U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS No. 214, DYNAMIC SIDE IMPACT PROTECTION

-Moving Deformable Barrier Impact Test Requirements-

APPENDIX B
CHECK SHEETS

ENFORCEMENT
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Ave. SE
Washington, DC 20590

CHECK SHEETS

The check sheets provided in this Appendix contain step by step instructions to follow when conducting the pole test. The step by step method assures consistency in performing tasks such as preparing the test vehicle, positioning the test dummy, setting adjustable seats, etc. The use of check sheets enhances the repeatability of the test.

Contractors are required to provide draft copies of check sheets to the COTR for approval prior to conducting any compliance test for the OVSC. Contractors may alter the check sheets provided in this Appendix or generate other check sheets to use during the test. At a minimum, contractor generated check sheets must include all of the information on the check sheets provided in this Appendix. Copies of the actual check sheets used during the test must be submitted with the draft test report.

TABLE OF CONTENTS

CHECK SHEET NO. 1
Collect and Record Vehicle Specifications

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

__1 **Test Vehicle information**
Complete the table using information on the Monroney label, other vehicle labels and information supplied by the COTR;

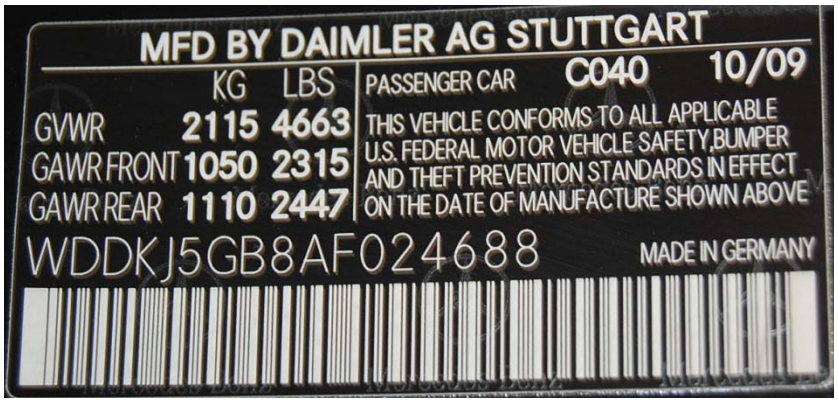
Test Vehicle Information	
Make	
Model	
VIN	
Body Style	
Body Color	
Engine Disp (liters)	
# of Cylinders	
Engine Placement	
Transmission Type	
Transmission Speeds	
Overdrive	
Final Drive	
Odometer Reading	

__2 **Test Vehicle Options**
Indicate whether the test vehicle is equipped with the following option, "Yes" or "No."

Optional Equipment	
Anti-lock Brakes (ABS)	
All-Wheel Drive (AWD)	
Traction Control System (TCS)	
Electronic Stability Control (ECS)	
Side Curtain Air bags	
Torso Air bag - Front seats	
Torso Air bag - Rear seats	
Combination/Head Torso Bag	
Pelvic Air bag - Front seats	
Pelvic Air bag - Rear seats	
Knee Air bag – Driver	
Knee Air bag - Front Passenger	
Seat belt pretentioners - Front seats	
Seat belt pretentioners - Rear seats	
Seat belt load limiters - Front seats	
Seat belt load limiters - Rear seats	
Tire pressure monitoring system (TPMS)	
Tilt Steering Wheel	
Automatic Door Locks (ADL)	
Power Window Auto-reverse	
Power Seats	

CHECK SHEET NO. 1 (Continued)
Collect and Record Vehicle Specifications

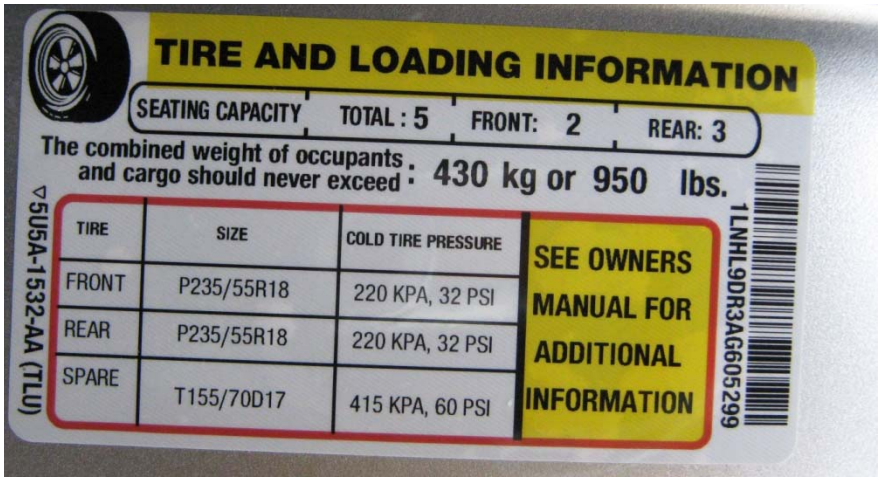
__3 **Data from Certification Label (Part 567)**
Complete the table using information from the certification label;



Manufactured by	
Date of Manufacture	
Vehicle Type	

GVWR (kg)	
GAWR Front (kg)	
GAWR Rear (kg)	

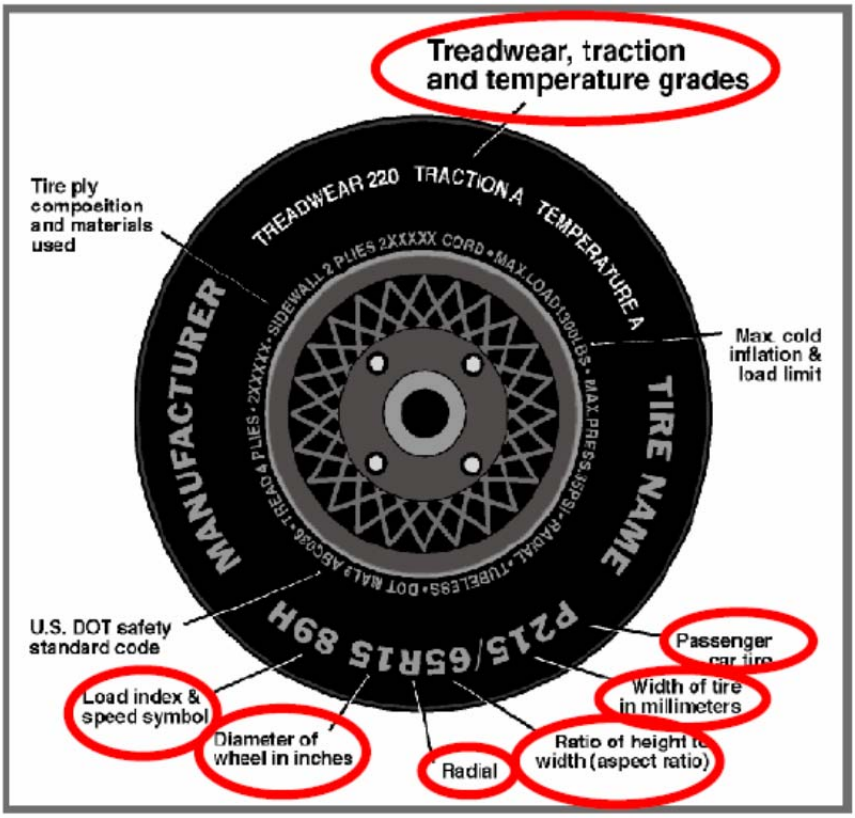
__4 **Vehicle Capacity Data**
Complete the table using information on the tire placard and supplied by the COTR;



	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)				
Number of Occupants (DSC)				
Vehicle Capacity Weight (VCW) (kg)				

CHECK SHEET NO. 1 (Continued)
Collect and Record Vehicle Specifications

__5 **Tire Information**
Complete the table using information from the tire placard and sidewalls;



Tire Placard	Front	Rear
Recommended Cold Pressure (kPa)		
Recommended Tire Size		
Tire Sidewall		
Maximum Tire Pressure (kPa)		
Tire Size on Vehicle		
Tire Manufacturer Model		
Tire Name		
Tire Type		
Tire Width		
Aspect Ratio		
Radial		
Wheel Diameter		
Load Index/Speed Symbol		
Tread wear		
Traction Grade		
Temperature Grade		

_____ _____
Signature **Completion Date**

CHECK SHEET NO. 2
Determine the Vehicle Test Weight and Attitude

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

__1 Determine the "As Delivered" Weight

__1.1 Fill the transmission with transmission fluid to full capacity.

__1.2 Top off the fuel tank to capacity supplied by the owner's manual.
__Record the useable fuel tank capacity supplied by the COTR (Form 1) _____liters
__Record the fuel tank capacity supplied in the owner's manual. _____liters

__1.3 Fill the coolant system to capacity

__1.4 Fill the engine with motor oil to the maximum mark on the dip stick

__1.5 Fill the brake reservoir with brake fluid to its normal level

__1.6 Fill the windshield washer reservoir to capacity

__1.7 Inflate the tires to the cold tire pressure on the tire placard. If no tire placard is available, inflate tires to the recommended pressure in the owner's manual and record below;

Tire placard pressure	RF_____	LF_____	RR_____	LR_____
Owner's manual pressure	RF_____	LF_____	RR_____	LR_____
Actual inflated pressure	RF_____	LF_____	RR_____	LR_____

__1.8 Weigh the vehicle at each wheel and add together to determine the "As Delivered" weight. Record the weight measurements on the "Vehicle Weight" table below.

__2 Calculate the Test Vehicle Target Weight (TVTW)

__2.1 Copy VCW from Check Sheet No. 1 = _____kg

__2.2 Copy the DSC from Check Sheet No.1 = _____

__2.3 Rated Cargo and Luggage Weight (RCLW) = VCW - (68.04 kg x DSC) = _____

__2.4 Is the vehicle certified as a truck, MPV or bus (see Check Sheet No.1)
__Yes, if the calculated RCLW is greater than 136 kg, use 136 kg as the RCLW.
__No, use the RCLW calculated in 2.3.

__2.5 TVTW = RCLW + wgt of test dummies + As Delivered Weight = _____ kg

__2.6 Fill in the table below;

Measured Parameter	Units	Value
As Delivered Weight	kg	
Weight of Test Dummies	kg	
Rated Cargo/Luggage Weight (RCLW)	kg	
Calculated Test Vehicle Target Weight (TVTW)	kg	

__3 Determine the "Fully Loaded" Weight

__3.1 With the vehicle in the As Delivered weight condition, drain the fuel system. Operate the engine until the fuel system is dry. Describe the operation of the fuel pump;

_____

_____

_____

_____

_____

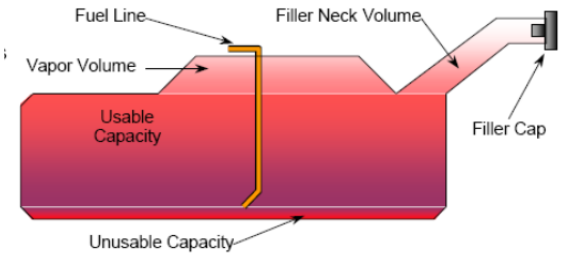
_____

_____

_____

_____

_____



VEHICLE FUEL TANK ASSEMBLY

CHECK SHEET NO. 2 (Continued)
Determine the Vehicle Test Weight and Attitude

__3.2 Using purple dyed Stoddard solvent having the physical and chemical properties of Type 1 solvent or cleaning fluid, Table 1, ASTM Standard D484-71,"Standard Specifications for Hydrocarbon Dry-cleaning Solvents," fill the fuel tank to 93 (± 1 %) of useable capacity through a 10 micron filter
Fuel tank capacity x 0.93 =_____liters Amount added =_____ liters
__3.3 Crank the engine to fill the fuel delivery system with Stoddard solvent.
__3.4 Load the vehicle with ballast equal to the RCLW from 2.3 or 2.4 whichever is applicable.
__3.5 Place the ballast in the cargo area. Center the load over the longitudinal centerline of the vehicle.
__3.6 Place the weight of the fully instrumented test dummies in the appropriate front outboard and rear seating positions.
__3.7 Weigh the vehicle at each wheel and add together to determine the "Fully Loaded Weight". Record the weight measurements on the "Vehicle Weight" table below

__4 Determine the Vehicle Attitude – "Fully Loaded" Weight
__4.1 Place the vehicle on a level surface.
__4.2 Exercise the suspension by rolling the vehicle forward and rearward approximately 4 to 6 feet.
__4.3 Repeat step 4.2, three to four additional times.
__4.4 Mark a reference point on the test vehicle's body, directly above each wheel opening.
__4.5 Measure the distance from ground to each of the four reference points. Record the measurements on the "Vehicle Attitude" table below.

