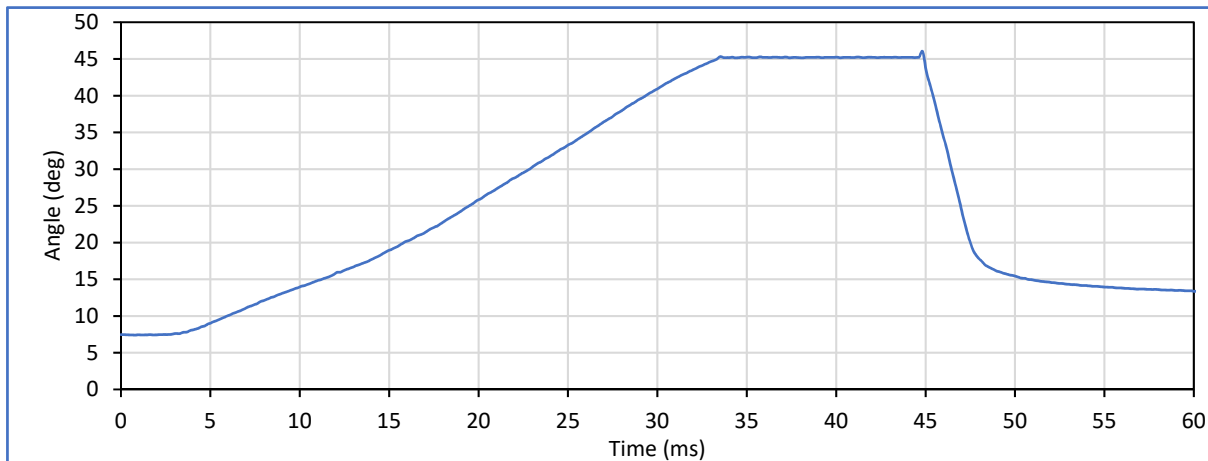
P. Puzzuto

P. Puzzuto

ATD Serial No.: 044

Test Date: 2020-08-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	30	Pass
Orientation Angle	deg	0.0	15.0	7.3	Pass
Peak Force at 45° (+/-0.5°)	N	130.0	180.0	168.1	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.27	Pass
Final Reference Plane Angle	deg	-10.0	10.0	4.6	Pass
Overall Test Results				Pass	



Technician:

J. Hernandez

J. Hernandez

Approved By:

