

Transmitted by
the expert from USA

Informal Document No. GRSP-42-38
(42nd GRSP, 11-14 December 2007,
agenda item 2(a).)

Pedestrian Safety GTR Leg Impact Testing

42nd Session of GRSP
December 2007

Overview

- ★ VRTC Lower Legform Testing
 - Vehicles tested
 - Results
 - Examples of good bumper performance

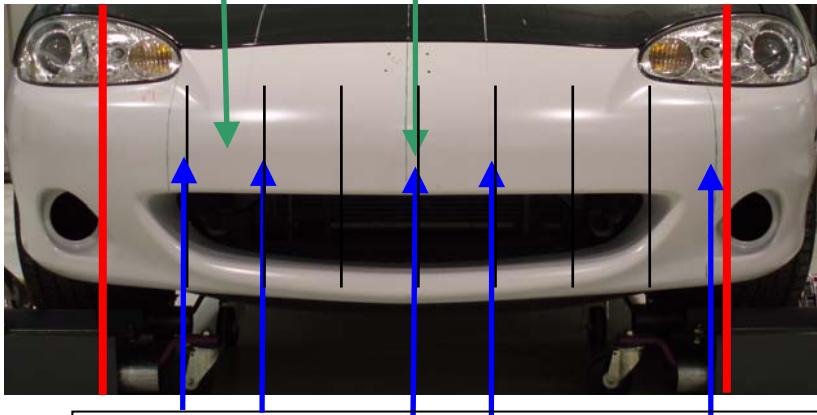
TRL Lower Leg Testing

VRTC EuroNCAP Testing (ESV 2005)

★ 5 North American passenger cars

- 2002 Mazda Miata
- 2000 Volvo S40
- 2001 Ford Focus
- 1999 VW Beetle
- 2001 Honda Civic

2 locations: support and center



5 locations

VRTC GTR Testing (2007)

★ 2 passenger cars

- 2002 Mazda Miata
- 2006 VW Passat

★ 3 SUVs

- 2005 Honda CR-V
- 2002 Jeep Wrangler
- 2006 Dodge Durango

★ 2 Pickup Trucks

- 2006 Toyota Tacoma
- 2005 Chevrolet Silverado

★ 1 Minivan

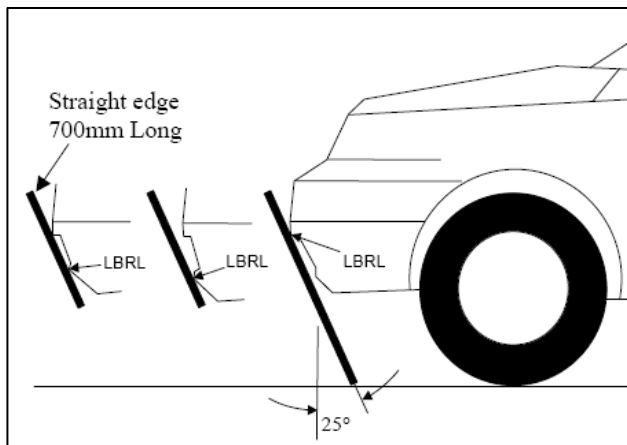
- 2006 Toyota Sienna

★ 1 Full-size van

- 2003 Ford E350 Van

Lower Bumper Reference Line (LBRL) Height Across Bumper Test Area

	SUVs			Pickup Trucks		Minivan	Van	Passenger cars	
	2006 Dodge Durango	2002 Jeep Wrangler	2005 Honda CRV	2005 Chevy Silverado	2006 Toyota Tacoma	2006 Toyota Sienna	2003 Ford E350 Van	2006 VW Passat	2002 Mazda Miata
LBRL Minimum Height (mm)	405	451	410	420	378	260	348	219	200
LBRL Max. Height (mm)	452	481	415	505	378	264	408	230	218