__5 Determine the "As Tested" Weight
__5.1 With the vehicle in the Fully Loaded Weight condition, drain transmission fluid, engine coolant, motor oil, and windshield washer fluid.
__5.2 Remove the RCLW from the cargo area
__5.3 Secure instrumentation, equipment and cameras to the test vehicle.
__5.4 Weigh the vehicle at each wheel and add together to determine the "As Tested Weight". Record the weight measurements on the "Vehicle Weight" table below.
__5.5 If necessary, add ballast to achieve an As Tested Weight that falls within the required weight range (TVTW – 4.5kg to TVTW – 9 kg).
___N/A
Weight of ballast _____kg
As Tested Weight _____kg
__5.6 If necessary, remove vehicle parts in accordance with the list provided by the COTR to achieve an As Tested Weight that falls within the required weight range;
Vehicle Parts Removed_____
_____
_____
___N/A
Total Weight of vehicle parts _____kg
As Tested Weight _____kg
__5.7 Complete the table below;

Vehicle Weight

		As Delivered			Fully Loaded			As Tested		
	Units	**Front Axle**	**Rear Axle**	**Total**	**Front Axle**	**Rear Axle**	**Total**	**Front Axle**	**Rear Axle**	**Total**
Left	kg									
Right	kg									
Ratio	%									
Totals	kg									

CHECK SHEET NO. 2 (Continued)
Determine the Vehicle Test Weight and Attitude

__6 Determine the Vehicle Attitude – "As Tested" Weight

__6.1 Place the vehicle on a level surface.

__6.2 Using the same reference points to determine the vehicle's attitude in the "Fully Loaded" weight condition, measure the distance from ground and record on the "Vehicle Attitude" table below.

__7 Verify that the As Tested vehicle attitude meets requirement

The As Tested vehicle attitude is equal to the Fully Loaded attitude ± 10mm (S8.2). For each wheel opening, compute the difference between the As Delivered and Fully Loaded attitude and record on the table below.

__7.1 Complete the table by indicating (Yes, No) in the column labeled "Meets Reqmnt."

Vehicle Attitude

Wheel Opening Loc	Distance (grd to ref. point above wheel opening in mm)		Diff (Δ mm)	Meets Reqmnt (Δ ≤ 10 mm)
	Fully Loaded	As Tested		
Left Front				
Right Front				
Left Rear				
Right Rear				

__7.2 If any measurement of the As Tested attitude does not meet the requirement, adjust the load by shifting ballast, instrumentation and/or cameras.

__7.3 Repeat steps 6.1 thru 7.1.

__7.4 If any measurement of the As Tested attitude does not meet the requirement, contact the COTR.

_____ _____

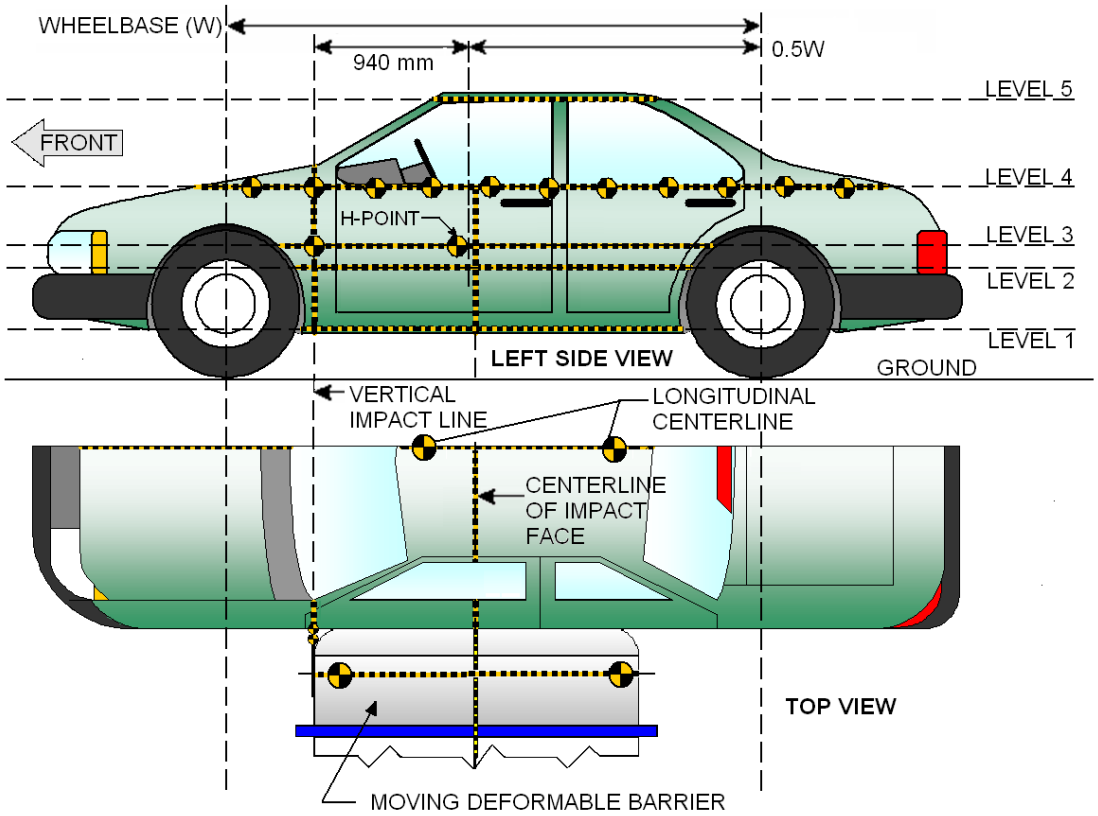
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 3

Affix Photographic Targets to the Test Vehicle

Test Vehicle:_____ Technician:_____

Test Facility:_____ Start Date:_____



__1 **Tape the Struck Side of the Test Vehicle**

Affix 25 mm (1 inch) wide checkerboard tape (yellow/black or other colors that contrast the test vehicle's body color) horizontally along the struck side of the test vehicle at each level indicated in the chart below. Measure and record the vertical distance from ground to each level (top edge of the tapeline) along a vertical line passing through the B-Pillar or front door striker.

__1.1 Top of side sill – Affix tape along the door sill from front to the rear wheel-wells.

__1.2 Occupant H-point – Project the location of the H-point determined by the H-point manikin laterally through the door to its exterior panel. Affix tape to the side body panels so that the tape intersects the H-point.

__1.3 Mid-door - Measure the height of the front door body panel at two different locations that are at least 600 mm apart. Take the average of the two measurements. Mark this point on the exterior door panel. Affix tape to the side body panels so that the tape intersects this point.

__1.4 Window Sill - Affix tape just below the front door window sill.

__1.5 Top of Window - Affix tape just above the top of the front door window.

LEVELS	Vertical distance from ground (mm)
1 – Top of side sill	_____
2 – Occupant H-Point	_____
3 – Mid-door	_____
4 – Window Sill	_____
5 – Top of window	_____

CHECK SHEET NO. 3 (Continued)
Affix Photographic Targets to the Test Vehicle

__2 **Tape the vertical impact reference line**
Determine the wheelbase of the test vehicle (See Check Sheet No. 4) and record below.
Wheelbase = _____mm

__2.1 PASSENGER CARS – WB ≤ 2,896 mm
Affix 25 mm (1 inch) wide tape vertically along the vehicle body 940 mm ± 5 mm forward of the center of the test vehicle's wheelbase.
__N/A

__2.2 PASSENGER CARS, MPVS, LIGHT TRUCKS AND VANS – WB > 2,896 mm
Affix 25 mm (1 inch) wide tape vertically along the vehicle body 508 mm ± 5 mm rearward of the test vehicle's front axle centerline.
__N/A

__2.3 MPVS, LIGHT TRUCKS AND VANS– WB ≤ 2,489 mm
Affix 25 mm (1 inch) wide tape vertically along the vehicle body 305 mm ± 5 mm rearward of the centerline of the test vehicle's front axle.
__N/A

__2.4 MPVS, LIGHT TRUCKS AND VANS – 2,489 mm < WB ≤ 2,896 mm
Affix 25 mm (1 inch) wide tape vertically along the vehicle body 940 mm ± 5 mm forward of the center of the test vehicle's wheelbase.
__N/A

__2.5 Measure and record the distance from the center of the front axle to the edge of the tape.
Target Vertical Ref. Impact Line Aft of Front Axle Centerline _____mm

__3 **Affix Targets to the Struck side of the Test Vehicle**

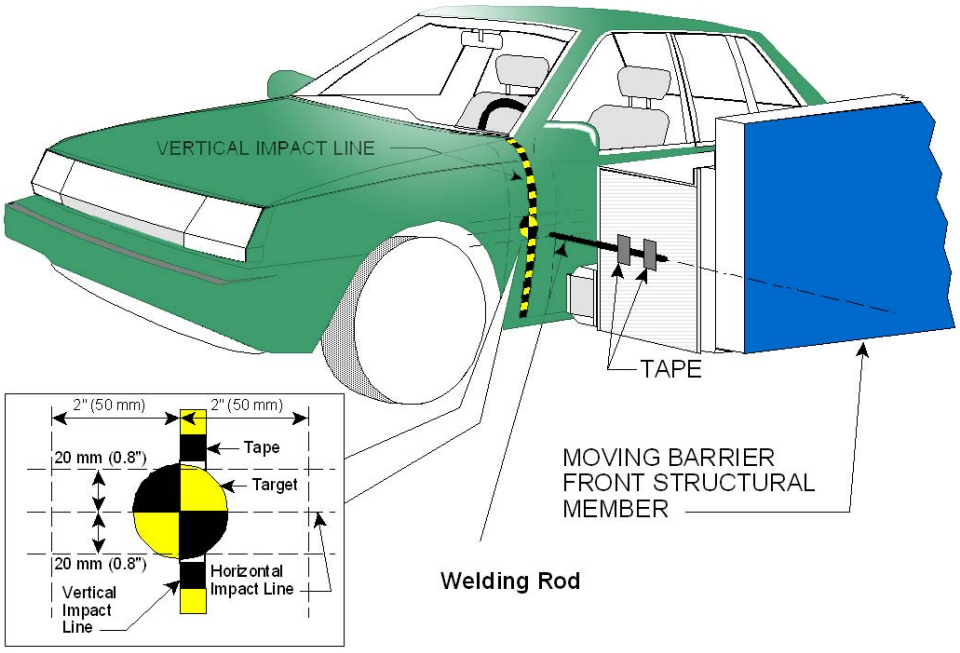
__3.1 Affix targets every 300 mm along the LEVEL 4, window sill tape line.

__3.2 Affix a target at the approximate location of the vehicle's center of gravity (CG)

__3.3 Affix a target to the door or side panel to denote hip pivot center of the test dummy placed in the front outboard seat

CHECK SHEET NO. 3 (Continued)
Affix Photographic Targets to the Test Vehicle

__3.4 Using the figure below as a guide, affix a 50 mm (2 inch) diameter photo target on the vertical impact reference line at the mid-door level.



__4 Tape the Roof and Hood

Affix 25 mm (1 inch) wide checkerboard tape on the hood and roof along the longitudinal centerline of the entire vehicle (excluding glazing surfaces).

__5 Affix Targets to the Roof

__5.1 Affix two 100 mm (4-inch) diameter targets 700mm apart (at target centers) on the roof's longitudinal centerline.

__5.2 If the vehicle has a sunroof, do not affix targets to any glazing. Maximize the distance between the targets assuring that the targets only lie on the roof's body panel.

__N/A

__5.3 Record the diameter of the targets and distance between them.

Roof Target Dia. _____mm Distance between target centers_____mm

__6 Affix Vehicle ID placards

Affix vehicle ID placards with the following information to the roof, struck side, front and rear of the test vehicle;

Name of the test laboratory
The words "FMVSS No. 214 MDB Test"
NHTSA number
Vehicle year, make and model
Date of the test

_____ _____

I certify that I have read and performed each instruction. Completion Date

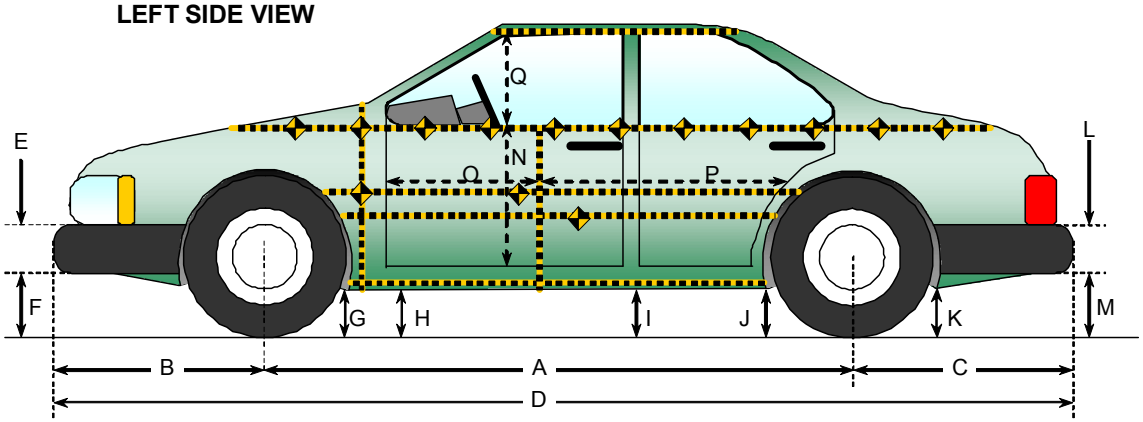
CHECK SHEET NO. 4

Take Pre and Post test Vehicle Measurements

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

Using the schematic as a guide, take the following measurements prior to impact with the vehicle in the "As Tested" condition resting on a level surface and posttest, at the same points, with the vehicle's tires inflated and resting on a level surface. Compute the difference between pretest and posttest measurements and record all measurements on the table.