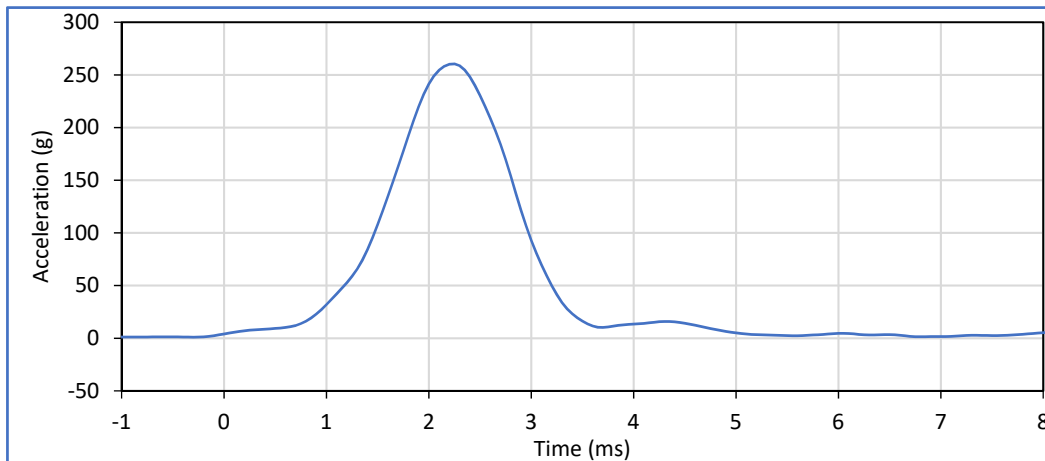
P. Puzzuto

P. Puzzuto

Post-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	

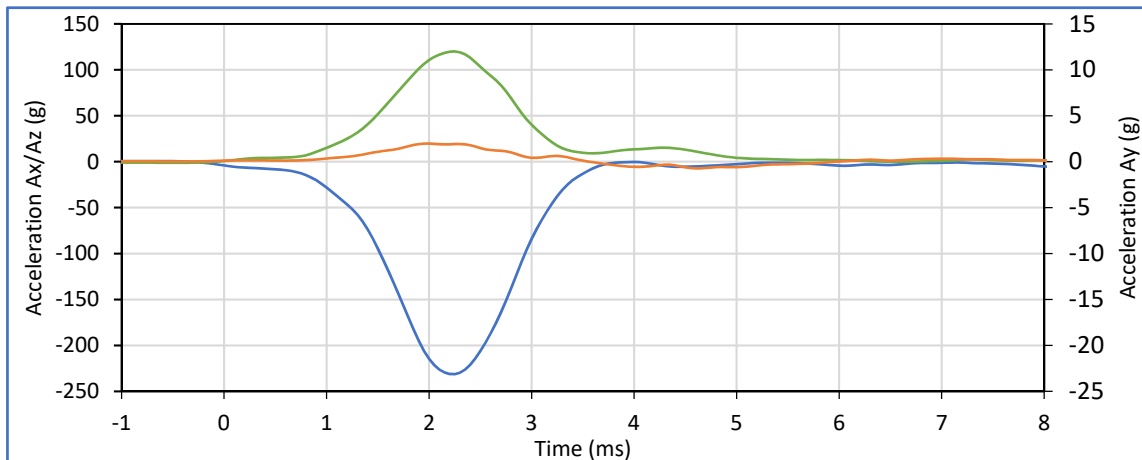


Head Resultant

Max:260.5@2.3

Min:1.4@6.8

SAE Class 1000



Head Ax

Max:-0.3@4.0

Min:-231.2@2.3

SAE Class 1000

Head Ay

Max:2.0@2.0

Min:-0.7@4.6

SAE Class 1000

Head Az

Max:120.0@2.3

Min:-3.4@10.0

SAE Class 1000

Technician:

J. Hernandez

J. Hernandez

Approved By:

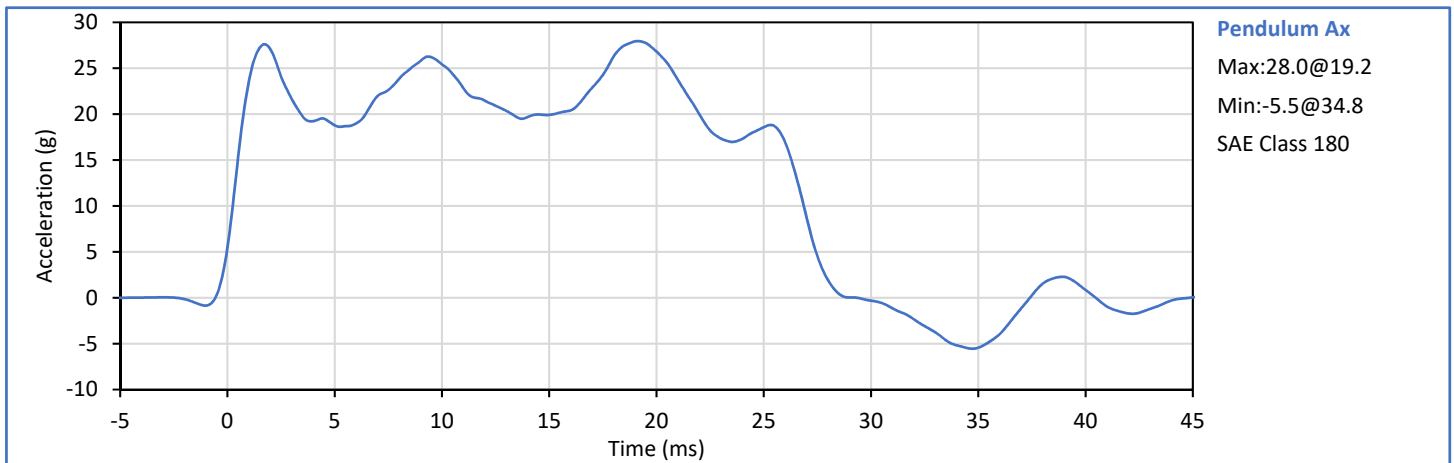
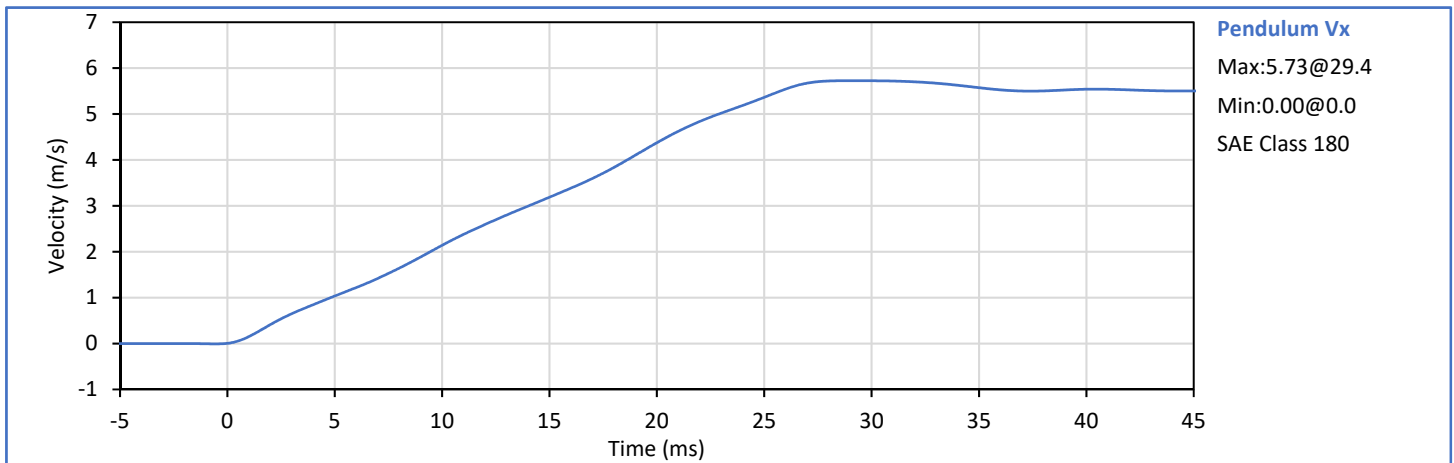
P. Puzzuto