GTR Test Rules

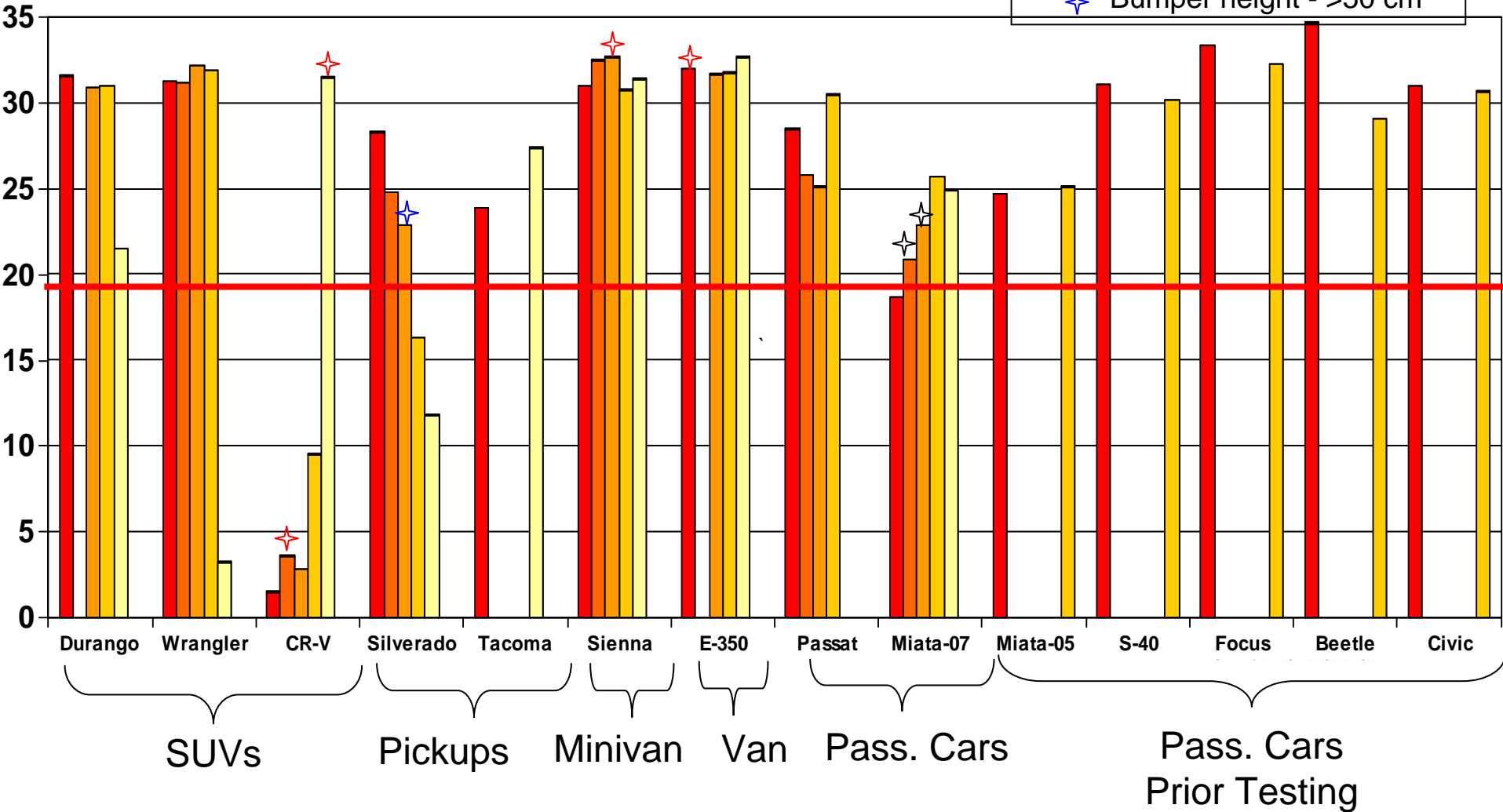
- LBRL < 425 mm** lower leg test required
- 425 mm ≤ LBRL < 500 mm** manufacturer's choice of lower or upper leg test
- LBRL ≥ 500 mm** upper leg test required

Bending Angle (degrees)