LEFT SIDE VIEW



Code	Description	Pre-Test	Post-Test	Δ Diff
A	Wheelbase			
B	Front Axle to FSOV			
C	Rear Axle to RSOV			
D	Total Length at Centerline			
E	Front Bumper Thickness			
F	Front Bumper Bottom to Ground			
G	Sill Height at Front Wheel Well			
H	Sill Height at Front Door Leading Edge			
I	Sill Height at B Pillar			
J1	Sill Height at Rear Wheel Well			
J2	Pinch Weld Height at Rear Wheel Well			
K	Sill Height Aft of Rear Wheel Well			
L	Rear Bumper Thickness			
M	Rear Bumper Bottom to Ground			
N	Sill Height to Window Bottom Sill			
O	Front Door Leading Edge to Impact CL			
P	Rear Door Trailing Edge to Impact CL			
Q	Front Window Opening			
R	Right Side Length			
S	Left Side Length			
T	Vehicle Width at B-Pillar			

CHECK SHEET NO. 4 (Continued)

Take Pre and Post test Vehicle Measurements

__A *Wheelbase* – front axle centerline to rear axle centerline
__B *Front Axle to FSOV* - The longitudinal distance between the front axle centerline and the most forward surface of the vehicle
__C *Rear Axle to RSOV* - The longitudinal distance between the rear axle centerline and the most rearward surface of the vehicle
__D *Total length at Centerline* - Overall length of the vehicle measured at its longitudinal centerline
__E *Front Bumper Thickness* – the vertical height of the front bumper fascia
__F *Front Bumper Bottom to Ground* - Vertical distance from ground to the bottom of the front bumper fascia
__G *Sill Height at the Front Wheel Well* - Vertical distance from ground to the sill at the front wheel well opening
__H *Sill Height at the Front Door Leading Edge* - Vertical distance from ground to the sill at the front door seam
__I *Sill Height at B-Pillar* - Vertical distance from ground to the sill in line with the front door striker or B-pillar if no striker exists
__J1 *Sill Height at Rear Wheel Well* - Vertical distance from ground to the sill at the rear wheel well opening
__J2 *Pinch Weld Height at Rear Wheel Well* – Vertical distance from ground to the pinch weld at the rear wheel well opening
__K *Sill Height Aft of Rear Wheel Well* - Vertical distance from ground to the vehicle sheet body at the rear of the rear tire's wheel well
__L *Rear Bumper Thickness* – vertical height of the rear bumper fascia
__M *Rear Bumper Bottom to Ground* - Vertical distance from the ground to the rear bumper
__N Sill Height to Bottom of Front Window Sill - Vertical distance from the bottom of the door to the bottom of the window sill
__O *Front Door Leading Edge to Impact CL* - Longitudinal distance from the vertical impact reference line to the front door seam
__P *Rear Door Trailing Edge to Impact CL* - Longitudinal distance from the vertical impact reference line to the rear door seam
__Q *Front Window Opening* - Vertical distance that measures the front window opening on the impact side
__R Right Side Length – longitudinal distance of the side of the vehicle measured along a plane parallel to its longitudinal centerline
__S Left Side Length – longitudinal distance of the side of the vehicle measured along a plane parallel to its longitudinal centerline
__T *Vehicle Width at the B-Pillar* - The width of the vehicle measured laterally across the width of the vehicle at its B-Pillar

_____ _____

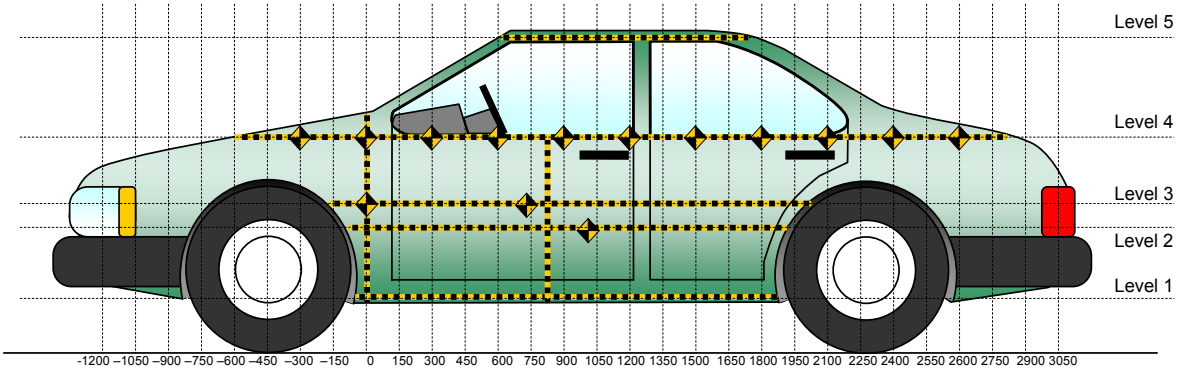
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 5

Vehicle Exterior Static Crush Measurements

Test Vehicle:_____ Technician:_____

Test Facility:_____ Start Date:_____



All Measurements Shown in mm

LEFT SIDE VIEW

__1 Prior to the test, with the vehicle in the "As Tested" condition, establish a fixed reference plane parallel to the vehicle's longitudinal centerline.

__2 Measure from the fixed reference plane to the exterior vehicle body surface across the entire length of the impact side at all five levels determined in Check Sheet No. 3. Take measurements at 150mm intervals forward and rearward of the impact reference line. Record on the table below. Mark the location where each measurement is taken for future reference.

__3 Post-test place the test vehicle on a flat, level surface. Inflate the test vehicle's tires to maximum cold pressure.

__4 Using the same reference locations established in step 2 above, begin taking static crush measurements at the first 150mm interval forward of the forward-most point of the induced body damage and end at the first 150 mm interval past the rearward-most point of induced body damage. Record measurements on the table below.

__5 Compute the difference (i.e., static crush) between pre-test and posttest measurements at each interval and record measurements in the table below.

CHECK SHEET NO. 5 (Continued)

Vehicle Exterior Crush Measurements

	Pre-Test					Post-Test					Diff Δ				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300															
-150															
0															
150															
300															
450															
600															
750															
900															
1050															
1200															
1350															
1500															
1650															
1800															
1950															
2100															
2250															
2400															
2550															
2700															
2850															

__6 For each level 1 thru 5, record the vertical height above ground. Compute the maximum static crush at each level. Record the maximum static crush and the distance from the impact line (i.e., a vertical line that intersects the actual impact point) on the table below.

Level	Measurement Description	Maximum Exterior Static Crush	Distance from Impact Line	Height Above Ground
1	Sill Top			
2	Occupant H-Point			
3	Mid-Door			
4	Window Sill			
5	Window Top			

__7 For each level 1 thru 5, plot (x-distance from impact in 150 mm intervals, y-static crush measurement)

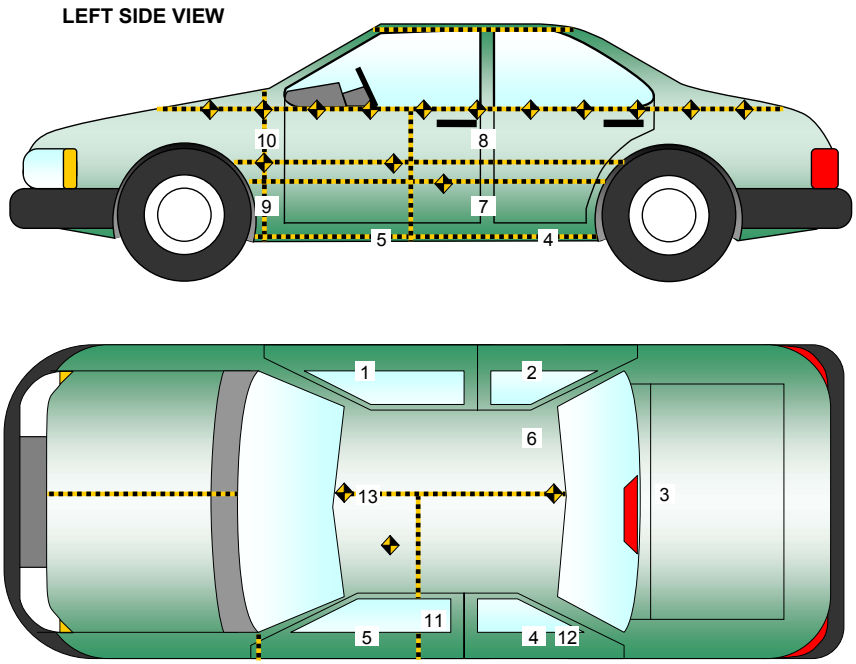
_____ _____

I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 6

Attach Accelerometers to the Test Vehicle

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____



Attach accelerometers to the test vehicle at the locations indicated below using the schematic as a guide. Record the coordinates, serial number, manufacturer and last calibration date of each accelerometer on the table below.

__1 Mount an array of X, Y and Z direction accelerometers mounted on the opposite side to the impacted side sill at the front seat.
__2 Mount an array of X, Y and Z direction accelerometers mounted on the opposite side to the impacted side sill at the rear seat.
__3 Mount an array of X, Y and Z direction accelerometers mounted on the rear floor pan above the axle.
__4 Mount a uniaxial accelerometer mounted on the impacted side sill in line longitudinally with the center of the widest portion of the rear door and located under the sill inward of pinch welds.
__5 Mount a uniaxial accelerometer on the impacted side sill in line longitudinally with the center of the widest portion of the front door and located under the sill inward of pinch welds to provide Ay data.
__6 Mount a uniaxial accelerometer in the rear occupant compartment to provide Ay data.
__7 Mount a uniaxial accelerometer on the impacted lower B-Post (located 1/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.
__8 Mount a uniaxial accelerometer on the impacted middle B-Post (located 2/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.
__9 Mount an uniaxial accelerometer on the impacted lower A-Post (located 1/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data
__10 Mount a uniaxial accelerometer on the impacted middle A-Post (located 2/3 the distance from the floor to the bottom of the doors window opening) to provide Ay data.
__11 Mount a uniaxial accelerometer on the front seat track nearest the impacted door and approximately aligned with the dummy's H-point to provide Ay data.
__12 Mount a uniaxial accelerometer on the rear seat track or structure nearest the impacted door and approximately aligned with the dummy's H-Point to provide Ay data.
__13 Mount an array of X, Y and Z direction accelerometers on the floor at the vehicle CG.

CHECK SHEET NO. 6

Attach Accelerometers to the Test Vehicle

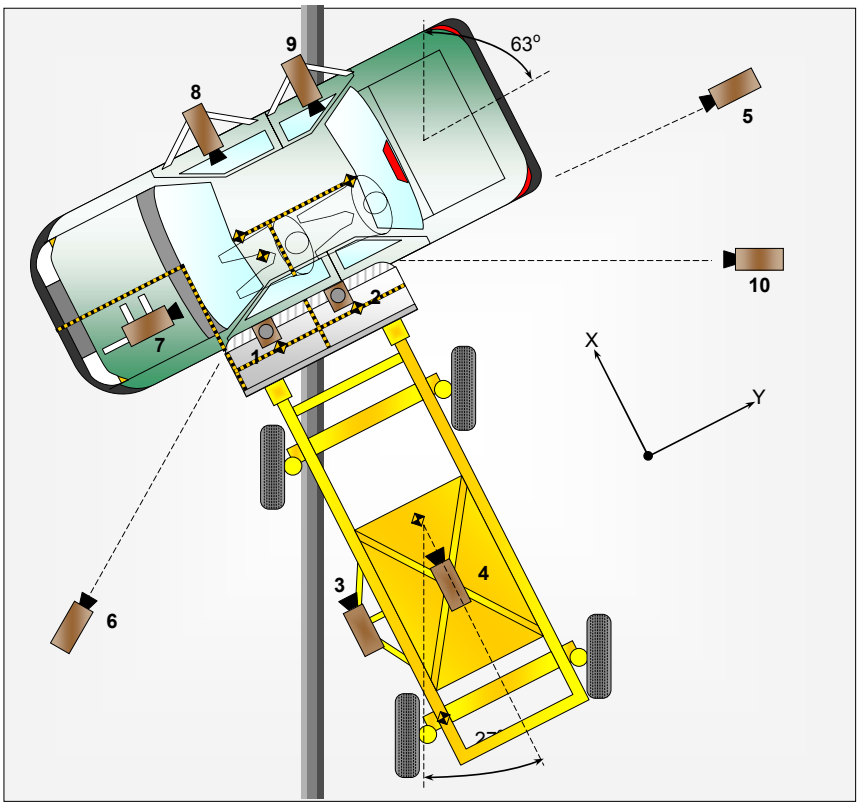
For each accelerometer, record on Data Sheet No. 10 the magnitude (g) and time (ms) at which maximum and minimum peak values occur. Also, include the magnitude and time of the resultant peak response for each tri-axial array. Provide data traces (acceleration, velocity and displacement) in the Final Report (see Section 14).