P. Puzzuto

ATD Serial No.: 044

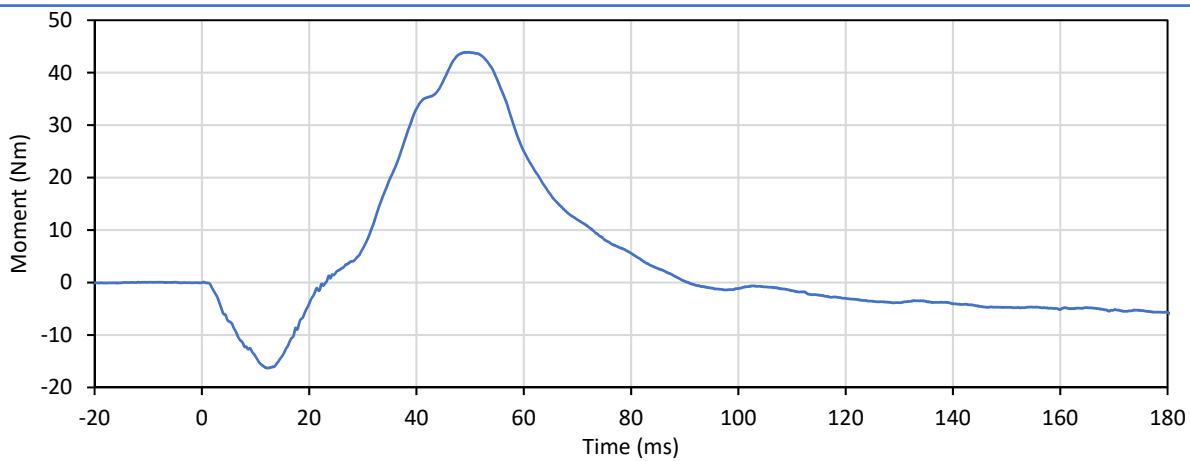
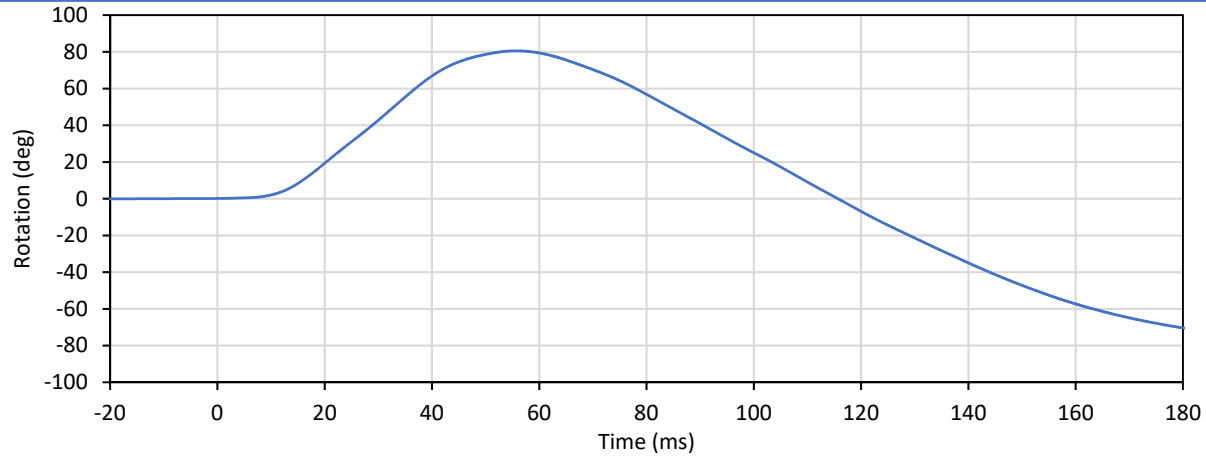
Test Date: 2020-08-19