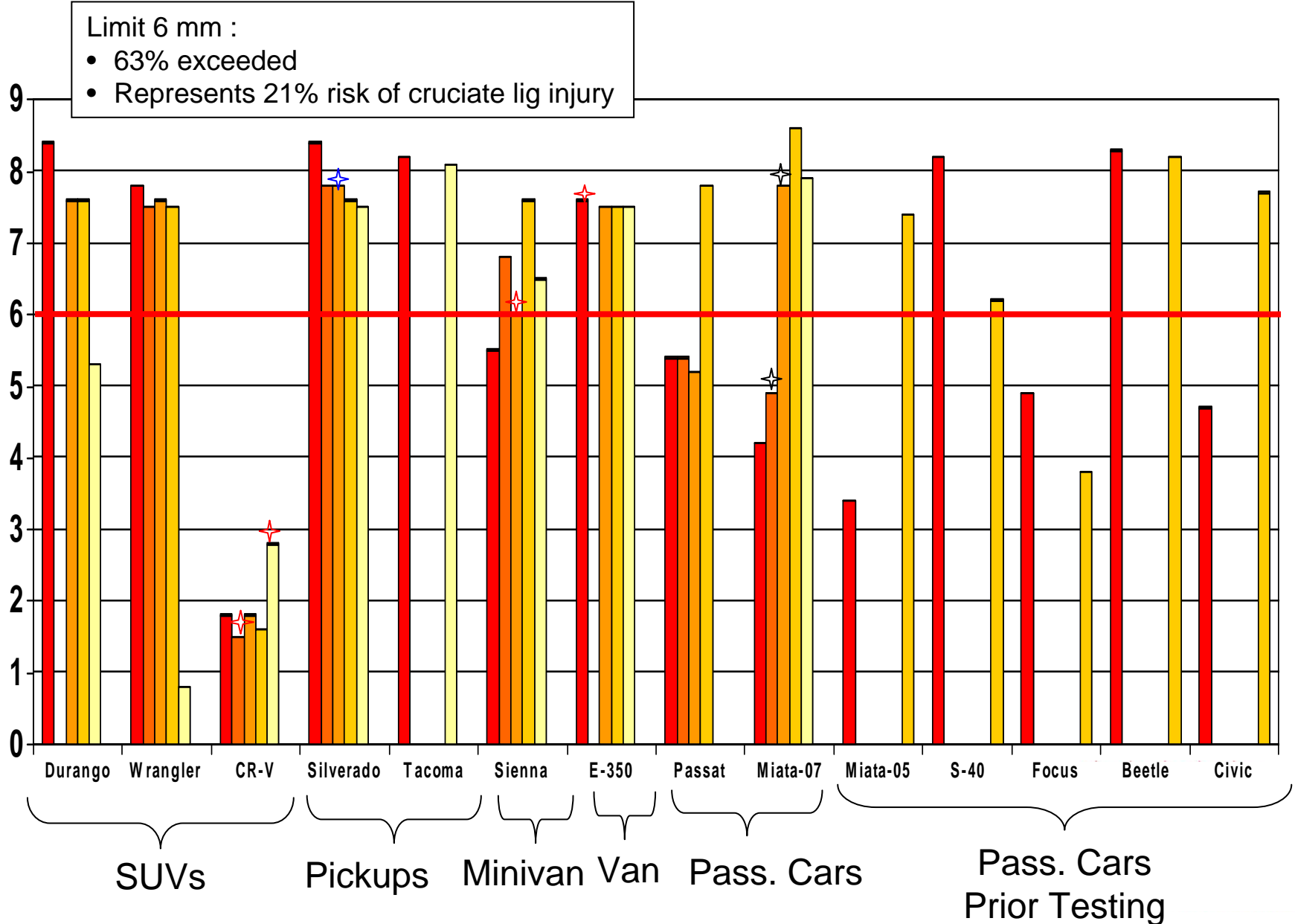
Limit 19 ° :