Loc. No	Accelerometer	Serial No.	Mfr	Cal. date	Coordinates		
					x	Y	Z
1	Vehicle CG(X)						
	Vehicle CG(Y)						
	Vehicle CG(Z)						
2	Struck side - Floor Sill(Y)						
3	A-Pillar Sill(Y)						
4	A-Pillar Low(Y)						
5	A-Pillar Mid(Y)						
6	B-Pillar Sill(Y)						
7	B-Pillar Low(Y)						
8	B-Pillar Mid(Y)						
9	Seat Track(Y)						
10	Engine(X)						
	Engine(Y)						
11	Firewall(Y)						
12	Right Roof(Y)						
13	Right Floor Sill(Y)						
14	Rear Deck(X)						
	Rear Deck(Y)						

CHECK SHEET NO. 7

Place Cameras at Impact Site and Attach Onboard Cameras to the Test Vehicle

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____



__1 Verify that each high speed digital camera is set to capture video at a minimum 1000 fps and the real time camera is set to capture video at 24 to 30 fps.
__2 Record frame speed and length of lens for all cameras on the table below.
__3 Using the figure above as a guide, place high speed cameras at the impact site as follows;
__3.1 Camera No. 1 – overhead to view target vehicle dynamics and positioned directly above the impact plane between the target vehicle and the MDB.
__3.2 Camera No. 2 - overhead to provide close-up view of the impact plane (should include view of photo targets on centerline of test vehicle and photo targets on top of MDB barrier face) and positioned adjacent to Camera No. 1.
__3.5 Camera No. 5 - right side view camera to cover both the MDB and the target vehicle during the side impact event.
__3.6 Camera No. 6 - left side view camera to cover the motion of the target vehicle after impact.
__4 Record the x, y & z coordinates of cameras 1,2,5 & 6 on the table below. (+X = Forward of Impact, +Y = Right of Impact, +Z = Down)
__5 Rigidly attach camera nos. 3 & 4 to the MDB as follows;
__5.1 Camera No. 3 - positioned along the MDB's impact face vertical edge to cover target vehicle impact point during side impact event.
__5.2 Camera No. 4 - positioned on MDB's centerline to view struck side of test vehicle during the side impact event

CHECK SHEET NO. 7 (Continued)

Place Cameras at Impact Site and Attach Onboard Cameras to the Test Vehicle

__6 Rigidly attached camera nos. 7, 8 & 9 to the test vehicle as follows;
__6.1 Camera No. 7 - on the hood structure and placed to the left side (for driver's side impacts) or right side (for front passenger side impacts) to provide a frontal view of dummy kinematics.
__6.2 Camera No. 8 - to the non-struck side front door structure to provide a side view of dummy kinematics through the vehicle's front side door window.
__6.3 Camera No. 9 - to the non-struck side rear door structure or rear window opening to provide a view of the dummy kinematics.
__7 Mount lighting systems to the vehicle to illuminate the interior during impact.
__8 To indicate time zero, place strobes or flash lights with diffused light in the field of view of each camera.

No.	Camera View	Location			Lens (mm)	Operating Frame Rate
		X	Y	Z		
1	Overhead Overall					
2	Overhead Close-up					
3	Impact Point Close-up (MDB)					
4	Centerline of Impact (MDB)					
5	Right Side View					
6	Left Side View					
7	Front Seat Occupant - Frontal View (OB)					
8	Front Seat Occupant – Side View (OB)					
9	Rear Passenger - Side View (OB)					
10	Real Time Coverage					

__9 Posttest, verify that all high speed digital cameras operated at or above1000 fps and produced video at or above the minimum resolution specification of 1920 x 1035.
__9.1 Yes, all camera views were captured and all cameras operated within specifications
__9.2 No - Camera No.__ did not operate as intended because _____
_____
__10 Posttest, verify that the real-time camera operated within specification
__10.1 Yes, all views were captured and the camera operated within specifications
__10.2 No - The real time camera did not operate as intended because _____
_____

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 8

Mark for Reference the Location of Adjustable Seats, Adjustable Seat Belt Anchorages and Steering Wheel

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

Before placing the test dummy in the driver or right front outboard seating position, mark for reference the location of adjustable seats, adjustable seat belt upper anchorages and steering wheel as follows;

__1 **Determine the seat type**
Visually inspect the front seats to determine its type (i.e., bucket or bench).
Driver seat: Bench__ Bucket__
Front outboard passenger seat: Bench__ Bucket__
Rear outboard passenger seat: Bench__ Bucket__

__2 **Position lumbar supports**
Position the seat's adjustable lumbar supports to the lowest, retracted or deflated adjustment positions.

__*N/A* No lumbar adjustment

__3 **Position additional supports**
Position any adjustable parts of the seat that provide additional support so that they are in the lowest or most open adjustment position.

__*N/A* No additional support adjustment

__4 **Position leg supports**
Position an adjustable leg support system in its rearmost position.

__*N/A* No adjustable leg support system

__5 **Position the head restraint**

__5.1 For a Subpart V (SIDIIs) test dummy:

__5.1.1 Does the adjustable head restraint have a non-use position as defined by FMVSS No. 202a?
__Yes - Set the head restraint to the lowest position using the procedure described by the manufacturer. Go to step 6.
__No – go to step 5.1.2

__5.1.2 Using any adjustment of the head restraint, position it to its lowest position.

__5.1.3 Using any adjustment of the head restraint, position it to the full forward position. If it rotates, rotate it such that the head restraint extends as far forward as possible.

__5.2 For a Subpart U (ES-2re) test dummy:

__5.2.1 Using any adjustment of the head restraint, position it to its highest position.

__5.2.2 Using any adjustment of the head restraint, position it to the full forward position. If it rotates, rotate it such that the head restraint extends as far forward as possible.

__*N/A* The test vehicle is equipped with automatically adjusting head restraints or there is no head restraint adjustment,

__6 **Mark the longitudinal centerline of the seat**

__6.1 **Driver's seat**:
If adjustable, place the seat back in its most vertical (upright) position. For bucket seats, locate and **mark** for reference the intersection of a vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface, seat back and head restraint. For bench seats, draw a line along the intersection of a vertical longitudinal plane that passes through the centerline of the steering wheel and the seat cushion upper surface, seat back and head restraint.

__6.2 **Front Passenger outboard seat (Right Side Impact)**:
If adjustable independent of the driver's seat place the seat back in its most vertical (upright) position. For bucket seats, locate and **mark** for reference the intersection of a vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface, seat back and head restraint. For bench seats, locate and **mark** for future reference the longitudinal centerline of the passenger seat cushion, seat back and head restraint. The longitudinal centerline of the seat is the same distance from the longitudinal centerline of the vehicle as the center of the steering wheel.

CHECK SHEET NO. 8 (Continued)
Mark for Reference the Location of Adjustable Seats,
Adjustable Seat Belt Anchorages and Steering Wheel

__6.3 **Rear Passenger outboard seat (Second Row)**
If adjustable, place the seat back in its most vertical (upright) position. For both bucket and bench seats, locate and **mark** for reference the intersection of a vertical longitudinal plane that passes through the SgRP and the seat cushion upper surface, seat back and head restraint.

__7 **Mark the range of seat travel**
Prior to marking the seat, move the seat through its full range of motion using all available controls. Separately, operate each control to determine whether it moves the seat and/or seat cushion primarily in the fore-aft or up-down directions.

__7.1 Mark a point (seat cushion reference point - **SCRP**) on the side of the seat cushion that is between 150 mm and 250 mm from the front edge of the seat cushion. For seat cushions that move up and down independently from the seat housing, mark the point on the side of the cushion in an area that will not be obscured by the seat housing when the seat cushion is at its lowest height position.

__7.2 Draw a horizontal line (seat cushion reference line - **SCRL**) through the **SCRP**.

__7.3 Use only the controls that primarily move the seat in the fore-aft direction to move the **SCRP** to the rearmost position.

__7.4 If the seat cushion adjusts fore-aft, independent of the seat back, use only the controls that primarily move the seat cushion in the fore-aft direction to move the **SCRP** to the rearmost position.

_ *N/A* No independent fore-aft seat cushion adjustment

__7.5 Use any part of any control, other than the parts just used for fore-aft positioning, to determine the range of angles of the **SCRL** and to set the **SCRL** at mid-angle. Record the maximum, minimum and mid-angles in the table below.

__7.6 If the seat and/or seat cushion height is adjustable, use any part of any control other than the parts which primarily move the seat or seat cushion fore-aft, to put the **SCRP** in its lowest position with the **SCRL** angle at the mid-angle found in 7.5.

_ *N/A* No seat height adjustment

__7.7 Use only the controls that primarily move the seat in the fore-aft direction to verify the seat is in the rearmost position.

__7.8 Use only the controls that primarily move the seat in the fore-aft direction to **mark** the fore-aft seat positions. **Mark** each position so that there is a visual indication when the seat is at a particular position. For manual seats, move the seat forward one detent at a time and **mark** each detent. For power seats, **mark** only the rearmost, middle, and foremost positions. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the closest adjustment position to the rear of the mid-point), and R for rearmost.

Two different methods for marking the fore-aft seat positions are illustrated in the photos below.

CHECK SHEET NO. 8 (Continued)

Mark for Reference the Location of Adjustable Seats,
Adjustable Seat Belt Anchorages and Steering Wheel

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

__7.9 Use only the controls that primarily move the seat in the fore-aft direction to move the **SCRP** to the rearmost position.

__7.10 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find the maximum, minimum, and middle height of the **SCRP** with the **SCRL** at the mid-angle determined in 7.5 by measuring from the **SCRP** to a reference point on the floor pan or sill. Record the maximum, minimum and middle heights on the table below.

__*N/A* No seat height adjustment. Go to step 8.

__7.11 Use only the controls that primarily move the seat and/or seat cushion in the fore-aft direction to place the **SCRP** at the mid-fore-aft position.

__7.12 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find **the** maximum, minimum, and middle height of the **SCRP** with the **SCRL** at the mid-angle determined in 7.5 by measuring from the **SCRP** to a reference point on the floor pan or sill. Record the maximum, minimum and middle heights on the table below.

__7.13 Use only the controls that primarily move the seat in the fore-aft direction to place the **SCRP** at the full forward position.

__7.14 Use any part of any control, other than the parts which primarily move the seat or seat cushion fore-aft, to find and visually **mark** the maximum, minimum, and middle height of the **SCRP** with the **SCRL** at the mid-angle determined in 7.5 by measuring from the **SCRP** to a reference point on the floor pan or sill. Record the maximum, minimum and middle heights on the table below.

__8 **Mark the seat belt upper anchorage positions**
Mark for reference each vertical position of a manually adjustable seat belt upper anchorage.

__*N/A* The seat belt upper anchorage is not manually adjustable.

__9 **Mark the steering wheel position**
Is the steering wheel adjustable up and down and/or in and out?
__ Yes - go to 9.1
__ No - check sheet completed. Go to the end and sign.

__9.1 Find and **mark** for future reference each up and down position. Label three of the positions with the following: H for highest, M for mid-position (if there is no mid-position, label the next lowest adjustment position), and L for lowest.
N/A steering wheel is not adjustable up and down

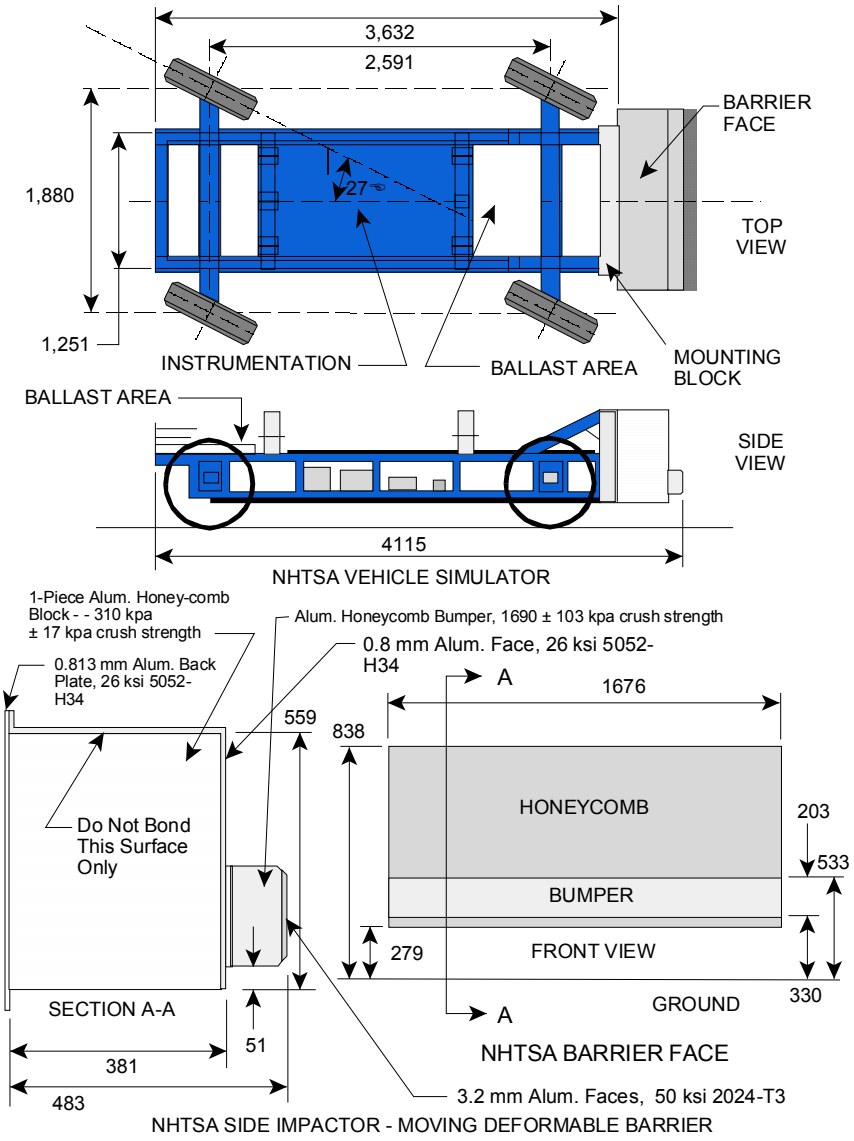
__9.2 Find and **mark** for future references each in and out position. Label three of the positions with the following: F for foremost, M for mid-position (if there is no mid-position, label the next rearmost adjustment position), and R for rearmost.