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

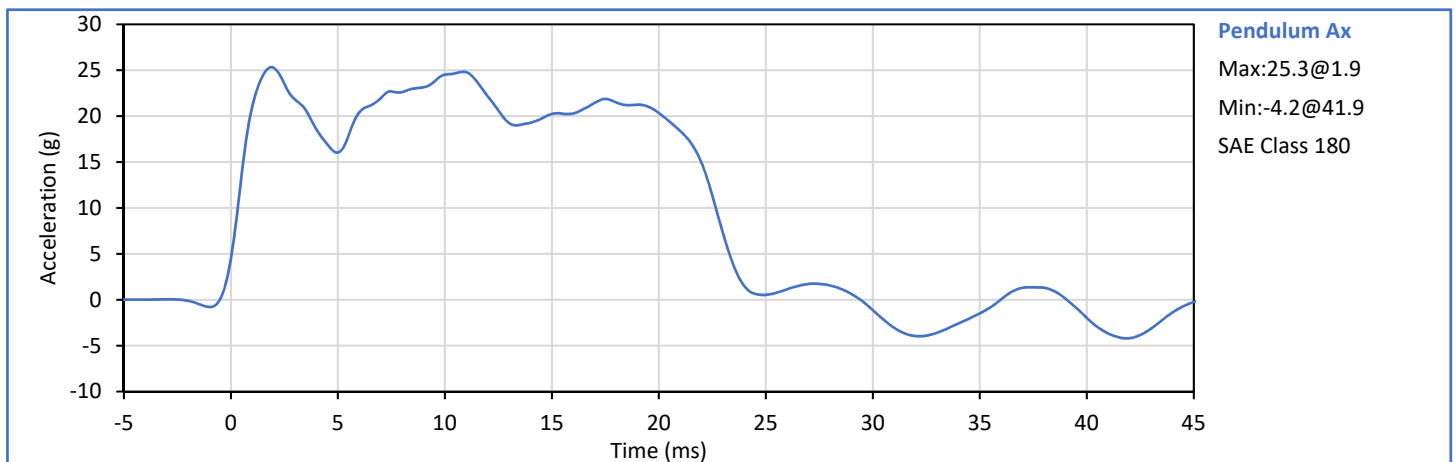
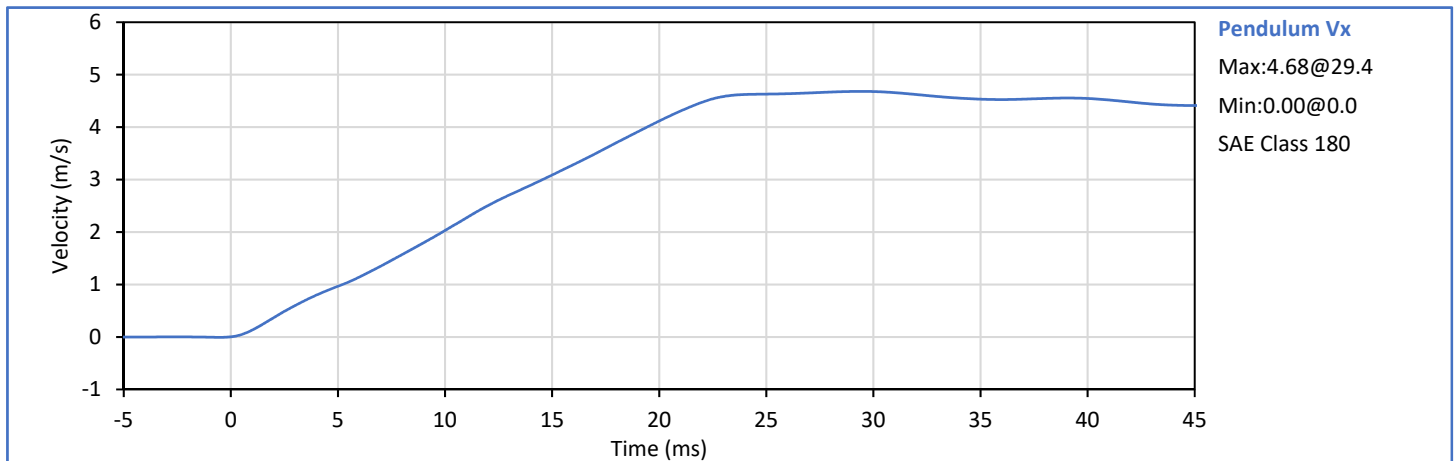
Approved By: P. Puzzuto