- 84% exceeded
- Represents 19% risk of collat. lig injury

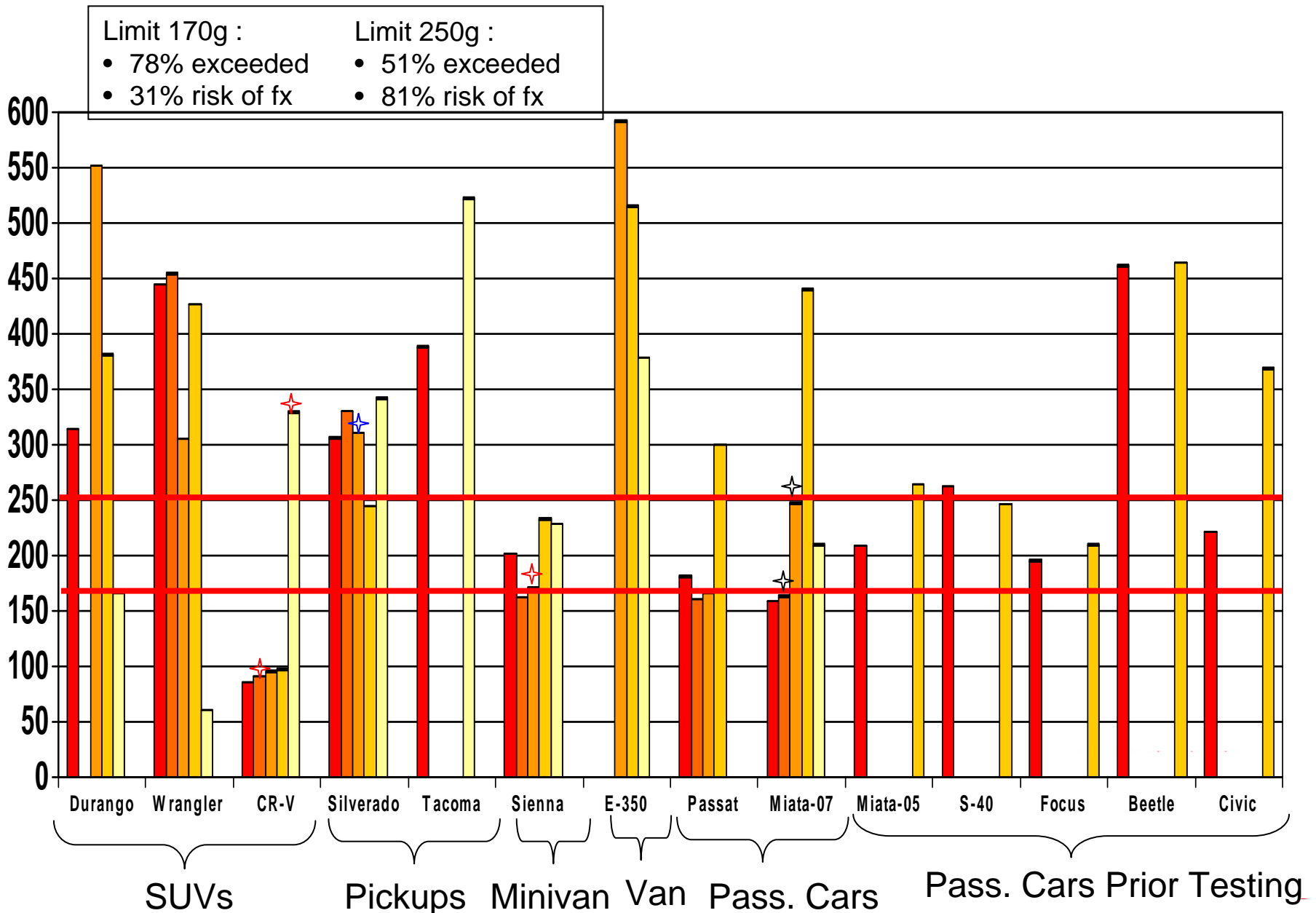
- ✦ Out of alignment limits
- ✦ Out of speed range
- ✦ Bumper height - >50 cm



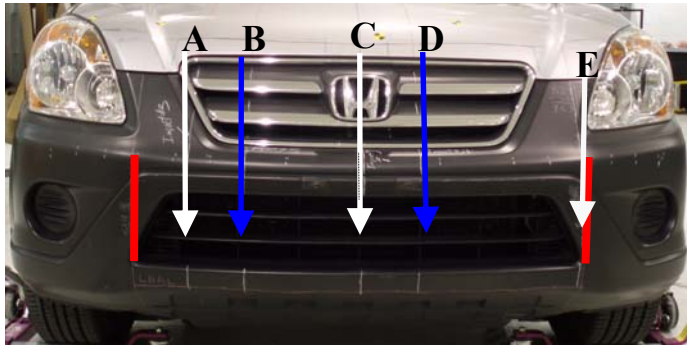
Shear Displacement (mm)



Tibia Acceleration (g)



2005 Honda CR-V – Passed 4/5



C (Pass)



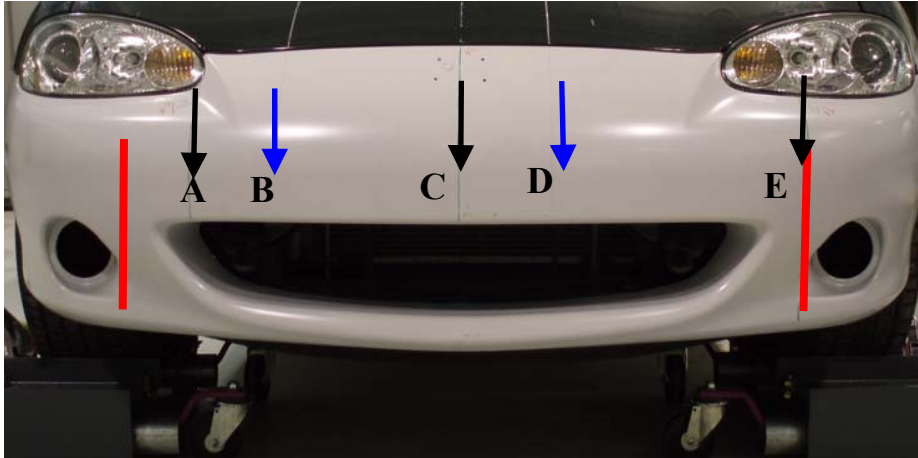
E (Fail)