	SCRL Angle° (step 7.5)	SCRP Height (mm)		
		Rearmost (step 7.10)	Mid-fore/aft (step 7.12)	Full forward (step 7.14)
Max				
Mid				
Min				

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 9
Prepare the Moving Deformable Barrier (MDB)

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____



CHECK SHEET NO. 9 (Continued)
Prepare the Moving Deformable Barrier (MDB)

__1 Verify that the MDB meets Part 587 specifications

__1.1 Attach a certified honeycomb impact face to the MDB carriage. Complete the table below.

Measurement Description	Unit	Requirement	Value	Meets Reqmnt
Honeycomb Impact Face				
Width	mm	1671 – 1682		
Height	mm	553 – 665		
Ground Clearance	mm	276 – 282		
Depth at Bumper Height	mm	477 – 489		
Depth at upper impact face	mm	375 - 387		
MDB Carriage				
Overall Width of the Framework Carriage	mm	1241 – 1261		
Overall length including honeycomb face	mm	4140 – 3990		
Wheelbase of Framework Carriage	mm	2566 – 2616		
Center of gravity location aft of front axle	mm			
Front Axle Weight	kg			
Rear Axle Weight	kg			
Total Weight	kg	1356.5 – 1365.5		

__1.2 Inflate the MDB tires to the proper inflation pressure. Complete the table below.

	RF	LF	RR	LR	Requirement	Meets Reqmnt
Tire Size					P205/75R15	
Tire Pressure (kpa)					200 +/- 21 kPa	
Crabbed angle					27° ± 1°	

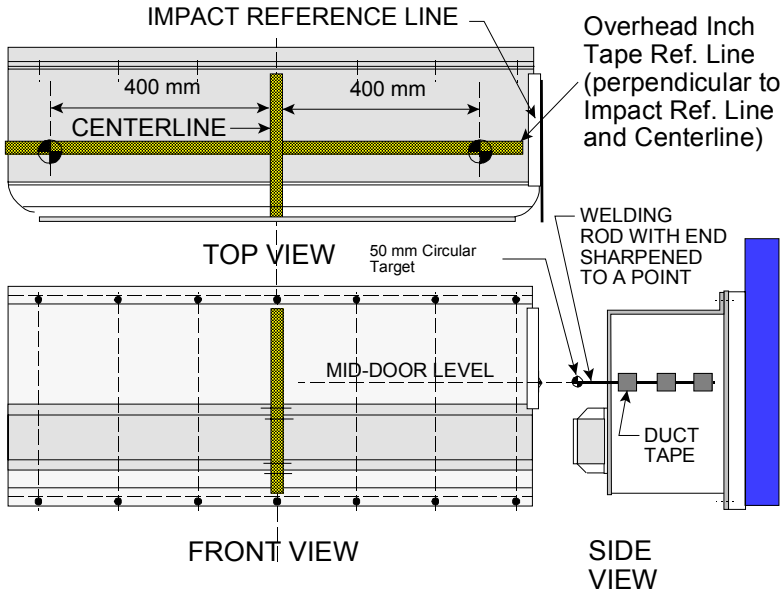
__2 Affix Photographic Tape and Targets to the MDB

__2.1 Affix tape to the top and front of the honeycomb barrier face as shown in the figure below.

__2.2 Affix two 102 mm (4“) diameter targets on top of the barrier face 400 mm from its centerline

__2.3 Affix a 102 mm (4”) target on the MDB carriage at the rear cross-member accelerometer location on the left (right) side of the frame.

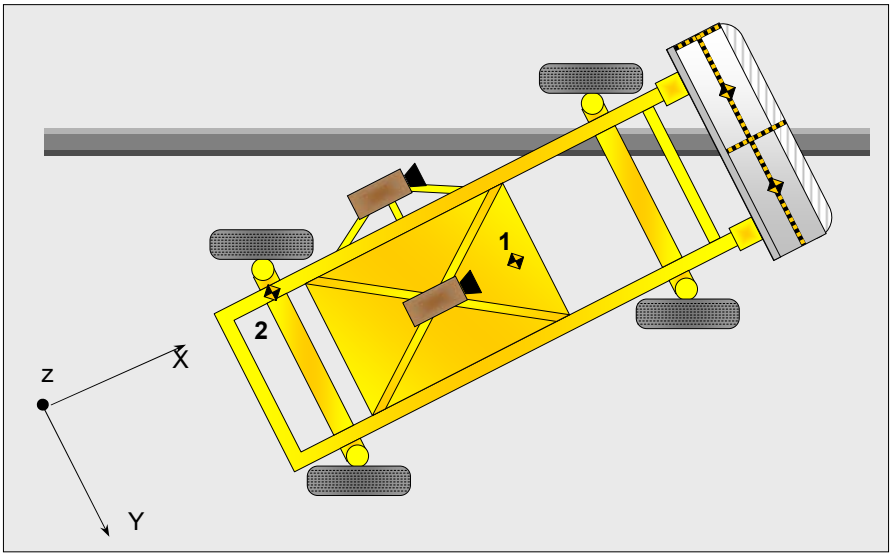
CHECK SHEET NO. 9 (Continued)
Prepare the Moving Deformable Barrier (MDB)



__3 **Mount accelerometers to the MDB** (see Figure below)

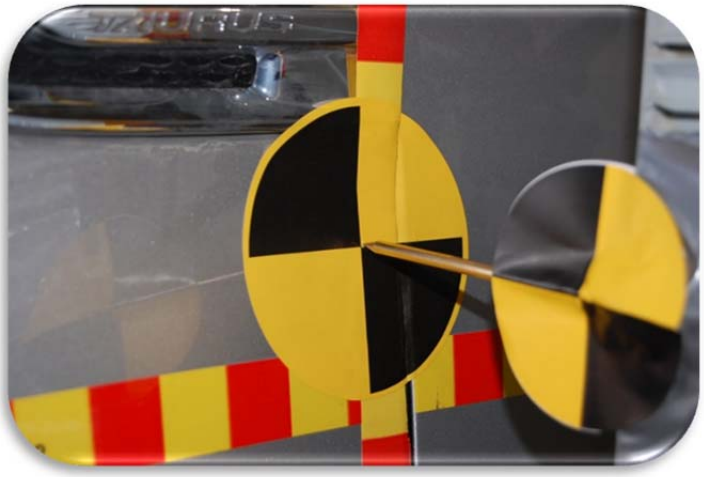
__3.1 Mount an array of X, Y and Z direction accelerometers at the MDB's center of gravity to provide Ax, Ay and Az data

__3.2 Mount an array of X and Y direction accelerometers mounted on the left side of the frame member (for left-side impacts) or the right-side frame member (for right-side impacts) along the rear axle centerline to provide Ax and Ay data



CHECK SHEET NO. 9 (Continued)
Prepare the Moving Deformable Barrier (MDB)

__4 Align the MDB against the struck side of the test vehicle. Check for proper impact angle alignment.
__5 Use tape to attach a thin rod to the left (right) side of the honeycomb barrier face with its tip aligned to the center of the target that was affixed to the vertical impact reference line on the test vehicle.



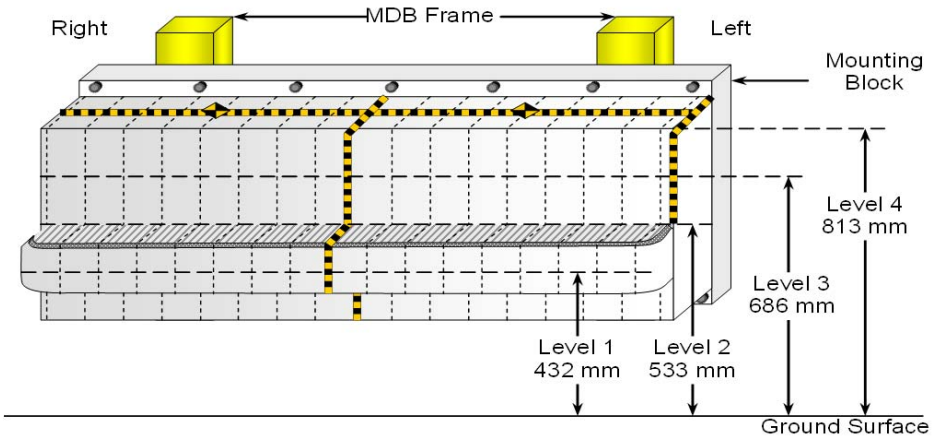
__6 Verify alignment of speed measurement device trigger
__7 Move the MDB to start position
__8 Assure attachment of all necessary instrumentation/power cables
__9 Verify operation of the MDB cameras
__10 Perform shunt calibrations of MDB accelerometers
__11 Attach tow & propulsion system cables

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 10

Honeycomb Barrier Face Static Crush Measurements

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____



__1 Prior to the test, establish a fixed reference plane parallel to the honeycomb barrier face.
__2 Measure from the fixed reference plane to the honeycomb barrier face surface across its entire length at all four levels shown in the figure above. Take measurements at 100mm intervals forward and rearward of the barrier face centerline. Record on the table below. Mark the location where each measurement is taken for future reference.
__3 Post-test place the MDB on a flat, level surface. Inflate the MDB's tires to pretest pressures.
__4 Using the same reference locations established in step 2 above, begin taking static crush measurements at 100mm intervals forward and rearward of the barrier face centerline. Record measurements on the table below.
__5 Compute the difference (i.e., static crush) between pre-test and posttest measurements at each interval and record on the table below.

Honeycomb Barrier Face Static Crush Measurements

	Distance Right of Center								C/L	Distance Left of Center							
Stack Level	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Level 1																	
Level 2																	
Level 3																	
Level 4																	

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 11

Position a Test Dummy Conforming to Subpart U of Part 572 (ES-2re)
in the Driver or Front Outboard Passenger Seat

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____
DSP: ___Driver ___Front Passenger

__1 **Set the seat for a Subpart U (ES-2re) test dummy**
Using the reference marks on the seat (see Check Sheet No. 8), set the seat in the mid fore-aft, lowest height at mid seat cushion angle position as follows;

__1.1 Using the control that primarily moves the seat fore and aft, move the **SCRP** to the mid-travel (i.e., mid-fore aft) position. (S8.3.1.3.2)

__1.2 If the seat or seat cushion height is adjustable, other than by the controls that primarily move the seat or seat cushion fore and aft set the height of the **SCRP** to the minimum height, with the **SCRL** set as closely as possible to the mid-angle determined in Check Sheet No. 8. (S8.3.1.3.3)

__1.3 Set the seat back angle at the manufacturer's nominal design riding position for a 50th percentile adult male in the manner specified by the manufacturer. If the position is not specified, set the seat back at the first detent rearward of 25° from vertical. (S8.3.1.2)

__*N/A* The seat back does not adjust.

__2 **Set the steering wheel to the mid-position**
Use the markings to position the steering wheel hub at the geometric center of full range of driving positions including any telescoping positions or if applicable, the next lowest detent position. (S10.5)

__*N/A* The steering wheel does not adjust.

__**3** ***Set* adjustable seat belt upper anchorages**
Use the markings to position an adjustable seat belt upper anchorage at the manufacturer's nominal design position for a 50th percentile male adult occupant. (S12.2.1)

__*N/A* The seat belt upper anchorage does not adjust.

__4 **Retract the armrest**
Retract any folding armrest (S12.2.1)

__*N/A* No armrest or armrest is fixed, not retractable.

__5 **Determine the H-point location;**
Position the three dimensional H-point manikin (i.e., H-point machine) specified in Society of Automotive Engineers (SAE) Surface Vehicle Standard J826, revised July 1995, Devices for Use in Defining and Measuring Vehicle Seating Accommodation in the seat as follows;

__5.1 Place a 910 mm^2 piece of muslin cotton cloth over the seat area. (The muslin cloth shall be comparable to 48 threads/in^2 and density of 2.85 lb/yd.) Tuck the muslin cloth in a sufficient amount to prevent hammocking of the material.

__5.2 Place the seat and back assembly of the H-Point machine such that its plane of symmetry is coincident with the longitudinal centerline marking on the seat.