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	Pass



Technician:

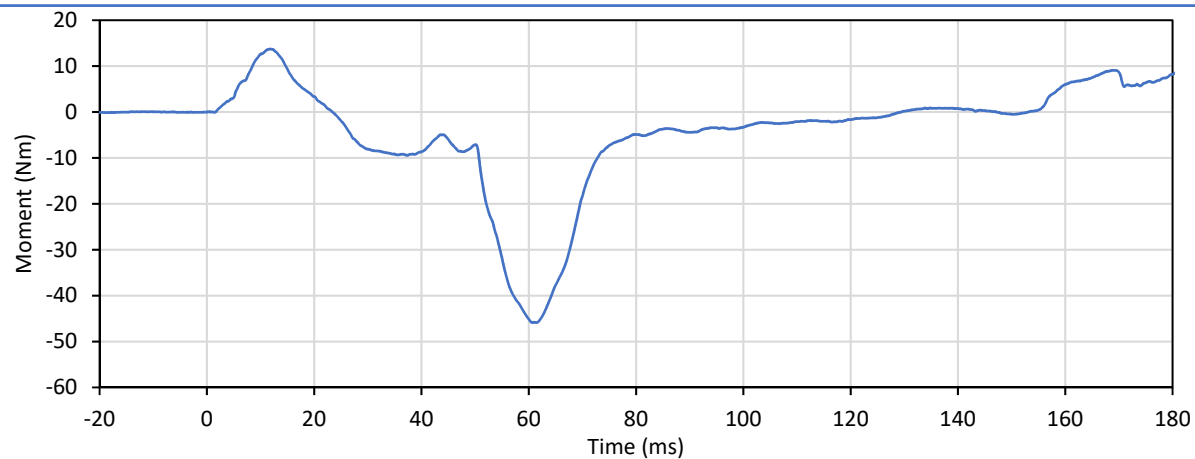
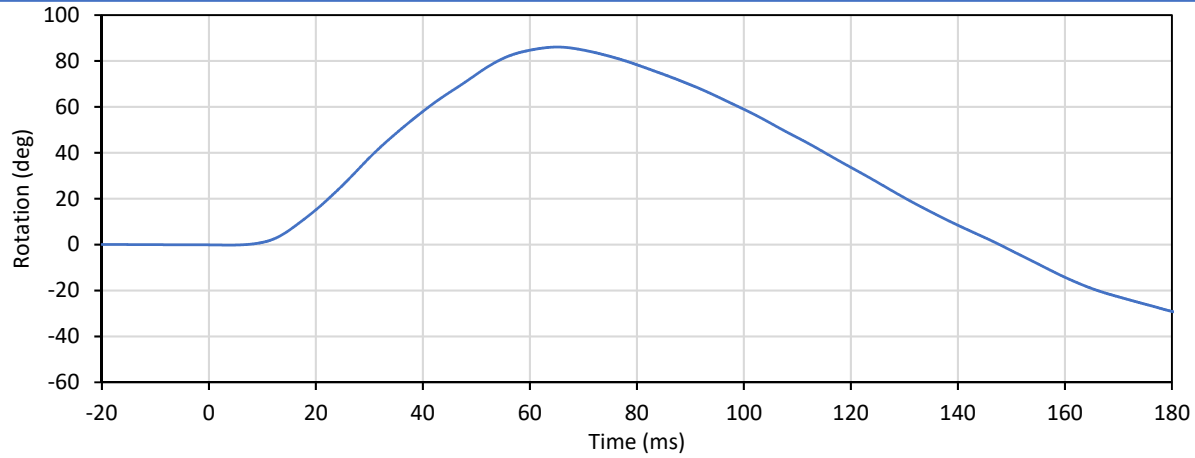
J. Hernandez

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