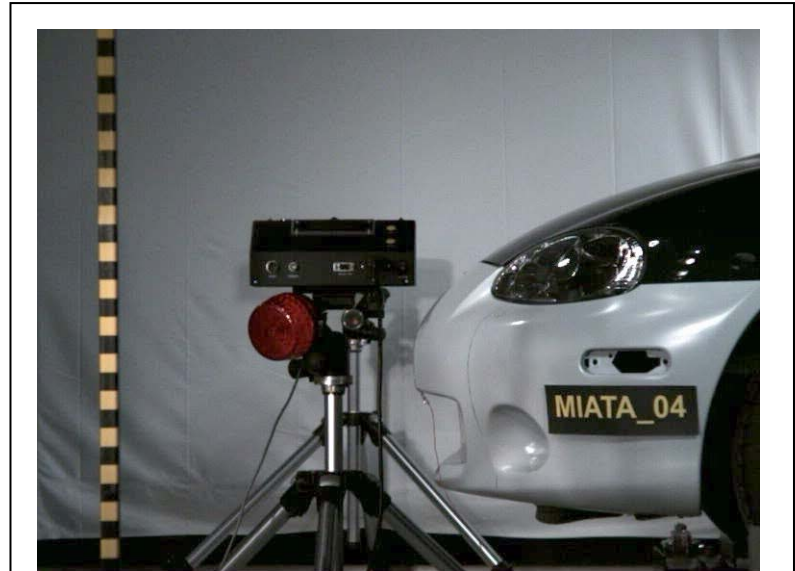
	A	B	C	D	E	Pass/ Fail
Peak bending angle (degrees)	9.5	2.8	1.5	3.6	31.5	19
Peak shear displacement (mm)	1.6	1.8	1.8	1.5	2.8	6
Peak tibia acceleration (g)	97	96	85	91	329	170/ 250



2002 Mazda Miata - Passed 1/5

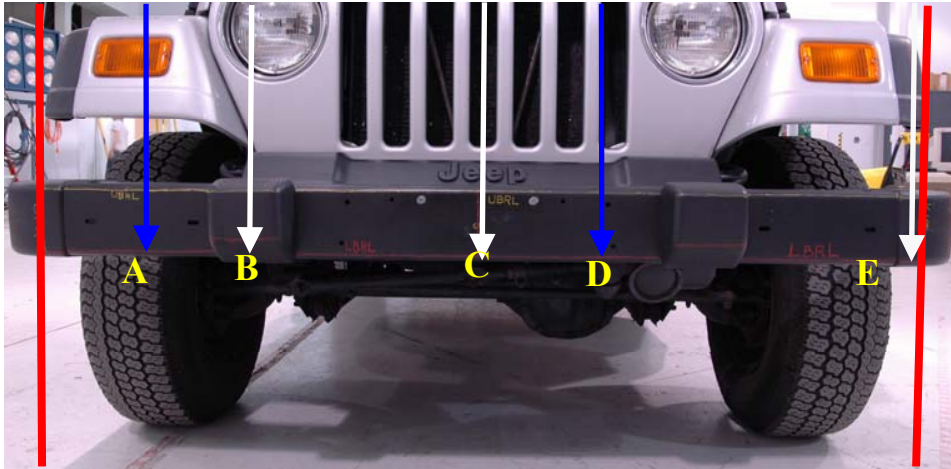


	A	B	C	D	E	Pass/ Fail
Bending angle (degrees)	25.7	22.9	18.7	20.9	24.9	19
Shear displacement (mm)	8.6	7.8	4.2	4.9	7.9	6
Tibia acceleration (g)	440	247	159	163	210	170/250



C (Pass)

2002 Jeep Wrangler - Passed 1/5



	A	B	C	D	E	Pass/ Fail
Bending angle (degrees)	31.9	32.2	31.3	31.2	3.2	19
Shear displacement (mm)	-7.5	-7.6	-7.8	-7.5	-0.75	6
Tibia acceleration (g)	427	305	445	455	60	170/250



E (Pass)

Summary

- ★ Lower leg test performance generally poor relative to GTR requirements
- ★ Energy-absorption and support above/below knee appear to be key for good performance.