__5.3 Install the lower leg, and foot segments.

__5.4 Set the length of the lower leg segment at 414 mm (16.3 in) and the length of the thigh bar at 401 mm (15.8 in).

CHECK SHEET NO. 11 (Continued)

Position a Test Dummy Conforming to Subpart U of Part 572 (ES-2re)
in the Driver or Front Outboard Passenger Seat

__5.5 **Leg and foot placement**

__5.5.1 *Driver Seating Position*

__5.5.1.1 Insert the pin so that the foot angle is not less than 87°.

__5.5.1.2 Place the right foot on the un-depressed accelerator pedal with the sole of the foot on the pedal and the heel as far forward as allowable. Do not place the heel on the toe board.

__5.5.1.3 Adjust the left leg to be the same distance from H-point machine centerline as the right leg.

__5.5.1.4 With the T-bar level, place the left foot on the toe board with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.

__Foot on toe board
__Foot on floor pan

__5.5.2 *Front Outboard Passenger Seating Position*

__5.5.2.1 Insert the pin so that the foot angle is not less than 87 degrees.

__5.5 2.2 Space the lower legs 254 mm (10 in) apart, equally spaced about the centerline of the H-point machine.

__5.5.2.3 With the T-bar level, place the left foot on the toe board with the rearmost point of the wheel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.

__Foot on toe board
__Foot on floor pan

__5.5.2.4 With the T-bar level, place the right foot on the toe board with the rearmost point of the heel resting on the floor pan as close as possible to the point of intersection of the planes described by the toe board and the floor pan and not on the wheel well projection. If the foot cannot be positioned on the toe board, set it on the floor pan.

__Foot on toe board
__Foot on floor pan

__5.6 Apply the lower leg weights.

__5.7 Apply the thigh weights.

__5.8 Tilt the back pan forward against the forward stop and draw the H-point machine away from the seatback using the T-bar.

__5.9 **Re-positioning the back pan**

__5.9.1 Allow the H-point machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required due to the seat pan contacting the seat back.

__The seat pan does not slide rearward. Go to 5.9.2

__5.9.2 Slide the H-point machine rearward by a horizontal rearward load applied at the T-bar until the seat pan contacts the seat back.

__5.10 Apply a 10 kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.

__5.11 Again apply a 10 kg load at the intersection of the hip angle quadrant and the T-bar housing along a line from the above intersection to a point just above the thigh bar housing.

__5.12 Carefully return the back pan to the seat back.

__5.13 Install the right and left buttock weights.

__5.14 Install the eight torso weights alternately the installation between right and left.

__5.15 Tilt the back pan forward until the stop is contacted.

__5.16 Rock the H-point from side to side over a 10° arc (5° to each side of the vertical centerline) for three complete cycles. Restrain the T-bar during rocking so that the seat pan does not change position. Minimize any inadvertent exterior loads applied in a vertical or fore-aft direction. The feet are free to move during this rocking motion.

CHECK SHEET NO. 11 (Continued)
Position a Test Dummy Conforming to Subpart U of Part 572 (ES-2re)
in the Driver or Front Outboard Passenger Seat

__5.17 Without applying a forward or lateral load lift the right foot off the floor the minimum amount necessary until no additional forward foot movement is obtained.
__5.18 Lower the right foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor, toe board, or undepressed accelerator pedal.
__5.19 Without applying a forward or lateral load lift the left foot off the floor the minimum amount necessary until no additional forward foot movement is obtained.
__5.20 Lower the left foot until the heel is in contact with the floor pan and the ball of the foot is in contact with the floor or toe board.
__5.21 Is the seat pan level?
__Yes. Go to 5.23
__No. Go to 5.22
__5.22 Apply a sufficient lateral load to the top of the seatback pan to level the H-point machine seat pan on the seat.
__5.23 Holding the T-bar to prevent the H-point from sliding forward on the seat cushion, return the seatback pan to the seatback.
__5.24 Holding the T-bar to prevent the H-point from sliding forward on the seat cushion, apply sufficient rearward force perpendicular to the back angle bar just above the torso weights to increase the hip angle 3°. Minimize the exterior downward or side forces applied to the H-point machine. Release the force. Repeat this step until the hip angle readout is identical. Complete as many force applications as necessary and record the results in the following table:

Force App.	Hip Angle
1	
2	
3	
4	
5	

__5.25 Is the H-point machine level?
__Yes, go to 5.26
__No, go back to step 5.15 and repeat steps to re-level H-point machine.
__5.26 Record the H-point location in the table below;
__5.27 Remove the H-point machine

H-point location	
Torso Angle (fore/aft)	°
X(fore/aft) of striker	(mm)
Z(above/below) striker	(mm)

__6 Set limb joints and clothe the test dummy (S11.1(a) & S11.2(a))
__6.1 Set the limb joints at between 1 and 2 g. Adjust the leg joints with the torso in the supine position.
__6.2 Clothe the test dummy in clean short sleeve formfitting cotton stretch top and midcalf length pants.
__6.3 Place size 11EEE shoes meeting MIL-S-13192(1976) on each foot.

CHECK SHEET NO. 11 (Continued)
Position a Test Dummy Conforming to Subpart U of Part 572 (ES-2re)
in the Driver or Front Outboard Passenger Seat

Once the H-point has been determined, position a calibrated ES-2re test dummy in the designated front seat on the struck side of the test vehicle.

__7 **Place the test dummy in the seat**
__7.1 Move the seat and seat back rearward as necessary to get the test dummy in the seat.
__7.2 Position the test dummy in the seat such that its plane of symmetry (i.e., mid-sagittal plane) is coincident with the longitudinal centerline marking on the seat cushion, seat back and head restraint.
__7.3 Bend the upper torso forward and then lay it back against the seat back. Push the shoulders of the dummy fully rearward. (S12.2.1(a)(2))
__7.4 Remove the foam blocks from the pelvis flesh.
__7.5 Position the dummy so that it sits square and level in the seat.
__7.6 Repeat steps 1 thru 1.3 to set the seat at the mid-fore aft position
__7.7 Maneuver the dummy's pelvis until the M3 hole on its back plate is within a circle with a radius of 10 mm round the H-point location (x,z) determined by the H-point machine. (S12.2.1(b)(2))
__7.8 Position the pelvis of the dummy such that a horizontal (lateral) line passing through the dummy's hip pivot center is perpendicular to the longitudinal center plane of the seat.
__7.9 Measure the angle using the tilt angle sensor installed in the test dummy. Verify that the line through the dummy's hip pivot center is horizontal with a maximum inclination of ± 2°. (S12.2.1(b)(1))
__7.10 Is the pelvis tilt angle within spec. ± 2°?
__Yes - Record the tilt angle and measure and record the X and Z location of the dummy's hip pivot center on the chart below;

Dummy hip pivot center location	
Tilt Angle	°
X(fore/aft) of striker	(mm)
Z(above/below) striker	(mm)

__ No, go back to step 7.2 and repeat steps to re-adjust the position of the test dummy.
__ Proper position cannot be achieved, contact COTR immediately.

__7.11 **Foot Placement**
__7.11.1 **For test dummy placed in driver seating position (S12.2.1(d)(1)):**
__7.11.2 Without inducing pelvis or torso movement, place the right foot of the dummy on the un-pressed accelerator pedal with the heel resting as far forward as possible on the floor pan.
__7.11.3 Set the left foot perpendicular to the lower leg with the heel resting on the floor pan in the same lateral line as the right heel.
__7.11.4 If possible within these constraints, place the thighs of the dummy in contact with the seat cushion.
__7.11.5 **For test dummy placed in front passenger outboard seating position (S12.2.1(d)(2)):**
__7.11.6 Without inducing pelvis or torso movement, place the heels of the dummy as far forward as possible on the floor pan.
__7.11.7 Position the knees of the dummy such that their outside surfaces are 150±10mm from the plane of symmetry of the dummy. Measure the distance and record on the table below.
__7.12 **Arm Placement (S12.2.1(c))**
Place the dummy's upper arms such that the angle between the projection of the arm centerline on the mid-sagittal plane of the dummy and the torso reference line is 40°±5°. Measure the angle of each arm and record on the table below.
__8 **Seatbelt Placement (12.2.1)**
Place the seatbelt around the test dummy and fasten latch.

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 12

Position a Test Dummy Conforming to Subpart V of Part 572 (SID-IIs)
in the Rear Passenger Outboard Seat

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

S12.3.4 ***5th percentile female in rear outboard seating positions.***

__1 **Set the seat at rearmost fore/aft position, lowest height at mid-angle (S8.3.3.3)**
__1.1 Using the control that primarily moves the seat fore and aft, move the **SCRP** to the rearmost position.
__1.2 If the seat or seat cushion height is adjustable, other than by the controls that primarily move the seat or seat cushion fore and aft, set the height of the **SCRP** to the lowest height, with the **SCRL** set as closely as possible to the mid-angle determined in Check Sheet No.8.
__N/A The seat is not adjustable.
__1.3 Fully recline the seat back
__*N/A* The seat back does not adjust.
__2 Set limb joints and clothe the test dummy (S11.1(b) & S11.2(b))
__2.1 Set the limb joints at between 1 and 2 g. Adjust the leg joints with the torso in the supine position.
__2.2 Clothe the test dummy in clean short sleeve formfitting cotton stretch top and knee length pants.
__2.3 Place size 7.5W shoes meeting MIL-S-21711E on each foot.
__3 Place the test dummy in the seat (S12.3.4)
Position the dummy in the seat such that the midsagittal plane is coincident with the longitudinal centerline markings on the seat cushion, seat back and head restraint. Place the dummy in the seat with the legs at an angle of 120° to the thighs. The calves should not be touching the seat cushion.
__4 Hold down the dummy's thighs and push rearward on the upper torso to maximize the pelvic angle.
__5 Set the angle between the legs and the thighs to 120°.
__6 Set the transverse distance between the centers of the front of the knees at 160 to 170 mm. (6.3 to 6.7 inches). Center the knee separation with respect to the longitudinal centerline markings of the seat cushion
Record Knee Separation _____
__7 Push rearward on the dummy's knees until the pelvis contacts the seat back, or the backs of the calves contact the seat cushion, whichever occurs first.
__Pelvis contacted seat back.
__Calves contacted seat cushion.
__8 Gently rock the upper torso ± 5° arc (approximately 51 mm (2 inches)) side-to-side three times. (S12.3.4(f))
__9 If needed, extend the legs until the feet do not contact the floor pan. The thighs should be resting on the seat cushion. (S12.3.4(g))
__10 With the feet perpendicular to the legs, place the heels on the floor pan. If a heel will not contact the floor pan, place it as close to the floor pan as possible.
__11 For vehicles without adjustable seat backs, adjust the lower neck bracket to level the head as much as possible. For vehicles with adjustable seat backs, while holding the thighs in place, rotate the seat back forward until the transverse instrumentation platform of the head is level to within ± 0.5°, making sure that the pelvis does not interfere with the seat bight. (S12.3.4(h))
__12 If it is not possible to orient the head level within ± 0.5° minimize the angle.(S12.3.4(i)).
__13 Measure and set the dummy's pelvic angle using the pelvic angle gauge. The angle is set to 20.0 °± 2.5°. If this is not possible, adjust the pelvic angle as close to 20.0 ° as possible while keeping the transverse instrumentation platform of the head as level as possible.
__14 Passenger foot positioning (S12.3.4(k))
__14.1 Place the passenger's feet flat on the floor pan.
__14.2 If the either foot does not contact the floor pan, place the foot parallel to the floor and place the leg as perpendicular to the thigh as possible.

CHECK SHEET NO. 12

Position a Test Dummy Conforming to Subpart V of Part 572 (SID-IIs)
in the Rear Passenger Outboard Seat

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

__15 **Passenger arm/hand positioning (S12.3.4(l))**
Place the rear dummy's upper arm such that the angle between the projection of the arm centerline on the midsagittal plane of the dummy and the thoracic spine centerline is 45°± 5°.

__16 **Seatbelt Placement**
Place the seatbelt around the test dummy and fasten latch.

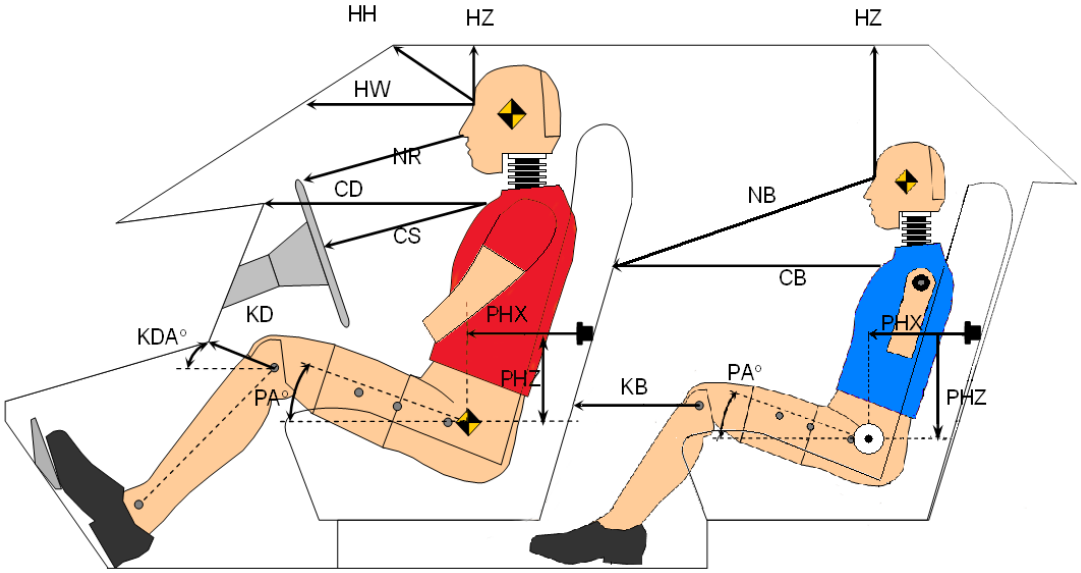
CHECK SHEET NO. 13
Take Dummy Measurements

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

Take the following measurements after the dummy has been properly positioned. Complete the table below.

