

REPORT NUMBER: 5FEM-MGA-2001-025

35 MPH FRONTAL BARRIER IMPACT TEST

**Ford Motor Company
2001 Ford Windstar SE
NHTSA NUMBER: M10212**

**PREPARED BY:
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April 18, 2001

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590**

35 MPH FRONTAL BARRIER IMPACT TEST

Vehicle: 2001 Ford Windstar SE

NHTSA No.: M10212

Test Date: April 18, 2001

Test Speed: 56.3 kph

Vehicle Test Weight:

Weight as Delivered: = 1899.3 kg

Weight as Tested: = 2114.8 kg

Injury Criteria:

ATD Position	HIC	Clip (g's)	Chest Disp (mm)	Left Femur (N)	Right Femur (N)
Driver	113	30	19	1795	750
Passenger	382	35	16	2247	2044

**DATA SHEET NO. 8
HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2001/Ford/Windstar SE
Test Program: 35 mph Frontal Barrier Impact

NHTSA No.: M10212
Test Date: April 18, 2001

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	.5	195	-36.4	61	26.2	172	-62.8	87
Head CG	Y	G's	1.4	32	-11.2	62	9.8	81	-6.9	103
Head CG	Z	G's	16.8	99	-8.6	68	24.5	95	-.2	11
Head CG Resultant	N/A	G's	38.0	61			63.4	87		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	4.9	198	-29.6	96	5.4	173	-35.1	95
Chest CG	Y	G's	3.6	26	-5.4	24	1.7	181	-7.9	86
Chest CG	Z	G's	6.8	100	-18.1	69	3.2	181	-12.7	75
Chest CG Resultant	N/A	G's	30.3	96			35.8	95		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	469	37	-1795	49	304	32	-2247	53
Right Femur	Z	Newtons	750	46	-450	94	346	31	-2044	91

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	2410	98			1722	45		

HEAD INJURY CRITERIA (HIC₁₅)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary	113	35.5	58.5	73.5	382	57.9	75.8	90.8

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	29.8	94.3	97.4	35.4	93.9	97.0

NECK INJURY CRITERIA

Location	Driver	Passenger
N _{te}	0.2	0.4
N _{tf}	0.3	0.2
N _{ce}	0.0	0.0
N _{ct}	0.2	0.1

DATA SHEET NO. 8...(continued)
HYBRID III ATD INJURY CRITERIA AND SENSOR DATA

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PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	1.8	143	-31.9	49	1.7	133	-34.8	61
Pelvis	Y	G's	6.3	100	-4.1	75	4.1	93	-7.7	65
Pelvis	Z	G's	3.2	19	-23.7	59	2.9	200	-21.0	76

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	263	60	-263	114	47	178	-445	80
Neck Force	Y	Newtons	68.8	77	-167	60	63	17	-262	89
Neck Force	Z	Newtons	735	98	-105	146	1016	101	-173	16
Neck Moment	X	N•m	16.6	62	-5.8	89	6.5	168	-11.2	124
Neck Moment	Y	N•m	28.7	60	-11.6	39	11.1	175	-19.3	78
Neck Moment	Z	N•m	9.7	94	-4.8	152	4.8	106	-2.7	70

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	14.5	51	-62.4	36	2.7	71	-63.8	59
Left Foot Aft	Z	G's	22.8	49	13.0	78	16.1	69	-44.0	45
Left Foot Fore	Z	G's	43.5	40	-24.8	55	46.4	69	-102.5	57
Right Foot Aft	X	G's	3.8	19	-127.3	50	2.8	191	-55.1	35
Right Foot Aft	Z	G's	14.5	82	-67.3	52	8.8	69	-24.2	37
Right Foot Fore	Z	G's	103.6	50	-117.5	44	23.4	41	-80.7	33

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N•m	10.7	77	-7.0	53	6.3	60	-10.5	91
Left Lower Moment	Y	N•m	5.4	50	-30.6	35	11.7	91	-52.2	59
Left Lower Force	Z	Newtons	921	38	-58	149	1592	47	-121	64
Left Upper Moment	X	N•m	29.6	76	-12.7	162	17.3	75	-5.8	165
Left Upper Moment	Y	N•m	8.6	136	-48.9	38	13.3	133	-69.5	59
Left Upper Force	Z	Newtons	600	79	-52	143	1032	47	-234	64
Right Lower Moment	X	N•m	24.1	69	-19.6	51	2.7	153	-8.1	47
Right Lower Moment	Y	N•m	30.9	71	-20.2	52	16.1	39	-29.8	60
Right Lower Force	Z	Newtons	2396	51	-159	146	1301	38	-190	81
Right Upper Moment	X	N•m	13.7	69	-30.5	52	10.3	135	-23.7	52
Right Upper Moment	Y	N•m	14.4	130	-64.1	52	12.1	134	-50.8	60
Right Upper Force	Z	Newtons	1696	51	-135	33	926	47	-249	87

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CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			-19.0	99			-15.6	55

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	.6	14	-38.3	61	26.0	172	-61.7	87
Head CG	Y	G's	2.0	147	-11.5	62	10.7	81	-5.2	118
Head CG	Z	G's	17.1	101	-11.5	67	24.7	95	-.3	4
Head CG Resultant	N/A	G's	39.5	61			62.5	87		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	4.8	198	-29.3	96	5.5	173	-34.9	95
Chest CG	Y	G's	3.7	26	-5.6	24	1.7	180	-7.6	62
Chest CG	Z	G's	7.0	99	-17.9	69	3.5	41	-12.6	73
Chest CG Resultant	N/A	G's	30.3	74			35.7	94		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Redundant	112	35.4	58.4	73.4	377	57.6	76.0	91.0

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	29.7	72.6	75.7	35.4	93.7	96.8