NOTE: When a level is to be used, it is to ensure that the line containing the two points described is either parallel or perpendicular to the ground. If a measurement to be made is less than 250 mm ignore the directions to use a level and approximate a level measurement. Also, when a measurement is to be taken to or from the center of a bolt on the dummy, take the measurement from the center of the bolt hole if the bolt is recessed.

Longitudinal Measurements



Driver Code	Rear Occupant Code	Measurement Description	ES2-re (mm)/ °	SID-IIs (mm)/ °
HH	--	Head to Header		
HW	--	Head to Windshield		
HZ	HZ	Head to Roof		
NR	NB	Nose to Rim/Seat Back		
CD	CB	Chest to Dash/Seat Back		
CS	--	Chest to Steering Wheel		
KD(L)	KB(L)	Left Knee to Dash/Seat Back		
KD(R)	KB(R)	Right Knee to Dash/Seat Back		
KDA(L)	--	Left Knee to Dash Angle		
KDA(R)	--	Right Knee to Dash Angle		
PA	PA	Pelvic Angle		
PHX	PHX	H-Point to Striker (X-Axis)		
PHZ	PHZ	H-Point to Striker (Z-Axis)		

CHECK SHEET NO. 13 (Continued)
Take Dummy Measurements

__1 FRONT OCCUPANT

__1.1 HEAD TO HEADER - Measure the distance from the point where the dummy's nose meets his forehead (between the eyes) to the furthest point forward on the header.

__1.2 HEAD TO WINDSHIELD - Measure the distance from the point where the dummy's nose meets his forehead (between the eyes) in to a point on the windshield directly in front of it. Use a level or plumb-bob.

__1.3 HEAD TO ROOF LINER - Measure the distance from the point where the dummy's nose meets his forehead (between the eyes) to the point on the roof liner directly above it. Use a level.

__1.4 NOSE TO RIM/DASH PANEL - Measure the distance from the tip of the dummy's nose to the closest point on the top of the steering wheel rim for left-side impacts. For right-side impacts, measure the distance from the tip of the dummy's nose to the point on the dash panel.

__1.5 CHEST TO DASH - Place a tape measure on the tip of the driver dummy's chin and rotate 125 mm of it downward toward the dummy to the point of contact on the transverse center of the dummy's chest. Measure the distance from this point to the closest point on the dash either between the upper part of the steering wheel between the hub and the rim, or measure to the dash placing the tape measure above the rim, whichever is a shorter measurement.

__1.6 STEERING WHEEL TO CHEST - For left side impacts, measure the distance from the. center of the steering wheel hub to the dummy's chest. Use a level.

__1.7 LEFT AND RIGHT KNEES TO DASHBOARD - Measure the distance from the center of each knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the dashboard.

__1.8 HIP POINT TO STRIKER (X) - Locate a point on the front door striker and project this point (with a level) vertically downward. Measure the distance horizontally from the pivot center of the dummy's torso and thigh to the point it intersects with the level.

__1.9 HIP POINT TO STRIKER (Z) - Locate a point on the front door striker and project this point (preferably, with a level) horizontally toward the pivot center of the dummy's torso and thigh. Measure the distance vertically from the pivot center of the dummy's torso and thigh to the point it intersects with the level.

__1.10 LEFT and RIGHT KNEES to DASHBOARD - taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the dashboard.

__1.11 KNEE (OUTBOARD) TO DASHBOARD ANGLE - Using the line representing the length measurement of the "outboard" knee (left or right) to the dashboard above, measure the angle between that line and horizontal.

__1.12 PELVIC ANGLE - measure by inserting the pelvic angle gauge into the H-point gauging hole on the dummy and taking this angle with respect to the horizontal.

__2 REAR OCCUPANT

__2.1 HEAD TO ROOF LINER - Measure the distance from the point where the dummy's nose meets his forehead (between the eyes) to the point on the roof liner directly above it. Use a level.

__2.2 CHEST TO BACK OF SEAT - place a tape measure on the tip of the passenger dummy's chin and rotate 125 mm of it downward toward the dummy to the point of contact on the transverse center of the passenger dummy's chest. Then measure from this point to the closest point on the seat back directly forward of the rear outboard passenger seating position. Mark point on seat back for later NB measurement.

__2.3 NOSE TO BACK OF SEAT - taken from the tip of the passenger dummy's nose to the **same** point on the seat back located in CB measurement

__2.4 HIP POINT TO STRIKER (X) - Locate a point on the front door striker and project this point (with a level) vertically downward. Measure the distance horizontally from the pivot center of the dummy's torso and thigh to the point it intersects with the level.

CHECK SHEET NO. 13 (Continued)
Take Dummy Measurements

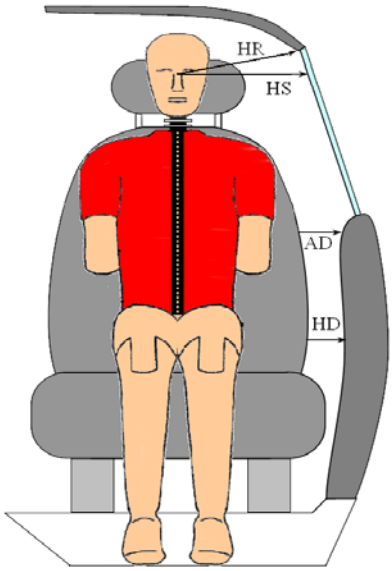
__2.5 HIP POINT TO STRIKER (Z) - locate a point on the front door striker and project this point (preferably, with a level) horizontally toward the pivot center of the dummy's torso and thigh. Measure the distance vertically from the pivot center of the dummy's torso and thigh to the point it intersects with the level.

__2.6 LEFT and RIGHT KNEES to SEAT BACK - taken from the center of the knee pivot bolt's outer surface to the closest point forward acquired by swinging the tape measure in continually larger arcs until it contacts the seat back.

__2.7 PELVIC ANGLE - taken by inserting the pelvic angle gauge into the H-point gauging hole on the dummy and taking this angle with respect to the horizontal

NOTE: When testing 2-door vehicles, the B-post striker will be used as the reference point for PHX & PHZ measurements. When testing 4-door vehicles, the B-post striker will serve as the reference point for the front seat occupant, while the C-post striker will be used for the rear seat occupant.

Lateral Measurements



Code	Description	Units	ES2-re	SID-IIs
HR	Head to Side Header	mm		
HS	Head to Side Window	mm		
AD	Arm to Door	mm		
HD	H-point to Door	mm		

__3 HEAD TO SIDE HEADER - measure the shortest distance from the point where the dummy's nose meets his forehead (between the eyes) to the side edge of the header just *above* the window frame, directly adjacent to the dummy.

__4 HEAD TO SIDE WINDOW - measure the distance horizontally from the point where the dummy's nose meets his forehead (between the eyes) to the outside of the side window. In order to take this measurement, roll the window down to the exact height that allows a level measurement. Use a *level.*

CHECK SHEET NO. 13 (Continued)
Take Dummy Measurements

__5 ARM TO DOOR - measure the distance horizontally from the center of the outboard arm segment to the closest point on the door

__6 H-POINT TO DOOR - Project a point horizontally from the pivot center of the dummy's torso and thigh, outward to edge of the pelvis skin (for ES-2re) or pelvis plug (for SIDIIs). Measure the distance horizontally from this point to the closest point on the door panel.

_____ _____

I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 14

Apply Chalk Paint Color to Test Dummy

After the test dummies have been properly positioned and final measurements have been taken, using the chart and photo below as guides, apply chalk paint color to the head, face, hip and shoulder of each dummy as follows;

Dummy Part	Color
Face	
Top of Head	
Side of Head	
Back of Head	
Shoulder	
Hip	

CHALK COLORS *TO BE USED ON TEST* DUMMIES

__1 Paint the face of the dummy blue in color. Be careful not to paint the sides.
__2 Paint the top of the head yellow in color. Stop painting at the skull cap.
__3 Paint the side of the head green in color.
__4 Paint the back of the head (i.e., skull cap) red in color.
__5 Paint the outer shoulder (closes to the door) orange in color.
__6 Paint the outer hip (closes to the door) red in color.

_____ _____

I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 15
Take Pre-test Photographs and Video

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

Take the following photographs prior to impact;
Note – Place a test vehicle ID placard in each view

__1 Frontal View of Test Vehicle

__2 Rear View of Test Vehicle

__3 Impacted Side View of Test Vehicle

CHECK SHEET NO. 15 (Continued)
Take Pre-test Photographs and Video

__4 Frontal View of Impactor Face

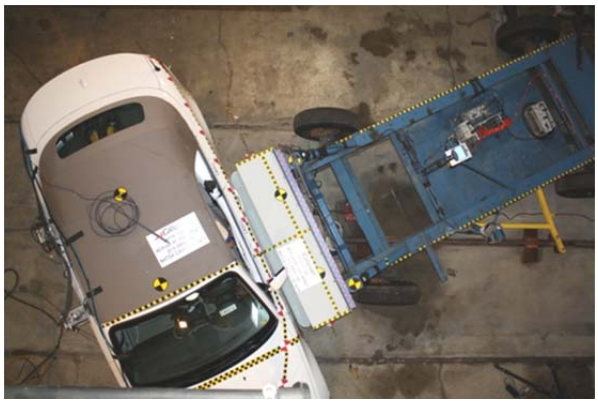
__5 Left Side View of Impactor Face

__6 Right Side of Impactor Face

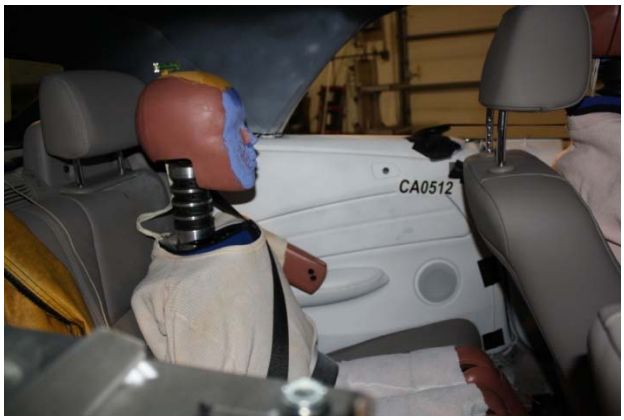
CHECK SHEET NO. 15 (Continued)
Take Pre-test Photographs and Video

__7 Top View of MDB Impactor Face

__8 Overhead View of Aligned MDB and Vehicle at Impact Location



__9 Occupant Compartment View Showing Both SIDs



CHECK SHEET NO. 15 (Continued)

Take Pre-test Photographs and Video

__10 Interior of Front Door

__11 Interior of Rear Door

__12 Left Side View of Aligned MDB and Vehicle

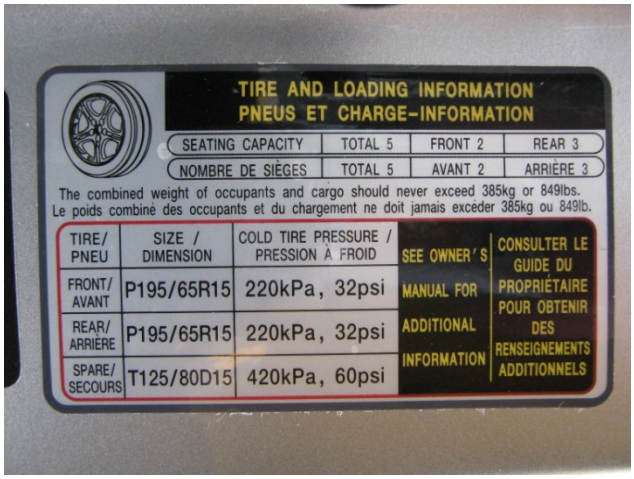
CHECK SHEET NO. 15 (Continued)

Take Pre-test Photographs and Video

__13 Right Side View of Aligned MDB and Vehicle

__14 Close-up View of the Vehicle's Tire Placard Label

__15 Close-up View of Vehicle's Tire Placard Label



CHECK SHEET NO. 15 (Continued)

Take Pre-test Photographs and Video

Capture the following pan views using a real-time camera;

__1 **MDB**
__1.1 Left side view of MDB
__1.2 Right side view of MDB
__1.3 Front view of MDB
__1.4 Overhead view of MDB

__2 **VEHICLE**
__2.1 Impact side view of vehicle
__2.2 Rear view of vehicle
__2.3 Non-impact side view of vehicle
__2.4 Front view of vehicle

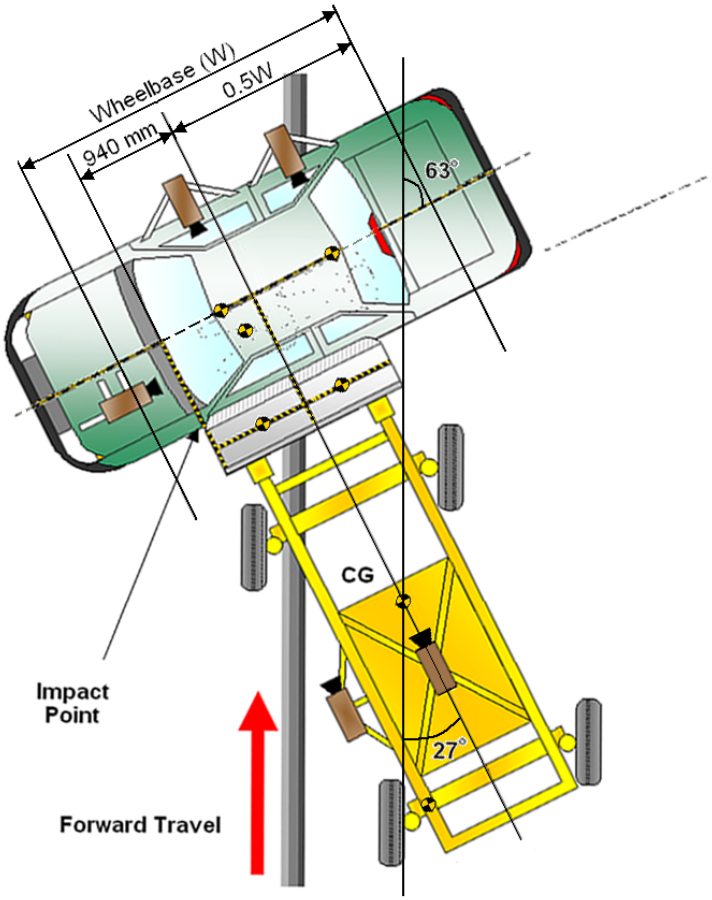
__3 **TEST DUMMIES**
__3.1 Side View of ES-2re in front seat (struck-side door open)
__3.2 Side View of SID-IIs in rear seat (struck-side door open)
__3.3 Side View of ES-2re in front seat (doors closed)
__3.3 Side View of SID-IIs in rear seat (doors closed)
__4 View of gas cap being attached to filler pipe

_____ _____
Signature Completion Date

CHECK SHEET NO. 16

Conduct the Test

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____



__1 Close shut all doors and hatches. Check instrument panel telltales just prior to impact to ensure that all doors and hatches are closed. (S10.8)
__2 Place manual transmissions in 2nd gear. __ automatic transmissions in neutral (S10.9)
__3 Engage the parking brake. (S10.9)
__4 Place the key in the ignition and switch to the **"ON"** position. If the ignition switch operates without entry of a key, assure the ignition is in the "power on" position.
__5 Place any movable windows and vents located on the struck side of the vehicle in the fully closed position. (S10.6)
__6 Place sunroof(s) in the full closed position. (S10.6)
__7 Place convertible tops in the closed passenger compartment configuration. (S10.7)
__N/A
__8 Tow the MDB toward the test vehicle at 52.9 kph ± 0.8 kph such that its line of forward motion forms an angle of 63°± 0.5° with the longitudinal centerline of the test vehicle.
__9 At impact, the longitudinal centerline of the MDB is perpendicular (90°± 1.5°) to the longitudinal centerline of the test vehicle.
__11 Apply the MDB brakes 1000 to 1500 milliseconds (1 to 1.5 seconds) after initial impact
__12 Post impact record MDB test speed.
__13 Measure the impact point location.
__14 Verify impact angle using high speed video analysis

CHECK SHEET NO. 16 (Continued)

Conduct the Test

__15 Complete the tables below;

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	52.9 ± 0.8	
Trap No. 2 Velocity (Redundant)	km/h	52.9 ± 0.8	
MDB C/L to Target Vehicle C/L	Degrees	90° ± 1.5°	

MDB IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	
Vertical Offset	mm	+/- 20	

_____ _____

Signature Completion Date

CHECK SHEET NO. 17
Post Test Observations

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

__1 DUMMY CONTACT INFORMATION
Prior to removing the test dummy from the vehicle, observe where each dummy body part made contact with the vehicle's door, interior components and air bags as indicated by chalk markings transferred to the contacted surfaces. Where applicable, confirm contact regions by high speed video analysis. Record observations on the table below If no contact occurred, indicate as "No contact."

	Observation	
	Front Occupant	**Rear Occupant**
Face		
Top of Head		
Left (Right) Side of Head		
Back of Head		
Left (Right) Hip		
Left (Right) Shoulder		

__2 POST TEST CONDITION OF DOORS AND SEAT
Observe the condition of the vehicle's doors after impact. Check "Yes" or "No" in response to the following questions.

2.1 Struck Door
Did the door separate totally from the vehicle at the hinges or latches?
__Yes - Fail; __No - Pass

2.2. Non-Struck Doors

2.2.1 Did the door disengage from the latched position?
Front Door: __Yes - Fail; __No - Pass
Rear Doors: __Yes - Fail; __No - Pass; __*N/A,* no rear doors
Rear Hatch: __Yes - Fail; __No - Pass; __*N/A,* no rear hatch

2.2.2 Did the latch separate from striker?
Front Door: __Yes - Fail; __No - Pass
Rear Doors: __Yes - Fail; __No - Pass; __*N/A*, no rear doors
Rear Hatch: __Yes - Fail; __No - Pass; __*N/A,* no rear hatch

2.2.3 Did the hinge components separate from each other?
Front Door: __Yes - Fail; __No - Pass
Rear Doors: __Yes - Fail; __No - Pass; __*N/A,* no rear doors
Rear Hatch: __Yes - Fail; __No - Pass; __*N/A,* no rear hatch

2.2.4 Did the hinge components separate from vehicle?
Front Door: __Yes - Fail; __No - Pass
Rear Doors: __Yes - Fail; __No - Pass; __*N/A,* no rear doors
Rear Hatch: __ Yes - Fail; __No - Pass; __*N/A,* no rear hatch

2.2.5 Did the latch or hinge systems pull out of their anchorages?
Front Door: __Yes - Fail; __No - Pass
Rear Doors: __Yes - Fail; __No - Pass; __*N/A,* no rear doors
Rear Hatch: __Yes - Fail; __No - Pass; __*N/A,* no rear hatch

For any door or door component failure (indicated by "Yes" in response to any of the questions above), complete a Laboratory Notice of Test Failure form and forward to the COTR.

CHECK SHEET NO. 17 (Continued)
Post Test Observations

2.3 Seat
__2.3.1 Did the seat track remain attached to the floor?
__Yes __No
__2.3.2 Did the seat back move from its initial position?
__Yes __No

__Fill in the table below by indicating Yes or No;

		Front	Rear	Hatch
Struck Doors	Total separation from vehicle at the hinges or latches			
Non-Struck Doors	Disengaged from latched position			
	Latch separated from striker			
	Hinge components separated from each other			
	Latch or hinge systems pulled out of their anchorages			
Seat	Seat track remained attached to the floor pan			
	Seat back moved from initial position			

2.4 Describe the door and door latch performance
__2.4.1 Using video analyses, verify whether any door including the rear hatch, opened during the impact event. Record your observation on the table below.

__2.4.2 Posttest, determine whether the door latch is operable and capable of opening the door without the use of tools. To describe the condition of the door, use the following categories: Remained closed and operational, opened or unlatched during the crash, or jammed shut. Sometimes, the door is jammed and unlatched. If the door cannot be opened by manually pulling on the door at the latch location, and then note the door as "jammed shut." If the door is open as a result of the crash, measure and indicate the width of the door opening (mm) on the table below.

	Door and Door Latch Performance
Struck Door	
Non-Struck Door – Front(Left/Right)	
Non-Struck Door – Right Rear	
Non-Struck Door – Left Rear	
Non-Struck Door – Rear Hatch	

__3 POST TEST STRUCTURAL OBSERVATIONS
Record the following observations on the table below;
__3.1 describe the amount of deformation to the struck-side pillar
__3.2 describe the amount of damage to the struck side sill
__3.3 whether there was damage to the front windshield area and where the damage occurred
__3.4 whether there was damage to the side door window

	Observations
Pillar	
Sill Separation	
Front Windshield	
Side Window	

CHECK SHEET NO. 17 (Continued)
Post Test Observations

__4 SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION
__4.1 Indicate whether the vehicle was installed with the restraint types listed in the table below
__4.2 Observe whether the test vehicle's supplemental restraints deployed. Verify that each front outboard occupant deployed within 20 ms of impact using high speed video analyses. Provide descriptive comments for any air bag that failed to deploy, deployed late or appeared not to have inflated to full volume during impact.

Restraint Type	Front Occupant		Rear Occupant	
	Installed	Deployed	Installed	Deployed
Frontal Air bag				
Side Torso Air bag				
Combination Head/Torso Air bag				
Side Curtain Air bag				
Pelvic Air bag				
Seat Belt Pretensioner				

_____ _____
I certify that I have read and performed each instruction. Completion Date

CHECK SHEET NO. 18
Take Post Test Photographs and Video

Test Vehicle:_____ Technician:_____
Test Facility:_____ Start Date:_____

Take the following photographs prior to impact;
Note – Place a test vehicle ID placard in each view

__1 Frontal View of Test Vehicle

__2 Rear View of Test Vehicle

__3 Impacted Side View of Test Vehicle

CHECK SHEET NO. 18 (Continued)
Take Posttest Photographs and Video

__4 Frontal View of Impactor Face

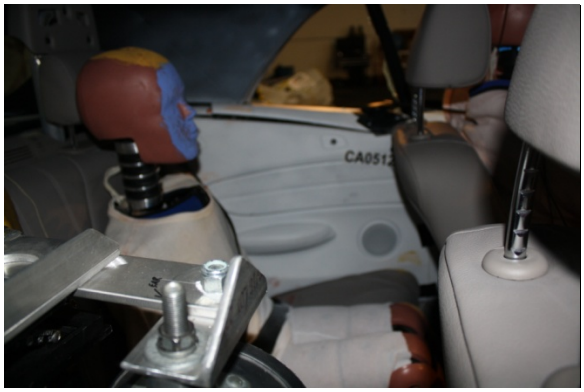
__5 Left Side View of Impactor Face

__6 Right Side of Impactor Face

CHECK SHEET NO. 18 (Continued)
Take Posttest Photographs and Video

__7 Top View of MDB Impactor Face

__8 Occupant Compartment View Showing Both SIDs



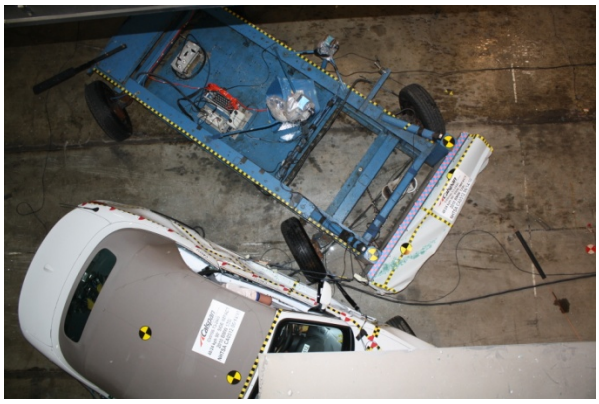
__9 Interior of Doors Showing SID Impact Locations

CHECK SHEET NO. 18 (Continued)

Take Posttest Photographs and Video

__10 Close up View of Impact Point Target

__11 Post test Overhead View of the MDB and Target Vehicle



_12 Speed Trap Indicators

CHECK SHEET NO. 18 (Continued)

Take Posttest Photographs and Video

Capture the following pan views using a real-time camera;

__1 **MDB**
__1.1 View of MDB and vehicle - front of vehicle
__1.2 View of MDB and vehicle - rear of vehicle
__1.3 View of MDB and vehicle - 1/4 front
__1.4 View of MDB and vehicle - 1/4 rear
__1.5 View of MDB and vehicle - parallel to impact door

__2 **VEHICLE**
__2.1 View of impact point - close-up
__2.2 View of impacted side (vehicle removed)
__2.3 View of front of car
__2.4 View of rear of car
__2.5 View of inside front door (dummy removed)
__2.6 View of inside rear door (dummy removed)
__2.7 View of rollover - 90°
__2.8 View of rollover - 180°
__2.9 View of rollover - 270°
__2.10 View of rollover - 360°

__3 **TEST DUMMIES**
__3.1 View of front ES-2re - parallel to impact door
__3.2 View of rear SID-IIs - parallel to impact door
__3.3 View of front ES-2re - thru opposite window
__3.4 View of rear SID-IIs - thru opposite window

_____ _____
Signature Completion Date